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Examination and Comparing of Technical, Allocative and Economic Efficiency of Date Producer in Baravat and Rostamabad Region from Bam Township, Iran

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Abstract
Bam province is one of the main regions for Mazafati date production in Iran country. According to limitation of date production factors in Bam province it is necessary to do a optimum management on production of this product and consumption of production inputs. Therefore it is necessary to calculate inefficiencies by calculate of efficiency of agriculture units of date producers in Bam province and be taken in consideration planning and making policy for production increasing. In this research Baravat region as the high-yield region and Rostamabad region as the low-yield region have selected. This research's information is about years of 2012 - 2013 that have obtained by interview and questioners. For calculating the efficiency of agriculture units from data envelopment analysis method is used. The average efficiencies of technical, allocative and economic of Baravat region respectively equal: 91.88, 40.03, 37.45 and the average efficiency of technical, allocative and economic of Rostamabad region respectively equal: 91, 36.5 and 33.8. The results show that efficiencies of management and scale of two regions are the same, but efficiencies of allocative and economic of Baravat region is more than Rostamabad region.
Keywords: Efficiency, date, orchard, Bam, Iran.

Introduction
Producing of date has a long history in Iran and now days also it is one of the important and high profit products in agriculture portions of this country. Each year date dedicate one of the most important agriculture portions of Iran to itself so that this country in the year of 2012 produced one million tones date accounting nearly for about 315478000 $ and around 13 percent of world date and in that year had the second ranking all over the world, FAO (2012). Mazafati's kind after Estameran and Shahani is the most important economic kind in Iran, Hashempour (2001). Bam province is one the most important region of date production in Iran by producing 90313 tons of date each year, SIAA[1] (2011). Optimum using of sources and enhancing the production in Bam orchard s is reliable by two methods in improving of available technology and increasing in agriculture units' efficiency. Changing in available technology face more limitation, but for better management of inputs and enhancing of products in a short time increasing of agriculture portions efficiency is a noticeable item. Therefore according to the limitation of date production factors specially water in Bam province its necessary to do an optimum management on production and using inputs, Dinani and Akbari (2005). So it is essential to calculate agriculture units' efficiency of date producer in Bam province to calculate the range of inefficiencies then pay attention to them for planning and policy making. In this study Baravat area and Rostamabad area from Bam have selected. According to presented statistic agriculture administration of Bam province from Baravat area with function around 9 tons per hectare in 2011 has a more revenue in compare to Rostamabad region with yield around 7 tons per hectare. In this study technical, allocative and economic efficiency of mentioned areas as high-yield and low- yield areas are compared and have been examined.

Materials and Methods
In this study Bam province is selected as one of the largest Mazafati date producer in Iran. Baravt and Rostamabad areas are selected as the important areas for date producing of Bam province. Then by using of Cochran formula in the years of 2012-2013 in Baravat region 75 questioners and in Rostamabad area 67 questioners and in total 142 questioners have been completed.

In this study data envelopment analysis (DEA) technique was used to estimate the technical, allocative and economic efficiency from orchard s of Mazafati Dates in Bam province. Also input oriented DEA model under the assumption of variable return to scale was used to estimate the technical efficiency in this study as, farmers in Bam have more control over inputs than outputs, and therefore, input oriented DEA model was used in the study. The variables used in

[1]Statistic of Iran Agriculture Administration

this study included Dates production (kg) (Y_1), land (ha) (X_1), irrigation (m^3) (X_2), machinery (hour) (X_3), animal fertilizer (ton) (X_4), NPK (kg) (X_5), pesticide (kg) (X_6), number of pollens (X_7), number of consumption rope (X_8), labor (number of man-days) (X_9) and their cost for economic efficiency.

Following Coelli et al. (1998), an input oriented variable Returns to Scale DEA model for estimation of technical efficiency was specified as:

$Min\ Y_0 = \theta$

St:

$\sum_{j=1}^{n} \lambda_j Y_{rj} \geq Y_{r0}$ (r=1, 2, 3… s)

$\theta X_{i0} - \sum_{j=1}^{n} \lambda_j X_{ij} \geq 0$ (i=1, 2, 3… m)

$\sum_{j=1}^{n} \lambda_j = 1$ (j=1, 2, 3… n)

$\lambda \geq 0$

λ is an $N \times 1$ vector of weights which defines the linear combination of the peers of ith orchard.

Also economic efficiency is the ratio of the minimum cost to the observed cost. Following Coelli et al. (1998), a cost minimization DEA model used to estimate minimum cost was specified as:

$Min\ C_0 = \sum_{i=1}^{m} W_{i0} X_{i0}^{*}$

St:

$\sum_{j=1}^{n} \lambda_j X_{ij} \leq X_{i0}^{*}$ (i=1, 2, 3… m)

$\sum_{j=1}^{n} \lambda_j Y_{rj} \geq Y_{r0}$ (r=1, 2, 3… s)

$\sum \lambda_j = 1$ (j=1, 2, 3… n)

$\lambda_j \geq 0$

Where

W_i Is a vector of input prices $W_{1i}, W_{2i}, \ldots, W_{9i}$ of inputs used on the ith orchard. N refers to total number of farms in the sample.

Economic efficiency was calculated by the ratio: Economic Efficiency = minimum cost / observed cost

Economic efficiency = $\frac{\sum_{i=1}^{m} W_{i0} X_{i0}^{*}}{\sum_{i=1}^{m} W_{i0} X_{i0}}$

Allocative efficiency was calculated by the ratio:

Allocative efficiency = Economic efficiency / Technical efficiency

Technical, allocative and economic efficiency scores in this study were estimated by using the computer software DEAP 2.1 developed by Coelli (1996).

Table 1. The range of frequency distribution of management and scale efficiencies of dates in Rostamabad and Baravat Bam

Region	Efficiency Level	Technical efficiency		Allocative Efficiency		Economic Efficiency	
		Frequency	Percent	Frequency	Percent	Frequency	Percent
Poshtrrod Rostamabad	0 – 10	0	0	11	16.4	12	17.9
	10.1 – 20	0	0	14	20.9	14	20.9
	20.1 – 30	0	0	5	7.5	11	16.4
	30.1 – 40	0	0	11	16.4	7	10.4
	40.1 – 50	1	1.5	8	11.9	7	10.4
	50.1 – 60	1	1.5	6	9	6	9
	60.1 – 70	6	9	4	6	3	4.5
	70.1 – 80	7	10.4	3	4.5	2	3
	80.1 – 90	5	7.5	0	0	0	0
	90.1 – 100	47	70.1	5	7.5	5	7.5
	Total	67	100	67	100	67	100
	Mean	91		36.5		33.8	
	Maximum	100		100		100	
	Minimum	46.7		4.2		3.9	
	Stdev	13.7		26.9		26.9	
Baravat	Efficiency Level	Frequency	Percent	Frequency	Percent	Frequency	Percent
	0 – 10	0	0	3	4	5	6.7
	10.1 – 20	0	0	13	17.3	14	18.7
	20.1 – 30	0	0	20	26.7	23	30.7
	30.1 – 40	0	0	11	14.7	7	9.3
	40.1 – 50	0	0	5	6.7	5	6.7
	50.1 – 60	2	2.7	7	9.3	5	6.7
	60.1 – 70	6	8	7	9.3	8	10.7
	70.1 – 80	6	8	2	2.7	2	2.7
	80.1 – 90	9	12	0	0	0	0
	90.1 – 100	52	69.3	7	9.3	6	8
	Total	75	100	75	100	75	100
	Mean	91.88		40.03		37.45	
	Maximum	100		100		100	
	Minimum	54.1		8.9		6.1	
	Stdev	12.5		25.47		25.65	

Results and Discussions

Technical, allocative and economic efficiency of sample orchards in Rostamabad and Baravat are presented in table 1.

It is evident from the results that the mean technical efficiency of the sample orchards in Rostamabad and Baravat respectively are 91 and 91.88, with minimum level of 46.7 and 54.1 and maximum level of 100 and 100. The mean allocative efficiency of the sample farms are estimated at 36.5 and 40.3, with a low of 4.2 and 8.9 and a high of 100 1nd 100. The mean economic efficiency of the sample orchards are 33.8 and 37.45, with minimum level of 3.9 and 6.1 and maximum level of 100 and 100. These results indicate that if sample farmers in Rostamabad and Baravat operated at full efficiency levels they could reduce respectively, on an average, input use by 9 and 8.12 percent and cost of inputs by about 63.5 and 59.7 percent without reducing the level of output, with existing technology.

As it observes in the table 1 in Rostamabad and Baravat respectively 70.1 and 69.3 per cent of date producers have technical efficiency around 90.1 to 100 per cent that this percentage indicate the high technical efficiency in these orchards and it is at the Result of high experience and proficiency of farmers date producers. Also respectively 73.1 and 69.4 per cent of Rostamabad and Baravat date producer in agriculture units have allocative efficiency under 50 percent. That these Percentage Indicate the low allocative efficiency in Rostamabad and Baravat date producer orchards. Average of range indicate that producer units have low allocative efficiency and giving the exciting technology and available conditions there is a potential possible to reduce production price and to make profitable product in both region. Also economic efficiency in both region Indicate us that range of economic efficiency is too low and there is potential possible in order to increase profit.

Comparing of technical, allocative and economic efficiency from agriculture units of date producer in Bravat and rostamabad region

At first to compare the efficiencies average of two areas mann – whitney test used. The results are presented below.

Table 2. The test of Mann-Whitney U of the efficiency of agricultural units in Rostaabad and Baravat from Bam

Efficiency	Region	Mean	Mann-Whitney U	Wilcoxon W	Z	Sig
Technical	Rostamabad	91	2478	4756	-0.162	0.87
	Baravat	91.88				
Allocative	Rostamabad	36.5	2260.5	4538.5	-1.03	0.303
	Baravat	40.03				
Economic	Rostamabad	33.8	2223	4501	-1.18	0.237
	Baravat	37.45				

About technical efficiencies we can explain that there is no difference among technical efficiencies of two regions and nearly two regions have the same efficiency. The reason is high experience of farmers in date production and management of agriculture units.

There is no significant difference in 5 per cent error among allocative efficiency of two regions. But usual survey of two areas averages indicate that Baravat region with average of 40.03 per cent have a higher allocative efficiency in compare to Rostamabad region with an average of 36.57 per cent. Because in Baravat region farmers have more herbivorous animal in compare to Rostamabad region and they pay Lower cost for animal fertilizer. In addition in this region more family labor is used in compare to Rostamabad region and they have paid lower cost for human labor. There is a subterranean canal in Baravat region so they pay a little for water in compare to Rostamabad that use electromotor. Consequently it can explain that Baravat region has lower production cost in compare to Poshrtrod Rostaabad region and at result has higher allocative efficiency in compare to Rostamabad. But should pay attention that both of two regions have low allocative efficiency.

According to the result of the table it can explain that there is not a lot difference among average of economic efficiency of two Baravat and Rostamabad region in 5 per cent error, but by comparing the rate of average of efficiency among two region we get result that Baravat region with average of efficiency around 37.45 per cent has more average of economic efficiency in compare to Rostamabad region with average of economic efficiency around 33.8 per cent. Because Baravat region has lower cost of production in compare to Rostamabad so it has more profit and consequently has higher economic efficiency in compare to Rostamabad region.

Conclusions and Suggestions

According to achieved technical efficiency the amount of Baravat and Rostamabad regions of Bam province it observes that enhancing in production is reliable, so suitable and on time distribution of inputs such as fertilizer and poisons of gradually guidance in this field will increase the efficiency.

According to lake of water in mentioned region and critical situation of underground waters it suggest that management of water of area in province do maneuvers in order of decreasing water and suitable distribution among farmers so by these activities besides of acting base on principle of Sustainability of underground waters, they can help to become more efficient in production producers. In addition under crop areas including watering canals, delicate measurement means and encourages investigators to investigate water resources in these regions which cause the enhancing economic value and optimum consumption of water.

A lot Consumption of labor in the palms groves of Bam indicate that date production has become a usual activity for most of producers and there is a limitation employment opportunity in agriculture and non-agriculture activities in these regions. Development and expanding of industries dependent on date production cause that congestion of labor working decrease and improve in Productivity of date production.

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Better Cotton Initiative Approach for Sustainable Cotton Production: A Case Study of Turkey

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Abstract
Cotton cultivation often puts stress on the planet's natural resources and undermines the long-term sustainability of the sector. Helping farmers to grow cotton through a process that reduces stress on the local environment, improves the livelihoods and welfare of the farming communities, Better Cotton Initiative aims to create a long term change. It is a global approach that provides a solution for the mainstream cotton industry, including both smallholders and the large scale farmers. The BCI aims to carry out global cotton production better for the people who produce it, better for the environment it grows in and the sector's future. BCI Retailers and Brand members have represented almost 10% of the world's total cotton consumption at the end of 2013. There were 239.000 farmers producing 'better cotton', 754.000 hectares under 'better cotton production', which produced a total of 750.000 MT of better cotton lint in 2013. Even though Better cotton supply is increasing worldwide, there is less information related to BCI. This paper aims an introduction to the Better Cotton approach, its evolution process, where it is going, and a brief description on BCI's agronomic and economic result indicators by some countries. In addition, an assessment has made for Turkey which is one of the Better Cotton producing countries in the world.
Keywords: Better Cotton, sustainable cotton, Turkey

Introduction
Global cotton production comes increasingly from low-wage areas of the developing countries as China, India, Africa, Bangladesh and Latin America. However, enduring the threefold challenge of economic, social and environmental issues, cotton production is often implicated as unsustainable (Schueneman, 2014). While many farmers have already been producing cotton in responsible ways; soil erosion, water depletion, oppressive or unsafe working conditions, and decreasing biodiversity continue to be the challenges in many cotton growing regions in the world. Many cotton farmers suffer from low incomes, lack of affordable finance and often have difficulty overcoming financial barriers (BCI, 2013a). These pose serious threats to the sustainability of the industry as a whole (Anonymous, 2013). According to the Sustainable Trade Initiative (IDH), the cotton industry accounts for about 10% of all agricultural chemicals used worldwide. Irrigation supports 70% of global cotton production and 15% to 35% of those water withdrawals are considered unsustainable according to estimations of the Environmental Justice Foundation (Schueneman, 2014).

In addition to the need for an environmental-friendly industrial and agricultural system, increasing awareness of depleting natural resources and their consequences are influencing consumer lifestyle choices and consumption patterns. These trends have led to greater support for sustainable cotton production (WWF, 2010). A Sustainable Cotton Supply Chain does not finish at the farm gate, includes good working practices and efficient use of inputs and resources, by gins, spinning mills, garment manufacturers right through to the retailers, and also includes contract sanctity throughout the supply chain from field to retailer (Esteve, 2010). Various global initiatives have been developed for increasing 'sustainable' cotton production. In the cotton sector, four major initiatives are organic cotton, Fairtrade cotton, Cotton made in Africa, and the Better Cotton Initiative. While OC focuses mainly on the farming system and environmental sustainability, FT, CmiA and BCI focus on tackling rural poverty (ICAC, 2011). Sustainability standards for cotton are relatively new and have only played a role on the market for a few years. Due to the environmental damage caused, coupled with issues of high costs and low incomes for the farmers, the demand for organic and fair trade cotton has grown rapidly. Nevertheless, the organic cotton market is predicted to stay relatively small. There is a need for initiatives that aim for mass market transformation that makes sustainable cotton the norm. An initiative that focuses on making sustainable cotton production the mainstream standard is the Better Cotton Initiative (IDH, 2014).

Even though Better Cotton supply is increasing worldwide, there is less information related to BCI. This paper provides an introduction to the Better Cotton approach, how it has evolved,

where it is going, and a brief description on BCI's agronomic and economic result indicators by some countries. In addition to, an assessment was made for Turkey which is one of the Better Cotton producing countries in the world.

Material and Methods

This study examines the BCI in two stages; macro and micro level. For the macro level, the data is used from relevant studies in the literature. Sources included materials such as articles, research and statistics from a number of relevant sources. Data for the micro level is obtained from the BCI datasets. The BCI datasets are used as a baseline for measuring the impacts of the BCI on key agronomic (such as input use-e.g. fertiliser, pesticide and water use-and productivity) and economic result indicators (profitability). The results presented in this paper are weighted national averages of farm-level results, comparing the averages of BCI Farmers to those of Comparison Farmers. Comparison Farmers present similar socio-economic characteristics as BCI Farmers.

Results

Overview of Better Cotton Initiative (BCI)

The long-term objectives of BCI are to demonstrate the inherent benefits of Better Cotton production, particularly the financial profitability for farmers, to reduce the impact of water and pesticide use on human and environmental health, to improve soil health and biodiversity; to promote Decent Work for farming communities and cotton farm workers, to facilitate global knowledge exchange on more sustainable cotton production and to increase the traceability along the cotton supply chain (ICAC, 2011). BCI works through identified 'Implementing Partners' (IP). IPs are International NGOs, national level NGO, supply chain actors, Government organizations etc. IPs train and provide support to farmer groups to produce Better Cotton. BCI facilitates connecting Better Cotton supply with demand (BCI, 2013b). BCI does not set a premium and pricing is a function of the market (BCI, 2012). Rather, the focus is on reducing costs at farm level (and therefore increasing farmers' profits) through better management practices and reduced input use. BCI is not a labeling scheme, but it does involve some third party monitoring and verification (ICAC, 2011).

Better Cotton supply chain

In July 2013, BCI introduced the new Chain of Custody (CoC) system that covers the whole supply chain to enable retailers to make claims with confidence and to inform all supply chain actors about their role in tracing Better Cotton throughout the supply chain. Two distinct CoC mechanisms used are from farm to gin level and after gin level (Figure 1). The CoC mechanism employed at farm and gin level is segregation. This means that the farmers and ginners need to store, transport and process Better Cotton (seed cotton and lint cotton bales) separately from conventional cotton. The CoC mechanism employed after gin level is an administrative Mass-Balance (MBa) system, which allows for Better Cotton to be substituted with conventional cotton, and ensures that the quantity of Better Cotton purchased with a Better Cotton claim is equal to the quantity of cotton sold with a Better Cotton claim (BCI, 2014). In a MBa system, not the physical sustainable product itself, but the volumes of sustainable product is tracked. The Better Cotton Tracer ensures for example that a trader cannot sell more Better Cotton to yarn spinners or other traders than he himself has acquired from Better Cotton ginners or traders. At the end, a retailer can trace the BCCUs (Better Cotton Claim Unit) back to the yarn spinner that issued them, by using the Better Cotton Tracer (ChainPoint, 2014).

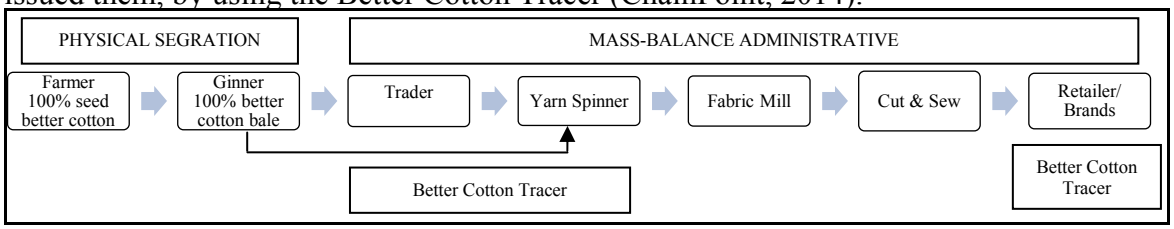

Figure 1. Supply chain for Better Cotton (Saral, 2014).

Better Cotton production in the World

According to BCI 2013 Harvest Report, 78% (238888) of farmers who took part in training in BCI projects went on to receive a Better Cotton (BC) license. The area under BC cultivation in 2013 is 754.237 hectares. Approximately 750.000 MT lint BC was harvested in 8 countries worldwide. 3.7% of all the cotton produced globally was BC in 2013. Projects in Brazil, India and Pakistan accounted for 85% of BC production, while volumes in China, Mali, Turkey, Tajikistan, and Mozambique accounted for the remaining 15% (Table 1).

Table 1. Number of BC farmers, area under BC cultivation and BC production by countries - 2013

	Brazil[1]	India[1]	Pakistan[1]	China[1]	Mali[1]	Tajikis-tan[1]	Turkey[2]	Mozam-bique[1]	Total
Number of BC farmers	130	146000	46500	6000	33000	680	278	6300	238888
Area under BC cultivation (ha)	188000	236000	193000	27000	86000	11000	7237	6000	754237
BC production (MT lint)	321000	160000	157000	53000	35000	10000	9200	1300	746500

Source: 1.BCI, 2013c; 2. IPUD, 2014.

Better Cotton production studies in Turkey

In 2011, leading actors in the Turkish Cotton Sector approached BCI with the aim of starting production of Better Cotton in Turkey. Turkey became a part of the BCI in 2013. As one of BCI's strategic partners, 'Good Cotton Practices Association' (IPUD) is responsible for the implementation of Better Cotton Standard System and the production of Better Cotton in Turkey. IPUD has also focused on creating Better Cotton supply and demand in Turkey. BCI's Implementing Partner worked with 310 farmers organized into 7 Producer Units in 2013. Nearly all participating farmers fall into BCI's medium farm category: farms of between 20 and 200 hectares (BCI, 2013c). 278 farmers in Turkey had a Better Cotton license. For the 2013 harvest season, 9.200 tons of lint cotton was licensed to be produced by 278 farmers, on 7.237 hectares of cotton producing fields (Table 1). In 2014, there are Better Cotton projects in 10 provinces in Turkey. Aydin, Izmir, Manisa, Denizli, Adana, Gaziantep, Kahramanmaras, Hatay, Sanliurfa and Sirnak provinces in the country have planned to cultivate about 14.000 hectares of land. According to the IPUD Annual Report, IPUD has set the target of producing 27.000 tons of cotton for the 2014 harvest period under the standards of the BCI. The total crop of 27.000 tons represents an increase of 193% compared to the 9.200 tons produced in the previous season.

BCI's agronomic and economic result indicators by Turkey and some countries

When considering the agronomic and economic results of the projects in Turkey and the selected countries, it is seen that the licensed Better Cotton farmers significantly differ from the comparable farmers in almost all agronomic and economic indicators (Table 2). These results show consistently positive trends. BCI farmers have used, on average, less pesticide, less synthetic fertilizer and less water for irrigation per hectare than comparison farmers. Better cotton licensed farmers, however, do have significantly higher yield and higher use of organic fertiliser than the comparison farmers, with the exception of Turkey. Turkish BCI Farmers have slightly higher profitability than the comparison farmers compared with other better cotton producing countries. According to the IPUD, increased costs of diesel fuel (11%) used to run farm machinery and irrigation systems, and fertilizers (9%) in the last year had an adverse effect on farmer profitability in general. Pesticide costs have also increased between 1% and 2%. It should be noted that the data used for the baseline assessment for Turkey are from the first harvest season in 2013. It should be reconstructed the true baseline situation based on data collected after the next harvest seasons.

Table 2. Differences as percentage between BCI farmers and comparison farmers in Turkey and some countries by BCI's agronomic and economic indicators

Countries	Yield	Pesticide use	Synthetic fertiliser use	Organic fertiliser use	Water use	Profit
Turkey	1⇩	9⇩	18⇩	na	na	2⇧
India	18⇧	22 ⇩	28⇩	22⇧	14⇩	44⇧
Pakistan	15⇧	24⇩	17⇩	85⇧	14⇩	42⇧
China	11⇧	10⇩	1⇩	42⇧	23⇩	37⇧
Mali	8⇧	55⇩	2⇩	46⇧	na	14⇧

Source: BCI.2013c. The Better Cotton Initiative 2013 Harvest Report.

Discussion and Conclusion

According to the agronomic and economic results of the BCI projects in Turkey and the other countries, BCI looks like a positive solution to all the challenges of economic, social and environmental issues caused by conventional cotton cultivation. In general high production costs and competition from other crops are having an adverse effect on cotton production Turkey. So, the area under cotton has seen a significant decrease. Taking 2003 as a base (637.329 ha), the area under cotton in Turkey showed a decrease of approximately 30% in 2013 (450.890 ha) (TurkStat, 2013). As a result of a continued decline in harvested cotton area, the production of cotton fibre, which was 918.000 tons in 2003 (AEPDI, 2005), also fell by 45% to 500.000 tons in 2013 (USDA, 2014). Additionally, Turkey is a net cotton importer for years due to the large textile industrial capacity and low domestic cotton production. For that reason, Better Cotton is a good opportunity to improve the situation of cotton producers and increase cotton production in Turkey.

Turkish textile manufacturers are forced to take Better Cotton by large textile brands. However, better cotton production in Turkey is limited. So, cotton has been supplied from Africa, India and Pakistan by Turkish cotton textile companies. But, Turkey has not a comparative advantage in cotton production compared to countries like India, Pakistan. Because the Turkish government does not currently permit planting of Genetically Modified (GM) cotton. For instance, among farmers in India, GM cotton is popular because it raises their yields. The area under GM cotton in India rose from 66% in 2007–8 to over 90% in 2010–11. India is now the country with highest area under GM cotton cultivation. China and Pakistan are also converting to GM seeds. GM cotton is currently grown on 25 million hectares around the world, mostly in India, China, Pakistan and the US (CBAN, 2013). Policy initiatives are required in terms of competitive advantage and it is crucial that "better management practices" are integrated in Turkey's overall cotton production.

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Effect of Domestic Policies on Market Integration for Fertilizer in Ethiopia

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Abstract
Several policy shifts occurred on fertilizer markets in Ethiopia. The last one was the introduction of a monopoly on each stage of the supply chain in 2008, alongside with government credit and stockholding programmes. In order to assess the effect of these policies on the integration of domestic markets with world markets, this paper uses dynamic regression models. Time series data of DAP and urea prices on world, import and retail markets between 1971 and 2012 are used. The results show high transmission from world market to import prices for both DAP and urea. However, between import and retail prices, while for DAP full price transmission is concluded, for urea there is no evidence of cointegration. This result can be traced back to the policies in place on the fertilizer markets. Whereas for DAP these policies ensure the efficient distribution to farmers, for urea, they lead to large stocks that act as a buffer between import and retail prices. Therefore, the study suggests to reduce the stocks, especially for urea. Additionally, the demand estimation process needs to be revised.
Keywords: Price transmission, vector error correction models, fertilizer, agricultural trade policy, Ethiopia.

Introduction
Low agricultural productivity is a major development challenge in Ethiopia (Abebaw and Haile, 2013). Although a number of measures is required to enhance agricultural productivity, a great potential lies in increasing fertilizer use in the country (Zerfu et al., 2010). Being cognizant of this, the Ethiopian federal government (FGov) implemented several policies on fertilizer markets. After the introduction of fertilizer in the country in 1967, a state monopoly prevailed until 1991 (Matsumoto et al., 2011). The following years witnessed private dealers and cooperatives entering the market (Spielman et al., 2010). However, in 2008, the FGov decided to coordinate all fertilizer import through only one company in order to take advantage of economies of scale through bulk purchase (WB, 2011). Thus, one importer has to be selected every year. However, since the introduction of the policy, only the Agricultural Inputs Supply Enterprise (AISE), a government company has been awarded the position. The arrangement left the cooperatives with the role of fertilizer distribution (IFPRI, 2012).

Two types of fertilizer are mostly used in Ethiopia: diammonium phosphate (DAP) and urea. They are entirely imported to the country. However, fertilizer prices in Ethiopia are two to threefold prices on world markets (Gregory et al., 2006). To have a better understanding of the determinants of this high price gap, we conduct a price transmission analysis. Although there are several market integration studies on food and cash crops in Ethiopia, the literature screening showed that there is a knowledge gap regarding agricultural inputs. Thus, this study contributes to the existing literature by focusing on fertilizer in Ethiopia. First we analyse the supply chain of fertilizer and then investigate the intensity of price transmission from world markets to domestic prices in Ethiopia. Next, we ask how domestic policies implemented on the fertilizer markets affect integration with world markets.

Data and Methods
Data
The time series used for the analysis emanate from the annual prices of world, import and retail markets from 1971 to 2012. Annual prices were considered because the structure of the fertilizer markets is such that the retail price is fixed by the Ethiopian Ministry of Agriculture (MoA) once for a year. World market prices were collected from the World Bank commodity price database. We took as import price, the cost insurance and freight (c.i.f.) price, which is the price after the delivery of fertilizer to central warehouses in Ethiopia. Time series of retail prices

were collected from the MoA and the AISE. For the price transmission analysis, all the time series were logarithmised and all prices were converted to US dollar per metric ton.

Methods

We used dynamic regression models as they allow for the time lag inherent to transporting goods, which is important for our analysis since fertilizer supplies are purchased on world markets and shipped to Ethiopia through the port of Djibouti. The analysis consisted of four main tasks. First, the Augmented Dickey-Fuller (ADF) test is used to check whether individual price times series are non-stationary and integrated of order one. Second, the Johansen-Trace test checks for the presence of a long-run equilibrium between pairs of time series. Third, the Granger causality test is used to identify the lead-lag relationships between two markets. This test informs about the direction of price transmission, while the VECM is needed to inform on the intensity of price transmission. The different tests were performed with JMulTi 4.24 software. A constant was added to the regression, as prices usually do not fluctuate around zero mean. A time trend was also included when there is evidence of significance. The appropriate number of lags was chosen according to Hannan-Quinn criterion. The critical value for all tests performed was chosen at the 5% significance level.

Results

Description of the fertilizer marketing chain in Ethiopia

There are three main stages along the supply chain of fertilizer in Ethiopia: the import planning, the import execution, and the marketing and distribution. The import planning consists in assessing the demand before the procurement. It is a bottom up approach through which farmers' demand is progressively aggregated at district, zone, region and national levels. However, in practice, many manipulations occur in the process. Often, production targets and assumptions over fertilizer application rates are used to estimate the fertilizer demand. Import execution is implemented by the sole importer (AISE). It invites international suppliers through a competitive tendering process. Winning suppliers are selected by an interdepartmental committee and deliver the fertilizer to Djibouti port. From the port, AISE transports the supplies to central warehouses located along the main roads in Ethiopia. Then, the cooperative unions (CU) take the quotas allocated to them by the MoA and the Bureaus of Agriculture (BoA). Thus, the CUs in conjunction with the BoAs deliver the fertilizer quotas to primary cooperatives (PC), which make the fertilizer available to farmers. The retail price of fertilizer is in fact a weighted average of the price of the new supply and the price of the old stock. Moreover, the marketing margins for AISE, CUs and PCs are set by the MoA.

Price transmission analysis for fertilizer products in Ethiopia

Price transmission analysis for DAP

The ADF test shows that time series of world, import and retail prices for DAP are all non-stationary and integrated of order one. The Johansen trace test suggests that all pairs of time series share one cointegration relationship. Granger causality test points out a unidirectional lead-lag relation from import to retail price and from import to world market price, as well as an overall unidirectional lead-lag relation from world market to retail prices.

Between world market and import prices, the VECM results (Table 1) suggest incomplete price transmission from world to import price. Only $\propto^B$ is significantly different from zero, suggesting that the world market price reacts to deviations in the long-run. The value of β_0 indicates the presence of a long-run margin. Assuming a world market price of 100 USD/MT, this would cause an import price of 151 USD/MT ($e^{0.97} * (100)^{0.88} = 151$). Between import and retail prices, full price transmission is concluded. $\propto^A$ being significantly different from zero implies that only the retail price of DAP reacts to changes in the long-run. The value of β_0 implies a long-run margin between import and retail prices of 34% of the import price. The overall transmission from world market to retail prices is also complete. $\propto^A$ is significantly

different from zero implying that the retail price of DAP reacts to deviations in the long-run. The value of β_0 implies a long-run margin of 88% of the world market price.

Table 1. Restricted VECM coefficients for DAP prices, 1985-2012

Pairs of time series data	Number of lags	Adjustment coefficients		Transmission elasticity	Long-run margin
		$\propto^A$	$\propto^B$	β_1	β_0
Import and world market prices	2	- 0.69	1.12*	0.88	0.97
Retail and import prices	6	- 0.49*	- 1.27	1.00	0.29
Retail and world market prices	1	- 0.21*	0.00	1.00	0.63

* H_0 rejected at 5% significance.

Price transmission analysis for urea

The results of the ADF test show that all the time series of urea prices are non-stationary and integrated of order one.The results of the Johansen-Trace test for pairs of time series of urea prices show that world market and import prices on one hand and world market and retail prices on the other hand are cointegrated with one relationship. However, no evidence for a cointegration between import and retail prices was found. Therefore, this market pair has to be excluded from further analysis. The results of Granger causality tests show that the import price leads the world market price, which leads the retail prices.

The results of the VECM (Table 2) reject the null hypothesis of full price transmission from world market to import prices. Only $\propto^B$ is significantly different from zero, implying that world market price reacts to deviations in the long-run. The value of β_0 suggests the presence of a long run margin. Assuming a world market price of 100 USD/MT, this would cause an import price of 135 USD/MT. Moreover, the hypothesis of full price transmission from world to retail price has to be rejected. Nonetheless, $\propto^A$ is significantly different from zero, suggesting that the retail price reacts to changes in the long-run. Assuming a world market price of 100 USD/MT, the value of β_0 suggests a retail price of 296 USD/MT.

Table 2. Restricted VECM coefficients for urea prices, 1985-2012

Pairs of series	Number of lags	Adjustment coefficients		Transmission elasticity	Long-run margin
		$\propto^A$	$\propto^B$	β_1	β_0
Import and world market prices	6	0.00	2.25*	1.18	- 0.53
Retail and world market prices	4	-0.50*	0.00	0.28	4.40

* H_0 rejected at 5% significance.

Discussion

For DAP, the Granger causality test shows that the world market price is led by the import price. This result is the opposite of what one would expect since Ethiopia as a player on the world markets of fertilizer is too small to influence the world market prices. However, the results could be interpreted in light of the structure of fertilizer markets in Ethiopia. Indeed, the import price reflects international suppliers' expectations about future world market prices. When bidding prices in response to the tenders floated usually in August by the AISE, the international suppliers try to anticipate prices that would prevail at the delivery time in January-February of next year. Thus, it seems that the world market price follows the import price, but actually it is the reverse being anticipated. This anticipation mechanism could also explain the rejection of the null hypothesis of full price transmission from world market to import prices, as the expectations do not completely match the real price development.

The result of Granger causality test between import and retail prices is in line with expectations and shows that import price leads the retail price. The estimated VECM indicates full price transmission from import to retail prices. Thus, the domestic policies do not hinder the cointegration on domestic DAP markets. Finally, it is observed that the world market price leads the retail price, as expected. The VECM results reveal a full price transmission from world

market to retail prices. Then, one can conclude a good overall integration of domestic markets with world markets for DAP.

For urea, between import and retail prices, the Johansen-Trace test shows no evidence of cointegration. This result could be interpreted by the fertilizer demand process and the farmers' demand for urea. In fact, the demand estimation process has often overestimated demand for urea. Indeed, for farmers, the application of urea is optional as most of their soils are sufficient in nitrogen. Thus, most of them do not buy it, what leads to large left-over stocks of urea. These stocks strongly influence the retail price for urea since this price is a weighted average of the price of the old stock and the price of the new supply. As a result, there is a fluctuating price margin associated with the stocks that keeps the retail price disconnected from the import price.

The Granger causality test between world market and import prices shows that the import price leads the world market price. Likewise for DAP, this result could be interpreted by the anticipation of future prices on world markets by the international suppliers. The transmission elasticity is 118%, which means that a price change on the international market is amplified domestically. The Granger causality test shows that the world market price leads the retail price. The hypothesis of full price transmission is rejected. The large stocks of urea, which keep the retail price disconnected from the import price also explain the absence of full price transmission from the world market to retail prices.

Conclusion

This study shows that the supply chain of fertilizer is highly regulated. Our findings indicate high transmission from world to import prices for both DAP and urea. This result suggests that the overall procurement system of fertilizer in Ethiopia is competitive and that the domestic markets on the import side are well integrated with the world markets. However, between import and retail prices, the results suggest a mixed picture. While, for DAP perfect price transmission from import to retail price is observed, there is no evidence of cointegration between import and retail prices for urea. This is an example of contrasting outcomes from the implementation of the same policy on different products. In fact, whereas the estimated demand often matches the actual demand for DAP and the administration of the entire chain ensures the efficient distribution of DAP to farmers, that is not the case for urea. As far as urea is concerned, the mismatch between the estimated and the actual demand has resulted over years in large stocks, which are kept in place by the rigid administration of the chain. As a result, the storage costs of the stocks are translated into the retail price of urea the next year and this keeps the retail price disconnected from the newly imported urea price. In light of these results, the demand estimation process needs to be improved by enhancing the transmission of farmers' actual demand to the Ministry of Agriculture, where national demand is aggregated, while improving transparency along the process. Second, the stockholding programmes need to be revised in order to reduce the stocks, especially for urea.

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An Ecological Footprint Analysis and the Sustainability of Turkish Agriculture

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Abstract
Natural resources have begun to use in an extreme way because of unplanned growth of population. Contrary to popular belief, natural resources are not infinite. In fact, many resources are on the verge of extinction. As a result of excessive and irresponsible use of available resources, natural resources are become unavailable, and some even began to run out. In today's world, many countries have reached their ecological limits. The Ecological Footprint is a resource accounting tool that helps countries understand their ecological balance sheet and gives them the data necessary to manage their resources and secure their future. To protect the future of humanity the countries should know their ecological capacity and response to questions such as how we use natural resources and how we should use, which is important to calculate their ecological footprint. The aim of this study is to review Turkey's ecological footprint reports, interpret the data and compare with other countries, as well as by making various calculations with integrated data, to advance proposals for improving the current situation. In doing so, by revealing the role and importance of agriculture in ecological footprint, the various assessments have been made for sustainability of agriculture.
Keywords: Ecological Footprint, agricultural sustainability, assessment, Turkey.

Introduction
Growing population needs more food and resource to sustain their life. This will cause unconscious usage of natural resources. In that point, we have to know about our ecological footprint for the sustainability of our natural resources.

Human activities consume resources and produce waste, while the populations grow and global consumption increases, it is essential that nature's capacity has to be measured to meet these demands. The Ecological Footprint has emerged as one of the world's leading measures of human demand on nature. Simply put, Ecological Footprint Accounting addresses whether the planet is large enough to keep up the demands of humanity (Global Footprint Network, 2014).

The Ecological Footprint represents the productive area required to provide the renewable resources which humanity is using and to absorb their waste. The productive area currently occupied by human infrastructure is also included in this calculation, since built-up land is not available for resource regeneration. It now takes the Earth one year and six months to regenerate what we use in a year. By measuring the Footprint of a population—an individual, city, business, nation, or all of humanity—humans' pressure on the planet can be assessed for helping to manage humans' ecological assets more wisely and take personal and collective action in support of a world where humanity lives within the Earth's bounds (Global Footprint Network, 2014).

Ecological Footprint calculations which are revealing the ecological risks ensure the balance between conservation and use of natural resources, help to provide a framework as well as creating the necessary infrastructure for valuing ecosystem services. Decision-makers used the amount of natural resources as a mechanism for monitoring and evaluation (WWF, 2012)

In that point, agriculture should be the main subject for sustainability that contributes one of the largest components to population as ecological footprint and biocapacity (Rees, 2004). Population growth and unsustainable use of natural resources put pressure on agricultural growth.

For these reasons, Turkey is aware of the ecological footprint, understands and interprets it in the context of sustainability which is important for looking to the future with hope. Therefore, it is considered that the ecological footprint should be evaluated and should be proposed as a solution for the problems of the agricultural sustainability. In this study Turkey's ecological footprint was compared with the world and ecological footprint of agriculture and it is examined that agriculture has an important place within the framework of sustainability. In line with the assessment made, various suggestions have been made towards a solution.

The main material of the study generated from Global Footprint Network Report and World Wildlife Foundation Report. Also, other reports, articles, papers, secondary data and web sites

were examined related to the research subject. In this context, the available materials examined and the information obtained by compiling, a variety of solutions has been conducted for the existing problems in the current situation.

Ecological Footprint and Sustainability

As stated in Global Footprint Network (2014), "The footprint represents two sides of a balance sheet and on the asset side biocapacity represents the planet's biologically productive land areas including our forests, pastures, cropland and fisheries; these areas especially unharvest ones can also absorb much of the waste we generate especially our carbon emissions". Then, biocapacity can be compared with humanity's demand on nature: Human's Ecological Footprint**.** The Ecological Footprint represents the productive area required to provide the renewable resources which humanity use and absorb their waste. The productive area currently occupied by human infrastructure is also included in this calculation, since built-up land is not available for resource regeneration (Global Footprint Network, 2014).

Ecological Footprint and biocapacity values are expressed in mutually exclusive units of area necessary to annually provide such ecosystem services; cropland for the provision of plant – based on food and fiber products; grazing land and cropland for animal products; fishing grounds (marine and inland) for fish products; forests for timber and other forest products; uptake land to accommodate for the absorption of anthropogenic carbon dioxide emissions and built - up areas for shelter and other infrastructure (Boruckea et al., 2013).

Sustainability means transferring and sustaining of the environmental quality to next generations by protecting the nature and the biodiversity without corruption in order to maintain the diversity and productivity (Salalı, 2013).When an analysis is held within the framework of this definition, it should be noted that demand of sources of the earth has reached to an unsustainable level since the middle of 1970s, so it is not possible to maintain this trend at the same pace. The available pace of the consumption will sooner or later come to an end either due to the conscious preference of the people or due to the natural deficiencies. These truths have forced the human being to find pathways to be able to live without destroying the nature and without exceeding the limits of the renewal capacity of the natural sources.

In order to stop current unsustainable process on earth, developing countries such as Turkey have many responsibilities. The wealth, development and success indicators mostly defined by National Income per Capita should be renewed in a way that will include social and environmental factors. Ecological Footprint is one of the indicators such as Human Development Index, Gini Coefficient and Living Planet Index. One of the most significant problem which the decision makers in Turkey should seek an answer for is to find a way in which the humans can live "within the boundaries of a single world" with the increasing level of population and prosperity. The recent situation has to be thoroughly described in order to stop the corruption of the natural environment of Turkey and to establish a better future compatible with the nature (WWF, 2012).

The Role of Agriculture in Ecological Footprint

World's ecological footprint

The total biological capacity of the planet, i.e. the ecological capacity to meet the demands of the humanity equals to the total productive areas on Earth. The biological capacity may display variations within years depending on the change of the dimensions of the productive areas. The areas regarded as the productive areas in the World were calculated as 11.9 billion gha (1.8 gha per capita) displaying with an increase in 2007. While the productive areas increased with a percentage of 4% by opening up many more fields to production between the years 1961 and 1964, it is decreased with a percentage of 1% between the years 1994 and 2007. The reasons of the decrement are desertification and salinization caused by the global wealth, growth of population and the use of infertile and water increased in parallel with total Ecological Footprint.

The Ecological Footprint exceeded the available biological capacity with an approximately percentage of 50%, starting in mid of 1970s to 2007. In other words, since 2007, people have been using the sources as if having an average one and a half planet in order to maintain their

activities. When the biological capacity of the world is compared to the footprint of the humanity, it has seen that the global ecological deficit has been increasing in a rapid fashion within years (WWF, 2012).

Analyzing data of ecological footprint; The World's ecological footprint is 2,7 gha and the biocapacity is 1,78 gha, this numbers shows us that we use more than our available natural resources and this means we are using natural resources unsustain (Table 1).

Table 1. Ecological footprint in World, Regions and Turkey, by area type

Country/Region*	Population (millions)**	Cropland	Grazing land	Forest land	Carbon	Fishing ground	Built up land	Total Ecological Footprint	Cropland	Grazing land	Forest land	Fishing ground	Built up land	Total biocapacity
		Ecological Footprint 2008 (global hectares per person)							Biocapacity 2008 (global hectares per person)					
World	6,739.6	0.59	0.21	0.26	0.10	1.47	0.06	2.70	0.57	0.23	0.76	0.16	0.06	1.78
Africa	975.5	0.51	0.23	0.29	0.07	0.29	0.06	1.45	0.46	0.41	0.48	0.11	0.06	1.52
Middle east/ Central asia	383.7	0.60	0.20	0.12	0.04	1.44	0.06	2.47	0.39	0.22	0.12	0.13	0.06	0.92
Asia-pacific	3,729.6	0.46	0.07	0.15	0.11	0.76	0.07	1.63	0.40	0.09	0.18	0.12	0.07	0.86
Latin america	576.8	0.64	0.67	0.39	0.12	0.80	0.08	2.70	0.80	0.80	3.60	0.31	0.08	5.60
North america	338.4	1.13	0.22	0.85	0.10	4.75	0.07	7.12	1.66	0.26	2.22	0.75	0.07	4.95
EU	497.1	1.13	0.34	0.53	0.14	2.42	0.16	4.72	0.91	0.13	0.77	0.27	0.16	2.24
Other europe	239.3	1.05	0.16	0.40	0.17	2.23	0.05	4.05	1.01	0.27	2.82	0.73	0.05	4.88
Turkey	**70.9**	**0.92**	**0.08**	**0.28**	**0.03**	**1.17**	**0.07**	**2.55**	**0.74**	**0.13**	**0.32**	**0.05**	**0.07**	**1.31**

*World population is inclusive of countries not included in the Table.

**Table includes Footprint data for countries with populations greater than 1 million. (Kaynak: WWF, Living Planet Report, 2012)

Turkey's ecological footprint

In Turkey, Ecological Footprint of consumption was 2.7 gha in 2007, which was equal to the world average value but lower than the average of Mediterranean countries. Turkey's Ecological Footprint of consumption is 50% higher than the global biocapacity per capita. This value is an indication of a globally unsustainable life style in Turkey.

Turkey's Ecological Footprint per capita hasn't changed over the years. Considering the stability of Footprint per capita since 1961, there is a significant increase in the gross domestic national income per capita. The reason of such an increase is due to the increment of natural resource productivity by approximately 10% between the years 1961 and 2007. In spite of the relatively constant progress of Ecological Footprint per capita, total Footprint of consumption has grown by 150% between 1961 and 2007. The main reason of this situation is the population growth during the same period (WWF, 2012). The consumption level in Turkey is 100% higher than the amount of natural resources which the country produces sustainably (national biocapacity) and 50% higher than the worldwide per capita biocapacity (Figure 1).

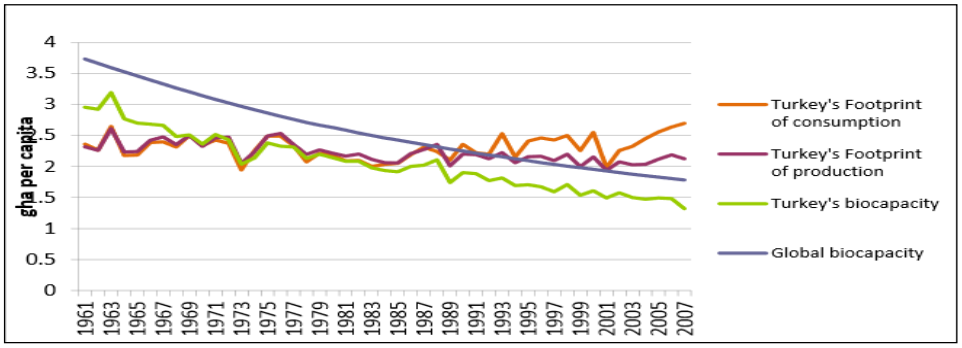

Figure 1: Ecological Footprint of consumption and Ecological Footprint of production in Turkey compared to Turkey's biocapacity and global biocapacity, 1961-2007.

Source: WWF, Turkey's Footprint Report, 2012

The analysis of the Footprint according to the field type will contribute to detect of the areas in which the ecological deficit is heavy, to track the changes saved during the course of the time and to plan the use of the effective source in a better way. If it's needed to examine Turkey

closely in terms of ecological footprint, such percentages of the components of the ecological footprints are founded as following; 46% carbon, 35% croplands, 11% forest, 3% pasture, 3% built-up land and 2% fishing field (WWF, 2012).

It's seen that agricultural field footprint is among the most significant components which constitute the ecological footprint of Turkey. This shows that sustainability is important in agriculture. In this context when the Agricultural Footprint and biological capacity analyzed, the relation between the national biological capacity and the consumption of the agricultural food display the distribution of it among the specific parts of the community.

Discussion and Conclusion

Increasing demand of the natural resource in parallel with the growth of population and prosperity in Turkey leads the conversion of the natural areas to the production fields. The misuse of the fields affects the biodiversity and sustainability in a negative way. Also, biological capacity is affected by this situation.

In Turkey, the structure of the agriculture consists of small scale farms therefore it's better to meet the demands of the growing population. There has to be an increase in efficiency to meet these demands. The expansion of irrigation, extensive use of fertilizers, pesticides, high-yielding crop varieties and mechanization are important items for increase in efficiency. To open up new productive areas will eventually avoid the destruction of the natural areas besides providing yield increase in available production areas. However, both extensive usages of input and opening up new areas are not sustainable.

Biocapacity in Turkey has been in a continuous decline, however ecological footprint of Turkey is growing, so Turkey's overshoot is getting bigger. Cropland biocapacity is more than the %50 of the total. According to Turkey's footprint components; cropland, grazing land, forest and fishing ground are constitute more than %50 of Turkey's total ecological footprints. Additionally, while Turkey's ecological footprint is increasing year by year, biocapacity has continued to drop.

Thus, the government must take measures on increasing the biocapacity and decreasing the ecological footprint related to agriculture. As an examined of some studies (Vintila, 2011) the conventional production system were found to have EF value in average with 50% higher than in organic processing. So, nature friendly methods, such as; organic farming, good agricultural practices, natural farming, low input farming etc. should have been used to reduce ecological footprint of agriculture.

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The Dimensions of Traditional Foods in the Global Markets

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Abstract
The production of traditional foods, which are the indicators of a country's cultural wealth, contributes to the economy by creating employment, tourism, and income. Therefore, their protection within the scope of cultural heritage and their sustainability is also important. Today, consumers' environmental awareness and food safety sensitivity also influences their tendency to choose traditional products instead of industrial products. Traditional foods are nostalgic foods found in the search for new products and to promote and protect them from imitation and disappearance from commercial life, different prevalent systems employed should be explored. In this study, supply structure, factors influencing the demand for traditional foods, possible strategies employed to sustain this demand, and the importance and methods of protecting these foods from increasing market competition, related legislation are discussed.
Keywords: Traditional food, branding, marketing, geographical indication

Introduction
Human development, the discovery of trade methods and technological development have also affected product markets. The spread of high technology use has also brought product markets closer to each other. Thus, stakeholders can access information related to supply, demand, price, regulations, and foreign trade much faster, and firms can shape their strategies based on these data.During this period, firms that cannot develop new products may tap the cultural heritage for products, and at this point, focusing on traditional foods may be recommended. In fact, with respect to sustainability and development of traditional production methods, protection against imitation and contribution to the rural economy, traditional foods are products of commercialimportance thatsocietiesneed to use and protect.

The aim of this study is to demonstrate the possible risks involved in perceiving traditional foods, which are part of a cultural heritage, as primarily commercial commodities and to discuss prevention methods.

Material and Methods
This study is exploratory in nature and based on literature review (Churchill, 1995; Alam and Hoque, 2010). Exploratory research often relies on secondary research such as there view of available literature and/or data. The research results of related studies, reports and publications were used as secondary data sources. Evaluation and suggestions are presented.

Results and Discussion
Traditional foods are defined as foods that are widely consumed on special occasions and celebrations, produced naturally with special methods from thegastronomic heritage, which are transferred from one generation to another. These products are associated with sensory features and with a geographical area/region/country (Borec,2013;Vanhonacker et al.,2010). Traditional foods contribute to the rural economy and to domestic and foreign tourism. They also add special value to a product, which differentiates it from others on the market. The increase in international relations also affects the traditional foods trade. Although there may be similarities

between the food production and consumption of societies that live together, different traditional structures can be observed as well.

Traditional foods (TFs) need to comply with food regulations, especially those involving hygienic conditions. Poor hygienic conditions in traditional food production lead to problems in production, distribution, The increase in consumers' awareness of food safety demonstrates that this issue cannot be neglected in traditional foods.

Environmental pollution negatively affects plants that are used in traditional food production, which creates problems for safe traditional food production. Regulations pertaining to GI certification, production area restrictions, and the origin of raw materials in the production of traditional foods can increase production (Vakraou et al., 1997). This can also increase competition and imitation products in the market. Because of these reasons, production and marketing of traditional foods need to be made traceable (Taşdan vd., 2014a).

The fact that traditional food producers are primarily small scale firms puts a strain on continuity in production, costs, financial power, and quality production. This structure can make large scale firms enter the market and make small businesses withdraw. Moreover, the contribution of traditional foods to the rural economy will also diminish.

Through developments in informatics and especially the use of computer-internet technology, markets have come closer to each other. These developments can change consumer habits and make them similar. Borowski (2010) reveals how in traditional food consumption features such as familiarity, sensory appeal, health, naturalness, reliability, ethical concerns, price, and weight control shape consumer attitudes and behavior toward traditional foods. And some research findings show that TFs are often not available in supermarkets, the taste/color may vary, label information is not reliable (Borec, 2013), they are perceived or known as traditional and can be sold higher price than the market price (Kezer, 2013). To sum up, traditional food consumption is affected mostly by individuals' demographic features especially age (Hopping et al. 2010; Matenge et al. 2012; Taşdan vd., 2014b) and education (Taşdan vd., 2014c), geographical location, habits, consumer behavior patterns and nutritional values (Kuşat, 2012; Pieniaketal., 2009), cultural differences (Laroche et al., 1999) as well. It is the task of traditional food producers to turn these findings into opportunities.

In order to identify problems and develop strategies, the production to consumption chain needs to be followed. Some researchers have shown that traditional food producers are small scale firms that reports related to the market are insufficient, which causes problems in market adaptation, that their organizational activity related to planning and application in marketing is poor, and that they cannot compete with rivals. The use of advanced technology and tools can be suggested to reduce the cost of traditional products. Indeed, the use of electronic commerce can create considerable advantages with respect to costs. E-commerce provides faster access to the consumer and increases advertisement opportunities.

To protect traditional foods worldwide and create familiarity over generations, regulations and harmony among regulations is required. Supporting this with producer organization and subsidy systems in addition to special practices, such as geographical indication, is of importance. Protecting traditional food is important. To this purpose, different countries protect their traditional foods with different instruments, such as trademarks and Geographical Indication (GI) certification. For example, in the USA, traditional foods are protected withtrademarks, while in the European Union (EU) and Turkey with GI certification. The formation of an accredited international platform needs to be considered so that traditional foods can be recognized and protected at international level. In Turkey, legal regulations related to the protection of geographical indications (June 27,1995, Official Gazette Nr 22326) started with "Decree Law Nr 555 on the Protection of Geographical Indications". In the European Union, Mark Protection was achieved through designation of origin and geographical indication based on Regulation Nr 2081/92. This regulation has been replaced with Regulation Nr 510/2006 and

then Regulation Nr 1512. The inspection of GI certified products by independent and impartial organizations that are accredited according to the standards EN 45011 or ISO/IEC Guide 65 before they are put on the market has become compulsory. This obligation holds for members and non-members of the EU since May 1 2010.

In Turkey, according to the article 23/2 of the "Law Nr 5996 on "Veterinarian Services, Plant Health, Food and Feed (13.06.2010 and Official gazette Nr 27610),the conformity to the certification regulations in the use of geographical indications pertaining to agriculture and food is inspected by the Ministry of Food, Agriculture, and Livestock. However, the General Directorate of Food and Inspection works on the Regulations for the inspection of food products certified with geographical indication. Therefore, problems are encountered in practice. In the domestic market in Turkey, many imitation or fake products are encountered that are produced in accordance with the food regulations, but which are not marketed, and which do not conform to labeling, packaging, storage and distribution regulations. This harms the consumers as well as the producers and sellers who do comply with the regulations, as deception of different parties on the market creates distrust and unfair competition. The effect of these problems will be more pronounced with GI certified products.

The results of inspections of traditional foods conducted by the Ministry in Turkey reveal that in 11 cities and for 11 products, 92 GI inspections were conducted (GTHB, 2013). During the inspections of the Ministry, incompatibilities between the elements of the GI certification Regulations and the Turkish Food Codex Regulations were found.

In the traditional food sector, there are many marketing channels between the producer and consumer. Products either directly reach the consumer or are offered to the consumer by mediators. In the market, many actors are active that are mediators, producer organizations, GI certification obtaining firms-foundations-municipalities-professional chambers-special provincial administrations, outlet-sales points of institutions, side-of-the-road vendors, electronic traders, wholesalers, and retailers. Products are mostly sold in the region of production and especially by the producers themselves. The fact that consumers wish to buy the products in the location where they are produced, results in local sales. Producers also sell their products by attending festivals and fairs held in and outside the region of production.

There are numerous advantages of traditional food producers' forming cooperatives, producers associations, or companies and operating together in the market. This way they can be more powerful, decrease production-marketing costs, gain competitive power, form a common rationale in strategy development and application. Among organizations related to GI certificated TFs there is one olive oil cooperative, two associations for Ezine Cheese and Raki, and one producer of Terme Pitta Bread. The GI certificates for other traditional foods is held by chambers industry and commerce, municipalities, mercantile exchanges, Governorship Special Provincial Administration Directorates. While the present regulations allow individual applications, in the new Draft, the ownership rights of producer groups are emphasized. This new development may encourage the formation of producer organizations.

Conclusion

Changing the nature or features of traditional foods due to commercial concerns, can pose a threat to societies' cultural heritage. In order for smaller firms not to be overpowered by larger firms, traditional products should not be ignored while meeting the increasing demand. The increasing awareness about TFs in the world is reflected in the publications and work of academic and other relevant organs. Determining the number of problems and accurate assessment of these will help reaching solutions. The problems related to traditional foods in Turkey are limited production opportunities discontinuities in production, low production capacity, limited producer organizations, poor market adaptation and limited marketing strategy

development ability, high GI certification cost, conflicts between related to laws and absence of a database.

The following predictions are suggested to protect and develop the traditional foods are in below:

1. National database is required on traditional products.
2. The new Draft needs to be reviewed and revised by all partnerships involved. Clarity should also be brought to traditional product standards and the requirements of the Turkish Food Codex to achieve compatibility.
4. GI certifications in all countries could be given validity in every country.
5. GI certified products need to be distinguished with their own particular emblem and logo.
6. A control mechanism at EU standards should be established in which inspections are conducted by accredited institutions.

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Comparison of Cost and Profitability of Major Field Crops in Adana Province

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Abstract

The costs and breakeven yields of major field crops (wheat, cotton, first and second crop maize and sunflower) grown in Adana Province were estimated and compared in terms of profitability. Crops were selected based on their shares in the total crop production value. Districts and villages were selected in a purposeful manner. Number of sample farms was determined using Stratified Sampling Method with Neyman distribution approach. According to the results of the study first crop maize was found to be the most advantageous crop in terms of both gross and net return. Sunflower is the most advantageous crop in terms of relative profitability. When breakeven points were considered, yields of all selected crops, except cotton, the current level of efficiency allows to be profited. It is seen that cotton farmers cannot afford their production costs without government supports. Relative advantages of selected crops were interpreted together with recent changes in their share in crop pattern within the region.
Keywords: Field crops, cost, profitability, breakeven point

Introduction

Çukurova Region and Adana Province in this region have a very important role in terms of field crop production in Turkey. Shares of grains, industrial crops, tuberous plants, pulses and forage crops within the field crops cultivated in Adana are as follows respectively: 74.06 %, 12.69 %, 7.61 %, 0.36 % and 5.28 % (GTHB 2011).

The cropping pattern has undergone important changes in both yield and production since 2000 in Adana. As cultivation areas of wheat, cotton and second crop maize (26%, 2% and 54% respectively) decreased, those of first crop maize (86%) and sunflower increased between 2001 and 2011. While being cultivated in small areas at the beginning, sunflower covered about 40 000 ha land at the end of the period, and showed almost 14 fold increase. (GTHB 2012).

Profitability is an important factor in crop pattern change. There are only a few studies on the economic importance of the crops grown in the region. For example: Ören et al (1998) analyses competition between cotton and its alternative crop combinations. Budak et. Al (2001) calculates costs of some major crops. Gül and Orhan (1998) estimates production costs of maize.

This study calculates costs of some selected major field crops (wheat, first and second crop maize, cotton and sunflower) in Adana, compares them in terms of profitability, and calculates breakeven yields to measure sufficiency of yield levels in terms of economical profitability.

Materials and Methods

Material: The basic material was the primary data acquired from the surveys answered by the producers of wheat, first and second crop maize, cotton and sunflower. The study was conducted between 2010-2011 production seasons. The data were gathered at December 2011. The study was also supported by secondary data obtained from the Provincial Directorate of the Ministry of Agriculture, TÜİK and FAO and some research findings.

Method: Based on their shares in total crop production value in 2009 in Adana, wheat (35.17%) and maize (38.34%) from grains, cotton (7.19%) and sunflower (3.54) from industrial crops were selected as the subjects of the study. Costs of first and second crop maize were calculated separately. By consulting the officials of the Provincial Directorate of Agriculture, seven representative districts were selected in a purposeful manner, based on their shares in total area planted in Adana (GTHB 2011). Number of villages was determined as 12 with a 10% margin of error and 95% confidence limits. Number of sample farms was determined using Stratified Sampling Method. Neyman approach was employed in distributing sample farms to the strata. Number of farms to be surveyed was kept a little bit higher than the number determined.

50 farms for wheat, 35 farms for first crop maize, 37 farms for second crop maize, 38 farms for cotton and 53 farms for sunflower were randomly selected and interviewed.

Analyses were made using MS Excel program. The results were presented in the form of tables for each farm size group separately and one table was prepared for the whole sample.

Production costs consist of fixed and variable expenses. (İnan, 2006)**.** Farmland rent and administrative overhead were calculated as the fixed cost components. Variable expenses cover costs for seeds, fertilizers, pesticides, labor, water, machinery lease, crop sale and transportation. The analysis covers physical quantities of inputs such as fertilizers, seeds and chemical pesticides, and the costs which are paid for these inputs.

In calculating costs, enterprise budget analysis was employed. When the own sources of the farm are used, these sources are priced based on the alternative cost (opportunity cost) principle.

Agricultural loan interest rate of Ziraat Bank of Turkish Republic was used for calculating interest cost of circulating capital. This interest rate was determined as 5% for 2010, taking into consideration the 50% discount applied by the Bank. It was assumed that variable expenses are distributed homogenously and interest cost was calculated for the crop growing period.

Administrative overhead consist of the costs for common services such as management, administration and all production activities. Generally 3% of total production expenses are calculated as administrative overhead in the field of agricultural management (Kıral et al 1999).

Gross Value Production (GVP) is the total value of main product and by-products obtained from the relevant crop. Gross profits were calculated as GVP minus variable costs; net profits were calculated as GVP minus production costs. Relative profits are obtained by dividing gross production value by the cost of production (İnan, 2006). Breakeven point is calculated because it shows the lowest production level protecting the enterprise against the losses, helps to choose the most profitable crop combinations. Breakeven level of efficiency is obtained by dividing production costs by sales prices.

Findings and Discussion

Changes in crop pattern, efficiency and production: Cultivation areas of wheat, second crop maize and cotton decreased between 2001 and 2011 in Adana, on the other hand, cultivation areas of first crop maize and sunflower increased. Wheat cultivation area decreased from 307.000 hectares to 228.000 hectares; and second crop maize areas from 79.000 hectares to 6.000 hectares. Cotton cultivation areas decreased up to the middle of the period, then reached again to the beginning level. In contrast, first crop maize areas increased from 38.000 hectares to 71.000 hectares. During the period, a significant change was observed in sunflower cultivation areas, which were very small at the beginning of the period but reached 40000 ha at the end. While a reduction of %26 occurred for wheat, %2 for cotton and %54 for second crop maize, there was an increase of %86 for the first crop maize areas. The increase in sunflower areas was quite big (about 14 fold). The main reason for this huge increase is the support given through Alternative Crops Projects since 2002.

The yields of the selected crops are increasing regularly during this period, despite adverse climatic conditions and crop diseases. Average yields were as follows during recent years: 500 kg/da for wheat, 1.200 kg/da for the first crop maize, 850 kg/ da for the second crop maize, 550 kg/da for cotton, and 300 kg/da for sunflower.

The production of wheat was 1.2 million tons on average at the beginning of the period. Since yield increased, production level remained the same despite the reductions in cultivation area. During this period, because of the increases in both cultivation area and yield, the production of the first crop maize also increased from about 362.000 tons to 900.000 tons. Despite yield increases, production of second cop maize decreased by 8% due to decreases in cultivation areas. Total production for this crop was about 300.000 tons in recent years. In spite of the reduction in cultivation areas, average cotton production, which was 209.000 tons at the beginning of the period, increased to 332.000 tons at the end of the period. Due to large increases in the cultivation areas, sunflower production, increased from 5.700 tons to 130.000 tons.

Cost and profit comparisons and breakeven yield determination: Costs of selected crops with 2010 prices are as follows (per kg): 0.52 TL for wheat, 1.28 TL for cotton, 0.87 TL for sunflower, 0.45 TL for first crop maize and 0.46 TL for second crop maize (Table 1).

Table 1.Cost and profitability comparison of major field crops

Cost Elements (TL/da)	Wheat	First Crop Maize	Second Crop Maize	Cotton	Sunflower
Machine Power	79.81	151.19	117.71	205.71	83.97
Labor Cost	6.30	22.27	22.25	40.49	4.40
Seed	25.14	37.30	41.85	21.07	14.60
Fertilizer	58.30	112.53	85.91	90.78	11.75
Pesticide	8.90	7.92	12.72	62.50	2.46
Water Cost	0.00	15.93	14.41	27.56	0.00
Interest on Circulating Capital	2.23	4.30	3.71	5.57	1.46
Variable Costs	180.68	351.44	302.72	453.67	118.65
Administrative Overhead	5.42	10.54	9.08	13.61	3.56
Land Tenure	90.97	248.85	115.85	173.32	107.29
Land Tenure	96.39	259.39	124.93	186.93	110.85
Production Cost	277.07	610.83	427.65	640.60	229.51
Yield	506.29	1345.39	920.79	501.61	263.82
By-Product Revenue	12.98	0.00	0.00	0.00	0.00
Cost (TL/kg)	0.52	0.45	0.46	1.28	0.87
Gross profit (TL/da)	149.21	423.50	169.86	165.15	188.81
Net Profit (TL/Da)	52.82	160.80	42.96	-21.78	77.95
Relative Profit	1.19	1.26	1.10	0.97	1.34
Cost Elements (%)	Wheat	First Crop Maize	Second Crop Maize	Cotton	Sunflower
Machine Power	29.00	24.75	28.00	32.00	36.59
Labor Cost	2.00	3.65	5.00	6.00	1.92
Seed	9.00	6.11	10.00	3.00	6.36
Fertilizer	21.00	18.42	20.00	14.00	5.12
Pesticide	3.00	1.30	3.00	10.00	1.07
Water Cost	0.00	2.61	3.00	4.00	0.00
Interest on Circulating Capital	1.00	0.70	1.00	1.00	0.64
Variable Costs	65.00	57.53	71.00	71.00	51.70
Administrative Overhead	2.00	1.73	2.00	2.00	1.55
Land Tenure	33.00	40.74	27.00	27.00	46.75
Land Tenure	35.00	42.47	29.00	29.00	48.30
Production Cost	100.00	100.00	100.00	100.00	100.00

Share of variable costs are as follows: 65.00 % for wheat, 57.53 % for first crop maize, 71.00 % for second crop maize, 71.00 % for cotton and 51.70 % for sunflower, important for all crops. Machinery power and fertilizer are the most important variable cost items, accounting together about half of the variable costs. Even a little increase in them may lead to a considerable increase in the production costs. Increasing fuel and fertilizer prices can be shown as the reason of rising production costs. Cotton is the crop having the highest machinery power cost (205.71 TL/da), and wheat is the one with the lowest (79.81 TL). Fuel has an important place in machinery expenses. First crop maize has the highest fertilizer cost, cotton is the second and second crop maize has the third. Fertilizer expenses for wheat and cotton are relatively low.

Land rent, a fixed expense, is an important cost element. Land rent reaches its highest average value (248.85 TL/da) for first crop maize and its lowest value is for wheat (90.97 TL/da).

Profitability in agricultural production is expressed by a wide range of measures. Gross profit is a significant indicator for crop pattern determination. The crops with the highest and the lowest gross profits are first crop maize (423.50 TL) and cotton (165.15 TL) respectively. The most important competitors of cotton are wheat (129.21 TL/da) and second crop maize (169.86 TL/da) which are cultivated consecutively in crop rotation. Another measure, relative profit shows the money the business earns for each 1 TL investment. Crops with the highest and the lowest relative profits are sunflower (1.34) and cotton (0.97) respectively. Relative profits for first and second crop maize and wheat are as follows: 1.26, 1.10 and 1.19 respectively.

Government subsidies and premiums are not included in cost calculations. The relative profit of cotton is below one. This shows that the cotton investment is not good enough to cover its opportunity cost at market prices. Continuity of production is provided by agricultural supports. Wheat and second crop maize rotation is a usual practice in the region. This rotation has some advantages since it allows utilization of idle labor force and brings new income opportunities. Cotton becomes disadvantageous in this situation. In addition, increasing prices of fuel, fertilizer and pesticide, a great part of the cost, make producers think negatively about cotton.

Obtaining yields above breakeven points is necessary for covering production costs. In particular, actual yield of second crop maize (920.79 kg/da) is higher than the breakeven yield (378.45 kg/da), 14% more than the breakeven yield. Actual yields of wheat, first crop maize and sunflower are 15 %, 25 % and 33 % more than their breakeven yields respectively. But the case for cotton is different. For this crop, actual yield is 4 % below the breakeven yield (Table 2).

Table 2.Breakeven yields of major field crops in Adana

	Wheat	First Crop Maize	Second Crop Maize	Cotton	Sunflower
Total Cost (kg/da)	277.08	610.83	427.65	640.60	229.51
Price (TL/kg)	0.63	0.57	1.13	1.23	1.16
Yield of Breakeven Point (kg/da)	439.81	1.071.63	378.45	520.81	197.853
Yield (kg/da)	506.29	1.345.39	920.79	501.61	263.82

Results

Analyses show that the costs of wheat, cotton, sunflower, first and second crop maize were 0.52 TL/kg, 1.28 TL/kg, 0.87 TL/kg, 0.45 TL/kg and 0.46 TL/kg respectively with 2010 prices. It was concluded that first crop maize, sunflower and wheat have advantages in terms of gross profit and net profit which are calculated without supports. Sunflower, first crop maize and wheat have advantages in terms of relative profit. Supports are more important for cotton whose relative profit is below 1. The findings which help to explain recent crop pattern changes are expected to provide guidance in determining agricultural policies.

Cotton is a crop requiring intensive care (hoeing, spraying and more irrigation requirement), high machinery tract power and labor costs. The most important rival of cotton is wheat because it allows second crop maize agriculture and its cost is low. Increases in the first crop maize areas may depend on the increases in the first crop areas. Sunflower cultivation areas are increasing due to support obtained through Alternative Crop Project since 2002. Because sunflower needs relatively less care and low production costs, its production is increasing year after year.

During the interviews, a large part of the producers stated that the most important marketing problem is the absence of market alternatives. Because of the lack of market alternatives, they have to sell their crops to traders, brokers etc. at low prices. Creating new market alternatives may strengthen the position of producers in market and facilitate selling their crops at a competitive price and so they may increase their income.

Acknowledgement

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Implications of the Current Structure of Livestock Herds from Romania upon Food Self-sufficiency

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Abstract
Following the land restitution to former owners, which began in the year 1991 and continued up to the present moment, a huge number of farms emerged, out of which most farms are small and very small. Agricultural land fragmentation also determined the fragmentation of livestock farms, so that at present most herds, mainly bovines, pigs and goats are raised on the small farms, which have only a few animals. The paper investigates the effects of land fragmentation and CAP adoption upon the supply of meat. These effects are evaluated on the basis of certain indicators calculated on the basis of the data of the two successive general agricultural censuses (GAC 2002 and GAC 2012). The main results reveal the diminution of livestock herds, mainly in bovines and pigs, and at the same time the beginning of herds concentration into large farms, mainly in the case of pigs. At the same time, the sheep and goat herds significantly increased and sheep in particular began to be concentrated on large-sized farms. Throughout this period, the domestic meat supply in Romania was deficient, due to the increase of domestic demand, and meat imports increased.

Keywords: Meat supply, land fragmentation, meat demand, Romania

Introduction
In Romania, population's concerns regarding food have been present almost anytime, because of the low incomes and of the stressed incidence of poverty, which persisted in certain regions of the country, even in the context of the economic growth in the period 2001-2009. Among the food products which knew the most frequent problems due to the insufficient supply from the communist period and to the low population's incomes in the transition period there are meat and meat products (Petrovici *et al*, 2000).

The analysis of the meat consumption evolution and of the possibility for its covering from the internal production makes the subject of the present paper. Meat consumption in Romania is among the lowest in the European Union, although in the last decades it increased, on the background of the period of economic growth which has started since the year 2000. The period 2004-2008 was one of macroeconomic growth, with a moderate inflation as we can see also from the indicators presented in Table 1.

Table 1. Evolution of the indicators relevant for the population's incomes and for food security

		2004	2005	2006	2007	2008	2009	2010	2011
GDP	% pa	108.5	104.2	107.9	106.3	107.3	93.4	98.9	102.3
CPI	% pa	111.9	109.0	106.6	104.8	107.8	105.6	106.1	105.8
Real wage	1990=100%	78.3	89.5	97.4	111.8	130.3	128.3	123.6	121.3
Real pension	1990=100%	57.5	62.3	68.1	83.6	112.1	125.7	122.6	116.8
The share of the food consumption expenses	% from total consumption expenses	49.6	47.2	45.4	45.0	44.3	44.2	44.1	44.9

Source: Romanian Statistical Yearbook, NIS

Economic growth stopped in the year 2008, but re-started with lower rhythms though in years 2011 and 2012. The population, mainly the urban one, knew a significant increase of the real incomes(especially of the state social security salary and pension) and this fact was accompanied by a decrease of the share of the food consumption expenses in total consumption expenses, from almost 50% in the year 2004 to 44% in the years 2009-2010. Concomitantly, a quantitative

and qualitative increase of the food consumption took place, mainly at products considered as important from nutritional point of view as meat, dairy products and fruits. In figure 1 we can see the increase of the meat consumption per inhabitant from the level of 43 kg/year in the year 2000 to almost 67 kg/year in 2009, so that, afterwards, the consumption decreased again to 57 kg/year in 2012, under the pressure of the economic crisis and of the diminution of the population's incomes. Population's preferences as regards to meat consumption changed in this period, because it considerably decreased the beef meat consumption, also of mutton, and it concomitantly increased the consumption of pork and poultry meat.

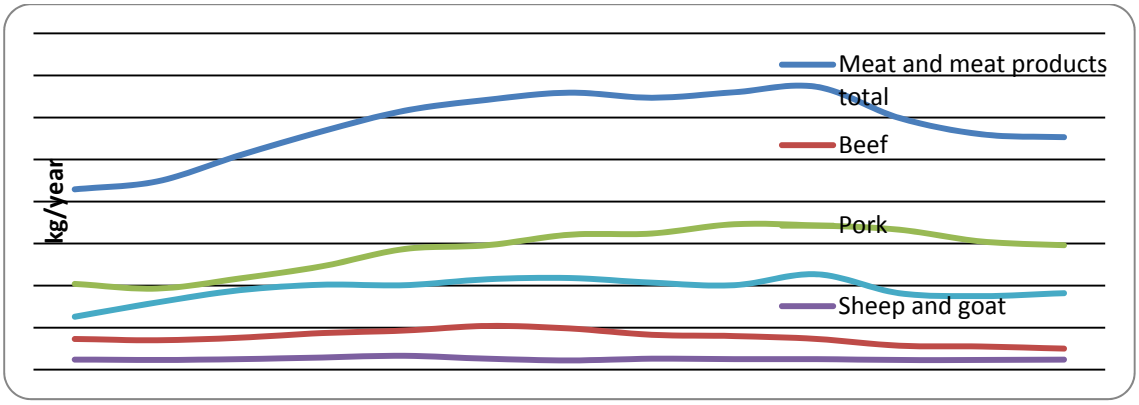

Figure 1. Yearly consumption for the main type of meat (kg/capita).

In the year 2012, in the structure of the meat consumption, pork meat represented 54%, poultry 33%, beef 9%, and mutton and goat 4%. According to the Family Budgets Survey data (NIS, 2011), the share of purchases of meat and meat products represent around 24% of the value of the amounts spent for the purchase of food in a household, the percentage maintaining itself relatively stable during the time.

The daily average consumption per one person was approximately of 2500 kcal in the last decade, with an increasing trend for the share of animal origin calories from 530 kcal at the beginning of the 2000's to 620 kcal in the years 2008-2009. This consumption of animal origin calories decreased in the last two years of the analyzed period (2010 and 2011), mostly probable as an effect of the reduction in the households' incomes together with the installation of economic crisis.

Practically, in the period of economic growth, Romania behaved as a country with a high potential for the increase of the food demand (Cupak et al. 2013). Another characteristic of the food consumption in Romania is represented by the high share of the consumption out of own resources, especially in the case of the rural households, where, in the case of meat, almost half of the value of the consumed products comes from the own household.

Material and Methods

The data used in the present study comes from the Romanian Institute of Statistics, i.e. data of the two successive general agricultural censuses (GAC 2002 and GAC 2012), the food balance data, the population's consumption availabilities and the household budget survey.

For the evaluation of food availability I used the self-sufficiency at Romania's level, which represents the domestic agricultural production capacity to cover the population's consumption needs. According to the methodology of the Romanian Institute of Statistics (NIS), which is harmonized with the Eurostat methodology, the food self-sufficiency (Gapr) is calculated for the main agricultural products, in a reference period (one year in general), according to the formula:

Gapr = Pint/Da *100

Da = Supply availability

Da = Pint + I – E – (Vs)

I = Import, E = Export, Pint = Domestic production,
Vs = Stock at the end of year – Stock at the beginning of the year

Results and Discussion

Romania itself cannot ensure the quantities of meat necessary for the consumption from internal production, and this deficit is more important at pork meat, which also is on the first position in the consumers' preferences (table 2). The differences between the quantities necessary for the consumption and the internal production are covered through imports from European Union Countries, and the value of these imports has become higher and higher together with the increase of the population's demand for meat. The highest value of the meat imports, ready meat and live animals was registered in the year 2009, of about 818 million Euros, which is 27% of the value of the food imports in Romania.

Table 2. The self-sufficiency degree of the meat production in Romania (%)

Meat of	2004	2006	2008	2010	2011	2012
Poultry	70.3	62.7	74.4	92.1	97.5	93.7
Pork	76.3	68.2	62.6	66.8	69.4	71.6
Bovines	97.5	75.0	91.4	88.8	94.6	97.0
Ovines and goats	104.2	102.1	98.1	112.4	106.5	102.0

Source: Population's consumption availabilities, NIS

The reasons for this situation, in which a country with important agricultural resources, with a population not very numerous (decreasing in fact) cannot ensure its own necessary meat quantities for the population's consumption are firstly of economic and structural nature. We mention in this context, that Romania owns important agricultural areas within EU-27, respectively 7.7% of the Utilized Agricultural Area (position 5- after France, Spain. Germany and Poland) and 8% of the area occupied by permanent pastures (also position 5- after Great Britain, Spain, France and Germany), and that, in this situation it could have the necessary conditions for developing an important livestock sector. We are trying to identify in the followings, some of these reasons.

1) The livestock numbers owned by the farms decreased generally, knowing different evolutions in function of the species. The livestocks expressed in LSU (Livestock Unit) decreased by almost 17% at the Census in 2010 comparatively to that in 2002. If we examine the movement of the livestocks by species, we can see that between years 2002 and 2010, the bovine herds decreased by 30%, the porcines by 35%, and the poultry by only 4%, whereas, the goats herds increased spectacularly by 66%, and those of ovines by 16%. The reasons which produced these differentiated evolutions are specific for each species. For example, the bovine herds knew an important diminution, and the categories of farms where this was registered more accentuated is that of the small farms, and the main reason is that in the post-accession period, the farms which owned only 1-2 cows were not subsidized by complementary national payments within the CAP. The ovine and goats livestock numbers increased due to the export opportunities toward Arab countries.

2) The majority of livestock numbers are held in the small farms. Romania is the country in the European Union with the most divided agrarian structure owning 32% of the European farms' number and only 7.7 of the agricultural area. The livestock numbers are owned overwhelmingly by the small farms, this reality being present at all animal species. For example, at bovines, in the year 2002, 54% of the livestock were owned by farms with 1-2 bovines, and in the year 2010, this percentage was reduced to 36%. At swine, 32% of effectives were owned by the farms with 1-2 pigs in 2002 and this percentage was maintained also in the year 2010. Though, at swine, it started a process of production concentration into big complexes (ex. The Smithfield farms in Timis). At ovines it also started a process of concentration of the livestocks towards the medium-

size farms. At poultry, although over half of the effectives are owned by farms raising under 100 poultry number, here also, the concentration process is ongoing.
3) As result, by farms types, the livestock effectives decreased substantially at the farms of 1-10 hectares and there increased the numbers of the medium and big size farms. This trend is also confirmed by the results in Table 3.

Table 3. Structure of livestock numbers expressed into LSU, in function of the size of farms owning livestock (%)

Farms	2002	2010
1-10 ha	89.9	79.3
10-20 ha	4.8	6.1
Over 100 ha	3.1	9.3

Source: own calculations on basis of data in GAR 2002 and GAR 2010

4) The associative forms of organization can be considered competitive structures encouraging the modernization of the sector and could improve the products' sale because they make possible that a big number of small farmers participate actively and efficiently on the market. But, the farmers in Romania are reticent to association, due to the traumatic experiences from the communist period. As a consequence, although during these years different measures and forms of support for the farmers who would have wished to associate existed, the results were not the best, few associations which could be considered for the moment a real success existing.
5) The fragmented nature of the sector, the character of the small scale production and the very strict regulations of the European Union regarding the slaughter housing and the sanitary veterinary conditions led to the utilization of the animals in the very small households only for self consumption and to the accentuation of their subsistence character. For example, in the pork meat utilization, which was on the first place in the consumers' preferences, only 47% of the production slaughtered entered on the chain for the sale, the rest, of 53% entering into the family consumption.

Conclusions

1. Meat demand is developing in Romania, existing yet an important potential for increase, on the background of the increase of the population's living standard.
2. Problems linked to the ensuring of the internal production necessary to cover this demand still exist and they maintain themselves. The problems' nature is mainly, the structural nature.
3. A process of concentration of the livestock in big size farms has started, especially at pork and poultry species.

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Consumer's Perception of Risk in Foodstuffs: Some Evidence from Izmir

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Abstract

Safe food is the risk-free food physically, chemically and biologically during their production life. Consumers prefer food supply that is free from herbicides, pesticides, drugs, hormone, etc. This study shows the measurement of consumer perception of risk in various foodstuffs such as fresh fruit and vegetables, dairy products, meat products, dried and canned products and alike. In the study, sample sized was calculated as 118. A structured questionnaire was applied to randomly chosen Mavisehir households. Ordered logit method was used to analyze the data for identifying the variables in various food products that affect the risk perception of the consumers. At the end of the study, The main conclusion was that consumers' perception of risk varies depending on their demographic characteristics. For instance, the middle aged consumer find the fresh fruits and vegetables more risky compared to younger one. For the dried food products, the young and well-income consumers were more careful. While there was no difference in risk perceptions of red meat consumers of all ages, incomes and educational status, we saw that the white meat consumers in middle age and over, with a good income and education find the white meat risky.

Keywords: Consumer perception, safe food, risk foods, ordered logit

Introduction

The foodborne risks can damage human health are assessed individually in the stages of the food production , that are processing, transportation, storage, purchasing, preparation and cooking, etc. and they are grouped as physical, chemical and biological risks.

Consumers want the food to be away from all kinds of risks and to be produced according to the basis of food safety. Therefore, the purpose of the study, for the consumers with different demographic characteristics, is to measure the risk perceptions of the food products with the applying Ordered Logistic Regression (OLR) method.

Although logistic regression is used in various fields, it is commonly used in marketing, sociology, economy, psychology and the medical fields (Keskinoglu et al., 2006; Ozkan et al., 2007). While the studies in the field of food are limited, some of them are summarized as follows: Cankurt et al. (2010) conducted a research named "A research on the Determination of Factors Affecting the Beef Preferences: Izmir Province Case". As a result of the analysis, it is observed that the probability of consuming beef has increased 1.20 times in the absence of heart disease in the family. Also, the probability of consuming beef has increased between 2.52 and 8.10 times in other high-income groups comparing with the lowest income group (<500 TL). According to the results of the study named "Consumers' Perception Genetically Modified Food and Their Stated Willingness to-Pay for Genetically Modified Food Labelling" by Karli et al. (2008), people are more prone to implement compulsory policy on GMO foods than that of voluntary policy. In the study of Alaimo et al. (2001) named "Low family income and food insufficiency in relation to overweight in US children", the prevalence of overweight was compared by family income category and food sufficiency status within age-, gender etc. And the conclusion was that food insecurity causes overweight in American children requires longitudinal quantitative and in-depth qualitative methods. In the study of Dai Yin-chun et al. (2006) named "Consumers' choice on food safety: a case study of organic vegetable purchasing behavior in Nanjing", the results showed that age, education, cognition level for organic vegetables and concern over the vegetable safety exert great influences on consumers' purchasing behavior. Ordered Logit Regression result indicates that factors affecting willingness to pay (WTP) are significantly and positively related to concerns on environmental pollution and experience and negatively related to education, gender, the ranking of importance of price and appearance.

Material and Methods

The main material of the study is the data obtained from the survey which was conducted in 2012 in the urban areas of Izmir province. The proportional approach was utilized in order to determine the number of samples in the best level in 90% confidence interval, the probability value was taken as p=0,5 and sample volume was found 118 (Miran, 2009).

In the survey, "Do you agree with the statement that there are drug, hormone or other chemical residues in the products in Table 1 and this is dangerous for the health of the consumers?" was asked to the respondents and they answered the question in 5-point likert scale as 1 (strongly disagree) and 5 (strongly agree). The data were analyzed by Ordered Logit Regression method (OLS) and consumers' risk perceptions of food were measured. The sixteen dependent variables (Table 1), four Independent variables and their dummy variables (Table 2) were summarized .

Table 1. Dependent variables

Fresh fruit	Bread
Fresh vegetable	Red meat
Frozen food	White meat
Canned fruits and vegetables	Natural fish
Dried fruits-vegetables	Culture fish
Readymade soup	Milk
Fruit juice	Milky products
Bakery products	Olive oil

Table 2. Independent variables

Gender
Education
Age
İncome
Dummy for gender
Dummy for education
Dummy for age
Dummy for income

Results

In this study, primarily the descriptive statistics were provided on the foodstuffs risk status and related to the structure of households. Then the results of OLR analyze have taken place.

Independent variables or demographic characteristics of the respondents were summarized in Table 3. The most important element of a survey sample was sufficient numbers of respondents in sub-classifications (i.e., *age, gender, education, and income)* to warrant statistical analysis.

Table 3. Demographic characteristics of mavisehir households

Characteristic	**N**	**Percent**
AGE		
18-25	5	4,2
26-30	26	22,0
31-40	14	11,9
41-50	34	28,8
51-60	22	18,6
61>up	17	14,4
Total	**118**	**100,0**
GENDER	**N**	**Percent**
Female	81	68.6
Male	37	31.4
Total	**118**	**100,0**
EDUCATION	**N**	**Percent**
Master and PhD	9	8.8
University	65	63.6
More than high school	4	4.0
High school	20	19.6
Less than high school	2	2.0
Primary school	2	2.0
Missing	16	NA
Total	**118**	**100,0**
ANNUAL HOUSEHOLD INCOME (₺) (1 USD ≈12.15Turkish Liras (₺)).	**N**	**Percent**
1000-1999	8	8,2
2000-2999	8	8,2
3000-3999	17	17,5
4000-4999	8	8,2
5000-5999	17	17,5
6000-6999	12	12,4
7000-7999	3	3,1
8000-8999	8	8,2
9000-9999	2	2,1
10000>up	14	14,4
Missing	21	NA
Total	**118**	**100,0**

The dependent variable table used in OLR analysis and measuring of consumer risk perception for different food products is shown in Table 4, in addition the mean values were given by the consumers for these products according to the risk status were also seen.

Table 4. Ordered logit method dependent variables (1= Strongly Disagree / 5= Stronly Agree)

Dependent Variables	N	Minimum	Maximum	Mean	Std. Deviation
Fresh fruit	118	1	5	3,66	1,322
Fresh vegetable	118	1	5	3,60	1,334
Frozen food	118	1	5	3,46	1,477
Canned fruits and vegetables	118	1	5	3,71	1,462
Dried fruits-vegetables	118	1	5	3,16	1,519
Readymade soup	118	1	5	4,06	1,361
Fruit juice	118	1	5	3,86	1,426
Bakery products	118	1	5	3,26	1,458
Bread	118	1	5	3,15	1,465
Red meat	118	1	5	3,14	1,535
White meat	118	1	5	3,57	1,470
Natural fish	118	1	5	2,46	1,599
Culture fish	118	1	5	3,16	1,519
Milk	118	1	5	3,18	1,550
Milky products	118	1	5	3,29	1,491
Olive oil	118	1	5	2,45	1,506

Some of the variables in logistic model such as *age, income, educational level* (Table 2), have been transformed into the categorical variables in order to analyze the differences between categories. Additionally, some dummy variables which have categorical structure were utilized for better interpretation of the results of analysis. For example, age and income variables were transformed into the dummy variables, and the consumers in ages between 18-25 with incomes between TL1000-1900 were taken as the reference.

The results of OLR Analysis can be explained as follows: **Consumers' risk perception of fresh fruit;** It did not differ by the gender. The difference of education had no importance. Age and income categories were statistically significant. All the participant consumers aged 25 and over have found risk compared to the reference group consumers aged 18-25. The risk perception of consumers with incomes over TL5000 was higher comparing to the reference income. **Consumer risk perception of fresh vegetables;** It did not differ by the gender. Also the difference of education had no importance. Consumers over age 40 and with income TL5000 and over had found fresh vegetables more risky compared to the reference group. **Consumer risk perception of frozen and canned foods;** Risk perception of consumers from all age groups with different education levels and incomes related to frozen and canned foods were not different from each other. **Consumer risk perception of dried foods;** Risk perception of the consumers aged between 26-30 was higher for this product compared to the reference age group. In addition, all consumers with income TL3000 and over have found this product more risky compared to the reference income group. **Consumer risk perception of readymade soup and fruit juice;** It didn't differ by the age, gender and income. According to the model, it was understood that men find readymade soup and fruit juice more risky than the women. **Consumer risk perception of pastries and bread;** It didn't not differ by the age, gender and income. According to the model, it was seen that men find pastries and bread more risky compared to women. **Consumer risk perception of red meat;** The risk perception of consumers from all age groups with different educational levels and incomes related to red meat were not different from each other. **Consumer risk perception of white meat;** consumers aged over 40 and with income between TL6000-8000 have found white meat more risky compared to the reference

groups. In addition, risk perception of the consumers having a high school, college or graduate school diploma was higher compared to the consumers having a primary school diploma. **Consumer risk perception of naturel fish and farmed fish;** Risk perceptions of consumers from all age groups with different education levels and incomes related to naturel fish and farmed fish were not different from each other. **Consumer risk perception of milk and milk products;** Men find these products more risky compared to women. In addition, consumers between the ages of 40-50 find these products more risky compared to the consumers in ages between 18-25. **Consumer risk perception of olive oil;** Men find olive oil more risky compared to women.

Discussion and Conclusion

This study which measured the risk perceptions of consumers have shown that the middle aged and over participants find the fresh fruits and vegetables more risky compared to younger participants. In addition, for the consumption of fresh fruits and vegetables, the risk perception level of high-income households were higher than the low-income households. We can see that the young people do not care a lot about the food-borne diseases and low-income families do not pay attention about the risk of food during their shopping's. For the consuming of frozen and canned foods, the risk perception of consumers from all ages, income levels and educational levels were not different from each other. The consumer perception that the frozen and canned foods are safe could be the reason for this.

For the dried food products, especially, the possibility that aflatoxin exists in dried foods, for instant in dried figs, indicated us the young and well-income consumers in study were more careful and selective when consuming these products.

If needed to compare the consumer risk perceptions of red meat and white meat, while there was no difference in risk perceptions of red meat consumers of all ages, incomes and educational status, we saw that the white meat consumers in middle age and over, with a good income and education found the white meat risky. It is understandable that the white meat was found risky for the consumers at a certain level of education and awareness due to the risk of its rapid degradation comparing to the red meat.

According to the model, consumer risk perception of the other foodstuffs, such as; *readymade soup, fruit juice, pastries, olive oil, milk and milk products* did not differ by the age, education and income levels. it was understood that men find them more risky than the women.

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The WTO Integration and Agricultural Policy in BiH - What We Can Expect

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Abstract
Bosnia and Herzegovina's strategic, political and economic goal is to integrate in Euro-Atlantic structures. However, integrating in international or regional associations, apart from opportunities, can also bring real risks, especially for the developing economy such as the economy in Bosnia and Herzegovina. Experiences of the previous integrations are not positive for the agricultural sector in Bosnia and Herzegovina. Therefore, it is not surprising that the forthcoming BiH membership in the WTO is anticipated with fear and skepticism among the local farmers. That is why the aim of this paper is to estimate the effect of the WTO integration on agriculture and Agricultural policy in BiH. Special attention is devoted to agricultural policy reform in BiH after gaining WTO membership.
In the first part of this paper we are going to describe the model of agricultural policy in BiH and theoretical aspects of WTO integration in Agriculture. In the second part we are going to analyze agricultural policy in BiH using AMS methodology. We compared our agricultural policy with the policy of selected member countries by using the WTO database. The results of the work show that BiH Agriculture is less protected when compared to the selected countries. The findings also show that domestic support measures in Bosnia and Herzegovina are mainly based on measures which are restrictive in terms of the WTO rules. Domestic support for several key agricultural products exceeds the *de minimis* threshold of 5%, which can be a problem especially after gaining membership in the WTO. Finally, the paper considers how to prevent the negative effect of the membership with a proposal for the local policy reform.

Keywords: Agriculture, Bosnia and Herzegovina, WTO, AMS, agricultural policy

Introduction
Bosnia and Herzegovina is very close to integrate WTO. This integration like any other, can bring many benefits but also a set of rules which may have adverse consequences, especially on sensitive sectors such as Agriculture. If we take into consideration the State's complexity and the lack of a common agricultural policy, these risks are more expressed for Bosnia and Herzegovina. Agrypolicy-related competencies in BiH are divided among the state, Entities and the Brčko District of BIH (In the Federation of BIH cantons also). There are 13 levels of authorities in Bosnia and Herzegovina (without municipalities), which somehow provide support to agricultural producers in the country (B a j r a m o v i ć, et al., 2010). This institutional structure and the lack of a uniform agricultural policy in the country are the main reasons of the problems in Agriculture in BiH. The integration processes which country experienced are the best indicator how a lack of uniform agrarian policy can lead to major problems in Agriculture.

Bosnia and Herzegovina has joined several multilateral, regional trade agreements, CEFTA, SAA, EFTA and bilateral FTA with Turkey and Iran. The results of this process are that BIH, even 20 years after the war, has not yet reached pre-war production and the foreign trade balance is continually a disadvantage for Bosnia and Herzegovina (still below 30%). On the other hand, Bosnia and Herzegovina must continue with the integration, especially into the EU and the WTO. However, not everyone in the country is willing support this integration, especially integration in the WTO. This is the result of negative experiences from previous process of agricultural trade liberalization. The aim of this paper is to estimate possible implications of membership BIH into the WTO. The work will also provide some proposals for agricultural policy reform in BiH with the aim of facilitating the integration process as well as the applying of commitments after membership.

Material and Methods

The negotiations to access the WTO in agriculture field are based on three pillars: market access, export subsidies and domestic support. Each of the three pillars has certain rules defined in the AoA, which are required during the negotiations for membership. These criteria will be the basis for assessing the effects of BiH membership in the WTO. In the first pillar, "market access" we will consider "Tariffication'' processes and Minimal market access. The analysis will be done based on the domestic Customs Tariff and the methodology for the execution of these two processes. We will also analyze all existing free trade agreements signed by BiH.

AMS / WTO methodology was used for the analysis of domestic support. To calculate the AMS for BiH only data on budget support were used considering that this form of support is the most important form of support in BiH. Possible support resulting from the administration control of prices is not calculated because this kind of support in BiH is *ad hoc* nature. The AMS is calculated for a base period of 2011 - 2013, using two possible *de minimis* threshold, of 5 % and 10%. Both statuses are taken into consideration because it is not clear which status BiH delegation will ensure at the end. As BiH had no export subsidies during the reference period, we will not considering this pillar.

Results and Discussion

What are the possible scenarios of access to BiH in the area of market access? Customs protection for agricultural products was provided through four *ad valorem* duty rates amounting to 0%, 5 %, 10 % and 15 %, which were considerably lower than average in the region countries (Figure 2). Since 2000, as a consequence of the interest pressures, levies for some agricultural products were added to the *ad valorem* charges. The *ad valorem* duties and fixed-tariff levies have formed so-called complex duty for agricultural products, thus making them the best protected within the national customs tariff. This additional duty is charged on 783 of the total number of tariff headings and the amounts range from 0.08 KM per unit to – 6.0 KM per unit.

Considering the fact that Bosnia and Herzegovina during the observed period have only "complex duty" tariffication is not necessary. Reductions commitments can be applied to existing "complex duty". The reduction will be, depending on status, 24% or 36%.

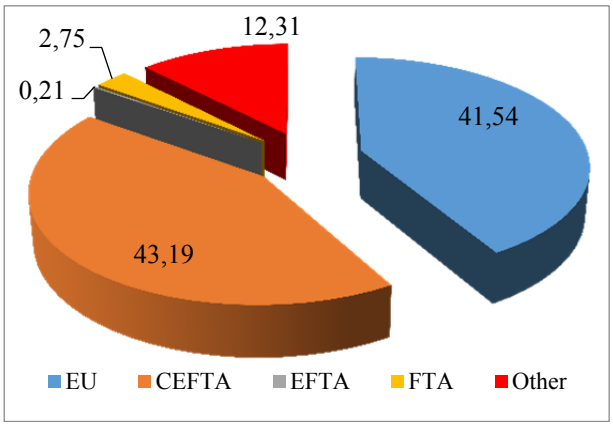

Figure 1. Structure of imports, by importing destinations, average 2008 – 2013.

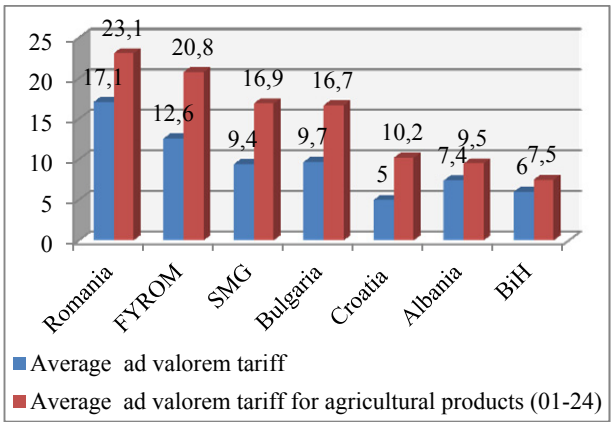

Figure 2. Comparison of average *ad valorem (%)* tariffs on agricultural products BiH vs Region Countries 2002.

Source: Agency for statistics of Bosnia and Herzegovina and Internal analysis of MOFTER

However, considering that BiH is already fully liberalized agricultural trade with its key trading partners (Figure 1), this reduction will not cause big impact on the agricultural sector of the country. The same situation is for the provision of the minimal market access. As the Figure 1 shows, largest volume of trade BiH has with the countries of the region and the EU, almost

85,0%. With both groups of countries BiH already have signed free trade agreements, CEFTA and SAA, considering that WTO membership will have no large effect on imports. Only 12.3% of trade in BiH is realized with other countries with which BiH has no free trade agreements. These countries maybe can expect certain benefits from accession of BiH into WTO. Finally we can conclude that in this segment there is no fear of WTO membership for BiH agriculture.

The third pillar of the WTO integration, domestic support, will make the most innovations for BiH membership into WTO. Domestic support for agricultural producers in BiH is mostly based on budget support. Funds allocated for budgetary support in reference period are amounted between 72.6 million and 80.3 million euros. Within the structure of support, we have several groups of measures but two groups of measures are dominant: *payment based on output* and *payment based per had/area produced related*. These measures, according to the WTO classification, can be classified in yellow box. Blue box measured does not exist in BiH. Yellow box measures the amount in average 88% from total agricultural support, which is very high. On the other hand green box measures in structure participated approximately about 11.6%, which is extremely low, especially taking into account trends in the region and especially in the EU.

Presented structure of support measures for agriculture in BiH is certainly unfavorable from the point of accession to the WTO, because yellow box measures, are dominant in structure. Of course, the reduction refers to calculated AMS not directly on the measures. Therefore, below we calculated base total AMS for the period 2011 - 2013. Base total AMS was calculated taking into account the conditions for developing countries and developed countries. As seen in Table 1, taking into account the support of the reference period, if BiH achieves membership as a developing country base total AMS would be 32.3 million euros.

Table 1. Calculated base total AMS *(000 EUR)*

	2011	**2012**	**2013**	**Average**
5% de minimis	31.668,4	30.962,9	44.327,3	35.652,9
10% de minimis	26.925,8	28.952,2	41.259,7	32.379,3

Source: Author's calculations

On the other side, if BiH treated as a developed country, base total AMS would be 35.6 million euros. Both calculated AMS are not significantly high. Comparing with the countries of the region it would be behind Croatia and Slovenia (167,6 and 74,73 milliona euros of AMS) and in front of Macedonia and Montenegro (16,0 and 0,33 million euros). The main reason for this low AMS is a lack of adequate market price support, which actually produces the greatest amounts of AMS.

When we apply reduction rate to the Basic AMS for BiH (regardless of status) whether final amount of AMS for BiH would be about 28.0 million euros. Final Bound Total AMS of 28.0 million euros is certainly something domestic policy creators should worry about. Especially because currently in BiH almost half of arable land is uncultivated[1]. The amount of funds needed to activate these uncultivated area, we tried to calculate below. Calculation of the amount of subsidies necessary for activating the uncultivated land in BIH is based on average amber box subsidies for period 2011-2013[2] and total cultivated land in BIH. In accordance with that Amber box subsidies per hectare of cultivated land, in BiH is 116.6 EUR/ha. Given that, estimated subsidies necessary to activate it uncultivated land would amount 52.26 Million EUR.

The second problem when we are talking about domestic support is certainly the structure of calculated Base total AMS for the country. (Figures 4 and 5). As the chart shows the largest share in the calculated AMS is the support provided to milk producers from 68.73% to 75.68% depending on which AMS we look.

[1] *Total arable land is about 1.009.000 ha and uncultivated land areas in BiH is 449.937.5 or 44,6%*
[2] *64,943,305 Million euros*

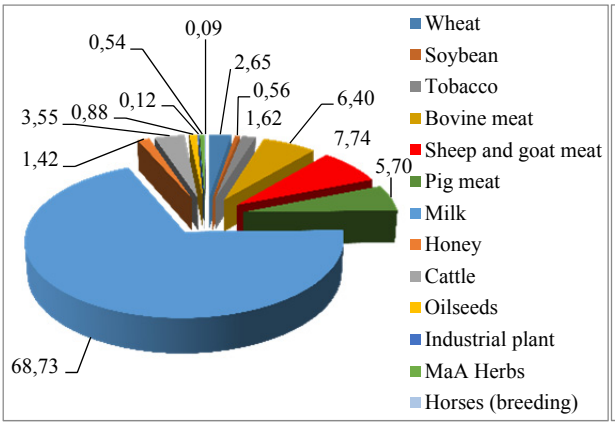

Figure 3. The structure of the Base Total AMS in % (5% of *de minimis*).

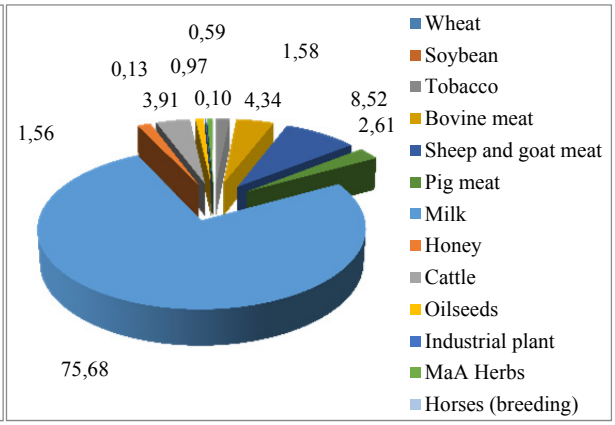

Figure 4. The structure of the Base Total AMS in % (10 % of *de minimis*).

Source: Author's calculations

This structure is very unfavorable, especially from the point reduction commitments. Although the Uruguay Round's Agreement on Agriculture does not predict reduction of AMS on product-specific basis, for large domination of milk support in AMS will not be possible to reduce AMS without reduction of the allocation for milk producers. Of course, there are some other possibilities but they predict rapid decrease or even ending of support for other productions. Such solutions would certainly be disapproved and considered as problems for the farmers.

Conclusions

Observing the executed analysis and comparisons, it can be concluded that BiH farmers do not have to worry about the accession BiH into WTO. As analysis showed, the smallest problems we can expect are the problems considering the obligations about export subsidies and market access. At the same time, most problems we can expect would be based on domestic support. The relatively low base AMS can be a problem, particularly because of uncultivated surfaces which will certainly require additional investments in support.

Poor structure, in which one product (milk) is dominating, represents a problem caused by support reduction. This problem can be solved by switching support in the blue box. At the end, the biggest problem is definitely the no existing common agricultural policy in the country. It would therefore be necessary to initiate the reform of agricultural politics and implementing institutions. Establishing harmonized common agricultural policy for the country and Ministry of Agriculture on the state level would certainly facilitate the implementation of duties after acceding to the WTO.

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The Current Situation and Marketing Problems of Cut Flower Sales Units in Adana Province of Turkey

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Abstract

The purpose of this study is to find out the current situation, marketing structure of sales unit engaged in sales of cut flower and to determine the marketing problems with the enterprises' future trends and expectations. The main material of this study is the primary data obtained from the face to face interviews with 51 sales unit of cut flower. In this study, frequency and averages were used for socio-economic issues; Likert Scale was used for marketing problems. In the result of the study, it was found that the most important marketing problems are unregistered production (41.9%) and lack of demand (27.9%). For the development of the sector, encouraging the production policies and SME (small and medium size sales unit) supports should be increased and awareness of consumers should be raised in terms of demand.
Keywords: Cut Flower, Cooperatives, marketing, Adana, Turkey.

Introduction

Today ornamental plants sectors are important sectors which contribute many countries' economies in the world and are not ignored. Ornamental plants are a general concept and cut flower divide cultivation of indoor ornamental plants, of outdoor ornamental plants and of natural bulbs. Cut flower and indoor ornamental plants have important share (80%) in world trade (Ay, 2009). About 145 countries have produced ornamental plants as trading in the world. The field of ornamental plants production has been about 1.5 million ha in the world since 2011. Production of cut flower has an important role in the production of ornamental plants. About 40% of production fields of ornamental plants are for cut flower in the world. In 2010, the production field of cut flower was 501 thousand ha in the world. Respectively, the most important countries in the production of cut flower are India, China, Brazil, Mexico, Japan, USA and South Africa. Turkey has 0.2 % share of the production of cut flower in the world (Hekimoğlu and Altındeğer, 2012).When this sector started in Turkey by 1940, cut flower was produced in 28 provinces. This sector firstly was common in Marmara Region but later it developed in Antalya because of climatic advantages (Ay, 2009). The actual development started with the establishment of "Floriculture Production and Sales Cooperative" by producers in 1945. Then this cooperative's name was changed as "Flora Horticulture Production and Marketing Cooperative" (FHPMC) (Can, 1999). In Turkey, ornamental plants were produced in total 4.786 ha in 2011, 75.7% of this area belonged to indoor and outdoor crops, 22.7% of it belonged to cut flower and 1.6 % of it belonged to wild onions and ribosomal plants. Ornamental plants productions were 1.4 million. 16.1% of this production was for indoor and outdoor crops, 79.5% for cut flower and the remaining 4.5% for wild onions and ribosomal plants (TOBB, 2012). Cut flower is produced in these provinces respectively; Antalya (40.1%), İzmir (34.2%), Yalova (15.0%), Isparta (14.0%) and Mersin (10.0%). Adana had 137 da for cut flower cultivation and this province had 1.3 % share of total cultivation areas in Turkey (Kazaz et al., 2013).Researching the literature of cut flower market, it is seen that there are various studies about production, marketing, policies etc. (Ay, 2009; Karagüzel et al., 2007; Taşçıoğlu and Sayın, 2005; Magoti et al., 2010; Jahan, 2009). As a result of the literature review, a study about the current status, marketing structure and problems of the cut flower sales unit is encountered in Adana. The main purpose of this study is to reveal the cut flower sales unit's current status and marketing structures and to determine marketing issues with future trends and expectations of cut flower sales unit' owner.

Materials and Methods

The primary data obtained as a result of individual (face to face) interviews with cut flower sales unit' owner (sales unit) in Adana. For determining the total number of flower sales unit in Adana, records of FHPMC are taken into account. Cooperative has operated by dividing into five sub-regions in 16 provinces throughout Turkey. These sub-regions are Antalya, Yalova, İzmir, Adana and Mersin. The cooperative's branch established in Adana has provided services in Çukurova Region (Adana, Hatay and Gaziantep) since 2007. And sometimes it has provided services in Mersin, Osmaniye and Kilis. Cooperative's this sub-region has 320 members (sales unit). Around 200 of 320 registered members are in Adana. The number of sales unit which will be interviewed individually is determined by representing Adana and basing on a voluntary basis with "Purposeful sampling method". According to this, 51 of flower sales units have been reached. The survey was conducted during July-August of the year 2011. Data obtained via surveys is analyzed with the program "Statistical Package for the Social Sciences". Frequency and averages were used for socio-economic issues; 5 Likert Scale was used for marketing problems.

Results

Socio-Demographic characteristics of sales unit: Cut flower sales unit owners participating in the study are 92.2% male and 7.8% female. About half of the sales units (52.9%) were graduated from high school (Table 1). More than half of the trainees in vocational subjects participated in the training of Adult Education Centers. Excluding the trainings of Adult Education on Centers, there are participants in the cooperative trainings and the trainees about INTERFLORA. The purpose of these trainings is to provide professional qualifications (to receive a certificate of mastery) and to increase the level of knowledge and skills.

Table 1 Socio-Demographic characteristics of sales unit

Characteristic	Frequency	%	Characteristic	Frequency	%
Sex			**Education**		
Female	47	92.2	Primary School	9	17.7
Male	4	7.8	Secondary School	4	7.8
Total	51	100.0	High School	27	52.9
Age			Junior Technical college	2	3.9
30 <	14	27.5	University	9	17.7
31-40	11	21.6	Total	51	100.0
41-50	15	29.4	**Years of Experience**		
51 >	11	21.6	10 <	14	27.5
Total	51	100.0	11-20	25	49.0
Average	39.5		20 >	12	23.5
Partnership Status			Total	51	100.0
Yes	7	13.7	Average	16,5 years	
No	44	86.3	**Working Hours**		
Total	51	100.0	12 <	7	13.7
Professional Organization Status			13-14	32	62.8
Florists Association	42	82.4	14 >	12	23.5
Chamber of Commerce in Adana	2	3.9	Total	51	100.0
Chamber of artisans and craftsmen	7	13.7	Average	12.7	
Total	51	100.00	**Vocational Education**		
			Yes	19	37.3
			No	32	62.7
			Total	51	100.0

Situation of cut flower market: The most important intermediary in the marketing of cut flower in Adana is FHPMC. This cooperative has sold the cut flower coming from various places, to sales unit like owners of florist's shop and a bench in their saleroom (flower sales

exchanges) with auction method. In auction three days in a week in Adana, flowers provided from various forms are presented to receivers with auction method and prices according to supply and demand. These receivers can be both the previously registered owners of florist's shop and bench, and directly consumers (as a result of the registration made during sales). The receivers who want to benefit from this cooperative do not have to pay any dues and it is sufficient to pay participation fee for auction they have participated. The cooperative provides marketing services like grading, standardization, or packaging for the product provided from the manufacturer. These marketing services are discharged by manufacturer.

The procuring of the cut flower: Cut flower sales units procure largely (78.4%) the flowers from cooperative; the rest of sales units (21.6%) prefer to procure the flowers directly from producers. More than half of sales units (58.8%) need to procure cut flower from outside of Adana and Antalya. These are the most preferred province with 90.0%. The other provinces are İzmir, İstanbul and Mersin.

Determining the prices: The prices of cut flower sales in businesses are determined by adding a certain rate of profit margins to purchase price. 58.8% of sales unit determine their selling prices in that way, 27.5% of them base on prices in the market and 13.7% of them base on the amount of demand.

Advertising: Only 45.1% of sales units are advertising. Instruments to advertise are handbill (47.8%), radio (30.4%), television (8.7%), internet (8.7%) and newspaper (4.4%).

The problems of the sales unit in marketing of cut flower: The most important problem is to preservation the flowers. In the florists there aren't special cold storages for cut flower and they conserve the flowers in the fridge. They can't use cold chain and flower vase life decreases causes high losses. The other problems are lack of demand and capital deficiency. The sellers can not satisfy the demand in special days (Table 2).

Table 2. The problems of sales unit related with cut flower marketing

Problems	1		2		3		4		5		Mean	Std dev.
	f	%	f	%	f	%	f	%	f	%		
Flowers preservation	8	15.7	6	11.8	7	13.7	10	19.6	20	39.2	3.6	1.5
Lack of demand	9	17.7	5	9.8	13	25.5	7	13.7	17	33.3	3.4	1.5
Lack of capital	8	15.7	4	7.8	18	35.3	7	13.7	14	27.5	3.3	1.4
Smallness of the sales unit	11	21.6	9	17.7	14	27.5	9	17.7	8	15.7	2.9	1.4
Insufficient quality of flowers	12	23.5	10	19.6	12	23.5	10	19.6	7	13.7	2.8	1.4
Insufficient varieties of flowers	17	33.3	7	13.7	12	23.5	7	13.7	8	15.7	2.7	1.5
Lack of market information	16	31.4	5	9.8	20	39.2	7	13.7	3	5.9	2.5	1.2
Carriage of Flowers	23	45.1	6	11.8	10	19.6	5	9.8	7	13.7	2.4	1.5
Price determination in Coop.	27	52.9	8	15.7	7	13.7	2	3.9	7	13.7	2.1	1.5
Lack of technical knowledge	25	49.0	14	27.5	8	15.7	3	5.9	1	2.0	1.8	1.0
Shopping in Cooperatives	33	64.7	6	11.8	7	13.7	2	3.9	3	5.9	1.8	1.2
Entering to Cooperatives	35	68.6	5	9.8	5	9.8	2	3.9	4	7.8	1.7	1.3

Measurements: 1: Not at all, 2: Slightly important, 3: Moderately important, 4: Important, 5: Very important

E-commerce condition: 39.2% of sales unit have web page on the internet and the average years of activity on web are 3.8. 40.0% of sales unit use web page for advertisement, 35.0% of them for sales, 15.0% for order and the rest, 10.0%, for both advertisement and order.

Membership of Interflora[1]*:* 45.1% of cut flower' sellers are membership in Interflora Florist Association.

[1] INTERFLORA is an organization which allows to order by seeking member organizations and benefiting from the website when someone send flowers from somewhere in the world to Turkey or from Turkey to somewhere in the world. This organization was established in 1908. In Turkey, INTERFLORA Florist Association which represents

Expectations of sales unit for future: 72.5% of sales unit want to continue their jobs and to expand their businesses in the future.

Factors obstacle the development of cut flower sector: The biggest obstacle for the development of sector is expressed as unregistered sales of cut flower (41.9% of sales unit). This situation causes unfair competition and revenue losses for registered sellers that fulfill various obligations. The other factors are lack of demand (27.9%), the general structure of the economy (11.6%), selling of flowers by supermarkets and various organizations (Adana Chamber of Commerce) (11.6%) and insufficient supply (7.0%). 16.0% of sales unit do not answer the question.

Discussion and Conclusion

As a result of the investigations in the field of research, cut flower sales units' problems in the sector can be handled in two titles as interior and exterior. External problems are unregistered production and lack of demand; interior problems are the physical conditions of sale units and the inability of the sales unit in terms of formal and non-formal education.

When we compared cut flower sales units in Adana and other agricultural producers in the region, cut flower sales units are quite successful in terms of the level of organization as a cooperative. The most important problem is lack of demand in the sector. The reason of this is insufficiency economic and the socio-cultural awareness in society. Cut flower consumption in Adana focuses particularly on special occasions. Otherwise as a gift cut flower is not a way of life in the community. Because of this reason, consumers must acquire the habit of buying cut flower by means of the advertisements. Inadequate physical conditions of sale unit are the other important problem. To solve this problem, credit or supporting system should be improved for sales unit. Except of internal and external problems in the cut flower sector, there is lack of statistical data relating to matters such as sector production, consumption, efficiency, marketing, the number of sales unit etc. Because the long-term, consistent and regular information related to sector is unavailable, it is hard to study it. So reliable database related to the sector should be created and it must be allowed to access by all stakeholders. And for the development of sector, incentives production policies and SME support should be increased. When considered that nearly three-quarters of sales unit want to continue and expand their businesses, this topic will also be very important.

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our country and is the only legal organization was established by Ministry of the Interior with no.5788 approval on 23.06.1976 and it has been still active.

The Problems and Suggested Solutions about Farmer's Organizations in Dairy Cattle

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Abstract
One of the primary problems on dairy cattle is insufficiency of the farmer's organizations. It is obvious that in the developed countries the sector is mostly dominated by strong producers organizations with a considerably high awareness level. Even when only European countries considered, the importance of the producers organizations in dairy cattle sector draws attention. For instance, the market share of the cooperatives in Ireland is 97%, 96% in Finland, 95% in Denmark and Sweden, 82% in Holland and Portugal, 60% in Germany, 38% in Italy, 20% in Greece, while it is only 5% in Turkey. It is pointed out that the tasks of the producers organizations are not defined in accordance with the laws in Turkey and the competition between the producers is weakened.
This study aims to highlight the analysis of regulations of Dairy Cattle Breeders Association, Milk Producers' Union, Cooperatives (HAY-KOOP and KOY-KOOP) in Turkey, and the share of milk marketing. Essentially, which organization model is required for Turkey is studied, especially in order to formulate it according to the advanced models of organizations in developed countries.

Keywords: Dairy cattle, farmer's organization, organization model, Turkey

Introduction
One of the primary problems on dairy cattle in Turkey is about producers organizations. While, the incentives to the producers in the recent years are positively received, on the other hand producers' organizations fail to achieve expected economic and social impacts because of the tasks of the producers' organizations are not well defined. In this study, Primarily, organizational structure on dairy cattle in Turkey is analyzed, afterwards situations in other countries especially in EU countries is taken into account and lastly suggested solutions about the problems on dairy cattle organizations in Turkey is highlighted.

The Situation and Problems of Dairy Cattle Organizations in Turkey
Organizations operating in dairy cattle in Turkey are divided into three groups in terms of legally. Agricultural Development Cooperatives and Dairy Cattle Breeders Associations (DSYB) are based on cooperative system. Livestock Associations and Milk Producers Associations are organized as legal entities. The last group formed as joint-stock companies. As defined by Ministry (Ministry of Food Agriculture and Livestock) "mainly based on breeding for all types of animals, in order to perform breeding, marketing activities, formed by real and legal entity organizations and institutions" are Dairy Cattle Breeders Associations that were taken under the scope of Law No. 5996 in 2011. HAY-KOOP (Livestock Cooperatives Central Union) is consisted by shareholders of dairy cattle breeders who restrict their activities with only livestock in the scope of Law No. 1163 on Agricultural Development Cooperatives (TKK). Milk Producers Unions, are the specialized organizations on specific products and product groups in the scope of Law No. 5200 on Agricultural Producer Unions, aim to produce quality products planned according to demand and focus on increasing marketing power. Main difference from agricultural cooperatives of agricultural producers' associations is the associations restriction of "at most one association can be exist for the same product or group of product at the district level" and the less number of cooperatives' founder shareholders (minimum 7 shareholders). However, the primarily problem is that the organizations are not established or performed for the needs of producers or breeders but the requirements of governmental organizations.

Organizations in Turkey holding wide field objectives and activities with the common goals make the market power of each other weakened. Considering market share of the organizations in Turkey, even while milk production of DSYMB is in the first rank with 47.63 %, Milk Producers Associations is in the first rank with 61.77% on marketing milk with the high level (Table 1). This situation might be because of the subsidies of the government for producer associations is more than to other organizations (Kumlu, 2007). This causes another problem of organizations in milk and dairy cattle in Turkey.

Table 1: Market share on milk market of agricultural development cooperatives and producers associations in Turkey (Milk amount, 2012)

		Amount of milk production		Amount of milk production marketed	
Organization		Ton	Percentage	Ton	Percentage
1	DSYMB (Dairy Cattle Breeders Associations)	2.599.686	47,63	519.937	24,49
2	TSUMB (Turkey Milk Producers Central Union)	2.186.753	40,05	1.311.452	61,77
3	HAYKOOP (Livestock Cooperatives Central Union)	320.205	5,87	128.082	6,03
4	TARKOOP (Turkey Agricultural Development Cooperatives Central Union)	145.501	2,67	87.301	4,11
5	KÖYKOOP (Village Development Cooperatives Central Union)	140.698	2,58	70.349	3,31
6	DKKYMB (Sheep and Goat Breeders Central Association)	38.006	0,70	0	0,00
7	ORKOOP (Forest Cooperatives Central Union)	30.338	0,56	6.068	0,29
8	TUSKOOP (Turkish Irrigation Cooperatives Central Union)	100	0,00	0	0,00
TOTAL		5.457.588		2.123.189	
		Market rate (%): 38,9			

Source: Source of Ministry of Food Agriculture and Livestock, 2013, Ankara.

One of the significant organization problems in Turkey is that organizations tasks are not be focused on purposes of producers or breeders with considering solving their problems, and also are given attention only to establish the organization. Shareholders expectations differ due to the organizations with not well defined tasks and holding wide field objectives. Organizations with wide scope of objectives cannot accomplish shareholders' expectations and consequently relations between organizations and shareholders cannot be developed, and finally stay weakened. (Kumlu, 2007). For instance, HAYKOOP's organizational tasks are formed multiple. The purpose of this cooperative activities with confusion leads to failure to comply fully. While to share the same aim is sufficient issue for being shareholder for cooperatives, to be the owner of at least 5 cows except to share the same aim is required for DSYB membership. Moreover, market-oriented production is required for the membership to Milk Producers Association. The smallest organizational unit for Agricultural Development Organizations is village, while it is provinces for DSYB, and districts for Milk Producers Associations. This situation provides an advantage for the shareholders of cooperatives but disadvantages for the members of DSYB and Milk Producers Associations. Because, existence of the cooperative units in the villages increase the communication and possibility of profiting of the producers with the organizations. This opportunity is lower for the members of DSYB and Milk Producers Associations in the province and district level.

The Situation of Dairy Cattle Organizations in Other Countries

Cooperatives in Norway, New Zealand and US cover 80-99% of the milk production (BM Referans Belgesi, 2012). Producer organizations have not received much attention as players in the sector in US. Even though these organizations are not necessarily registered as cooperatives, they belong to the group of producer organizations owned and managed by farmers on the basis

of grass-root structures and democratic decision-making rules. In the US bargaining associations of the dairy sector are usually viewed as cooperatives (Hueth & Marcoul, 2006; Hueth & Marcoul, 2003; alıntılayan Hanisch and Rommel, 2012). The market share of the cooperatives in EU countries is extremely high; 97% in Ireland, 96% in Finland, 95% in Denmark and Sweden, 82% in Holland and Portugal, 60% in Germany, 38% in Italy, 20% in Greece, while it is only 5% in Turkey (Inan, 2008). EU made reforms about milk policies and milk package has been implemented because of the adversities experienced recently. Milk package is purposed for prevention of taking excessive share of one of the other actors in the supply chain. Milk package includes producer organizations and also inter-branch organizations. Considering organizational structure of milk deliveries in EU after milk package came into force, milk deliveries are made through mostly processing and collecting cooperatives (Figure 1). Particularly, milk deliveries are made by processing cooperatives with the contractual arrangements in Germany, Denmark, Holland, Ireland and Austria, Poland which are the developed countries on milk economics.

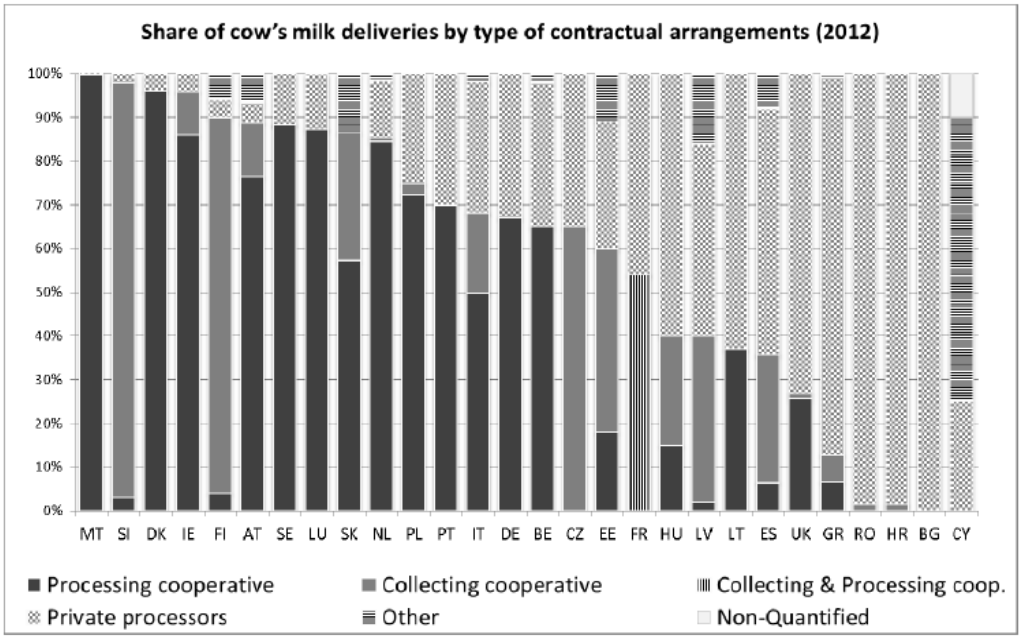

Figure 1: Share of cow's milk deliveries by type of contractual arrangements (2012).
Source: EU, Commission, 2014.

None of the Dairy Cattle Breeders Associations have dairy factory in EU; however most of the dairy factories are the property of breeder's cooperatives particularly in northern countries in EU (Kumlu, 2007). Breeding Associations are established by the farmers coming together who are breeding the same race as pure cattle. The main purpose to prefer this kind of organizations is to carry out studies on genetic improvement of race so that breeding high efficiently dairy cattle which provide more income (Uzmay ve Kaya, 1997). In this scope, identification and numbering of the animals, milk yield controls and artificial insemination, record keeping and assessments, genetic improvements, extension, purchasing extra breeding animals of the breeders, moreover animal welfare and animal protection for the animals registered in herd book are in the activity field of these organizations (Uzmay ve Kaya, 1997, ARD, 2014). Considering Breeding Associations in Germany, it is observed that the top corporation is National Breeders Associations and there are three types of organizations available for membership. These are Pedigree Associations (31 units and 44,369 of recorded farms), Artificial Insemination Organizations (21 units and 79,369 of recorded farms) and Yield and Quality Control Organizations (15 units and 53,154 of recorded farms) (ARD, 2014). In contrast, these three activities are in the scope of Dairy Cattle Breeders Associations but yield and quality function is

not well worked in Turkey. As mentioned before, Breeding Associations in Germany are able to trade dairy cattle but are out of activity field on marketing milk.

Conclusion and Suggested Solutions

While examining dairy cattle organization models in the world countries, it is observed that particularly the work area for Breeding Associations differs from the other producer's organizations. It is observed that raw milk is marketed through collecting and processing cooperatives in developed countries on milk market as EU countries. Thus, the main aim of DSYB in Turkey should be through identification and numbering of the animals, genetic improvement, productivity and quality improvement. Subsidies on dairy cattle producer organizations in Turkey play an important role in organizational restructuring. DSYB and Milk Producers Associations are subsided to make them powered in the past so that membership to these organizations increased to get maximum support (Kumlu, 2007). Most of the current farmers' organizations might be established as implemented tools of the policies with governmental promotions and coercions. Therefore, producers consider the current organizations as promotional and semi-official organizations so that they do not adopt them.

The first requirement to be taken to avoid the organizational problems encountered in dairy sector in Turkey is, to define the organizational objectives well and clear and not to determine common field of activities. Thus, market power of each other will not be weakened. Current organizations should have a mentality to act as if they were a single producer on the basis of province, district and village. Organizations in dairy cattle should be organized among themselves and formed to intensive organization model instead of spread model. They should make cooperation with other organizations and their upper units to have high marketing power therefore taking more active role in defined politics should be provided.

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The Problems and Suggested Solutions about Farmer's Organizations in Dairy Cattle

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The Situation and Problems of Dairy Cattle Organizations in Turkey
Organizations operating in dairy cattle in Turkey are divided into three groups in terms of legally. Agricultural Development Cooperatives and Dairy Cattle Breeders Associations (DSYB) are based on cooperative system. Livestock Associations and Milk Producers Associations are organized as legal entities. The last group formed as joint-stock companies. As defined by Ministry (Ministry of Food Agriculture and Livestock) "mainly based on breeding for all types of animals, in order to perform breeding, marketing activities, formed by real and legal entity organizations and institutions" are Dairy Cattle Breeders Associations that were taken under the scope of Law No. 5996 in 2011. HAY-KOOP (Livestock Cooperatives Central Union) is consisted by shareholders of dairy cattle breeders who restrict their activities with only livestock in the scope of Law No. 1163 on Agricultural Development Cooperatives (TKK). Milk Producers Unions, are the specialized organizations on specific products and product groups in the scope of Law No. 5200 on Agricultural Producer Unions, aim to produce quality products planned according to demand and focus on increasing marketing power. Main difference from agricultural cooperatives of agricultural producers' associations is the associations restriction of "at most one association can be exist for the same product or group of product at the district level" and the less number of cooperatives' founder shareholders (minimum 7 shareholders). However, the primarily problem is that the organizations are not established or performed for the needs of producers or breeders but the requirements of governmental organizations.

Organizations in Turkey holding wide field objectives and activities with the common goals make the market power of each other weakened. Considering market share of the organizations in Turkey, even while milk production of DSYMB is in the first rank with 47.63 %, Milk Producers Associations is in the first rank with 61.77% on marketing milk with the high level (Table 1). This situation might be because of the subsidies of the government for producer associations is more than to other organizations (Kumlu, 2007). This causes another problem of organizations in milk and dairy cattle in Turkey.

Table 1: Market share on milk market of agricultural development cooperatives and producers associations in Turkey (Milk amount, 2012)

		Amount of milk production		Amount of milk production marketed	
Organization		Ton	Percentage	Ton	Percentage
1	DSYMB (Dairy Cattle Breeders Associations)	2.599.686	47,63	519.937	24,49
2	TSUMB (Turkey Milk Producers Central Union)	2.186.753	40,05	1.311.452	61,77
3	HAYKOOP (Livestock Cooperatives Central Union)	320.205	5,87	128.082	6,03
4	TARKOOP (Turkey Agricultural Development Cooperatives Central Union)	145.501	2,67	87.301	4,11
5	KÖYKOOP (Village Development Cooperatives Central Union)	140.698	2,58	70.349	3,31
6	DKKYMB (Sheep and Goat Breeders Central Association)	38.006	0,70	0	0,00
7	ORKOOP (Forest Cooperatives Central Union)	30.338	0,56	6.068	0,29
8	TUSKOOP (Turkish Irrigation Cooperatives Central Union)	100	0,00	0	0,00
TOTAL		5.457.588		2.123.189	
		Market rate (%): 38,9			

Source: Source of Ministry of Food Agriculture and Livestock, 2013, Ankara.

One of the significant organization problems in Turkey is that organizations tasks are not be focused on purposes of producers or breeders with considering solving their problems, and also are given attention only to establish the organization. Shareholders expectations differ due to the organizations with not well defined tasks and holding wide field objectives. Organizations with wide scope of objectives cannot accomplish shareholders' expectations and consequently relations between organizations and shareholders cannot be developed, and finally stay weakened. (Kumlu, 2007). For instance, HAYKOOP's organizational tasks are formed multiple. The purpose of this cooperative activities with confusion leads to failure to comply fully. While to share the same aim is sufficient issue for being shareholder for cooperatives, to be the owner of at least 5 cows except to share the same aim is required for DSYB membership. Moreover, market-oriented production is required for the membership to Milk Producers Association. The smallest organizational unit for Agricultural Development Organizations is village, while it is provinces for DSYB, and districts for Milk Producers Associations. This situation provides an advantage for the shareholders of cooperatives but disadvantages for the members of DSYB and Milk Producers Associations. Because, existence of the cooperative units in the villages increase the communication and possibility of profiting of the producers with the organizations. This opportunity is lower for the members of DSYB and Milk Producers Associations in the province and district level.

The Situation of Dairy Cattle Organizations in Other Countries

Cooperatives in Norway, New Zealand and US cover 80-99% of the milk production (BM Referans Belgesi, 2012). Producer organizations have not received much attention as players in the sector in US. Even though these organizations are not necessarily registered as cooperatives, they belong to the group of producer organizations owned and managed by farmers on the basis

of grass-root structures and democratic decision-making rules. In the US bargaining associations of the dairy sector are usually viewed as cooperatives (Hueth & Marcoul, 2006; Hueth & Marcoul, 2003; alıntılayan Hanisch and Rommel, 2012). The market share of the cooperatives in EU countries is extremely high; 97% in Ireland, 96% in Finland, 95% in Denmark and Sweden, 82% in Holland and Portugal, 60% in Germany, 38% in Italy, 20% in Greece, while it is only 5% in Turkey (Inan, 2008). EU made reforms about milk policies and milk package has been implemented because of the adversities experienced recently. Milk package is purposed for prevention of taking excessive share of one of the other actors in the supply chain. Milk package includes producer organizations and also inter-branch organizations. Considering organizational structure of milk deliveries in EU after milk package came into force, milk deliveries are made through mostly processing and collecting cooperatives (Figure 1). Particularly, milk deliveries are made by processing cooperatives with the contractual arrangements in Germany, Denmark, Holland, Ireland and Austria, Poland which are the developed countries on milk economics.

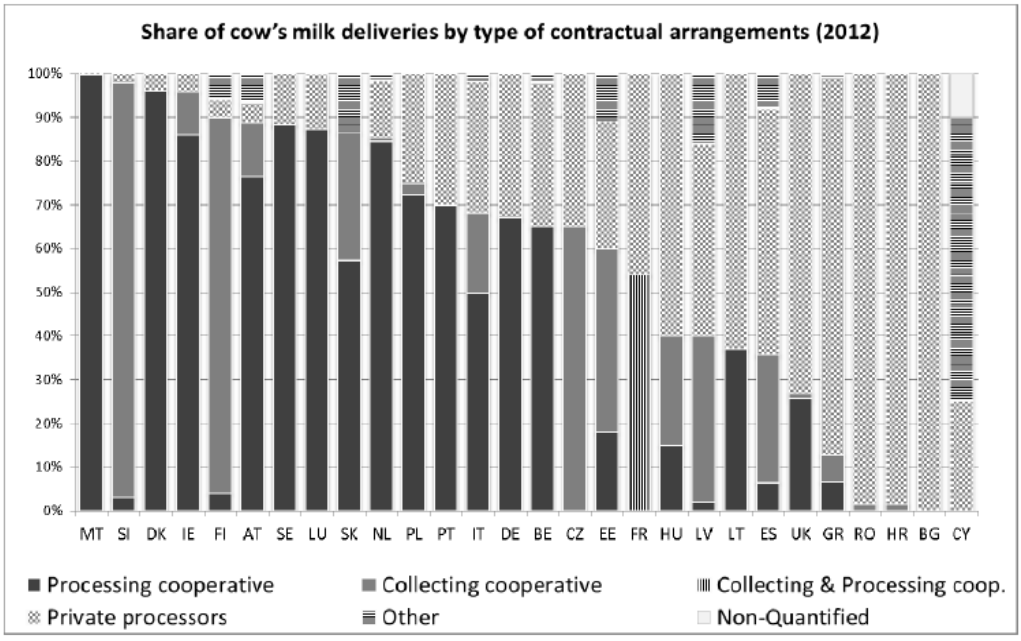

Figure 1: Share of cow's milk deliveries by type of contractual arrangements (2012).
Source: EU, Commission, 2014.

None of the Dairy Cattle Breeders Associations have dairy factory in EU; however most of the dairy factories are the property of breeder's cooperatives particularly in northern countries in EU (Kumlu, 2007). Breeding Associations are established by the farmers coming together who are breeding the same race as pure cattle. The main purpose to prefer this kind of organizations is to carry out studies on genetic improvement of race so that breeding high efficiently dairy cattle which provide more income (Uzmay ve Kaya, 1997). In this scope, identification and numbering of the animals, milk yield controls and artificial insemination, record keeping and assessments, genetic improvements, extension, purchasing extra breeding animals of the breeders, moreover animal welfare and animal protection for the animals registered in herd book are in the activity field of these organizations (Uzmay ve Kaya, 1997, ARD, 2014). Considering Breeding Associations in Germany, it is observed that the top corporation is National Breeders Associations and there are three types of organizations available for membership. These are Pedigree Associations (31 units and 44,369 of recorded farms), Artificial Insemination Organizations (21 units and 79,369 of recorded farms) and Yield and Quality Control Organizations (15 units and 53,154 of recorded farms) (ARD, 2014). In contrast, these three activities are in the scope of Dairy Cattle Breeders Associations but yield and quality function is

not well worked in Turkey. As mentioned before, Breeding Associations in Germany are able to trade dairy cattle but are out of activity field on marketing milk.

Conclusion and Suggested Solutions

While examining dairy cattle organization models in the world countries, it is observed that particularly the work area for Breeding Associations differs from the other producer's organizations. It is observed that raw milk is marketed through collecting and processing cooperatives in developed countries on milk market as EU countries. Thus, the main aim of DSYB in Turkey should be through identification and numbering of the animals, genetic improvement, productivity and quality improvement. Subsidies on dairy cattle producer organizations in Turkey play an important role in organizational restructuring. DSYB and Milk Producers Associations are subsided to make them powered in the past so that membership to these organizations increased to get maximum support (Kumlu, 2007). Most of the current farmers' organizations might be established as implemented tools of the policies with governmental promotions and coercions. Therefore, producers consider the current organizations as promotional and semi-official organizations so that they do not adopt them.

The first requirement to be taken to avoid the organizational problems encountered in dairy sector in Turkey is, to define the organizational objectives well and clear and not to determine common field of activities. Thus, market power of each other will not be weakened. Current organizations should have a mentality to act as if they were a single producer on the basis of province, district and village. Organizations in dairy cattle should be organized among themselves and formed to intensive organization model instead of spread model. They should make cooperation with other organizations and their upper units to have high marketing power therefore taking more active role in defined politics should be provided.

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Economic Aspects of Dairy Goat Farming in Turkey

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Abstract

There are approximately 996 million goats in the world. The share of Turkey in the global goat population and goat milk production is 0.73% and 1.79%, respectively. Goat breeding in Turkey has been performed either within an agricultural facility or in form of village herd or migratory herd. However intensive organizations providing milk for the dairy farms producing cheese have performed their activities for the matter involved also in recent years. Today, problems encountered by farmers are available also and they have to be solved by various precautions. Main purpose of this study is to analyze the economic aspects of dairy goat farming between 2003 and 2012 in Turkey and to offer solutions for the encountered problems. Statistical data for 2003-2012, used in the study have been obtained from FAOSTAT and TurkStat. Data obtained have been shown in the tables issued by the use of percentage and index calculations.

Keywords: Goat breeding, small ruminant, goat milk, goat cheese, goat milk marketing.

Introduction

According to the data of FAOSTAT for 2012 there are approximately 996 million goats in the world. Production of goat milk in the world between 2003 and 2012 has increased 24.39%. Most important countries in goat milk production in 2012 are respectively India (26.67%), Bangladesh (14.61%), Pakistan (4.36%), Mali (4.00%), France (3.49%) and Spain (2.48%). The share of Turkey in the global goat population and goat milk production is 0.73% and 1.79%, respectively (FAOSTAT, 2014).

Goat breeding in Turkey has been performed either within an agricultural facility or in form of village herd or migratory herd. However intensive organizations providing milk for the dairy farms producing cheese have performed their activities for the matter involved also in recent years. Hair goats which are available in every region of Anatolia constitute approximately 98% of goat population. In the recent years, Saanen cross breeding have been observed to be developed in Aegean and Marmara Regions (Kaymakci and Engindeniz, 2010).

Some studies on economical of aspects of dairy goat farming in Turkey have been done (Dellal et al., 2002; Tan and Dellal, 2004; Dellal and Dellal, 2005; Dellal et al., 2008; Keskin et al., 2008; Paksoy and Ozcelik, 2008; Demircan et al., 2008; Akturk et al., 2009; Engindeniz and Ucar, 2014a; Engindeniz and Ucar, 2014b). But these studies should be repeated in the course of time and solutions should be produced for related problems. Main purpose of this study is to analyze the developments in goat milk production between 2003 and 2012 in Turkey and to offer solutions for the encountered problems. Statistical data for 2003-2012, used in the study have been obtained from FAOSTAT and Turkish Statistical Institute (TurkStat). Data obtained have been shown in the tables issued by the use of percentage and index calculations.

Goat Population in Turkey

According to the data of TurkStat for 2012 there are still 8.35 million goats in Turkey. Hair goats which are available in every region of Anatolia constitute approximately 98% of goat population. Hair goats are bred commonly in the inner parts and on the side of forests. Other than hair and angora goats in Turkey comparatively a little number of Maltase goats and cross breeds and Kilis cross breeds have been produced respectively at Western Anatolia coastline and in Kilis and its vicinity. In the recent years, Saanen cross breeding have been observed to be developed in Aegean and Marmara Regions (Engindeniz and Ucar, 2014a).

In 2003-2012 period population of Angora goats has increased 25.83% and population of Angora goat has decreased 38.14 %. In the same period total number of goats has increased 23.41%. Share of goats in the population of small ruminant became 21.03% and 23.35% respectively in 2003 and 2012 (Table 1).

Table 1. Developments in the goat population of Turkey

Years	Hair Goats (Head) (1)	Angora Goats (Head) (2)	Total Goats (Head) (1+2)	Index (2003=100)	Share of Goat Population in Small Ruminants (%)
2003	6,516,088	255,587	6,771,675	100.00	21.03
2004	6,379,900	230,037	6,609,937	97.61	20.78
2005	6,284,498	232,966	6,517,464	96.24	20.45
2006	6,433,744	209,550	6,643,294	98.10	20.59
2007	6,095,292	191,066	6,286,358	92.83	19.80
2008	5,435,393	158,168	5,593,561	82.60	18.92
2009	4,981,299	146,986	5,128,285	75.73	19.08
2010	6,140,627	152,606	6,293,233	92.93	21.42
2011	7,126,862	151,091	7,277,953	107.47	22.53
2012	8,199,184	158,102	8,357,286	123.41	23.35

Source: TurkStat (http://www.tuik.gov.tr).

Goat Milk and Products Production in Turkey

The number of milked goats between 2003 and 2012 has increased 12.02%. Hair goats and Angora Goats constitute 98.21 % and 1.79% of 3.50 million goats milked in 2012. 99.39% and 0.61% of 369,249 ton milk produced in 2012 have been produced respectively from hair goats and angora goats. Average milk productivity per milked animal in 2012 was 106.75 kg for hair goats and 35.49 kg for angora goats. Total goat milk produced in 2012 constitutes 2.17% of total milk production (Table 2).

Table 2: Developments in Goat Milk Production of Turkey

Years	Number of Animals Milked (Head)			Milk Production (Tons)				Share of Goat Milk in Total Milk Production
	Hair Goats	Angora Goats	Total Goats	Hair Goats	Angora Goats	Total Goats	Index (2003=100)	
2003	2,999,110	127,546	3,126,656	274,350	3,786	278,136	100.00	2.62
2004	2,379,038	97,536	2,476,574	255,468	3,619	259,087	93.15	2.43
2005	2,331,556	95,437	2,426,993	250,246	3,513	253,759	91.24	2.28
2006	2,334,514	86,128	2,420,642	250,594	3,165	253,759	91.24	2.12
2007	2,190,602	73,027	2,263,629	234,883	2,604	237,487	93.59	1.93
2008	1,937,387	60,302	1,997,689	207,385	2,185	209,570	75.35	1.71
2009	1,778,420	52,393	1,830,813	190,286	1,924	192,210	69.11	1.40
2010	2,516,200	66,339	2,582,539	270,476	2,335	272,811	98.09	2.01
2011	2,968,157	64,954	3,033,111	318,273	2,315	320,588	115.26	2.13
2012	3,439,708	62,564	3,502,272	367,208	2,221	369,429	132.82	2.17

Source: TurkStat (http://www.tuik.gov.tr).

Goat milk products produced generally for family consumption in rural area become wanted today upon the concentration of urbanization and developments in tourism. Firms processing the milks collected from goat farms in the integrated plants manufacture pasteurized milk, cheese, strained yoghurt and butter and put them into market. Furthermore some firms use goat milk in ice-cream production (Savran et al., 2011).

According to data of FAOSTAT for 2012 457,401 ton goat cheese has been produced in the world. Turkey takes 0.02% share in the world with its production of 92 tons. Production of goat cheese has increased 31.43 % in Turkey between 2003 and 2012 (FAOSTAT, 2014).

Marketing of Goat Milk and Products in Turkey

Farmers are dependent on the purchasers fully and unilaterally in the marketing of products. Most important reason of it is the lack of governmental support to this part as well as unorganized state of producers (Kaymakci and Engindeniz, 2010). A great part of the milk produced from goats is consumed within the body of organization. Remaining part is marketed as raw product in dairy farms or processed in cheese and sold to the purchasers in local markets. Goat milk is processed together with cattle milk or cattle and sheep milk in the production of white cheese. According to the results of 2006 Agricultural Enterprise Animal Production Research, 3.3% of total milk quantity produced in agricultural enterprises in research period is goat milk and 42.4% of the produced goat milk is sold in dairy farms (TurkStat, 2014).

Turkish entrepreneurs have imported Saanen and Boer goats from Australia, Togenburgs from Swiss and USA, Damascus Goats from Syria and created a new market of 425 million € in the farms that they have established. Goat farms give the entrepreneurs to take the return of investment in 6-8 years since the amount of investment is little and the price of goat milk is two-and-half times more than the price of cow's milk. Together with recent developments the share of goat milk exceeds 5% in the market of milk and milky products of 5 billion €. Furthermore most preferred goat type in the farms is the Saanen goats which take origin from Australia and may triple milk productivity.

According to the data TurkStat the goat milk price obtained by farmers in Turkey are 409.09 €/tons in 2003, 475.68 €/tons in 2006, 663.41 €/tons in 2010, 663.83 €/tons in 2012, respectively (TurkStat, 2014). However, according to the data FAOSTAT for 2011 the goat milk price obtained by farmers in Turkey is 617.66 €/tons. In this sense Turkey has a similar position with Greece (582.62 €/tons) and production quantity is over Spain (479.15 €/tons), Switzerland (483.69 €/tons) and Albania (346.74 €/tons) (FAOSTAT, 2014).

Total production value of goats (388 million €) in Turkey formed 1.85% of total animal production value in 2012. Further, goat milk production value was 62.78% of total production value of goats. There is no any data of FAOSTAT and TurkStat on web pages related to goat milk and products foreign trade of Turkey. But according to data of TurkStat, live goat import value of Turkey were €85,210 in 2009, €113,668 in 2010, €231,139 in 2011, €246,418 in 2012, respectively (TurkStat, 2014). Recently, Turkey have exported live goats to Azerbaycan.

Conclusion

Various precautions have been taken by the Ministry of Food, Agriculture and Livestock in order to solve the problems of and to develop goat breeding in recent years. For instance interests are subsidized 100% for the livestock sector in the credits given to Agriculture Sector by the Republic of Turkey, Turkish Agricultural Bank and Agricultural Credit Cooperatives and interest free credit application has started to be implemented since 1st August 2010. Interest free 7-year loan has been offered to the producers to make investment in sheep and goat farming within this scope. Further, some supports (the matronly goat support, goat milk premium, vaccination support, support for improving of goat herd, organic goat breeding support etc.) have been applied in 2012 pursuant to the decree No. 2012/3106 taken by the council of ministers on the supports to be made to Agriculture Sector and the notification No. 2012/49 on the codes of practice on Animal Production Supports.

If technical and economic problems encountered by farmers are solve by short- and long-term precautions, goat breeding will make important contributions to the economy of both region and country. However in the event that safety product range to be exported is enlarged, Turkey will be able to compete with other countries. Suggestions both to develop goat breeding and to increase the alternative market opportunities in Turkey are as follows;

- Breed stock flow from breeding organizations to production organizations should be performed highly on the basis of breeding goat.
- Considering different physiological periods in the enterprises involved in the intensive and half-intensive milky goat breeding in closed areas a feeding order should be carried out, which is suitable for the requirements of animals.
- Illegal animal entrance to Turkey should be prevented. When live goat is imported, tested male goats should be selected and appropriate genotypes should be preferred.
- Structural changes are necessary in the medium and long terms as well as the continuance of the supports by price in order to increase the production in goat breeding. For this purpose growth and merge of little and dispersed enterprises and conversion of the enterprises to enterprises specialized in ovine breeding for milk production and related inputs for these enterprises should be provided.
- An organizational model should be prepared based on horizontal and vertical integration within the period from the production of goat products to consumption by consumers. This model will be formed by cooperatives. Cooperatives will be determinative in not only production stage but also in processing and marketing the products. Producers should be promoted in this direction.
- Milk collection order followed by milk processing firms and dairy farms as a production model should be developed the rights of farmers.
- Live stock exchange markets should be developed and legal regulations to encourage cooperative formation should be made.
- EU has important deficits in goat products and this deficit can be met by Turkey in most rational way. This goat breeding in Turkey should be supported directly and indirectly in accordance with EU standards.

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Understanding Consumers' Attitudes toward Fruits and Vegetable Attributes: A Multi-method Analytic Approach

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Abstract

Results from previous work indicated that consumers in making purchasing decisions pay more attention to freshness, taste and hygiene attributes of fruits and vegetables than they do price and nutritional value, when these attributes are considered individually. To shed light on the underlying factors that shape the pattern of reported preferences, fresh fruit and vegetable attributes derived from a FPC model were separately regressed using five doubly censored Tobit models in which the attributes: nutrition value, hygiene, taste, price and freshness as dependent variables and a number of demographic and personal characteristics as explanatory variables. The sample was drawn proportionate to population size by county in Georgia, North Carolina and South Carolina. Data were collected from a random sample of 412 respondents. Results show that higher levels of education and income do not affect the level of importance consumers' accord to the nutritional value of fresh fruits and vegetables. The relative lack of difference among consumers as classified in the model, along with the results that show consumers giving a higher preference rating to hygiene, taste and prices offer support for the notion that the nutritive value attribute plays a subsidiary role in consumers purchasing decisions. Results also show that education makes little difference in consumers' evaluation of this attribute. This finding seems to explain the increasing realization that education alone may not be effective in persuading consumers to eat more fresh fruits and vegetables.

Keywords:Consumer prefences, fresh fruit and vegetables

Introduction

Success in realizing increased dietary intake of fruit and vegetables will depend in part on knowledge of consumer preferences for the attributes of fresh fruits and vegetables and the underlying factors that shape these preferences. Recognizing that consumers differ in their preferences for the attributes of fresh fruits and vegetables, and that consumers take into account more than one attribute of fresh fruits and vegetables in making their purchase decisions, and also realizing that personal and other demographic features of consumers impact choice and behavior, a multi-method approach adds scope and depth to our understanding of consumers attitude and behavior toward fresh fruits and vegetable attributes. Fuzzy pairwise comparison and Tobit analysis along with insights from multidimensional scaling will provide farmers, health professionals and policy makers with the insight they need to customize their products and services to meet the needs of specific groups of consumers instead of producing a generic, one-size-fits-all product or service.

Materials and Method

The sample for this study was designed following the protocol described by Dillman et al. (2009). The sample was drawn proportionate to population size by county in Georgia, North Carolina and South Carolina. Based on the sampling frame parameters, the required sample was purchased from Survey Sampling Inc. Researchers designed and formatted a Fuzzy Pair-wise Comparison (FPC) questionnaire to be compatible with the data collection protocol of Survey Monkey, and trained enumerators to use the questionnaire to collect the data. Enumerators asked consumers to make pair-wise comparisons of five food attributes: nutritional value, hygiene, taste, affordable price and freshness to determine their preference for one attribute over the other. Data were collected from a random sample of 412 respondents.

The data collected was analyzed in a previous study that employed fuzzy pairwise comparison (FPC) to profile consumer preferences (Gunden and Thomas, 2012). The Fuzzy matrix R (Van Kooten et al., 1986) can be represented as follows:

$$R_{ij} = \begin{cases} 0 & if\ i = j\ \forall\ i, j = 1, \ldots, n \\ r_{ij} & if\ i \neq j\ \forall\ i, j = 1, \ldots, n \end{cases} \quad (1)$$

In the FPC method, a measure of preference, μ can be calculated for each attribute by using the consumer's preference matrix R. The intensity of each preference is measured separately using the following equation:

$$\mu_j = 1 - \left(\sum_{i=1}^{n} R_{ij}^2 / (n-1) \right)^{1/2} \quad (2)$$

μj has a range in the closed interval [0,1]. A larger value of μj indicates greater intensity of preference for attribute j. In identifying consumer preferences, researchers ranked the importance of the attributes following Gao et al. (2011). In the current study, preference measures derived from a FPC model were separately regressed on demographic variables using five censored Tobit models as a means of identifying the underlying factors that drive the expression of respondents' preferences.

The Tobit model is specified as follows:

$$\begin{aligned} Y_{ij} &= \beta_0 + \sum_{i=1}^{N} \beta_i X_i + u_i \qquad if\ u_i > -\beta_0 - \sum_{i=1}^{N} \beta_i X_i \\ Y_{ij} &= 0 \qquad\qquad\qquad\qquad if\ u_i \leq -\beta_0 - \sum_{i=1}^{N} \beta_i X_i \end{aligned} \quad (3)$$

where Yij; is the measure of preference for attributes (nutrition value, hygiene, taste, price and freshness), i; Xi's are explanatory variables that influence preference of the attributes, N is the number of explanatory variables, β and u are parameters of the model and random error term respectively. Since the consumer preference measures are censored between zero and one, the doubly censored Tobit model is chosen in this study (Ramanathan, 1998).

Results and Discussion

Descriptive statistics for consumers' pair-wise comparisons of the attributes of fresh fruit and vegetables, ranked from most to least preferred, derived from FPC analysis were as follows: freshness 0.579, taste (0.452), hygiene (0.449), nutritional value (0.428) and affordable price (0.411).

Table 1 shows the results of five Tobit models. For each categorical variable the models use a reference variable for comparison. For example, single is a reference variable for marital status, which means the other categories of marital status are compared to single. Following this convention, African American is the reference variable for race, unemployed category is the reference for employment status, and low income level is the reference category for income.

Model 1 *(Nutritional value)*: Apart from single consumers and unemployed, there is no difference between the other consumers, as classified in the model. Contrary to what is expected, higher levels of education and income do not affect the level of importance consumers accord to the nutritional value of fresh fruits and vegetables. Nutritional value may be playing a subsidiary role in consumers' purchasing decision regarding fresh fruits and vegetables, since consumers indicate a higher level of preference for hygiene, taste and freshness.

Model 2 *(Hygiene)*: As may be expected, females care more about the hygiene of foods than do males. Neither the race nor education level of consumers change the level of preference assigned to the hygiene of fresh fruits and vegetables. Generally speaking, all consumers are concerned with the hygienic features of fresh fruits and vegetables given preference scores reported above, which is consistent with the assumption of that hygiene is the default attribute of fresh fruits and vegetables.

Table 1: The results of five Tobit models

Variable	*Model 1:* Nutrition Value	*Model 2:* Hygiene	*Model 3:* Taste	*Model 4:* Price	*Model 5:* Freshness
	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)	Coefficient (Std. Error)
Constant	0.46501*** *(0.02944)*	0.48461*** *(0.03457)*	0.44676*** *(0.03047)*	.46601*** *(0.03636)*	0.49429*** *(0.04070)*
GENDER	-0.00922 *(0.01305)*	-.02782* *(0.01532)*	0.01696 *(0.01350)*	-0.03528** *(0.01612)*	0.01786 *(0.01806)*
AGE	-0.00060 *(0.00048)*	-0.00038 *(0.00056)*	0.000177 *(0.00049)*	0000587 *(0.00059)*	0.00099 *(0.00066)*
EDUCATION	0.00678 *(0.01499)*	-0.00935 *(0.01761)*	0.01084 *(0.01552)*	-0.04552** *(0.01854)*	0.00586 *(0.02074)*
MARITAL STATUS_MARRIED	0.01614 *(0.01104)*	0.00188 *(0.01296)*	-0.00649 *(0.01143)*	-0.01611 *(0.01363)*	0.00284 *(0.01529)*
MARITAL STATUS_SEPARATED	-0.05591** *(0.02522)*	0.00513 *(0.02961)*	-0.02799 *(0.02610)*	-0.02256 *(0.03112)*	.06173* *(0.03499)*
MARITAL STATUS_DIVORCED	0.02460 *(0.01956)*	0.01931 *(0.02296)*	0.02029 *(0.02024)*	0.03044 *(0.02413)*	-0.04251 *(0.02700)*
MARITAL STATUS_WIDOWED	0.01523 *(0.01907)*	-0.02634 *(0.02239)*	0.01420 *(0.01974)*	0.00833 *(0.02353)*	-0.02215 *(0.02634)*
RACE_WHITE	0.01231 *(0.01326)*	0.01605 *(0.01558)*	0.01400 *(0.01373)*	-0.01252 *(0.01638)*	-0.01848 *(0.01834)*
RACE_ASIAN	0.08198 *(0.06319)*	0.02412 *(0.07421)*	0.02013 *(0.06542)*	-0.02335 *(0.07798)*	0.04363 *(0.08723)*
RACE_NATIVE AMERICAN	-0.02689 *(0.04852)*	-0.01906 *(0.05698)*	0.06466 *(0.05023)*	0.01549 *(0.05988)*	-0.00979 *(0.06691)*
RACE_HISPANIC	-0.05598 *(0.04857)*	-0.03942 *(0.05703)*	0.02750 *(0.05028)*	0.12490** *(0.05993)*	-0.08600 *(0.06696)*
RACE_OTHER	-0.01140 *(0.04241)*	0.01824 *(0.04980)*	-0.12626*** *(0.04390)*	-0.10437** *(0.05233)*	0.07052 *(0.05892)*
EMPLOYEMENT_PARTTIME	-0.01165 *(0.02181)*	-0.02186 *(0.02562)*	-0.00291 *(0.02258)*	0.02114 *(0.02692)*	0.03638 *(0.03015)*
EMPLOYEMENT_FULLTIME	-.03717** *(0.01634)*	-0.03110 *(0.01919)*	-0.02214 *(0.01692)*	-0.02103 *(0.02019)*	.07062*** *(0.02262)*
SALARY_MIDLEVEL	-0.00918 *(0.01562)*	-0.01738 *(0.01835)*	0.02370 *(0.01617)*	-0.00583 *(0.01929)*	-0.00110 *(0.02160)*
SALARY_UPPERLEVEL	0.00245 *(0.02000)*	0.03548 *(0.02348)*	-0.03564* *(0.02070)*	-0.04724* *(0.02472)*	0.01878 *(0.02768)*
Sigma	0.11912*** *(0.00415)*	0.13988*** *(0.00488)*	0.12332*** *(0.00430)*	0.14699*** *(0.00522)*	0.16420*** *(0.00612)*

Model 3 *(Taste)*: An interesting finding is that high income consumers are less interested in the taste of fresh fruits and vegetables. This may mean that high income consumers' perception of taste is different from other consumers or the taste of high priced fresh fruits and vegetables produced primarily for high income consumers is different from the commonly grown low priced fresh fruits and vegetables.

Model 4 *(Price)*: Females are more sensitive to the price of fresh fruits and vegetables than males. Consumers with higher levels of education, particularly the ones with BS degree, are less sensitive to price of fresh fruits and vegetables. As expected, upper level income consumers are not concerned with fresh fruit and vegetable prices.

Model 5 *(Freshness)*: differences in attitude to the attributes of fresh fruits and vegetables are observed for consumers classified in terms of marital status and employment. All the other consumers, as classified in the model, accord equal significance to the freshness attribute of fresh fruits and vegetables. Naturally nobody wants to buy food that is not fresh.

Conclusion

Consumers in making purchasing decisions pay more attention to freshness, taste and hygiene attributes of fresh fruits and vegetables than they do price and nutritional value, when these attributes are considered individually. However, multidimensional scaling shows that consumers tend to associate taste and price in making purchasing decisions under conditions of reduced freshness, nutritive value and hygiene (Gunden and Thomas, 2012). In this case, it may be that consumers use the attributes of price and taste to guide their purchasing decisions if the hygiene, freshness and nutritive value of fruits and vegetables are in question. As Model one in the Tobit analysis indicates, there is no difference among consumers in their evaluation of the nutritive value except for those classified in terms of employment and marital status. This relative lack of difference among consumers, along with the results that show consumers giving a higher preference rating to hygiene, taste and prices offer support for the notion that the nutritive value attribute plays a subsidiary role in consumers purchasing decisions. The Tobit Model results also show that education makes little difference in consumers' evaluation of the attributes. This finding seems to explain why education alone may not be an effective tool in persuading consumers to include more fresh fruits and vegetables in their diets. And certainly goes a long way in explaining the failure, up to now, of programs relying on education strategies to modify food purchase and dietary behavior. In the context of massive advertisement of other foods products and the powerful salience of immediate consumption on consumers' attitude and behavior toward food, educational efforts must be strategically targeted toward influencing specific consumer attitudes, behavior and known preferences. These results indicate the need to employ educational strategies to target consumers' preferences as a point of leverage, for example, designing programs to teach consumers to make more tasty meals from fruits and developing strategies to make fresh fruits and vegetables more affordable. Additionally, educate consumers on the connection among the food attributes and their relevance to healthy eating habits and a healthier lifestyle.

In summary, these results present extension with an opportunity to (1) assist farmers in marketing their produce in order to meet the needs of specific groups of consumers and (2) in developing a holistic education program, that teaches consumers to use information available on all the attributes: price, taste, hygiene and nutritional value in making purchasing decisions and in preparing tasty nutritious meals.

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Financing of the Agricultural Sector via Cooperatives in Turkey and in the World

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Abstract
Agricultural enterprises which intend to continue their activities within the framework of economic principles need regular financing like other enterprises. Agriculture's own structure shows itself in financing need, particular importance is given to agricultural sector's financing. Many establishments like banks, the state, agricultural insurance organizations, factoring companies, cooperatives work in the agricultural sector's financing. Cooperatives of these establishments are seen as the third sector in economic system and they are getting important. This report is about how the agriculture sector is financed by states via cooperatives in Turkey and in the world. Unlike the samples in the world, that there is not any cooperative bank which finances the agriculture is seen as the most important deficiency. And the agriculture and the other sectors are expected to provide an effective financing with a cooperative bank to be founded.
Keywords: Agriculture, finance, cooperative.

Introduction
Agricultural products which increased in 20 century and a high level of industrialization has caused to be attracted attention about financing. Financing of agriculture which is the most important step of capital accumulation is one of the most interesting topics in this process.

Like all enterprises, the main aim of agricultural enterprises is to maintain activities in the framework of economic principles. An agricultural enterprise needs financing at each stage like production, marketing and even after marketing. Financing of agriculture supplies a number of distinctive features like other sectors. These features are based on the people who finance activities, use operation and credit (Bülbül 2006, Kazancı 2010, Yılmaz 2008).

Agricultural production structure –based features: Agricultural activities need a long production process. Although expenses (Planting, fertilizing, watering, hoeing, harvesting, harvesting, marketing etc.) in agriculture are more than once in different terms, generally income is obtained once during production. Agricultural enterprises may have cash crunch during production. The maturity of agricultural credits should be arranged more elaborate than the credits of other sectors. Generally in agricultural sector, credit interest rates are kept within a certain limit by law. And also because agricultural sector depends on natural conditions more than others, natural, social and political risks to be felt more in agriculture ect. many features of the structure of agriculture requires that financing of agriculture should be studied quite sensitively.

Small and disorganized enterprises-based features: Generally agricultural enterprises are small and disorganized in Turkey and these causes not to supply their financing needs appropriately. Providing credits to most of small enterprises is a risky factor for financial institutions and so the number of transactions increases and profit decreases. In the future financing of the agricultural sector will have important impression and be good.

Personal characteristics of credit users- based features: In Turkey farmers have low level of education so they have low level of information about financing. Between financial institutions and farmers there is a misunderstanding of reciprocal rights and obligations clearly and this causes that farmers avoid using credits. Besides farmers can collateral only their land and the house they live and if they cannot pay credit, they have some trouble in their social life.

Generally agricultural sector is financed by government, private and public banks, leasing companies, factoring companies, agricultural insurance, futures markets and cooperatives. In this

report‘s subject is that agricultural sector is financed by cooperatives in Turkey and some chosen countries.

Agriculture Is Financed By Cooperatives: Turkey Applications

Cooperative which is defined as “Organized Cooperation” is often in production (agriculture), marketing, purchasing, housing, services areas. In International Cooperative Union (ICA)’ definition, cooperative is defined clearly as a “operating”. Agricultural cooperatives are self-governing organizations which are created by producer and controlled democratically to provide common needs and desires which cannot be supplied by producers, themselves, in appropriate circumstances (Mülayim 2006).

In these cooperatives, Turkey Agricultural Credit Cooperatives (TKK: TACC) service to find financial sources in shareholder’s suitable proportions. TKK was established according to the Agricultural Credit Cooperatives Associations Law of the dated 1972 and of numbered 1581 and. The aims of TKK are to supply sources and credits, to reduce interest rate, to make recommendations on credit, to use the borrowed credits in production and to increase agricultural production. TKK has 16 regions, 1 Central Union, 1690 units of cooperative and more than 1.5 million shareholders (www.tarimkredi.org.tr, Tanrıvermiş and Bayaner 2006).

The financial resources of TKK are equity and external resources. These resources are shares of cooperative shareholders, domestic resources and reserve capital coming from reserve funds and undistributed earnings, accumulation of cooperative and interest earnings (Cooperatives have farmers use the sources which they use from T.R Ziraat Bank by adding margin to resource cost) and depts which TKK supplies from other resources to give credits. Resources used from T.R. Ziraat Bank are allotted as placement. Every credits which are taken from bank by cooperatives, are used in the form of current account within placement Money which is taken from shareholders , is invested in cooperative account in bank, if placement is suitable for lending money, it reuses but if it is not, new placement is demanded (Taşkıran 2011, Tanrıvermiş and Bayaner 2006).

Credits given to shareholders by TKK divided two groups. These are short-term business credits (general purpose, seed, fertilizers, pesticides animal husbandry) and medium-term investment and credits for equipment (tools and machinery, livestock and other equipment credits). Generally TKK’s shareholders benefit business credits. While business credits are opened with a 1-year maturity, it is up to 3 years in investment credits. In equipment credits, 1/10 of this credit is taken from farmers for capital share. And agricultural inputs and raw materials are sold to shareholders by TKK. .TKK’s operating activities are expanded with law of numbered 5330 and of date 06.04.2005. Goods and commodities sales activities made to shareholders by TKK are excluded from taxes with the same law (www.tarimkredi.org.tr, Tanrıvermiş and Bayaner 2006).

Except TKK, there are some cooperatives like agricultural sales cooperatives which provide credits to the agricultural sector, Tea Growers Production Cooperatives. While TKK generally finance in cash to the agricultural sector, other cooperatives finance in kind. For example Tariş S. S. Fig Sales Cooperatives Union provides inputs about production to shareholders and it researches in the areas of production, plant health, productivity, quality and evaluation with AR-GE center coordination and they offer information resources to their producers (www.tarisincir.com, Tanrıvermiş and Bayaner 2006).

Agriculture Is Financed By Cooperatives: Applications From Some Chosen Countries

Turkish Republic of Northern Cyprus: Sources of cooperatives which work for financing of the agricultural sector in the TRNC consist of equity and external resources. While equity resources of capital are taken from shareholders and this capital composes deposit which is in the Cooperative Central Bank and interest which is obtained from this deposit, external resources composes credits which is taken from Cooperative Central Bank to supply the short and long-term needs of shareholders. Cooperative Central Bank both provides income to be financed agriculture for other cooperatives and contributes to agricultural financing with the credit policy which is also applied by itself and by other means (Şafaklı 2003). As well as it is a

cooperative, Cooperative Central Bank which is deposit banking was established with the participation of all cooperatives which are in the country and operate. Cooperative Central Bank provide credits whose maturity is a year and which are TL, to other cooperatives or farmers who applied individually to supply for their every input needs and Cooperative Central Bank gives credits whose maturity is up to three years and which are TL and foreign currency, to supply of equipment like tractors, harvesters, etc. and agricultural project credits whose maturity is up to five years and it gives flexible payment plans in the payment of credits by taking into account the structure of agricultural production (www.koopbank.com).

Cooperative Central Bank supplies sources for other cooperatives by giving higher interest than deposit which belongs to other individuals and also applies lower interest rate to credits which cooperatives use from itself. In this way, Bank contributes to financing of the agricultural sector and to the development of the cooperative movement in the TRNC.

Federal Republic of Germany: Germany has one of the most developed systems about financing of agricultural sector in the world. There are three different financing structures in the system of Germany. **(1) Local Banks- Raiffeisen Banken:** In the country there are more than 2000 active cooperatives. These banks are connected with legal personality of cooperative; they provide not only financial services but also services concerning agricultural activities like fuel, fertilizer, seed, harvest, storage, marketing and recycling. **(2) Deutsche-Zentrale Genossenschaftbank:** This bank operates as center of the top organizations of Volksbanken and Raiffeisenbanken which are in the southern of the country. It is the biggest economic organization with 5300 cooperatives and 17 million shareholders. It aims to reduce costs by creating synergies between parent organizations cooperatives which offer services like compliance policy, international relations, legal and tax consulting, human resources and inspection. **(3) WGZ Bank** is the central organization of Volksbanken and Raiffeisenbanken which are in the northern of the country. It is expected that in the different region these two top organizations will unite in the near future (Kandemir 2010).

Sources of credits which will be opened to agricultural enterprises by cooperatives are savings of unlimited liability members. To direct people's savings to cooperatives necessary atmosphere of trust is maintained with manufacturer's representatives who are chosen among local union and other local administrators by bringing them to co-management. To provide the equivalence between the sources and uses and make easy to control, there are two top central banks (DZ Bank and WGZ Bank) which take the task of clearing center and gather all system. Raiffeisen cooperatives are connected with 11 regional unions. Besides at the national level, there are German Raiffeisen Union, Federal Association of the German Volks and Raiffeisen Bank, small-scale industry of the Central Union and these are connected with German Cooperative and Raiffeisen Confederation. By establishing banks which accept deposit, cooperatives' opening branches, establishing commercial establishments, warehouses and factories are symbols of competition. In Raiffeisen cooperatives, the number of the shareholders is not more than 100 and their shareholders work on the basis of unlimited liability principle and the funds which they use are intended for long-term agricultural projects. They supply necessary technical and financial support to be successful of shareholders' activities by observing the projects where cooperatives use low-interest funds. The profits from these projects are transferred to reserves so their financial structure grows stronger (Kandemir 2010, Küçükkaplan 2003).

Japan: According to data in the end of 2008, Japan obtained 1.7% of 4.534 billion dollars of GSMH from agriculture. The share of total employment in agriculture is around 4%. In spite of this, agricultural lobby is quite effective and this efficiency is to ensure the protection by the state of agricultural markets. Besides agricultural production costs and product prices in the country are much higher than world market (Çakıroğlu 2008).

Norinchukin Bank is a Japan agricultural financing and cooperatives bank and it is one of the biggest banks in the world. Agricultural credit in Japan consists of cooperative network and Norinchukin Bank is in the center of this network. Cooperative network has a three-layer

structure which consists of agricultural cooperatives, regional federations and national federations. In the minimal level, agricultural cooperatives divided into two groups: General and specific. General cooperatives service like sales and supply, solidarity insurance, guidance except collecting deposits and lending credits. Federations at regional level include Central Union of Agricultural Cooperatives, Agricultural Cooperative Economic Federation, Solidarity Insurance Federation of Agricultural Cooperatives, Agricultural Credit Cooperatives and federations in other specific areas of Agricultural Cooperatives. Each of them is connected with central organization and continues to operate. Financial institutions that are associated with agricultural cooperative develop some project like attaining a stronger financial structure by combining of cooperatives and integrating regional federation to national federation to strengthen the management base (Kandemir 2001, Yılmaz 2008).

Conclusion

Cooperatives which are third sectors besides private and public sectors in economic system and whose importance is growing are seen to be one of the most effective organ to benefit in financing of agricultural sector because of peculiar structure of agriculture. Cooperatives in the financing of agricultural sector in the world (TRNC, German, Japan) are located effectively through a cooperative bank. In Turkey, cooperatives which provide credits to their shareholders provide these credits from their own resources or banks like Ziraat Bank. Because of this, it is important that a cooperative should be established to be useful for cooperatives which will take a task of financing of agricultural sector and also are located in other sectors.

A Cooperative Bank which will be established should cover all sectors. And so operating costs can be withdrew to the possible lowest level. Besides, the difference of credit needs (maturity, amount etc.) of sectors and A Cooperative Bank which cover all sectors like this would have deposits and credits in its portfolio belonging to different sectors and reduce the risk by diversification.

If cooperative shareholders and cooperatives made banking transactions with cooperative bank which will be established, the bank's financial structure would enrich. In addition by adhering to the principle of cooperative, banks should distribute risturn to cooperative shareholders and cooperatives holding their deposits.

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Agricultural Potentials in Central African Republic

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Abstract

The Central African Republic has relatively abundant natural resources and agro-ecological conditions generally favorable to agriculture and livestock. The Central African Agriculture employs about 75% of the total population and contributes above 55% to the national GDP. It contains food production (29%), cash crops (1.7%), livestock (13.3%), hunting and gathering (3.1%), fishing (1.8%) and forestry (6%).

The Agricultural potential (crops and livestock) of the country is one of the highest on the African continent. Over 25 % of the land is arable and more than 35 % of the land covered by good quality pasture. Agro-demographic potential land is about 80 million people, while the population of the country is 4.5 million. It is the same case in animal production of which offer is currently at least three times lower than the potential burden. Central African rain forests cover an area of 5.300.000 ha or 0.85 % of the national territory. It houses one of the richest fauna of Central African region with the presence of large mammals, predators and several species of game.

This unfortunately has not allowed Central African Republic to achieve food self-sufficiency due to socio- political, technological and economic problems. The main goal of the new authorities of the country is to implement a new agricultural development policy in order to achieve sooner food self-sufficiency.

Keywords: Agriculture, potentials, CAR

Introduction

According to the Ministry of Agriculture and Rural Development of CAR, the country is endowed with huge and varied natural resources: good rainfall, a dense river network, a rich soil, a basement with significant mineral potential of forests and a variety of savannah, a diverse and abundant wild fauna. The terrain consists of a 2,000–3,000 ft. (610–910 m) undulating plateau, mainly covered by savanna; dense tropical forests in the south; and a semi desert area in the east. The Bongo Massif in the northeast reaches a height of 4.500 feet (1.370 m). The country is drained by numerous rivers, but only the Ubangi is commercially navigable. Rainfall is heavy in the south; the north is hot, dry, and subject to harmattan winds.

Despite this potential, the country moved in a continuous cycle of impoverishment. In addition, although internal management problems exist, it must be added that only few foreign countries actually support the development of Agriculture in Central Africa.

The main objective of this work is to raise international awareness on both the potential and the fragility of the Central African Agriculture. This presentation also aims to encourage foreign investors to invest in the development of the Agriculture in Central African Republic which is one of the best potential granaries of the world. Our working hypothesis is: the Agriculture of CAR cannot develop without foreign investment.

Methodology

Materials and methods

We have relied primarily on literature review to complete this work. Reviews, articles and books related to our topic have been consulted. The Internet has also been a major source of our documentation. Sites that publish articles, reviews and discussion forums were visited. Finally information gathered has been analyzed, ranged and interpreted. Since in our study we only used the raw data as found in the literature, the preferred criteria during collecting data related to the source of the document, the relevance of the topic and its relation to our subject. Thus, by comparing and analyzing each statistic found we were able to conduct this study to completion.

Results

Importance of Agriculture in Central African Republic

As shown in Table 1, Agriculture is at the center of the Central African economy by the wealth it generates, its contribution to employment, food self-sufficiency and the fight against poverty (BEAC, 2008). Indeed, analysis of national accounts shows that the Central Agriculture occupies 1.3 million people, nearly 76% of the workforce. It is therefore the main driver of the Central African economy (Monkan, 2005).

Table 1: Importance of agriculture in the various branches of activities in CAR (Monkan, 2005)

Branchs	Added value	%	Employment	%	Export	%
Food agriculture	148185	29.0	1030185	65.1	333	0.2
Export agriculture	8536	1.7	43631	2.8	10459	7.1
Forestry, logging and timber industry	31150	6.0	75887	4.8	20639	14.0
hunting and gathering	15952	3.1	58069	3.7	-	-
Fisheries	9347	1.8	28707	1.8	-	-
Breeding	68248	13.3	104657	6.6	4902	3.3
Ores and minerals	24366	4.8	61480	3.9	39295	26.7
Manufacturing industries	8806	1.7	17642	1.1	395	0.3
Buildings and Public Works (BPW)	15807	3.1	14413	0.9	-	-
Banking and insurance	5122	1.0	437	0.0	-	-
Transport and communication	19906	3.9	12051	0.8	9409	6.4
Hotels and restaurants	5465	1.1	17232	1.1	-	-

Farming Systems

Main production tools

The main agricultural inputs used in the CAR remained still rudimentary tools and even archaic. It consists of hoes, ax, machete. However we can also mention the use of animal traction as an alternative to strengthen the hand tools (Endjikpeno, 2009). This has been used particularly in the context of animal traction was initiated and adopted in the 70s.

Agricultural inputs:

Central African farmers have a very limited use of NPK fertilizers compared to other farmers across the sub-region (Endikpeno, 2009). This can be explained by the fact that the amount of fertilizer relative to the total arable land is 0.6 kg per hectare for CAR against 5.0 kg / ha for Cameroon, 7kg/ha for Burkina Faso, 8kg/ha for Mali, 15kg/ha for Benin and 22kg/ha for Ivory Coast.

Cropping systems

The agriculture of CAR is broadly divided into three major agricultural areas. Subsistence farming is the most practiced in Central African Republic. It provides (Table 2) necessary nutrients that provide the staple food of people. It produces legumes (peanuts, beans, peas, greens and bananas), tubers and other root crops (cassava, sweet potato, yams) and cereals (maize, millet, squash, rice etc.). According to the BEAC (Bank of Central African States) in 2008, cash crops in Central African Republic include speculation as cotton (120.000 producers), coffee (60.000 ha, source of income of nearly 10% of the population), palm oil (250 ha of plantations, 300 tons of palm oil per year).

Forest and its contribution to the national economy

Central African rain forests cover an area of 5.300.000 ha or 0.85% of the national territory. The production of Forestry Sector totaled 671,200 m3 of logs whose 278,100 m3 were exported in 2001 and the rest 393,100 m3 was transformed into timber (planks, rafters, battens) and plywood for local markets but also export. High-value species such as: Sappeli, Sipo, the

Kossipo, Tiama, the Dibetou, the Bossé, Iroko, the Amiégré, Ebony, Padouk and Ayous among those which are most exploited and exported (Mahode et al, 2002.). The most consumed and having a significant economic importance Non-Timber Forest Products (NTFPs) are: *Gnetum africanum, Dorstenia sp,* caterpillars, edible mushrooms, wild pepper and and shea.

Wildlife

Central African forest is also the field of : chimpanzee, gorilla, the duikers, brush-tailed porcupines, small insectivores, Bongo, the dwarf buffalo, elephant and various dwarf guenons. Many birds with Parrot (highly sought species), Indicators and the Nighthawks and Galogo live there (MEE, 2010). In Savannah, larger mammals such as the Hippopotamus, Elephants, Big Buffalo, the Elks of Derby, Cob of Buffon, the Cob waterbuck, the hartebeest, the antelope, the duiker, the Baboons, etc.. abound. This abundance of herbivores attracts predators such as Lion, Leopard, Hyena and the Lycaon. Every kind of birds, the Secretary, the Eagles Fishermen, the Guinea Fowl, the Francolins, Ostriches, vultures, the Weavers, Moorhens, the doves, green pigeons, etc., and reptiles such as.: different Snakes, Boa Snake, the Crocodile, the Varans, Giant Turtles are also abundant (Gillet, 1964).

Livestock sector

The proportion of rural households which practice farming activities is estimated at 35.3% (MEE, 2010). The breeds used are very limited despite the hardiness that characterizes productive performance. The CAR has moved from a situation of importing countries of live animals, there is a little more than three decades, to the one of exporter of livestock (FAO, 2012).

According to the MADR (Ministry of Agriculture and Rural Development) in 2003, livestock production in 2000 estimated for the different species are:

- cattle: 69,230 tons of meat (80% of the national total) and 9,500 tons of milk (excluding dairy products imported);
- sheep and goats: 9583 tons of meat (10.62% of total production);
- pigs: 8,748 tons of meat (9.70% of total meat);
- Poultry: 2593 tons of meat (2.88% of total) and 438 tons of eggs.

Mini farming: beekeeping

Beekeeping was a gathering activity, but in recent years it is practiced by rural people as gainful employment. In several prefectures (Ombella-Mpoko, Kemo, Nana-Gribizi, Ouham, Ouham-Pende, Ouaka, Nana-Mambéré, Bamingui-Bangoran, etc.), There are individual and organized beekeepers. These beekeepers produce honey and wax that are flowing with difficulty on markets.

Discussion

As we saw, the Central African agricultural system is non-competitive and must be improved. This lack of competitiveness is explained partly by the predominance of the use of crude and archaic tools such as hoes, machetes, shovels in the production system, and other part, this is due to the non-agricultural diversification and insufficient use of fertilizers in the cropping system. As a result, its productivity remains lower. That situation cannot allow paying correctly producers.

In fact, there will be no potential development in Central Africa without an increase in agricultural productivity. This improvement in the productivity may be achieved first by using mechanized farming practice and improved inputs, then by a bold investment program with all appropriate measures (Kanga and Bernoussi, 2012).

CAR has significant natural resources. Agricultural potential is likely to be a source of supply for countries in the sub-region and serve as a basis for sustainable growth, export-oriented sectors and the emergence of an integrated development.

Unfortunately, very few agricultural business exist in Central Africa. Those that exist are outdated and are not economically profitable. Many conflicts experienced by the country have shattered this small heritage. The latest to be completely destroyed is National Federation of Central African farmers during 2014.

Despite its significant natural resources, the country does not attract as investors than its neighbors, especially those in emerging countries. This situation is the direct result of political instability and armed conflicts that have characterized the CAR until a recent period. It is also explained by the lack of visibility of the potential investors for the conduct of state structures, particularly regarding the protection of their capital.

Conclusion and Suggestions

From the analysis of the history of almost all countries (USA, Japan, China, Korea, Germany, Côte d'Ivoire, Sierra Leone, South Africa etc.) we can draw two lessons:

- The true and the first wealth of a country is the Human;
- No country can develop without foreign investment.

Agricultural potential of CAR are immense, as we have just demonstrated. However, lack of resources and funds for its operations in that country remains one of the poorest on the planet.

Finally, we say that CAR needs foreign capital to develop its agriculture. By the fact that it's the basis of the Economy of the country, the development of agriculture will result at the same time all other sectors like communication, transportation, education and food security. The Government should create all favorable conditions for attracting foreign investors while ensuring its own interests and those of investors in a profitable partnership.

That's why, to strengthen the system of Central African agricultural production, we propose the following measures:

- Develop human capital (the first and most important inputs) and use of modern inputs;
- Position the cropping system in modern intensive and extensive farming to maximize agricultural yields;
- Diversify the agricultural production in order to increase the number of agricultural exports and also to consider their diversifications;
- Develop partnership with emerging countries in the field of agriculture.

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Analysis of Balance Sheet and Income Statement of Meat Processing Companies in Bosnia and Herzegovına

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Abstract

Balance sheet and income statement are core documents of the financial reports that business entities are required to submit at the end of each year. In addition to the obligations, business entities constitute these balances in order to realize their financial position i.e. to realize the value of assets, obligations and capital of a legal entity, or the success of work and creating added value. Meat processing sector in Bosnia and Herzegovina makes a very important branch of the food industry.

The aim of the work within this paper was the analysis of economic position on meat processing companies in Bosnia and Herzegovina on the basis of balance sheet and income statement for the period 2008-2010. General analysis of meat processing sector was performed prior to financial reports analysis. Financial statements have been analyzed in accordance with the scientific-research methodology, by mean of horizontal and vertical analysis. Meat processing sector in BH is dominated by very small and small enterprises with no recent trend of enlargement. Increase of assets of 14.33 % is caused by increase of capital within liabilities. The dominant growth in revenues over expenditures led to a growth of profit of 56.48 %. Profit was accomplished by about 70% of meat processing companies.

Keywords: Meat processing, business analysis, balance sheet, income statement.

Introduction

Analyses should precede any plan, strategy or activity because it is the foundation of any improvement process. According to Kulelija, B. (2012), meat processing sector is very important for Bosnia and Herzegovina since it is characterized by three courses of action. The first course of action is focused on the dining table, and thus allows customers to meet their needs. The second course of action is aimed at contribution to society, as companies through the creation of added value pay taxes to the state. The third course of action is the action of the primary agricultural production.

The analysis that was conducted within this paper refers to the period 2008-2010. For the purpose of this research balance sheets and income statements of all meat processing companies in Bosnia and Herzegovina were collected and analyzed. Analysis of the meat processing business was conducted with the aim to identify the strengths and weaknesses of meat processors in terms of their resources, the relation between and within obligations and capital, and the relation in terms of revenues and expenditures.

Material and Methods

Business analysis of meat processing companies in Bosnia and Herzegovina for the period 2008-2010 was based on analysis of secondary data. Balance sheet and income statement were obtained from AFIP (Agency for the financial, IT and intermediary services, dd Sarajevo- FBH) and FIPA (Agency for Intermediary, IT and financial services, Banja Luka- RS).

According to Kovacevic at all (2007), the balance sheet provides a current picture of the value of assets, liabilities and capital of a legal entity on the last day of the accounting period with comparative data of the same items on the last day of the previous period, while the income statement is defined as a basic report of business performance of economic society and the performance of its management.

Based on these data from the financial statements of all 101 companies in Bosnia and Herzegovina dealing with meat processing in the period 2008-2010, abbreviated form of the balance sheet and income statement was created and analyzed. Analysis encompassed horizontal and vertical analysis of balance sheet and income statement in accordance with methodology applied by Basic (2007), Bogetic(2000), Ognjenovic, Dragana(2009), Zager and Zager (1999), and Osrag (1997).

Results

Review of the number of meat processing companies in BH by size is presented in following Table.

Table 1. Structure of meat processing in B&H (2008-2010)[1]

Type of company	Year			Index
	2008	2009	2010	2008=100
Very small enterprises (up to 10 employees)	58	61	58	100.00
Small enterprises (11-50 employees)	26	25	28	107.69
Medium enterprises (51-250 employees)	17	14	14	82.35
Large companies (over 250 employees)	0	1	1	-
Total number of enterprises	101	101	101	100.00

Source: Own calculations based on data from AFIP and FIPA

Meat processing sector in BH is characterized by unfavorable size structure, as dominant share in it had very small and small companies through observed period.

Table 2. The abbreviated Balance sheet of meat processing in B&H (2008-2010) (in BAM)

ASSETS	Year			Index
	2008	2009	2010	2008=100
Fixed assets	2644018	2701586	2860513	108.19
Current assets	1870453	2369889	2309750	123.49
Loss over capital level[2]	31893	28186	27812	87.20
Total assets	4546365	5099662	5198075	114.33
LIABILITIES				
Capital	1776702	2187074	2438260	137.24
Commitments	2769663	2912588	2759815	99.64
Long-term liabilities	985444	844096	839412	85.18
Short-term liabilities	1784219	2068492	1920404	107.63
Total liabilities	4546365	5099662	5198075	114.33

Source: Own calculations based on data from AFIP and FIPA

[1]Because of comprehensive perception of the situation in this sector, the structure was presented. The criterion for the division of enterprises by size the number of employees. was used According to Kushnil (2010), enterprises in BH are divided, according to the number of employees, very small -up to 10 employees, small 11-50 employees, medium 51-250 employees, and large enterprises -over 251 employees.

[2]According to Jahic (2008), if the loss over capital level is determined, it appears after the last position in assets, in order to maintain computational balance of the balance sheet.

Table 3. Structure of the balance sheet of meat processing in BH (2008-2010) (in %)

ASSETS	**Year**		
	2008	**2009**	**2010**
Fixed assets	58.16	52.98	55.03
Current assets	41.14	46.47	44.43
Loss over capital level[3]	0.70	0.55	0.54
Total assets	100.00	100.00	100.00
LIABILITIES			
Capital	39.08	42.89	46.91
Commitments	60.92	57.11	53.09
Long-term liabilities	21.68	16.55	16.15
Short-term liabilities	39.24	40.56	36.94
Total liabilities	100.00	100.00	100.00

Source: Own calculations based on data from AFIP and FIPA

Changes in items within assets and liabilities led to change of balance sheet structure as presented in the table. The structure of bots assets and liabilities was good throughout the observed period. The changes that occurred were positive too, as current assets increased the share in assets, as well as capital within liabilities. Thus, meet processors, in general, managed to maintain liquidity and prospective for financial stability even in the years of economic crisis.

Table 4. Abbreviated income statement of meat processing in BH (2008-2010) (In BAM)

	Godina			**Index**
	2008	**2009**	**2010**	**2008=100**
Total revenue	4884491	5768251	6030843	123.47
Total expenditure	4632618	5336663	5618614	121.28
Profit before tax	311318	468767	487154	156.48
Loss	59445	37179	74926	126.04
Income tax	31132	46877	48715	156.48
Net profit	280186	421890	438439	156.48

Source: Own calculations based on data from AFIP and APIF

Discussion and Conclusion

Few facts obtained from performed analyses should be considered while drawing conclusions on business position of meat processors in Bosnia and Herzegovina.

Meat processing in BH is characterized by unfavorable structure in terms of firm size. Very small and small enterprises account for an average 84% of the total number of enterprises.

Balance positions in assets were variable, but during the three-year observed period there was an increase in fixed assets of 8.19%, current assets increased by 23.49%, which together led to the growth of total assets of 14.33%.

In liabilities, there was a growth thanks to the dominant increase in own capital. It increased by 37.24%. during the observed three years. Long term liabilities were reduced by 14.82%, while the short-term liabilities increased by 7.63%.

The total income of meat processing of FBH and RS in the three-year period has been constantly growing, and recorded an increase of 23.47%, while expenditures increased by 21.28%. This has led to an increase in profit of 56.48%. Also, the value loss recorded an increase of 26.04%. Profit was accomplished by approximately 70% of meat processing companies.

[3]According to Jahic (2008), if it is determined the loss over cpital level, it appears after the last position in the assets, in order to maintain computational balance of the balance sheet.

Taking into account these results it can be concluded that the meat processing sector, although there are unfavorable structure in terms of size of operations, recorded a high value assets, and a favorable balance between liabilities and capital. Also, with the increase in the value of assets that is based on equity growth, continuously growing profit was recorded.

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Building Database for Bosnia and Herzegovina AGMEMOD Model: Challenges and Solutions for Application of Common Methodology

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Abstract

Since Bosnia and Herzegovina (B&H) is a potential candidate country for European Union (EU) accession an adoption of EU analytical tools is an important step towards assessment of likely impacts of B&H EU integration. One of analytical tools is partial equilibrium AGMEMOD model, which has been developed to obtain medium term outlook for agricultural markets as well as to capture the impact of changes in agricultural policies and macroeconomic situation. In order to build the AGMEMOD model for B&H a consistent database containing agro-food balances and macroeconomic indicators has to be built at the first step, and it has to follow common templates and methodology. Availability and quality of data remains the main problem for database completion work regarding B&H AGMEMOD model.

The paper deals with the review of AGMEMOD database construction methodology with respect to B&H situation comparing data sources used for EU countries, looking for similar data providers in B&H and making suggestions regarding other sources from where necessary data can be obtained, e.g., international statistical and projects databases. The paper also provides description of adapted methodology applied for completing supply-demand balances of B&H cereals sector and macroeconomic data template which allows for calculation of derived indicators needed for further modelling work.

Keywords: Data, modelling, agriculture.

Introduction

Since Bosnia and Herzegovina is a potential candidate country for European Union accession, an adoption of EU analytical tools is necessary for assessment of likely impacts of B&H EU integration. It must be taken into account that Bosnia and Herzegovina's agricultural and food market interacts with the EU agricultural commodity markets. Common modelling approach and modelling tool used gives an opportunity to link them in combined modelling system for broader market analysis (Erjavec et.al, 2010). One of analytical tools is a partial equilibrium AGMEMOD model which has been developed to obtain medium term outlook for agricultural markets as well as to capture the likely impact of changes in agricultural policies and macroeconomic situation. The benefits from building the country model can be outlined also as the development of model's database, the forecasts generated at country level within the integrated economic environment; and potential analytical support during B&H and EU negotiations. The first task before to start building the model is collection of data necessary for simulations.

Usually the main provider of data is state statistics office. Producers' organizations use to collect data for their industries as well, so they also play important role in terms of data supply. The fact that administrative division in Bosnia and Herzegovina is organized in two entities – the Federation B&H (FB&H) and the Republic of Srpska (RS), plus internationally supervised - Brcko District, additionally complicates data collection task as the standards between entity's institutes of statistics are often not harmonized. Although the State Agency of Statistic of Bosnia and Herzegovina (BHAS) is authorized for determination of standards, data production and dissemination at state level and international representation, the data available at state level are not as detailed as at entities level because certain data are recorded by one entity's institute but not by the other one. Main statistics can be found through publications of entities' institutes of statistics - Institute for Statistics of FB&H, Institute of Statistics of RS and of Department of

Statistics of Brcko District. BHAS as state agency compiles the data (by simple summing them up) and publishes them on the state level. Statistical data related to agro-food trade and to foreign trade in general is one that is harmonised with international standards completely.

The purpose of this paper is to find a way how to combine the data available from different sources for modelling purposes. There exist numerous examples done by countries included already into AGMEMOD (Salamon et al., 2008), and there is also considerable experience introduced into CAPRI model data base (Britz et al., 2012). The content of the paper includes description of data needs for AGMEMOD model and potential data sources and situation with data availability in B&H. Data collection work and results for cereals in particular for wheat, maize, barley and macroeconomic indicators is presented as well.

Material and Methods

AGMEMOD model

The AGMEMOD model, that captures the diversity of European agriculture and its regional variations, can be extended towards B&H to conduct a quantitative analysis of a future development of B&H agricultural sector. The AGMEMOD model has been already upgraded with a capacity to incorporate candidates and potential candidates for EU accession as well as other countries outside the EU. Besides EU28, the current AGMEMOD version 7.34 incorporates FYR of Macedonia, Turkey and EU neighbour countries Russia and Ukraine (more details about extension of the model can be find at Chantreuil et al., 2012; Salputra et al., 2013). In order to build the AGMEMOD model for B&H a consistent database has to be built at the first step. To be incorporated into the AGMEMOD modelling system it has to follow common templates and methodology.

Data sources

The most common data source used by European countries is Eurostat composing consistent time series by collecting data from different national and EU sources. However data collection work at national level becomes more and more important as since 2013 Eurostat does not provide market supply and use balances anymore. The latest European Commission (2013) report claims that the adoption of B&H agricultural information strategy and the Law on the Agricultural Census remain pending. Agricultural statistics and the agricultural information system remain to be improved, including harmonisation of existing systems. The outcomes of FP7 project AgriPolicy made a valuable contribution by summarizing the situation with agricultural statistics in B&H, collecting key statistics for agriculture and developing a comprehensive policy database reflecting all the measures from different sources that can be received by agricultural producers (Bajramovic et al., 2009). The work done allows evaluation of availability of data needed for model building – product balances, productivity indicators and information regarding prices.

Commodity in question for this paper is cereals, where the main cereals in terms of area are maize and wheat. Crops statistics for B&H covering sown and harvested area and production is gathered trough the regular statistical surveys. Main data about domestic food-processing are available in the framework of industrial production statistics. Agricultural output prices are monitored through survey on purchase prices. The data are available from 2000; however, better quality of data can be obtained if to use data only from 2004. Official statistics does not provide food balance sheets, and no data regarding food consumption in physical amounts is available.

Methodology

For modelling purposes the original data obtained from statistics might need to be modified in order to ensure that, for each year and for all commodities, supply and use equilibrium is maintained. For every crop market there are three types of data have to be obtained: prices, production data and data on the market balance. It is necessary to ensure consistent input information for the model in order to get reliable model output. Table 1 describes general methodology and data sources for collecting data of crop products balances.

Table 1. Methodology and data sources for collecting historical values for crop balances in B&H

Variable	Source	Comments
Producer price	BHAS release "Purchase and direct sale/realization of agricultural products"	Average price of purchase and direct sales
Area harvested	BHAS release "Harvested area and production by crops"	Should be used sown and not harvested area in order to get correct balance of total land use.
Yield	Derived variable	Calculated as production/area sown
Production	BHAS release "Harvested area and production by crops"	-
Imports, Exports	Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina (MVTEO), Chamber of Commerce of B&H	Detailed data available only upon request. Only tariff lines for non-processed products should be accounted (for example 1001 for wheat and 1005… for maize)
Domestic use	-	In this case when product balances are not provided by statistics, it is derived variable calculated as production+imports-change in stocks-exports
Ending stocks	Manufacturing enterprises	Unpublished information
Feed use	-	In this case when product balances are not provided by statistics, it is derived variable calculated as domestic use-food use-losses-seed use-factory use
Non-feed use	Derived variable	Calculated as domestic use-feed use-losses
Losses	Calculated from BHAS release "Harvested area and production by crops"	The difference between sawn and harvested area multiplied by average yield
Food use	-	Similar consumption patterns can be applied. In case of maize11.3 kg/capita - average of 2000-2011 in Croatia. Household surveys could give us some part of answer on this.
Seed use		Similar agronomic normative can be applied. In case of maize 0.027 t/ha - average of 2000-2011 seed use in Croatia.
Industrial and processing uses	Derived variable	Calculated as non-feed use-food use-seed use.
Processing use	-	Quantities of product used for the production of a derived foodstuff for which an individual balance sheet exists. Assumed equal to 0 in case of B&H.
Factory use	Industrial production statistics from FB&H and Institute of Statistics of RS	Quantities of product used by the industry for the production of products not intended for animal feed or for human consumption, including beer and alcohol industries.

All macroeconomic indicators can be obtained either from BHAS or from Central Bank of Bosnia and Herzegovina (CBBH), or derived from these directly available variables.

Results

BHAS national accounts statistics does not provide time series of real GDP and deflator in constant prices of fixed year, but provides annual growth rates in prices of previous year. For input data of the model a real GDP, GDP deflator and real GDP per capita have been recalculated in constant prices of 2000 (see Table 2).

Table 2. Macroeconomic variables for B&H AGMEMOD model

Macro variable	Unit	2005	2013	Data Source and/or method for calculation
Population	Millions	3.843	3.790	BHAS
Real GDP	Millions KM'2000	14483	17321	calculated based on BHAS data of nominal GDP and year to year real growth rates
GDP deflator	2000=1	1.18	1.52	calculated based on BHAS data of nominal and real GDP year to year real growth rates
Exchange rate	Euro/KM	1.9558	1.9558	CBBH
Real GDP per cap.	KM'2000	3769	4570	Derived dividing real GDP by number of population

Data for supply/demand balances for wheat, maize and barley for 2013 (see Table 3) have been collected according to methodology and data sources described in Table 2 in previous chapter.

Table 3. Supply/demand balances for wheat, maize and barley in B&H AGMEMOD model database, 2013

Variable	Unit	Wheat	Maize	Barley
Producer price	KM/100kg	32.47	36.85	43.60
Area harvested	1000 ha	67.63	190.11	20.74
Yield	t/ha	3.90	4.20	3.42
Production	1000 t	265.15	798.50	70.84
Imports	1000 t	271.37	223.27	32.80
Exports	1000 t	45.33	0.42	0.03
Domestic use	1000 t	477.22	1021.37	103.61
Ending stocks	1000 t	21.96	0.05	0.00
Feed use	1000 t	115.40	905.31	82.75
Non-feed use	1000 t	353.07	76.14	19.09
Losses	1000 t	8.75	39.93	1.77
Food use	1000 t	334.05	30.64	0.47
Seed use	1000 t	19.01	5.70	2.71
Industrial and processing uses	1000 t	67.73	39.79	15.91

Discussion and Conclusion

Availability of data at country level for B&H remains complicated if to compare with the EU standards. However, it is quite clear that data constraints for B&H will not be solved in very short term, and there is an opportunity to take into account the shortages recognized, to find the best possible solution and to start developing agricultural sector model and the database.

However, the questions how to solve the data gaps remain opened for discussion mainly with market experts in B&H, representatives from industries, economists and agricultural scientists. For example: can ending stocks be assumed equal to zero due to B&H net importing country status? Can household surveys' data be used to identify amount of food consumption for certain products? Should we account only area harvested or in case of bad weather conditions (for example, floods) area sown is the one which allows better modelling of the level of productivity and land use balance.

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Understanding the Motives behind Organic Food Consumption in Bosnia and Herzegovina

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Abstract
Increasing awareness of food quality impact on public health and environmental issues regarding food production increased interest for production and consumption of organic food products (OF). Consumers, along with researchers, became interested on OF, on their respective angles: consumers searching for the best overall benefit/price ratio, and researchers searching for factors that promote or limit consumption of such products, than for factors that significantly shape involvement and loyalty of buyers and their attitudes towards OF. In spite of increased interest, availability of research focusing consumers' motives and attitudes towards OF at emerging markets are very limited. Therefore the aim of this study is to determine motives for OF purchase in Bosnia and Herzegovina, and by so, to define generic marketing strategy as a way for future, sustainable, development of OF production and consumption. Conventional sample was created (800 respondents) and the consumer survey was conducted in December 2013, in Bosnia and Herzegovina. Statistical analysis was performed in SPSS (v21.0), and it included exploratory factor analysis (EFA) along with descriptive statistics. OF purchase and consumption motives are driven by common lifestyle defined by concern for social equality and consumers' belief that OFs are basis for their health. Study shows that public and private promotion/marketing policies for OF need to be designed in a way that strongly emphasizes their symbolic meaning that elicits in consumers feeling of belonging to both local community and their family.

Keywords: Bosnia and Herzegovina, purchase motives, organic food

Introduction
Changes in lifestyle and socio-demographic structure, increasing awareness that public health and quality of environment depends on sustainable consumption patterns have generated increased interest for and consumption of organic foods (OF). The research done to date strives to identify factors that promote or limit OF consumption, factors that significantly shape involvement and loyalty of buyers and their attitudes as well as OF potentials to improve public health, quality of environment, while providing better living to rural areas by transforming OF into innovative, modern and attractive tourism product. The studies done to date suggest that OF products are: (i)enjoying rapid growth on the market; (ii) rather complex concept, and consumers are sometimes not quite sure what such products really are (Vanhonacker et al., 2010); (iii) associated with local communities: "homemade" and natural food (Stojanovi and Barjolle, 2012) as well as better quality food, the consumption of which may have positive effects on health (Fotopoulosa et al., 2003), and are associated with premium prices; (iv) products with social and economic potential, which have capacity to transform local skills and cultural heritage into assets underlying development of innovative business activities, especially innovative forms of tourism (Amilien and Hegnes, 2013); (v) products which promotion becomes an issue from the perspective of public health, agricultural and rural development policies and regional development policies (Vanhonacker et al., 2010).

This study sets out to define motives of OF consumers, or better to say factors that drive their behavior in order to better understand evolution of OF markets, and to identify, if possible, generic way of creating public policies and marketing strategies to facilitate development of OF in order to pave the road for more sustainable food production and consumption.

Method
Primary quantitative data were gathered through consumer survey in the form of face-to-face interview organized in front of supermarkets in Sarajevo (capital city) and two small towns Bugojno and Fojnica, in December 2013. Out of 800 respondents, 310 said they were buying

organic products. Respondents rated importance they assigned to/agreement with various dimensions of identified lifestyle factors on a 5-point scale ranging from 1 – "not important at all or "I completely disagree" to 5 – "very important" or "I fully agree". In order to assess clarity and relevance of each item, a pilot survey had been implemented at University of Sarajevo (10 respondents). As in many other studies, the research was based on self-reported ratings, which are subjective in nature, so the researchers need to keep this in mind when interpreting the results. Basic descriptive statistic (mean and standard deviation) and exploratory factor analysis (EFA) was performed using the Principal Component method with Varimax rotation. Item mean and variance were calculated to establish psychometric properties of the lifestyle factors in question. The internal consistency of factor construct was assessed by Cronbach's Alpha as having acceptable value of 0.855 to 0.862. Finally, cluster analysis on the basis of extracted factors and their dimensions has been performed. Hierarchical cluster analysis was employed to determine the number of clusters, identify outliers and profile the cluster centers. After that, Hierarchical Cluster Analysis, Ward's method of Squared Euclidian distances was used to establish final cluster membership. Factor dimensions membership according to the identified clusters had been used to outline common lifestyle pattern framing OF consumers' behavior. SPSS (21.0) statistical software packages were used for all analysis.

Results of research

Table 1 shows factors and their dimensions, mean, SD and weight loading. Out of 12 factors, only three (Food&Mood, Convenience and Purchase) were not selected because their loading was below 0.5 and they had very low internal consistency (Cronbach's Alpha less than 0.5). Also, not all dimensions of the extracted factors were selected while dimensions of other factors contributed to the total loading. As shown in Table 1, OF consumers act on the basis of: ethnocentrism, their attitude towards cooking as an important part of family life, environment, health, local community and their need to be informed about the food they consume, but also on the producers' attitude towards environment (both natural and social). This is in line with conclusions of most studies done in this field.

Table 1 – Lifestyle factors and their dimensions – factor internal consistency, factor loading, mean and standard deviation (SD)

Original factors (Cronbach's Alpha)	Extracted loading	Mean	SD
Health related attitudes (Cronbach's Alpha = 0.584)			
I take better than average care of my health	0.427	3.490	1.089
Food is the basis for my health	0.409	3.780	1.076
I choose foods to help me preserve beauty	0.599	3.070	1.215
Food for children must be of better quality	0.600	3.850	1.241
Eco lifestyle (Cronbach's Alpha = 0.629)			
I buy products packed in environmental-friendly packaging	0.806	3.300	1.246
I do not use plastic bags	0.511	2.870	1.425
"Openness" to new information (Cronbach's Alpha = 0.490)			
I spend my vacation abroad	0.605	2.850	1.461
When travelling, I try to learn more about culture of the country I am visiting	0.648	3.630	1.245
I try new foods when I have an opportunity	0.446	4.110	1.011
Attitudes towards cooking (Cronbach's Alpha = 0.759)			
Cooking the main meal is a part of care for family	0.758	3.900	1.317
I find it very important to have at least one home-made meal	0.420	4.190	1.103
I use seasonal foods in cooking	0.665	3.870	1.199
Cooking helps me express my creativity	0.570	3.390	1.254
Food involvement (Cronbach's Alpha = 0.483)			
I read gastro papers	0.657	2.470	1.217
I read about food and its quality	0.754	2.850	1.221
It is important to me to know what is in the food	0.723	3.090	1.291
Hedonism (Cronbach's Alpha = 0.490)			
I am willing to pay for food that makes me happy	0.956	3.390	1.124
Ethnocentrism (Cronbach's Alpha = 0.747)			
BH products are the best because the soil is not polluted	0.699	3.310	1.288
BH citizens should only buy domestic products	0.732	3.990	1.140

If I cannot find BH products, I buy products made in the Region	0.662	3.850	1.184
Purchase (Cronbach's Alpha = 0.610)			
I check whether the producer respects environment	0.787	2.160	1.172
I check whether the producer is conscious of animal welfare	0.792	2.200	1.232
Price (Cronbach's Alpha = 0.146)			
Money is an important factor when choosing food	0.297	3.360	1.302
When buying for special occasions, money is no object	0.328	3.640	1.233

Based on the extracted factors and their dimensions, a cluster analysis was done to determine which values tended to "go" together forming a specific segment. Three clusters were identified. Cluster 1 for OF was formed by ethnocentrism, attitude towards cooking, health and convenience, while the cluster 2 for OF was formed by consumers' need to be informed on quality and content of the food, by their curiosity (desire to know their own and others' cultures) and need to preserve their beauty and health.

Table 2 - Factor dimensions and loading according to identified clusters of OF

Cluster 1 (27.42% of sample) "Ethnocentric consumers"		Cluster 2 (35.16% of sample) "Curious consumers"		Cluster 3 (37.42% of sample) Consumer taking care about producers social responsibility level	
Factor dimension	Loading	Factor dimension	Loading	Factor dimension	Loading
Cooking the mail meal id a part of care for family	0.758	I buy products packed in environmental-friendly packaging	0.806	I check whether the producer is conscious of animal welfare	0.792
BH citizens should buy only domestic products	0.732	I read about food and its quality	0.754	I check whether the producer respects environment	0.787
BH products are the best because the soil is not polluted	0.699	It is important to me to know what is in the food	0.723	I look for recycling mark on packaging when buying a product	0.237
I use seasonal foods in cooking	0.665	I read gastro papers	0.657		
If I cannot find BH products, I buy products made in Region	0.622	I spend my vacation abroad	0.605		
Food for children must be of better quality, regardless of price	0.600	I choose food that help me preserve beauty	0.599		
BH citizens should buy only domestic products even when more expensive	0.519	Cooking helps me express my creativity	0.507		

As it can be seen the biggest share had cluster 3, or better to say consumers which are driven by the values of universalism, they care for the welfare of all people, social equality, and are concerned about nature, and this, according to authors (Aertsens et al., 2009), falls into the group of general abstract universal values. Cluster 3 members also take care of their health (enjoy walking), and consider food as a basis of their health. In addition, they believe that their behavior benefits environment and are willing to take part in activities upgrading quality of environment. Food and cooking are important part of taking care of family and the main reason for family gatherings, consumers typically choose foods they have been accustomed to since youth, and although they are price conscious, consumers are willing to pay more for food that makes them happy and that they consider to be of good quality. This confirms their preference for food that looks and smells good. In other words, hedonism plays an important role when selecting OF products. In addition, the consumers' desire to receive more information on the producers and production methods, as well as the authenticity of the products, has been confirmed by the fact that respondents had recognized the OF sign, while only a minority (less than one fifth) had been able to recognize the PDO and PGI signs. This suggests that labels may provide good enough signals that might lead consumers to assign higher value to these two product groups because they believe/feel them to be superior or having symbolic values that provide stronger feeling of belonging to both their family and their broader community.

Discussion and conclusion

Cluster 3 was explained in detail because it takes the most of the whole sample (37.42% of sample), and makes the best representation of BH OF consumers, of course, as it can be seen the purchase behavior of major part of OF consumers is driven by universalistic values (need to know the producers' attitude towards social and natural environment, animal welfare, as well as how they treat their employees), but also by their need to strength feeling of belonging to both their family and their local/broader community, while hedonism plays important role as well. This implies that notions of locality that are, according to authors (Gill, 2006), socially and culturally specific and in case of BH include a high level of ethnocentrism, make the main common denominator that formulates attractive symbolic meaning of both products groups and is found in expression of positive attitude towards them. Specific attitude towards health and food preparation - daily meals are seen as an important leverage for improving quality of family life and strengthening family cohesion - completes characteristics of lifestyle pattern of OF consumers that formulates motives behind their purchase behavior at BH market, which is an emerging market. The points discussed above have significant practical implications. According to some authors (Aertsens et al., 2009) purchase intention strongly depends on positive opinion about products formed by belief that their consumption and production benefits health, environment and socio-economic progress. Logical conclusion emerging from this study is that promotion of such products and provision of conditions for using their potential related to improving all aspects of quality of life requires raising awareness of positive consequences of their consumption while simultaneously emphasizing cultural, environmental and socio-economic effects, but also those of very practical nature related to personal enjoyment and quality of life of an individual. This needs to be done "at every place and at every time" and in a colorful, understandable and straightforward way (Nikolić et al., 2013). Therefore, identifying symbolic meaning of these products that elicit in consumers feeling of belonging to both local community and their family is important. The strong social interaction, trust and identity has to be base-line for all marketing, but also all business activities undertaken by OF producers. OF has to be communicated as a food with "human face and big heart" and credibility. This may become an excellent basis for a well thought-through generic marketing strategy that would provide additional information on culture, product-related customs, and is explicitly linked to positive effects expressed in easy-to-remember slogans, using quantitatively expressed facts, suggesting that by using these products we are taking better care of and strengthening our own family. However, this approach requires sophisticated knowledge and skills, as well as significant assets that OF producers do not have. For that reason, development of sophisticated and effective generic promotional campaign must be the backbone of public policies striving to promote healthier eating/consumption patterns and policies promoting sustainable rural development and improved living in local communities. Such policies, according to Gill (2006), will strengthen resilience and adaptability of local communities. This issues even more important in countries like BH that are trying to deal with negative effects of transition while at the same time overcoming consequences of a war and poverty.

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Underlying Factors Shaping Level of Market Orientation of Food Companies in Bosnia and Herzegovina

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Abstract

High level of food sector trade deficit indicates low competitiveness of B&H agribusiness. It brings the question whether B&H agribusiness low competitiveness is shaped by companies' low market orientation, i.e. capability to apply integrated business philosophy which ensures adequate competitive advantages and sustains development of companies. To answer that, a survey of 50 B&H food companies was conducted by using a MKTOR scale to measure level of market orientation in the period May – December 2013. Statistical analysis was done using SPSS, and it included reliability test, exploratory factor analysis and confirmatory factor analysis, along with the tests of statistical significance and descriptive statistics. B&H food companies are only partly market-oriented (3.43 out of 5.00). Level of market orientation of small (3.511) and large companies (3.364) was statistically different, meaning that the smaller companies are less capable to understand the market. Factor analysis revealed three market orientation factors: intelligence generation (0.393), intelligence dissemination (0.503) and responsiveness (0.522). However, there is statistically significant difference between the values of three main market orientation factors depending on company size ($p>0.05$). Generally speaking, B&H food companies lack ability to collect and use key information about the market. Furthermore, omissions in internal organization and lack of knowledge about marketing prevent efficient use of collected (often disorganized) market data to develop communication and to discover the new ways to create added value which will serve as a sustainable competitive advantages.

Keywords: Market orientation, MKTOR, B&H food industry

Introduction

B&H food industry is one of the most important branch of processing industry, which employs approximately 3% of total employment and recorded an average annual growth rate of 10%. The rate of growth and number of employed would be much higher if the manufacturing industry in B&H isn't characterized by problems with equity, underutilization of installed capacities and outdated equipment and technology. As a consequence B&H food industry lack ability to recognize and serve consumers failing behind the competition. So, to solve this problem it is not enough to modernize facility, but also to modernize the way how business is run. In order to do so it is important to implement modern business methods, especially one which raise ability to adopt to market needs such as "market orientation", which can "wake up" the food industry and strengthen its competitive ability on both domestic and foreign market. Unique definition of market orientation does not exist, therefore the number of models/scales to measure the level of market orientation increases every day, but in literature two models (MKTOR and MARKOR) are frequently used. Those models can help to understand first level of market orientation business philosophy application, but also to find out which factors shapes reached level of market orientation in order to find out the ways to improve it and to benefit from it. Therefore, the aim of this research is twofold: first to measure level of BiH food industry market orientation, and second to find out factors underlying level of market orientation for both small and bigger food companies. Results of research will help us to formulate a recommendation to improve level of B&H food industry market orientation.

Method

Top managers at fifty food companies took part in a research survey done in the period from May to December, 2013. The sample consisted of 50% small (under 50 employees) and 50% big companies (over 50 employees) from the following subsectors: dairy, non-alcoholic beverages,

meat sector and confectionery. The used questioner combined constructs of two approaches to measure market orientation: MKTOR scale (Narver and Slater, 1990) and MARKOR scale (Jaworski and Kohli, 1993). Therefore questionnaire encompassed five fields: external factors, internal factors, market orientation, company's efficacy and general information about the company. Top managers have been asked to display level of agreement (1 strongly disagree to 5 strongly agree) with offered statements in order to catch and evaluate situation regarding implementation of market orientation within company in question. Crombach's Alpha test was used to determine reliability of scales while confirmatory factor analysis (CFA) using EQS (Structural Equation Program) was used to assess the measurement model acceptability. T-test was used to test difference between small and big companies regarding market orientation level and factors underling level of market orientation. Statistical analysis was performed in SPSS and AMOS SPSS statistical package. Factor analysis was made using Principal Component Method with Varimax rotation.

Research Results

Two scales and their components exhibited a high level of reliability. Crombach's Alpha value of MKTOR scale has been slightly higher than MARKOR scale, 0.943 and 0.923 respectively. On the opposite side, overall model fit (both scales) determined by few most commonly used indexes (root mean square residual - RMR, goodness of fit index - GFI, normed fit index - NPI) was not so good (Fig. 1). Therefore, each of the constructs that measure level of market orientation should be corrected with elimination of question which reduces acceptability, or by more precise definition of questions (translation has to be improved to address better issues in questions).

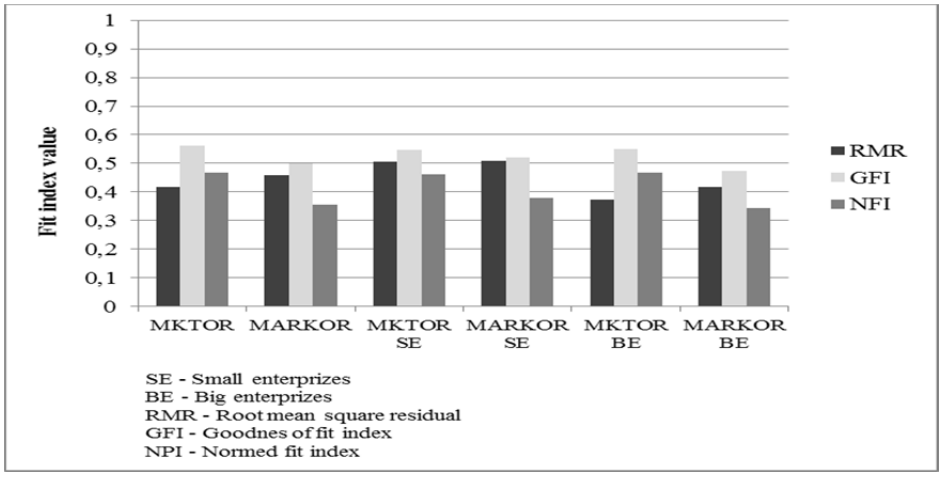


Figure 1. Overall model fit.

B&H food companies are only partly market-oriented (3.431 MKTOR scale and 3.619 MARKOR scale) which is in line with previous researches made in B&H (Agić, 2010, Kurtović, 2007, Lakomica, 2010). It means food industry performances are in line with a rest of B&H economy. Level of market orientation in small (3.511 MKTOR and 3.796 MARKOR) and big (3.364 MKTOR and 3.459 MARKOR) companies was statistically different, meaning that the smaller companies are less capable to adopt market needs, what was expected.

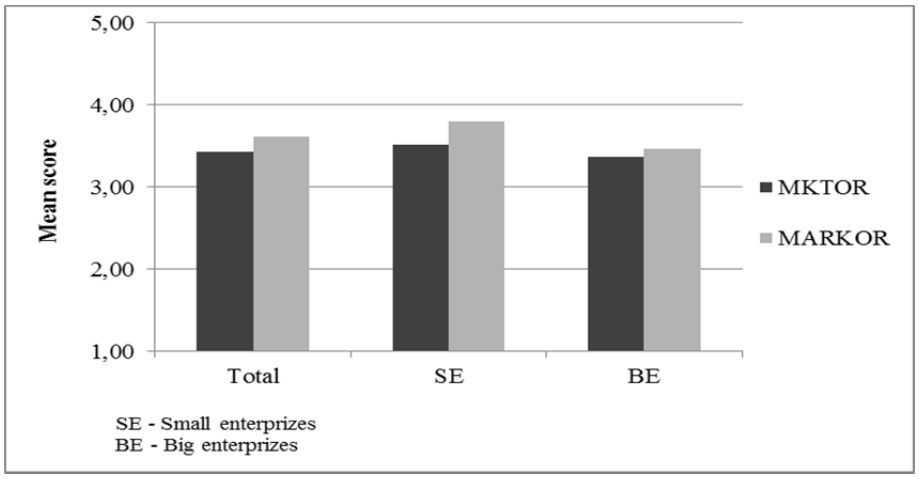
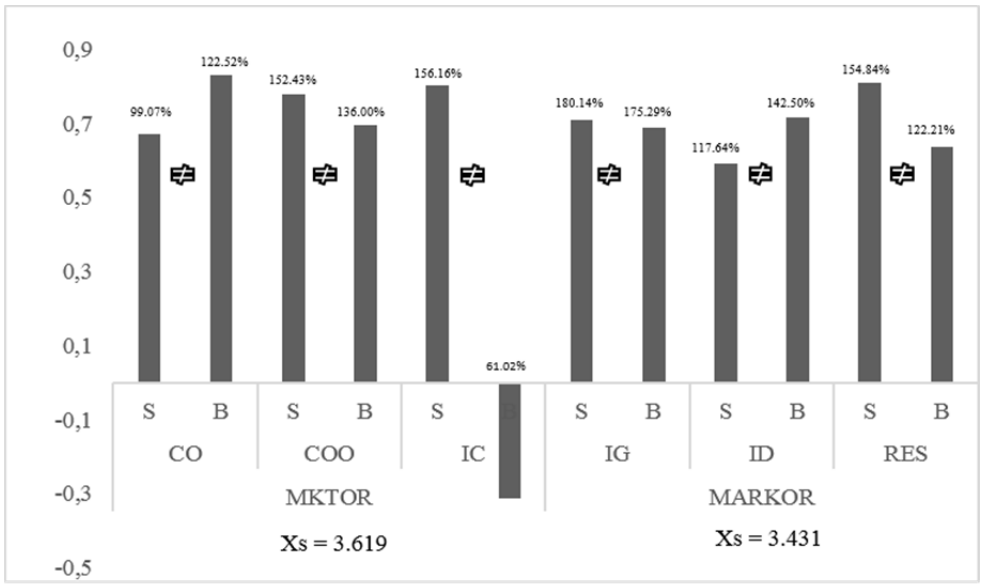


Figure 2. Level of market orientation.

By implementing factor analysis, for both scales three influential factors stand out: (i) for MKTOR scale: intelligence generation (average factor loading 0.393), intelligence dissemination (average factor loading 0.503) and responsiveness (average factor loading 0.522); and (ii) for MARKOR scale: orientation towards customers (average factor loading 0.677), orientation towards competitors (average factor loading 0.510) and interfunctional coordination (average factor loading 0.515).



CO – Customer orientation; COO – Competitor orientation; IC – Interfunctional coordination; IG – Intelligence generation; ID – Inteligence dissemination; RES – Responsiveness; S – Small companies; B – Big Companies.
Percentage is calculated as average factor loading of small/big company / average factor loading of overall sample * 100, and the ⇄ sign means statistically significant diference between small and big companies.

Figure 3. Results of factor analysis.

According to research results, one can say that for both types of companies, intelligence generation and intelligence dissemination are a weak link (below average mark), whereas responsiveness is assessed better than total average. Small companies, as expected are less capable to acquire and utilize market information in order to enhance competitiveness at market place. But in the same time they are "closer" to the market and therefore have better insight into customer needs and ability to tailor their products to customer needs. According to MARKOR scale, larger companies pay more attention on competitors and interfunctional coordination, but in the same time pay less attention to customers (below average mark). This is expected, having in mind general characteristic of food industry: lack of modern technology and management

capabilities. For them easiest way to adopt market needs is to follow key competitors. On the contrary, smaller companies are closer and more oriented to customers, and they don't pay much attention on competitors and interfunctional coordination. This is expected because small companies have limited resources, and usually are focused on everyday business problems. Consequently they are not paying sufficient attention to competitors. For small companies interfunctional coordination is not big issue due to the fact that number of employees and departments is low.

Conclusion

Results show that food companies in B&H have low capability to collect and utilize key information about the market needs. So, as it was outlined by pervious research (Nikolić et al., 2013) BiH food industry low competitiveness is shaped by its low level of market orientation. This inadequate ability to adopt market needs is shaped by first of all poor management capabilities that is reflected in poor internal organization, communication and utilization of collected, often disorganized data on market needs. Therefore, BiH food industry lack capacity to properly use all resources (including information on market needs) in order to discover new ways of creating added value and development of sustainable competitive advantages. In this situation a strong focus on improvement of all internal processes, especially improvement of management practice which will allow development of propulsive corporate culture is a first step ahead for food industry in BiH. Such propulsive business culture will encourage cohesion, communication and creativity enabling effective utilization of available market information. All that together with strongly improved performances will be reflected on improvement of BiH food industry market position. Furthermore, top management has to recognize co-opetition as a proper strategy to strength its business performances by creation of cooperative and benchmarking networks in order to share experience and to learn faster and increase capacity to innovate to adopt to customer needs. It is recommended to include academia, administration and local communities in wider cooperative, target-oriented network to boost innovativeness and faster development.

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Evaluation of Food Security About Some of the Main Food Products in Turkey

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Abstract
Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life. This widely accepted defination points to the following dimensions of food security; food availability, food access, utilization and stability. However, it is possible to say that the main dimensions of food security are focused food production and consumption. According to Food and Agricultural Organization (FAO)'s data, there are enough supply quantity for daily dietary energy per capita in Turkey. But, food insecurity generally occurs because of that; lack of animal products consumption in Turkey. Turkish feeding behaviour mostly based on bread and other products which are produced from cereals with regard to previous studies. Thus, 50% of daily energy demand provides by bread and the other cereals products. Even though meat and meat products are important sources of protein, the rates in total food consumption is only 10% for 2007-2009 years in Turkey. The aim of this study is to evaluate food security in terms of food availability and food accessibility for basic agricultural and food products (such as cereals, sugar, meat and egg, milk and milk products) which are important for Turkish feeding behaviour. Food availability go about degree of sufficiency* and food economic access to put forward the rate of poverty, food expense rate for total expenses.
Keywords: Food security, milk, meat, cereals, sugar.

Introduction

Consumption of food is an obligatory and necessity to survive, that is non elastic. Food security exists when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life (GPO, 2001; GPO, 2003; FAO, 2009; WHO, 2014). This widely accepted defination points to the following dimensions of food security; food availability, food access, utilization and stability. (FAO, 2006). Food security is assured depend on adequate amount of food available, stability of supply and obtaining ability of food (Demirbaş ve Atış, 2005).

This study aims to evaluate availability and accessibility dimensions of food security in Turkey, based on basic food groups such as; cereals, sugar, red and white meat, egg, milk and milk products.

Material and Methods

Currently five methods are available to measure food security and these methods are; FAO methods, household incomes and expenses surveys, personal food purchasing surveys, anthropometrics methods and qualitative methods (FAO, 2002; Keskin and Demirbaş, 2012). But, all these methods are money and time consuming. For this reason, two dimensions of food security (food availability, food access) are viewed in this study. This study is consist of secondary data. Macro data are collected from FAO and TSI (Turkish Statistical Institute). Self-sufficiency degree is calculated as ratio according to these data for last decade. Results are supported by literateur researches.

Results

In this part of the study, quantitative sufficiency of basic food groups is evaluated on Turkish people's diet. These food groups are defined as; cereals, sugar, red and white meat, egg, milk and milk products.

*Degree of sufficiency: (Available production/Domestic access)*100

Table 1. Suffiencіey ratios of the seleceted products (%)

	Red meat (%)	White meat (%)	Egg (%)	Milk (%)	Cheese (%)	Butter (%)	Cereals (%)	Sugar (%)
2000	100.20	100.34	100.24	99.19	99.25	96.90	103.20	144.82
2001	100.21	103.50	102.60	99.81	100.83	98.62	93.16	118.71
2002	100.37	102.89	99.85	99.48	102.38	96.88	97.57	133.33
2003	100.38	102.90	100.66	99.08	104.77	96.06	92.04	117.32
2004	100.34	103.38	101.18	99.07	103.98	96.73	97.42	115.85
2005	100.38	105.06	101.24	99.51	106.14	100.58	109.25	119.57
2006	100.47	104.27	101.53	99.08	109.44	95.47	104.45	93.70
2007	100.68	105.05	106.10	99.38	108.86	96.11	92.55	99.71
2008	100.50	107.75	110.24	99.22	112.43	95.30	92.17	114.60
2009	101.21	109.65	111.43	99.12	112.82	91.42	103.03	125.47

Reference: Food and Agriculture Organization, (2014). www.fao.org, *Erişim: 07.08.2014.*

Turkey has self-suffiency for red meat when you look at the data for the last decade. But the reason of self-sufficiency is importation. Shortage of feed crop (Tosun and Demirbaş, 2012), insufficiency of subvention to the animal products (GPO, 2007), privatization of State Owned Enterprises like Meat and Fish Board, Milk Industy Board, Feed Industy Board (Anonymous, 2005), be supposed to meat importation (TEPRD, 2010) caused to increase on importing and reduction on production.

Another important protein source; white meat is increasing over years along with exportation. Increase in production of white meat is assumed to be arising because white meat is cheaper alternative of red meat and more accessible for people with lower income.

Egg production is increasing on last decade in Turkey. Egg is an important nourishment and there is no problem like being lack of egg in Turkey.

Turkey can provide its own milk demand mostly but not all. The data of yogurt can not be found neighter FAO nor TSI. That's why excluding yogurt, when we look at average of milk products quantity within 2009-2011 years, butter production ratio is 49.97%, and cheese %49.84 in total. Turkey has self-sufficiency of cheese production. Unfortunately, Turkey has not self-sufficiency of butter production, even though constant increasing of production and exportation.

When we look at to tend to eating, cereals and cereal products are mostly consumed in Turkey. Wheat is usually consumed as bread, cracked wheat and pasta (GPO, 2001). One third of cereals are used as animal feed. This situation demonstrates importance of cereals in terms of food security (Demirbaş and Atış, 2005). Considering importance of cereals as nourishment in Turkey, food security is not totally provided during last decade.

Sugar is raw material for most of the food stuff. Sugar is really important especially for the food industry. When sugar production of Turkey is examined, Turkey produced excessive amount during last decade except 2006-2007.

Most important matter in terms of accessibility of food in Turkey is financial. Thus, 8.4% of people lives below poverty line. Lowest 20% of income distribution spend more money on cereals based products, sugar, oil, tea and coffee and spend less on meat, fish, juice and pastry while there's not much difference on milk, milk products and egg (GPO, 2003) (See: Table 1).

TSI has reported that individuals poverty ratios has decreased from 1.35% in 2002 to 0.48% in 2008, which is calculating by method of poverty line. Food related and non-food related poverty ratio decreased from 26.96% in 2002 to 18.08% in 2009. Even though ratios indicating poverty has decreased, increase in population must be considered. Expenses based poverty ratio increased in contrast to other two ratios; from 14.74% in 2002 to 15.12% in 2009.

According to Engels principle, as consumers have more income they spend less for food and more for health and cultural activities (Anker, 2011; Chakrabarty and Hildenbrand, 2011).

Empirical data tells us as society has more income, tends to spend less for food. During last decade in Turkey household consumption ratio reduced from 26.7% in 2002 to 20.7% in 2011 for food. Even though this reduction is an improvement, 20.0% is still high ratio considering other expenses.

To determine Turkey's ranking in terms of food security among world, FAO's food security indicators are scanned. According to FAO 2012**,** indexes of domestic food prices; South Africa (231.3) Ethiopia (113.2), Somali (80.7), Turkey (50.7), United Kingdom (24.7), Canada (9.0), Italy (6.9), France (6.2). These numbers demonstrates in Turkey, food stuff is cheap compared to non-developed countries but expensive compared to developed countries. Production index per capita South Africa (11.8), Ethiopia (3.6), Somalia (5.8), Turkey (9.9), United Kingdom (4.0), United States of America (14.2), Canada (18.9), Italy (14.7), France (12.9). Turkey can be considered successful in terms of production per capita. Consumption index per capita; South Africa (8), Ethiopia (19), Turkey (30), United Kingdom (20), United States of America (13), Canada (26), Italy (45), France (43). This data tells us Turkey is considerably good in terms of consumption per capita.

After scanning food based poverty and consumption expenses of household in Turkey, meat consumption, which is important parameter food security, is evaluated.

When we look at ''the status of eating food; which is included red meat, white meat or fish, every other day'' of Turkish people, within 2006-2011 years that are indicated 60% of Turkish people could not meet this situation. This data tells us also food security in Turkey is not totally met.

Discussion

Problems about Turkish agriculture are agricultural structural problems such as instability of agriculture policies, complications during application of policies, insufficiency of subventions, high income costs, ambiguity of production pattern, fluctuation of product prices. All of these problems named above are important problems on ensuring food security.

Food security is achieved in Turkey when considering availability and accessibility on basic agricultural products and food products. Yet, it's observed that Turkey for cereals, which is very important for Turkish people's diet, hasn't got self-sufficiency. There is a risk of external dependency on such specific products. Therefore, food security in Turkey doesn't met in terms of cereals quantity. For milk and butter case, self-sufficiency doesn't met totally in Turkey. For sugar, even though it's not stable year by year, self-sufficiency of Turkey can be agreed.

Red meat, white meat, cheese and egg exist sufficient, but economical accessibility of these products, especially meat, cannot be considered in food security. Meat prices are fluctuating and increasing suddenly. As it's stated in result part, Turkish people who cannot eat meat, chicken or fish once in every two days is double number of who can.

Location of Turkey is convenient for almost all kinds of agricultural product. As quantity of basic food products Turkey is self-sufficient but food security is not ensured because of equally income distribution issue. Even though there is excessive supply on agricultural products, big portion of people cannot access to food. To overcome food security issue in Turkey, fluctuation of food prizes must be taken under control and average income must raise.

Professionalization of food products market would control sudden fluctuations on food prizes. stock markets and warehouse receipt system must be applied. Beside reduction of input costs, or supported by government, of agricultural products would cause reduction of food prizes

Income distribution inequality is important is issue all over the world. The incomes of the poor people must be increase with increasing transfer expenditures ratio for the short term.

For long term adjustment, income of individuals must be raised above life demand cost, such as food, housing, education etc.

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Recent Developments in WTO Negotiations on Agriculture and Position of Turkey

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Abstract

Last conference of negotiations on agriculture was held in Bali, in December 2013. During the negotiations on agriculture, a great deal of discussion has been made about reduction of tariffs, reducing domestic supports and elimination of export subsidies, however, a final agreement was not reached. Despite this fact, some decisions was made during the negotiations such as reduction/removal of export subsidies, development of sensitive and special product concepts against adverse effects of reductions in tariffs, reduction in domestic supports in developed countries to a significant extent. These developments are also important in terms of position adopted by Turkey in negotiations on agriculture. Turkey has been protecting its agriculture considerably via tariffs. Bound and applied tariff rates are 61.0 % and 41.2% in agricultural products of Turkey. For this reason, position adopted and to be adopted by Turkey in the negotiations is important. Tariff rates applied by Turkey for animal and dairy products are over % 100. Therefore, issue of sensitive and special products is very important for Turkey. Turkey has no obligation about domestic supports but if a position is adopted in the negotiations towards substantial decreases in developed countries, this can increase chances of competition in international markets for Turkey. Export subsidies of Turkey are at a negligible level. However, if developed countries eliminate their export subsidies, Turkey can get a set of gains for its import products in long run. This study evaluates Turkey's position in negotiations on agriculture and reflections of decisions taken during the negotiations on turkey's agriculture and agricultural policies. Furthermore it also makes some suggestions for Turkey for not being affected adversely and even getting some gains from the process.

Keywords: WTO, negotiations on agriculture, Turkey, agricultural policies

Introduction

Agriculutural negotiations were incorporated in the Doha Development Round (DDR) started in 2001. In conferences that have been made within agricultural negotiations, though discussions were made among groups representing developed countries and developing countries-least developed countries. Because developing and least developed countries have regarded agriculture as an important sector for development. Therefore, they have insisted that developed countries cover their demands. But developed countries acted unwillingly to cover those demands. This prevented that final deal is formed in negotiations. In spite of problems which occurred in negotiations, negotiations were kept alive anywise to complete DDR. Decisions taken in Bali conference in December 2013 have pointed at this situation.

Agricultural Negotiations from 2001 to 2013

After DDR had started, discussions in negotiations intensified with draft modalities that were proposed by Stuart Harbinson in 2003. These draft modalities were criticised intensely by the EU supporting multifunctionalty of agriculture and the USA supporting liberasition of agriculture. So, the EU and the USA tabled a joint framework paper 4 weeks ahead of the Cancun Ministreal. Following the presentation of the joint framework, a new coalition of developing countries called the G-20 rised and tabled a framework paper containing their proposals (Baracuhy, 2011; Aggarwal, 2005). Thus, the G-20 joined into negotiations as an important third force and this situtiation have continued during the negotiations. In addition, in Cancun, "Cotton Initiative" consisting of especially Benin, Çad, Burkina Faso, Mali came out against the policies of developed countries, particularly the USA, about cotton subsidies. Because economies of Benin, Çad, Burkina Faso, Mali rely on cotton and cotton subsidies of developed countries reduced the world cotton prices (Işın, 2005). These conflicts led to the collapse of the Cancun Ministerial Conference. After Cancun, it has emerged that the EU and the USA need to concern particularly the G-20 as a powerful party in the negotiations (Anania ve Bureau, 2005; Aggarwal, 2005).

Dialog that lost with Cancun was recreated by the EU and the USA. Thus, Geneva Conference was made in 2004 and July Framework which was decided to implement with 2005 Hong Kong Conference was signed. Regulations related to market access, export subsidies and domestic supports were specified in July Framework. Besides, due to the problems related to cotton it was decided that cotton committee should be established (Acar, 2006). In 2005 Hong Kong Conference, positive atmosphere which emerged with 2004 July Framework deteriorated. Conference fell short of expectiations and deadline was determined as 30 April 2006 to conclude modalities that were to implement (Baracuhy, 2011; Clapp, 2006; Wilkonson, 2006). But, since modalities could not be concluded in 30 April 2006, negotiations were officially suspended by Director-General Pascal Lamy in 24 July 2006 (Baracuhy, 2011). Following the July 2006 suspension, several WTO country groups such as the G-20 and the Cairns Group of agricultural exporters met to lay the groundwork to restart the negotiations. While these meeting did not yield any breakthrough, Lamy announced the talks that were back in "full negotiating mode" on January 31, 2007. In July 2007, WTO Agriculture committee chairman Crawford Falconer submitted a draft modality paper to address the divergent negotiating positions of the parties (Ferguson, 2008). After meetings and discussions made on the Falconer's draft modality paper, last version was formed. The last version of the paper was the basis for the July 2008 Geneva Confererence and some new regulations were made on market access, export subsidies and domestic supports in 2008 Geneva Confererence. But, 2008 global financial crisis prevented implementation of decisions. The leaders of the global G-20 met in Washington in November 2008 and protectionism loomed on the horizon. The US became even more averse to trade liberalization—except of course in areas in which it still felt competitive (Baracuhy, 2011; Ferguson, 2008).

There was no any progression in 2009 and 2011 Geneva Conferences. Hence, negotiations deadlocked before Bali Conference (ICTSD, 2013). Since DDR negotiations announced in 2001 were not concluded positively, Bali Conference was made in a period when efficiency of WTO in global trade relationship was interrogated. As members realized that DDR were not to complete in the soonest time and the 2008 global crisis could not be overcome completely, Expectations from Bali Conference were kept at the minimum level. So, it was projected that some matured issues were presented as *"early harvest"* (Aran, 2013). The assumption behind the 'early harvest' initiative is that there are a number of negotiating issues which are potentially seen as 'win-win' issues for all members, so that they can be carved out of the overall negotiations without materially affecting the intricate balance of gains and concessions represented by the draft modalities texts (Matthews, 2013). Agriculture once again appeared as a major area of engagement for the WTO Members in the run-up to the Bali Ministerial. The issues currently under discussion were raised by the two developing country formations, G-33 and G-20. While the G-33 raised issues that were focused on furthering the objectives of food security and rural livelihoods, which formed the core demands of this group, the G-20 argued for the introduction of measures that would enhance the effectiveness of the disciplines in the areas of export competition and tariff quota administration (Dhar and Kishore, 2013). A final agreement was not reached in Bali Conference and instead of it "Bali Package" which would revive deadlocked negotiations after 2008 Geneva Conference was approved. Bali Package included decisions related to acception of Yemen as a new member, trade facilitation, agriculture and cotton, development and LDC issues. Additionally, decisions under agriculture topic were general services, public stockholding for food security purposes, tariff rate quota administration, export competition (WTO, 2014/a).

Decisions taken in the agricultural negotiations could be summarized like that: Market Access; making the highest reduction of the highest tariff rates, determination of special and sensetive products for each countries, providing ease of market access for LDC's producing cotton. Export subsidies; elimination of all forms of export subsidies in the end of 2013 for

developed countries[1] (2016 for developing countries), elemination of impacts of agricultural exporting state trading enterprises on trade and production, not to be commercial of international food aid. Domestic support; significant reductions in overall trade-distorting domestic support, considerable cut for members having high domestic support, non-exceedence % 2.5 (% 5 for developing countries) of the average total value of agricultural production for blue box payments.

Position of Turkey in Agricultural Negotiations

Position of Turkey in agriculture negotiations could discuss in two parts. First is Turkey's proposal paper presented to WTO when the DDR started. Second is Turkey's attitude exhibited during the DDR. When first one analysed in detail, we could see that since either Turkey have protected her agriculture considerably via tariffs or her export subsidies are at a negligible level and Turkey has not any obligation about domestic supports, Turkey concentrated her efforts on market access. At second one, it is hard to say that Turkey had sue generis policies in negotiations. Turkey did not make sufficient preparation for negotiations. Due to the membership process of the EU, it can be said that Turkey have exhibited attitude tied to the EU during the DDR. On the other hand, Turkey tried to benefit privileges provided to developing countries and in this issue Turkey liaised with the G-33. Besides, Turkey have concentrated her efforts on market access during the DDR (Anonymous, 2014; Anonymous, 2010; İmir, 2008; WTO, 2001). One final thing, it can be said that Turkey supported decisions taken in Bali Conference because Turkey's employment rate is nearly 24 % in agriculture and especially due to a member of the G-33, Turkey cared about food security issue and Turkey responded positively developments in Bali Conference (Özatay, 2013).

Turkey's bound and applied tariff rates are 61.0 % and 41.2 % in agricultural products of Turkey. For this reason, Turkey would be adversely affected from tariff reductions. So, position adopted and to be adopted by Turkey in the negotiations is important. It could be clearly seen when we examined Turkey's tariff rates in agricultural product groups: Animal products (132.8 %, 110.0 %)[2], dairy products (169.8 %, 129.3 %), sugars and confectionery (107.3 %, 81.9 %) (WTO, 2014/b). Moreover, pruducts such as wheat, sugar beet and tea that Turkey is sixth with 5 % in the world tea production would be adversely affected from tariff reductions (Şahinöz ve ark., 2007; Kıymaz, 2008; İmir; 2008; FAO, 2014). Therefore, Turkey would better strive towards incorporating them into sensitive and special products category. Further, that Turkey's export subsidies are at a negligible level and there is no any obligation about domestic supports don't trivialise export subsidies and domestic support issues in terms of Turkey. Because, that substantial decreases of domestic supports provided by developed countries can create opportunities for Turkey in international competition.

Conclusion

During the negotiations on agriculture, a great deal of discussion has been made about reduction of tariffs, reducing domestic supports and elimination of export subsidies, however, a final agreement was not reached. Despite this fact, some decisions were made during the negotiations such as reduction/removal of export subsidies, development of sensitive and special product concepts against adverse effects of reductions in tariffs, reduction in domestic supports in developed countries to a significant extent. Final agreement has not reached since conflicts between developed countries and developing countries-least developed countries have continued and the 2008 global crisis could not be overcome completely. It can be said that successful conclusion of negotiations depends on meeting the demands of developing countries and least

[1] But this decision could not implement. Regret about this subject was mentioned in decisions taken Bali Conference and elimination of export subsidies was reaffirmed as a commitment.

[2] First one is Final Bound Tariff rate, Second one is MFN Applied Tariff rate

developing countries. There is a trend towards liberalization in world agricultural trade under the leadership of WTO. It was concluded that Turkey should try to acquire privileges on market access and insist on that developed countries should decrease domestic supports and abolish export subsidies by recognizing WTO reality instead of having a position tied to EU.

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The Relationship Between Gender and Poverty in Rural Areas of Turkey

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Abstract

In this study, the concept of poverty was observed in terms of rural and gender perspective derived from secondary data. The women living in rural area have more disadvantages than the women living in urban areas and all men to reach the socio-economic resources and so they cannot develop themselves. In the other hand, because of the agricultural transformation (men' migration for job, job seeking out of farm etc.) in developing countries, only women undertake the full burden of rural areas (production, reproduction, and socialization). However, most of these women work as unpaid family labor and finally feminization of agriculture and poverty is converted to sustainable phenomenon.

Keywords: Rural poverty, gender, feminization of poverty and agriculture.

Introduction

The concept of poverty with social, cultural and economic changes which started in 1980 has highlighted the development debates. The poverty was used as an main title in "World Development Report" prepared by World Bank. Accumulation of poverty studies and this subject is not only an economic problem but also international organizations are interested in the subject (Arpacıoğlu and Yıldırım, 2011). Poverty generally is a situation when people cannot meet basic needs to survive. That situation is not only deprivation of material objects (such as income and consumption) but also health, education; transportation (WB, 2001). The poverty can be defined in different ways according to levels of development of countries and perspectives to the poor. Institutions like OECD and World Bank measures poverty rates on country levels in addition to their assessments for measuring poverty rates in the world

On the other hand, differentiation of socio-economic conditions in rural and urban areas, comes as a result of variety of socio-economic indicators and finally the concept of rural and urban poverty comes out.

In most of countries, poverty seen in rural areas is a question should be considered. Because of most basic indicators, people who live in rural areas are poorer than people who live in urban areas (Bıçkı, 2011). **Rural poverty** is described by the basic elements which are education, health, clean water, housing, transportation, and communication barriers in access to services. Rural poverty encompasses landless peasant and agricultural workers (temporary or seasonal agricultural workers), landowners with small amounts of soil (Dumanlı, 1996). The most unjustly treated people under these poverty criterias are women. Women can not only reach education, water, transport, communications etc. resources but also they are affected by poverty because of landlessness. However women workers almost work as temporary agricultural workers. And they are paid fewer wages than men and they cannot control their incomes. Rural and gender based poverty are concepts which are not focused on like other poverty concepts as definition and content and they are handled generally. Especially there are hardly ever special studies about gender-based poverty.

In 1978, Diane Pearce came up with the concept of feminization of agriculture by detecting that two-thirds of women were poor (Ulutaş, 2009). Pearce expressed the reasons of the feminization of agriculture are that enough government support was not be given to divorced and single women and they had to pay heavy prices for their individual freedoms (McLanahan vd.,2006). Fuchs (1984), expressed that the feminization of poverty changed seriously on the basis of ethnicity and there was an important difference between black and white women.

In feminist economics, the feminization of agriculture means increasing of the participations of women to agriculture sectors in the developing countries. This phenomenon began in 1960, it

was pronounced with liberalism in 1990s and negative effects were seen on the population of women in rural areas (Anonymous, 2014). The reasons of the feminizations of agriculture are to increase the share of female labor in the agricultural labor force, migration of men from rural areas, to decline women' access to the opportunities in agriculture productivity and women' taking lower impairment charges depending on rural skills (Anonymous,2014). Especially in the developing countries agricultural transformation has been mainly focused on gender. Industry, services and the rapid transformation of urbanization in connection with the change in the structure of agricultural conversion and migration have influenced gender. Depending on the gender norms firstly men migrate for long-term and non-agricultural jobs in remote places because they are more educated on average. Because they have less time and motion constraints than women, men would probably leave farming easer and seek paid employment in non-agricultural sectors (Schutter, 2013).

Women who are alone because of death, leaving or migration of men for work have undertaken all agricultural activities and economic woes and so the concepts of the feminization of both agriculture and poverty have emerged. These two concepts have to be explained with a gender perspective and only in this way they are meaningful concepts. Finally although women participations to productivity have increased from past to present, they have dropped behind men economically and have grown poor. And this poverty is certain in rural areas.

In this study, the concept of rural poverty was intended to examine with gender perspective and with secondary data.

Measurement of Poverty Depending on Gender

Index on poverty which is used by UNDP is "Human Poverty Index" (HPI). According to the definition of UNDP, "human poverty" is being deprived of necessary opportunities and options for bearable life. An index which measures "Gender-based poverty" by UNDP does not exist and there is "Gender Development Index" (GDI) which measures the discriminations against female.

Firstly, UNDP puts GDI to its report in 1995. This index presents the inequality in terms of human development between women and men. On the basis of gender, life expectancy at birth for men and women, literacy rates, enrollment rates with primary, secondary and tertiary and earned income estimates are used (Aktan, 2002).

According to Gender Development Index (GDI) in World Development Report which was published by UNDP in 2014, Turkey was in the 68th rank of 168 countries with 0,366 in 2012 (UNDP, 2014). In GDI ranking of Turkey which is the world's 17th largest economy keeps behind the countries like Barbados, Kuwait, Romania, Malaysia, Oman, Armenia, Tunisia, Thailand, Mongolia, Tajikistan and Vietnam and this is an indicator of continuing problem of gender-based poverty in Turkey.

Rural and Gender- Related Poverty in Turkey

Generally women' impoverishment is handled completely without distinguishing rural and urban. And also because women in the rural areas have less limited opportunities to reach education, employment, health, communication etc. than women in the urban areas and all men, their poverty is more serious and for this reason distinguishing rural and urban should be made.

Although women in urban can be paid for their qualified or unqualified work, women in rural work as unpaid family workers. Women in rural areas spend their incomes which they earn from their small-scale activities (dairy, vegetables, carpet, etc.) for their children or they give their income to management of men. Because in the family last decisions are given by father / husband who is head of family, it is impossible that women can take a decision themselves or divorce from their husbands. And this causes that women remain dependent on their husbands. When they divorce, men can work in any jobs but women impoverish financially and mentally

because opportunities are not created to earn money, they have not insurances and their personal skills are not developed.

Poverty about rural and urban is researched by TURKSTAT in Turkey but there are not any detailed researches about poverty with a gender perspective. In TURKSTAT's statistics, only two indicators can be used for women' poverty directly. One of them is the rate of female labor force in agriculture and the other one is the rate of poor women. In 2012, 29.0% of the total female labor force work in farm (TURKSTAT, 2012). This rate is 16.0% for men. And also most of these women (77.9%) who employ in rural areas have the status of unpaid family labor. So they do not have any income for their labors (Önder, 2012). As of the year 2012, in Turkey the rate of poor women is 40.2% in rural areas; this rate is more than men' (37.7%). Only 9.3% of women and 8.5% of men are poor in urban areas (TURKSTAT, 2009). On the other hand, the other indicator which would be about female poverty is the average number of children per female. It varies in every region. When the average number of children per female is 2.7 in rural areas, the average number of children per female is 2.1 in urban areas (HÜNEE, 2009). Increasing the number of children grows female's poverty financially.

When the studies about rural poverty by TURKSTAT (2012) are handled, 29.7% of people in rural areas and 28.6% of people in urban areas are poor. The number of households people is the other factor of increasing poverty and especially the average number of households people is more in rural areas than urban areas. So while 53.6% of households where 7 or more than 7 people live are poor, this rate is 23.2% in urban areas (TURKSTAT, 2009). When poverty about sectors where household members work is examined, 35.4% of workers in farms in rural areas and 13.3 % of them in urban areas are poor. Type of households is other important factor which affects poverty. According to this, 37.4% of patriarchal households in rural areas and 34.1% of small family are poor (TURKSTAT, 2009). The numbers are close to each other and its reason is that there is not any small family in rural areas. The rate of small family in rural areas extends because of changing people's lives. Social and economic cohesion continues. These rates for urban areas are 9.7% and 6.9% (TURKSTAT, 2009).

Conclusion

All elements in the social structure affect each other. All elements which affect women' poverty in rural areas are each other's both reason and result. Those women are in the second position than men causes that women do not have land ownership and so they cannot have heritage. Because of social reasons, women cannot work in paid jobs. And this is a result of cessation from women' education and being first choice of men. On the other hand being mother and housewife is excessive important for women and gender-based work sharing estrange women from working life. These results do not allow women to earn money directly and they are elements of women' poverty. On the other hand, because of men who are the head of family and give last decision, women cannot manage even they can earn their money. Although, especially, women who work in seasonal agricultural work are the only income resources of house, their wages are given to their husband/ father. The wrong economic decisions which are given by men affect all family and women. Bankruptcy, sale of land to the city, the family migration or the men of migration for work are some of the elements which affect women negatively.

In the poverty measures which are made in the international level, income and education-based indexes take aim at poverty values. Besides, the measurements of poverty line are made on the basis of households and these blocks to emerge inequality of gender-based poverty clearly.

Finally, the improvements in macroeconomic indicators do not reflect the values of poverty. Poverty maintains pressure on rural areas and women. So in rural development policies, gender-based rural poverty should be handled mainly; women who have already been active in rural areas, should have economic benefits.

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The Use of Geographical Information System in Agricultural Biodiversity Conservation: The Case of Aegean Region

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Abstract

In-situ conservation of plant genetic resources is critically important in order to maintain the genetic diversity of plants, to determine the priorities and strategies for ensuring the sustainable use and management and their implementation on a national scale. The relationship between the areas which are not suitable for wheat farming and the use of local wheat varieties has been examined, within this research area composed of eight villages in Manisa, Afyon, Uşak and Kütahya provinces. In the study to analyze and assess of suitable areas for wheat production, Geographical Information System (GIS) was used. As a result of overlay of considering the soil properties such as slope, depth, salinity and alkalinity with the research are, the areas which are not suitable and suitable for the cultivation of wheat were obtained. According to suitability map derived from overlay it is seen that the natural conditions of the villages forcing wheat farming. In respect of data, in five villages of total of eight, local wheat varieties were found. It was determined that the local wheat varieties are no longer available, in the remaining three villages. According to this, in the research field, the areas which are not suitable for wheat farming are the majority areas for local wheat cultivation.

Keywords: Geographic Information System (GIS), agricultural biodiversity, local wheat variety, in-situ conservation

Introduction

Majority of species is needed to sustain life and to maintain physical processes such as climatic types, atmospheric and soil. For this reason, to identify the priorities and strategies and implementation of these in nationwide is of utmost importance for in-situ conservation of plant genetic resources, maintenance of diversity of plant genetic and providing the sustainable use and management. With this aim, the analysis of data collected and evaluations were carried out in GIS. Additionally, the existing local wheat varieties on the pass way region in Aegean Region were determined, survey data processed and data base combined (Table 1).

Table 1: Geographic location of villages in the study area

	Afyon		**Kütahya**		**Manisa**		**Uşak**	
Districts	Bolvadin	Çobanlar	Simav	Altıntaş	Akhisar	Kula	Merkez	Banaz
Villages								
Lowland	Dişli			Beşkarış		Gökçeören	Susuzören	
Hillside		Kocaöz	Kuşu					Büyükoturak
Mountain					Hanpaşa			

Material and Method

Nowadays, computer-aided remote sensing and geographic information systems are used extensively for determination of vegetable cultivation area, in parallel with technological developments in the agricultural sector. Tuğaç and Torunlar (2002) primarily have identified the status of current land use of the research area by using GIS and stated the product pattern regarding years from the past to the present. GIS, recently have been used in the field of agricultural economics. Akça and Esengün (2003) have highlighted the opportunities for the use of GIS in the field of agricultural economics, in their study. Also, Karakayacı and Oğuz (2007) have been applied GIS in valuation of agricultural land.

In this study, spatial and non-spatial data and data processing tools which are suitable for identifying wheat production areas are the main components of the research. In this context, the data sets used for analysis within Geographic Information System were;

- 1/25000 scale topographic maps,
- 1/25000 scale soil maps,
- product and production information obtained from the results of face-to-face interview with producers,
- interviews with institutions and people related to the research area.

In the study, ArcGIS 9.3 software was used for the preparation, processing and analyzing of the necessary data sets for analysis applied under GIS. We defined two groups "suitable lands for wheat production" and "unsuitable lands for wheat production". Unsuitable lands for cultivation over %20 slope areas, soil depth is less than 20 cm. areas (Erpul and Saygın, 2012) and rocky areas are marked as unsuitable lands for wheat production. Furthermore, boron areas causing the problem of boron toxicity also evaluated as unsuitable for wheat production (Paull et. al., 1988). Besides, salinity, alkalinity and acidity like other soil properties that negatively affect wheat production (Mızrak, 2011), areas with these features are also classified as unsuitable areas for wheat production. In addition to these features, due to existing land use / land cover (residential, scrub, woods, water surfaces and river beds) the areas which disallow to agricultural activities have also been incorporated into the unsuitable lands for wheat production. Because of the wheat can grow in almost any soil condition, in the research agricultural areas which are unsuitable for cultivation are noted as "unsuitable lands for wheat production" and except these areas are defined as "suitable lands for wheat production". In this context, the research was conducted in five phases;

- obtaining the data,
- the production of map layers in GIS,
- GIS analysis,
- production of the result map,
- interpretation of the results.

Results

Beşkarış and Susuzören villages have low and moderate slope areas when evaluated for the whole research area of the study. Therefore, it is thought that these villages are having suitable lands for wheat production. However, Büyükoturak and Kuşu villages have considerably rugged areas. In terms of the slope property, 30% portion of the land in the village Büyükoturak and 42% portion of the land in the village Kuşu are determined as unsuitable lands for wheat production. Kocaöz and Dişli villages have relatively moderate slope areas. The lands of 16% of Kocaöz village and 18% of Dişli village are unsuitable for the cultivation of wheat. With a view for slope, while 37% of Gökçeören village and 72% of Hanpaşa villages are determining as unsuitable lands for wheat cultivation, particularly village of Hanpaşa seems to be having a slope which is unsuitable for cultivation. However, local wheat varieties have been found in these villages. This situation shows that while the natural constraints increase local wheat farming continues. One of the most important reasons is, the local varieties are generally producing within marginal lands where proprietary seeds couldn't grow, small areas and less input (Şehirali et.al., 2005). Due to being unique to the region, local varieties can adapt almost all conditions.

Local varieties have strategically important place especially in sensitive ecosystems such as arid and semi-arid areas, mountains and savannahs. The majority of these plants don't need more input, can be grown in marginal areas and arid lands with a minimum input. These plants can also contribute to rise in agricultural production and improved environment (Sthapit and Padulosi, 2011).

When the villages have evaluated in terms of soil depth, it has seen that especially a large part of Susuzören village consists of depth and mid-depth soil. In Susuzören village local wheat varieties was replaced by the proprietary seeds. The villages except Susuzören usually composed of shallow, very shallow and litozolic soil. Accordingly to this, 8% of Susuzören village, 31% of Beşkarış village, 25% of Büyükoturak and Kuşu villages, 19% of Dişli village and 18% of Kocaöz village appear to be unsuitable for wheat production. The villages of Gökçeören and Hanpaşa were determined to be unsuitable for wheat production in terms of soil depth, too. Therefore, 56% of Gökçeören village and 75% of Hanpaşa village consist of very shallow soil. The areas which are unsuitable for wheat cultivation because of salty, alkalinity and boron features were formed based on other soil features attribute information. In addition, rocky areas unfit for wheat cultivation were obtained again by utilizing the attribute information oriented to the other soil features.

Accordingly, there are no unsuitable lands for wheat cultivation due to salty, alkalinity and boron features of soil in Büyüoturak, Dişli, Kuşu and Susuzören villages. However, 5% of Gökçeören village, 1% of Hanpaşa village, 7% of Beşkarış village and 20% of Kocaöz village are having unsuitable areas for wheat cultivation due to the presence of these soil features.

In the study area, water surfaces, forest and heathland areas are designated as unsuitable areas for agriculture due to current land use. In addition, in the areas marked as river floodplains as terrain have been identified as unsuitable for wheat cultivation. Accordingly, in Beşkarış, Kocaöz and Susuzören villages, there are no unsuitable areas for wheat cultivation due to current land use. When considering proprietary seeds can grow almost anywhere mostly in the absence of natural constraints, it is supportive property that no local wheat varieties haven't been observed in these villages. It seems to be unsuitable for wheat cultivation due to current land use in 45% of Gökçeören, 64% of Hanpaşa, 31% of Büyükoturak, 6% of Dişli and 47% of Kuşu villages.

By overlaying all of these lands which don't have suitable features for wheat cultivation, suitable and unsuitable areas were mapped for the villages. Accordingly, in Dişli and Susuzören villages the proportion of unsuitable areas for wheat cultivation is low. However, especially in Kuşu and Hanpaşa villages, unsuitable areas for wheat cultivation respectively compose 65% and 77% of the villages. 62% of Gökçeören, 43% of Beşkarış, 41% of Büyükoturak and 40% of Kocaöz villages compose unsuitable areas for wheat cultivation. In Hanpaşa and Kuşu villages which are having maximum lands in terms of unsuitable areas for wheat cultivation, existence and continuation of production of local wheat varieties show the ability to adapt to conditions specific to the area of local wheat varieties despite the all adverse conditions available for wheat cultivation. Also, the producers surveyed with in Kuşu and Hanpaşa villages that have the highest slope, indicated that they have sufficient water for irrigation for the production of present wheat variety. This shows that while the local wheat varieties adjust to the conditions unique to the district, they were resistant to some challenging conditions such as arid conditions. The local varieties that can give high yields even in sensitive ecosystems have been met with in Büyükoturak village. In addition, all of the producers surveyed with in Hanpaşa village, cultivate local wheat varieties. In conclusion, after overlaying in acquired suitability map can be seen suitable and unsuitable areas for wheat cultivation (Figure 1). Accordingly, in the study area, in the majority of unsuitable areas for wheat cultivation there was a production of local wheat varieties. Especially local wheat variety production was done intensely in Kuşu, Gökçeören and Hanpaşa villages. Considering to the suitability map, there were no traces of local wheat varieties in Susuzören seen as the most suitable area for wheat cultivation.

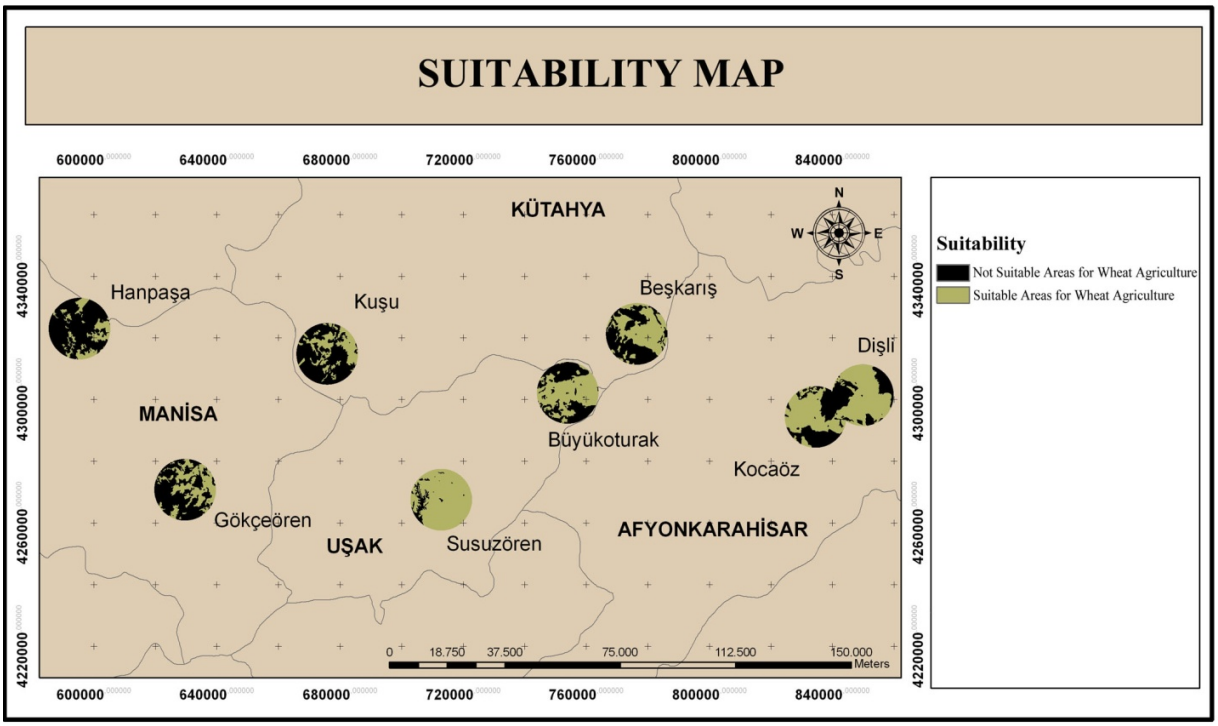

Figure 1. Suitability map

Conclusion

According to the results of GIS analysis, when soil properties such as slope, depth, salinity and alkalinity taken into account, seen that the natural conditions of the villages are forcing the wheat production. In the research area, local wheat varieties were detected in five of the eight villages. It is designated that in the remaining three villages local wheat varieties are vanished from now on. The production of wheat with local varieties is ongoing currently in villages which have difficult natural conditions. The results of GIS analysis are supportive nature thereof. When all the results are considered, enhancement of studies on in-situ conservation of local wheat varieties which the producers continued to grow due to low input costs and achieving relatively high yields under difficult environmental conditions is required. Also it is considered that primarily, for the conservation of these varieties it would be useful to implement the agricultural policies based on the views and advices of producers.

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Analysis of Attributes Considering for Meat Preference of Consumers: A case of Izmir, Turkey

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Abstract

The purpose of this research is to investigate the consumer preferences of meat, beef, one of the foods of animal origin, which has an important place in nutrition particularly in the province of Izmir. The study was based on the meats by the production techniques such as conventional, organic, certified and imported. The data obtained through the surveys that were conducted with the meat consumers residing in the province of Izmir via interviews constitute the main material of this study. The study sample size was determined as 121 with proportional sampling, 90% confidence interval and 7.5% error margin. The basic descriptive statistics were applied in order to achieve the objectives of the research. Furthermore, the Best-Worst method was utilized for the consumers' preferences of different types of red meat according to meats' characteristics. According to the research results it was found that generally the meat type that is mostly preferred by consumers according to meats' features is conventional meat while the least preferred one is imported meat. While the conventional meat is the most preferred meat in terms of the price, taste, nutritional value and freshness; the least preferred meat is imported meat.

Keywords: Consumer preference, meat, best-worst

Introduction

Red meat is an important part in foods of animal origin. It is very rich in protein. Protein is the building block of all living organisms. Growth, reproduction and replication of dna of living beings are made possible by protein (Lorcu and Bolat, 2012). The consumption of foods of animal origin is an indicator of how economically advanced the country is. As level of income, cultural influence and civilization level increases carbonated food consumption decreases and consuming food rich in protein increases. Besides level of income consumer consumption tendencies, the sex of consumer, the age of consumer and other socio-cultural aspects effect the food consumption. Other effects are believed to be ethical values, traditional values and religious beliefs (Karakuş et al., 2008; Cankurt et al, 2010; McAfee et al, 2010; Yaylak et al, 2010; Şeker et al, 2011; Furnols and Guerrero, 2014). Nowadays the country which goods are produced effect the buying decision of the customer. As well as their take on consuming products produced locally or consuming products which are imported (Kadanalı et al.,2014).

As mentioned above in literature the research made in this area is mainly focused on consumption of meat consumption and consumer habits of meat consumption. There is no focus on the tecnique of meat production. Therefore this research is an important contribution to literature. The goal of this research is finding out customer preferences considering their red meat consumption in the form of beef focusing production methods aspects.

Material and Method

Material

The data is obtained via a face to face survey which was carried out in Bornova. In the survey a structured questionnaire was used.

Method

Consumers which reside in Bornova district are the main target of the research. According to TÜİK year 2012 demographic values and postulating there are average 4 people per household the consumer reside is calculated to be around 100000. Using these values and the percentage example value formula below:

$$n = \frac{Np(1-p)}{(N-1)\sigma_{px}^2 + p(1-p)}$$

n: example value , N: Number of people in Bornova District , σ_{px}^2: Variance
p: ration of people which know of organicly produced meat, (to achieve maximum volume is taken to be 0.5) (Miran, 2003). Calculated to be 121 for %90 confidence interval and %7.5 error margin. Survey participants are chosen considering age, gender, education infos and who consume meat according to quota sampling.

The basic descriptive statistics were applied in order to achieve the objectives of the research. Furthermore, the Best-Worst method was utilized for the consumers' preferences of different types of red meat according to meats' characteristics.

Results

Consumers' Demographics

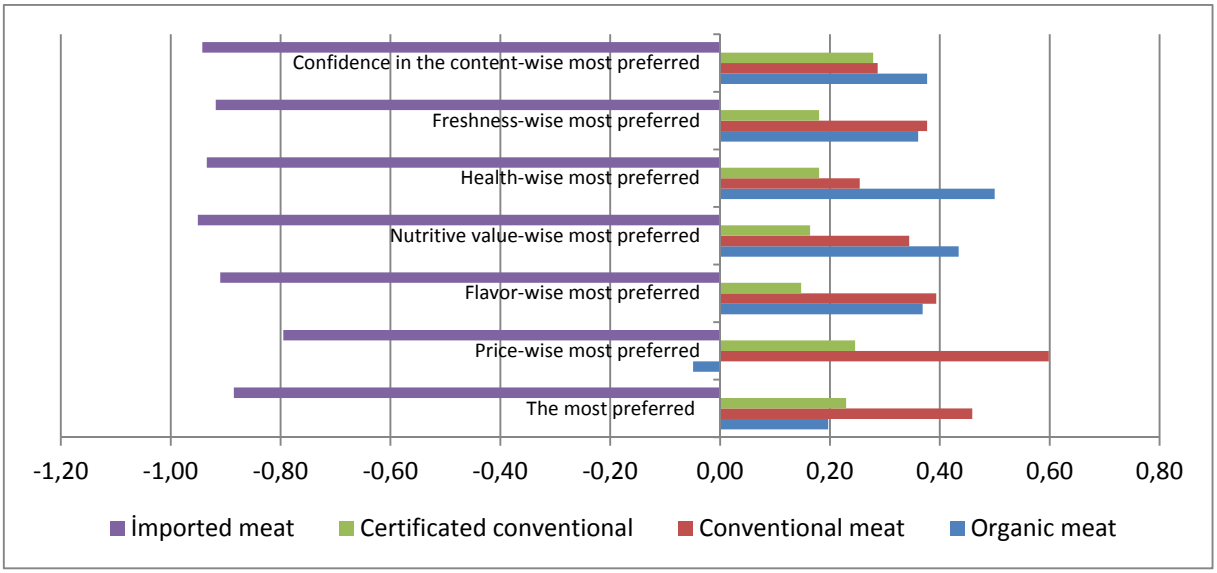
Table 1. Consumers' socio-demographics

Attribute		n	%	Attribute		n	%
Income (TL)	< 1000	6	5,0	Education	literate	1	0,9
	1000-1999	14	11,6		Elementary school	20	16,5
	2000-2999	28	23,1		Middle school	9	7,4
	3000-4999	42	34,7		High school	34	28,1
	5000-9999	27	22,3		College	53	43,8
	10000 - +	4	3,3		Postgraduate	4	3,3
Gender	Male	63	52,1	Marital Status	Married	85	70,2
	Female	58	47,9		Single	31	25,6
	Average	Min.	Max.		Widowed	5	4,1
Age	42.03	22	66				

121 people took the survey. 52% is male(63 people), 48% is female(58 people). Average age of consumers were 42. The youngest was 22, the oldest was 66. 44% have college education(53 people), 28% have high school education(34 people), 17% have elemantary school education(20 people), 7% have middle school education(9 people), 3% have postgraduate education(4 people), 1% can read and write(1 person). 70% are married(85 people), 26% are single(31 people) and 4% are widowed(5 people). 35 %have 3000-4999 income(42 people), 23% have 5000-9999 income(27 people), 22% have 5000-9999 income(27 people), 12% have 1000-1999 income(14 people).

Consumer meat consumption preferences according to consumer characteristics

As seen in graphic 1; the most preferred type of meat is conventional meat, least preferred type of meat is imported meat. Price-wise most preferred type of meat is conventional meat, least preferred type of meat is imported meat. Flavor-wise most preferred type of meat is conventional meat, least preferred type of meat is imported meat. Nutritive value-wise most preferred type of meat is organic meat, least preferred type of meat is imported meat. Health-wise most preferred type of meat is organic meat, least preferred type of meat is imported meat. Freshness-wise most preferred type of meat is conventional meat, least preferred type of meat is imported meat. Confidence in the content-wise most preferred type of meat is conventional meat, least preferred type of meat is imported meat.



Graphic 1: Consumer meat consumption preferences according to general attributes.

Consumer meat consumption preferences according to income and education level

Table 2. Consumer meat consumption preferences according to income and education level

	INCOME						EDUCATION			
	< 1000	1000-1999	2000-2999	3000-4999	5000-9999	10000 +	Elementary	Middle	High	College
Price										
Organic	-0,008	-0,025	-0,025	0,008	-0,016	0,016	-0,033	-0,032	-0,016	0,000
Conventional	0,033	0,098	0,139	0,164	0,147	0,016	0,041	0,041	0,156	0,279
Certificated conventional	0,008	0,008	0,057	0,131	0,041	0,000	0,025	0,025	0,074	0,115
Imported	-0,033	-0,082	-0,172	-0,303	-0,172	-0,033	-0,033	-0,033	-0,213	-0,393
Taste/flavor										
Organic	0,041	0,041	0,057	0,131	0,066	0,033	0,082	0,041	0,082	0,156
Conventional	0,008	0,057	0,123	0,115	0,090	0,000	0,041	0,033	0,123	0,197
Certificated conventional	0,000	0,000	0,049	0,074	0,025	0,000	0,041	0,000	0,041	0,066
Imported	-0,049	-0,098	-0,229	-0,320	-0,180	-0,033	-0,164	-0,074	-0,246	-0,418
Nutrition Value										
Organic	0,041	0,057	0,066	0,139	0,098	0,033	0,115	0,026	0,098	0,188
Conventional	0,008	0,049	0,115	0,090	0,082	0,000	0,016	0,041	0,107	0,180
Certificated conventional	0,000	0,000	0,049	0,098	0,016	0,000	0,033	0,008	0,066	0,057
Imported	-0,049	-0,107	-0,229	-0,328	-0,205	-0,033	-0,164	-0,074	-0,270	-0,426
Confidence in content										
Organic	0,041	0,057	0,049	0,098	0,098	0,033	0,115	0,033	0,107	0,115
Conventional	0,008	0,049	0,098	0,074	0,057	0,000	0,025	0,025	0,090	0,156
Certificated conventional	0,000	0,000	0,082	0,156	0,041	0,000	0,033	0,016	0,074	0,139
Imported	-0,049	-0,107	-0,229	-0,328	-0,197	-0,033	-0,172	-0,074	-0,270	-0,410

Consumers' meat preferences according to income

When consumers' meat preferences according to income are considered according to graphic 2 all income groups except above 10000 income group choose conventional meat, only above 10000 income group chooses organic meat. Considering taste/flavor mostly conventional meat is chosen. Less than1000 income group and 3000-4999 income group choose organic meat. Considering nutrition value most of the consumers choose organic meat. Considering confidence

in content most of the consumers choose organic meat. Both surveys conducted considering education and income show that imported meat was the least chosen option.

Consumers' meat preferences according to education

As seen in graphic 2 all education level groups choose conventional meat considering price. Considering taste/flavor elementary school educated, middle school educated and postgraduate groups choose conventional meat. Considering nutrition value elementary school educated, college educated and postgraduate groups choose organic meat. Considering confidence in content elementary school educated, middle school educated, high school educated groups choose organic meat. College educated groups choose certificated conventional meat. Considering all criteria imported meat was the least preferred type of meat.

Conclusion and recommendations

Consumers who come from different backgrounds choose different meat types. In this study consumer backgrounds are investigated in 3 categories: general, income level and education level. When consumers are categorized generally; considering price, taste/flavor and freshness conventional meat is chosen mostly. Considering nutrition value and confidence in content organic meat was chosen. When consumers are categorized by income level; considering price only highest income level (10000+) choose organic meat. Other groups choose conventional meat. Considering taste/flavor conventional meat is chosen. Considering nutrition value and confidence in content organic meat is chosen. When consumers are categorized by education level; considering price all consumers choose conventional meat. Considering other criteria mostly organic meat was chosen. Although conventional meat was chosen in some cases. In all aspects imported meat was the least chosen option. The reason for that is religious beliefs, traditional values and distrust in imported goods. From all these information the following can be concluded. Consumers are aware of the health benefits and reliability of organic food. We can understand that consumers of all income levels have an understanding of organic meat concept. Although these consumers are yet to be convinced to buy organic meat. In order to get consumers who have the tendency to buy organic meat more educational and awareness raising work can be done.

These types of researches in these areas are thought to be imported considering it will be enlightening policy and choice makers as well as giving data for private sector meat business representatives.

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The Wine Industry in Greece: Does Market Orientation Affect Wineries' Performance?

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Abstract
Past research devoted to various industry sectors help us enrich our knowledge about market orientation. However, research efforts at the wine industry sector are extremely scarce. This study explores in which extent the Greek wineries are market oriented, and the degree of its influence on winery's performance. The research represents an application of the MARKOR scale to the winery sector, provides empirical evidence for a direct link between market orientation and organizational performance and highlights that wineries need to proceed by gathering and disseminating information relative to consumer needs and satisfaction, competitor tactics and environmental factors in order to respond to the market.

Keywords: Market orientation, firm performance, winery industry, Greece

Introduction
During the 1990's, market orientation received a lot of attention from the marketing discipline (indicative: Chang *et al*., 1999; Diamantopoulos and Hart, 1993; Kohli and Jaworski, 1990; Narver and Slater, 1990). Market orientation is defined as the ability of a firm to learn about customers, competitors and environmental factors on a continuous basis, permitting them to act on events and trends in present and potential markets (Day, 1994). The first phase of empirical studies on the subject, focused mostly on the meaning and measurement of the construct (Kohli and Jaworski, 1990; Narver and Slater, 1990; Webster, 1998).

In the last decades the Greek wine industry faced intensified competition, changes in the socio-economic consumer's demographics, price raising as well as high taxation of alcoholic products. These all factors have affected demand and many wineries attempt to rationalize their operations. Despite the great body of research devoted to the market orientation of manufacturing firms and to other business areas, research on the implementation of market orientation in the wine industry remains limited. Moreover, the wine industry remains till nowadays a relatively unexamined context of the relationship between market orientation and firm performance. The aim of this study is to examine the market orientation construct within the Greek winery industry and its influence on winery performance.

Theoretical Background – Market Orientation and Performance
The concept of market orientation can be approached from two perspectives: as a business philosophy and as behavior (Dreher, 1994). Market orientation as a business philosophy is defined as the pattern of shared values and beliefs within an organization, helping individuals to understand the functions of the organization and provide them with normative behaviors (Deshpande and Webster, 1989). The behavioral perspective focuses on characteristics of the organization like strategy, structure, process and activities (Dreher, 1994). In this study the behavioral perspective will be used. Additional elements of market orientation behavior have been suggested like intelligence generation, intelligence dissemination, and responsiveness to market intelligence (Kohli and Jaworski, 1990), innovation and competitor reference (Liu, 1995), or competitor orientation (Narver and Slater,1990). Kohli and Jaworski, (1990) define market orientation as "…*organization wide generation of market intelligence pertaining to current and future customer needs, dissemination of intelligence across departments, and organization wide responsiveness to it*" (p. 6). In contrast with Kohli and Jaworski (1990), Narver and Slater's

(1990), operationalization of market orientation incorporated three behavioral components: a) customer orientation, b) competitor orientation, and c) interfunctional coordination.

Performance measurement has been developed as a mean of monitoring and maintaining the process of ensuring that an organization adopts strategies that lead to the achievement of overall goals and objectives. The most of the models of performance measurement focus on the achievement of a number of key financial measures i.e. ROI, ROA, profitability etc. These models have been criticized as failing to measure multiple dimensions of performance, as well as, the degree of how the organization adapts to the environment in comparison to its success (Brignall and Ballantine, 1996). In order to overcome these obstacles indirect measures of financial indicators have been developed. Non-financial indicators specify the indirect effect that leads to financial performance. Measures like market share, product or service quality, customer loyalty and customer satisfaction could be treated as non-financial indicators (Venkatraman and Ramanujam,1986). The measurement of firm performance is a complex phenomenon. The underlying potential solution is the use of both financial and non-financial indicators which probably provides a broad operationalization of winery's performance and an opportunity to clarify the relationship between financial and operational aspects of performance to be investigated (Venkatraman and Ramanujam, 1986).

Research into the market orientation-performance relationship has been conducted in a variety of contexts. A great number of studies have been conducted in the United States (e.g. Jaworski and Kohli, 1993; Narver and Slater, 1990; Slater and Narver, 1994) and in the UK (e.g. Diamontopoulos and Hart, 1993; Pitt *et al.,* 1996). A market oriented organization monitors continuously customers' needs and attempts to satisfy them by modifying the organizational offering whilst remaining profitable (Kohli and Jaworski, 1990; Narver and Slater, 1990). Moreover, the organization is in a position of understanding consumer's needs. This results in closing potential gaps between the management of the organization and its customers and lead to better firm performance. Market oriented firms would be capable of creating better value for their customers (Day, 1994;).

It is widely known that a number of studies have been undertaken in order to test the relationship between the market orientation and organizational performance (indicative: Deshpande *et al.* 1993; Fritz, 1996; Guar *et al.,* 2011; Chung, 2012). The Greek wine industry remains till nowadays an unexamined context of the relationship between market orientation and firm performance. This study takes the opportunity to address the need of further exploration of market orientation in a winery context and its potential relationship with organizational performance and thus our basic research proposition are:

RP: The dimensions of the market orientation construct will positive affect winery's performance.

Methodology

The context of this study is the Greek wine industry. To be able to investigate the relationship between market orientation and performance in the winery industry, a research design was employed that involved structured questionnaires targeting the population of the Greek wineries. The final questionnaire included measures for market orientation and wineries' performance as well a large number of demographic variables in order to provide a holistic outline of a typical Greek winery. A small set of items had to be adapted to a winery context. The sampling frame was derived combining the list of wineries in the data set of the ICAP Hellas -research company with specialization in industry reports- and the data from the Greek wine federation. All the wineries found to have some kind of contact information were included in the sample frame, leading on an overall number of 202 wineries. The respondents were not given any incentive and they contributed voluntarily. After the appropriate pre-testing, 202 questionnaires were sent both by post and e-mail to the wineries. A response rate of 28.8% was achieved (63 questionnaires).

At the end 60 were usable, representing an overall response rate of 27.4%. The data collection lasted from October 2011 to August 2012 in order to avoid the peak period of vine harvest.

In order to measure the market orientation construct, the 20-item MARKOR instrument developed by Kohli *et al*., (1993) was adopted. All the items (MARKOR) were measured using a 7-point Likert scale ranging from 1= "I strongly disagree" to 7= "I strongly agree". Having in mind the measurement of the winery's performance, financial and non-financial indicators have been used: overall sales, sales growth, market share and profit margin. The adopted indicators were determined during the conduction of "in depth interviews". Respondents were asked to evaluate each performance indicator in comparison to the largest competitor over the past three years. All the performance items were measured using a 7-point Likert scale ranging from 1= "much worse" to 7= "much better".

Results

The vast majority of the respondents are male (76,7%) and have either a graduate (35,6%) or a postgraduate degree (27,1%). The age distribution of the sample indicates that the 30,4% belongs to the group of 31-40, 25% to the group of 41-50 and the rest respondents are categorized within the group of 51 years old and more. Having in mind the position that the respondent occurs, most of them are the owners or co-owners of the winery, a 15,5% were marketing executives and a 12,2% were enologists. Most of the participants have the same job position for 6 to 10 years (35%) and a large percentage 1 to 5 years (31,7%). The findings relative to the various "demographics" of the Greek wineries are very interesting. The great majority of the Greek wineries can characterized as "family business" (78,3%), lacking marketing department (70%) and employing less than ten people (61,7%). An important percentage of the Greek wineries (30%) devote less than 2% of their sales turnover to the marketing budget. Moreover a 21,7% assigns a 2 to 4% of their sales to the marketing activities, a corresponding percentage allocates a 4% to 6% of their sales performance. During the period of the last three years, Greek wineries found to introduce 3 to 4 new wines in the market during (41,7%), having 1 to 2 experimental wines (58,4%) and the slight majority show a orientation towards to the organic grape cultivation in parallel to the conventional viticulture.

The exploratory factor analysis for the MARKOR construct revealed a three principal components solution– *Intelligence Generation*, *Intelligence Dissemination* and *Responsiveness*- that collectively construed 60,15% of the total fluctuation of the initial variables. Cronbach's alpha coefficients were calculated in order to check the internal consistency and reliability of each factor. Factor loadings less than .40 have been excluded from the further steps of analysis. The sample size was a major restriction on adopting a SEM analysis for the identification of the MARKOR construct. In order to avoid common method bias, a hypothetical construct was formulated: a single factor model, a one-dimensional model in which all the items forced to load into one factor (Podsakoff *et al*. 2003). The findings suggest that Greek wineries adopt a market orientation behavior. Next, principal component analysis revealed that the four financial and non-financial indicators of winery's performance constitute one factor (component) named *Performance* (72,1% of Variance).

Next, for the examination of the main research proposition a multiple regression analysis was performed using as dependent variable winery's *Performance* and as independent variables the dimensions of the MARKOR scale. It should be noted that prior to multiple regression analysis conducted, a control was made to examine whether the relations between the dependent and the rest of independent variables were efficient for the linearity case with the use of scatter diagrams, that showed that there weren't any intense non-linear relations. Another significant issue that should be examined was the multicollinearity, and that only because it was given that all three independent variables are the partial dimensions of the same variable, of the MARKOR construct. In the first regression analysis, where all the three dimensions of market MARKOR

have been included, results indicated that *Intelligence Generation* and *Intelligence Dissemination* variables were not significant as independent variables and were excluded from the next step of analysis. Therefore, we proceed to the second regression analysis where the only independent variable was the *Responsiveness* dimension of the market orientation scale. The analysis reveals that there is a positive effect of the *Responsiveness* dimension on winery's Performance.

Following the proposition of Kohli *et al*., (1993) of examining the potential sequence of effect within the three dimensions of MARKOR construct, one more multiple regression analysis was conducted: the independent variable was the *Responsiveness* dimension and the other two respective dimensions were the independent variables. Both *Intelligence Generation* and *Intelligence Dissemination* have a direct positive influence on *Responsiveness*.

Conclusions

This is one of the very few studies, which has examined the adoption of the MARKOR in the winery industry. The role of marketing both as a function or a bundle of activities and dominant organizational culture in Greek wineries has grown as they face intensive competition, changes in consumers' demographics and environmental conditions. The findings of this study have some important managerial implications. First, the positive relationship identified between wineries' performance and market orientation supports a proposition running through the marketing literature which states that the achievement of winery's goals is determined by satisfying the needs of consumers more efficiently and effectively than competitors. The results confirm that a market orientation, particularly the Responsiveness dimension, is a worthwhile management goal to adopt and highlight that wineries need to proceed by gathering and disseminating information in order to respond to the market. It is important to underline that each of the dimensions of market orientation does not affect equally firm performance and this provides the opportunity of further verification and investigation in different contexts.

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Analysis of the Turkish Domestic Market for Organic Products under the Light of Consumer Studies

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Abstract
In this study, an attempt is made in order to put forward an evaluation on the Turkish domestic market of organic products through a comprehensive review of the research findings on consumers' attitudes and behaviors toward organic products in the country.

Keywords: Turkey, organic products, domestic market, consumer behavior

Introduction
With the increasing sensitivity of consumers to health related and environmental issues, development of organic agriculture has gained a worldwide momentum. In Turkey, as well, consumer awareness of organic products has increased in recent years. Yet, the production is still rather export-oriented. The main reasons preventing the domestic market from a faster development are said to be the difference between retail prices of organic and conventional products; the low level of consumer income; insufficient availability of the organic products in the market place and the consumers limited level of awareness regarding the organic products.

Undoubtedly, development of the domestic market is closely related to the consumer demand. Therefore, examination of the factors affecting demand would uncover the main deterrents and encouraging aspects in the market. Indeed, attitudes and behaviors of consumers toward organic food products have become a popular research topic. It is observed that consumers' approaches to organic products varied from one country to another and along the time in the same country. The objective of this paper has been evaluating the Turkish domestic market of organic products through review of relevant consumer research. After a brief overview of the organic agriculture and domestic market of organic products in Turkey, research findings on consumers' attitudes and behaviors were summarized and their implications for the organic sector were evaluated.

Organic agriculture and domestic market of organic products in Turkey
In Turkey, history of organic agriculture dates back to late 1980's, when export oriented firms started production to meet the demand by the European countries. Recently, both increased awareness of Turkish consumers on food safety and environment, and government support policies on organic agriculture seems to encourage the development of the sector. In fact, in last ten years, number of organic farmers has increased by 310.85%, rising from 14798 in 2003 to 60797 in 2013. In the same period, area under organic production has increased even more drastically, from 113621 hectares to 769014 hectares, which means a 576.82% rise up in ten years. Yet, organic agriculture is still mainly carried out upon the export oriented contractual production model. Official data reveals that, in 2013 value of organic product exports equaled to about 46 million dollars. This means a 24.61% increase after 2003[1]. In 2009, when Turkey's organic exports equaled to 19.8 million Euros, the retail sales of organic products in the domestic market was reported to be about 3.6 million Euros (FIBL and IFOAM, 2014). According to local experts, share of the domestic market rose up to 20% in 2013 (Dünya, 2014). In the domestic market, exporting/processing firms, individual farmers, cooperatives and intermediaries supply hypermarkets, organic open markets, their own retail shop chains and other organic shops. They also perform direct sales or e-marketing of products. Despite variety of marketing channels, when per capita organic consumption of 0.1 Euros (FIBL and IFOAM, 2014) and the rates of organic farms (1.98%) and area allocated to organic agriculture (3.23%) (MFAL, 2013) were considered, it is clear that organic agriculture still has a long way to go in the country.

[1] These official figures are made up of those reported by the export firms to the Unions of Export; and according to experts, they deviate widely from the real export value which is estimated to be far higher.

Review of the research findings on consumers' attitudes and behaviors toward organic products in Turkey

Research in Turkey revealed that majority of consumers were ***skeptical*** regarding the impact of chemical residues in fresh fruits and vegetables on their health and environment (Akgüngör et al, 1999; Özkan et al, 2000; Karabaş and Gürler, 2012; Sönmez et al, 2013). ***The most important attributes searched in food products*** appears to be healthiness, nutritional value, good taste and favorable price (Akgüngör et al, 1999; Özkan et al, 2000; Oraman and Unakıtan, 2010). While those ***aware*** of organic agriculture were about 10-20% in late 1990's; this figure increased continuously, and today, who are not aware of organic production are only 10-20% (Akgüngör et al, 1999; Özkan et al, 2000; Koç et al, 2001; Armağan and Özdoğan, 2005; Mutlu, 2007; Altuğ et al, 2008; Dağıstan et al, 2010; Seçer et al, 2010; Çiçek and Kartalkanat, 2010; İlyasoğlu et al, 2010; Karabaş and Gürler, 2012; Azak and Miran, 2012; Sönmez et al, 2013). ***Determinants of awareness*** are found to be higher levels of education and income (Koç et al, 2001; Armağan and Özdoğan, 2005, Akgüngör et al, 2010). Even if consumers are aware of organic products, they are not familiar with the organic product ***certificates*** (Mutlu, 2007; Dağıstan et al, 2010; Uysal et al, 2010). Although more than half of the consumers states to know about the certification obligation (Karabaş and Gürler, 2012), only 20% differentiate the organic product from conventional by the certification logo. Instead, 17% seek for the organic product section in the store; 17% consider the appearance of the product, 17% the color and 16% the taste (Dağıstan et al, 2010). Yet, when asked, consumers state they trusted the certification logos (Uysal et al, 2010). While female consumers are found to pay more attention to inspection than man (Sarıkaya, 2007), over a certain level of income, attention paid to certification logos decreases (Uysal et al, 2010). Increased share of organic products in total food expenditure of the family increases the probability that the logos are known to consumers. Those buying organic products more frequently are found to have higher level of trust on certification (Uysal et al, 2010).

Consumers are found to be ***positive*** toward organic attribute of the products, while ***negative*** toward distribution, price and quality attributes (Semiz, 2008). Almost 70% of them find organic products either expensive or too expensive (Dağıstan et al, 2010; Karaman et al, 2013). In Turkey, retail prices of organic products sold in hypermarkets are estimated to be about 17 to 268% higher compared to those of conventional ones. Non-weighted average price margin of a large bundle of organic products is estimated to be about 108% for raw and processed organic products of plant origin and about 73% for organic products of animal origin compared to those of conventionally produced ones (Bektaş and Uysal, 2012). While, in average up to 37-50% of all consumers trust that organic food is inspected properly (Altuğ et al, 2008; İlyasoğlu et al, 2010), level of trust is found to be even less for subgroups such as conventional local market consumers (Sönmez et al, 2013). ***Determinants of positive perception of organic products*** included, higher income and education, youth, being female and holding values friendly to the nature (Semiz, 2008; Akın et al, 2010). ***Reasons for preferring organic products*** are found to be being healthy, safe, tasty, natural, environment friendly, residue and additive free, having nutritional value and high quality, (Armağan and Özdoğan, 2005; Oraman and Unakıtan, 2010; Mutlu, 2007; Sarıkaya, 2007; Altuğ et al, 2008; İlyasoğlu et al, 2010; Ergin and Özsaçmacı, 2011; Çelik, 2013; Karaman et al, 2013; Sönmez et al, 2013). ***Reasons for not buying*** include, high price, limited availability in the market, limited product variety, low level of income, lack of trust and knowledge, and to a lesser extent, disliking the taste and low level of quality (Mutlu, 2007; Altuğ et al, 2008; Dağıstan et al, 2010; Seçer et al, 2010; Çiçek and Kartalkanat, 2010; İlyasoğlu et al, 2010; Sönmez et al 2013). Karabaş and Gürler (2012) found that, trust in conventional products and the prejudgment that organic products are too expensive were also obstacles against domestic market development.

More than half of the consumers states that they ***consume organic products*** (Dağıstan et al, 2010; Karabaş and Gürler, 2012; Altun and Öztürk, 2013), the rate being increased especially in recent years (Mutlu, 2007; Seçer et al, 2010; Karaman et al, 2013). On the other hand, frequency of organic product consumption and purchase varies considerably between different locations, and generally it is not very high (Mutlu, 2007; İlyasoğlu et al, 2010; Ergin and Özsaçmacı, 2011;

Altun and Öztürk, 2013; Karaman et al, 2013). Higher frequencies of purchase were detected for organic open market consumers (Azak and Miran, 2012; Çelik, 2013). ***Determinants of organic product purchasing probability*** included, higher income and education, awareness of and access to organic products and concern about healthiness of conventionally produced food, vegetable and fruit expenditure level and other sensory characteristics (Oraman and Unakıtan, 2010; Dağıstan et al, 2010; Karabaş and Gürler, 2012; Sönmez et al, 2013; Altun and Öztürk, 2013). Even if, middle aged and older consumers are found to be more inclined to consume organic products in some studies (Akgüngör, 1999; Yeşiloğlu, 2013); "age" variable was not found to be significant in others. In a comparative study, Turkish consumers are found to be younger and belonging to wider families with more children compared to European ones and having high level of education and medium level of income (Mutlu, 2007). In other studies, males, married individuals having two children (Çelik, 2013), those having health related and environmental concerns (Seçer et al, 2010; Altun and Öztürk, 2013) were also found to purchase more of organic products. Organic product ***purchasing behavior is explained*** by factors such as, nutrition and health considerations, environmental benefits, responsibility, trust, availability, taste, economy/value, utility and trend (Sarıkaya, 2007; Akgüngör et al, 2010; Ergin and Özsaçmacı, 2011; Çelik, 2013). ***Reasons for starting to consume organic food*** were stated to be news on GMO foods, health problems and the fact that their production creates less pollution (Seçer et al, 2010). ***Reasons for increasing the quantity of organic products purchased*** were found to be promotion of organic products and TV programs on side effects of conventional ones (Karabaş and Gürler, 2012). While hypermarket is the most ***preferred sales point*** for organic products with about 50% of the consumers; generally, it is followed by organic open markets and specialty shops respectively (Mutlu, 2007; Sarıkaya, 2007; Ergin and Özsaçmacı, 2011; Dağıstan et al, 2010; Seçer et al, 2010; Karabaş and Gürler, 2012). Before the establishment of organic open markets by NGOs and local municipalities starting from 2006, organic product specialty shops were occupying the second place. While the number one ***source of information*** on organic foods is found to be media (newspapers, TV, radio, etc.); along with the increased use of e-marketing and increased level of awareness on organic products among people, a trend towards amplified role of internet and friends/neighbors is identified (Akgüngör et al, 1999; Özkan et al, 2000; Sarıkaya, 2007; Dağıstan et al, 2010; Seçer et al, 2010; Karabaş and Gürler, 2012; Karaman et al, 2013; Sönmez et al, 2013). ***Products that were preferred as organic*** are found to be fresh and processed fruits and vegetables, meat, flour and products, milk and products and eggs (Akgüngör et al, 1999; Koç et al, 2001; Armağan and Özdoğan, 2005; Mutlu, 2007; Sarıkaya, 2007; Azak and Miran, 2012; Çelik, 2013). ***Willingness to pay for organic products*** is identified to increase from less than 5% in late 90s to about 30% in recent studies (Akgüngör et al, 1999; Özkan et al, 2000; Armağan and Özdoğan, 2005; Bayramoğlu and Göktolga, 2009; Akgüngör et al, 2010; Seçer et al, 2010; Sönmez et al, 2013). ***WTP is positively influenced by*** the level of income and education, by the quantity purchased of the product, by concerns on the risks associated with conventional product, and by knowledge on and/or consumption experience of the organic products (Akgüngör et al, 1999; Özkan et al, 2000; Bayramoğlu and Göktolga, 2009; Akgüngör et al, 2010; Gündüz and Bayramoğlu, 2011). Findings on the impact of age, gender and marital status on WTP are rare and don't present a persistent pattern (Akgüngör et al, 1999; Özkan et al, 2000; Kacur, 2009; Bayramoğlu and Göktolga, 2009).

Conclusions

Review of literature reveals how and how much consumer attitudes toward organic products and their purchasing behaviors changed over time in Turkey. The findings may assist for a better understanding of the domestic market and enable designing of stimulating strategies. Overall, development of the domestic market seem to require further improvement of both producer and consumer awareness toward organic production system and construction of a closer dialog between them. Besides, rapid development of the market reveals the need for continued research.

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Recent Developments on Economics of Milk and Dairy Products in the World and Turkey

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Abstract
In this study, recent developments on milk and dairy products in the world and the situation in Turkey were researched. For this purpose, milk production and consumption in the world and Turkey, developments in the external trades and milk prices are the subjects of this study. This study indicates that the rate of increase in milk production and consumption in developing countries is higher than developed countries. Besides, while considering recent developments, the rate of increasing on world milk prices and cost of production from the producers' side in developing countries is higher than developed countries. While Canada, Italy, Norway, Sweden, Iran and Belarus are the producing countries with the highest cost, Pakistan and Cameroon are the producing countries with the lowest cost. As comparing developments in Turkey to the world countries, increase on production is expected with the 2.6 rate which is higher than developed countries. Increase on external trade and milk production costs and milk producers' prices are to be above the average of the world figures is observed. In this scope, it is obvious that implementations of reducing cost policies, organizations, quality and hygiene, advancements in animal health and prevention of informal economy are required issues for the economic empowerment in domestic and overseas markets in Turkey.

Keywords: Milk, dairy products, economic developments, World, Turkey

Introduction
Recently, world countries have begun taking significant precautions for regulating dairy market. While, new policies on dairy sector has been implemented in the world (Uzmay, 2014), dairy sector is also being analyzed on the recent and possible future developments. Study findings of the organizations such as OECD-FAO, IDF and IFCN on global world market in this scope are remarkable. Precautions in Turkey like other countries are on for empowering domestic market and to open up external market. In this study, recent developments on milk and dairy products in the world market and some projections for the future are analyzed based on the organizations' research findings. Furthermore, Turkey's situation in this development framework is examined.

Developments on Milk Production and Consumption in the World and Turkey
World milk production value in 2012 is 769 525 thousand tons and it is increased with the rate of 2.4% comparing to total production in 2000. In total world milk production value, the share of cow milk is 82.82%, buffalo milk 13.09%, goat milk 2.4% and sheep milk 1.3%. Comparing these rates to year of 2000, it is pointed out that the share of buffalo milk is increased with 2% but the share of cow milk is decreased with the same rate (2%) (Table 1). While considering most important regions, cow milk production value in Asia is 177 million tons, 152 million tons in EU-27, and 116 million tons in North and Central America. Turkey's milk production is 16 million tons in the world with the share of 2.50%. 92% of total buffalo milk production is obtained from India and Pakistan, 3% of China and 0.04% of Turkey (IDF; 2014 Bülten). According to FAO data, the total milk production value in the world is 754 million tons. Organizations' production numbers may differ due to differences of data collection methods (USK, 2014). World milk production numbers show that the annual growth rate of milk production has increased with the rate of 2.4% in the recent years; however, the increase rate is 1.5% in 2012-2013 periods. Effects of climatic conditions have an impact in the world market of

dairy products. Thus, price has fallen by the increase of supply in the milk and dairy market in the period of January 2011-June 2012. Moreover, lower increase of production has been reflected to the price due to negative climatic conditions and the prices of milk and dairy products have increased from June 2012. It is reported that the markets will be influenced by the effects of climatic conditions, developments on income, population and the other factors in 2014 (Andria Krichger, 2014). According to OECD –FAO data, the most increase on production is expected in butter for developing countries and cheese for developed countries in 2022 (OECD-FAO, 2013). Also, it is expected that the increasing rate of total milk production will be 51% in developing countries and 49% in developed countries in the same period. Furthermore, 74% of milk and dairy products production is expected in developing countries in 2022. According to the milk production projections of OECD-FAO based on 2013, it is estimated that the annual increasing rate on milk production is 0.98% in developed countries, 2.50% in developing countries and 2.6% in Turkey (OECD-FAO, 2013).

Table 1. World milk production by species of milk animal (1000 tons)

	2000	2005	2010	2011	2012	2000/12 Change of %
Cow Milk	489284	549370	608001	624165	637288	2.2
Buffalo milk	67106	79451	93282	97380	100747	3.4
Goat milk	13208	15316	17803	18162	18271	2.7
Sheep Milk	8171	8862	9977	9882	10198	1.9
Other	2180	2378	2866	3002	3020	2.8
Total world production	579948	655377	731927	752592	769525	2.4

Source: IDF, 2013

The data for world consumption given into the Table 2, Asia has the biggest share with 41% in total consumption of milk but it is 73 kg per capita consumption in lower consumption regions. Even, Africa is the lowest consumption region with 50 kg per capita consumption. Otherwise, the highest consumption per capita is 289 kg in EU countries. Increase on milk consumption in developing countries is related to the increasing income rate, urbanization rate, intention to western-type diet and improvements in the storage system (Gramer, Wheeler, Governor, 2014, OECD-FAO, 2013). Per capita consumption of milk in Turkey is 230 kg (USK, 2014), and this is above the world average which is 109 kg.

Table 2. Global consumption by region in 2012

	Consumption (2012) ml ton	Per capita consumption	Share (%) world consumption	Share (%) world production	Self-sufficiency ratio
Asia	311.6	73.1	40.6	37.7	93
Europa	207.5	280.3	27.0	28.4	105
EU	144.8	288.5	18.9	20.4	108
Non-EU	62.6	263.1	8.2	8.0	98
North America	95.6	274.0	12.5	12.9	104
South America	69.6	175.2	9.1	9.1	100
Africa	53.3	49.7	6.9	6.0	86
Central America	20.4	127.6	2.7	2.2	81
Oceania	9.4	254.7	1.2	3.8	311
Total World	767.4	108.7	100.0	100.0	100

Source: IDF, 2013

Developments on External Trades of Milk and Dairy Products in the World and Turkey

Considering exporting countries of milk and dairy products (milk equivalent); New Zealand (28%), EU 27 (26%), USA (12%), Australia (7%), Belarus (4%) and Argentina (4%) are the important countries for world trade. EU, New Zealand and USA are observed as the most

important countries on export, especially in the last three years. On the other hand, China, Russia, Mexico, Algeria, Japan, Venezuela, Indonesia, Saudi Arabia, Philippines, United Arab Emirates are the top countries on milk importation in the world. The first three countries (top-3) are to perform 50% of total import. Increase on milk and dairy production (as milk equivalent) in the world is 16.9 million tons in 2012 comparing to 2011. 27% of this amount (4.5 million ton) is the external trade rate. China imported 30.8% (1.4 million tons) of total external trade. China imports of 70% from New Zealand (Gramer, Wheeler, Governor, 2014). Turkey's exportation value in 2012 was 228.3 billion $ and the important exportation products are cheese and whey. Besides, the important importer countries from Turkey are Saudi Arabia, Iraq, Kuwait, the United Arab Emirates, Azerbaijan and Jordan. Export value of Turkey was increased by 67% in 2012 comparing to 2008 (TÜİK, 2013).

Developments on Milk Price in the World, Raw Milk/Feed Price Parity and Turkey

While considering milk producer prices for the important countries, the prices for 100 kg milk are 42.82$ in Brazil, 38.46$ in India, 57.22$ in China, 41.97 $ in EU27, 40.79$ in USA and 46.36$ in New Zealand. On the other hand, it was 44.56 $ in Turkey in 2012 which was lower than New Zealand and China. Figure 1 shows the developments of producer prices for milk about mentioned countries from 2007 to 2012. While producer price index increases in emerging economies (BRIC countries), decreases in EU27, New Zealand and USA.

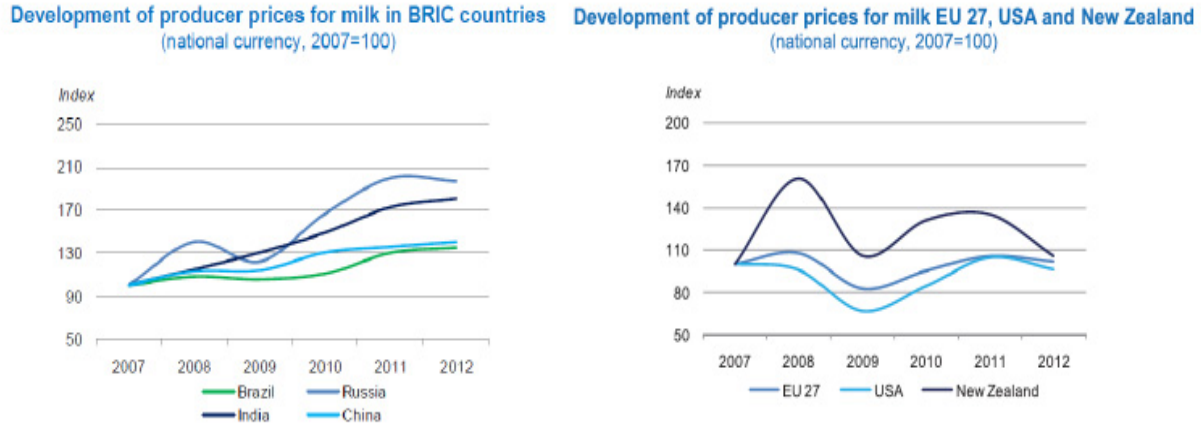

Figure.1 Developments of producer prices in some selected countries.
Source: IDF, 2013.

Price parity for raw milk/feed is more than 84% which was decreased in 2012 comparing to one year before in the world wide. While the parity is above 2 in Belarus, Canada, Egypt, South Korea, Saudi Arabia, Sudan, Uzbekistan, and Yemen; is between 1.5 and 2 in Australia, Algeria, Azerbaijan, Brazil, Finland, Kazakhstan, Jordan, Russia, Taiwan, Turkmenistan and Venezuela. Raw milk/feed price parity is between 1.1 and 1.5 in Turkey (IFCN, 2013, USK, 2013).

The Developments in the cost of production in the World and the Situation in Turkey

The database of calculated milk production costs for all the countries could not be formed in the worldwide. However, it has seen that there are some institutions and organizations studying on the countries or country groups. Even Turkey has started a pilot project; system of FADN (Farm Accountancy Data Network) could not be formed yet. Anyway, some recent study findings and results have been given in this work. According to research results using FADN database about exporting countries of EU (Germany, France, UK, Nederland, Ireland, Denmark) in milk and dairy products, average cost of production of dairy cattle in milk price is 77% in the

period of 1999-2004, 75% in 2005-2010 (Donellan et al, 2011). On the other hand, IFCN calculates the cost of production for certain sized typical dairy businesses for some countries in the worldwide. Considering Turkey's businesses of 2003 with the numbers of 2011; while the cost of milk production was 20-30$ in Turkey and China in 2003, was 30-40$ in France, Spain, Germany and Mexico. However, it was increased to 50-60$ in 2011 for all of these mentioned countries. The cost of milk production for 100 kg was 40.6$ in 2011 for all of the countries participated IFCN's project with their typical businesses. As evaluating all of 51 member countries of IFCN due to cost of milk production in 2011, the countries with the highest total cost were Canada, Italy, Norway, Sweden, Iran and Belarus with 61-120 $ but the countries with the lowest total cost were Pakistan, Cameroon (<20$). Other countries with lower cost of production with 21-30 $ are Argentina, Chile, Peru and Nigeria. Turkey is in the second higher cost of production group with 51-60 $ (in the same group with France, Spain, Germany, China and Mexico). 1 kg of feed price in the period of 2006-2011 was increased from 0.15$ to 0.4$ related to many factors (IFCN, 2004, Hemme, 2012). Labor cost, increase on energy and fertilizer costs are the other significant issues comes after feed costs in the countries in which dairy cattle is developed. The average of 51 countries for the cost of milk production for 100 kg has increased to 46$ in 2012. Turkey's milk production cost is above the average with 50-60$ (considering data for two typical businesses). However, it should be taken into account that IFCN data is not prevailing for all of the regions in Turkey. The businesses participated to the project are west region businesses.

Conclusion

While considering the developments in the world, increase on world milk production and consumption will mostly be in developing countries, on the other hand the increase on production of dairy products will differ from developed to developing countries. In terms of milk producer prices in the last period, increasing is observed in developing countries but decreasing in developed countries. According to IFCN, world milk cost, especially because of the increase on feed prices, has increased by 6$ in just one year.

According to developments in Turkey, it is expected that the increasing rate on milk production will be 2.6 which is higher than developed countries; the external trade is developed in the last period, and milk cost and milk producer prices will be above the world average in Turkey. In this scope, Turkey needs important policy instruments about reducing cost of production, organizations, quality and hygiene, advancements in animal health and prevention of informal economy for the economic empowerment in domestic and overseas milk and dairy products markets.

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Bosnian and Herzegovinian Dairy Sector Position at Croatian and Serbian Markets

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Abstract
Bosnia and Herzegovina (B&H) is implementing liberal trade policy with the aim of creating export opportunities for domestic producers. The effects of trade liberalization on competitive capabilities of B&H dairy sector have not been explored in detail, therefore, this research aims to determine dairy industry position at markets of two B&H major foreign trade partners: Croatia and Serbia. In addition to determination of dairy sector competitive performances, dynamics of performance change will be part of this research. Position of B&H dairy sector has been determined by two indicators: Grubel-Lloyd IIT and revealed comparative advantage (RCA). The base of competitive advantage (price or quality characteristics) has been determined by the four categories of foreign trade flow, while Markov's probability matrix was used to determine the likelihood of trade flows change. B&H dairy sector has a certain competitive advantages at markets in Croatia and Serbia, based on the price and quality characteristics of the products. GLIIT index, although rising, indicates low level of integration of the sector at more sophisticated markets, such is Croatian market. Generally, B&H dairy sector market position is vulnerable and there is a high likelihood of trade flows change: from successful to non-successful price competitiveness (especially at Croatian market), suggesting that future public policies should encourage sector to work on capabilities to increase level of market orientation and capabilities to improve innovativeness, recognition and quality of the products.

Keywords: B&H dairy sector, revealed comparative advantage, competitiveness

Introduction
Postwar Bosnia and Herzegovina chooses liberal trade policy, decreases the import barriers level and signs contracts on free trade in order to lower trade deficit and open export opportunities to Bosnian-Herzegovinian producers (Hadžiomerović et al., 2007). Basically, by imposing liberal trade policy, Bosnia and Herzegovina is trying to pull offer on domestic market and encourage domestic companies to increase productivity, i.e. to modernize and achieve a technical-technological development, and as such to contribute market evolution (Škuflić and Vlahinić-Dizdarević, 2001). In other words, liberalization should contribute to the development of offer (by increasing size and scope of production) and demand (by lowering the prices by improving efficiency, productivity and quality of all parts of business process), this market expansion, which is basically reflected in lowering the market barriers (Uzunović, 2010 and Bećirović et al., 2011) has both positive and negative effects on domestic producers, but also on the society as a whole. Lubura (2007) stated that the increased market size (effect of trade liberalization) had positive reflection on the: strengthening the capital flow (direct foreign investments), and on the increased exchange of knowledge and technology. As negative effects, they consider the entrance of big multinational companies on domestic market, which can now, with reduced transaction costs perform on a domestic market with lower prices, which can result in decreased demand for domestic products, lowered production and in that manner, decreased economic growth and country development in time. Therefore, it is important to get more information regarding influence of trade liberalization on whole economy, but especially on "sensitive sectors" such as agricultural and food sector, specifically B&H dairy sector. That is why, research goal is two-folded: first: to get insight into the position of Bosnian milk industry on markets of Croatia and Serbia, which are the most important Bosnian trade partners, but competitors also; second to assess future evolution of B&H dairy sector position on this two

most important markets in order to provide recommendation regarding activities which has to be taken in to ensure positive and prevent negative effects of further economic integration.

Method

In this paper, we use Balassa's measure of relative export performance (Hadžiomeragić et al., 2007), GLIIT as a measure of integration on mentioned markets (Bojnec and Ferto, 2006), a methodological approach which should divide price and non-price competitiveness, as well as one-way and two-way market flows. This approach divides trade flows in four categories (Uzunović, 2010), where the first category shows price, and third category shows non-price competitiveness of home country. Second category shows unsuccessful price competitiveness, while the fourth category shows unsuccessful non-price competitiveness of the home country. This categorization is done to assess current position of B&H dairy sector on respective markets. After that, Mrakov's probability matrix was used to determine dynamics of change within this four categories in future times. This is done in order to assess future trade position of sector in question. Trade data disaggregated on six tariff numbers were used. Trade data (HS classification) are gathered from B&H Chamber of Foreign Trade for period 2008-12 when strong and sharp trade liberalization was executed.

Results of research

In Table 1 are presented average results for export/import growth rates and coverage, RCA values, GLIIT values, trade categories and Mrakov's M for Bosnia and Herzegovina dairy sector on markets of Croatia and Serbia and for Bosnian and Herzegovinian food sector at the same markets.

Table 1 – Average results for BH agri-food sector and its dairy sector for period 2008-12

	Croatia		Serbia	
	Food sector	Dairy sector	Food sector	Dairy sector
Export growth rate % (2008/12)	39.17	22.76	7.10	26.68
Import growth rate % (2008/12)	6.31	7.88	14.53	263.46
Export/import coverage % (2008)	20.96	54.22	16.95	34.55
Export/import coverage % (2012)	27.44	61.71	15.85	101.95
RCA (2008)	1.09	1.13	0.88	0.41
RCA (2012)	1.23	1.00	0.71	0.99
GLIIT % (2008)	34.65	62.59	28.99	28.53
GLIIT % (2012)	43.06	65.66	27.37	87.3
Trade category (2008-2012)	K1	K2	K1	K2
Markov's M		1.05		0.3

* K1 - unsuccessful price competitiveness; K2 - successful price competitiveness.

In Table 2 are presented average results for export/import growth rates and coverage, RCA values, GLIIT values and trade categories on the markets of Croatia and Serbia and for Bosnian and Herzegovinian food products, for Milk, Cheese and Yoghurt.

Table 2 - Average results for particular products of BH dairy sector for period 2008-12

	Croatia			Serbia		
	Milk	Cheese	Yoghurt	Milk	Cheese	Yoghurt
Export growth rate % (2008/12)	9.33	-26.16	59,91	373.46	-100.00	116.26
Import growth rate % (2008/12)	13.56	-48.90	10.94	-23.38	-32.08	164.91
Export/import coverage rate % (2008)	91.28	71.83	51.79	61.97	1.37	0.22
Export/import coverage rate % (2012)	94.82	49.70	94.30	382.91	0.00	1.01
RCA (2008)	1.09	1.67	1.38	0.61	0.02	5.77
RCA (2012)	0.74	1.40	1.21	2.69	0.00	0.12
GLIIT (2008)	95.44	83.60	0.04	76.52	2.71	0.44
GLIIT (2012)	97.34	63.20	9.15	41.42	0.00	2.00
Trade category (2008-2012)	K1	K2	K1	K2	K1	K2
Markov's M			0.98			0.44

* K1 - unsuccessful price competitiveness; K2 - successful price competitiveness.

Discussion and conclusion

As we can see B&H dairy sector shows better market performance on Croatian and Serbian market than the rest of the B&H agri-food sector and shows certain comparative advantages. It is better integrated on Serbian and Croatian markets than the rest of the B&H agri-food sector. Therefore BH dairy sector has higher capability then rest of the agri-food sector to attract consumers and investors. In the same time, B&H dairy sector build its offer (trade) on products with low sophistication and apply simple "low price" marketing strategy. Such, "price based" advantage and trade position is easy to lose. Therefore, in order to improve existing performance, B&H dairy sector has to modernize its production, marketing, but also whole business process in order to offer product able to satisfy more sophisticated market needs. Currently B&H dairy sector is not capable to do it, so there is need to introduce adequate public policies. General recommendation is to work rapidly on building the institutional and legal framework support development of B&H dairy sector capabilities to find ways to build added values for consumers and to strengthen consumer loyalty. On of public policy priority has to be improvement of efficiency of knowledge and technology transfer and R&D system. It can be done by introducing programs which will push and shape development of stronger links between "centers of excellence", academia, industry and administrators. Such programs are the key to modernization of all B&H dairy sector parts/business areas, but also it will motivate dairies to start to cooperate and exchange experience, or better to say to pursue with business strategy known as "co-option", which allows to competitors to cooperate in order to raise synergetic business effects and increase wellbeing of all included. All mentioned are long term systemic measures. As a short-term, if sector wants to maintain the current position it has to work rapidly on the following: (a) improving efficiency of creating new values (sophisticated business managing), create conditions to retain competitive advantages based on price characteristics of a product; (b) constantly work on improvement of quality characteristics of a product, to better adjust to market requests in a way of promoting relational level of satisfaction and price, in order to create conditions for competitive advantages' strengthening based on non-price characteristics; (c) keep pressuring B&H administration to improve their performance and to build an adequate regulatory-institutional frame, which is necessary for pleasing attractive market's needs, as well as to attract EU structural funds, which are necessary to promote both price and non-price characteristics of a product.

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Economic Potential of Sewage Sludge Use in Primary Agricultural Production: Case Study of Wastewater Plant Žepče, Bosnia and Herzegovina

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Abstract

Almost every wastewater treatment plant produces sewage sludge which has to be treated and disposed in a proper manners. Sewage sludge can be used in agriculture, where it has a huge value, because of its properties. Although, when using sludge in agricultural purposes care should be taken of the nutrient needs of plants, without impairing neither the quality of the soil nor the surface and ground waters. Therefore, every sewage sludge should be examined and treated before any kind of use. The aim of this paper is to examine sewage sludge nus-produced in a Wastewater treatment plant Žepče, and to propose a proper use in agriculture, or a proper disposal method, with approximation of economic potential of such uses. As Bosnia and Herzegovina aspires to become a European Union member, all analysis were conducted in governance by Council Directive No. 86/278/EEC, and they included dry matter, organic matter, pH, nickel, copper, nitrogen, phosphorus, zinc, mercury and chromium. Results showed that all of the examined parameters were in line with mentioned Directive. Several primary agricultural productions could benefit the use of sewage sludge from this Wastewater plant. However, economic potential varied with the level of treatment of the sludge: use of primary sludge shows great economic potential, while, use of treated, dried secondary sludge shows very poor economic potential, because, almost half of the cost goes to sewage sludge treatment.

Keywords: Sewage sludge, economic potential, agriculture, Bosnia and Herzegovina

Introduction

Sewage sludge is a mixture of solids and water which are produced during wastewater treatments as a by-product. Wastewater treatments processes purify combined discharges from domestic and industrial resources by a series of physical, biological and chemical processes to remove and stabilize the degradable materials present in raw wastewater (Smith, 2002). Sewage sludge has valuable agronomic properties, since that it contains significant amounts of important plant nutrients, such as nitrogen and phosphorus and is an effective fertilizer. Sludge products have large amounts of organic matter that can also improve physical and biological properties of soils and together these attributes provide a case for encouragement the beneficial re-use of sludge as a resource in agriculture, forestry and land reclamation in preference to its disposal (Smith, 2002; Andres et al., 2008). The application of sewage sludge to agriculture land has always been a subject of intensive discussion (IAEA, 2002). Sludge can either be viewed as valuable agronomic source of plant nutrients which can be used as fertilizers and soil conditioning agents or can be seen as a dangerous waste. Besides the significant amount of plant nutrients, sewage sludge contains heavy metals and organic pollutants, so that its application on agricultural land could have environmental consequences. The main concern is over accumulation of heavy metals and other pollutants in the soil and their adoption by plants.

When using sludge in agricultural purposes care should be taken of the nutrient needs of plants, without impairing neither the quality of the soil nor the surface and ground waters. Therefore, every sewage sludge should be examined and treated before any kind of use. European Union has adopted the Council Directive No. 86/278/EEC to manage the use of

sewage sludge for agricultural purposes. As Bosnia and Herzegovina aspires to become a European Union member, the wastewater treatment and sewage sludge use has to be in governance by this Directive. The aim of this paper is to examine sewage sludge nus-produced in a Wastewater treatment plant Žepče, and to propose a proper use in agriculture, or a proper disposal method, with approximation of economic potential of such uses.

Method

The sample sludge was obtained from Wastewater Plant in Žepče during the April of 2014, along with all other necessary information, and were analyzed in laboratory of Institute of Pedology, Agrochemistry and Melioration, Faculty of Agricultural and Food Sciences, University of Sarajevo. Three samples were collected, and average values were used for presenting the results. After drying the samples standardized methods (ISO 10390, dichromate method, AL-method, ISO 11047) were used to determine organic matter, major nutrients and heavy metals in the sewage sludge. The Wastewater Plant Žepče operates with the installed capacity of 30 l/s of wastewater, and during the most of the year, it operates at 10% of installed capacity. Only 3% of the treated water is sewage sludge.

Research Results

After the analysis, results are presented in the next Tables:

Table 1. Wastewater Plant Žepče' capacity

Installed capacity	Real capacity	Sewage sludge produced	Dried sewage sludge	Average daily production
30 l/s	3 l/s (15% of installed capacity)	0.09 kg/s (3% of real capacity)	0.036 kg/s (40% of sewage sludge produced)	3,110.4 kg/day

As shown in Table 1, daily production of dried sewage sludge is around 3 tons, and it is necessary to point out that the Plant is working only at 10% of its installed capacity. Table 2 shows pH, organic content, major nutrients content and heavy metals content in dried sewage sludge.

Table 2. pH, organic, major nutrients and heavy metals content

Parameter	Method	Measuring unit	Observed value
pH (H_2O)	ISO 10390	pH	6.89
pH (KCl)			6.62
Humus	Dichromate method	%	19.59
P accessible	AL-method	mg/100g	187.09
K accessible			208.10
Pb	ISO 11047	mg/kg	86.63
Cd			1.58
Cr			183.53
Ni			*227.71
Cu			254.00
Zn			252.15

pH value is 6.62 which says that the observed sludge is slightly acidic medium. The sample contained 19.59% of humus which was highly stable, Sample also contained considerable amounts of accessible P and K. Heavy metals concentrations remained under the Federation Regulation, except for the Ni, whose concentration was above critical allowed value (80 mg/kg). In relation to EU regulation, Ni allowed in sludge is too rigidly defined in Federations Regulations, and with the fact that the Ni is in inaccessible form in the sludge, we may say that

with the observed concentrations in sample sludge, there is no immediate danger of accumulation of Ni in the plants.

Allowed concentrations of heavy metals by the Federation Regulations are presented in Table 3, along with the maximum allowed amounts of analyzed sewage sludge per hectare:

Table 3 - Maximum allowed amounts of analyzed sewage sludge per hectare

Element	Allowed concentration (kg/ha)	Maximum sewage applied (tons/ha)	Maximum sewage sample applied (tons/ha)
Cd	0.15	30.00	94.93
Cr	2.00	4.00	10.89
Cu	3.00	6.00	11.81
Ni	0.75	9.38	3.29
Pb	2.50	5.00	28.85

This means that 3.29 tons are usable for fertilizing without any danger of accumulating any heavy metal element in plants.

Discussion and Conclusion

In the sample from wastewater plant Žepče, organic matter content and major nutrients were found to be quite high. These parameters are considered essential for enhancing soil fertility/quality and sustaining soil productivity (Usman et al., 2012). As shown in Table 2, the sludge sample had a significant amount of accessible P and K; two of the macro-nutrients for plants. The issue of micronutrients and heavy metals concentration needs careful attention. Continuous application of sewage sludge with high concentrations of heavy metals can result in toxic accumulations, which may have phytotoxic effects on various cereals, vegetables, fruits, pastures and fodder crops (Usman et al., 2012). High concentration of heavy metals in agricultural products are a serious problem, since they can cause health hazards to human beings. Therefore, it is very important to analyze and determinate the content of potentially dangerous elements in sewage sludge before its use on agricultural land. Also, attention must be given to organic pollutants and pathogens in sewage sludge. Less is known about the environmental consequences of these pollutants (IAEA, 2002) and different kind of pathogens. Several primary agricultural productions could benefit the use of sewage sludge from this Wastewater plant. In the past, many studies were conducted to examine the possibility, effects and risks of sewage sludge use for agricultural purposes. In Bosnia and Hercegovina these kind of studies were not done so far. Organic manuring is mainly used on Bosnian agricultural land to improve soil fertility and crop specific needs are fulfilled by commercial fertilizers. It would be interesting to examine the effect of sewage sludge on potato, maize and wheat in our country. Also, the greenhouse producers could benefit from this method to improve soil characteristics and fertility. The most produced greenhouse crops in our country are tomato, pepper and cucumber. Generally, every kind of plant production can benefit from the use of sewage sludge, but precautions must be taken. When using sludge in agricultural purposes care should be taken of the nutrient needs of plants and soil characteristics, without impairing neither the quality of the soil nor the surface and ground waters. Sludge should be regarded as an organic supplement to the use of manufactured fertilizers. It cannot replace fertilizers, because the high annual rates of application needed to supply sufficient macronutrients to crops will create a heavy metals hazard (IAEA, 2002). Although, sewage sludge generally has lower nutrients contents than commercial fertilizers, it can reduce the use and need for the same. Furthermore, it can reduce the costs of agriculture (Ghazy et al., 2009).

According to Table 3, only about 3.5 tons of sewage sludge is recommended for use per year on the fields, without any danger of accumulating heavy metals and that fact gives data important for approximating economic potential of sewage sludge use in primary agricultural

production. In Bosnian terms, considering the fact that the sewage sludge cannot be used as a main fertilizer, the most economical way of using sewage sludge (or its disposal method) can be use of it as an additional fertilizer. Bosnia and Herzegovina has no record of sewage sludge trade, so it can be concluded that all of the produced sewage sludge is being disposed on local level, in a highly concentrated areas. Also, there is no created price for the sewage sludge in BiH, which is not a case in neighborhood (Ex-Yu countries - 20€/t). If we approximate yearly production of wastewater treatment plant in Žepče (3,110.4 kg/day with 365 days in year, it is around 1100 tons/year) and multiply it with the price of 20€/t we get the potential market worth of 22 thousands of €, and this represents only the 10% of the economic potential of this treatment plant. If we scale the potential on the National level, market of sewage sludge gets a multimillion market potential. Of course, here is talked about primary sludge, which is without any treatment. On the other hand, according to many authors, sewage sludge treatment gets its price doubled, which then gets over its benefits, and there are very little economic potentials in it, with all the other conditions as a constant.

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Estimation of Demand for Macronutrients and Food Diversity in the Slovak Republic

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Abstract
In last few decades nutrition security has become very important and plays decisive role in everyday living, to achieve basic food´s needs and on the other hand to have healthy lifestyle with balanced nutrition. These nutrition requirements are different and depend on society of living, but mostly on incomes. Based on the facts, households with lower incomes have a tendency to consume a higher amount of lipids and they do not have diversified diet. Therefore in our article we focus how macronutrients (proteins, carbohydrates and lipids) are related to food and nutrition security and health. We use regression analysis to analyze how is the consumption of macronutrients affected by incomes; family size, type of municipality; education and by amount of children. We chose these factors to represent determinants of individual nutrition behavior. Our analysis has not taken into account age of individual household members. We assume, that economic development in the country (e. g. GDP per capita; unemployment rate; incomes in selected counties; etc.) also affects demand for food. And finally we are using Berry index to calculate food diversity by individual counties in year 2011. To summarize, our article confirms generally known facts and research findings in case of the Slovak republic.

Keywords: Nutrition security; macronutrients; individual nutrition behavior; food diversity

Introduction
Slovakia is small country in the central Europe with about 5. 43 milion inhabitants and with capital city Bratislava, which is the biggest city with population around 417, 000. It is divided into 7 counties (county of Bratislava; Trnava; Trenčín; Žilina; Nitra; Banská Bystrica; Prešov and Košice). There are differences between these counties/regions, e. g. in transport infrastructure, education, incomes, GDP, unemployment etc. The most developed is the western and southwest Slovakia. These differences affect purchasing power and consumption. Therefore we focus in our analysis how is the consumption of macronutrients affected by incomes and family size. In our article we pay attention on three main macronutrients – proteins, carbohydrates and lipids.

According McKinley Health Center (2013), macronutrients are nutrients that provide calories or energy. Nutrients are substances needed for growth, metabolism and for other body functions.

We used similar analysis like HERZFELD, T. (2013) et al., who investigated how the changes in socio-demographic and economic indicators affected consumption behavior.

Material and Methods
To achieve our objectives we used data from Household budget survey from Slovak statistical office. This database for year 2011 includes data of 4, 706 households. Database with all items of the consumer basket contains data in kilograms, grams, liters and pieces (for eggs). Based on these data for year 2011, we performed calculations of household consumption in quantitative units into the nutritional value. We used conversion tables and indices obtained from Eurostat.

We used regression analysis to create a model of demand for macronutrients (carbohydrates, proteins, lipids) in 2011. The aim of regression analysisis to explain the variability of the random variable *Y* (dependent variable) depending on its median value for several non-random independent variables *X*.

In our research we used the following equation to estimate demand for macronutrients:

$$lnqi{=}ln\beta 0 + \beta 1 lnINCOME + \beta 2 lnFAM\_SIZE + \varepsilon i;\ \text{where } i = 1,\ldots n,$$

$$\vec{x} = (INCOME; FAM\_SIZE)$$
$$\vec{\beta} = (\beta_0; \beta_1; \beta_2)$$

where: qi is demand computed for i-th macronutrient group; INCOME is net monthly income per household member and FAM_SIZE is dummy variable represents size of a household.

Our second objective was to analyze food diversity. Food diversity can be measured by a Berry index, where s_j is the share of expenditures on food group j in household's total consumption expenditure.

$$BI = 1 - \sum s_j^2$$

Higher values indicate a more diverse diet. Nutritionists believe that a more varied diet is one core element of healthy nutrition behavior.

We compared the parameters of two basic samples with normal distribution using two-sample parametric tests - comparing the mean values and comparing the variances to known if there are differences in food diversity between poor and rich households.

Results

As we mentioned above, it is believed that macroeconomic development in the country affects purchasing power and consumption. But the most important is household income, which is a relevant variable for consumers choice and consumption behaviors. According to HERZFELD, T. et al. (2013) demand for lipids increases with increasing income. Consumer behavior is also affected by regions; family size; education; age and gender. First, for our analysis we chose five factors, but during the research we found only two factors (family size and income), which are statistically significant. In the following table we can see the results of the regression analysis:

Table 1. The regression model for macronutrients in 2011

coefficient	cabrohydrates	lipids	proteins
Const	6. 7703	5. 99025	5. 58686
ln family size	- 0. 6041	- 0. 64814	- 0. 589019
ln income	0. 449906	0. 426636	0. 458145
R-squared	0. 584827	0. 546394	0. 623555
P-value (F)	0	0	0

Source: Own processing

Regression equation for carbohydrates:

$$Ln\ cabrohydrats = 6.\ 77\ - 0.\ 6041\ ln\ family\ +\ 0.\ 4499\ ln\ income\ +\ \varepsilon_i$$

If an income will change by 1 %, the consumption of carbohydrates will change by 0. 45 %.

Regression equation for lipids:

$$Ln\ lipids = 5.99\ - 0.\ 6481\ ln\ family\ +\ 0.\ 4266\ ln\ income\ +\ \varepsilon_i$$

If an income will change by 1 %, the consumption of lipids will change by 0. 43 %.

Regression equation for proteins:

$$Ln\ proteins = 5.59\ - 0.\ 5890\ ln\ family\ +\ 0.\ 4582\ ln\ income\ +\ \varepsilon_i$$

If an income will change by 1 %, the consumption of proteins will change by 0. 46 %.

The higher number of household members means that macronutrient consumption per household member decreases. This is probably due to the fact that consumption is divided among the other household members.

In the following figures we can see distribution functions for macronutrients in year 2011. E. g. the highest consumption of proteins is in the rang of 2, 000 - 5, 000 grams per household member. There are also households, which consume more than 10, 000 grams of proteins per household member, but these values are extreme and their amount is negligible.

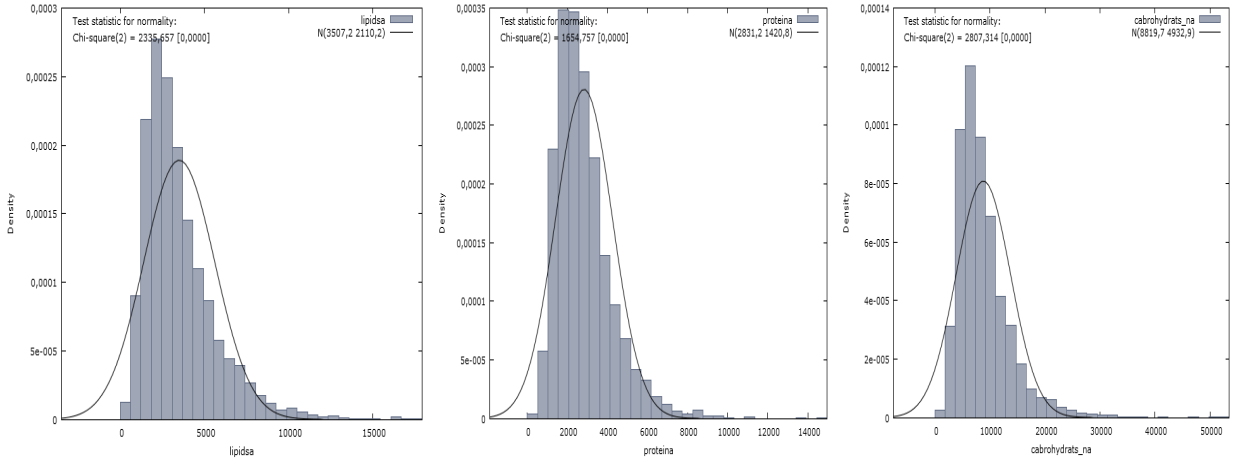

Figure 1. Distribution functions for macronutrients in year 2011.
Source: Own processing

Table 2. An analysis of incomes, proteins, lipids and carbohydrates

INCOMES		PROTEINS		LIPIDS		CARBOHYDRATES	
Mean	550.33	**Mean**	13.961	**Mean**	37.311	**Mean**	39.45
Median	399.97	**Median**	13.833	**Median**	37.081	**Median**	38.088
Minimum	23.6	**Minimum**	3.0053	**Minimum**	6.0082	**Minimum**	5.6304
Maximum	4,600	**Maximum**	27.086	**Maximum**	77.574	**Maximum**	247.57
Standard deviation	479.16	**Standard deviation**	2. 588	**Standard deviation**	8.1094	**Standard deviation**	12.324

Source: Own processing

Income is calculated per household member. Proteins, lipids and carbohydrates are converted into calories - 1 gram of lipids = 9 calories; 1 gram of carbohydrates = 4 calories and 1 gram of proteins = 4 calories. In general, daily amount of carbohydrates is 45 - 65 %; 20 - 35 % of total calories should come from lipids and diet should consist of 10 - 35 % proteins. This table shows the share of calories in household in percentage on total consumption of calories. Slovak consumers take the most amount of calories from carbohydrates, on the other hand the least from proteins. We can claim it from mean values and variaton margin, which is the difference between minimum and maximum.

Table 3. Berry index computed for whole Slovakia, for rich and for poor households

Berry index (whole Slovakia)		Berry index (rich)		Berry index (poor)	
Mean	0.93848	**Mean**	0.932755	**Mean**	0.941337432
Median	0.94312	**Standard deviation**	0.000516	**Standard deviation**	0.000530024
Minimum	0.60081	**t test**			
Maximum	0.98724	**t Stat**	-6.0668		
Standard deviation	0.024026	**P(T<=t) (1)**	1.35E-09<0.05		

Source: Own processing

Berry index is interpreted as more as its value close to 1, food consumption is more diversified. Whereas the average for whole Slovakia is 0. 9348 we can argue that Slovak consumers have diversified diet. We tested whether mean values are different between rich and poor households. We divided households according their incomes and took 10 % of households with the highest incomes and 10 % of households with the lowest incomes. The test showed that mean value is different between rich and poor household. We used two-sample t-test and based on the p-value, which is less than 0. 05, we can confirm mentioned difference.

Discussion and Conclusion

One of our objective was to find if Slovak inhabitants have diversified diet or not and based on Berry index we claim, that their diet is varied and there are differences between poor and rich, wherein rich households have more diversified diet. Another objective was to known which variables affect the macronutrient consumption. We found that the relevant variables are income per household member and the number of household members (family size). The last objective was to ascertain how macronutrients involved in calory consumption. Slovak consumers take the most amount of calories from carbohydrates, which is in average around 39 % from total calories and vice versa the least amount from proteins, which is about 13 %. These research is one part of project VEGA - Economic growth, world commodity markets and food security in countries of central and eastern Europe and western Balkan (registration number 1/0843/14). Our findings show how macronutrients play an important role in a demand for food, balanced nutrition and diet.

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Factors Affecting Consumer Preferences between Red Meat and Chicken Meat; A Case of Izmir

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Abstract
The aim of this study is to determine the factors affecting consumer preferences between red meat and chicken meat. Consumption preferences of 200 households are located in this study. Firstly the share of red meat and chicken meat consumption in total meat consumption for the households is found out. Chicken meat consumption (60%) is more than red meat consumption in 200 households under the study. While the factors affecting consumption preferences of red meat and chicken meat is examined, income factor is correlated with consumption. Besides, cardiovascular diseases existence in the households is found statistically significant for the consumption of chicken meat but not red meat. However, graduation of university is statistically significant for the consumption of red meat but not chicken meat. According to results of logistic regression model, having income above the poverty threshold, graduation of university or high school and gender affect to prefer consuming chicken meat (ratio of 2/3) to red meat in total meat consumption. As a result, policies about red meat and chicken meat in Turkey should be taken into account together to correspond the needs of animal protein of the consumers.

Keywords: Red meat, chicken meat, consumption, logistic regression, Izmir

Introduction
The problems experienced on livestock sector in Turkey affected the demand of consumer preferences on red meat and chicken meat in the recent years. Red meat imports in Turkey have been realized on the grounds that the red meat price is high in the recent years. It is considered that the consumer preferences on chicken meat are affected in the same period. In this study, consumers (200 respondents) doing shopping at the hypermarkets were questioned to determine the factors affecting consumer preferences on red meat and chicken meat in Izmir province. Objectives of this study is to determine total meat consumption of the households, the share of red meat and chicken meat in total consumption, to find out extensively consumed meat, and the factors affecting the consumption of extensively consumed meat.

Material and Methods
Respondents profile is representing households consuming chicken meat and doing shopping at the hypermarkets. Daily average consumer number who is doing shopping in hypermarkets could not be estimated and also some hypermarkets did not allow for doing survey. Therefore, population of Izmir (3,965,000) was taken into account to determine the household number of the survey to be conducted. Population of Izmir divided by four and number of households 991,250 was adopted. Number of respondents responding the households to be interviewed was determined through sampling method (95 % confidence interval and 0.07 % error ratio were taken into consideration) (Newbold, 1995).

$$n = \frac{Np(1-p)}{(N-1)\sigma_{px}^2 + p\,(1-p)}$$

n: Sample volume, N: Population (991,250) σ_{px}^2: Variance

Maximum sample volume was aimed to be achieved in the study. In doing so, p: 0.50 and (1-p): 0.50 were taken. 200 respondents from the study area were interviewed.

The interviews were conducted in Bornova, Konak and Karşıyaka which are the three of five districts that have the most crowded population in İzmir in 2013. In doing so, totally 200 respondents were interviewed at 5 hypermarkets in Bornova, 3 hypermarkets each for Konak and Karşıyaka. All of the households under this study consume both red meat and chicken meat.

In this study, 2/3 of total consumption of each household were considered and found out the extensively consumed meat. So, chicken meat in 71 households is consumed extensively and red meat in only 8 households. The share of consumption of red meat or chicken meat in total consumption for the rest of the households is less than 2/3. In this context, the households extensively consume chicken meat is accepted as "1", and the households not extensively consume chicken meat is accepted as "0" in the analysis. Thus, factors affecting the probability of consuming extensively chicken meat are determined. Dependent variable in logistic regression model is discrete and estimated probability values differ between 0 and 1. Logistic regression model depending on cumulative probability function is expressed below (Gujarati, 1995).

$$\frac{1}{1+e^{-(zi)}} = \frac{1}{1+e^{-(\alpha+\beta X_i)}}$$

P_i= the probability of preference the option of i' nd respondent

F= cumulative probability function,

z= α+βXi,

α= constant coefficient,

β= parameters for each explanatory (dependent) variable to be estimated,

X_i= i' nd dependent variable

The following equation is obtained with rearrangement of the above equation and Taking natural logarithm of both sides of the equation.

$$L= \ln\left[\frac{P_i}{(1-P_i)}\right] = z_i = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 ..... + \beta_n X_n$$

Gender of respondent, people aged over 55 in the household, people having heart problem in the household, population of households, household income above or not poverty threshold (3580 TL), education status of the respondent are considered as dependent variables in the analyzes. Descriptive statistics are given in Table 1.

Table 1. Descriptive statistics

Variable definitions	Variable name	Mean and Number	Standard deviation and percent
Number of members in the household	HSIZE	3.1400	1.24048
Age of the respondent (year)	RAGE	41.735	11.56606
60% of households in the population at the age of 55 (above age of 55= 1; 55<age=0)	HAGE	YÜ=138,A= 62	0.69
Income above poverty threshold (above poverty threshold:1, below poverty threshold:0)	INCOME	U=108, O=92	0.54
Is there anyone having heart problem in the household?(Yes = 1; No = 0)	HEALTH	Y=70, N=130	0.35
Gender of the respondent (Male = 1; Female = 0)	GENDER	M=95, F=105	0.48
Education level of the respondent (University graduate = 1; otherwise = 0)	EDUCATION1	U=86, 0=114	0.43
Education level of the respondent (high school=1; otherwise = 0)	EDUCATION2	L=77, 0=123	0.39
Education level of the respondent Secondary school= 1; otherwise = 0)	EDUCATION3	or=16, 0=184	0.08

Results

Total meat consumption of 200 households in 15 days is 1033 kg. 40% of total meat consumption is red meat and 60% is chicken meat. Average consumption of the households in 15

days is 5 kg, average red meat consumption is 2 kg; chicken meat consumption is 3 kg. Average chicken consumption for per person in a year is 23.56 in this study; according to a study conducted in Aydın, it is 23.7 kg (Armagan, Ozdogan, 2005). According to a study conducted in Izmir about beef consumption, average beef consumption for per person in a year is 7.93 kg (Cankurt et al, 2010); a results show in the study conducted in Erzurum it is 4.98 kg in a month (Kızıloğlu and Kızıloğlu, 2013), but in this study beef consumption for per person in a month is 4.10 kg.

Red meat consumption for 44% of the households is between 1 kg and 2 kg, 30% is not more than 1 kg. Thus, red meat consumption for 74% of the households is 2 kg and less. Chicken meat consumption for 37% of the households is between 3.1 kg and 6 kg, about %32 is between 2.1 kg and 3kg. Considering meat consumption according to income groups; the red meat consumption is 2 kg and less in the first income group that forms 95% of the households. However, it is about 49% of the households for the same amount of chicken meat consumption. The same amount of red meat consumption for the highest income group forms 43% of the households, and 20% of the households for the chicken meat consumption. Thus, income group is found statistically significant with both consumption of red meat (Kruskall-Wallis Chi-Square 54.538, p $0.000<0.05$) and chicken meat (Kruskall-Wallis Chi-Square 16.792, p $0.000<0.05$). However, heart disease in the household is not found statistically significant with the consumption of red meat (Mann-Whitney U F 4174, p $0.311>0.05$), but it is statistically significant with chicken meat consumption (Mann-Whitney U F 3792.5, p $0.003<0.05$). While the education status of the respondent is found statistically significant (Mann-Whitney U F 3925, p $0.011<0.05$), there is no relation with chicken meat consumption (Mann-Whitney U F 4546, p $0.365>0.05$).

According to logistic model results (Table 2-3-4-5), variables of having income above the poverty threshold, graduation of university or high school and gender affect the probability of consuming extensively chicken meat. The probability of consuming chicken meat is increased 2.6 times by having income above the poverty threshold comparing to having income below poverty threshold. Besides, the probability of chicken meat consumption is increased 4 times by graduation of university comparing to not graduation and 5 times by graduation of high school comparing to not. Male respondents decrease the consumption of chicken meat 3.4 times comparing to female respondents (1/0.294). There is no statistically relation between the extensively consumption of chicken meat with elderly population and heart problems in the households. While the factors affecting preferences of chicken meat is analyzed by ordinary logistic model (Uzmay et al, 2013); the increasing on food expenditure in total expenditure, graduated from university and high income group affect each 1 kg of increasing in consumption of chicken meat positively, however, age of the respondents, heart diseases and 44-55 years old population in the households affect negatively. In this study, Heart diseases and the population of above 55 ages in the households are not effective to extensively consumption of chicken meat. Because of the 50% of the households have income below the poverty threshold; it is considered that the rate of old population in the household is not effective to the consumption. Five households have income above the poverty threshold in eight households which consume red meat extensively with the rate of 2/3. Likewise, seven of eight respondents graduated of university.

Conclusion

Considering the factors affecting consumption of red meat or chicken meat, income is found statistically significant with both red meat and chicken meat consumption. Heart disease in the households is statistically significant with consumption of chicken meat, but not for red meat. Moreover, Graduation of university is related to red meat consumption but not to chicken meat consumption. There is a relation between the probability of consuming chicken meat and having income above poverty threshold, graduation of university or high school, gender of the

respondents considering the households which consume extensively chicken meat. It is pointed out that especially income factor is effective to the consumption of red meat and chicken meat taking into account the results of logistic regression analyzes. Less than 1 kg consumption of red meat (%60) in two weeks for the households of lower income group is the result of red meat policies could not reach the successful in recent years. As a result, chicken meat policies should be taken into account with red med meat policies in Turkey to correspond the consumer needs of animal protein.

Table 2 . Logistic Regression model results (Variables in the Equation)

	B	S.E.	Wald	df	Sig.	Exp(B)
Constant	-,597	,148	16,329	1	,000	,550

Table 3 . Logistic Regression model results (Model Summary)

Step	-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
	229,309(a)	,143	,197

Table 4 . Logistic Regression model results (Variables not in the Equation)

		Score	df	Sig.
Variables	Age	,074	1	,786
	gender(1)	12,038	1	,001
	household_number	6,947	1	,008
	heartdisease(1)	,444	1	,505
	povertyincome(1)	8,203	1	,004
	agepopulation6VAR00011(1)	,492	1	,483
	edu1	,025	1	,874
	edu2	,655	1	,418
	edu3	,517	1	,472
Overall Statistics		28,322	9	,001

Table 5 . Logistic Regression model results (Variables in the Equation)

	B	S.E.	Wald	df	Sig.	Exp(B)
age	,009	,018	,274	1	,600	1,009
gender(1)	-1,224	,346	12,518	1	,000*	,294
household_number	-,179	,145	1,517	1	,218	,836
heartdisease(1)	-,430	,363	1,404	1	,236	,651
povertyincome(1)	,953	,365	6,822	1	,009*	2,594
agepopulation 6VAR00011(1)	,621	,552	1,267	1	,260	1,860
edu2	1,620	,762	4,522	1	,033*	5,053
edu3	1,434	,686	4,364	1	,037*	4,194
edu4	1,119	,806	1,929	1	,165	3,061
Constant	-2,081	1,516	1,884	1	,170	,125

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Determination of Environmental Attitudes of Farmers in the Aegean Region

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Abstract

Environmental attitudes of farmers were determined in this study. The new Environmental Paradigm (NEP) was applied to 270 farmers in Izmir, Manisa, and Aydin Provinces. NEP, which is a recognized measurement in the world, has been designed to measure the environmental concern of groups through a survey instrument with fifteen statements. The environmental attitude was found statistically different according to education level of farmers in the study. Five different groups were elicited regarding the environmental attitudes. Factor analysis scores were used in the cluster analysis which refers to three different groups.

Keywords: New Environmental Paradigm, farmer, environmental attitudes of farmers, Aegean Region.

Introduction

Intensive usage of synthetic inputs in agriculture has caused environmental problems in agriculture all over the world in last few decades. On the other hand agricultural lands have been diminishing because of the unplanned, scattered and disruptive developments expanding to the open countryside. The implicit problem between human activities and health of natural systems has received increasing recognition from scientists and environmentalists. As for Turkey, after the organic agriculture movement started at 1980's, there are important changes in environmental attitudes and behaviors. It is also important to know the environmental awareness and attitudes of farmers for agricultural and environmental inputs suppliers.

Material and Methods

The New Environmental Paradigm (NEP) was applied to 270 farmers living in Izmir, Manisa and Aydin provinces. Nine counties and 36 villages were selected by interviewing with Ministry of Food, Agriculture and Livestock in the study area.

The factor analysis was employed to reveal the main factors of the farmer's environmental attitudes and factor analysis scores were used in the cluster analysis. Kruskal Wallis Test was also employed to determine the differences between groups.

The NEP was introduced by Dunlap and Van Liere (1978). The scale is designed to measure the environmental concern of people using a survey instrument constructed with fifteen statements by the five-points Likert Scale (Dunlap et al., 2000; Anderson, 2012). NEP include environment-centered (expected to be low average) and people-centered (expected to be high average) statements. The validity and ability of the NEP on accurately represent environmental attitudes have been repeatedly tested in many countries (Dunlap, 2008; Harraway et al., 2012).

Results

According to the findings; the average age of farmers is 52.5 years; education duration is 6.7 years and farming experience is 29.0 years in the study area. The small sizes and fragmented structures of farms in the study area reflect the typical Mediterranean situation. Farmers are cultivating olive (35.6%), wheat (33.0%), cotton (29.6%) and corn (28.1%) nearly 12 hectares lands. About 36.3% of the farmers are engaging with animal husbandry beside, plant production.

The most attended statement by farmers from the part of environment centered statements is "*If things continue on their present course, we will soon experience a major ecological catastrophe*". After that, "*Plants and animals have as much right as humans to exist*", "*Humans are severely abusing the environment*" are followed respectively. "*The earth is like a spaceship*

with very limited room and resources" is the least attended statement. As for the people centered statements, "*Humans were meant to rule over the rest of nature*" is the most attended statement. "*Humans have the right to modify the natural environment to suit their needs*", "*Humans will eventually learn enough about how nature works to be able to control it*" are followed respectively (Table 1).

Table 1: New Environmental Paradigm

Provinces	Izmir		Aydin		Manisa		Total	
Statements	Mean	Std.Dv.	Mean	Std.Dv.	Mean	Std.Dv.	Mean	Std.Dv.
If things continue on their present course, we will soon experience a major ecological catastrophe	4.53	0.722	4.48	0.722	4.47	0.722	4.49	0.720
Plants and animals have as much right as humans to exist	4.50	0.658	4.48	0.640	4.37	0.880	4.45	0.734
Humans are severely abusing the environment	4.27	0.934	4.51	0.658	4.49	0.674	4.42	0.771
When humans interfere with nature it often produces disastrous consequences	4.07	1.089	4.38	0.856	4.20	0.974	4.21	0.982
Despite our special abilities humans are still subject to the laws of nature	4.26	0.978	4.08	1.052	4.20	1.051	4.18	1.027
We are approaching the limit of the number of people the Earth can support	3.90	1.290	4.22	0.945	4.08	1.309	4.07	1.196
The balance of nature is very delicate and easily upset	3.90	1.272	3.86	1.232	3.83	1.238	3.86	1.243
The earth is like a spaceship with very limited room and resources	3.78	1.331	3.69	1.269	3.71	1.283	3.73	1.290
Humans were meant to rule over the rest of nature	4.28	1.081	4.51	1.104	4.17	1.238	4.32	1.148
Humans have the right to modify the natural environment to suit their needs	4.12	1.216	4.50	1.094	4.30	1.096	4.31	1.143
Humans will eventually learn enough about how nature works to be able to control it	4.09	1.138	4.19	1.226	3.79	1.370	4.02	1.255
The so-called "ecological crisis" facing humankind has been greatly exaggerated	3.57	1.374	3.70	1.465	3.63	1.487	3.63	1.439
The balance of nature is strong enough to cope with the impacts of modern industries	3.31	1.242	3.42	1.289	3.57	1.423	3.43	1.319
Human ingenuity will insure that we do not make the earth unlivable	3.04	1.323	3.46	1.334	3.02	1.357	3.17	1.348
The Earth has plenty of natural resources if we just learn how to develop them	3.08	1.455	2.27	1.405	3.00	1.499	2.78	1.494

Cornbach's Alpha: 0.614

The farmers' environmental attitude was found as 3.94. The environment centered statements was averaged 4.18, on the other hand, the mean of the people centered statements was calculated as 3.67 (Table 2). While there is no statistically difference between the provinces, environmental attitudes statistically differ according to the farmer's education levels. The environmental attitudes increase with the farmer's education levels (Table 3).

The factor analysis was employed to reveal the main factors of the farmer's environmental attitudes. Three variables were removed from the analysis which has extraction value lower than 0.50. Analysis has been continued with 12 variables. According to the results, five different groups were elicited regarding the environmental attitudes which named Eco-Crisis (posibility), Balance of Nature, Human Domination, Antiexemptionalism (humans are not exempt from the constraints of nature) and Nature Domination. Total variance explained was found %67.515 (Table 4).

Table 2: Environmental attitudes of farmers interviewed

Provinces	Izmir		Aydin		Manisa		Total	
Variables	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Environment Centered	4.15	0.596	4.21	0.479	4.17	0.588	4.18	0.555
People Centered	3.64	0.667	3.72	0.644	3.64	0.695	3.67	0.668
Environmental Attitude	**3.91**	**0.486**	**3.98**	**0.417**	**3.92**	**0.477**	**3.94**	**0.460**

Table 3: Environmental attitudes according to the educational level

Education Levels	N	Mean Rank	Chi-Square	Degrees of Freedom	Asymp. Sig.
1-5 years	162	126.64	5.558*	2	0.062
6-8 years	51	144.24			
9 years and >	57	152.87			

*p:0.10

Table 4: Factors determining the environmental attitudes of farmers

Groups	Variables	Factor Scores
Eco-Crisis	When humans interfere with nature it often produces disastrous consequences	0.847
	We are approaching the limit of the number of people the Earth can support	0.718
	Humans are severely abusing the environment	0.706
Balance of Nature	The earth is like a spaceship with very limited room and resources	0.858
	The balance of nature is very delicate and easily upset	0.797
Human Domination	Humans were meant to rule over the rest of nature	0.773
	Humans will eventually learn enough about how nature works to be able to control it	0.765
	Despite our special abilities humans are still subject to the laws of nature	0.526
Antiexemptionalism	Plants and animals have as much right as humans to exist	0.866
	If things continue on their present course we will soon experience a major ecological catastrophe	0.544
Nature Domination	The balance of nature is strong enough to cope with the impacts of modern industries	0.832
	The so-called “ecological crisis” facing humankind has been greatly exaggerated	0.610
Total Variance Explained: %67.515		
Kaiser-Meyer-Olkin: 0.658 Sig: 0,000		
Bartlett's Test of Sphericity: 598.600		

By using the scores of factor analysis in cluster analysis the farmers divided into three groups (Table 5).

Table 5: Farmer groups according to the environmental attitudes (Cluster Analysis)

Groups	Number of Farmer	%
Group 1	112	41.5
Group 2	42	15.6
Group 3	116	43.0
Total	270	100.0

The Kruskall Wallis Test was employed for comparing the farmer groups according to the characteristics such as age, experience, city and satisfaction with farming. The farmers who are elders, with moderate satisfaction, and inhabitant of Aydin constitute the first group. The second group includes middle-aged, inhabitant of Izmir, and highly satisfied farmers. Third group covers younger, inhabitant of Manisa, and with low satisfaction levels farmers. Also the environmental attitudes of farmer groups are statistically different. Group 3 is the most, and Group 2 is the least environmentalist group in this study (Table 6).

Table 6: Some characteristics according to the farmer groups

Variables	Groups	N	Mean Rank	Chi-Square	Degr. of Freed.	Asymp. Sig.
Average of Environmental Attitudes	Group 1	112	121.96	68.946***	2	0.000
	Group 2	42	63.14			
	Group 3	116	174.78			
Provinces	Group 1	112	128.27	6.122**	2	0.047
	Group 2	42	120.50			
	Group 3	116	147.91			
Age	Group 1	112	148.33	5.974**	2	0.050
	Group 2	42	135.64			
	Group 3	116	123.06			
Satisfaction from farming	Group 1	112	135.20	9.137***	2	0.010
	Group 2	42	157.98			
	Group 3	116	127.66			

***p:0.01 **p:0.05

Conclusion

Although general attitudes, beliefs, and worldview are not the sole determinants of appropriate environmental behaviors, they are nonetheless important in the chain of factors underlying these behaviors (Gardner and Stern, 2002).

The purpose of the study was to test the environmental attitudes of the farmers in Aegean Region in Turkey. The farmers have moderate environmental perspectives in the region. The farmers in Manisa and younger's are more environmental friendly. It can be said that, education is lead to environmental attitudes of farmers.

During the extension activities on environmental issues the young farmers who are more sensitive to environment must be taken consider for diffusion of sustainable farming practices in the region.

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A Study on Adopting Probit Method for the Calculation of Lethal Concentration (LC-50) Regarding Aquatic Organisms

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Abstract

Some substances that are thrown into water or mixed in water have a lethal effect on aquatic organisms due to the fact that living organisms may resist until the concentration reaches a certain level. These chemicals do not show a lethal effect until a certain concentration ratio. This resistance varies depending on the species, the morphological and physiological conditions of the living organisms, and on the characteristics of the contaminant and characteristics of the habitat. Nevertheless, the aforementioned resistance has a limit. When that limit is exceeded, mortalities are observed. To a certain concentration, mortality rate increases gradually; afterwards, the whole population dies.

The amount of a substance found in water is called concentration. In other words, concentration defines the quantity of a substance in a certain volume. Therefore, it is more appropriate to use the term lethal concentration for aquatic organisms. Dose is used for determining the amount of substance given to the organisms by means of injection or by mixing it into feed. Probit analysis is the preferred method for calculating the concentration that kills 50 % of the organisms within a certain time. This study examines the Probit method that enables Lethal Concentration (LC-50-24h) to be determined.

Keywords: Probit method, Lethal Concentration

Introduction

The idea of probit analysis was originally published in *Science* by Chester Ittner Bliss in 1934. He worked as an entomologist and was primarily concerned with finding an effective pesticide to control insects that fed on grape leaves (Greenberg 1980). In 1952, David Finney took Bliss' idea and wrote a book called *Probit Analysis* (Finney 1952). Today, probit analysis is still the preferred statistical method in understanding dose-response relationships.

Probit analysis is commonly used in toxicology to determine the relative toxicity of chemicals to living organisms. This is achieved by testing the response of an organism under various concentrations of each of the chemicals in question and then comparing the concentrations at which one encounters a response. The response is always binomial (e.g. death/no death) and the relationship between the response and the various concentrations is always sigmoid. Probit analysis acts as a transformation from sigmoid to linear and then runs a regression on the relationship (Finney, 1952).

Definition of the Probit

In a normal distribution, if the mean and variance of that distribution is known, the cumulative probability or the area up to a certain point can easily be found.

The probit of proportion P (ratio of the number of fish died to that of fish exposed, in our study) is defined as the abscissa which corresponds to a probability P in a normal distribution with mean 5 and variance 1; in symbols, the probit of P is Y, where

$$P = \frac{1}{\sqrt{2\pi}} \int_{-\infty}^{Y-5} e^{-\frac{1}{2}u^2} \mathrm{du} \qquad \ldots(1)$$

The expected proportion of fish killed by a dosage x_0 is

$$P = \frac{1}{\sigma\sqrt{2\pi}} \int_{-\infty}^{x_0} e^{-\frac{1}{2}(\frac{x-\mu}{\sigma})^2} dx \quad \ldots(2)$$

where $Y = \frac{(x-\mu)}{\sigma}$ is known as Normal Equivalent Deviation (N.E.D.) (Bhar, L).

Due to the fact that the N.E.Ds of the proportions which are smaller than 50% are negative, the value 5 is added to those proportions in order to make calculations easier, . This is called Probit (probability unit). (Düzgüneş and Düzgüneş, 1958).

The calculation of LC-50

When a large number of sample materials are available, it is likely that the LC-50 of a substance can be found through repeated trials. However, this is not possible in practice because of the fact that the LC-50 must be calculated by interpolation. Also, the value to be found will be an approximate value.There exists a sigmoid relationship in the form of " " between the concentrations of a substance and the death rate of the aquatic population on which these concentrations are used. In other words, death does not occur until the concentration **a**, then it increases rapidly, and the whole population of organisms dies at the concentration **b**. Therefore, the dose that results in the death of 50% of the population is considered as the lethal concentration. This is called the Median effective concentration or Median effective dose. The point **m** in sigmoid relationship indicates the lethal concentration which kills 50% of organisms.

The probits (Y) of death rates and the natural logarithms of concentrations characterize a straight line relationship which can be formulated as follows:

$$Y = 5 + \frac{(x-\mu)}{\sigma}, \text{ or } Y = 5 - \frac{\mu}{\sigma} + \frac{x}{\sigma} \quad \ldots(3)$$

Thus this equation can be arranged as $Y = (5 - \frac{\mu}{\sigma}) + \frac{1}{\sigma}x$ and the equation can be reformulated as a regression equation which will take the form of Y = a + bx, where a=$(5 - \frac{\mu}{\sigma})$ and b= . In this equation, the probit of the 50% death rate is Y = 5.

To test whether the line is an adequate representation of the data, an X^2 test may be used.

Computer Software

Computers, which marked the onset of the information age, are undoubtedly the most important technological products of our age. There is no other device which affects the development of scientific fields and technological advancements as much as these devices (Manas, Eren, İkiz, 1985).

In this study, two separate computer software packages – the classic probit analysis method and the iterative method – are used. By both methods, the values of 'a' and 'b' in the regression equation Y=a+bx are estimated.The software using the classic probit analysis method has been programmed in PL/1 programming language. Again, with the help of the probit method referred to in Düzgüneş, Düzgüneş (1958), the regression equation and the LC-50 value have been obtained.

The SPSS statistical software package is also used to obtain the values of 'a' and 'b' using the iterative techniques. Data used in calculations are given in Table 1 and results obtained using the classical calculation method are given in Table 2.

Table 1: Data used in calculations

Cons. (mg/1)	No.of fish	No.of affected
5.0	30	5
10.0	30	12
15.0	30	17
20.0	30	22
25.0	30	28

Tablo 2: Results obtained using the classical calculation method

Con. (mg/l.)	Log Con.		No. of fish n	No. of affected r	% kill p	Empirical probit	Expected probit Y	Weight	
	X	X^2						W	nW
5.0	0.70	0.49	30	5	17	4.05	3.9	0.405	12.2
10.0	1.00	1.00	30	12	40	4.75	4.8	0.627	18.8
15.0	1.18	1.39	30	17	57	5.18	5.4	0.600	18.0
20.0	1.30	1.69	30	22	73	5.61	5.8	0.503	15.1
25.0	1.40	1.96	30	28	93	6.48	6.1	0.405	12.2

Probit		nWX	nWX^2	nWY	nWY^2	nWYX
Y	Y^2					
4.07	16.56	8.51	5.95	49.45	201.26	34.62
4.75	22.56	18.81	18.81	89.35	424.40	89.35
5.17	26.73	21.28	25.10	93.22	481.92	109.99
5.59	31.25	19.62	25.50	84.35	471.53	109.66
6.41	41.09	17.01	23.81	77.88	499.22	109.62

As a result of the calculations using the classical method, the values a and b, the regression line, and LC-50 are obtained as follows:

a = 1.773, b= 3.041, Thus, Y= 1.773 + 3.041 X, m= 1.0613, LC-50= 11.52

In the same way, 'a' and 'b' values and the related result using SPSS statistical software package are obtained as a= 1.711, b= 3.097, $X^2 = 2.920$, and LC-50=11.48.

Conclusion

In this study two methods of calculating LC-50 are introduced. As can be seen from the results, both the classical and the iterative methods gave similar values. Since the iterative method produces results faster and more easily, it is preferable to the classical probit method.

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Aquaculture Potentials and Inventory of Fish Species in Central African Republic

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Abstract

Located in the heart of Africa, the Central African Republic (CAR) has an area of 623.000 km^2. The Country has relatively abundant natural resources and generally favorable to agriculture and livestock agro-ecological conditions. The climate in the country is favorable to rain fed agriculture with relatively long cropping cycles. Rainfall is fairly abundant and ranges from 1200 to 1800 mm per year with peaks of 2000 mm locally. Agricultural potential of 15 million hectares of arable land of which only about 800.000 hectares are grown each year, corresponding to 5.3% of the total and less than 0.5 ha operated on average farm assets.

The CAR has two major river systems: the basins of the Chari and Logone where about 195 species of fish live and finally the Ubangi basin which has 206 ones. Fish is especially a good source of protein intake. Fish proteins are highly digestible and contain a high concentration of essential amino acids. Fish also contains significant amounts of vitamins and minerals and is rich in polyunsaturated fatty acids (PUFAs). With the exception of the northern part of the country, the supply of fish in each region is below to demand. Domestic demand for fish would be of the order of 1825 tons / year. The main commercial species are *Alestes sp*., *Clarias sp*., *Hydrocynus sp*., *Lates sp*., *Heterotis sp*. *Tilapia nilotica* is introduced specie. The current national fish production is around 300 tons of tilapia per year. The total annual fisheries potential is currently estimated at 5000 tons. Most of fishery products are smoked and transferred from the North to the South and do not compete directly with fresh fish ponds, which are very popular in the markets.

Keywords: Central African Republic, aquaculture, fish

Introduction

Fisheries and aquaculture are not an important sector of the Central African economy. With a production of 15,000 tons in 2003, the country still does not ensure self-sufficiency. According to the FAO in 2008, CAR imports 1,035 tons of fish for a gross value of more than one million U.S. dollars. With many natural lowland relatively well irrigated, biogeographic conditions of the CAR are nevertheless suitable for fish. The main purpose of this work is to present the aquacultural potentials of CAR whose exploitation could give the country an important place in the countries of the region. Our working hypothesis is double: - (i) -CAR has all the necessary potentials for the practice and the development of aquaculture and - (ii) - the good practice of aquaculture helps to reduce poverty in the country.

In this document, first we present an inventory of water resources of the country, then we give an overview of aquatic ecosystems. Finally before we look at fishing and aquaculture situation in Central African Republic.

Materials and Methods

Materials

Our study is mainly based on the use of official documents published in scientific journals or on the internet. The selection criteria are multiple: relevance of the topic, connection with our subject of study, the source etc... So, sort was done in which many documents were removed. The use of sorted materials allowed us to draw tables, figures, graphs that are presented in this document.

Analysis method

Since in our study we only used the raw data as found in the literature, the preferred criteria during collecting data related to the source of the document, the relevance of the topic and its

relation to our subject. Thus, by comparing and analyzing each statistic found we were able to complete this study.

Results

Water sources

Most of the water resources of CAR come from rain and are the only meteoric waters that the country receives. Rains generate runoff and groundwater recharge. Rainfall is unevenly distributed in the territory of CAR. The average annual rainfall amounts from 800 mm in the north-east of the country to 1800 mm in the south-west. Based on an average annual rainfall of 1200 mm for the entire country, the country receives 746.4 billion m3 of water as rainfall volume (Piriou, 2009).

Central African Republic has been favored by nature that has a dense hydrographic network covering almost all the national territory. The network is divided into two large basins that divide the country into two parts from East to West: the Lake Chad Basin (flow over 1000 m^3 per year) and the Congo River (flow over 800.000 m^3 per year) with their tributaries. Tributaries consist of lakes, waterfalls and rivers.

Water ecosystems

Aquatic flora includes about 149 species of plants organized in 35 associations of aquatic, semi-aquatic and riparian forests (Boulvert, 1987). It consists of two types of vegetation:

- The unistrate herbaceous vegetation of which characteristic species are *Lemna aequinotialis*, *Wolffiela welwitshii, Spinodela polyrrhizza, Nymphellula salvinia, Azolla nilotica,* etc. (Boulvert, 1987);
- The pluristrate herbaceous vegetation: this category consists mainly of *Ceratophyllumdemersum*, *Pistiastratiotes*, *Eicchornniacrassipes*, *Salviniamolesta*, *Hydrocharischevalieris*, *Nymphaea lotus*, *Utricularia spp.*, *Ranalismahumile*, *Potamogetonspoctandus* and Maga. Among these species, *Eicchorniacrassipes*, *Salviniamolesta* and *Pistiastratioites* are invasive aquatic plants (Boulvert, 1987).
- The semi-aquatic herbaceous vegetation: it's characterized by *Cyperus papyrus*, *Echinochloa spp*. *Phragmitesmautianus*, *Polyumsallicifolium* and *Impatience spp.*

Fisheries and aquaculture

The two major river systems of CAR contain about 400 fish species: 195 species for Chari Basin and about 206 ones for the Ubangi. The main commercial species are *Alestes sp*., *Clarias sp*., *Hydrocynus sp*., *Lates sp.*, *Heterotis sp*., and *Tilapia nilotica* which is an introduced specie. A non-exhaustive list of these species is given in the Table 1.

Table 1. Some fish species discovered in watercourses of CAR (Boulvert, 1987)

	Congo Basin	**Chad Basin**	
Fish species	*Odazofhrissa viffafa* *Microfhrissa royauxi* *Synodonfis ornafus* *Aptocheilichthys hutereaui* *Barbus miotepis miolepis*	*Barbus macrops* *Hemichromisbimaculatus* *Alesfes baremoze* *Barilius senegalensis orienfalis* *Synodonfis membranaceus* *Aplocheilichfhys normani* *Tilapia melanopleura* *Micrulesfes sformsi,*	*Aptocheitichthys baudoni* *Hydrocyon uiffahzs* Castelneau *Alesfes nurse* *Alesfes macrolepidofus* *Labeo senegulensis* *Epiplufys bifasciafus* *Hemichromis fasciafus* *Tilapia niloticus* *Hydrocyon uiffafus*

Structure of the fishing industry

According to the FAO organization in 2008, potential output is estimated between 20 000 and 50 000 tons per year depending on climatic conditions.

Sub-sectors of inland fisheries

In CAR, the practice of capture fishing is an activity with a long tradition, seen in the same way as activities of gathering and collecting, related to hunting game. It is prevalent in all suitable areas of the country and is now an integral part of production systems in rural areas. We distinguish broadly two forms of capture fisheries: traditional and artisanal.

Fishing periods

There are two fishing seasons in the year: one is called "sedentary" and corresponds to the rainy season (Piriou, 2009). At this time, the fishing is practiced on site by producers or near to their residence; the other period is called "nomadic" in the dry season (4-5 months) during which fishermen travel tens of kilometers to settle in temporary camps and exert full time fishing in underused areas

Means of production

Fishing tools

In general, the capture tools used are efficient but of inferior quality. There are mainly gillnets, beach seines, cast nets and longlines of various types. Methods of use of these devices vary according to local conditions, but are always more or less effective.

Gear

According to FAO, the wooden canoes are virtually the only gear used by fishermen in CAR. Their nautical quality and their affordable price make it an attractive tool. However, the scarcity of large trees along the streams has several consequences.

Fishermen communities

According to the results of an FAO survey conducted in 2012 with households involved in fishing, the number of Central African fishers by river basin is as shown in Table 2.

Table 2. Distribution of the number of fishermen in CAR (FAO, 2012)

Basin	Professional fishermen	Peasant fishermen	Total
Oubangui-Chari	11 899	47 595	38 485
Chari-Logone	7 617	30 788	50 494
CAR	19 596	78 383	97 979

The main ethnic groups of fishermen are:

- For the basin of the Ubangi and Sangha: the Mbemons, the Sangha-Sangbas and the Linzombos;
- For the basin of the Chari and Logone: the Gbayas, theNgamans, the Saras and the Yakomas

Aquaculture

Fish is the only resource affected by artisanal fisheries because of its acceptance by everyone: by all ethnic groups, women and men of all ages. But besides fish, people are interested in other aquatic animals, including amphibians (frogs), molluscs (snails, mussels...), crustaceans etc., but very marginally due to the very local character of some culinary habits. We also note that the shell is now used in livestock but in a very small scale.

Excepted the northern part of the country, the supply of fish in each area is below to demand. Domestic demand for farmed fish is nearly 1825 tons/year (Piriou, 2009). The current national fish production is around 300 tons of tilapia per year or 16% of theoretical demand. The total annual fisheries potential is currently estimated between 20.000 and 50.000 tons per year depending on climatic conditions (FAO, 2008).

Discussion

Central African Republic has abundant natural resources. Its landlocked position, coupled with the mismanagement of the economy and political instability caused the economy not to grow as much as expected. Although it is not a rich country, CAR has the potentials to meet the needs of its population (Yele et al., 2011).

The fauna of CAR includes 260 genuses in 12 families. Only 10 families are grown such as Protopteridae, Mochocidae, Claridae, Cyprinidae, Bagridae, Citharinidae, Cichlidae, Marmyridae, Gymnarchidae and Malopteridae.

In general, the diet of people has enough carbohydrates (energy) but is low in essential nutrients for health (FAO in 2008). This imbalance can be corrected by an increase of fish consumption. Because fish protein is an excellent nutrient.

The practice of aquaculture in CAR can largely help to balance the diet of the population with good proteins. Aquaculture allows both sustainable resource management and collection for socio-economic needs.

The fishing industry and fish farming employs respectively 97.979 workers (Table 2). To them must be added the traders, transporters, equipment manufacturers, manufacturers of fish facilities and fishing gear, transformers (smoking, salting). It is therefore clear that the development of this sector is a great opportunity for the country to eradicate hunger, unemployment, insecurity.

Conclusion

The aquaculture potentials of CAR, as we have demonstrated, are immense. Proper use of these potentials can greatly help the country to get out from chronic poverty cycle. In fact, the economy of CAR suffers from structural and historical constraints related to conflicts and poor governance. It results the destruction of infrastructure and a squandering of productive capital. Pathways are largely unstructured, whether in agriculture, fishing, mining and forestry. They struggle to be reconstituted, mainly because of the lack of an overall strategy. The country has to develop over the world partnership able to meet the needs of its population.

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Preliminary Study for Utilization of Some Invasive Aquatic Plants as Raw Material for Aquaculture Feeds

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Abstract

The aquaculture industry in Turkey has been grown up for twenty years and reached to two hundred thousand tonnes per year (2012) production capacity. Commonly cultured species need to the mixed feeds which contain many raw materials inside. Proximately %80 of these raw materials is exported and this is also a problem for national economy. The main protein source in mixed feed is fish meal. Because of limited natural resource the usage of fish meal will be in danger in the future. As an alternative to fish meal, aquatic plants (especially freshwater species) can be used in fish feeds after some processes. However with their water purification capacity, they have an invasive character which has an eutrophication threat for environment and water resources. For minimize their harmful effects, some combat methods (mechanic, biological, etc) are indispensable. But after harvesting methods, the plant wastes may cause environmental problems also.

In this study, some invasive aquatic plants; *Eichornia crassipes, Cyperus sp., Lemna minor, Pistia stratiotes, Hottonia sp., Nasturtium sp., Typha sp.* have been examined to be utilized as a raw material in fish feed possibilities for imparting to the economy after the harvest in order to prevent environmental damage they cause. With biochemical analysis of these plants, eleostearic acid ratios and structures are investigated as raw materials possibilities for fish feeding. In addition, thus plants and their wastes were been integrated into the economy and intended for the protection of environmental sustainability.

Keywords: Aquaculture, feed, raw material, plant.

Introduction

Fish culture or with the common name “aquaculture” is mentioned as the fastest growing nutritional sector by Food and Agriculture Organization (FAO). In order to supply the deficiency of protein sources all around the world, aquaculture sector is shown as an inevitable production type for the future.

As in case with the world, aquaculture industry grows year by year in Turkiye. Compared to last 20 years, the sector has grown proximately 15 times more with the % 20 annual growth rate. The type of aquaculture in Turkiye generally can be described as “monoculture-intensive” (Yabanlı, 2009). The main cultured species are Gilthead Seabream (*Sparus aurata*) and Sea Bass (*Dicentrarchus labrax*) in sea and Rainbow Trout (*Onchornycus mykiss*) in freshwater (Anonymous, 2012). The mentioned species are commonly carnivorous and they need high animal based protein rates in their diet. This requirement is supplied by compound feeds including many raw materials in aquaculture industry.

The major animal based protein source in aquaculture feeds is fish meal. Fish meal is produced from abundantly catched pelagic species. Also fish meal is a limited and expensive source. The situation is also a risk for economy and sustainability. In order to reduce this risk, feed producers search for the new sources especially the plant based sources for many years. Invasive aquatic plants are one of these sources.

Aquatic plants have been utilized as food components since 4000 years in Egypt and 2500 years ago in the Orient (Mandal et al., 2010). However there are critical problems about the invasive plants such as their highly reproduction and growing potential in the sense of aquatic environment. However it is possible to convert their negative effects to positive by evaluating them in the feed industry.

Water hyacinth, water lettuce, duckweed, water cress, water violet, cattail are the plants those have the potential of being used by aquaculture feed industry. For instance; water lettuce (*Pistia stratiotes*), is a good protein source, because of its high crude-protein level and it may be replaced with the fish meal (Mohapatra and Patra, 2014). Duckweed (*Lemna minor*), includes high rated pigments and minerals and also is a rich source about carotenoids. The duckweed is used in animal culture because of its amino acid profile is resembled with the animal based protein sources (Dayıoğlu et al., 2006)..

In this study, usage potential of some invasive aquatic plants such as *Eichornia crassipes*, *Cyperus sp.*, *Lemna minor*, *Pistia stratiotes*, *Hottonia sp.*, *Nasturtium sp.*, *Typha sp*. was investigated.

Material and Methods

The plants were cultured in the garden of Ege University Bayindir Vocational Training School. For the analysis from every plants, they were choosen the most healty individuals those have the fully charecteristic of their species and sent them into laboratoaries. The plants were firstly washed with the clean fresh water then analysed. After analysis, their dry and wet weights were measured. For the crude oil analysis In-House method and for the fatty acids COI/T.20/Doc.No.17 (determination of trans unsatured fatty acids by capillary column gas chromatography) method were used.

Results and Discussion

This was a preliminary study about the usage of some invasive aquatic plants and it was evaluated the potential of nutritional acceptability for the plants which were used. However it is possible to study with these plants with fish species in the future.

In table 1 and 2, the basic nutritional values percentage and fatty acid profile of selected plants in the study was shown.

Table 1. The basic nutritional components for aquatic plants in the study

	Eichornia crassipes	***Cyperus sp.***	***Lemna minor***	***Pistia stratiotes***	***Hottonia sp.***	***Nasturtium sp.***	***Typha sp.***
Moisture (%)	93.57	79.39	91.00	93.83	94.30	83.04	76.30
Crude Ash (%)	1.54	2.66	2.42	2.07	1.23	2.63	1.88
Crude Oil (%)	0.20	0.45	0.56	0.63	0.22	0.46	0.55
Crude Protein (%)	1.29	2.64	1.49	0.76	1.33	1.37	1.57
Crude Cellulose (%)	0.82	13.26	0.00	0.97	1.10	4.96	10.63

Table 2. Fatty acid profiles of the aquatic plants in the study

	Eichornia crassipes	***Cyperus sp.***	***Lemna minor***	***Pistia stratiotes***	***Hottonia sp.***	***Nasturtium sp.***	***Typha sp.***
Arachidic (C20:0)	0.23040	1.77537	-	2.50722	0.42324	3.72207	-
Eicosenoic (C20:1)	-	-	-	1.30355	-	-	-
Methyl Cis-11,14,17 (C20:3)	0.29124	-	-	-	-	-	-
Arachidonic (C20:4)	-	-	43.07801	-	-	-	-
EPA (C20:5)	-	-	-	-	1.73008	5.49452	0.65265
Heneicosanoic (C21:0)	0.44928	-	-	-	-	-	-
DHA (C22:6)	1.2496	-	-	-	-	-	-
Nervoic (C24:1)	2.78697	-	-	-	-	-	-

About the usage of plant in aquaculture feeds, some anti-nutritional factors must be considered. Some of the important factors are protease inhibitors, phytates, glucosinolates, saponins tannins, lectins, oligosaccharides and non-starch polysaccharides. Common processing techniques like dry and wet heating, solvent extraction and enzyme treatment can be effective removing the deleterious effects of antinutrients (Francis et al., 2001).

The plants *Eichornia crassipes*, *Cyperus sp.*, *Lemna minor*, *Pistia stratiotes*, *Hottonia sp.*, *Nasturtium sp.*, *Typha sp.,* were used in many studies through the animal feeding. About the fishes, many of the studies are tried with the herbivorous species.

Ray and Das (1996), have studied with dried water lettuce (*Pistia stratiotes*) meal on Rohu, Indian major carp (*Lubeo rohita*). They have obtained the best growth feed conversion ratio and protein efficiency ratio with the %15 weed meal containing diet.

Yilmaz et al. (2004) has used dried Lemna minor as a dietary protein source for *Cyprinus carpio* common carp fry. They applied %5, %10, %15, %20 *Lemna minor* to %32 protein control group diet. The results showed that a diet consisting of up to 20% content could be used as a complete replacement for commercial feed in diet formulation for common carp fry.

D'agaro (2006) has made a trial with the Crayfish (*Astacus astacus*) juveniles with the Nasturtium officinale and concluded that water cress (*Nasturtium officinale*) can be used as supplemental food in noble crayfish feeding.

Dayıoğlu et al. (2006) have studied the effects of Lemna minor on the length weight and puberty of *Pseudemys scripta elegans*. As a result it was determined that, the turtles, fed by *L. minor* and special feed were heavier than the other groups.

Mohapatra and Patra (2014) has had an experiment to evaluate nutritional quality and acceptability of *Pistia stratiotes* meal as component in diets of *Cyprinus carpio* fry. The best growth rate was gained with the %15 inclusion of *Pistia* in feeds. Also they declared that the diets consisting of *Pistia* up to 45% level could be used as a replacement for fish meal in the diet of common carp fry.

As a result, by the invasive characteristic, the plants were choosen in the study were a threat. But this kind of studies may have chance to evaluate them into commercial type and may bring a chance for the obligatory harvesting. Thus, their neggative effects to ecology and environment would be converted into the positive.

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Production of Functional Cheese by Replacement of Milk Fat with Hazelnut Oils

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Abstract

Hazelnut oil contains essential fatty acids, phytosterols, antioxidants and minerals. Full-fat dairy products such as cheese have been reported as a major risk factor in heart attacks due to its cholesterol and a high proportion of saturated fatty acids which have negative health effects. In this study, because of mentioned reasons fat in white brined cheeses was substituted with hazelnut oils at levels of 50% and or 100% w/w; full-fat cheese (FFC) was made as a control. Fatty acids profile, vitamin E, lipolysis index, total count of starter bacteria and sensorial properties were determined during 80 days of storage at intervals of 20 days. Results showed that white brined cheeses containing hazelnut oils had significantly ($P<0.05$) lower amounts of saturated fatty acids and higher levels of unsaturated fatty acids and vitamin E compared to FFC controls. Lipolysis index significantly ($P<0.05$) increased in all samples during ripening and the control cheese had significantly ($P<0.05$) higher lipolysis value than the experimental cheeses containing hazelnut oils at the end of ripening period (80th day). Total count of lactococcus spp. increased during 40 days of ripening but then decreased slightly, whereas total count of lactobacillus spp. decreased during 40 days of ripening but then increased slightly. Moreover, sensorial properties of white brined cheeses made with hazelnut oil at fat replacement levels of 100% was more acceptable than the other samples. Results showed that cheese can be made from skim milk and hazelnut oils with new healthy and functional properties.

Keywords: Milk fat, cheese, hazelnut oil, fatty acids profile, vitamin E.

Introduction

Hazelnut oil has recently gained popularity for consumption because of being a good source of vitamin E, phytosterols and monounsaturated fatty acids which can reduce total and LDL cholesterol levels (Alasalvar et al. 2003). Full-fat dairy products have been reported as a major risk factor in heart attacks due to its cholesterol and a high proportion of saturated fatty acids which have negative health effects (Ney, 1991). A diet rich in saturated fatty acids and low density lipoprotein (LDL) cholesterol are associated with cardiovascular diseases. A diet rich in mono and polyunsaturated fatty acids provides positive health effects (Lobato-Calleros et al., 2003; Karvonen et al., 2002). It has been recognized that polyunsaturated fatty acids provide health benefits, for instance by the prevention of coronary heart disease, hypertension and type 2 diabetes (Ye et al., 2009).Therefore, it has recently gained interesting for dairy products with a modified fat composition (Kondyli et al., 2003; Mistry, 2001). Replacing the fat content of dairy products such as cheese by hazelnut oils that contain low saturated fatty acids can be regarded as a solution for health problems. The replacing of milk fat by vegetable oils can contribute to a healthier saturated/unsaturated fat balance in cheese (Liangping and Hammond, 2000). The major aim of this study was to formulate and production of a functional cheese by replacement of milk fat with hazelnut oils.

Materials and Methods

Materials

DVS type mesophilic and thermophilic cheese culture (from Delvo-Tec, DSM Food Specialists, the Netherlands) and rennet (Mito, Japan) were purchased. Hazelnut oils were extracted from the local hazelnuts (Ardabil, Iran).

Oil extraction

Oil extraction from the hazelnuts sample was performed following the previously published methods by Azadmard-Damirchi et al. (2006).

Cheese preparation

Firstly, milk fat was separated using a laboratory separator and then skim milk and hazelnut oils (50% and or 100% w/w) was added to blend of three emulsifiers at normal temperatures ranging between 40-45˚C through the application of high speed mixers for 10 minutes and then were pasteurized at 65°C for 30 min, followed by cooling to 32-35°C. Starter culture (1% w/w) was added to the milk, followed by the addition of rennet to coagulate the milk within 90 minutes. The resulting coagulum was then cut into 2×2×2 cm pieces. The curds were then cut into 7×7×7 cm pieces and put into brine with 24% salt for 24hours. The resulting cheese was stored in brine with 8% salt in glass jars for 80 days.

Chemical analysis

Cheese samples were analyzed at days 1, 20, 40, 60 and 80 during ripening for the extent of lipolysis (Nunez et al. 1996; Park 2001).The extent of lipolysis in the cheese, as assessed by acid-degree value (ADV), was determined during the 80-day ripening period. Fatty acid methyl esters (FAMEs) were analysed by GC according to partial modification of the method described by Azadmard-Damirchi and Dutta (2008) and Martini et al.(2009). Vitamin E was analysed by HPLC according to the method described by Maguire et al. (2004).

Microbial analysis

DVS type mesophilic and thermophilic cheese culture (from Delvo-Tec, DSM Food Specialists, the Netherlands) applied in cheese samples were used for total count of starter bacteria using M17 agar and Rogosa agar according to the method described by Marshall (2005).

Sensory analysis

Organoleptic assessments of cheese after 60 and 80 days of ripening were performed by a 12-member test panel. Samples (approx. 30 g) were given to the selected panelists in a random order after standing for 1 h at room temperature and were given a score between 1 and 5 (1: very bad; 5: very good) for oil flavor, rancid flavor, bitter taste, saltiness and overall acceptability.

Statistical analysis

For statistical analysis, the effects of different treatments (FFC, cheese containing 50% hazelnut oil (T1), cheese containing 100% hazelnut oil (T2)) and cheese ripening periods (1, 20, 40, 60 and 80 days) were evaluated by repeated-measures analysis of variance. Depending on the results of this analysis, Duncan's test was used to determine the groups significantly different from each other. The level of significance was determined at $P<0.05$. Analysis of variance was performed using a general linear model (GLM) via SAS(Institute, 2003).

Results and Discussion

The total fatty acid composition of experimental cheeses during ripening was determined by GC. Eleven fatty acids (C4:0-C18:3) were detected in the oils extracted from the experimental cheeses. Saturated fatty acids (C4:0-C18:0) were significantly ($P<0.05$) higher in the control cheese than cheese containing hazelnut oils, while the experimental cheeses containing hazelnut oils, had significantly ($P<0.05$) higher amounts of unsaturated fatty acids (C18:1-C18:2) and lower amounts of saturated fatty acids (C4:0-C18:0) than control cheese during ripening.

α-tocopherol and γ-tocopherol compositions of experimental cheeses during ripening as determined by HPLC are presented in Table 1. Results showed that cheeses containing hazelnut oils had significantly ($P<0.05$) higher levels of α-tocopherol (vitamin E) and γ-tocopherol compared with FFC control.

The extent of lipolysis during ripening, as assessed by the ADV assay, was determined for all samples. The ADV values of all samples significantly ($P<0.05$) increased during ripening (Figure 1). This was due to the lipolysis that occurs to some extent in all cheeses and reflects continuous hydrolysis of lipid fraction in cheeses. These results were in agreement with the

findings of Sabbagh et al. (2010) who monitored the chemical and microbiological changes during ripening of Iranian probiotic low-fat white cheese.

Total count of *lactococcus* spp. increased during 40 days of ripening but then decreased slightly. On the other hand, total count of *lactobacillus* spp. decreased during 40 days of ripening and then increased slightly. The results of sensory scores at 80th day of cheese ripening time are presented in Figure 2. Total acceptability (including appearance and color) of the experimental cheeses were considered reasonable during testing. However, sensory properties of cheeses made with hazelnut oils were significantly ($P<0.05$) different to control sample. Total acceptability scores of the cheeses incorporated with hazelnut oils (at 100% substitution level) had significantly ($P<0.05$) higher scores than control cheese.

Conclusion

In the present work, replacement of milk fat in Iranian white brined cheeses by half or complete substitution with emulsified hazelnut oils was studied. The experimental cheeses containing hazelnut oils, had significantly ($P<0.05$) higher amounts of unsaturated fatty acids (C18:1-C18:2), lower amounts of saturated fatty acids (C4:0-C18:0), higher levels of α-tocopherol (vitamin E) and γ-tocopherol than control cheese during ripening. The lipolysis (ADV) of the experimental cheeses increased significantly ($P<0.05$) during ripening. Total count of *lactococcus* spp. and *lactobacillus* spp. increased and decreased during 40 days of cheese ripening time, respectively. Moreover, sensorial properties of white brined cheeses made with hazelnut oil at fat replacement levels of 100% was more acceptable than the other samples.

Table 1. The effects of different treatments of cheese substituted with hazelnut oils on tocopherol compositions at 80th day of ripening time (ppm)

Treatments	α-tocopherol	γ-tocopherol
FFC	ND	ND
T1	220.8±0.89b	35.5±1.192[b]
T2	435.6±0.89[a]	74.3±1.192[a]

a-b Means ± standard error within the same column with different superscript letters differ significantly ($P<0.05$). FFC= Full fat cheese (Control), T1 = cheese substituted with hazelnut oil at level of 50%, T2 = cheese substituted with hazelnut oil at level of 100%. ND= Non Detected

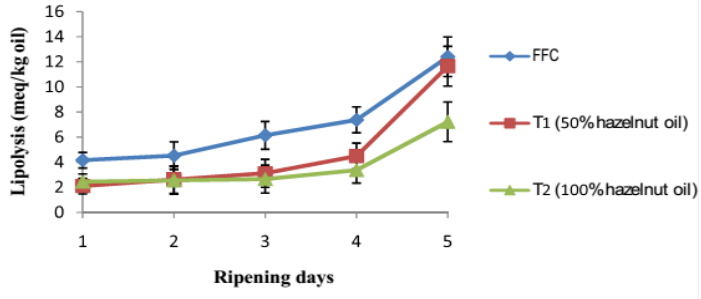

Figure 1. Lipolysis in cheeses incorporating with hazelnut oils at levels of 50 and or 100% substitutions.

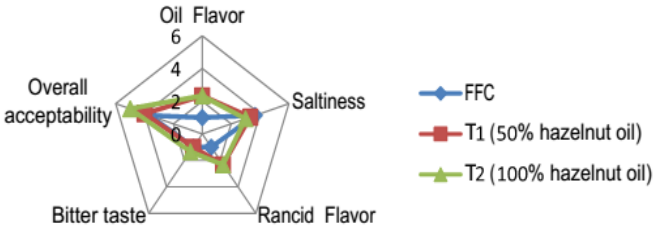

Figure 2. Sensory scores of cheeses made with hazelnut oils at 80th day of ripening time (points are means of scores from twelve judges).

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Sensory Acceptability of the Autochthonous Fruits of Bosnia and Herzegovina-Challenges and Possibilities for Food Industry

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Abstract
The autochthonous fruits present challenges for experts breeders because this fruits could grow with little care and without the use of costly agricultural inputs. In the same time, traditional fruits are challenges for the fruits processing industry providing some specific and different sensory touch for the fruit products. The main objective of this study was to sensory evaluated autochthonous apples and pears from an ex situ collection in Bosnia and Herzegovina (B&H). A total of 63 fruits were analyzed, 34 apple cultivars and 29 pear cultivars. The samples were evaluated by Quantitative Descriptive Analysis (QDA) by eight trained panelists. Flavour of fruits was described by eight sensory attributes. Principal component analysis was performed for the visualization of all sensory attributes concerning their relationship within samples. The averages sensory score of all investigated traditional and commercial cultivars showed significance differences depending on cultivar and harvest years.

Keyword: Sensory analysis, autochthonous fruits, flavor, apples, pears.

Introduction
Results of Gasi et al., (2013a; 2013b; 2013c) indicate that many traditional B&H cultivars represent an interesting genetic resource. Also investigation of Vukojević et al., (2012) and Milosevic at al., (2010) emphasize the importance of protection and adequate useing of indigenous fruit cultivars. Increased consumptition of fruit in B&H is evident but not as hoped (Alekić et al., 2010). Most studies that have investigated the importance of different sensory modalities on consumer acceptability conclude that flavour is the most important modality, (Moskowitz and Krieger, 1995 according to Kilcast and Filon, 2001). Fruits own just expressed aromatic properties and therefore can be exploited as a flavoring for many foods.

As Mattiacci and Vignali (2004 -according to Favalli et al., 2013) highlighted, for consumers, unique food products seem to have a distinctive and superior quality with respect to the general ones and thus producers can position their unique food products in the premium price range and gain a higher profit margin. In the last years the consumers' demand for unique food products has increased rapidly (Favelli et al., 2013) At the point of B&H fruit producer's view it means that autochthonous fruits offer unique and distinctive quality what is challenge for the fruits processing industry. Autochthonous fruits could provide specific flavour and other chemical compounds (antioxidant and vitamin) and give the added value for many fruits products such as jam, juices and fruit distillates. On simple words autochthonous fruits could give unique touch to B&H products. So the main task of this work is to investigate sensory quality of autochthonous fruits aimed at their recommendation to appropriate using in fruits processing industry.

Material and Methods
Thirty-four apples and twenty-nine pears were harvested in 2012 and 2013 at the comemercial stage determinated by the specialist fruit growers. The fruits maintained at the *ex situ* collection 'Srebrenik' in Northeast Bosnia. Time of harvested varied depending on fruit repening time from the end of June to early November. Just after harvesting the fruit varieties transpored to our laboratory. Name of autochthonous and commercial fruit cultivars were given in table 1.

Table 1 Apple and pear cultivars harvested in 2012 and 2013 (in bold are presented commercial cultivars)

Apple Cultivars	Petrovača	Mirisavka	Funtača	Bukovija	Tetovka	Masnjača	Ruzmarinka	Lederka	Senabija	Francuska kožara	Kanjiška	Prijedorska zelenika
2012	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1
2013	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1
Apple Cultivars	Ljepocvijetka	Dobrić	Rebrača	Srebreničk	Žuja	Paradija	Konjuha	Crvena petr	Stana	Habikuša	Bijela funtača	Pašinka
2012	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	X 0
2013	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	X 0	X 0	X 0	X 0	X 0	√ 1
Apple Cultivars	Đulabija	Budimka	Bobovec	Šarenika tvrda	Sarija	Samoniklica	**Granny Smith**	**Idared**	**Golden Delicious**	**Gala**		
2012	X 0	X 0	X 0	X 0	X 0	X 0	√ 1	√ 1	√ 1	√ 1		
2013	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	X 0		

Pear Cultivars	Kačmorka	Tikvenjača	Hambarka	Zelenika	Sarajka	Ahmetova	Budeljača	Duardova maslovka	Takiša	Krakača	Dolokrahan
2012	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1
2013	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1
Pear Cultivars	Crna Izmirka	Ljeskovača	Hasanagićka	Delkora	Zimnjača	Izmirka	Jeribasma	Okrugljača	Kaličanak	Urumenka	Hasenbegovićka
2012	√ 1	√ 1	√ 1	√ 1	X 0	X 0	X 0	X 0	X 0	X 0	X 0
2013	√ 1	√ 1	X 0	X 0	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1
Pear Cultivars	Ćopa	Viljamovka	Tikvenjača	Begarika	**Williams**	**Gellerc**	**Sweet Harow**	**Aleksandar Lukas**			
2012	X 0	X 0	X 0	X 0	X 0	X 0	X 0	X 0			
2013	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1	√ 1			

√- harvested; X- not harvested

Sensory evaluation of fruit

Quantitative Descriptive Analysis were carried out with a panel of 8 panelists who had been recruited from the staff of the Faculty of Agriculture and Food Science University of Sarajevo The panelists were trained in the evaluation of apples and pears and in the use of the attributes. During training, panelists agreed on a consensus list of the next attributes for sensory profiling of fruits flavour: odour intensity, sweet flavour, sour flavour, green, fruity flavour, floral, typically, after taste, and overall sensation. Flavour attributes were rated using category scales from 1 = not detectable to 5 = extremely strong examinated atributes. During the sensory session, each panellist analyzed one fruit of each cultivar.

Statistical analaysis

Mean values of intensity of sensory attributes for the different cultivars were subjected to Principal component analysis (PCA) of the corellation matrix, using Grimmer Soft programe - StatBox 6.7, France.

Results and Discussion

Insight to plot of sensory attributes (Fig.1A and 1B) one can see that positive flavour attributes such as fruity, floral, odor intensity, typicality, after taste and overall liking is sited at the right side of PC1 according to their significance values of Pearson correlation coefficient-(standardize PCA). Green and sour flavour attributes are on opposite side of PC1.

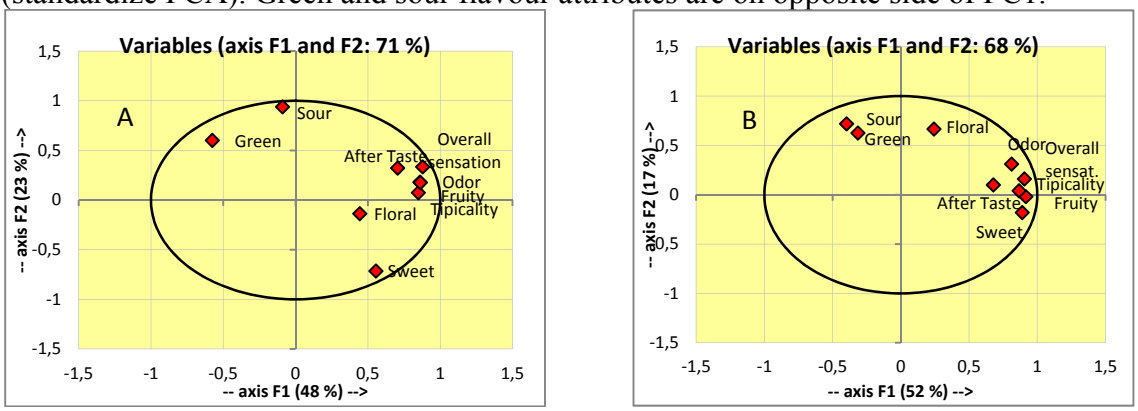

Figure 1. Plot of sensory attributes for the apple cultivars (A) and pears cultivars (B)

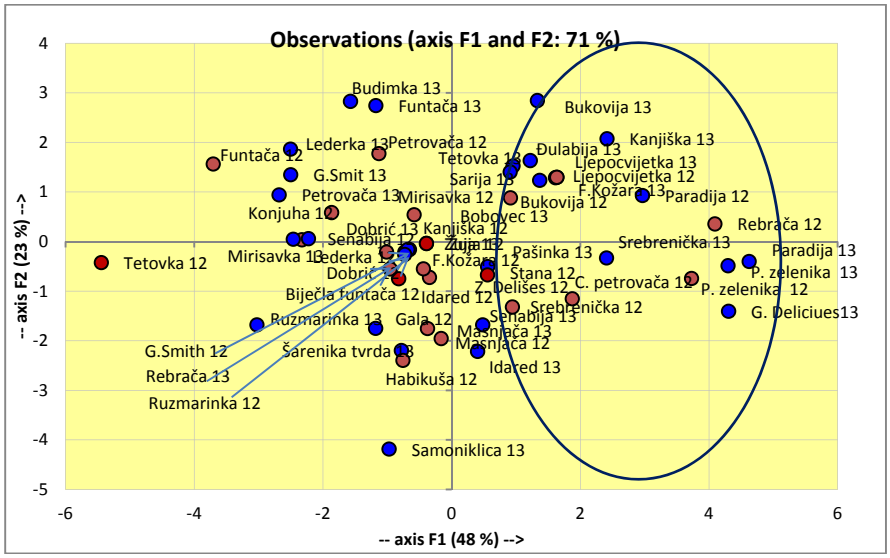

Figure 2. Plot of apple cultivars-rounded cultivar are determinate by the main positive fruit characteristic

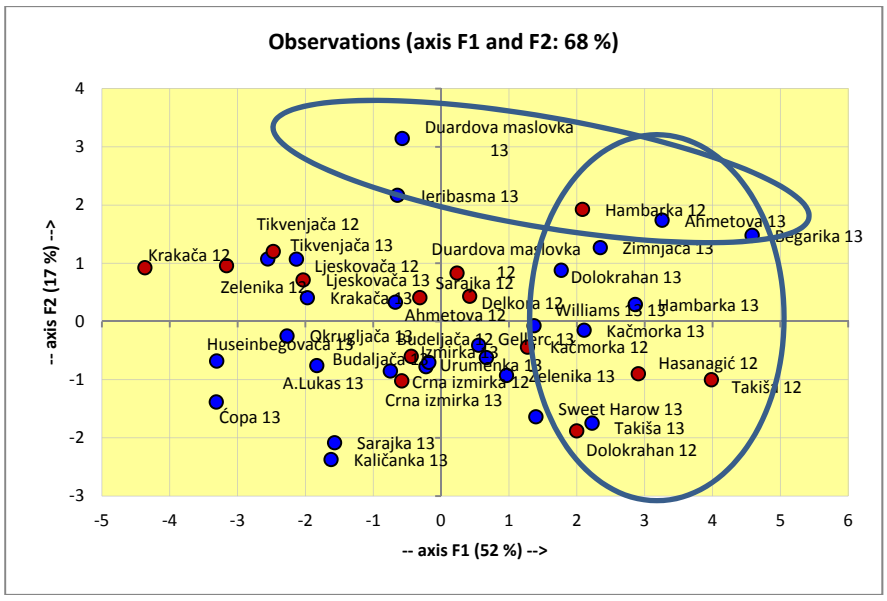

Figure 3. Plot of pear cultivars - rounded cultivars are determinate by the main positive fruit characteristic

Places of apple cultivar at the plot (Fig.2) were affected by harvest date but this is not currently sufficient for prediction of sensory attributes of fruit. Some cultivars showed high score in 2012 and 2013 for the most flavour attributes. For the apple cultivars those are: Prijedorska zelenika, Paradija, Srebrenička, Bukovija and Ljepocvijetka.

At the plot of pears cultivars (Fig.3) Takiša, Hambarka, Dolokrahan and Kačmorka distinguished by it's pleasant flavour in both harvest years. Especially floral and odor intensity showed Begarika, Jeribasma, Ahmetova and Hambarak in 2012.

In compared to commercial apple cultivars more autochthonous cultivar have better flavour characteristic. Just Golden Delicious owns very nice sensory attributes unlike Idared A, Granny Smith and Gala which showed much lower intensity of apple characteristic flavour in compared to some autochthonous apple cultivars. Williams and Sweet Harow are good evaluated unlike Aleksandar Lukas and Geller which were characterized by lower intensity of flavour attributes.

Conclusion

Autochthonous apple and pears cultivars could be a highly favoured fruit for manufacturing owing to their unique flavour characteristics. Fruit products such as juices, jam and distillates could provide a unique aroma profile by adding some amount of very flavoured autochthonous cultivars. Especially high intensity of sweet, fruity and floral aroma showed apple cultivars: Prijedorska zelenika, Paradija, Ljepocvijetka, Bukovija, Srebrenička and pear cultivars Dolokrahan, Hambarka, Takiša, Kačmorka. Pears Jeribasma, Begerika, Ahmetova are characterized by intensive floral aroma and could be used as flavouring for distillates and juices.

Acknowledgements

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Using Particule Size Index Hardness in Biscuit Wheat Selection

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Abstract

Particle size index hardness measured from whole meal in NIR for bread wheat is commonly used in breeding programs in Turkey. It gives important information in terms of bread-making quality selection together with other quality parameters and measuring particle size index hardness from whole meal in NIR is easier and more practical compared to classical method. While low values, means hard kernel, show suitability of bread-making quality genotypes which have high values, means soft kernel, are selected for biscuit-making quality. This study was done to investigate the suitability of particle size index hardness used for bread wheat breeding in biscuit wheat selection. For this purpose, 19 lines, promising for biscuit-making quality, and 5 varieties were grown both rainfed and supplemented irrigated conditions. After particle size index hardness measurement from whole meal in NIR some flour, dough, starch and biscuit properties were determined in the samples. Some dough rheological properties from alveo-consistograph, farinograph, extensograph, mixolab, damaged starch, some starch pasting properties gave important correlation with particle size index hardness. High particle size index hardness values had positive influence on biscuit physical properties. In supplemented irrigation conditions particle size index hardness took place in equations obtained from stepwise analysis using to predict biscuit spread ratio. It predicts approximately 40 % variation in biscuit spread ratio alone. According to results particle size index hardness from whole meal in NIR can be used successfully in biscuit wheat selection.

Keywords: Hardness, Particle Size Index, breeding, biscuit, Near Infrared Reflectance

Introduction

Many different food products are made from wheat flour, the particulate material obtained by milling wheat kernels (Delcour and Hoseney,2010). One of the major wheat properties determining end-product quality is its hardness, defined as the force needed to crush the kernels. Common hexaploid wheat (*Triticum aestivum* L.) endosperm texture ranges from very soft to hard. Differences in endosperm texture affect the properties and quality of flour and its preferential use. Kernel hardness was dependent on genetic factors and emerged protein starch interaction in endosperm (Özkaya and Özkaya,2005). Soft endosperm texture is indispensable parameter in biscuit production (Souza et al.,1994; Slade and Levine,1994; Karaduman,2013).

Hardness has to be determined fast, easy and accurate methods in breeding programs. Measuring particle size index (PSI) hardness from near infrared spectroscopy (NIR) is easier and more practical compared to classical methods and it is commonly used in breeding programs in Turkey. The method is based on measuring material amount passed through the sieve after milling in a standardized milling equipment. While low values, means hard kernel, show suitability of bread-making quality genotypes which have high values, means soft kernel, are selected for biscuit-making quality. This study was done to investigate the suitability of calibration files used for particle size index hardness measurement in NIR developed by bread wheat breeding in biscuit wheat selection.

Material and Methods

Nineteen soft wheat lines and 5 controls, which grown in randomized complete blocks with 4 replicates in rainfed and suplementary irrigated conditions, were used in this study. Results were analyzed with Jump Statistical Program (Patterson and Hunter,1983).

Test weight, one thousand kernel weight and kernel size analysis were done according to Uluöz (1965). Wheat was milled to flour using with Buhler experimental mill and to whole meal (0.8 mm size) with Perten3100 experimental mill. Protein content and moisture content were determined with NIR spectroscopy calibrated according to ICC Method 105/1 (Anon.,1960) and

ICC Method 110/1 (Anon.,1982) in whole meal and flour. Particle size index (PSI) hardness value with NIR spectroscopy calibrated according to Williams et al. (1986) was determined in whole meal. Sodium do desil sulphate (SDS) sedimentation test was performed according to procedure of Pena et al.(1990) in 1 g whole meal. Wet and dry gluten content values were determined using a Perten glutomatic test instrument according to ICC Method 155 (Anon., 1960). Zeleny sedimentation test was conducted according to ICC Method 116 (Anon.,1982) The SRC tests were conducted according to the AACCI Approved Method 56-11 (Anon.,2010) using 5% lactic acid, 5% sodium carbonate and 50% sucrose solutions and distilled water. Alkaline retention capacity test (AWRC) test was done according to Yamazaki (1953). The determination of starch damage content was carried out with Chopin sd-matic (Anon.,2011; Medcalf and Gilles,1965). Starch gelatinization properties were determined with Rapid Visco Analyser (Anon.,1998) and starch thermal properties were determined with TA Instruments Model FC100 ve TA refrigerated cooling system (Tufvesson et al.,2001; Guler et al.,2002). Farinograph, extensograph and alveo-consistograph analyses were done according to AACC 54-21, AACC 54-10 and AACC 54-30 methods respectively (Anon.,2000). Chopin mixolab was used to measure dough mixing and thermal properties (Anon.,2005). Cookie baking test was conducted following the AACC Method 10-54 (Anon.,1999). Biscuit diameter, thickness, spread ratio (diameter/thickness) and sensory properties were measured after baking.

Results and Discussion

Correlations between some quality parameters and PSI hardness value in rainfed and suplementary irrigated conditions were given in Table 1.

Biscuit spread ratio (diameter/thickness) were positively correlated with PSI hardness value which agreed with JinBao et al. (2010) in both conditions (r=0.58** in rainfed and r=0.45* in irrigated). Only in irrigated conditions biscuit sensory score gave positive correlation.

Quality parameters related with protein quality (gluten strength) must be taken into consideration with together hardness in soft wheat breeding. In the study, SDS sedimentation value; farinograph stability, development time, softening degree gave negative correlations in both conditions. Mixolab C2-C1, high values related with gluten weakness, gave positive correlation only in rainfed conditions. Also, it was found negative correlations with alveo-consistograph energy in 4 cm, extensograph maximum resistance (90.' and 135.') and resistance-5th minute (45.', 90.' and 135.') and Zeleny sedimentation value in rainfed conditions.

Softness was inversely correlated with starch damage. Low starch damage causes decreasing of water absorption of flour in alveo-consitograph and farinograph. Soft endosperm grind small particles and much flour pass through sieve and much break flour obtained in Buhler experimental mill. Hence, 1st flour amount was found directly corelated with PSI hardness.

Significant negative correlations were found between PSI hardness and AWRC, SRC-sucrose, sodium carbonate and water agreed with Guttieri et al. (2000) in rainfed conditions. SRC and AWRC tests can be used as a practical and infromative tests in biscuit wheat breeding programs.

Positive correlations with starch properites are needed detailed interpretations. C5-C4 difference are important to see the effect of retrogradation in biscuit quality evaluation. Increasing in retrogradation might be occured as a result of decreasing damaged starch and water absorption. Damaged starch also affect gelatinization entalpy and RVA properties.

In the study, in supplementary irrigated conditions PSI hardness value took place in equations which can be used to predict the biscuit spread ratio (Table 2,3,4). PSI hardness value explained aproximately 40% variation in biscuit spread ratio alone agreed with Moiraghi et al. (2011).

Table 1. Correlations between some quality parameters and PSI hardness value in rainfed and supplementary irrigated conditions

Quality Parameters (Rainfed)	Correlation coefficient (r)	Quality Parameters (Irrigated)	Correlation coefficient (r)
Alveo-energy (40)	-0,48*	Alveo-Wabs	-0,53**
Alveo-Wabs	-0,64**	Bis-score	0,42*
Awrc	-0,60**	Bis-Sratio	0,45*
Bis-Sratio	0,58**	Dsc-Ge	0,41*
Dsc-Ge	0,53**	Far-Dtime	-0,60**
Ex- R_m135’	-0,49*	Far-Wabs	-0,65**
Ex-$R_5$135’	-0,58**	Far-Stab	-0,40*
Ex-$R_5$45’	-0,45*	Far-Svalue	0,43*
Ex-$R_5$90’	-0,61**	Sds	-0,75**
Ex-R_m90’	-0,56**	Mlab-C5-C4	0,73**
Far-Dtime	-0,57**	2nd flour	-0,46*
Far-Wabs	-0,48*	1st flour	0,52**
Far-Stab	-0,60**	Rva-Ptime	-0,49*
Far-Svalue	0,47*	Rva-Pv/Fv	0.42*
Sds	-0,52**	Dstarch	-0,78**
Mlab C2-C1	0,71**	Dgluten	-0,46*
Mlab C3-C2	0,55**	Wgluten	-0,52**
2nd flour	-0,43*		
1st flour	0,54**		
Src-Suc	-0,68**		
Src-Scarb	-0,46*		
Src-water	-0,66**		
Dstarch	-0,76**		
Zsed	-0,43*		

** significant at P < 0.01 * significant at P < 0.05

Alveo-energy(40):alveo-consistograph energy in 4 cm;Alveo-Wabs:alveo-consistograph water absorption; Awrc:alkaline water retention capacity;Bis-Sratio.biscuit spread ratio;Bis-score:biscuit sensory score; Ex-Rm:extensograph maximum resistance;Ex-R_5:extensograph resistance-at 5th minute;Dsc-Ge:gelatinization entalpy; Far-Dtime,Wabs,Stab,Svalue: farinograph, development time, water absorption, stability and softening degree; Mlab-C2-C1:mixolab C2-C1 difference;Mlab-C3-C2:mixolab C3-C2 difference;Mlab-C5-C4:mixolab C5-C4 difference; 2nd flour:milling vals flour; 1st flour:break vals flour; Src-Suc,Scar,water:solvent retention capacity sucrose,sodium carbonate,water;Dstarch:Damagedstarch,Zsed:Zeleny sedimentation,Dgluten:drygluten; Wgluten:wet gluten;Rva-Ptime:peak viscosity time;Rva-Pv/Fv:peak viscosity/final viscosity;Sds:sodium do desil sulphate sedimentation;

Table 2. Stepwise analysis with parameters gave important correlations with biscuit spread ratio in suplementary irrigated conditions

Step	Parameter	R^2
1	PSI hardness value	0,38
2	RVA-breakdown viscosity (BV)	0,46
3	ALVEO-consistograph tenacity/extensibility (T/A)	0,52

Equation 1: Biscuit spread ratio =2.58 + (0.0013 RVA-BV*) + (-0.78 ALVEO T/A *) +(0.067 PSI **)

Table 3. Stepwise analysis with parameters gave important correlations with bicuit spread ratio in suplementary irigated conditions (starch pasting properties were excluded)

Step	Parameter	R^2
1	PSI hardness value	0,38
2	SRC-water	0,43
3	SRC-sucrose	0,48

Equation 2: Biscuit-spread ratio = 3.60 + (-0.117 SRC-water**) + (0.064 SRC-Suc) + (0.076 PSI**)

Table 4. Stepwise analysis with parameters gave important correlations with biscuit spread ratio in suplementary irrigated conditions (only alveo-consistograph paremeters included as a rheological parameters)

Step	Parameter	R^2
1	PSI hardness value	0,39
2	RVA-breakdown biscosity (BV)	0,47
3	ALVEO-consistograph tenacity/extensibility (T/A)	0,52

Equation 3: Biscuit spread ratio =2.58 + (0.067 PSI**) + (0.0013 RVA-BV*) + (-0.78 ALVEO- T/A*)

Conclusion

Hardness is very important parameter in biscuit wheat variety development programs. In the study, it gave important correlations with some flour, gluten strength, milling and starch properties. As a result of this study, current calibration files used for PSI hardness measurement in NIR developed for bread wheat can be used successfully in terms of biscuit-making quality evaluation in wheat breeding programs

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Application of Bacteriocins in Dairy Products

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Abstract
Selected strains of lactic acid bacteria are capable to produce antimicrobial peptides - bacteriocins, which are keeping their broader usage as natural preservatives, especially in products suffering from short shelf life. Our research was focused on the inhibitory effect of bacteriocins (enterocin, pediocin and plantaricin), produced by bacteria *Enterococcus faecium*, *Pediococccus acidilactici* and *Lactobacillus plantarum* against *Listeria innocua* as an indicator microorganism. Among the concerned bacteriocins, applied as the microbial preparations of the corresponding bacterial producing strains and tested both by the agar well-diffusion assay and by the traditional spread plate methods, plantaricin exhibited the highest antilisterial effect. Pediocin also demonstrated distinct inhibitory effect but enterocin has shown to be thermolabile and its efficiency has been suppressed by the refrigerator conditions. Plantaricin demonstrated its bactericidal impact by reducing the counts of *Listeria innocua* by 1 log in dairy spread made from cheese and quark. The application of bacteriocins into foodstuff by addition of the protective culture via *in situ* method seems to be a perspective way to enhance food quality and safety.

Keywords: Bio-conservation, protective culture, lactic acid bacteria, bacteriocin, *Listeria* spp.

Introduction
Food-borne pathogens represent a major problem in the field of public health on a global scale. Pathogenic microorganisms hold first place in the list of causes of illness and death in developing countries, with the number of fatalities approximately 1.8 million people per year (Fratamico et al., 2005). The group of bacteria responsible for foodborne diseases includes *Campylobacter* spp., *Salmonella* spp., *Staphylococcus aureus, Yersinia enterocolitica, Vibrio* spp., *Listeria monocytogenes*, *Shigella* spp., *Escherichia coli*, *Clostridium botulinum, Clostridium perfringens* and *Bacillus cereus* (McLaughlin, 2006). Bacterium *L. monocytogenes* is commonly found in soil, surface water, on plants and in food It is able to grow even at refrigeration temperatures and in packaged products intended to be consumed quickly, which makes it to be a frequent cause of infection. *L. monocytogenes* is important in terms of its pathogenicity. Infected individuals mortality ranges from 20 to 30% (Vázquez-Boland et al. 2001). The most affected categories in the EU is a group of elderly people over 65 years old, the second is the youngest age group up to 4 years of age. Milk and dairy products are an important source of listeriosis. During milking bacteria of *Listeria* spp. most often gets into the raw cow's milk from the udder and from there to the environment dairy plants (Bell and Kyriakides, 2009). The main transmission way to humans is consumption of contaminated food (Blazkova et al., 2005). Current legislation (Commission Regulation (EU) No 1129/2011) modified the conditions of use of chemical preservatives. Therefore, the increased attention is given to biological conservation using bio-protective cultures as a possible way of food safety and shelf-life control.

Lactic acid bacteria are capable of producing bacteriocins - extracellular bioactive peptides with proteolytic activity, which have bactericidal or bacteriostatic effect on other bacteria (Deegan et al. 2006; Molloy et al. 2011; Güllüce et al. 2013). Most bacteriocins are active against G^+ bacteria, but some recently described bacteriocins may also act against G^- organisms in the gastrointestinal tract of humans and animals. *Pediococcus acidilactici* is capable of producing pediocins which have antimicrobial activity against a broad spectrum of G^+ as well as G^- negative bacteria (Rodríguez et al. 2005; Papagianni and Anastasiadou, 2009). Enterocins

were isolated from bacterium *Enterococcus faecium*, which is used for production of fermented sausages, vegetables and dairy products (Giraffa, 1995; Alvarez-Cisneros et al. 2011; Medina and Nunez, 2011; Ghrairi et al. 2012). Plantaricin is thermostable antimicrobial peptide produced by *Lactobacillus plantarum* (Molloy et al. 2011; Sankar et al. 2012; Guidone et al. 2014). From the perspective of the current legislation only nisin (a bacteriocin produced by *Lactococcus lactis*) has been approved by the FDA in the USA and in the EU (Commission Regulation (EU) No 1129/2011) (Ghrairi et al., 2012; Vignolo et al., 2012).

The aim of this study was to investigate the inhibitory effects of bacteriocins produced by bacteria *Enterococcus faecium, Pediococccus acidilactici* and *Lactobacillus plantarum* against indicator nonpathogenic strain *Listeria innocua* in model experiments on cultivation media and in dairy spreads made from cheese and quark.

Material and Methods

Media and cultures

Agar Listeria according to Ottaviani and Agosti (ALOA) (Bio-Rad); Brain Heart Infusion (BHI) Agar and Brain Heart Infusion Broth (AES Laboratoire) were used. The following bacteria were used: lyophilized bacteria cultures of *Pediococcus acidilactici* (Fargo 37, Amerex), *Enterococcus faecium* CCDM 945 and *Lactobacillus plantarum* (Laktoflora Milcom a. s.), *Listeria innocua* CCM 4030, (Masaryk University, Brno).

Comparison of bacteriocins activity by the volume diffusion method, determination of the effect thermisation and incubation conditions

BHI agar was inoculated with *Listeria innocua* (LI) at a concentration of 10^5 cells/ml. Suspension of *Pediococcus acidilactici* (PED), *Enterococcus faecium* (ENT) and *Lactobacillus plantarum* (PLA) (concentrations of 0.1, 0.2 and 0.3%) was added into the holes (8 mm diameter). In another step of the experiment suspension of bacteria was heated at 72°C for 5 minutes before application to agar with LI. Subsequent incubation was carried out on Petri dishes at 37°C (24 h) or at 7°C (5 days).

Comparison of efficacy of bacteriocins in cheese and quark dairy spreads

Dairy spreads were prepared from smear surface-ripened cheese (Olomoucke tvaruzky) and from quark. Suspensions of strains producing bacteriocins were added at a concentration of 0.3% and 1% (in case of PLA). The samples were contaminated with LI (10^3 cells/g of spread) and stored in a refrigerator at 6 ± 2°C for 6 days. Enumeration of LI was performed according to EN ISO 11290-2.

Results

Growth of LI at 37°C for 24 h in the presence of strains producing bacteriocins before and after their thermisation is compared in Figures 1 and 2. The graphs show that increasing concentrations of the bacteriocin increases the rate of inhibition in both suspensions (without and with thermisation). PLA had the strongest inhibitory effects in both cases. Thermally untreated test strains producing bacteriocins had higher inhibitory properties than those which were heated.

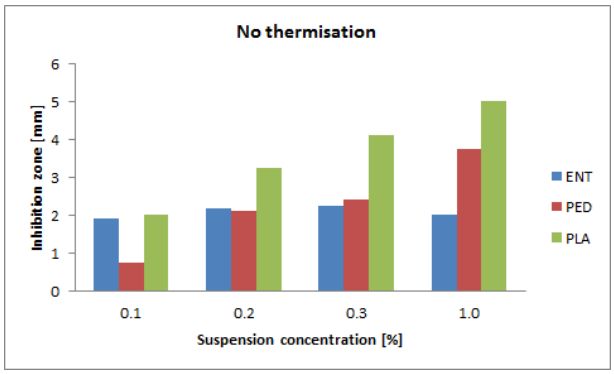

Figure 1. Inhibition of LI growth by not heat treated suspensions of ENT, PED and PLA

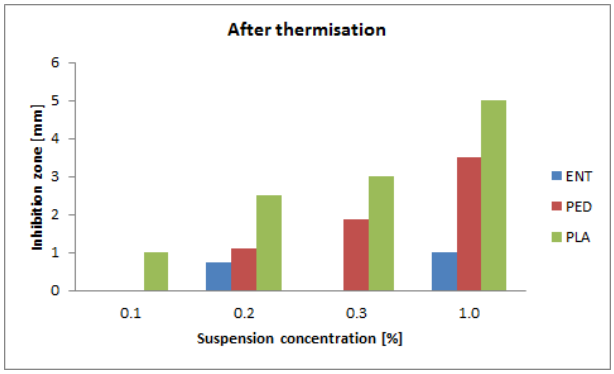

Figure 2 Inhibition of LI growth by heat treated suspensions of ENT, PED and PLA

Table 1 shows the results of the size of the inhibition zones when LI was cultivated in cold conditions (7°C/5 days) and at 37°C/24 h. Is it seen that ENT showed no inhibition rate at 7°C. The degree of inhibition by PED and PLA was, on the other hand, higher at cold temperatures. PED (0.3% and 1%) showed by approximately 50% higher values and PLA (0.1 to 1%) by about 100% higher values if the incubation takes place under cold conditions (7°C) compared to incubation in a thermostat (37°C). Table 2 shows the numbers of listeria in spreads after 6 days of storage in a refrigerator. Use of PLA in cheese spread resulted in a reduction of *Listeria* spp. PLA (1%) declined results by one order compared to the control. In case of quark spread PED (0.3%) did not demonstrated significant reduction of LI.

Table 1. The effect of temperature on the size of inhibition zones (mm) during the incubation of LI with strains producing bacteriocins

Bacteriocin/ temperature °C	Suspension concentration (%)			
	0.1	0.2	0.3	1.0
ENT/7	0	0	0	0
ENT/37	2.2	2.8	2.8	2.5
PED/7	1.5	2.0	3.25	6.0
PED/37	0	0	2	4
PLA/7	3.2	5.4	7.0	9.5
PLA/37	2.0	3.5	3.75	5.0

Table 2. Number of listeria CFU in one gram of cheese (CH) and quark (Q) dairy spreads

Sample	CH	Q
Control	$< 1 \times 10^1$	1×10^3
Control + LI	1.2×10^3	1.9×10^3
PED 0.3%	8.8×10^2	-
PLA 0.3%	5×10^2	6.3×10^2
PLA 1.0%	3×10^2	1×10^2

Discussion

Growth inhibition of LI in the application of strains producing bacteriocins was demonstrated in our experiments. The same results in the case of PLA and PED found Puttalingamma et al. (2006). Strains producing PLA and PED can be a suitable protective culture for use in dairy products which are quickly perishable and must be stored in a cool place. The observed lack of effect of ENT at 7°C is not in accordance with the conclusions of Kumar and Srivastava (2010) who demonstrated efficacy of enterocin against *L. monocytogenes* at the temperature range from 4 to 37°C. Application of bacteriocins into real food products often requires using a higher concentration of bacteriocins to achieve the same degree of inhibition as in model experiments on nutrient media. Hartman et al. (2011) and Guidone et al. (2014) came to the same findings.

Conclusion

The obtained results show that the tested strains producing bacteriocins are able to inhibit the growth of strains of *L. innocua*. PLA and PED showed a higher efficiency when used at cold temperatures than at temperatures around 37°C. Treatment of bacterial suspension by thermisation had significant effect on reducing the level of inhibition. PLA showed bactericidal effects by reducing the number of *L. innocua* by one order in dairy spreads. Concentrates of bio-protective cultures, respectively their bacteriocins, can effectively contribute to the barrier effect in the preservation of dairy products.

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Association Between Socioeconomic and Nutritional Status in Relation to the Place of Residence

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Abstract

Socioeconomic status (SES) is expressed by a number of indicators and the most commonly used are occupation, education and income. In this research are used: employment, education and income. Numerous studies have shown the impact of SES on the nutritional status of the individuals by which obesity is associated with low socioeconomic status.

The aim of this study is to assess the influence of three indicators of SES on the nutritional status of male adolescents (aged 14-15 years) in relation to the place of residence. Nutritional status is expressed by BMI-for-age percentiles.

The correlation has been demonstrated in adolescents from rural areas of Sarajevo Canton in relation to father's employment, showing that all obese boys and 87.5% overweight boys are from families where fathers are employed. Regarding urban adolescents significance has been demonstrated in relation to the monthly income. The highest percentage of malnourished boys (62.5%) come from families whose income is less than 1000 BAM and the highest percentage of obese (42.1%) come from families whose income is 1000 to 2000 BAM.

Keywords: Socioeconomic status, adolescents, BMI, place of residence.

Introduction

Prevalence of overweight and obese adolescents which leads to overweight and obesity in adulthood makes importance to investigate factors which contribute to that. There are many and in this research attention was given to socioeconomic ones. There are several indicators of socioeconomic status (SES); the most commonly used are occupation, education and income (Lahelma et al., 2004). From a life course perspective parental occupation can be used as an indicator of childhood socioeconomic status (Beebe-Dimmer et al., 2004). Occupation is commonly used as a measure of SES in Europe while income or education is more frequently used in the United States (Braveman et al., 2005). In this research as SES indicators were used parental education, monthly income and employment because of high unemployment rate in B&H, which directly affects income, as well as diet quality and nutritional status. Numerous studies have shown the impact of SES on the nutritional status of the individuals by which obesity is associated with low SES (Drewnowski&Darmon, 2005; Albright et al, 2005). In developing countries however, the level of obesity is greater in the higher SES segments of society (Wang, 2001). Besides SES, place of residence is an influential factor affecting nutrition, and thus nutritional status.

The aim of research was to estimate the association of three indicators of SES on the BMI of male adolescents in relation to the place of residence in Canton Sarajevo (rural *vs*. urban).

Subjects and Methods

Research has been conducted in the area of Canton Sarajevo, in twelve elementary schools and has been approved by Ministry of Education and Sciences of Canton Sarajevo.

There were 324 participants, male adolescents (14-15 years old) with the place of residence in Canton Sarajevo, regarded as rural (n=60) or urban (n=264) upon current Urbanistic plan and proportional to the corresponding distributions in Canton Sarajevo population (Zavod za planiranje razvoja Kantona Sarajevo, 2006). Adolescents were introduced to the research protocol and participated voluntarily. Data for the boys were analysed in this study due to the

fact that during the process of biological development boys are more sensitive to socioeconomic factors than girls.

Body weight and height were measured and used to calculate BMI-for-age percentiles. Height was measured with portable stadiometer and weight with medical digital balance (OT 150 FWEB Gorenje). Percentage distribution of children in relation to the standards of the World Health Organization by percentiles was defined and the nutritional status of children according to the WHO reference values (de Onis et al., 2007).

Information concerning SES was collected by means of questionnairre. Statistical analysis was performed using the statistical software package SPSS 19.0. (SPSS Inc, Chicago, Illinois, USA).

Results and Discussion

Normal weight is prevalent among both groups (rural *vs.* urban: 70.0%:58.3%). It is followed by overweight (rural *vs*. urban: 20.0%:24.2%) and obesity (rural *vs*. urban: 10.0%:14.4%). It is clear that urban adolescents have higher BMI but also underweight category is only present among them (3.0%).

Table 1. Adolescents' BMI and association between BMI and parent's employment according to the place of residence

Place of Residence	BMI categories	BMI	Mother			Father		
			Unemployed	Employed	Total	Unemployed	Employed	Total
Rural	$5^{th} < 85^{th}$	70.0	63.8	36.2	100.0	39.6	**60.4**	100.0
	$85^{th} < 95^{th}$	20.0	57.2	42.8	100.0	12.5	**87.5**	100.0
	$\geq 95^{th}$	10.0	75.0	25.0	100.0	0.0	**100.0**	100.0
Urban	$< 5^{th}$	3.0	25.0	75.0	100.0	37.5	62.5	100.0
	$5^{th} < 85^{th}$	58.3	44.3	55.7	100.0	17.6	82.4	100.0
	$85^{th} < 95^{th}$	24.2	59.4	40.6	100.0	10.0	90.0	100.0
	$\geq 95^{th}$	14.4	47.4	52.6	100.0	31.6	68.4	100.0

*bolded figures indicate significant associations

Urban boys had a greater relative body mass than rural boys in many studies carried out in Croatia, Poland, Hungary (Colić-Barić et al. 2004; Suliga, 2009; Eiben et al. 1996).

It is emphasized that a greater percentage of all categories among rural adolescents, especially obese (75.0%) have unemployed mothers. Urban underweight, normal and obese adolescents have in higher percentage employed mothers. But more overweight (59.4%) have non-working mothers. Higher percentage of all BMI categories among rural boys come from families where fathers are employed. A higher percentage of all categories, and significantly higher of normal weight (82.4%) and overweight urban adolescents (90.0%) have employed fathers.

Table 2. Spearman's and Pearson's coefficients

	Mother's employment		Father's employment		Mother's education		Father's education		Monthly income	
	ρ	*p*	ρ	*p*	ρ	*p*	ρ	*p*	ρ	*p*
BMI Rural	-0.006	0.963	0.270	0.037	-0.057	0.669	0.048	0.717	0.195	0.135
BMI urban	-0.101	0.102	0.018	0.773	0.195	0.135	0.063	0.317	0.142	0.022

Table 2. shows that there is correlation between rural boys' BMI and father's employment and urban boys' BMI and monthly income.

Table 3. Association between parent's education and BMI-for-age of adolescents

Place of Residence	BMI		Mother						Father						
			Primary	High school	College	University	Dr.sc.	Total	Primary	High school	College	Universit	Mr.sc.	Dr.sc.	Total
Rural	$5^{th} < 85^{th}$	%	59.6	34.0	6.4	0.0	0.0	100.0	37.5	50.0	2.1	10.4	0.0	0.0	100.0
	$85^{th} < 95^{th}$	%	57.1	42.9	0.0	0.0	0.0	100.0	37.5	37.5	0.0	25.0	0.0	0.0	100.0
	$\geq 95^{th}$	%	75.0	25.0	0.0	0.0	0.0	100.0	25.0	75.0	0.0	0.0	0.0	0.0	100.0
Urban	$< 5^{th}$	%	14.3	71.4	0.0	14.3	0.0	100.0	0.0	71.4	0.0	28.6	0.0	0.0	100.0
	$5^{th} < 85^{th}$	%	29.1	51.8	0.5	17.6	1.0	100.0	11.2	64.3	2.0	21.4	0.0	1.0	100.0
	$85^{th} < 95^{th}$	%	21.9	50.0	3.1	25.0	0.0	100.0	3.2	58.1	3.2	32.3	3.2	0.0	100.0
	$\geq 95^{th}$	%	10.5	73.7	0.0	15.8	0.0	100.0	5.6	77.8	0.0	11.1	5.6	0.0	100.0

Regarding education level, there is prevalence of primary education in all BMI categories among rural mothers, followed by high school. Half of rural adolescents with normal weight have fathers with a high school degree as well as 75.0% of obese adolescents. Half of urban adolescents with normal weight (51.8%) and overweight (50.0%) have mothers with high school degree as well as the most of underweight (71.4%) and obese (73.7%). Urban fathers have high school degree in the highest percentage in all BMI categories. It is evident that urban fathers are the most educated and followed by urban mothers.

According to Hakeem et al (2002) relatively a lot more parents in urban areas is educated (fathers: 64-100%, mothers: 55-89%) in comparison with rural parents (fathers 48%, mothers 11%). According to Salonen et al. (2009) men are more susceptible to adverse circumstances during childhood compared to women. Income was not associated with obesity in men. Wealthier population subgroups are not only healthier and slimmer but their food is of higher quality in comparison with the poor (Drewnowski and Darmon, 2005). McMurray (2000) found that the low SES group had a higher rate of being overweight or obese compared to the moderate and high SES categories (low=41%, moderate=35%, high=24%). Suliga (2009) reported that the boys with the highest relative body mass were brought up in families with a higher social status, i.e. in families with a small number of children, living in a city, and whose mothers have experienced higher education.

Table 4. presents that a higher percentage of normal weight (64.6%) and half of overweight rural boys come from families with income less than 1000 BAM[1] as well as urban underweight (62.5%) and normal weight (44.6%). The majority of obese (rural vs. urban: 75.0%:42.1%) live in families with the medium income. Urban overweight adolescents are equally in medium and high income families (34.4%).

[1] ISO 4217 Code for the Bosnian Convertible Mark is BAM. The Convertible Mark, is the official currency of the Bosnia&Herzegovina. Avaiable at: http://bosnian.currencyname.com/

Table 4. Association between monthly income and BMI-for-age of adolescents according to the place of residence

Place of Residence	BMI		Income			Total
			<1000 BAM	1000-2000 BAM	>2000 BAM	
Rural	$5^{th} < 85^{th}$	%	64.6	27.1	8.3	100.0
	$85^{th} < 95^{th}$	%	50.0	25.0	25.0	100.0
	$\geq 95^{th}$	%	25.0	75.0	0.0	100.0
Urban	$< 5^{th}$	%	**62.5**	25.0	12.5	100.0
	$5^{th} < 85^{th}$	%	**44.6**	41.2	14.2	100.0
	$85^{th} < 95^{th}$	%	31.3	**34.4**	**34.4**	100.0
	$\geq 95^{th}$	%	36.8	**42.1**	21.1	100.0

Conclusions

SES indicators in this research settings have shown that both, mothers and fathers of urban adolescents have higher education, are in higher percentage employed and their income is also higher than of those living in rural area. BMI of male adolescents living in urban area is also higher compared to rural. Statistical significance has been proved between rural boys' BMI and father's employment and urban boys' BMI and monthly income. Overall, BMI is associated with SES indicators which directly affect resources, diet and thus nutritional status of adolescents.

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Perception and Satisfaction with the Body Image According to Nutritional Status among Adolescent Boys

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Abstract

Adolescence is a very sensitive period of life which is characterized by intense growth and development, increased energy needs and experimentation with independence. It is also the period in which body perception is developed as well as appearance dissatisfaction leading to risky behavior. It is considered that mostly girls pay attention to their appearance and in this research boys are chosen as respondents.

The aim was evaluation of their satisfaction with appearance based on the actual nutritional status and tendency to risky behavior that leads to eating disorders. Boys were divided into groups according to the place of residence (rural *vs*. urban).

The results showed that there is in both groups a statistical significance in relation to the attempt of reducing body weight ($p < 0.0005$) and in relation to being on a weight reduction diet ($p = 0.002$ for rural, $p < 0.0005$ for urban). Regarding urban adolescents, nutritional status also affects the satisfaction of their appearance ($p < 0.0005$).

Detailed results suggest that most of the boys in all weight categories are not satisfied with their appearance, most of the boys with normal body weight and underweight tried to reduce their body weight and were on a weight reduction diet, which means that adolescent boys do not have a proper perception of body image and their nutritional status.

Keywords: Adolescents, body perception, nutritional status, weight reduction diet.

Introduction

Adolescence is a very sensitive period characterized by intense growth and development. It is period when nutritional demands are very high and their unfulfillment can lead to stagnation of cognitive and growth development.

Improper and inadequate nutrition can significantly affect the growth and development of children and adolescents, and temporarily or even permanently endanger their health (Gibney, 2002). Adolescence is a period of extreme sensitivity to social pressure from their peers, often reinforced by the media, which is reflected in conformity, in the behavior, attitudes and pattern of feeding (Johnston and Haddad, 1996). The search for identity, the struggle for independence and acceptance, concern towards the looks, are the changes that have a big impact on lifestyle, eating habits and nutrient intake of adolescents (Spear, 2002).

There are many studies of body image perception among girls showing that they are very conscious of their looks and body weight and make a huge effort to influence its shape, often through very harsh restrictive diets. These attitudes and behaviors are now more widespread and commonly referred to as the cult of thinness (Rukavina, 2002). There is a lack of data for the boys and body satisfaction/dissatisfaction is evidently appearing among men and adolescent boys which needs to be studied.

Subjects and Methods

Participants were 324 male adolescents (14-15 years old) living in rural and urban area of Canton Sarajevo (Zavod za planiranje razvoja Kantona Sarajevo, 2006). The research has been approved by Ministry of Education and Sciences of Canton Sarajevo. Adolescents were introduced to the research protocol and participated voluntarily.

The aim of research was evaluation of their satisfaction with appearance based on the actual body mass index and tendency to risky behavior that leads to eating disorders.

To calculate BMI-for-age percentiles, body weight (medical digital balance, OT 150 FWEB Gorenje) and height (portable stadiometer) were measured. BMI-for-age percentiles were defined in relation to the standards of the World Health Organization (de Onis et al., 2007).

Information concerning body perception and dieting was collected by means of questionnairre. Statistical analysis was performed using the statistical software package SPSS 19.0. (SPSS Inc, Chicago, Illinois, USA). Significant difference was considered at the level of $p<0.05$.

Results and Disccusion

Diets are identified as a risk factor for eating disorders (McVey et al., 2002) and are associated with many health problems (Fisher et al., 1995). According to Perković et al. (2006) it is of particular concern appearance of the implementation of reduction dieting among adolescents with normal body weight.

Table 1. Correlation between adolescent's BMI and body satisfaction and being on a reduction diet

Place of Residence	BMI categories	Adolescent's BMI	Body satisfaction			Reduction diet		
			No	Yes	Total	No	Yes	Total
Rural	$5^{th} < 85^{th}$	42	38	10	48	4	42	46
		70.0%	79.17%	20.83%	100.0	8.69%	**91.31%**	100.0%
	$85^{th} < 95^{th}$	12	4	4	8	3	4	7
		20.0%	50.0%	50.0%	100.0	42.86%	**57.14%**	100.0%
	$\geq 95^{th}$	6	3	1	4	2	2	4
		10.0%	75.0%	25.0%	100.0	50.0%	**50.0%**	100.0%
Urban	$< 5^{th}$	8	6	2	8	1	6	7
		3.0%	**75.0%**	25.0%	100.0	14.28%	**85.72%**	100.0%
	$5^{th} < 85^{th}$	154	165	36	201	6	187	193
		58.3%	**82.09%**	52.2%	100.0	3.11%	**96.89%**	100.0%
	$85^{th} < 95^{th}$	64	16	16	32	9	20	29
		24.2%	**50.0%**	**50.0%**	100.0	31.03%	**68.9%**	100.0%
	$\geq 95^{th}$	38	4	15	19	4	14	18
		14.4%	**21.05%**	78.95%	100.0	22.22%	**77.78%**	100.0%

*bolded figures indicate significant associations

Normal weight category, characterized as $5^{th} < 85^{th}$ percentile, is prevalent among both groups of participants (rural *vs* urban: 70.0%:58.3%). It is followed by overweight (rural *vs* urban: 20.0%:24.2%) and obesity (rural *vs* urban: 10.0%:14.4%). It is evident that urban boys are thicker, but also there is underweight category among them (3.0%).

In rural areas BMI does not affect satisfaction with their body image ($p = 0.172$, $\rho = 0.179$). Still a lot more normal weight adolescents were not satisfied with their appearance (79.17%) as well as the most obese (75%), while overweight boys were partly satisfied. In urban areas, BMI affects satisfaction with their body image ($p < 0.0005$, $\rho = 0.365$). The larger majority of normal weight adolescents (82.09%) were not satisfied with their body image. Overweight are equally dis/satisfied with their appearance, and 78.95% obese are satisfied. Overall, adolescents do not have the correct perception of their body image.

Regarding reduction diet, rural adolescents' BMI is correlated with it ($p = 0.002$, $\rho = -0.400$). A large percent of adolescents within the category of normal body weight was on a reduction diet (91.31%), as well as more than half of the overweight (57.14%) and half of obese. Urban boys' BMI is correlated with the reduction diet ($p < 0.0005$, $\rho = -0.299$). The majority of respondents in all categories were on a reduction diet.

Data research conducted in Croatia shows that 50% of girls and 16% boys are on some kind of reduction diet (Rukavina, 2002). Even 49% of girls believes that their ideal body weight is less than the present. It was found that as early as elementary school, 8% of girls aged 11 years are on a reduction diet, while that percentage rises to 29% at the age of 14 years (Pokrajac-Bulian et al., 2002). According to research done by Hodžić and Smajić (2012) among adolescents (13-15 years old) in Sarajevo, reduction diet and BMI are dependent, statistically significant ($p < 0.0005$). Adolescents with normal weight were never on a diet and most of obese (I degree) were among those who held a diet more times (32.5%). These data suggest that diet was held only by those who have a problem with obesity.

Table 2. Correlation between adolescent's BMI and weight reduction

Place of Residence	BMI		Weight reduction		
			No	Yes	Total
Rural	$5^{th} < 85^{th}$	%	13	33	46
			28.26%	**71.74%**	100.0
	$85^{th} < 95^{th}$	%	7	1	8
			87.5%	12.5%	100.0
	$\geq 95^{th}$	%	4	0	4
			100.0%	0.0%	100.0
Urban	$< 5^{th}$	%	0	8	8
			0.0%	**100.0%**	100.0
	$5^{th} < 85^{th}$	%	42	160	202
			20.79%	**79.21%**	100.0
	$85^{th} < 95^{th}$	%	20	11	31
			64.52%	35.48%	100.0
	$\geq 95^{th}$	%	14	5	19
			73.68%	26.31%	100.0

*bolded figures indicate significant associations

In rural areas BMI affects weight reduction (p <0.0005, ρ = -0.524). Boys with normal weight (71.74%) have tried to reduce the weight, while most overweight (87.5%) and all obese didn't try to reduce it. In urban areas, BMI affects weight reduction (p <0.0005, ρ = -0.421). Among them, also boys with normal weight (79.21%) have tried to reduce the weight. Some were exaggerating because all from the underweight category have tried to reduce their weight. Those who did not try to reduce their weight are overweight adolescents (64.52%) and obese (73.68%). It is obvious that adolescents do not have a proper picture of their body mass index.

According to mentioned study by Hodžić and Smajić (2012) adolescent's opinion about their weight and their BMI category are statistically dependent (p <0.0005), 50% underweight and 22.22% obese (II degree) think that their weight is just as it should be. 10.8% normal weight think that their weight is too big. Children are not aware of their underweight or overweight and obesity. Same unawareness is present among Croatian adolescents, Perković et al. (2006) found that according to the actual nutritional status, 21.2% of adolescents with normal body weight, 22.7% underweight and 30.1% overweight carried out reduction diets.

Table 3. Correlation between BMI and the method of reducing weight

Place of Residence	BMI	The method						Total
		Skipping meals	Reducing meal size	Physical activity	Fat free and snack free diet	Vomiting after meal	Usage of laxatives, shakes	
Rural	$5^{th} < 85^{th}$	8	3	12	1	1	0	25
		32.0%	12.0%	48.0%	4.0%	4.0%	0.0%	100.0
	$85^{th} < 95^{th}$	3	0	2	1	0	0	6
		50.0%	0.0%	33.33%	16.66%	0.0%	0.0%	100.0
	$\geq 95^{th}$	0	2	2	2	0	0	4
		0.0%	50.0%	50.0%	50.0%	0.0%	0.0%	100.0
	$< 5^{th}$	1	1	1	0	0	0	3
		33.33%	33.33%	33.33%	0.0%	0.0%	0.0%	100.0
Urban	$5^{th} < 85^{th}$	16	8	42	7	1	1	75
		21.33%	10.67%	56.0%	9.33%	1.33%	1.33%	100.0
	$85^{th} < 95^{th}$	6	6	9	0	0	1	22
		27.27%	27.27%	40.91%	0.0%	0.0%	4.54%	100.0
	$\geq 95^{th}$	1	4	6	2	0	0	13
		7.69%	30.77%	46.15%	15.38%	0.0%	0.0%	100.0

The method of reducing body weight and rural boys' BMI are not correlated ($p = 0.967$, $\rho = -0.005$). Most of the normal weight boys (48.0%) from rural area reduced body weight by physical activity, and then by skipping the meals (32.0%), overweight (50.0%) by skipping the meals, half of obese by reducing the meal size, and the other half by physical activity.

The method of reducing body weight and urban boys' BMI are not correlated ($p = 0.601$, $\rho = -0.50$). Normal weight (56.0%), overweight (40.91%) and obese (46.15%) were found to decrease their body weight by physical exercise. The second most common way is to skip meals, and among underweight are equally present: skipping meals, reducing the meal size and physical exercise.

Conclusion

There is a statistical significance of BMI in both groups (rural and urban) in relation to weight reduction and in relation to being on a reduction diet. In urban adolescents, BMI also influences the satisfaction with their body image. Boys with normal weight in both groups are not satisfied with their appearance, tried to loose the weight and were on a reduction diet. Other then diets, most of the participants used physical activity (which is proper way of reducing weight) but also skipping meals and reducing meal size.

Such data suggests that adolescent boys living in Canton Sarajevo are also affected by modern society idealization of body and weight which leads to risky behaviour in this very sensitive period. It highlights the need of adequate nutrition education in primary as well as in secondary schools.

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Assessing the Availability of the Health Datasets and the National Land Cover to Provide Useful Results Regarding Health and Green Space Studies

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Abstract
Due to the lack of the social and public health response to global environment and health problems now demands for an ecological approach which addresses the need of human health. That is because ecological public health calls for perspectives regarding interconnections between environments and human health. Hence, many countries developed different services in recent years. The USA has also developed various national datasets. However, although the USA national datasets Behavioral Risk Factor Surveillance System (BRFSS) and National Land Cover Database (NLCD) have been available since 1992, few researchers have used them to investigate the relationship between green space and health. It was investigated whether these datasets are suitable to support national and regional studies of green space and health. I reviewed the BRFSS, the NLCD, and how researchers have used similar European national datasets. I looked into reliability, validity, and accuracy of the datasets. I also examined the results of a study I conducted about the associations between green space and health indicators employing the BRFSS and NLCD datasets. My investigation revealed the BRFSS data are moderately valid and highly reliable. Overall, the accuracy of the NLCD 2006 data is 80%, but some certain classes have accuracy higher than 80%.
Keywords: BRFSS, NLCD, reliability, validity, green space, health

Introduction

The lack of the social and public health response to global environment and health problems such as mental health disorder now demands for an ecological approach that addresses the need of human health. That is why ecological public health calls for perspectives regarding the interconnections between the environment and our health and well-being (Reis et al., 2013). For that reason, a number of significant conceptual models for ecosystem services have been prepared in recent years. The Millennium Ecosystem Assessment (MEA) which focusses on the relationship between ecosystem services and human health (Millennium Assessment, 2005), the Economics of Ecosystems and Biodiversity (TEEB) that focuses more on the detail of the linkages between structural and process components of ecosystems and the different services and benefits they deliver to society (UK NEA, 2011). The United States has also developed many different national datasets for various purposes. Two of these national datasets are the Behavioral Risk Factor Surveillance System (BRFSS) and the National Land Cover Database (NLCD). The BRFSS is a state-based system of surveys of health issues (CDC, 2006) and the NLCD is a 16-class land cover classification system at a spatial resolution of 30 meters. (Fry et al., 2011).

In Europe, researchers in health and environmental sciences disciplines have collaborated in studies using national datasets (de Vries et al., 2003; Mitchell and Popham, 2007; Nielsen and Hansen, 2007; Maas et al., 2009; Richardson and Mitchell, 2010). On the other hand, in the USA, although the BRFSS and the NLCD datasets have been available since 1992, they have seldom been used together for health and green space researches in interdisciplinary studies. In this study I attempted to determine whether these datasets could be valuable for such studies by examining their reliability, validity, and accuracy. The purpose of this study was to investigate the availability and efficacy of the BRFSS and the NLCD to determine whether these two datasets can be used together to conduct studies regarding green space and health issues.

The BRFSS and the NLCD

The BRFSS is a telephone survey that is conducted by health departments of states with technical and methodological support of the Centers for Disease Control and Prevention (CDC) (CDC, 2006). Each year, states use a standardized questionnaire to conduct monthly telephone

surveillance to assess the health practices and distribution of risk behaviors among non-institutionalized adults (Mokdad, 2009). The BRFSS information is used by some states, national health organizations, and local health departments for planning and targeting their health initiatives. Sometimes BRFSS is used to improve understanding of the relationship between health status and heath behavior and results may influence health program decisions and may support health policy positions (CDC, 2006). The latest version of NLCD data is the NLCD2006. The NLCD2006 is a data which is based mainly upon the unverified classification of Landsat Enhanced Thematic Mapper+ (ETM+) circa 2006 satellite (Fry et al., 2011). Products of the NLCD provide a valuable tool to recognize and evaluate types of changes, their distribution and patterns, and potential consequences of changes in land cover, land use, and land condition throughout the United States (Fry et al., 2011). Four different levels exist to classify land cover and land use. These are: Level I: LANDSAT types of data, Level II: high-altitude data (less than 1:80,000), Level III: medium-altitude data (between 1:20,000 and 1:80,000 scale), and Level IV low-altitude data (more than 1:20,000 scale) (Anderson et al., 1976).

Method

To assess the BRFSS and the NLCD, I first posed research questions: 1) Can I feasibly use these national datasets for a national and regional study? And as sub-questions I asked (a) What are the reliability and validity of the BRFSS data? and (b) What is the accuracy of the NLCD data? 2) Do these national collected datasets support useful results? To answer these questions, I first conducted a systematic review to collate and synthesize the findings of studies that related to validity and reliability of the BRFSS on mental and general health indicators and accuracy of the NLCD 2006 datasets. I also examined the results of the study that I conducted in Washington State regarding the relationships between green space and mental and general health (Akpinar, 2013). In the study, I measured all different types of green space together as "simply green," but I also considered and measured individual types and structures of green space. The data for that study were derived from the BRFSS and the NLCD datasets.

Results

Reliability and validity of the BRFSS data

Nelson et al. (2001) assessed reliability and validity of measures on the BRFSS. The authors found that reliability of mental health days in the past month is unknown, but the measure of mental health days is moderately valid. Regarding self-reported health status data, Nelson, et al. found that BRFSS data are considered to be moderately reliable and highly valid. Andresen et al. (2003) investigated the retest reliability of the BRFSS Self-Reported Health and Healthy Days data. The authors found that self-reported healthy days was highly reliable (κ: 0.75) and moderate (κ: 0.67) for mental health days. Kapp et al. (2009) estimated test–retest reliability of health related quality of life questions among persons who did and did not report a personal cancer history. The authors revealed that general health data was moderately reliable (κ: 0.65), for mental distress was excellently reliable (κ: 0.71), and for mental health was moderately reliable (κ: 0.63).

Pierannunzi, Hu, and Balluz (2013) assessed reliability and validity of the BRFSS. Overall findings indicated the information shows that BRFSS data is reliable and valid. Mokdad (2009) examined the past, present, and the future of the BRFSS. He indicated that the BRFSS data has improved tremendously since 1984. Therefore, when the BRFSS data and other national household surveys are compared, the BRFSS data have always been considered reliable and valid (Mokdad, 2009; Nelson et al. 2001, 2003). My inquiry regarding reliability and validity of BRFSS mental and general health data revealed that overall the mental and general health date are moderately valid and highly reliable.

Accuracy of the NLCD data

U.S. Geological Survey (USGS) reports that large complex national databases such as NLCD are most accurate when they are used to support regional and national analysis (USGS, 2012). Wickham et al. (2013) conducted a study to report accuracy statistics of the NLCD2006 dataset, which includes both landcover and impervious surface change. The authors found that the NLCD2006 Level II overall accuracies were 78%. The accuracies for types of green space I used were: urban green space—(classes 21 and 22) 55.5%, forest (classes 41, 42, and 43) 83%, rangeland (classes 52 and 71) 80%, agricultural land (classes 81 and 82) 82.5%, and wetland (classes 90 and 95) 34% (Wickham et al., 2013). Wickham et al. (2013) reported that a main area of difference happened in the NLCD grass-dominated classes, which were developed open space (class 21), grassland (class 71), pasture/hay (class 81), cropland (class 82), and emergent wetland (class 95). That is maybe some green space types' accuracies were not higher than it was expected. In the NLCD2006 dataset, the closest level was Level I (8 classes) having 85% accuracies (Wickham et al., 2013). My inquiry has shown that the overall accuracy of the NLCD2006 data approach 80% and classes' accuracies for all forest classes (41, 42, and 43), shrubland (52), and cropland (82) are higher than 80%.

The research in regards to green space and health

The study I conducted revealed a lack of association between undifferentiated ("unified") green spaces and the mental and general health variables. Regarding the relationships between different types of green space and mental and general health, the results showed urban green space and forests are related to mental and physical health while controlling for covariates, where respondents in areas that have more urban green spaces and forests report fewer mental health complaints and better health. Additionally, distance between green spaces appears to be the structural aspect of green spaces most related to mental and general health (Akpinar, 2013).

Discussion and Conclusion

The results showed that the mental and general health of the BRFSS data are moderately valid and highly reliable. Overall the accuracy of the NLCD 2006 data is 80% and some certain classes are higher than 80%. In Europe researchers used similar methods to conduct their studies. In the Netherlands, for instance, researchers used individual-level data on health and socio-demographic characteristics were drawn from Dutch National Survey of General Practice and the data about the green space derived from the 2001 National Land Cover Classification database (LNG4) (de Vries et al., 2003; Maas et al., 2009.) In my study, besides my findings about reliability and validity of the BRFSS data, I found that the BRFSS data provides individual-level data on the mental and general health and socio-demographic characteristics. However, participants' addresses were anonymous, whereas studies in Europe knew the respondents' addresses in their studies.

Regarding the NLCD data, Wickham et al. (2013) reported that the accuracy of the NLCD 2006 Level II (16 classes) is overall around 80% and for some classes it is around 85% in 30x30 grid cell resolutions. The LGN4 is reported to have an overall 90.4% accuracy at the national level in 25x25 grid cell resolutions in the Netherlands (de Wit and Clevers, 2004). Similarly, the Generalised Land Use Database (GLUD) has 90% accuracy, but has much finer, 5x5, grid cell resolutions (Harrison, 2006). The Swedish CORINE land cover data provides 85% accuracy with 25x25 grid cell resolution (Büttner et al., 2000). Comparisons between the NLCD, the LGN4, the GLUD, and CORINE shows that NLCD provides less accurate land cover data and less finer grid cell resolutions than the others. Nevertheless, the NLCD has also a high accuracy rate and finer grid cell resolutions because of the fact that to 85% and 80% accuracy is becoming an accepted norm (Olson Jr., 2008). USGS also reports that NLCD are most accurate when they are used to support regional and national analysis (USGS, 2012). As a result, both the BRFSS and

the NLCD can be used in a national and regional study; however it does not seem adequate to use both datasets in small scale studies.

In regards to the green space and health study, it seems urban green space, forest and some aspects of green space structure have positive relationships with mental and general health after controlling for the covariates. The results provided useful information regarding the types and structures of green space like the studies conducted in Europe. Therefore, it is sufficient to state the BRFSS and the NLCD could support useful results for both researchers to be used in present studies and in future studies. On the other hand, it is important to emphasize that both the BRFSS and the NLCD need to be developed in order to use them more efficiently. BRFSS should be uniformly applied throughout the USA at the county or zip-code level, which will improve the sample representativeness of the BRFSS dataset. Managers of these datasets should include respondents` exact addresses in the data collection process, which can help researchers to conduct small scale studies. Managers of the NLCD dataset should improve class-specific accuracies to provide better support for future studies.

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The Influence of Foreign Designers on the Turkish Garden Culture – Izmir Culture Park

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Abstract

The 18th century Ottoman Empire turned its interest to western countries. As a consequence Ottoman Palace Gardens became designed according to French Baroque Style. With the political reforms of 1839, modernisation and renovation processes began. The interest to create new garden styles arose from the attention Ottoman Sultans paid to garden cultures in France, England and Germany.

At the end of 19th century and in early 20th century, foreign garden designers were commissioned to redesign Ottoman Palace Gardens. Their arrangements, designs and applications caused great changes in Ottoman garden culture.

In 1923 with the proclamation of the Republic, Turkey moved from a sultanate to a lay republic. The founders of the Republic aimed to establish an order quite different from the Ottoman Empire. One of their goals were new and modern cities with parks and green areas.

In this Study is the general characteristic of the Turkish garden culture explained. In the first part of the study are the Ottoman Garden Culture and the influence about the foreign designers explained. In the second part is the construction of the Izmir Culture Park in comparison to the Gorky Central Park of Culture and Leisure in Moscow illustrated.

Keywords: Garden culture, influence of foreign designers, Izmir Culture Park

Introduction

After the collapse of the Ottoman Empire in 1918 the proclamation of the Republic of Turkey in 1923 established a new order. The period between 1923 and 1945 is specific because at that time, modernization was emphasized politically and culturally, and it was perceived as a government policy. It encouraged the provision of land use plans which included open spaces such as parks and gardens.

In this study, in order to understand the influence of foreign designers on the Turkish Garden culture, the situation of the young Turkish Republic and the movements in landscape architecture have to be understood in depth as well as the evolution of the Izmir Culture Park. The Culture Park is a very important place for the Turkish Revolution to be represented through landscape architecture.

Material and Methods

This Study uses Ottoman Gardens and the Parks and green areas, which after the proclamation of the Republic were considered, as source material. The study aims to focus on the history of the Turkish Garden culture and their evolution. The first time takes a closer look at Ottoman Garden Culture.

Ottoman garden culture

When we look at the Park and the garden palace, which during the period of the Ottoman Empire arised, we recognize distinct characteristics of the Ottoman garden. When creating their own gardens, the Ottomans sought practical solutions that soil conditions and structure (topography, gradient, etc.), dimensions, climate, view, existence of watercourses (rivers, lakeside or valleys) and possibility of hunting, so that a harmony between the garden and nature could be established. If the terrain of the garden had a certain slope, it was tried was to reach the existing natural beauty with different terraces. The terraces were not very high and consisted of only a few steps. In the Ottoman garden places for trees, flower beds, ponds and the layout of watercourses were chosen identify. Fruit trees and trees, especially cypress trees and plane trees were mostly planted near the garden wall, to achieve the desired shade and to protect the privacy. In design of the Ottoman gardens the flowers were very important, that's why types of flowers (tulips, hyacinths, carnations, Narcissus, lilies and others) were combined (Chenchine, 1946; Evyapan, 1972).

The most important Element of the Ottoman garden was “garden kiosk”. For the location of the garden kiosk a corresponding place was selected, where the whole garden was visible. The specific elements of the Ottoman garden were the garden throne, cypress trees, fountains and watercourses. The thrones of the gazebo were simply designed and made of wood or marble. These were decorated with blanket, seat cushions, curtains, pillow and used as a chair in the palace gardens and gazebos (Atasoy, 2005).

Fig. 1. The Kiosk in Neavi Garden in Istanbul in 1530 (Atasoy, 2005)

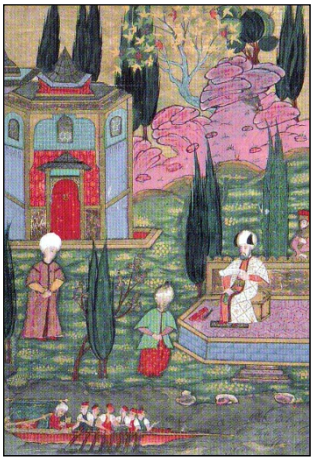

Fig. 2. Throne of Sultan Süleyman I. in Istanbul in 1524 (Atasoy, 2005)

The influence of foreign designers on the Turkish garden culture

The 18th century Ottoman Empire turned its interest to western countries. The interest to create new garden styles arose from the attention Ottoman Sultans paid to garden cultures in France, England and Germany. In the 19th century, along with the foreign gardeners from Europe working in the gardens of the palace, the influence of European garden culture started to be seen in the Ottoman’s garden designs. As a consequence Ottoman Palace Gardens became designed according to French Baroque Style. With the political reforms of 1839, modernisation and renovation processes began.

The influence of the Frech Baroque Style has not only extended the size of the garden, also also changed its design. The Ottoman garden was a place,which you could enjoy from the window, where you no longer alive through the influence of French Baroque Style. The redesigned Ottoman Garden, which located next to the palace,had no more terracing. The flower beds and other frets of the garden were always an importance. The lawn and flower beeds were enlarged. Trees (especially plane, tilia, elm and fraxinus) and flowers (tulips, narcissus, lilies) were planted. The ornamented fountains which are in rectangular shape are transformed to round or oval forms. The Kagithane Garden became symbol of the influence of the French Baroque Style (Evyapan, 1972).

The style of the Ottoman Garden Culture was not only influenced by French Baroque Style. Furthermore the English Garden Culture during the end of the 19th century and beginning of the 20th century affected the style of Ottoman Garden. Through the influence of English Garden Culture the Garden was designed with symmetry axis. The trees were taken out between the flower beds. Various flowers in different colors cover the flower beed and lawn. The ornamented fountains are transformed to artificial ponds (Evyapan, 1972). The influence of the English Garden Culture was mostly evident in the Dolmabahce and Beylerbeyi Palace.

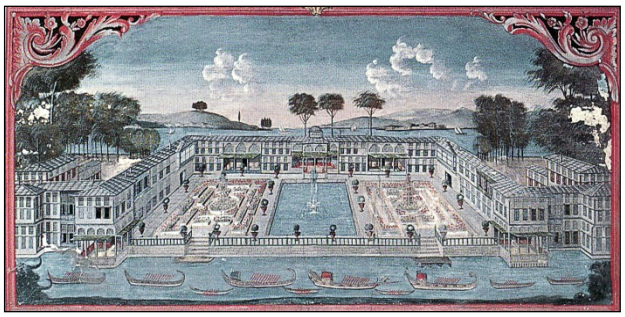

Fig. 3. View of Palace Garden in 1800 (Atasoy, 2005)

Fig. 4. Kağıthane Mesiresi in the second half of the 18th (Atasoy, 2005)

The style of the Ottoman Garden Culture was not only influenced by French Baroque Style. Furthermore the English Garden Culture during the end of the 19th century and beginning of the 20th century affected the style of Ottoman Garden. In 1923 with the proclamation of the Republic, Turkey moved from a sultanate to a lay republic. The founders of the Republic aimed to reshape the whole nation concerning cultur, social, political, educational, commercial issues, new trends in landscape architecture and urban planning. After the proclamation of the Republic werde designed two large parks, the "Genclik Park" in Ankara and the "Atatürk Park" in Adana by the German Architect Hermann Jansen and both plans were realized.

When we take a look at the Parks and green areas, which after the proclamation of the Republic were considered, we recognize that in selection of place of parks the conditions of surface, topography, dimensions, climate, view and existence of watercourses, was in the time of the Ottoman Empire were respected. We know that they made the best of possible use if available land when determining where a park or green areas should be. The influence of the French Baroque Style was evident in these parks, especially in their sightlines and terraces.

The most important element of the Turkish Garden is the water, as Ottoman Garden culture. It takes place in the gardens in the form of small ponds, fountains or well. It should be noted, that for example the fountains was built only for aesthetic reasons. In Parks that have been built on a very large area, large ponds were built.

Another important element of the Turkish Garden is the pavilion. Already in the time of the Ottoman Empire the pavilion was built in the form of "Kösk". The only difference is that the "Kösk" in the Ottoman Empire was built for Sultan. The Pavilion was established after the proclamation of the Republic for several people. Furthermore seating was created in the parks in the form of the benches. Mostly found this place under trees, that the shade provided. In the Parks walkways and bicycle paths have now been built for the population.

Izmir Culture Park and the Gorky Central Park of culture and leisure in Moscow

The landscape architectural works within Izmir Culture Park is the result of a whole act of the modernizing efforts of the young Turkish Republic. The Park was intended to be a recreational, cultural and entertaining center not only Izmir, but also the whole Aegean Region. The second part of the study deals with the construction of the Culture Park and its evolution.

The young Turkish Republic was greatly influenced by the economical policy of Russia and the Izmir Culture Park resulted from this influence. In 1922 the City of Izmir had been almost completely destroyed by a big fire. In 1924 René Danger and Henri Prost developed a first land use plan where a huge park replaced the burnt space of the city center. At first, an area of 60.000 m² was allocated for a park in this Plan. The Members of the Izmir municipal authorities who were impressed by their experience of the Gorky Central Park of Culture and Leisure in Moscow began to conceive of a comparable site for Izmir. The Gorky Central Park of Culture and Leisure in Moscow established in 1928 on an area of 119 ha. By a resolution of the Presidium of the Moscow Council, the Agricultural and Handicraft Industries Exhibition transformed into the Gorky Central Park.

Suad Yurdkoru has prepared a report on the construction of a similar Gorky Park in Izmir with Betti Glan, which was between 1929 and 1936 director of the Gorky Park. He commented that it would be more desirable to include a large park in the master plan of Izmir, and that 60.000 m² would be too small for such a project. For this reason the Danger-Prost Plan was changed and increased the area needed for this to 360.000 m² (Aksoy and Özgünel, 2001).

Plans were prepared by Russian architects and engineers, Mr. Iljin as a project manager, Mr. Salow, Mr. Musatowa and Mr. Schegolewa as a member of staff. The Russian model was not suitable for the Turkish culture. After readjustment through Turkish architects and engineers from Izmir authorities these plans became implemented. However comparing the Russian plan with the plan done by Turks, except the cultural differences in usage of areas there is not much of difference (Bingöl, 2012).

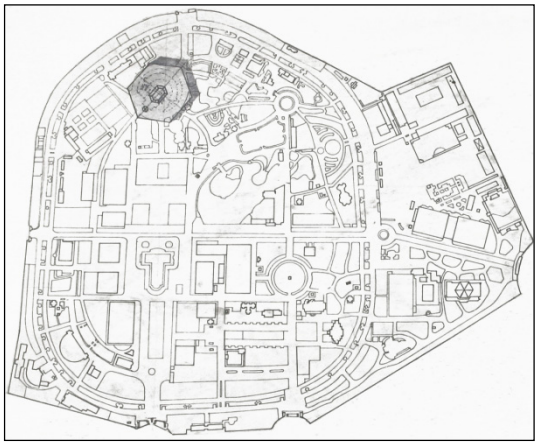

Fig. 5. The Russian plan in 1935 (Bingöl, 2012)

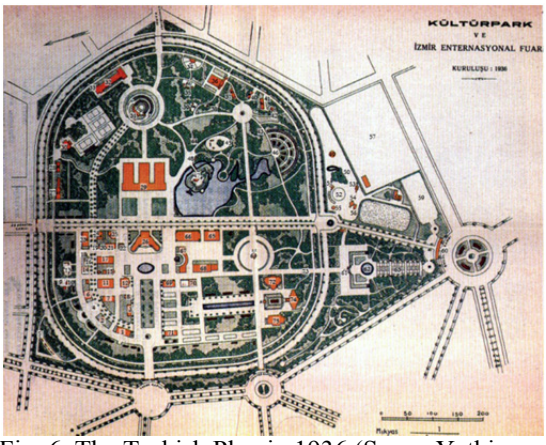

Fig. 6. The Turkish Plan in 1936 (Serçe, Yetkin und Yılmaz 2004)

On January 1, 1936 the construction of the Culture Park began with the construction of the walls along the borders of the Park and the plantation of the first trees. Until the end of 1938 a Stadium, a parachute tower, a zoo, a swimming pool, Museums (Atatürk Revolution Museum and Health Museum), children play areas, the Izmir Fair (the festival area and pavilion buildings), the garden pond, other various recreational and sports facilities was build in inside the Culture Park. The Culture Park was initially constructed on an area of 360.000 m², however with the addition of the amusement Park, a hippodrome for horseback riding and a botanical garden, the area increased additionally 60.000 m² by 1939 (Aksoy and Özgünel, 2001).

Conclusion

As a Result, despite the influence of foreign designers the Turkish Garden kept its own features. Comparing the Ottoman Gardens with the other gardens build with the influence of other garden cultures and the parks which were built after the declaration of the republic, it is understand that the Turkish Garden kept their own unique features. Example the usage of the water in the Park areas, the importance given to trees (fruit trees, cypress, pines, etc.) and also the variety of flowers (roses, tulips, etc.), Harmony of the formal and the informal forms in the Park areas and the importance given to the wildlife.

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Analyzing Urban Agriculture Pattern; The Case of Bornova

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Abstract

In urban landscapes, besides food production, agricultural lands have important environmental functions such as providing green areas in the city, reduction of urban heat islands, sustaining wildlife, reduction of ecological footprints, and facilitating sustainable storm water management. However, frequently, agricultural lands within and near urban settlements have mostly been considered as reserved areas for future urban development. Izmir had the same experience.

Bornova is one of the districts in İzmir. This study aimed to analyze the urban agriculture pattern of Bornova between 1963 and 2005. For this purpose, the land use maps derived from the 1963 CORONA and 2005 IKONOS satellite images and the composition and configuration of urban agriculture pattern were analyzed using landscape shape metrics.

The results revealed that the configuration of agricultural patches changed significantly over time. The agricultural patches on the plain and lower slopes were converted to urban fabric. The agricultural patches in the urban landscape became more scattered and fragmented. On the other hand new agricultural lands were created by clearing shrub and forest vegetation on the hilly slopes on the peripheries of Bornova.

Keywords: Urban agriculture pattern, Bornova, Izmir

Introduction

In urban landscapes, besides food production, agricultural lands also have important environmental functions such as providing green areas in the city, reduction of urban heat islands, improving air quality, sustaining wildlife, reduction of ecological footprints, providing opportunities for recreational activities, facilitating sustainable storm water management and sustaining urban life.

These multifunctional lands are one of the components of urban green networks that depict a system consisting of green patches and green corridors (Li, 2005). In this system urban parks, natural landscapes, wetlands, campuses, cemeteries and roof gardens are connected to each other through green corridors in the forms of greenways, river corridors, and canals.

For the last decade, urban agriculture has seen a rapidly growing popularity. Many cities around the world such as Boston, Barcelona, Rome, New York, Toronto, Chicago, and Rotterdam have supported the urban agriculture and protected urban agricultural fields as a part of urban green networks.

It is obvious that agricultural lands within and near urban settlements have mostly been considered as reserved areas for future urban development. Izmir as a metropolitan city is no exception. The trajectory of urban development in Izmir between 1963 and 2005 confirms the aforementioned statement. Since the 1980s, Izmir has experienced a rapid urbanization process (Sonmez, 2009). Bornova, as one of the central districts of the Izmir metropolitan area, also was affected by rapid urban development and lost most of its agricultural lands. Bornova in the past was a suburb with a low-density settlement character and fertile plains for agricultural production. Through the urbanization process, the landscape pattern in Bornova dramatically changed. This study aimed to analyze the urban agriculture pattern of Bornova between 1963 and 2005 using landscape metrics in order to reveal the level of change that has occurred that might set an example for further urban agricultural planning.

Study Area

Bornova is one of the 29 districts in the Izmir metropolitan area. It is located between the coordinates $38^{\circ}\ 34'\ 21''$ and $38^{\circ}\ 21'\ 51''$ North, $27^{\circ}\ 09'\ 10''$ and $27^{\circ}\ 20'\ 58''$ East (Figure 1). It covers an area of 214.40 km^2 with a population of 426,490 people (TurkStat 2014).

It is located on a fertile alluvial plain. For this reason, it used to be one of the important agricultural centers of Izmir until the 1980's with the products of tobacco, vegetables (tomato, okra) and fruit plantations (mandarin, pomegranate, grape).

Methods

Data acquisition

The land use maps of 1963 and 2005 were derived from CORONA (1.83-m ground resolution) and ASTER 1B (15-m spatial resolution; 3-2-1 visible and near infrared [VNIR] band combination) satellite images, respectively, using ERDAS Imagine Professional 9.1 (Leica Geosystems, 2006).

The land use/cover classes within the study area were determined as urban (urban areas, roads, stone pits, dump sites), agricultural land, olive groves, fruit plantation, forest (coniferous forest) and Mediterranean shrub vegetations (maquis, phrygana) based on the CORINE Land Cover nomenclature (Bossard et al., 2000).

Data analysis

In order to explore the urban agricultural landscape characteristics of the Bornova district, eight landscape composition and configuration metrics were used (Table 1) as follows: class area (CA), percentage of landscape (PLAND), number of patches (NP), patch density (PD), largest patch index (LPI), landscape shape index (LSI), mean patch size (AREA_MN), and connectance index (CONNECT). The metrics were computed using FRAGSTATS 3.4 (McGarigal and Marks 2003).

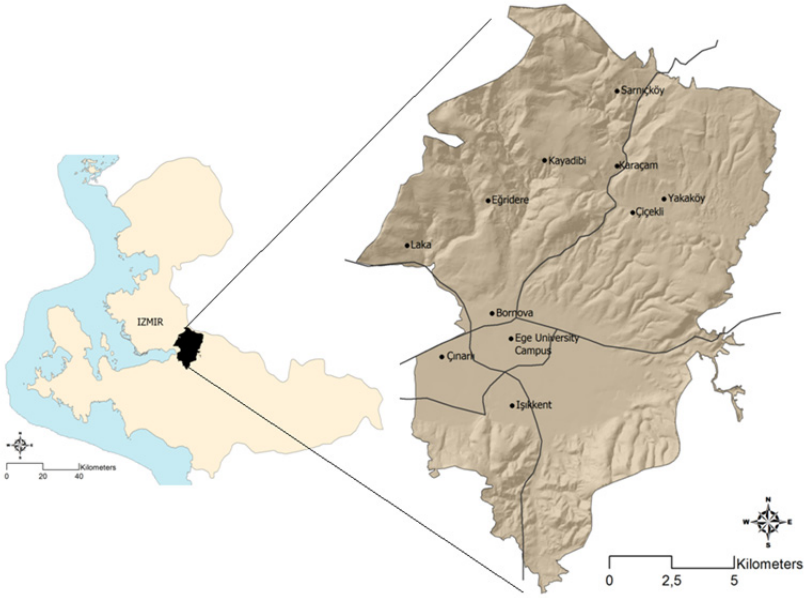

Figure 1. The study area

Results

Urban agricultural landscape pattern of 1963

The dominant land cover was Mediterranean shrub vegetation with 43% in 1963. Shrub vegetation was mostly spread out in the north, east and south in the form of larger patches. Forest vegetation which mostly occurred with shrub vegetation, occupied 27% of the entire area. The largest forest patches were distributed in a north-south direction in the western part of the study area (Table 1; Figure 2).

Urban areas covered around 4 % of the district. The city center was located on the plain on the western part of the district.

Agricultural land covered 14% of the district. Large and continuous agricultural lands were mainly located on the plain on the east of the city center. Medium and small sized agricultural lands were situated in the highlands and on the hillsides in the north of the district (Table 1; Figure 2).

Results showed that olive plantations occupied only 12% of the landscape and were mostly located on the Bornova plain in the form of large and medium-sized patches. Additionally, some olive plantations were located toward the north around Çamiçi, Çiçekliköy and Sarnıçköy villages (Figure 2; Table 1).

Urban agricultural landscape pattern of 2005

In 2005, the landscape pattern of Bornova had significantly changed. The total area of agricultural, Mediterranean shrubland, olive plantation and forest areas decreased, while the built-up areas increased (Table 1).

The results revealed that the urban fabric spread towards the east, west and south and reached 20%. The total amount of agricultural lands declined from 14% to 11%. Although, it seems like there was only 3% decrease, the composition and the configuration of the agricultural patches were dramatically changed. Most of the agricultural lands on the plain had been replaced with urban fabrics. The urban fabric was very dense and except for a few parcels, agricultural patches in the urban zone almost disappeared. At the same time new agricultural lands were created by clearing forest and maquis vegetation on the slopes of the surrounding hills.

The NP of agricultural land increased from 45 to 240. The AREA_MN decreased dramatically by more than 80%. This meant that the agricultural land patches became more divided. The connectivity of agricultural patches declined almost 3 times. The increase of Landscape shape index indicated that the agricultural patches became more complex in shape.

Olive groves decreased from 12% to 8%. Over the years the large olive grove patches on the low slopes in the north remained. But like the agricultural lands, most of the olive grove patches on the plain were converted to urban areas and the new large olive grove patches were created at the expense of natural vegetation cover in the north. The decreasing NP and increasing AREA_MN suggested high fragmentation of olive groves (Table 1).

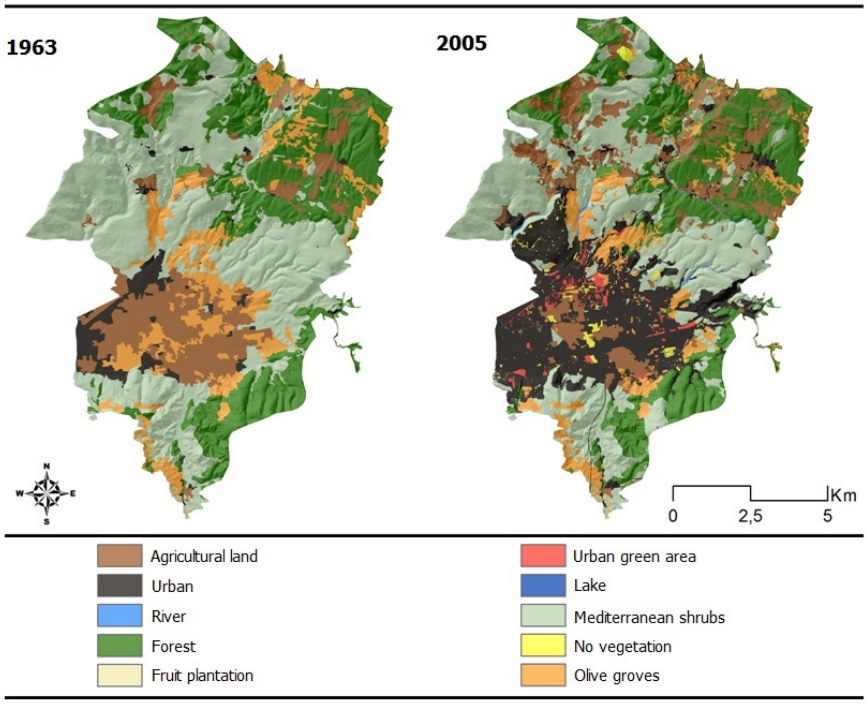

Figure 2. Land-use and land-cover maps of Bornova in 1963 and 2005

Table 1. Results of landscape metrics

1963	CA	NP	PD	PLAND	LSI	AREA_MN	CONNECT
Urban	832.76	40	0.18	3.88	9.17	20.81	1.12
Agriculture	3011.10	45	0.20	14.04	12.31	66.91	1.41
Olive groves	2612.17	57	0.26	12.18	16.43	45.82	1.31
Forest	5816.41	73	0.34	27.12	15.41	79.67	1.97
Mediterranean shrub	9167.36	56	0.26	42.75	10.98	163.70	1.75
Lake	0.12	1	0.004	0.0006	1.14	0.12	0
2005	**CA**	**NP**	**PD**	**PLAND**	**LSI**	**AREA_MN**	**CONNECT**
Urban	5507.34	277	1.29	25.68	24.32	19.88	1.26
Agriculture	2435.63	240	1.11	11.36	26.31	10.14	0.45
Fruit plantation	1.13	2	0.009	0.005	1.59	0.56	0
Olive groves	1695.32	241	1.12	7.90	23.10	7.03	0.49
Urban green area	406.40	470	2.19	1.89	27.40	0.86	0.59
Forest	5016.95	122	0.56	23.40	21.11	41.12	1.36
Mediterranean shrub	6255.96	200	0.93	29.17	19.82	31.27	0.59
Barren land	59.41	9	0.04	0.27	3.38	6.60	5.55
Lake	1.75	7	0.03	0.008	2.66	0.25	4.76
Canal	60.03	39	0.18	0.28	13.99	1.53	6.88

Table 3 describes the significant change of AREA_MN between 1963 and 2005. The number of patches (NP) of Mediterranean shrubland increased from 56 to 200, while the PLAND declined from 42 to 29. Significantly, the AREA_MN value dropped from just over 163 to 31 ha. These numbers indicate that the larger shrubland patches became smaller and the connectivity declined owing to urbanization and clearing up of vegetation cover for agricultural land.

Coniferous forest decreased almost 800 ha (Table 1). It was mainly replaced with olive plantations and arable land. The results in Table 1 show that NP, PD and LSI increased. The coniferous forest patches were fragmented, while their shapes became more complicated. The connectivity between existing patches declined.

Discussion and Conclusion

The rapid urban development in Izmir after the 1980s resulted in urban expansion mainly into agricultural lands and Mediterranean shrub vegetation (Hepcan et al, 2013). This is also the case for many cities both in Turkey and around the world (Doygun, 2009; Kucukmehmetoğlu and Geymen, 2009). This study confirmed that Bornova was no exception and its urban landscape pattern significantly changed over time.

There are two main reasons to explain what happened between 1963 and 2005. The first one is that former urban development plans did not have a policy to protect urban agricultural lands against development. The second reason is increased property values in the cities. As population density increases in the cities, the land prices tend to go up. Converting agricultural plots into built-up areas has always been very profitable for both urban residents and local governments. Unfortunately, agricultural lands cannot compete with the development pressures.

There is no doubt that agricultural lands are ecologically and economically important areas in the urban settlements as they increase water infiltration and act as buffer zones to protect the cities from flooding as well as provide marketable products for urban farmers. Agricultural lands around riverbeds are particularly important to prevent flooding. Agricultural lands in the urban zone also provide recreational activities for urban residents, help people to develop a sense of connection with the soil, support wildlife by providing habitats, and help create sustainable cities. It is very important that urban agricultural lands be considered as the main part of urban green networks. With the trend of increasing popularity of urban agriculture all over the world, these areas may be protected in the framework of urban green network plans.

These lands should be connected to other components by pedestrian and bicycle trails (Schans, 2010). Of course, urban development plans will have to be revised to include green networks and its components. Not only urban development plans but also ecological-based urbanization policies should be generated for better protection of agricultural lands in urban areas.

Acknowledgement

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The Analysis of User - Space Relations in Terms of Environmental Psychology: Urla Urban Settlement

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Abstract
It is important to execute the qualification and interaction between the members of the physical environment by approaching visually to offer solutions for existing and potential problems and to increase the quality of life while encouraging the local people to socialize. Urla, one of the important centers of İzmir with its historical background and touristic potential has been visually analyzed and by examining its characteristics the relationship between the physical environment and the users has been interpreted. This study has been conducted at three steps in downtown and in north coastal settlement, basically in two sub - region. At the first step, each sub - region has been photographed generally and the first impressions of the striking elements, factors which increase and reduce the visual quality and the distinguishing characteristics of the aforesaid environment have been examined visually. At the second step the area has been evaluated spatially and sensually. At the third step, the sub - regions of the study area have been photographed based on environment - user - behavior observation. During the observations; considering the characteristics of the users the social interaction types and behaviors have been evaluated, the mobile / stable activities done by the users have been determined and interpreted, and the parts that are used or not used of the area have been stated. Finally, by relating the environment and the user behaviors, the positive and negative environmental drivers that affect the user behaviors have been interpreted. As a result of this study, differences have been determined between the downtown and coastal settlement locations of Urla according to user behaviors as well as spatial characteristics and it has been foreseen that the improvements which will not ruin the traditional structure of the study area will contribute the local people to socialize.
Keywords: Environmental psychology, User - space - behavior relationship, Urla

Introduction
The duty of physical planner and designer is to create biological environment which can afford all physical and psychological needs of the users (Malkoç, 2008). It is very important that the environment has all the opportunities to keep the physical and psychological life going on healthfully (Atabek, 2002). The importance of the liveability and the quality of physical environment is increasing day by day and the studies about visual analysis have an important role on increasing the quality, defining and recovering the problems.

Visual analysis studies includes the works which determine the visual qualifications and the interaction between these visual elements of a place on the perceptual base, and these studies are important tools which enable directive data for the physical planning, design, application and maintenance processes (Kaplan, 2000). The interaction between users and the physical environment is interpreted on the base of environmental psychology and both the effects of environment on the users' behaviours and the effects of the users' various activities on the physical and social environment are determined within these types of studies. Concordantly this analysis about Urla downtown and north coastal settlement is conducted with the following purposes: Execute the qualification and interaction between the users of the physical environment by approaching visually, to evaluate the research area in terms of spatially and sensually and identify the social interaction types and behaviors of users, to determine the activities done by users and also interpret the relationship between the users and environment.

Research Area and Structure of the Study
Urla, known for its natural beauty and heritage, is a province of İzmir which is located at the center of the Urla - Çeşme - Karaburun peninsula. There are a bunch of coves and 12 islands affiliated to the province. Urla has a central municipality, 23 districts and 14 villages (Couch et al., 2013). Throughout history, Urla has been the center city of Persian, Greek, Roman and Byzantine periods. The province has a unique heritage of 8000 years of history (Verim, 2011). According to the 2013 census Urla has a population of 56.771 (TUIK, 2014). The population

growth is predicted to be because of high income group who prefer Urla to build their secondary houses due to easy transportation via new highway and the geographical position of the province which is favorable for summer houses. Industry and tourism has not been developed in Urla yet, the local people earn their lives based on agriculture and fishing instead (Couch et al., 2013).

The research method of this study is consists of four phases called as conceptual analysis, data collection, findings and discussion. In the conceptual analysis which is the first stage of the study the concepts of "environmental psychology, user - space - behavior relations" that are the base of the study are explored and the method of the study is defined. At the first step, the unique observation form is generated by the pre-observations about the study area. The observation form which had the main titles of "General Evaluation, Spatial Evaluation, Sensorial Evaluation, Social Evaluation" has been applied in two sub-regions downtown and North coastal (İçmeler, Cesmealtı and İskele locations) zones. In the results phase; the literature studies and the information found from the observations were analyzed and evaluated using a holistic approach. At the discussion part, considering the relationships between the defined spatial characteristics of downtown and coastal zones and the user behaviors, suggestions for motivating the urban dwellers to socialize were produced.

Findings

The visual analysis of the research area was made by the authors under four main headings: general, spatial, sensory and social evaluation and their responses are given below (Table 1).

Table 1. Observation data

				DOWNTOWN	NORTH COASTAL
General Evaluation	First Impression	Positive		Protected historic structure	Protected natural structure, Tranquil environment
		Negative		Vehicle dominant, Non - Pedestrian friendly	Lack of urban furniture and access components
	Elements Effecting the Visual Quality	Positive	Natural	None	Sea, Vegetation, View, Topography
			Cultural	Historical structure	Low - level traditional construction, Positive proportional scale
		Negative	Natural	Unreclaimed stream (Tabaklar Stream)	None
			Cultural	New buildings, Second houses, Square, Shopping center, Unkempt environment, Visual pollution	Poorly maintained access components, Bus stops and Signboards, Incompatible buildings
Spatial Evaluation	Settlement model			Organic and Irregular	Irregular
	Dispersion of the buildings			Contiguous, Aligned or Symmetrical	Not aligned and Spaced
	Type of street			Linear, Curved, Many dead end streets	Linear and Few dead end streets
	Built space / Open space			Closed and Semi - closed	Open and Semi - open
	Level of landscape diversity			Medium	High
	Transitions between the spaces			Suddenly	Gradually
Sensorial Evaluation	Unkempt 1 → 7 Well - kept			3	5
	Disturbing 1 → 7 Relaxing			4	6
	Distracting 1 → 7 Attracting			3	6
	Immobile 1 → 7 Mobile			6	5
	Unsafe 1 → 7 Safe			6	6
	Lack of Green 1 → 7 Green			4	6
Social Evaluation	Social Interaction Types			Solitary, Parallel, Two people, Small group	Two people, Small group
	User Behaviours			Self - focused, Observing, Verbally active	Self - focused, Observing, Verbally active
	Type of Activities		Active	Walking, Running, Biking, Shopping	Walking, Running, Biking, Shopping, Water sports
			Passive	Sitting, Observing, Eating - Drinking, Reading, Chatting	Sitting, Observing, Eating - Drinking, Reading, Chatting, Sunbathing, Fishing
	User Information		Sex	Equal	Equal
			Age	All age groups	Mainly middle and Older ages
	Environment - Behaviour Interaction			Compatible	Compatible

General Evaluation: The downtown of Urla accommodates many historical buildings from19th century that mostly inhabited by Greeks; hence there are buildings, especially located on main axis Zafer St. and Postane St. which have residential and commercial functions and also show

different spatial features than Turkish houses. Especially on the districts that the historical fabric is dominant, the presence of narrow and curved streets turns the vehicle traffic into a problem. Towards the periphery of Urla, the new concrete buildings that are incompatible with the local fabric are perceived as negative remarks, but on the other hand this district impresses, at least partially, a spacious affect. On the coastal zone, while the historical structures take attention in patches, the natural character in the whole zone reveals itself mightily. In the downtown zone, the historical / cultural features' positive affect on visual quality is observed, whereas any natural feature that can improve this positive affect is not determined in the zone. Especially the streets full of historical buildings and frequently used for commercial activities, highlight the zone as a prestige district and make it more vibrant and a livable place, hence the current situation positively affects social interaction. Also the lack of integration between the new buildings and the local fabric emerges as a factor that adversely affects both the violation of the whole integrity and the visual quality. Due to the neglect of Tabaklar Stream's rehabilitation process, the urban gentrification of the stream as a recreational area has been delayed. In contrast to downtown, the coastal zone becomes prominent by its natural features and also the presence of the sea and the climate has a relaxing effect on users. The coastal zone is also perceived more spacious than downtown due to the few storey heights. However, both the unrestored historical buildings and the unkempt form of reinforcement elements cause a negative visual impact in the coastal zone.

Spatial Evaluation: The organic structure of downtown provides certainty and continuity; also the aligned and symmetrical structure of the buildings has positive effects on local people to develop social communication skills. Different types of roads make downtown more vibrant and this situation creates curiosity on visitors on foot. The intensive use of roads and the presence of many dead-end streets sometimes interrupt the relation between the user and the environment; also the non-provided unity between the streets and the building facades reduce the sense of continuity. The presence of unused historical buildings is a loss in space - street interaction aspects and this situation interrupts the social life. On the coastal zone, an irregular settlement scheme is present and here the gaps between the buildings improve the perception of relaxing. Also transition between the spaces is slower, that the life is perceived calmer than downtown.

Sensory Evaluation: In general, downtown is lively and safe but not well maintained. The narrowness of the streets and the crowded population create the feeling of a lively settlement for users, however traffic problems are strongly felt in here. The physical environment lacks any holistic approach and the low quality of urban furniture along with the poorly maintained building facades creates an unkempt impression. The increasing presence of second houses is leading to an estrangement between local people and the owners of the second houses, exacerbated by the latter are often higher incomes. Well protected natural resources and longstanding cultural values, the presence of the sea, pleasant scenery and the positive interaction of people with the environment, make the coastal zone attractive and highly liveable. Scenic areas high above the sea level offer a refreshing alternative and a feeling of dominancy.

Social Evaluation: Active activities such as walking, cycling, shopping etc. and passive activities such as sitting, eating , drinking etc. can be seen being undertaken by all age groups in Urla's downtown. The groups have a harmonious interaction with the environment and the downtown serves to bring together the various different groups in society. However, it is noticed that people from outside of Urla are more self - focused, acting as observers, while the local people are more open to verbal communication. In the north coast, in addition to the same kind of activities observed in the downtown, water sports are also available. The user profile for the north coast indicated the population was mainly middle-aged and elderly. In both the downtown and the coastal areas the variety of activities are limited.

Discussion

As a result of this study which is conducted on Urla Downtown and Coastal zone; it has been determined that the natural features such as sea, vegetation, scene and topography etc. of the coastal zone affect the visual quality positively; due to low-rise residents having gardens and also the settlement's appropriate proportional structure in terms of mass-gap relations, it has physiological continuity; there is an absence of stimulus complexity as a result of existing factors' positive effects and this helps to protect the perceptual continuity, because of whole these factors the coastal zone has more positive and strong structure than downtown in aspects of

environmental psychology. However, when the place is examined in sociability aspects, it is observed that due to the lack/absence of the public spaces, the environment does not provide social behavior at an adequate level and the activities observed in the place is limited as observer or self-focused level especially on visitors. Moreover the lack of access components and urban furniture at overall the place, causes difficulties in aspects of spatial image and memory and this fact is also weakening the meaning of the place in terms of functional and spatial appropriation.

Although the downtown's historical character create a positive impact in terms of cultural meaning, natural features don't contribute to visual quality; also the unreclaimed Tabaklar Stream, new buildings and second houses which are incompatible with the historical pattern, the new constructed town square and the shopping center which are not integrated with the city's texture and climate in terms of design and material selection, wholly have an negative impact in environmental image aspects; despite the streetscape in too many types, as a result of the vehicle dominant traffic system especially in nearby the Municipality building and its environs, the stimulus complexity is interrupting the physiological continuity and so is weakening the perceptual continuity. It was concluded that due to whole these factors, the downtown creates more negative and weak structure than coastal zone in aspects of environmental psychology. Despite whole these negative effects, when the place is examined in terms of sociability; it was found that, the existence of public spaces which address each age and gender groups, the presence of a vibrant social life, the environment which provides social behavior in adequate level, increase the variety of activities observed in the area and also effect the users positively in terms of spatial image and signification. When both regions are taken into account as a whole, it is determined that the relationship between downtown and coastal area haven't been established yet in physical and functional aspects, in this sense the coastal zone had become an inward structure and this caused to come out two regions in different characters within the same city.

In this context, scenarios, which cover the downtown as well as coastal zone and also base on their potentials, should be produced, thus studies target sustainability and development / improvement have to be made with a holistic approach in accordance to planning decisions. In downtown; a pedestrian oriented transformation should be aimed by closing some ways to vehicular traffic for solving problems about transportation, new buildings should be designed compatible to the settlement's identity and local structure, existing historical building and spaces should be involved to public life by restoring them with the university - public collaboration and also planned parking areas should be created. Additionally a green open space system which includes whole public spaces should be established for enhancing existing green areas presence and in this context Tabaklar Stream should be rehabilitated and opened to public use as a recreation area in this system. In the coastal zone which keeps on developing, an access network in which the access and linkages are more defined which encourages the bicycle use and also which is supported by urban furniture must be developed. Necessary legal measures should be taken for protecting the region's occupancy rate and the regions planned development must be guaranteed. New activities, facilities and public spaces should be recommended for making the use more effective and enriching the use of coastal zone as living environment.

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Determination of the Behaviour and Opinions of the Local Community Towards Tourism Advancements

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Abstract

Cincin Village, which shares the unique values of Aydın City, has an economy based on agriculture and breeding and is a settlement rich in natural and cultural resources. Its history goes back to Cihanoğulları Beylic.

It is thought that the economy and the tourism of the village will improve if the historical potential of its castle, which was built from rubble stone in the 18th century, is evaluated from the aspect of tourism. The aim of this study is to determine the behaviour of the local community of Cincin towards advancing tourism and to reveal their point of view on the subject. In this context, in this settlement where tourism activities have not yet started, the socio - economic features and tourism perspectives of the local community and the tourism potential of the village are examined via face to face questionnaires.

It aims to determine the most valuable features of the settlement and the local community in terms of tourism. The formula for a proportional sample volume is used to determine the number of people with whom the questionnaire are answered; A 90 % confidence level, and 10 % sampling error, are taken as the basis of the calculations, with 63 people questioned. The opinions of the local community about the settlement are found by addressing open ended and close - ended questions (demographic questions, restricted elective and Likert scale questions). The behaviour and opinions of the local community towards tourism development are obtained from the data acquired from the questionnaire and proposals are made according to the results.

Keywords: Tourism, local community, behaviour

Introduction

Tourism is considered as an activity essential to the life of nations because of its direct effects on the social, cultural, educational and economic sectors of national societies and their international relations (Univeur, 2014). In recent years, tourism has become one of the world's biggest industries and has been playing a more significant role in the economies of developing countries including Turkey.

According to data from the World Tourism Organization in 2013, the number of participants in tourism activities in the world has been identified as 1,087 billion (UNWTO, 2014). Such extreme movements of people have both positive and negative effects on the local people and settlements of those areas with touristic potential. Studies related to tourism activities reveal especially economic, social, cultural and environmental impacts. Local people are primarily interlocutors of these effects. Their approaches to tourism have direct impacts on the development processes of the settlements. Tourism which is not sufficiently supported by local people will not be able to make enough progress.

This study had the following purposes:

- To determine the behaviour of the local people of Cincin village towards advancing tourism,
- To examine the socio - economic features and tourism perspectives of the local people and the tourism potential of the village,
- To determine the most valuable features of the settlement and the local people in terms of tourism,
- To guide the local governments and be a reference for villages which have the similar features.

Material and Methods

Material

The main focus for the research is Cincin Village. The village is situated in Koçarlı which is one of the districts of Aydın Province, Turkey (Wikipedia, 2014). Cincin Castle and Cihanoglu Mosque are among the most important structures in the village. As of 2012, it has a population of 855 people (TSI, 2014). Various literary sources on the subject, internet information, and the original questionnaire forms originally prepared for this study, and notes taken during the discussions with the local people constitute of the materials of the study (Figure).

Figure. Views from Cincin Village

Methods

The research method is composed of 4 main phases, namely conceptual analysis, data collection about the topic, results, discussion and conclusion. After studying the literature about the different concepts of tourism and carrying out preliminary observations in the village it was decided to use a questionnaire as the method of research.

In the calculation of sample size for the questionnaire, the following method of Simple Random Sampling was used (Newbold, 1995) and a 90 % confidence level and 10 % sampling error was taken as the basis. $n= N\ p\ (1 - p)/ (N - 1)\ \sigma 2px + p(1 - p)$

The population in the village (855) was used as the "Population Size (N)" in the calculation and, at the end of the calculation, the sample size of questionnaire was determined as 63 (62.76).

A number of written sources [Upchurch and Teivane (2000), Anderecket. Al (2005), Mansuroğlu (2006), Özdemir and Kervankıran (2010), Bridaet. All (2011)] were used in the preparation of the original questionnaire forms given to the people.

Open ended and close ended questions (demographic questions, restricted elective and Likert scale questions) were posed to the respondents under 3 headings, "local population's socio - economic characteristics", "local population's understanding of tourism" and "the settlement's tourism potential".The questionnaire was used to find out the socio - economic features, and tourism perspectives of the local community and the tourism potential of the village by means of the available data. The questionnaires were carried out by means of face-to-face interviews with people selected randomly from the village from 28 may to 28June 2014. SPSS (v.10) was used for statistical analysis of the data obtained from the questionnaires, in the evaluation stage of the results and there had some suggestions for the village was put forward on the topic in conclusion.

Results

Questionnaire form was conducted to the local people of Cincin Village in order to evaluate the behaviour and opinions of the local community on tourism advancements. Firstly, socio - economic characteristics of the local people are determined.

It is seen from the questionnaire that 63,5 % of population is female and approximately 50 % of the population is under 35 years old. Substantially, they are married (68,3 % and percentage of the primary school and high school graduates are the same (34,9%). Their incomes are mostly between 1.000 - 2.000 TL (44,2 %) (Table 1).

Table 1.Local population's socio - economic characteristics

Variables	Percent (%)	Variables	Percent (%)	Variables	Percent (%)
Sex		**Education**		**Profession**	
Male	36,5	Primary School	34,9	Self Employed	19
Female	63,5	Secondary School	4,8	Civil Servant	14,4
Age		High School	34,9	Farmer	14,3
15 - 24	19	Junior College	12,7	Retired	14,3
25 - 34	28,6	University	12,7	Student	14,3
35 - 44	22,2	**Income (TL)**		Employee	12,8
45 - 55	14,3	1.000 >	25,0	Housewife	7,9
55 - 65	11,1	1.000 - 2.000	44,2	**Time of Inhabitancy**	
65 +	4,8	2.000 - 3.000	19,2	Type A / Type B / Type C	
Marital Status		3.000 - 4.000	5,8	41,3 / 9,4 / 49,3	
Married	68,3	4.000 - 5.000	3,8	*Type A: Born and continues to live in Cincin*	
Single	31,7	5.000 <	1,9	*Type B: Born in Cincin but lives out of the village*	
				Type C: Not born but lives in Cincin	

When the questions on local population's understanding of tourism are posed, it is seen that substantially they go on holiday (74,6%). Local people find "hospitality" (4,37 %) most important while local cuisine (4,18 %) follows this characteristic.

A large majority of the community wants their village develop in terms of tourism (90,2 %) and the interviewers mostly believe that economy will develop, the recognition of the town will increase, general appearance will change and social structure will become rich when the tourism develops in their village (Table 2).

Table 2. Local population's understanding of tourism

Do you go on holiday?	Yes		74, 6	No		25,4
Where do you go on holiday?	Sea	71,4	Ski	12,2	Plateau	8,2
	Culture	4,1	Thermal	2,0	Religion	2,0
	Other					
What characteristics does the local population believe are most valuable in terms of tourism? Please rate as "1" the least important, "5" the most important	Hospitality					4,37
	The range of local cuisine					4,18
	Tends to trade					3,18
	Extroverted way of life					3,16
	The presence of unique handicraft products in the region					2,26
	Other					-
Do you want the settlement to develop in terms of tourism?	Yes		90,2	No		9,8
	Indecisive		-	No answer		-
	Economy develops	4,43		It becomes more crowded		3,23
	Recognition increases	4,33		Pollution increases		2,20
	General appearance changes	4,31		Other sectors decline		1,97
	Social structure becomes rich	4,30		Society's morality is broken		1,67
	Cultural structure develops	3,87		Other		0,0

Most of the people believe that their village has a tourism potential (85,7 %) due to their historical - archaeological buildings, clean air, quietness of the village and easy access to the village respectively. They find the infrastructure problems as the most negative feature of the settlement (29,1 %) (Table 3).

Table 3.The settlement's tourism potential

Do you think the settlement has tourism potential?	Yes	85,7	No	14,3
If your answer is yes; **What characteristics of the settlement are of value in terms of tourism?** Please rate as "1" the least important, "5" the most important				
Presence of historical - archaeological buildings	4,80	Traditional life		3,70
Clean air	4,46	Suitable climatic conditions		3,47
Safe	4,41	Presence of forest		3,45
Quiet and calm	4,09	Allowing of nature sports		2,98
Easy access	4,00	Near to the water's edge		2,93
Landscape feature	3,91	Presence of wildlife		2,79
Plateau	3,75	Geological formation		2,66
What is the most negative feature of the settlement when compared to other settlements?				
Infrastructure problems	29,1	Distance to the center	18,2	Dependence on a single sector	7,3
Don't know enough to comment	29,1	Transportation problems	16,4	Other	-

Discussion

This research aims to determine the opinions of the local people of Cincin on tourism activities in their village. It is indicated that the local people have a favourable opinion and support the developments on tourism in the near future. And also people think that parallel to the improvement of tourism activities, social structure will become rich, economy will improve, recognition will increase and so, general appearance will improve. They are aware of their valuable features of the settlement (presence of historical - archaeological buildings, clean air etc.). It is understood that the characteristics features of the local people such as hospitality, tends to trade, extroverted way of life, which determined by questionnaire, will be a driving force for the improvement of tourism. In this context, to provide sustainability of the traditional life in Cincin village, village tourism should be supported by taking into consideration the effect of natural, physical and cultural factors on the settlement's identity and pattern. Especially, the historical buildings should be restorated and also local handicrafts should be supported in the village which has daily tourism potential. It is important to cooperate with public institutions for infrastructural problems and recognisability of the village. Besides, existence of university campus is an advantage for the village which also provide alternative recreational possibilities for the university students and staff. It will be useful both for the local people and the city / region's developmentthat the local government should realise the potentials of the village and produce projects accordingly.

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Design Recommendations for iParks

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Abstract

Communication devices, which are one of the most important materials of our daily lives, have been rapidly changing and developing with each passing day. The more laptops, smart phones, tablet pc's evolve; the more people need internet in anywhere and anytime. Many applications on smart phones require internet connection; otherwise there are no differences between old fashioned cell phones and smart ones. As a consequence of this situation, internet is needed to become more accessible. Therefore, as an important parameter on the design of public open space has started to show its effect. iParks – internet parks or Wi-Fi parks in some resources – are getting more popularized by municipal election campaigns and by clarifying the design principles it would get more common all over the world. This is a public service; that's why, in line of demographic characteristics of the users shape the ultimate design, after surveying and determining users' profile and intensity of use. The internet which is used by people heavily transforms from an indoor recreation to outdoor recreation and this would increase the usage of the parks. In addition to this, Wi-Fi antenna types to be used in park must be placed to cover all parts of the park where would be expected to connect the internet connection. With the identity of landscape architect, it cannot be decided the types of antenna connection, speed, density, energy source and forms such as telecommunication engineer; but they can design the park according to the signal direction of antennas and coverage or integrate it into the existing park. Therefore, iParks require multidisciplinary work.

Keywords: iParks, Wi-Fi parks, wireless internet connection, design recommendations, new parameter on public space design.

Introduction

The Information Age is a period in human history and formed by capitalizing on the computer microminiaturization[1] advances, with a transition spanning from the advent of the personal computer in the late 1970s, to the Internet's reaching a critical mass[2] in the early 1990s, and the adoption of such technology by the public in the two decades after 1990 (Anonymous, 2014a). This evolution of technology in daily life, as well as of educational life style, The Information Age has allowed rapid global communications and networking to shape modern society (Kluver, 2000). Mobile digital communications connect movements of people to movements of data (Mackenzie, 2012).

The ways to connect Internet include traditional dial-up access through the analog modems and broadband options such as ISDN, DSL, Cable, leased lines and wireless. There are several wireless options, available for special Internet access applications. They can be extremely useful for some Internet users (Anonymous, 2014b); especially for who use mobile devices. There are 3G or in some countries 4G services are exist for mobile devices; may be required a fee by GSM operators. But those connection types end battery so fast, and battery means everything on mobile devices. That's why, users mostly prefer wireless connections if it is possible.

The term Wi-Fi[3], commercially used at least as early as August 2000 (Anonymous, 2014c). A Wi-Fi-enabled device can connect to the Internet when within range of a wireless network which is configured to permit this. The coverage of one or more (interconnected) access points— AP, called hotspots—can extend from an area as small as a few rooms to as large as many square kilometres. (Anonymous, 2014d).

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[1] *Miniaturization* (Br.Eng.: *Miniaturisation*) is the trend to manufacture ever smaller mechanical, optical and electronic products and devices. Examples include Miniaturization of mobile phones, computers and vehicle engine downsizing.

[2] *Critical mass* is a concept used in a variety of contexts, including physics, group dynamics, politics, public opinion, and technology. In social dynamics, critical mass is a sufficient number of adopters of an innovation in a social system so that the rate of adoption becomes self-sustaining and creates further growth.

[3] *Wi-Fi*: Wireless fidelity.

Public Wi-Fi Usage

As Wi-Fi has become such a prominent part of our daily lives, it has expanded from indoor space to outdoor space, from private property to public property. In February 2007, the Pew Internet & American Life Project reported that 34% of all Internet users have used a wireless connection, and that 79% of these have logged on from a place other than home or work (Horrigan, 2004).

Establishments offering food or drink indicate the highest potential for providing Wi-Fi service. According to a great many professional articles reporting findings on these places, people have gradually accepted the fact that ubiquitous Wi-Fi may influence the structure of social networks and social relationships (Park, 2010). However, public parks are missing in this discussion as the "third place" revolution, as little parks are quite capable of also offering the wireless experience. Currently, compared to other semi-public places such as coffee shops or bookstores, the number of parks with available Wi-Fi service is negligible. Nevertheless, this phenomenon has exploded rapidly in recent years, especially in urban areas (Wang, 2011). To underscore the willingness of people to use Wi-Fi in public spaces, there are some significant outcomes seen in the survey conducted by New York City's wireless team. Firstly, when choosing between two coffee shops of similar characteristics and quality, 75% of the respondents answered that they would choose a coffee shop that provides Wi-Fi access over one that does not. In addition, over 70% of respondents indicated that the accessibility of Wi-Fi is a significant factor in their decision to stop in and stay for a while. The paradox is that the actual usage of plazas or parks in the NYC metropolitan area is extremely low relative to people's intense desire to enjoy the outdoors (Forlano, 2008).

There is little evidence, however, that wireless emissions pose any danger to human health. W-Fi signals use very low intensity radio waves – 100,000 times less powerful than a microwave. Sitting in a Wi-Fi hotspot for a year would only expose you to the same dose of radio waves as making a 20-minute mobile phone call. Wireless radio waves also diminish significantly with distance. Those who want to reduce their exposure to Wi-Fi emissions should sit more than 1 m away from their router and place their laptop on a table rather than on their lap. Three years ago, research in Holland showed that trees that were planted in close proximity to a wireless router suffered from damaged bark and dying leaves. The Dutch scientists carried out their research on ash trees which had been suffering with bark bleeding and dying leaves. The city of Alphen aan den Rijn, in the West of the country, ordered the study five years ago after officials found unexplained abnormalities on trees which they did not believe had been caused by any known viral infection. The trees were exposed to six sources of radiation with frequencies ranging from 2412 to 2472 MHz and a power of 100 mW at a distance of just 50 cm. Trees placed closest to the Wi-Fi radio developed a 'lead-like shine' on their leaves that was caused by the dying of the upper and lower epidermis. This would eventually result in the death of parts of the leaves (Anonymous, 2014e).

Design Stages

1. Determining user profiles

These emphasized informations lead landscape architects to determine the ultimate design of iParks. But before all, there must be a survey work has to be done on people who may use iPark. There is a good example in Seattle. According to several observations made by students from the University of Seattle, there are four new types of users emerging under the Wi-Fi environment: True Mobile, Socializer, Passer-by, Economically Disadvantaged (Keyse and LeBlond, 2006).

***True Mobile*:** These users treat the public wireless location as a backdrop for their primary activities such as reading or working at their computers. These users remain primarily focused on their tasks and have less interaction with others. The extent to which they can be distracted from their work depends on the atmosphere in their chosen space, but most of those interviewed maintained that they could freely interact with their online contacts. Business travellers or local full-time employees who like to spend some time away from their office and who work with laptops were the main types to form the "true mobile" user group.

***Socializer*:** For Socializers, Wi-Fi is the means to the improvement of sociability in public space because they can engage in casual interactions while they surf the web, check email, and just enjoy the ambiance. They usually participate directly in creating a local community. However, their backgrounds vary; most Socializers tend to be locally employed regulars, students and small business owners. They are usually familiar with the public space and, given the proximity to their homes or jobs, they tend to hang out regularly. Some of them spend time chatting with their friends physically or remotely by Internet, and share information through blogging and the email community. The average time they spent in the coffee shop is the same as the True Mobiles, averaging more than thirty minutes. Moreover, Socializers appeared to be the main user type in the free Wi-Fi community.

***Passer – by*:** Passers-by enter the park for a casual rest or use the park as a meeting place with friends. They usually stay near the main intersection or walk on the path without leaving it for exploration. The cell phone is the main portable device they use to kill time or contact people they plan to meet. The people in the Passer-by category could be tourists, runners, and people who live or work nearby.

***Economically disadvantaged*:** There are people who unable to afford a laptop or Internet. Especially for the low-income community, the public library and the wireless park are the only places for them to update job information and submit resumes. Most of their online activities are directly related to life necessities and news updates.

2. Location & coverage

There are mainly two kinds of antennas[4] have been using for Wi-Fi connection outdoor; horizontal and vertical. According to shape and size of the outdoor space, these antennas must be used to cover whole the park or some expected spaces like a puzzle.

3. User profiles as a design parameter

As *True Mobile* users are apt to spend more time using Wi-Fi than any other user groups, these individuals expect a more comfortable environment to guarantee satisfactory work results. The location for them should firstly avoid direct light in order to improve screen visibility. Then, a long depth of field is conducive to relieving eye fatigue. If possible, activities should be available at a long distance with sounds or views offering the background of a pleasant social environment. the space for True Mobiles should be located away from the main path, and without crossing circulation. Should circulation be unavoidable, however, passing the user in the front is better than in the back, as the laptop screen occupies most of a True Mobile's attention.

As the group looking for fun through communication, the site design for Socializer should mix public use and personal interest as much as possible in order to maximize interaction among people. The space prepared for them should provide multiple alternatives, with the hope of encouraging them to participate in the normal activities taking place in the park. These users' outgoing nature will lead them to enjoy the rest. Moreover, when uploading their status by Twitter or other location-based applications, the location is more likely to draw more out-of-space people. For example, it is recommended that Socializers arrange to meet in gathering centres where they can directly access other event places. Sports facilities such as basketball courts, baseball fields, and playgrounds can be optimal spaces for Socializers. They pay more attention to variations in the surrounding environment. Movable facilities would enable them to observe more easily.

Passer – by users are not the main users of the park, but they are the most observed group in the open space. They treat the open space as a shortcut or temporary stopping point. In terms of wireless signal, Passers-by require continuity rather than speed. The problem of continuity emerges as the area of a park increases. The larger a park's size, the more disturbed is its signal zone.

Public Wi-Fi access provides life essentials to Economically Disadvantaged group. They need the Internet to apply for jobs and update everyday information, but cannot afford private Internet service. Moreover, they are also quite often in need of equipment. The site for the Economically

[4] *Antenna* can be used as AP – Access point – in some resources that refer to Wi-Fi routers.

Disadvantaged group should have indoor space with dedicated year-round accessibility. If possible, the site should be located near public transit, allowing these individuals to use the service quickly as an everyday routine without the need to spend extra time.

4. Vegetation

As a crucial element of the outdoor space design, the vegetation layer can also impact the Wi-Fi space by interfering with signal transmission. Normally, the ideal Wi-Fi space is considered to be a place free of obstacles. However, the design of open space on the premise of this condition is predictably negative. Although trees weaken signals, they do not diminish the average signal strength below -75 dBm (the minimum for a Wi-Fi connection). Therefore, as long as the effect of urban trees is taken into account during the planning of Wi-Fi networks, trees should not interfere with municipal Wi-Fi operation. (Lacán, McBride, 2009).

Discussion & Conclusion

The influence of Wi-Fi use on urban public spaces is uneven and heavily influenced by the character of the space. The popularity of a site for wireless users is determined by the role of reputation, free Wi-Fi, pre-existing population density, urban design, surveillance/harassment, and local culture (Campbell, 2007).

It is inevitable that Wi-Fi will spread outdoor in many countries, soon. USA, UK and Qatar have already successful projects in their country. As mentioned above, user profiles have to be determined firstly, then special spaces must be organised in park for every single profile. Designing a park with Wi-Fi facility is easier than integrating Wi-Fi to an existing one because of the materials in the park. There is no harm for inanimate materials but plants would be affected negatively from the routers. So, it must be tested for urban park plants that the stamina of them. Considering the health of plants to Wi-Fi radiation would be change the project. Wi-Fi is a really important parameter which can increase the usage of the parks, that's why more researches should be done for design perfection.

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Detection of Nitrogen Status in Cotton Using an Image Processing Approach

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Abstract

This study aims at investigating the relevance of leaf colour in predicting the nitrogen (N) status of field grown cotton (*Gossypium hirsutum* L.). A new non-destructive and easy to use algorithm that utilizes the Red, Green and Blue readings of leaf images is developed for estimating the N levels in cotton[1]. Five N treatments were applied, which are: N0 (control, or 0 N), N1 (80kg N ha^{-1}), N2 (160kg N ha^{-1}), N3 (240kg N ha^{-1}), and N4 (320kg N ha^{-1}). Data was collected from the topmost fully expanded leaves during different growth stages, i.e. late vegetative, peak reproductive and late reproductive growth. The proposed algorithm was utilised along with two other non-destructive devices; namely the SPAD-502 and GreenSeeker Handheld crop sensor (Trimble), in estimating N contents, while the actual N content of leaves were measured in the laboratory. Obtained results indicate that our proosed technique, and to a slightly less degree the SPAD-502, can give a good indication of N levels in cotton, while the GreenSeeker did not provide very competitive results. We have also conducted an experiment to differentiate between the five N treatments, which showed that our proposed method and the SPAD-502 were able to achieve superior performance compared to the GreenSeeker.

Keywords: Cotton, nitrogen estimation, image processing, SPAD-502, GreenSeeker

Introduction

Nitrogen (N) is an essential nutrient element that is consistently required for the growth and development of the cotton (*Gossypium hirsutum* L.) crop. Regular detection of N status is crucial for the crop to maintain normal growth, and optimise yield and quality. Due to its role in essential plant metabolic processes, such as cell division, protein synthesis and enzyme production, N plays a very important role for achieving optimum crop yield (Novoa and Loomis 1981). However, excessive application of N fertilisers is not desired, as it does not only increase the cost for crop production but can also have a negative impact on the environment (Di and Cameron 2002). Thus a mismatch between N supply and crop N requirement can produce excessive crop growth and harm the environment, resulting in low nitrogen-use-efficiency (NUE) and reduced profit. Accordingly, many researchers have explored the role of N in cotton crop (Boquet and Breitenbeck 2000; Boquet et al. 1995; McConnell et al. 1993) and found that both N deficiency and excess can negatively affect lint yield and fibre quality. Excessive N supply often results in higher vegetative growth and lower yield, while deficiency translates to lower biomass production limiting lint production. In addition, increased focus on greenhouse gas emissions and the higher N fertiliser cost have prompted greater attention to the efficient use of N fertilisers.

Accurate and timely prediction of N demand in cotton production is vital for N management in cotton farms. Hence, the main goal in cotton management is to detect N status of the crop and respond with supplemental N in a timely manner. This would increase N utilisation efficiency, improve yield, increase profit, and minimize N losses. Moreover, real-time knowledge of cotton crop N status is the key to timely application of supplemental N at a rate matched to the spatial variability of crop N need.

There are two main approaches for foliar N detection; destructive and non-destructive. Destructive technique accurately estimates foliar N status but it is generally time consuming,

[1] This work is supported by a CRDC (Cotton Research and Development Corporation, Australia) grant.

expensive and labour intensive. In contrast, non-destructive methods are rapid and less expensive than the destructive techniques, but are usually less accurate. The existing non-destructive methods vary in their complexity and optimality. Two of the most widely used hand-held devices are the SPAD-502 and GreenSeeker handheld crop sensor (Trimble). The SPAD-502 estimates leaf chlorophyll and subsequently N contents, as leaf chlorophyll content is closely related to leaf N concentration in plants. The GreenSeeker measures the Normalized Difference Vegetation Index (NDVI), which reflects the plant health, and hence, N status.

We developed a new, inexpensive and easy to use N detection technique, and in this study we investigate its applicability to cotton crops. This system provides rapid analysis and data storage at minimal cost.

Materials and Methods

Nitrogen rate experiments

The experiment was conducted at the Australian Cotton Research Institute, Narrabri, NSW, Australia (150◦ E, 30◦ S), as part of a project supported by a CRDC grant. The soil of the area is self-mulching medium grey clay overlying brown clay, and is classified as a fine, thermic, montmorillonitic Typic Haplustert (SoilSurveyStaff 1996). A commercial cotton (Gossypium hirsutum L.) cultivar Sicot 74BRF was grown in a split plot design, where different N rates were applied to subplots of size 8m × 16 m, while the main plot size was 8m × 200 m. The design had four replicates. Various rates of N (anhydrous ammonia) were applied as N0: without N (control), N1: 80 kg N ha-1, N2: 160 kg N ha-1, N3: 240 kg N ha-1, and N4: 320 kg N ha-1. Cotton crop was irrigated when soil water deficit approached the commercial thresholds (50–60 mm), and insects did not exceed commercial thresholds (Deutscher et al. 2005). Weeds were controlled with mechanical cultivation and herbicides.

Laboratory based N measurements as well as estimation using SPAD, GreenSeeker handheld devices and digital images (our proposed method) were recorded at three stages of plant growth, at late vegetative phase, early reproductive phase and late reproductive phase.

Laboratory nitrogen measurement

At specific growth phase, uppermost fully expanded cotton leaf samples were collected from the field and oven-dried at 75 ˚C for 24 hours. The dried samples were grounded using a ball mill grinder and sieved through a 1 mm screen; and again oven-dried at 75 ˚C for 24 hours. The N concentrations (%) of these samples were measured using a LecoTruSpec CHN analyser (Leco, 2006).

SPAD-502 chlorophyll meter

The Chlorophyll SPAD meter (Minolta SPAD-502, Konica Minolta Sensing, Inc., Tokyo, Japan) was used to determine total leaf chlorophyll in the field. SPAD readings were taken from 12 top most fully expanded leaves from each treatment plots and averaged. These readings are needed to overcome the sampling sensitivity of the device that is caused by its small measuring area (around 12.57 mm^2). This device emits two light intensities from two diodes: peak wavelength 650 nm (red) absorbed by the leaf tissues, which estimates the chlorophyll content (greenness). A second peak 940 nm (infrared LED) is emitted simultaneously with red LED to compensate for leaf thickness (Shapiro 2006). This device is relatively expensive (around US$ 2,200), which makes it not affordable for farmers in developing countries.

GreenSeeker handheld crop sensor (Trimble)

The GreenSeeker is an easy-to-use device that can assess crop health. The sensor emits brief bursts of red and infrared light, and then measures the amount of each type of light that is reflected back from the plant. The sensor continues to sample the scanned area as long as the trigger remains engaged. The sensor displays the measured value in terms of a Normalized Difference Vegetation Index (NDVI) reading (ranging from 0.00 to 0.99) on its LCD display

screen. The strength of the detected light is a direct indicator of the crop health; the higher the reading, the healthier the plant. The price of a GreenSeeker starts from US$ 495, considerably cheaper than the SPAD-502 (Trimble 2012).

The proposed image processing based nitrogen estimation in cotton (IPNC)

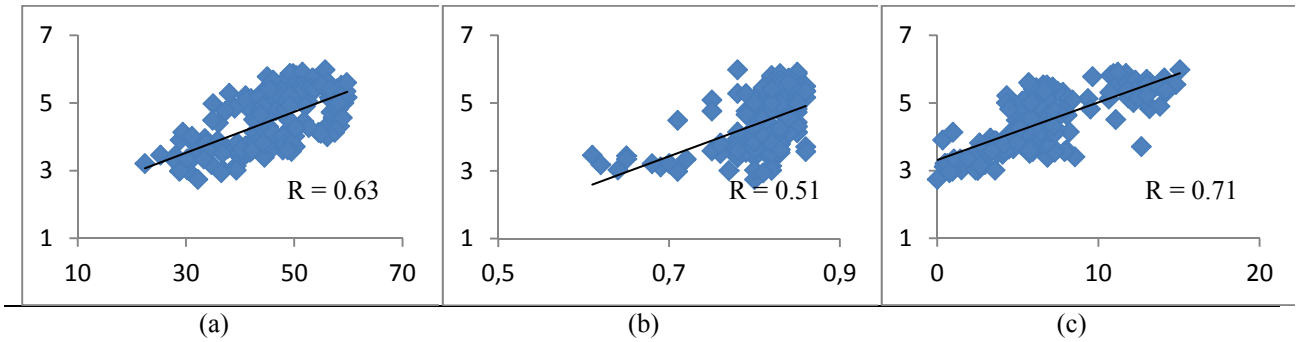
Unlike most of the existing image processing methods that use digital cameras to capture images, we decided to capture leaf images using a hand-held portable scanner with (40 × 22) cm reference plate. It reduces the variability in terms of angle, distance and lighting conditions. The acquired images were processed using Matlab, where we identified the leaf contour and then averaged the green (G), red (R) and blue (B) values of the leaf pixels. The scanning process involves placing a leaf on a white sheet. The scanner would then record the leaf image as it goes from top to bottom. Though the hand-held scanner is less influenced by the lighting conditions than cameras, we scanned leaves in a shaded location to minimise the effect of sunlight and glare. The images were then transferred to a personal computer for analyses.

In order to identify a formula that relates the R, G and B values to the N estimations, we used a cross-validation approach. Cross-validation is a statistical method of evaluating and comparing learning algorithms by dividing data into two segments: one is used to learn or train a model, and the other is used to validate the model. The K-fold cross validation method works by splitting the data into K groups. A loop that is run K times is used, where in each run; K-1 groups are used to identify the model parameters, while the remaining group is used to validate the outcome. Based on this approach, each of the K groups is used once for validation. The parameters obtained in each fold are then averaged to obtain the final model parameters.

Experimental Results

One hundred and eighty measurements of laboratory-based analysed nitrogen content (%), GreenSeeker, SPAD-502 and IPNC readings were used to find the correlation coefficient (R) between the actual N level and each of the three non-destructive methods. These measurements have been taken in three different growth stages of crop i.e. the first one during late vegetative phase, the second one during early reproductive phase and the last one during late reproductive phase, i.e., 60 readings for each growth stage.

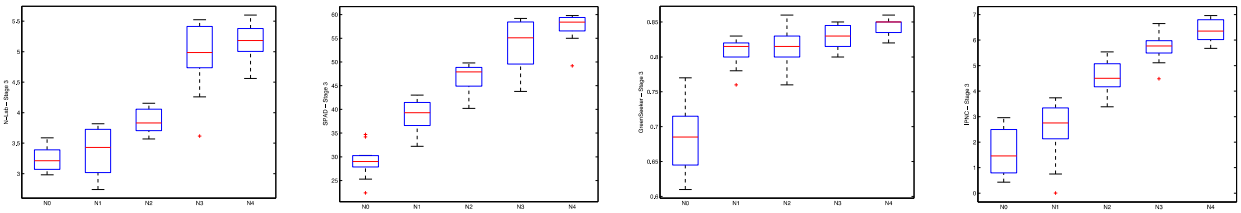
Figure 1(a) shows the correlation between laboratory-analysed N values and SPAD readings, where R was approximately 0.63. A similar correlation value for SPAD based N contents was reported in (Johnson and Saunders 2003). The correlation between leaf N contents calculated by destructive method and estimated by the GreenSeeker was a bit worse (R = 0.51), as shown in Figure 1(b). Our results confirmed the findings of Johnson and Saunders (2003), who claimed that Minolta SPAD-502 chlorophyll fluorescence meter was the most reliable hand-held meters for monitoring in-field N status of cotton crops. However, we obtained a relatively stronger correlation (R = 0.71) compared to those two methods using our proposed IPNC (Figure 1c), which may lead to a more reliable non-destructive tool for the estimation of N concentration in cotton.



(a) (b) (c)

Figure 1. Correlation between leaf N content and (a) SPAD, (b) GreenSeeker handheld crop sensor (Trimble), and (c) our proposed IPNC algorithm

In the second experiment, we investigated the ability of the measured N value (from the CHN analyser) as well as the readings obtained by SPAD, Handheld crop sensor (Trimble) and IPNC for detecting the five levels of N treatments in the field in Narrabri. Figure 2 shows a boxplot for the third stage of plant growth.



(a) (b) (c) (d)

Figure 2. Third growth stage (mid-Mar 2013). Each plot represents the five treatments vs. lab nitrogen (a), SPAD (b), GreenSeeker (c), and IPNC (d).

The plots of the third stage show that lab-nitrogen, SPAD and IPNC provide a good estimation of the N treatments, while the GreenSeeker still showed a noticeable degree of overlap. It is worth mentioning that we observed a high degree of overlap between the five treatments for all four methods in the first stage of growth and to a slightly less degree in the second stage. This is expected, as the field soil could have some residual N and since the plants are still in their late vegetative growth stage, the amount of N needed may not be much higher than what already exists in the soil.

Conclusion

Despite of the fact that the destructive method using laboratory techniques (e.g. Kjeldahl and Leco CHN analysis) are capable of accurately estimating the N concentration in plants, it cannot provide instantaneous N estimation in the field as it requires specialised equipment and chemicals. Two of the most widely used non-destructive devices are the SPAD and GreenSeeker provide a more practical approach for the estimation of N, however they are less accurate. We presented in this paper a new image processing based N estimation algorithm for cotton (IPNC), which proved to produce a slightly better results than SPAD and was superior to GreenSeeker. More experiments should be conducted to further validate the IPNC method, and hence offer a new system to the cotton community that is inexpensive, yet reliable in estimating crop nitrogen.

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Evaluation of Agronomical and Quality Traits of Triticale Genotypes in Spring Planting, under Arid Conditions of Gumushane

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Abstract

This study was conducted in spring planting, under arid conditions of Gumushane, Turkey in 2013 year. The trial was arranged according to the completely randomized block design with three replications. Some evaluated agronomical and quality traits such as plant height (58.3-71.4 cm), spike length (4.80-6.27 cm), test weight (73.0-77.7 kg hl^{-1}), grain moisture (10.4-10.8 %), starch ratio (61.6-64.7 %) and hardness (101.3-110.9 unit) were statistically different; however, other traits like biomass (4.27-4.98 t ha^{-1}), grain yield (1.30-1.64 t ha^{-1}), grain number per spike (22.3-29.2 no), spike yield (1.60-1.82 g $spike^{-1}$), thousand kernel weight (32.6-38.1 g), protein content (11.6-13.0 %), wet gluten content (28.1-30.5 %), zeleny sedim (35.7-47.3 ml) and alveographic energy (203.7-235.2 Joule) had non-significant variations. As a yield component, spike yield showed significant relationships with thousand kernel weight (r = 0.438*), protein content (r = -0.394*), and grain moisture (r = -0.423*) at probability of 0.05 while protein content presented sharp relations with starch ratio (r = -0.853**), wet gluten content (r = 0.884**), zeleny sedim (r = 0.971**), and energy (r = 0.714**) at $P < 0.01$. Especially, negative significant correlation between starch ratio and protein content has indicated that starch accumulation instead of the protein in grain can be decreased the protein ratio

Keywords: Triticale, quality, yield components.

Introduction

Triticale (X *Triticosecale* Wittmack) is an synthetic amphidiploid of female wheat (*Triticum* ssp.) and male rye (*Secale* ssp.) (Ammar et al., 2004). Triticale is more resistance to abiotic stress than the other cereals, and it combines the high productivity of wheat and resistance characteristics of rye to biotic and abiotic stress. It can give higher grain yield than the other cool-season cereals and shows more resistance to diseases and pests (Yagbasanlar et al., 2003). Triticale is well adapted and more favorable than wheat and the other cereal species under abiotic stress (Oettler, 2005). It has produced 14.6 million tones from 3.9 million hectare area in the world, 118 thousand tones from 35.4 thousand hectare area in Turkey (FAO, 2014; TUIK, 2014). There are lots of studies regarded with favorability of triticale for bread-making; however, it is not alone recommended for this purpose (Tohver et al., 2005). For this reason, it can be used for raw material in flour and bread making (Amiour et al., 2002). Also, spring triticale is the best choice in spring planting because it is more tolerant to drought than the other cool-season cereals (Hinojosa et al., 2002). However, facultative and winter triticale are suitable for grazing (Lozano, 1990). It has reported that triticale can be used as a good silage crop in animal feed (Kaplan et al., 2014).

In this study, agronomical and quality traits of spring triticale and relationships of these traits have been evaluated under arid conditions of Gumushane.

Material and Methods

Two triticale cultivars (Tacettinbey and Ege Yıldızı) and six triticale lines from Dicle University were used as material. The study was carried out in spring planting under rainfed conditions at the research area of the Vocational School of Siran, the University of Gumushane, Turkey, in 2013 growth season. Gumushane climate was ranked as moderately to severely dry (arid) in 2013, according to the weather forecast reports of Turkish State Meteorological Service (Anonymous, 2014). In total, 334.7 mm precipitation before sowing (September to March) and 135.1 mm during the growth season (April to August) was recorded. The trial soil was a sandy loam. Soil contains low organic matter (2.4%), a little alkaline (pH: 8), high lime (25.6%), a bit salt (0.12%), very rich potassium (1.4 t K_2O ha^{-1}), and enough phosphorus (0.06 t P_2O_5 ha^{-1}).

Trial was designed as three replicated according to the completely randomized blocks. Sowing was made by hand on 1st April, 2013 and plots which had 5.4 m^2 and six rows with 4 m long. Fertilizer was not used before sowing because of enough phosphorus and potassium content of the soil. Since the previous crop was common wetch (*Vicia sativa* L.) which gave some nitrogen to the trial field, only 60 kg ha^{-1} of N_2 was applied at the stage of booting. Harvest was made by hand in the middle of the August. Agronomical traits and some quality parameters (thousand kernel weight and test weight) were determined according to the methods of Bell and Fischer (1994). Other quality measurements were obtained from NIT (Infratec 1241, FOSS, Hilleroed, Denmark) in the Laboratory of Agricultural Faculty, Dicle University. All analysis items (F-test, LSD-test, comparisons between means, and correlations) were determined by JMP (2007).

Results and Discussion

Genotypes showed significant differences for only plant height and spike length among agronomical traits (Table 1). According to the Table 2, plant height varied between 58.3 cm (Line 2) and 71.4 cm (Tacettinbey cv.). Yagbasanlar et al. (2003) observed the plant height as the range of 127 to 132 cm according to the years under winter planting conditions in Mediterranean Region. But, in our study, plant heights of all the genotypes were very small. Because, in spring planting, some agronomical traits may be reduced by the decrease of the precipitation. Biomass ranged from 4.27 t ha^{-1} (DZ9-01 line) to 4.98 t ha^{-1} (Line 2) while grain yield ranged between 1.30 t ha^{-1} (Tacettinbey cv.) and 1.64 t ha^{-1} (Line 11). Also, harvest index changed 30.3 % (A-3 line) to 35.2% (A-13 line); however, these traits were not statistically different each other. In the study, spike length varied from 4.80 cm (A-13 line) to 6.27 cm (Tacettinbey cv). Differences between the genotypes for grain number per spike (GNPS) and spike yield (SY) were not statistically significant; however, GNPS ranged from 22.3 no (A-3 line) to 29.2 (Ege Yıldızı) while SY changed between 1.60 g (A-3 line) and 1.82 g (A-13 line). These lower data resulted from very low precipitation (135.1 mm) in the growth season of spring triticale. Kalbarczyk (2008) emphasized that above 205 mm precipitation is needed for an average yield during the period from planting to harvesting in spring triticale. Also, Fayaz and Arzani (2011) reported that emphatic decreases (%) under moisture stress can be observed in some agronomical characters such as plant height (3 – 22 %), biomass (6 – 32 %), grain yield (24 – 55 %), harvest index (19 – 36 %), GNPS (10 – 36 %), and SY (24 – 51 %).

Genotypes showed statistical significant differences for test weight, grain moisture, starch ratio, and hardness among quality traits (Table 1). According to the Table 2, thousand kernel weight (TKW) changed between 32.6 g (Line 2) and 38.1 g (DZD-09 line); however, differences were not significant for TKW. Test weight ranged from 73.0 kg hl^{-1} (Tacettinbey) to 77.7 kg hl^{-1} (DZ9-01 line). Ciftci et al. (2010) reported that test weight of the triticale lines changed between 66.1 and 72.6 kg hl^{-1}. Protein content (P) of the genotypes ranged 11.6 % (A-3 line) and 13.0 (Ege Yıldızı). While protein content of a spring triticale were found as 12.2 % by Knapowski et al. (2009), it was found as 13.7 % in another triticale cultivar by Wrobel (2005). Grain moisture changed between 10.4 % and 10.8%. Starch ratio (S) of the genotypes changed from 61.6 % (Tacettinbey and Ege Yıldızı) to 64.7 % (A-3 line). However, the changing of the wet gluten content (WG), zeleny sedim (S_z), and alveographic energy (W) were not significant; these traits showed a range like so: WG, 28.1 % (A-3 line) to 30.5 % (Ege Yıldızı); S_z, 35.7 mL (A-13 line) to 47.3 mL (Ege Yıldızı); and W, 203.7 Joule (A-3 line) to 235.2 Joule (Line 2). Some researchers (Gil and Narkiewiez-Jodko, 1997; Tohver et al., 2005; Knapowski et al., 2009) found lower values of protein, wet gluten, and sedimentation in their studies. Another quality trait, hardness (H) ranged from 101.3 (DZ9-06 line) to 110.9 (DZ9-01 and Line 11).

Correlation coefficients between all traits were given on Table 3. In this connecttion, grain yield was found significant positive correlated with biomass (r = 0.647**) and harvest index (r = 0.422*), but non-significant positive correlated with spike yield (r = 0.346). Fayaz and Arzani (2011) found similar relationships among grain yield, biomass, harvest index, and spike yield. Also, negative correlations of the TKW with P, WG, S_z, and H show that smaller grained and lower starchy genotypes present higher values of protein, gluten, sedimentation, and hardness.

Table 1. Mean squares and coefficients of variation according to the ANOVA for agronomical and grain quality traits of eight triticale genotypes.

Sources of Variation	Df	Mean Squares															
		Agronomical Traits							Grain Quality Traits								
		PH	BM	GY	HI	SL	GNPS	SY	TKW	TW	P	M	S	WG	S_z	W	H
Genotypes	7	50.0*	0.231	0.040	10.1	0.86*	13.84	0.02	11.80	7.30**	0.63	0.07*	4.34**	2.09	57.0	309.4	36.4*
Replicates	2	42.5	0.340	0.009	6.60	0.15	54.93	0.10	37.57	0.02	0.19	1.10	1.08	1.21	16.98	980.0	2.34
Error	14	14.7	0.306	0.044	10.2	0.21	17.94	0.05	10.61	0.30	0.34	0.02	0.62	1.61	45.25	274.6	10.92
CV, %		5.6	12.2	14.6	9.9	8.5	16.9	13.0	9.3	0.7	4.8	1.5	1.3	4.4	16.7	7.3	3.1

PH, Plant Height; BM, Biomass; GY, Grain Yield; HI, Harvest Index; SL, spike length; GNPS, grain number per spike; SY, spike yield; TKW, thousand kernel weight; TW, test weight; P, protein content; M, grain moisture; S, starch ratio; WG, wet gluten content; S_z, zeleny sedim; W, alveographic energy; H, hardness. Df, degree of freedom; CV, coefficient of variation.
*, Significance level at $P < 0.05$; **, Significance level at $P < 0.01$.

Table 2. Mean values for agronomical and grain quality traits of eight triticale genotypes.

Genotypes	Means															
	Agronomical Traits							Grain Quality Traits								
	PH (cm)	BM (t ha^{-1})	GY (t ha^{-1})	HI (%)	SL (cm)	GNPS (no)	SY (g)	TKW (g)	TW (kg hl^{-1})	P (%)	M (%)	S (%)	WG (%)	S_z (mL)	W (Joule)	H (unit)
Tacettinbey	71.4 **a***	4.29	1.30	30.4	6.27 **a**	25.6	1.72	33.5	73.0 **d**	12.5	10.8 **a**	61.6 **c**	29.3	45.3	230.2	108.8 **ab**
Ege Yıldızı	69.8 **ab**	4.35	1.34	30.8	5.95 **ab**	29.2	1.70	34.9	75.9 **bc**	13.0	10.6 **ab**	61.6 **c**	30.5	47.3	234.6	109.4 **a**
A-3	65.9 **abc**	4.85	1.47	30.3	4.87 **d**	22.3	1.60	34.5	77.5 **a**	11.6	10.4 **b**	64.7 **a**	28.1	36.3	203.7	106.0 **abc**
A-13	64.4 **bcd**	4.38	1.33	35.2	4.80 **d**	23.1	1.82	35.8	76.8 **ab**	11.8	10.4 **b**	64.4 **ab**	29.0	35.7	227.1	103.4 **bc**
DZ9-01	64.0 **bcd**	4.27	1.40	32.8	4.97 **cd**	23.4	1.67	37.6	77.7 **a**	12.0	10.5 **b**	63.8 **ab**	28.9	40.0	223.3	110.9 **a**
DZ9-06	63.7 **bcd**	4.46	1.46	32.7	5.27 **bcd**	26.0	1.81	38.1	77.1 **a**	11.8	10.6 **ab**	64.2 **ab**	28.2	36.4	226.1	101.3 **c**
Line 2	58.3 **d**	4.98	1.54	31.3	5.27 **bcd**	25.1	1.69	32.6	75.4 **c**	12.4	10.4 **b**	63.2 **b**	29.5	42.5	235.2	107.4 **ab**
Line 11	62.9 **cd**	4.75	1.64	34.4	5.70 **abc**	25.6	1.70	33.5	75.3 **c**	11.9	10.4 **b**	63.7 **ab**	28.2	39.1	232.7	110.9 **a**
Mean	65.0	4.54	1.44	32.2	5.39	25.1	1.72	35.1	76.1	12.1	10.5	63.4	29.0	40.3	226.6	107.2
$LSD_{0.05}$	6.73	NS	NS	NS	0.81	NS	NS	NS	0.96	NS	1.5	1.38	NS	NS	NS	5.79

PH, Plant Height; BM, Biomass; GY, Grain Yield; HI, Harvest Index; SL, spike length; GNPS, grain number per spike; SY, spike yield; TKW, thousand kernel weight; TW, test weight; P, protein content; M, grain moisture; S, starch ratio; WG, wet gluten content; S_z, zeleny sedim; W, alveographic energy; H, hardness. LSD, least significant difference.
*: Means with the same letter are not significantly different at $P < 0.05$.

In addition, negative significant correlations of S with P, WG, S_z, W, and H emphasize the contrast relation between starch quantity and other quality traits. Similar findings were reported by Knapowski et al. (2009). In brief, a strong negative correlation between starch ratio and protein content has indicated that starch accumulation instead of the protein in grain filling period of spring triticale under abiotic stress (high temperature and/or low moisture) can be decreased some quality criteria such as wet gluten content, sedimentation, energy, and hardness.

Table 3. Correlation coefficients between all evaluated traits of triticale genotypes (n = 24).

Traits	BM	GY	HI	SL	GNPS	SY	TKW	TW	P	M	S	WG	S_z	W	H
PH	.075	-.014	-.139	.458**	.176	.219	-.043	-.309	.057	.507*	-.371	.056	.045	-.331	.077
BM		.647**	-.138	.052	.136	.409*	.078	.087	-.217	-.221	.230	-.239	-.169	-.091	.027
GY			.422*	.086	.266	.346	.109	.048	-.172	-.239	.217	-.154	-.046	.103	.028
HI				-.264	-.102	.055	.038	.174	-.100	-.042	.191	-.073	-.031	.171	-.157
SL					.719**	.410*	-.127	-.701**	.219	.075	-.504*	.113	.218	.131	.130
GNPS						.738**	.203	-.221	-.022	-.335	-.081	.004	-.009	.131	-.108
SY							.438*	-.050	-.394*	-.423*	.322	-.314	-.356	-.041	-.284
TKW								.343	-.411*	-.303	.407*	-.358	-.361	-.125	-.240
TW									-.337	-.192	.576**	-.243	-.334	-.267	-.213
P										.250	-.853**	.884**	.971**	.714**	.492*
M											-.488*	.156	.173	-.307	.061
S												-.673**	-.810**	-.425*	-.506*
WG													.835**	.694**	.278
Sz														.747**	.569**
W															.291

PH, plant height; BM, biomass; GY, grain yield; HI, harvest index; SL, spike length; GNPS, grain number per spike; SY, spike yield; TKW, thousand kernel weight; TW, test weight; P, protein content; M, grain moisture; S, starch ratio; WG, wet gluten content; S_z, zeleny sedim; W, alveographic energy; H, hardness. *, ** Significant at $P < 0.05$, $P < 0.01$, respectively.

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Evaluate the Quality of Potato Minituber Changes During Storage Period After Application of Salicylic Acid and Methyl Jasmonate in Maternal Plant and Minituber Before Storage

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Abstract

A study in 2010 was carried out to evaluate the effect of pretreatment of potato maternal plant(Agria variety) and produced minituber with methyl jasmonate and salicylic acid as hormone-like on the minituber starch and protein percentage after 15 weeks storage period. It was a factorial experiment based on a completely randomized design with three replications. The first factor was four methyl jasmonate (MJ) levels (0, 2, 6 and 10 µl/l) and the second was salicylic acid(SA) at four levels (0, 0.2, 0.6 and 1 Mm). This study was carried out in two groups. Maternal plants (produced from tissue culture) in first group were sprayed weekly and their tubers were transferred to storage without any treatment. The second group normal minitubers were treated. Maternal plants were cultured in pots containing peat moss were fed with Hogland solution during cultivation. The results showed that the interactions of MJ and SA were significant ($p < 0.01$) in two groups and traits. Using 2 and 6 µl/l concentration of MJ with 0.2 and 0.6 mM of SA in maternal plants caused the highest minitubers starch content even after storage period. Also application of 0.2 mM SA with 2 and 6 µl/l MJ on maternal plants had the most percentage of protein after storage period among other treatments and control. Comparison of means showed that application of 6 µl/l MJ and 0.2 mM SA in the same and normal minitubers before storage period had the highest percentage of starch ofter storage. As well, in 2 µl MJ and 1 mM SA application in normal and same minituber, the highest amount of protein was obtained after storage period. Altogether, using SA and MJ can be helpful to save the quality of potato seed tubers during long storage period.

Keywords: Potato minituber, methyl jasmonate, salicylic acid, storage period

Introduction

Potato is in the fourth place in terms of production rate after wheat, barley and sugar cane in Iran. In Iran and many countries potato tuber as seed is cultivated repeatedly in traditional farm. This way causes severe pollution of tuber by many viruses whiles the health and quality of potato seeds have an important role in the final yield. The virus can seriously reduce potato yield. To produce disease-free seeds, micro propagation method is used recently. Now in Iran 5 million minitubers are produced annually that partialy satisfies the need of high quality potato seeds (Roodbar shojaei *et al*., 2009). Methyl jasmonate is a plant growth regulator hormone and is one of the defense reaction factors in plant (Nadarajah and Turner, 2008). This hormone is related to wide range of actions in plant such as tuber formation, acceleration of plant evolution and ripening (Wtanabe *et al.,* 2000). The jasmonates are compounds derived from unsaturated Cyclopentane linolenic acid. First time in 1962 ester of methyl jasmonate were separated as aromatic oil from *Jasmonium grandiflorum* (Hasibi *et al*., 2008). Other molecule involved in the defense reaction of plants is salicylic acid. The treatment with salicylic acid postpones stored fruit corruption such as banana, peach and apple (Mo *et al.,* 2008). This hormone-like has antioxidant properties (Maddah *et al*., 2007). Main part of potato dry matter is composed by starch, sugar, fiber, protein, fat and ash. The chemical composition of potato tuber will be saved in the best storage conditions (Yaghbani *et al*., 2005). The purpose of this experiment, reducing the amount of waste storage and preservation of potato seed quality during storage by reducing the damage caused by respiration with using antioxidant effects of methyl jasmonate and salicylic acid.

Materials and Methods

To study the effects of different concentrations of methyl jasmonate and salicylic acid on the minitubers starch and protein percentage, a factorial study was carried out based on completely

randomized design (CRD) with three replications in greenhouse of Behparvar Sabalan Company in Ardabil-Iran in 2010. The factors included methyl jasmonate at three levels of 0.2, 6 and 10 µl/l the second factor was salicylic acid at four levels 0,0.2,0.6 and 1 mM. This study was carried out in two groups. Maternal plants produced from tissue culture in first group were sprayed weekly and their tubers after maturing (after three-month growth period)were transferred to storage without any treatment. In the second group, normal minitubers were treated by methyl jasmonate and salicylic acid with mentioned concentrations. After storage for 15 weeks in 6 °C and 80% humidity, starch and protein were measured in minituber. The data was analyzed by SAS software and the means were compared by LSD Test at 5% level.

Results and Discussion

First group: The results showed that the simple effect of MJ and interactions of MJ and SA were significant ($p < 0.01$) in traits of tuber starch and protein percentage (Table 1). Using 2 and 6 µl/l concentration of MJ with 0.2 and 0.6 mM of SA in maternal plants caused the highest minitubers starch content even after storage period(6.9% in control vs >9.1%). Also application of 0.2 mM SA with 2 and 6 µl/l MJ on maternal plants had the most percentage of protein after storage period among other treatments and control(0.9 % in control vs >4.9%) (Table 3). Sajid and Aftab (2013) reported that concentrations of 0.125 and 0.25 mM salicylic acid can be useful in improving yield of potato plants under saline conditions. For protein content, they said there was a statistically significant difference between salicylic acid-treated and non-treated potato plants. Maximum protein accumulation (1.17 and 0.88 mg/g) was recorded at 0.75 and 0.50 m*M* salicylic acid treatment.

Second group: Analysis of variance in data obtained from application of MJ and SA in the same and normal minitubers before storage period showed that the simple effect of SA and interactions of MJ and SA were significant ($p < 0.01$) in tuber starch percentage. Also, application of SA, MJ and SA*MJ in normal minitubers before storage, had shown significant effects on tuber protein content ofter 15 weeks of storage (Table 2).

Comparison of means in MJ*SA showed that application of 6 µl/l MJ and 0.2 mM SA had the highest percentage of starch ofter storage(7.8% in control vs 9.2%). As well, in 2 µl MJ and 1 mM SA application, the highest amount of protein was obtained after storage period(0.99% in control vs 3.00%)(Table 4). Yao and Tian (2005) also studied the effect of pre- and post-harvest application of SA and MJ on inducing disease resistance of sweet cherry fruit in storage. Pre-harvest treatments with 2 mM SA and 0.2 mM MJ significantly reduced lesion diameters on sweet cherry fruit caused by *Monilinia fructicola* compared with control post-harvest treatments. Pre-harvest treatment of sweet cherry with SA or MJ induced β-1,3-glucanase, phenylalanine ammonia-lyase (PAL) and peroxidase (POD) activities during the early storage time. The efficacy of inducing resistance in sweet cherry fruit pre-harvest-treated with SA or MJ to *M. fructicola* was better than that for fruit with post-harvest treatments, especially, at 25 °C.

Conclusion

Using SA and MJ in regulated percentage can be helpful to save the potato minintubers resources during long storage period for production of good super elite seed tubers.

Table 1. Analysis of variance of effect of Methyl jasmonate and Salicylic acid pretreatment in maternal plants on different traits of produced potato minitubers after storage period

Sources of variance	df	Tuber starch	Tuber protein
Replication	2	0.22	0.02
Methyl jasmonate	3	1.34*	13.30**
Salicylic acid	3	1.01	4.55**
MJA×SA	9	1.88**	7.57**
Experimental error	30	0.39	0.07
C.V. (%)	-	7.56	10.18

* and **, show significance at 5% and 1% probability level.

Table 2. Analysis of variance of effect of Methyl jasmonate and Salicylic acid pretreatment in minitubers on different traits after storage period

Sources of variance	df	Tuber starch	Tuber protein
Replication	2	0.14	0.047
Methyl jasmonate	3	0.57	2.51**
Salicylic acid	3	12.86**	1.78**
MJA×SA	9	5.43**	1.19**
Experimental error	30	0.24	0.026
C.V. (%)	-	7.06	8.74

* and **, show significance at 5% and 1% probability level.

Table 3. Means comparison of Methyl jasmonate and Salicylic acid pretreatment in maternal plants on different traits of produced potato minitubers after storage period

	Tuber starch (%)	Tuber protein (%)
Methyl jasmonate 0 µl/l× salicylic acid 0 mM	6.90g	0.90hi
× salicylic acid 0.2 mM	7.78defg	0.80i
× salicylic acid 0.6 mM	8.07cdef	1.12hi
× salicylic acid 1 mM	9.00abc	2.23f
Methyl jasmonate 2 µl/l× salicylic acid 0 mM	8.09cdef	4.21b
× salicylic acid 0.2 mM	**9.71a**	**4.97a**
× salicylic acid 0.6 mM	**9.10abc**	3.30c
× salicylic acid 1 mM	7.37efg	2.67ef
Methyl jasmonate 6 µl/l× salicylic acid 0 mM	8.41bcde	2.44ef
× salicylic acid 0.2 mM	**8.99abc**	**5.14a**
× salicylic acid 0.6 mM	**9.22ab**	1.77g
× salicylic acid 1 mM	7.88defg	2.53ef
Methyl jasmonate 10 µl/l× salicylic acid 0 mM	8.40bcde	1.31h
× salicylic acid 0.2 mM	7.13fg	3.19cd
× salicylic acid 0.6 mM	8.19bcde	2.81de
× salicylic acid 1 mM	8.79abcd	3.89b

Means followed by the same letters in columns are not significantly different at P < 0.05 level

Table 4. Means comparison of Methyl jasmonate and Salicylic acid pretreatment in mintubers on different traits after storage period

	Tuber starch (%)	Tuber protein (%)
Methyl jasmonate 0 µl/l× salicylic acid 0 mM	7.80bcd	0.99gh
× salicylic acid 0.2 mM	6.47f	1.23fg
× salicylic acid 0.6 mM	6.01g	1.44e
× salicylic acid 1 mM	5.43hi	1.55e
Methyl jasmonate 2 µl/l× salicylic acid 0 mM	6.38fg	2.09cd
× salicylic acid 0.2 mM	8.39bc	1.60e
× salicylic acid 0.6 mM	6.67ef	1.99d
× salicylic acid 1 mM	7.33de	**3.00a**
Methyl jasmonate 6 µl/l× salicylic acid 0 mM	5.62gh	1.39ef
× salicylic acid 0.2 mM	**9.20ab**	2.38b
× salicylic acid 0.6 mM	8.74bcd	0.87h
× salicylic acid 1 mM	5.40hi	2.15bcd
Methyl jasmonate 10 µl/l× salicylic acid 0 mM	4.76i	1.98d
× salicylic acid 0.2 mM	7.67cd	1.92d
× salicylic acid 0.6 mM	8.46bc	2.26bc
× salicylic acid 1 mM	6.52ef	2.04cd

Means followed by the same letters in columns are not significantly different at P < 0.05 level

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Melatonin Content Of Endemic *Tanacetum cadmeum* (Boiss.) *Heywood* ssp. *cadmeum,* From Turkey

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Abstract

The genus *Tanacetum* belongs to Asteraceae (Compositae) family, comprising 44 species in Turkey. *Tanacetum cadmeum* (Boiss.) *Heywood* ssp. *cadmeum* collected from Isık Mountain in summer 2012. Melatonin (N-acetyl-5-methoxytriptamine) is a neurohormone synthesized from L-tryptophan via serotonin. The presence of melatonin in higher plants has been reported and concerning with the physiological and pathophysiological functions including regulation of circadian rhythms, prevention of ischemia – reperfusion damages, relief of chronic pain, enhancement of immunity, oncostatic effects, treatment of the neurological disorders such as migraine and antioxidative properties were reported. Many plant species contain melatoninin as microgram per gram range or much lower. The plant leaves were exracted with methanol-water and sonicated in ultrasonic bath and then analyzed with HPLC-UV at 280 nm. In this study, melatonin content was found 8,12 ug/gr in *T. cadmeum* ssp. *cadmeum*.
In conclusion, melatonin content was detected for the first time in this wild *Tanacetum* species from Turkey. This taxon include higher melatonin content once compared with previous literatures about *Tanacetum* species.
Keywords: . *Tanacetum cadmeum* ssp. *cadmeum,* melatonin, HPLC

Introduction

Genus *Tanacetum* belongs to Asteraceae (Compositae) family. This genus, represented in Turkish flora by 44 species with endemic 23 species and altogether 59 taxa, is rich in essential oils, bitter substances and sesquiterpene lactones (Davis, 1982; Baytop,1999).Various remedies containing *Tanacetum* species are used in the treatment of arthritis, fever, migraine, menstrual disorders, stomach-ache, toothache and insect bites (Zhou et al.1999) *Tanacetum* species are known in Anatolia as ‘‘pireotu’’ and their essential oils are used as repellent against insects (Baytop,1999; Gören, 2001)

In 1978, a British health magazine reported that a 68-year-old woman who had suffered from chronic migraines since the age of 16 tried feverfew (Tanacetum parthenium) leaves with complete relief of her headaches within a few months. Since the 1980’s feverfew has become a highly popular British, French and Canadian phytomedicine used to prevent migrain headaches, relieve menstrual cramps and treat painful joints. It also became a top-selling American phytopharmaceutical in the late 1990’s (Kathi, 1999). In vascular plants, melatonin was first detected in 1995 and the US magazine, Newsweek, named synthetic melatonin (N-acetyl-5-methoxytryptamine) the “Pill of the Year” for its potential health benefits. In 1995, In the same year, there was a report associating chronic migraine headaches with lower circulating levels of melatonin. (Murch, 1997) Feverfew preparations, taken prophylactically, can reduce the frequency and severity of migraine attacks in some patients (Randolph, 2006). Medicinal plants which used in the treatment of neurological disorders or diseases related to free radicals have been seen rich melatonin content, the relationship thought to be a powerful antioxidant properties of the molecule (Murch, 1997; Wu, 2006)

Since then, melatonin has been detected and quantified in roots, shoots, leaves, fruits and seeds of a considerable variety of plant species. The levels of melatonin in plant organs vary considerably, from picograms to micrograms per gram of plant material. Generally, seeds and leaves present the highest level of melatonin and fruits the lowest (Marino, 2007). Moreover, its presence in edible plants, such as bananas, cherries, white sprouts, and cucumbers (Lucien,

2000) has evidenced that there is a correlation between dietary vegetable intake and blood levels of melatonin, demonstrating that this molecule is well absorbed and it readily raises blood plasma concentration of melatonin (Reiter, 2001). Many animal studies and in vitro experiments have illustrated that melatonin possesses oncostatic activity. Clinical trials showed that melatonin could be efficient in preventing cell damage, as well under acute (sepsis, asphyxia in newborns) as under chronic (metabolic and neurodegenerative diseases, cancer, inflammation, aging)(Regina, 2007) As investigations possible roles for melatonin in plants are; in reproductive development, including circadian rhythms; in cell protection, in vegetative development (Marino, 2007)

In the present study we aim to detect the presence of significant amounts of melatonin in *T. cadmeum* ssp. *cadmeum* species with HPLC-UV. To our knowledge, this is the first time melatonin has been determined in this native *Tanacetum* taxon which is collected from Turkey.

Material and Methods

Tanacetum cadmeum (Boiss.) *Heywood* ssp. *cadmeum,* is collected from Isık Mountain,(1800 m), Kahramanmaras in july 2012. The plant material identified by taxonomist Dr. Ahmet İlçim using Flora of Turkey and East Aegean Islands.

2 gr dried leaves of plant material shaked with methanol-water (2:1) 30 mins and sonicated in sonic bath for 1 h and stored at -20 for two weeks. After two weeks, extractions sonicated 30 mins in sonic bath, santrifujed 10 min 6000 rpm at 4 C degree. It was filtered by a filter (0.2 _ 25 mm, Millipore) prior to HPLC analysis (Ansari, 2010) HPLC analysis was carried out on a (Agilent 1100) liquid chromatography system equipped with UV dedector and C18 colomn (ACE 25cmx4.6mm) The mobile phase consisted of 0.1 M potassium phosphate buffer with water/acetonitrile (20:80), flow rate of 1 ml/min at 280nm. The total analysis time was 25 minutes (Ansari, 2010). The melatonin peak, identified using synthetic melatonin (99% purity) purchased from sigma-aldrich, dissolved in methanol-water (4:1). Retention time of melatonin was determined in 17.8 mins. Melatonin was quantified by a calibration curve obtained from 0.97, 1.95, 3.90, 7.81, 15.62, 31.25, 62.5, 125, 250 and 500 ppm standart solutions (figure 1). Standard curve graphic evaulated as standart solution graphic (figure 2).

Results

Melatonin peak seen in 17.8 mins. and melatonin amount calculated as standart curve. Melatonin content was found 8,12 ug/gr in *T. cadmeum* ssp. *cadmeum*. HPLC chromatogram could seen in figure 3. Melatonin standart was added to plant extract and runned for confirm the melatonin peak (figure 4)

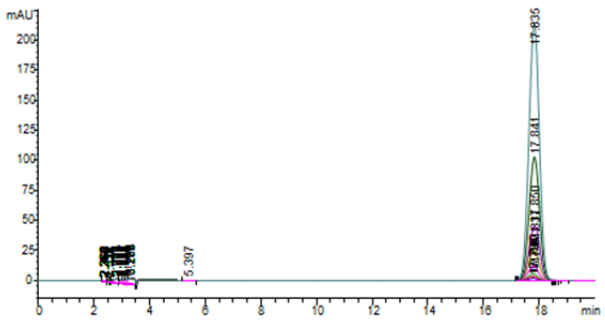

Figure 1 Standart consantrations peaks in HPLC

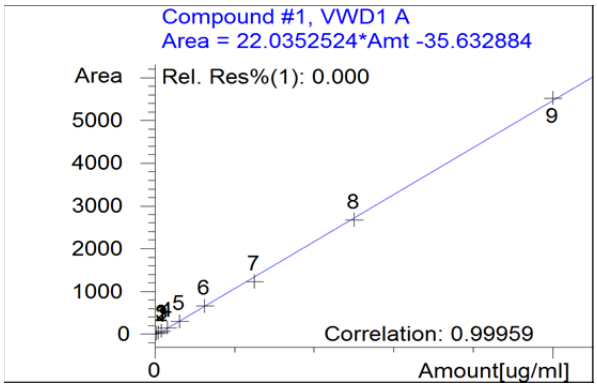

Figure 2. Standart Graphic

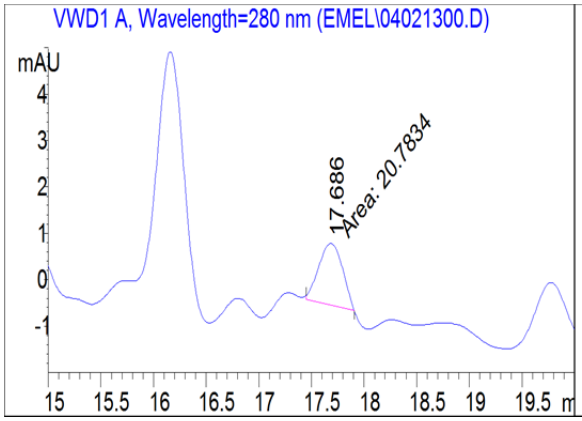

Figure 3. Melatonin peak in the plant extract

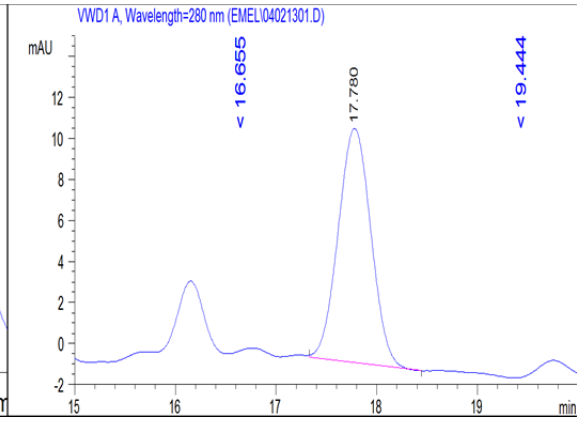

Figure 4. Melatonin standart with plant extract

Discussion and Conclusion

In previous reports, feverfew (*Tanacetum parthenium*), St John's Wort (*Hypericum perforatum*) and Huang Qin (*Scutellaria Baicalensis*) known with their rich melatonin content. (6) Murch et all. studied melatonin content of dried and fresh leave of *T. parthenium* (1.37-2.45 µg/gr) *H. perforatum* (1.75 µg/gr) and *S. baicalensis* (7.11 µg/gr). Ansari et al. (2010) determined the melatonin content of dried material of *Tanacetum parthenium* leave extracts with hot water extraction 1120 ng/g, methanol extraction, 2086.9 ng/g ın HPLC-UV device, ın ELİSA method hot water extraction 1010.6 ng/g, methanol extraction 1803.4 ng/g. Chen et all. (2003) determined the melatonin content in 108 chinese medicinal plant with HPLC-FD. Sixty four of these herbs contained melatonin in excess of 10 ng/g dry mass. Among these, 39 had melatonin levels in excess of 100 ng/g and 10 of them had melatonin levels in excess of 1000 ng/g. *Periostracum cicadae* has the highest melatonin content with 3,771ug.(14). Dıraz et al. (2013) determined melatonin content of *Tanacetum densum* subsp. *amani* as 8.46 µg/gr and *Tanacetum armenum* as 5.48 µg/gr.

As conclusion, *Tanacetum cadmeum* ssp. *cadmeum* has higher melatonin content than *T. parthenium* which commercially available as capsule forms. Our results showed that *Tanacetum cadmeum* ssp. *cadmeum* has the higher melatonin content in the plants which studied before. Only, *Tanacetum densum* subsp. *amani* has higher melatonin content than *Tanacetum cadmeum* ssp. *cadmeum.*

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Low Temperature Tolerance of Leaf Tissues in Cold-Acclimated Strawberry Plants

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Abstract

Frigo seedlings of Camarosa and Cal-Giant 3 (CG3) strawberry cultivars were grown in greenhouse for 8 weeks (until they had 5-6 leaves). Plants were then transferred to a climate chamber (5°C, 60% humidity, 12 h photoperiod) for cold acclimation for 15 days. Leaf tissues collected from cold-acclimated and non-acclimated plants were exposed to controlled freezing test (0, -5, -10 and -20°C) for 12 hours in manually-controlled low-temperature freezer. Following each temperature test, the activity of antioxidant enzymes catalase (CAT), ascorbate peroxidase (APX) and glutathione reductase (GR) were analysed. The activities of enzymes increased according to decrement of temperature and reached to the highest level at -20°C. In addition, the results indicated that the enzyme activities of cold-acclimated leaf tissues were lower than non-acclimated ones.

Keywords: Strawberry plants, low temperature, cold-acclimation, enzyme.

Introduction

Low temperature stress affects plant growth and decreases crop productivity (Ingram and Bartels, 1996). It is important to improve stress tolerance of the plant to increase yield under stress conditions. However, plants respond and adapt to low temperature stress and can increase their freezing tolerance with physiological and developmental changes (Thomashow, 1999; Shinozaki and Yamaguchi-Shinozaki, 2000; Cansev et al., 2009). Low temperature stress conditions generally can cause to generate reactive oxygen species (ROS) including superoxide (O_2^-), hydrogen peroxide (H_2O_2) and hydroxyl radical (OH^-) (Liu and Huang, 2000; Kocsy et al., 2004). These ROS inactivate enzymes and have harmful effects on important cellular components (Arora et al., 2002; Howarth, 2005; Ershova et al., 2011).

Antioxidant system is one of the protective mechanisms in plant cells, thus, plants have developed a complex antioxidant system to reduce and repair damage initiated by ROS (Foyer et al., 1994). ROS accumulation is counteracted by enzymatic antioxidant systems that include a variety of scavengers, such as ascorbate peroxidase (APX), glutathione reductase (GR) and catalase CAT (Gulen and Eris, 2004; Xu et al.; 2006, Gill and Tuteja, 2010).

Understanding the mechanisms of low temperature adaptation is crucial to the development of cold-tolerant crops. The study was designated to explore the physiological mechanism of cold tolerance in strawberry plants. The responses of the 'Camarosa' and 'CG3' strawberry (*Fragaria x ananassa* L.) cultivars to low temperature stress were also evaluated and compared by measuring injury and determination of APX, CAT and GR activities under low temperatures with cold-acclimated (CA) and non-acclimated (NA) plants. Moreover correlation between heat and cold tolerance of the plants was also investigated, since cvs. 'Camarosa' and 'CG3' are known heat tolerant and heat sensitive, respectively (Kesici et al., 2013).

Materials and Methods

Camarosa (heat-tolerant) and CG3 (heat-sensitive) strawberry (*Fragaria x ananassa*) seedlings were grown in a greenhouse for 8 weeks (25/10°C day/night temperature, 60% relative humidity and 12 h photoperiod). Half of the plants were transferred to a climate chamber with constant +5°C, 60% relative humidity and 12 h photoperiod for 15 days for cold acclimation (CA). The other half of the plants were kept in the greenhouse for control and non acclimation (NA) treatments. Leaf samples taken from NA and CA plants were exposed to low temperature (0, -5, -10 and -20 ° C) for 12 hours under controlled conditions.

Leaf discs in 2 cm diameter were used to measure cell membrane injury (Arora et al., 1998; Gulen and Eris, 2003). Discs were placed in test tubes then, 20 ml of distilled water was added to each test tube. After mesurements of electrical conductivity of using a conductivity meter, percentage injury of each treatment was calculated from ion leakage data using the equation: %injury=[(% L(t)-% L(c)) / (100-% L(c)] x 100, where % L(t) and % L(c) are percentage ion leakage data for the treatments or control samples, respectively (Arora et al., 1992).

Enzymes were extracted at 0–4 °C from 0.5 g of leaves, by grinding them with mortar and pestle in 1.0 % polyvinylpolypyrrolidone (PVPP) and 2 ml of the following extraction solution; 50 mM K-PO_4 buffer, pH 7.8 (for APX), 100 mM K-PO_4 buffer, pH 7.0 (for CAT), 50 mM K-PO_4, pH 7.6 (for GR) and the homogenate was centrifuged at 15,000 g for 20 min at 4 °C. The supernatants were used for the enzymatic assays. APX activity was determined by measuring decrease in absorbance of the oxidized ascorbate at 290 nm, according to Nakano and Asada (1980). CAT was assayed by monitoring the consumption of H_2O_2 at 240 nm (Rao et al., 1996). GR activity was determined by following the oxidation of NADPH at 340 nm (Cakmak and Marschner, 1992). Protein content was measured using Bradford assay method.

The experiment was arranged in a randomized block design with three replications. Data were tested by SPSS 13.0 for Windows program. Differences between applications were introduced 'Duncan' test with a significance level of 0.05.

Results

The percentage of injury based on electrolyte leakage in leaf discs exposed to low temperature stress for different stages (CA and NA) was shown in Figure 1A. In general, cold stress increased the percentage of injury in both stages, especially -10 and -20°C. However, injury of CA plants was less than NA plants in both cultivars.

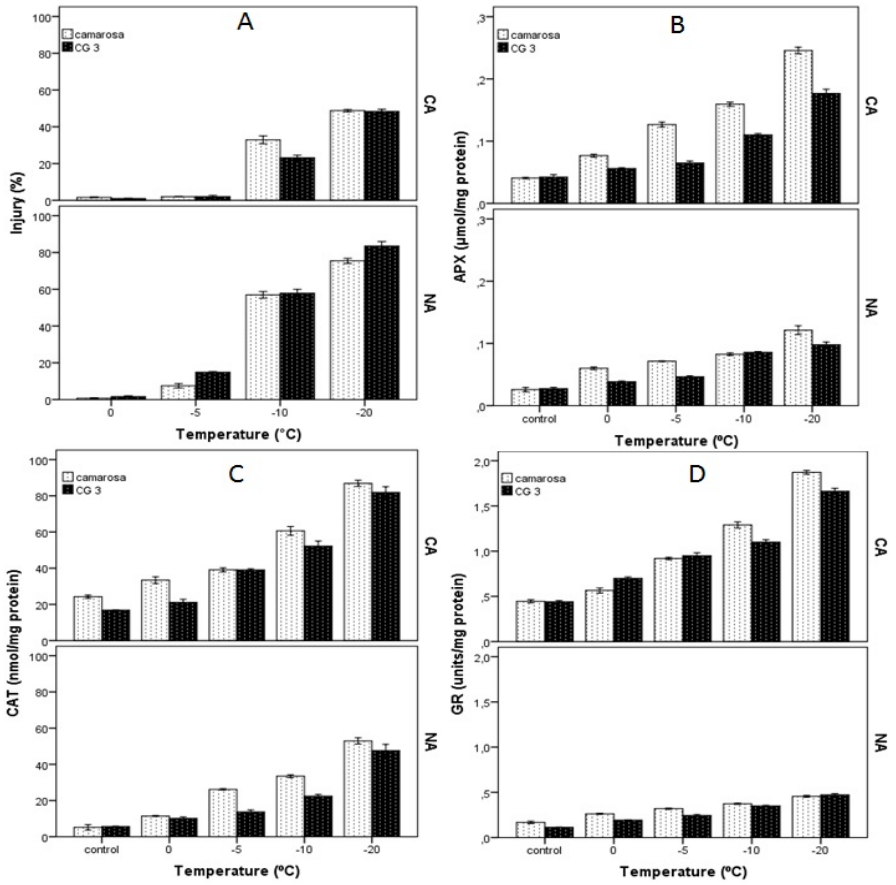

Figure 1. Effect of low temperature on enzymatic activity in leaf tissues of two strawberry cultivars in the CA and NA. A: Injury, B: Ascorbate peroxidase (APX) activity, C: Glutathione reductase (GR) activity and D: Catalase (CAT) activitiy. Values are means from three replications and vertical bars indicate ± S.E.

APX activity was increased with the decrease of temperature. Also the activity of CA plants was over than NA plants in both cultivars (Figure 1B). APX activity was higher in 'Camarosa' than in 'CG3' at all samples. The significant increase was observed in CAT activity during the CA stages in both strawberry cultivars (Figure 1C). The activity of cultivars was increased when temperature was decreased. CAT activity of 'Camarosa' was higher than 'CG3' almost in all temperatures. Similar conditions were observed for GR activity of cultivars in terms of both stages and temperatures (Figure 1D).

Discussion and Conclusion

In general, plants from temperate climatic regions are considered to be chilling tolerant to variable degrees, and their freezing tolerance can be increased by exposing to cold, but non-freezing, temperatures; this process is known as cold acclimation (Sanghera et al., 2011). In this study it is also indicated that the cultivars can adapt to cold stress when they acclimated 15 days at +5°C. Correlatively, Gülen et al., (2008) found that the decrease in injury on the 7th day of the low temperature treatment was correlated to cold acclimation of the strawberry leaf tissues.

APX is thought to play the most essential role in scavenging ROS and protecting cells in higher plants (Gill and Tuteja, 2010). APX is found almost every compartment of the plant cell and it participates in the removal of H_2O_2 as part of the ascorbate-glutathione pathway (Mittler and Poulos, 2005). CATs are tetrameric heme containing enzymes with the potential to directly dismutate H_2O_2 into H_2O and O_2 and are indispensable for ROS detoxification during stressed condition (Garg and Manchanda, 2009). GR catalyzes the reduction of GSH, a molecule involved in many metabolic regulatory and antioxidative processes in plants where GR catalyses the NADPH dependent reaction of disulphide bond of GSSG and is thus important for maintaining the GSH pool (Reddy and Raghavendra, 2006). An increased activity of one or more antioxidative enzymes may be accompanied of process of stress tolerance in plants (Zhou and Zhao, 2004). Strawberry exposed to low temperature can increase cold resistance through an increase in the activity of antioxidative enzymes (Gülen et al., 2008; Zhang et al., 2008; Turhan et al., 2012). APX, CAT and GR activities of strawberry leaf tissues were increased with severity of low temperature especially in CA stage. These results are in agreement with several previous studies that have demonstrated the important role of APX, CAT and GR in increasing oxidative tolerance in plant tissues (Cansev et a.,l 2011; Kuk et al., 2003; Chen et al., 2006).

In conclusion, CA induces antioxidant enzyme activities in both cultivars and it is also explain that injury of plants in CA was less than in NA. Moreover cv. 'Camarosa' showed greater tolerance to cold stress than cv. 'CG3, which is parallel to response of the cultivars to heat stress.

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Effects of Nitrogen Levels on the Grain Yield and Related Characteristics of Sweet Sorghum (*Sorghum bicolor* (L.) Moench *var. saccharatum*) in a Mediterranean Environment

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Abstract

In an attempt to evaluate the effect of six N levels (0-75-150-225-300-375 kg ha^{-1}) on the grain yield, thousand grain and hectolitre weight of sweet sorghum (*Sorghum bicolor* (L.) Moench *var. saccharatum*), an experiment was carried out at the Bornova experimental fields of Field Crops Dept. of Agriculture Fac., Ege Univ., Turkey, during 2010 and 2011 second crop growing season. The field experiment was assessed in randomised complete block with three replications. Results indicated that the effects of N treatments on plant height, grain yield and hectoliter weight were significant except year effect on thousand grain weight. The highest grain yields were obtained with the application of 225 kg ha^{-1} nitrogen in sweet sorghum cv. Keller under second crop production system.

Keywords: Sweet sorghum, N level, grain yield, thousand grain weight.

Introduction

Increasing the share of world energy that comes from renewable sources is critical in stabilizing the global climate. Among renewable energy sources, only biomass can provide fuel and electricity in a form and scale that is compatible with existing transportation and power generation infrastructure (Heaton et al., 2010). Unlike wind and solar energy, biomass can be converted directly into liquid fuel (ethanol) by a variety of conversion routes, as is current practice with petroleum, or it can be stored to generate electricity on-demand, as is the current practice with coal. It also provides raw material for renewable alternatives to fossil-based products. Biomass is also the only available source of renewable carbon for products currently made from fossil carbon sources (Heaton et al., 2010; Rutto et al., 2013).

Ethanol is the number-one biofuel currently produced mainly from maize (*Zea mays*) and sugarcane (*Saccharum officinarum*) or sugar beet (*Beta vulgaris*). Sweet sorghum (*Sorghum bicolor var. saccharatum*) is similar to grain sorghum, having fast growth, high biomass production and wider adaptability and is known to have great potential such as 2-3 t ha^{-1} in ethanol production (Reddy et al. 2005). There is an increased interest in the utilization of sweet sorghum for ethanol production in many countries like India, the Philippines, China and USA, as its growing period (about 4 months) and water requirement (8000 m^{-3} over two crops) (Soltani and Almodares, 1994) are 4 times lower than those of sugarcane (12–16 months and 36000 m^{-3} $crop^{-1}$, respectively).

Sweet sorghum is well adapted to sub-tropical and temperate regions, being highly biomass productive and water efficient. Under low soil moisture conditions, sorghum maintains its physiological activity close to that of plants with sufficient moisture by increasing root length, density, and water-use efficiency. Compared to other sorghums, sweet sorghum produces less grain but contains a large amount of readily fermentable sugars in the stem. Also like grain sorghum, starch reserves in sweet sorghum grain can be used for ethanol production (Rutto et al., 2013). Sweet sorghums produce 23% more fermentable carbohydrates, require 37% less nitrogen fertilizer and 17% less irrigation water than maize, and could yield more ethanol than maize during a dry year. Determination of starch composition in sweet sorghum seed is also important because some sweet sorghum varieties may have potential as dual-purpose crops yielding both sugar-rich extractable juice and grain. To make sweet sorghum a sustainable and profitable crop, there is a need for standardization of agronomic practices, apart from breeding high-yielding cultivars, which can contribute to increased yields resulting in higher returns to farmers (Reddy et al., 2008).

Application of fertilizers has a direct impact on crop productivity and nitrogen (N) is one of the major nutrients that support crop growth and is the most responsive nutrient required by sorghum (Singh et al., 1972). N increase sucrose content, protein percent, grain yield and growth rate in sweet sorghum (Jonston, 2000). The crop accumulates large amounts of sugar in its stems near the time of grain maturity. Sweet sorghums have 55 to 75% total starch content in grain, with non-resistant starch being 60-70% (Rutto et al., 2013). The results of much survey indicate that sweet sorghum appears to be most suitable and promising energy source for the existing conditions in Turkey. This study was designed to determine the optimum N level of application in sweet sorghum for obtaining highest grain yield under Mediterranean climatic conditions of Izmir/Turkey.

Materials and Methods

The experiment was carried out during second crop growing season of 2010 and 2011 (Table 1), on a silty-clay loam soil with 7.8 pH (Table 2) at Bornova experimental area (38°27.236 N, 27°13.576 E) in Ege University, Izmir, Turkey, at about 20 m a.s.l. with typical Mediterranean climate characteristics.

The following measurements were made on the soil samples collected in April 2010: pH (Jackson, 1967), water soluble total salt (Anonymous, 1951), $CaCO_3$ (Schlichting and Blume, 1966), organic matter% (Reuterberg and Kremkus, 1951) and texture (Bouyoucos, 1962); macronutrient content such as total-N%(Bremner, 1965), available P (Bingham, 1962) and K^+ (with 1 N CH_3COONH_4 according to Jackson (1967).

The experiment was carried out with a randomised complete block design with three replicates; six different N levels (0-75-150-225-300-375 kg ha^{-1}) were tested on sweet sorghum. ½ dose of N fertiliser (urea) was applied before sowing, and the rest ½ of N was applied at 7-10 leaf stage as NH_4NO_3. All plots even control were fertilised using 80 kg ha^{-1} P_2O_5 before sowing. June 22nd 2010 and July 1st 2011, seeds of sweet sorghum cultivar 'Keller' were planted in furrows 4 m long and 0.7 m apart, respectively.

Following establishment, plants were hand-thinned to 10 cm apart on rows so that the final populations were 142,857 plants ha^{-1}. Drip irrigation system was installed during the both growing season. No herbicide was used to control weeds, only hand hoe was done once at the beginning. Alphacypermethrin was applied at 6-7 leaf stage of crops to control *Ostrinia nubilalis*.

Table 1. Some meteorological data of experimental area in Bornova in 2010 and 2011

	Temperature (°C)			Precipitation (mm)		
Months	2010	2011	LYA	2010	2011	LYA
June	25.5	25.4	25.0	76.3	0.6	8.2
July	28.8	28.9	27.6	0.0	0.0	3.6
August	30.2	28.1	27.0	0.0	0.0	2.1
September	24.9	25.6	22.2	12.3	8.6	17.0
October	18.8	17.1	18.0	232.5	90.3	46.8
✕- Σ	25.6	25.0	24.0	321.1	99.5	77.7

LYA: Long year's average

Table 2. Soil characteristics of the experimental area

Soil (20-40 cm)			
Sand (%)	32.7	pH	7.8
Clay (%)	30.6	OM (%)	1.1
Silt (%)	36.7	N (%)	0.1
$CaCO_3$ (%)	18.6	P (ppm)	0.4
Salt (%)	0.07	K (ppm)	400

Plants were harvested after the grain reached hard dough stage (moisture 25-30%) by cutting and bundling plants from the two inner rows per plot. Bundles were transported to a work area where grain heads were cut and bagged. Grain heads were dried to moisture content below 13% before threshing by hand. Grain weight was determined per plot. Hectoliter weight was determined from two grain samples taken at harvest from each plot using standard procedures (Schopper chondrometer). Average 1000-grain weight was determined by counting and weighting four 100-grain samples. All data were statistically analyzed using analysis of variance (ANOVA) with the Statistical Analysis System (SAS, 1990). Probabilities equal to or less than 0.05 were considered

significant. If ANOVA indicated differences between treatment means, a LSD test was performed to separate them.

Results and Discussion

Plant height: Growing season significantly affected plant heights (Table 3), which averaged 208.9 cm in 2010 and 206.2 cm in the following year. Plant height of sweet sorghum crops increased noticeably by increasing N treatments, 225 kg ha^{-1} N level possessing max plant high (224.8 cm). Highly significant differences among the years were an indication of plant height variation at different N levels depending on the changes of climatic parameters of consecutive years. Some reports show that application of N increases plant height in sweet sorghum (Jonston, 2000; Almodares et al., 2007; Amiri et al., 2014).

Grain yield: The ANOVA results showed that the sweet sorghum grain yield was significantly affected by the rate of N at 5% probability level. The interactive effect of N level and year was not significant. Grain yields in sweet sorghum increased with the increasing rate of N, and 225 kg ha^{-1} N level had highest grain yield (2155 kg ha^{-1}) while control plots had the lowest (1162 kg ha^{-1}). Any significant difference in terms of grain yield was not observed between the years which averaged 1648 kg ha^{-1}. Many studies have shown that grain yield of sweet sorghum significantly differed at different N levels and, grain yield increased as more N application doses (Zandi and Shakiba, 2013; Amiri et al., 2014). Present results are in agreement with the above mentioned reports because of the type of the N treatments that were included both amount and timing of N application factors.

Table 3. Effect of N levels on the grain yield and other characteristics of sweet sorghum

N levels (kg ha^{-1})	2010	2011	2 yrs average	2010	2011	2 yrs average
	-------- Plant height (cm) --------			---------- Grain yield (kg ha^{-1}) ----------		
0	198.1	194.1	196.1 e	1177	1146	1162 e
75	201.9	198.9	200.4 d	1333	1296	1315 d
150	205.1	203.1	204.1 c	1870	1818	1844 b
225	225.7	223.9	224.8 a	2197	2113	2155 a
300	212.2	209.5	210.9 b	1750	1680	1715 c
375	210.5	207.5	209.0 b	1733	1662	1698 c
Mean	208.9	206.2	207.5	1677	1619	1648
LSD (.05)	Y: 1.1 N: 1.9 NxY: ns CV(%):7.6			Y: ns N: 108.9 NxY: ns CV(%): 5.5		
	-------- 1000 grain weight (g) --------			-------- Hectoliter weight (kg) --------		
0	22.8	23.9	23.3	46.4	46.1	46.3
75	23.3	24.3	23.8	47.1	46.1	46.6
150	24.4	25.3	24.9	47.9	47.1	47.5
225	24.3	25.0	24.6	48.7	48.4	48.6
300	23.9	24.5	24.2	48.1	47.7	47.9
375	23.7	24.1	23.9	47.3	46.1	46.7
Mean	23.7	24.5	24.1	47.6	46.9	47.3
LSD (.05)	Y: ns N: ns NxY: ns CV(%): 5.8			Y: 0.1 N: 0.3 NxY: 0.4 CV(%): 5.1		

Y: year, N: nitrogen levels, NxY: interaction, CV: coefficient of variance, ns: not significant

1000 grain and hectoliter weight (HW): Thousand grain weight of sweet sorghum was not affected by N levels or growing season and averaged 24.1 g across all treatments. Small but significant differences existed between N levels and NxY interaction for hectoliter weight of sweet sorghum. The highest HW (48.7 kg) recorded in 225 kg ha^{-1} N level treatment in 2010. Year effect was also significant and average HW of the first year (47.6 kg) was found to be higher than the second year (46.9 kg). Apparently, 1000 grain weight was negatively associated with the HW in our study. HW of sorghum grain increased by increasing rate of N level till 225 kg ha-1 then decreased. One of the oldest and most frequently used criteria for the evaluation of storage volume and milling quality for grain is hectoliter weight since it may indicate potential flour yield (Singh et al., 1972). Contrary to grain yield responses, hectoliter weights were significantly smaller in the lower yielding growing season of 2011 being 1619 kg ha^{-1} grain vs. 46.9 kg hl^{-1} on average when

compared to those in the previous growing season which were 1677 kg ha^{-1} grain vs. 47.6 kg hl^{-1}. HW weight was also affected by N fertilization inputs. Although absolutely and relatively small, significantly higher HW was found at the high-N input, which averaged 48.6 kg compared to 46.3 kg at the control rate. These results are in full contrast with those for the 1000-grain weights, demonstrating that the HW may vary depending not only on grain weight but also on grain shape and texture, as also shown by Singh et al. (1972) and Jonston (2000). Almodares et al. (2006) reported that grain yield in sweet sorghum increased by the application of 90 kg N+90 kg K per ha under Iran conditions, although increasing N+K levels did not effect 1000 grain weight. Amiri et al. (2014) emphasized that grain yield in sorghum increased with the increasing N rate, but there were no significant differences among 160 kg ha^{-1} or 240 kg ha^{-1} N doses, and effect of N rate was not significant on 1000 grain weight.

Conclusion

Based on the these results to obtain highest grain yield, we suggested that Keller cultivar of sweet sorghum may be preferred, which well adapted to experimental area and 225 kg ha^{-1} N treatment should be applied for higher grain yields and related properties under second crop production system.

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Pre-study on Some Morphological Properties of Endemic *Fritillaria fleischeriana*

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Abstract

Turkey is a very rich country in terms of plant diversity. It has about 11.000 plant species involving approximate 3000 endemic plants, 700 of which are geopythes. These are called natural flower bulbs. Bulbous, tuberous and rhizomed plants are all referred as bulbous plants in general. Turkey has 40 genuses of natural flower bulbs. One of these is *Fritillaria fleischeriana*, spreading in the Sultan Mountains, 1665m above the sea level, Afyonkarahisar. This study was conducted in 2013 to determine some morphological properties of *Fritillaria fleischeriana*. *Fritillaria fleischeriana* is a bulbous plant and blooms from April to May with purple tepal with 20.29 mm in length and 11.50 mm in width. The number of tepal is about 6. Stem length of *Fritillaria fleischeriana* is 18.10 cm and stem diameter is 2.90mm. Bulb diameter is between 8.65 mm and 17.65 mm and bulb weight about 0.90g. *Fritillaria fleischeriana* has green leaves and number of leaf is 5.71 and leaf length is around 5.83 mm. It contains one pistil and six stamens. Stamen length is 13.09 mm and it is shorter than pistil. *Fritillaria fleischeriana* can be used as an ornamental plant.

Keywords: *Fritillaria fleischeriana*, endemic plant, ornamental plant, geopythes, morphology

Introduction

Turkey is a rich country with regard to natural flower bulbs. Natural flower bulbs are the plants whose above ground parts such as stems, leaves and flowers dries and dies after completing their growth period and which in summer months live on thanks to their under earth storing parts such as bulbs, tubers and rhizomes. These are called geophytes. Bulbous, tuberous and rhizomed plants are all referred as bulbous plants in general. These are economically important in the sector of ornamental plants (Aksu et al. 2002; Zencirkıran. 2002). There are 40 genuses of natural flower bulbs (geophytes) which have totally 700 species in Turkey. Many of the geophytes which ornament the European gardens have originated from the Anatolian soils (Baytop. 1998; Ekim et al. 2005). Natural flower bulbs have been exported from Turkey for a long time (Arslan. 2000). *Fritillaria fleischeriana* Steudel Et Hochst. Ex Schultes Et Schultes Fil. is a rare perennial bulbous plant belonging to the *Liliaceae* family and found in Western Turkey between Ankara and Izmir (Afyonkarahisar, Ankara, Bilecik, İzmir) on steppes and dry clay hills at about 1000m. (Anonymous 2014a; Anonymous 2014b). This research was carried out to determine some morphological properties of *Fritillaria fleischeriana* in the Sultan Mountains, Afyonkarahisar, Turkey.

Material and Methods

This study was carried out in the Sultan Mountains (38° 30' 00″ North, 31° 10' 00″ East, with an altitude of 1665m), Afyonkarahisar, Turkey in 2013. *Fritillaria fleischeriana* is usually located in the hilly open areas of Sultan Mountains looking at the north (Figure 1a). The open area looking at the north was chosen as the study area. Twenty one plants were randomly selected from the study area and the data of the plants were analyzed (Figure 1b). Date of emerging, beginning of flowering and percentage of flowering of the plants were determined. Bulb diameter, bulb length, bulb height, stem length, stem diameter, leaf length, leaf width, tepal length, tepal width, stamen length and pistil length of *Fritillaria fleischeriana* were measured with calipers and ruler. Then, the number of leaf, number of tepal, number of stamen and number of pistil were counted. Bulb digging was performed on 10 July 2013. The data were analyzed by SPSS 15 and minimum-maximum and mean values with standard deviations were obtained.

Results and Discussion

The dates of emerging of the selected plants took place between 26 March and 2 April 2013. The beginning of flowering was on 14 April 2013 with 100% of flowering (Figure 1c).

Bulb diameter: A total of 53 *Fritillaria fleischeriana* bulbs were obtained from 21 selected plants. In the measurements, mean bulb diameter was determined as 13.03 mm ± 2.5 (Table 1) with minimum diameter of 8.65 mm and maximum diameter of 17.65 mm (Figure 1d). Similarly, Alan (2008), found that bulb diameter of *Fritillaria fleischeriana* was between 5-15 mm.

Bulb length: Bulb length ranged from 7.77 and 13.86 mm with an average of 10.99 mm ± 1.28 (Table 1).

Bulb weight: Minimum bulb weight was found as 0.30 g. On the other hand, maximum bulb weight was 2.15 g. Mean bulb weight was determined 0.90 g ± 0.39 (Table 1). A positive correlation of 99% was found between bulb diameter, bulb length and bulb weight. As the bulb diameter increased, bulb length and weight increased.

Stem length: Mean stem length of the total 21 stems was determined as 18.10 cm with 28.00 cm of maximum and 10 cm of minimum stem length (Table 1). Alan (2008) observed 12-23.5 cm of stem length in *Fritillaria fleischeriana.*

Stem diameter: Stem diameter varied between 1.84 mm and 4.40 mm. Mean stem diameter was 2.90 mm ± 0.56 (Table 1). A ninety nine percent positive correlation was found between stem length and stem diameter. Increase in stem diameter resulted in increase in stem length.

Number of leaf: Of the 21 selected plants, minimum number of leaf was 4 and maximum was 6. Mean leaf number was found as 5.71 ± 1.55 (Table 1). Alan (2008) observed 4-8 leaves in *Fritillaria fleischeriana*.

Leaf length: Leaf length ranged from 5 to 8 cm with a mean of 5.82 ± 0.80 (Table 1).

Leaf width: Minimum leaf width was determined 12.63 mm, whereas maximum leaf width was 22.42 mm. Mean leaf width was 15.97 mm (Table 1). A positive relation between the number of leaf ($p=0.05$), leaf length ($p=0.05$), leaf width ($p=0.01$) and stem diameter was found. An increase in these parameters caused an increase in stem diameter.

Number of tepal: The number of tepal was 6 – 13 with an average of 6.27 (Table 1).

Tepal length: Tepal length ranged between 16.75 mm and 23.25 mm with an average of 20.29 mm (Table 1).

Tepal width: Tepal width varied between 5.79 and 13.45 mm with an average of 11.50 mm.

Number of stamen: The number of stamen from 24 measurements occurred as 6.13 ± 1.08 and ranged from 5 to 11. Twin stamens took place in some plants.

Stamen length: Minimum stamen length was 10.97 mm; on the other hand, maximum stamen length was 16.32. Mean stamen length was found as 13.09 mm.

Number of pistil: Mean number of pistil from 24 measurements was determined as 1.04 ± 0.20. Maximum pistil number was 2.

Pistil length: Mean pistil length was found as 16.48 ± 1.62 mm and varied between 12.04 and 19.22 mm.

Table 1. Biometric measurements of *Fritillaria fleischeriana*.

Part of Plant / Parameter	Number of Measurements	Minimum	Maximum	Mean	SD
Bulb Diameter (mm)	53	8.65	17.65	13.03	2.05
Bulb Length (mm)	53	7.77	13.86	10.99	1.28
Bulb Weight (g)	53	0.30	2.15	0.90	0.39
Stem Length (cm)	21	10.00	28.00	18.10	4.31
Stem Diameter (mm)	21	1.84	4.40	2.90	0.56
Number of Leaf	21	4.00	9.00	5.71	1.55
Leaf Length (cm)	21	5.00	8.00	5.83	0.80
Leaf Width (mm)	21	12.63	22.42	15.97	2.19
Number of Tepal	26	6.00	13.00	6.27	1.37
Tepal Length (mm)	28	16.75	23.25	20.29	1.50
Tepal Width (mm)	24	5.79	13.45	11.50	1.64
Number of Stamen	24	5.00	11.00	6.13	1.08
Stamen Length (mm)	25	10.97	16.32	13.09	1.45
Number of Pistil	24	1.00	2.00	1.04	0.20
Pistil Length (mm)	25	12.04	19.22	16.48	1.62

Figure 1. Research area (a). *Fritillaria fleischeriana* (b.c). Bulbs of *Fritillaria fleischeriana*

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Soccer Playing Characteristics of Some Soccer Fields Around Izmir/Turkey under Mediterranean Conditions

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Abstract

In an attempt to investigate the recent situation and problems of soccer fields around Izmir area with a typical Mediterranean climate, turf quality and soccer playing characteristics of 10 soccer fields were tested during four different seasons in between 2012-2013. Ground cover, visual turf quality and some soccer playing quality traits such as ball rebound (cm), ball roll (cm), force reduction (%) and vertical deformation (mm) were assessed in four different seasons using "Club Set" of Deltec Equipment Company on the playing grounds of those soccer fields (Alacati, Alsancak, Ataturk, Bayindir, Cesme, Ege University, Gaziemir I, Gaziemir II, Halkapinar, Urla).

Differences of turf quality and soccer playing characteristics of the fields in different seasons and the effect of soccer field x season interaction were significant. The results of the experiment highlighted that turf cover and visual turf quality values of soccer fields established with C_3-cool season turf grass mixtures were very limited, being out of acceptable range, except the two fields with C_4-warm season grasses.

Turf quality and soccer playing characteristics differed with the turf grass type, cover rate, wetness (season) and texture of the root zone soils of soccer fields depending on the construction techniques and uncontrolled uses in different seasons.

Keywords: Soccer fields, turf quality, soccer playing characteristics, mediterranean ecology

Introduction

In Modern World, in addition to the turf quality characteristics, playing quality testing now forms a significant part of turf research programmes. There has also been an increasing interest in developing countries in the use of performance standards, incorporating playing quality measurements (Lulli et al., 2004).

The principal objectives of sports turf research are to provide a playing surface that is hard wearing and that can be managed with an acceptable budget, but above all we should be striving to produce a surface that maximises a player's enjoyment of a game and minimises the risks of injury. The players are also sensitive to physical properties of a playing surface, most notably in terms of traction hardness for running and falling, the interaction of the ball with the surface, its bounce and pace (Baker and Canaway, 1993), the evenness of the surface in terms of bumps and hallows, and grass cover. Since the turf cover and root zone soil texture in soccer fields have the major roles to provide a high quality playing ground, soccer field constructions and turf grass choices and establishment techniques in developing countries mainly in Mediterranean zone comprise many questions.

The purpose of the recent study was to detect and evaluate the turf cover, visual turf quality, and some soccer playing characteristics of the soccer fields around Izmir area for the first time and to generate information for the responsible authorities in Mediterranean environments to improve the soccer field playing grounds.

Materials and Methods

This study was conducted on the below mentioned soccer fields in Izmir area (38°26′0″ N, 27°9′0″ E) at about 21 m above sea level, testing turf quality and soccer playing characteristics in four different seasons of typical Mediterranean climate in between 2012-2013.

The following evaluations were carried out during the trial **(**Anon., 2009). Turf cover was determined by quadrate (dm^2, 4 reps.) on each soccer field as per cent ground cover in the middle of each season. The root zone of all soccer fields were analysed in terms of soil texture and types were identified. Turf grass type (or mixture) information were provided by authorities of soccer fields officially, informing that the turf of the eight fields were established using traditional turf mixture (*Lolium perenne 50% + Festuca rubra rubra* 20% + *Festuca rubra commutate* 10% + *Festuca ovina* 10% + *Poa pratensis 10%*), one field with Bermuda grass, and Gaziemir II field was covered with native weed (Barnyard grass: *Echinochloa*

crusgalli), and irrigation was provided twice a week. Visual turf quality estimates were made at monthly intervals and mentioned seasonally throughout the year. These rating were based primarily on a composite of three components; turf colour, texture and uniformity of appearance. Rating scale used 1= poorest and 9= highest quality. The following Soccer Playing Characteristics were also measured on the fields. Ball rebound (Football FIFA playing quality standard 5, inflated to 0,9 bar, released from a height of 2 m.) and data were given as cm, ball roll (cm), force reduction (%) and vertical deformation (mm) characteristics were measured as FIFA standards (Anon., 2009) using "Club Set" of Deltec Equipment Company. Statistical analyses were conducted by using TOTEMSTAT Statistical Program (Acikgoz et al., 2004). Probabilities equal to or less than 5% were considered significant. If TOTEMSTAT indicated significant differences between treatment means a LSD test was performed to separate them.

Table 1. Turf grass type and other properties of soccer fields tested.

Soccer Field	Turf Grass Type	Root Zone Soil Type	Maintanance Measures	Ownership	Rate of Use
Alsancak	Traditional Mix	Silty-clay	Irrigation+Mowing	Soccer Club	Intensive
Alacati	Traditional Mix	Silty-clay	Irrigation+Mowing	Municipality	Intensive
Ataturk	Traditional Mix	Silty-clay	Irrigation+Mowing	Ministry of Sport	Controlled
Bayindir	Traditional Mix	Sandy-loam	Irrigation+Mowing	Ministry of Sport	Controlled
Cesme	Traditional Mix	Silty-clay	Irrigation+Mowing	Municipality	Intensive
Ege University	Bermuda Grass	Sandy-loam	Irrigation+Mowing	University	Controlled
Gaziemir I	Traditional Mix	Silty-clay	Irrigation+Mowing	Soccer Club	Intensive
Gaziemir II	Barnyard Grass	Silty-clay	Irrigation+Mowing	Soccer Club	Intensive
Halkapinar	Traditional Mix	Silty-clay	Irrigation+Mowing	Ministry of Sport	Controlled
Urla	Traditional Mix	Silty-clay	Irrigation+Mowing	Municipality	Intensive

Results and Discussion

Turf cover (%): Cover characteristics results in different soccer fields and statistical parameters were summarised in Table 2. Main effects of soccer field type and seasons and soccer field x season interaction were significant. Bayindir, Ataturk and Ege University fields had higher cover rates among others and cover rates of Ege University field was also higher than others almost in all seasons except winter. It was due to the better adaptation of warm season grass (Bermuda) in the Ege University field under Mediterranean environmental conditions (Martiniello and Andrea, 2006) and natural favourable soil texture of Bayindir field. Ataturk field root zone soil was also a proper mixture for turf management having sandy-loam texture (Table 1). Performances of other soccer fields having also cool season turf grass traditional mixtures were very limited, being extremely low in summer. These results were attributed to the restricted adaptive capacity of cool season grasses to heat and drought stresses of Mediterranean environment (Salman et al., 2011).

Visual turf quality (1-9 point): Visual turf quality ratings of different soccer fields in four seasons and statistical parameters were indicated in Table 2. Soccer field x season interaction was significant resulting from the apparent variation among the soccer fields in various seasons and visual quality scores of all fields were highly limited except Bayindir, Ege University and Gaziemir I fields. Although the average quality scores of those three soccer fields were not in an acceptable level, Ege University field scores were higher than others in spring, summer and autumn. Soccer fields with sandy-loam soils and most particularly Bermuda grass cover (Ege University field) had higher visual quality rate under experimental conditions due to the better adaptability and grass growth (Volteranni and Magni, 2004). All soccer fields had very low scores in summer; on the contrary, Ege University field with Bermuda grass stand displayed highest quality score.

Ball rebound (cm): Ball rebound values of soccer field alternatives in four different seasons and the results of statistical analysis indicated significant variations in terms of main effects and soccer field x season interaction. Average ball rebound values of all soccer fields were over the acceptable level (60-85 cm) except Ege University and Gaziemir II fields. We suggested that the dense crop cover of Bermuda grass in the Ege University and intensive Barnyard grass invasion in Gaziemir II soccer fields caused this result and decreased ball rebound values down to the acceptable ranges. Grossi et al. (2004) explained that ball rebound test results could be vary downward in wet conditions or with a slightly higher grass heights.

Ball roll (cm): Ball roll values of soccer field alternatives in different seasons and statistical parameters were summarised in Table 2. Average ball roll values of various soccer fields were between the standard ranges (4-10 m) except Cesme and Ege University field. Although the differences were significant, ball roll distance variation among the soccer fields was inconsistent and dependant on many other variables like wind effect, direction and evenness in addition to turf cover, height and turf type (Reyneri and Bruno, 2004).

Table 2. Various traits of soccer fields tested in different seasons.

Soccer Field (SF)	Turf Cover (%)					Visual Turf Quality (1-9 point)				
	Season (S)					Season (S)				
	Winter	Spring	Summer	Autumn	Mean	Winter	Spring	Summer	Autumn	Mean
Alacati	46,32	55,8	34,34	52,4	47,21	6,45	6,6	5,35	6,2	6,15
Alsancak	49,23	57,21	43,15	48,18	49,44	5,75	6,2	5,05	6,5	5,88
Ataturk	69,08	76,12	54,51	71,04	67,69	6,15	6,22	5,58	6,68	6,16
Bayindir	67,02	73,82	63,68	69,95	68,62	6,31	6,79	6,07	7,01	6,55
Cesme	58,15	60,13	47,77	62,71	57,19	5,61	5,54	5,43	6,13	5,68
Ege University	38,97	78,51	87,32	71,31	69,03	3,45	7,05	7,43	6,86	6,2
Gaziemir I	36,5	42,53	33,06	49,12	40,3	6,57	6,93	6,07	6,27	6,46
Gaziemir II	57,21	58,63	95,53	23,2	58,64	4,47	5,05	3,95	2,55	4,01
Halkapinar	54,13	57,14	44,92	55,49	52,92	5,72	6,37	5,37	5,85	5,83
Urla	50,17	56,76	41,83	47,26	49,01	6,04	5,87	5,23	6,15	5,82
Mean	52,68	61,67	54,61	55,07	56	5,65	6,26	5,55	6,02	5,87
LSD (5%)	SF: 1,34		S: 0,72		SFxS: 2,28	SF: 0,16		S: 0,10		SFxS: 0,32
	Ball Rebound (cm)					Ball Roll (cm)				
Alacati	77,12	89,21	113,13	81,35	90,2	662,79	741,23	1012,79	975,76	848,14
Alsancak	93,08	96,13	107,24	98,99	98,86	568,22	640,46	697,86	671,65	644,55
Ataturk	85,86	92,39	105,36	92,03	93,91	607,46	389,75	451,31	544,91	498,36
Bayindir	94,79	100,97	101,1	88,27	96,28	752,15	691,88	517,75	587,56	637,34
Cesme	102,26	99,08	111,99	101,24	103,64	893,38	1071,89	1152,01	963,15	1020,11
Ege University	90,19	86,25	86,63	87,89	87,74	1166,82	1017,54	938,42	984,09	1026,72
Gaziemir I	92,48	85,22	108,32	79,52	91,39	807,68	668,26	930,38	805,44	802,94
Gaziemir II	74,66	65,52	58,76	94,43	73,34	572,27	536,69	457,36	545,8	528,03
Halkapinar	92,21	95,03	101,91	89,05	94,55	715,51	600,43	862,6	712,07	722,65
Urla	105,95	107,46	109,86	101,19	106,11	687,16	747,45	771,83	705,16	727,9
Mean	90,86	91,73	100,43	91,4	93,6	743,34	710,56	779,23	749,56	745,67
LSD (5%)	SF: 1,52		S: 0,96		SFxS: 3,05	SF: 8,06		S: 5,10		SFxS: 16,12
	Force Reduction (%)					Vertical Deformation (mm)				
Alacati	51,11	54,36	46,35	58,92	52,68	6,01	6,4	4,79	6,73	5,98
Alsancak	61,23	54,32	59,66	62,9	59,53	5,89	6,27	5,2	6,45	5,95
Ataturk	51,92	53,18	45,24	56,31	51,66	5,32	5,94	4,41	6,15	5,45
Bayindir	54,87	52,93	50,85	59,52	54,54	7,07	6,65	6,39	8,4	7,13
Cesme	50,68	48,76	49,19	54,17	50,7	6,85	7,12	5,93	7,27	6,79
Ege University	56,49	59,34	55,78	61,46	58,27	6,33	6,79	6,91	5,38	6,35
Gaziemir I	51,14	53,89	40,36	59,98	51,34	5,62	5,81	4,03	4,91	5,09
Gaziemir II	48,02	59,08	65,17	67,29	59,89	5,2	4,62	6,16	5,08	5,26
Halkapinar	59,53	59,43	49,22	66,1	58,57	5,34	6,23	6,6	6,75	6,23
Urla	45,82	45,98	41,32	53,98	46,77	5,9	6,65	4,72	6,26	5,88
Mean	53,08	54,13	50,31	60,06	54,4	5,95	6,25	5,51	6,34	6,01
LSD (5%)	SF: 1,16		S: 0,74		SFxS: 2,33	SF: 0,15		S: 0,10		SFxS: 0,30

Force Reduction (%): Force reduction as an indication of surface hardness has been defined as the ability of a surface to absorb the impact energy created by any object striking that surface (Rogers III, 1988). The results of force reduction measurements (Deltec Equipment) displayed significant variations among soccer fields and seasons. Average force reduction values of Urla, Cesme, Gaziemir I, Alacati and Ataturk fields with very week turf covers had extremely lower and far from standards while Alsancak, Ege University, Gaziemir II and Halkapinar fields had higher values between standard ranges (55-70%). These results were concluded as the result of better turf cover of Ege University and Gaziemir II fields, and more favourable soil texture of Alsancak and Halkapinar soccer fields. Magni et al. (2004) revealed similar conclusions.

Vertical Deformation (mm): Vertical deformation findings indicated diversity of values in terms of different soccer fields and significant statistical differences were recorded (Table 2). Bayindir, Cesme, Ege University and Halkapinar fields had higher deformation values compared to others. Since the FIFA standards are 4-8 mm of deformation in high quality soccer field turf surfaces, those soccer fields' surfaces showed better performances than others, having respectively better turf covers and lighter soil textures. Although some fields had better deformation ratings than others, noticeable inconsistencies were recorded in terms of overall deformation values.

Conclusion

The results of the experiment highlighted that turf cover and visual turf quality values of soccer fields established with C_3-cool season turf grass mixtures were very limited, being out of acceptable range, except the two fields with C_4-warm season grass, Bermuda grass and exceptionally local native, Barnyard grass, most probably due to the better adaptation to Mediterranean environment.

Soccer playing quality parameters differed with the turf grass type and cover rate, wetness and texture of the root zone soils of soccer fields depending on construction techniques and uncontrolled uses in different seasons.

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Determination of the Most Convenient Cool-Season Turfgrass Species and Turf Performance under Mediterranean Climate Conditions

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Abstract

This study was conducted to determine of the most convenient cool-season turfgrass species and their turf performance, at the Çukurova University in Adana (37°57′N, 35°30′E, altitude 20 m), during the 2005–2006 and 2006–2007 growing seasons. At the end of the research, among the cool season turfgrasses, tall fescue (*Festuca arundinacea* Schreb.), colonial bentgrass (*Agrostis tenuis* Sibth.), and creeping bentgrass (*Agrostis stolonifera* L.) had consistently high values in terms of turf quality, color, and coverage, followed by perennial ryegrass (*Lolium perenne* L.). Perennial ryegrass and tall fescue also maintained high values in terms of the clipping weight. The Apache, Cochise, Tracenta, and Highland varieties were found to be superior in general. All of the species performed better in spring, autumn and winter than summer period. However, all of the subspecies of red fescue (*Festuca rubra*) were negatively affected by high temperature when compared to the other species during the summer season, preventing their continued growth in autumn; hence, the red fescue subspecies, including all of its varieties, are not recommendable for growth under Mediterranean ecological conditions.

Keywords: Adaptation, colonial bentgrass, tall fescue, Kentucky bluegrass, turf quality

Introduction

Lawns provide many environmental, health, and esthetic advantages, and among these, turfgrass provides beauty and attractiveness for human activities. Moreover, turfgrass has a remarkable affirmative influence with regards to obtaining clean air and water, erosion control, energy consumption, providing oxygen, increasing physical activity, carbon sequestration, and stress prevention (Kusvuran, 2012). Cool-season (C3) turfgrasses, such as perennial ryegrass, tall fescue, Kentucky bluegrass, and colonial bentgrass, are widely used based on very old data and tradition in the turf sector of Turkey's Mediterranean region and similar regions of neighboring countries (Geren et al., 2009; Demiroglu et al., 2011), and the objection to warm-season turfgrasses that generally occur in the Mediterranean region is based on their lack of green color during their winter dormancy (Kir et al, 2010). The aims of this study were to determine the most convenient turfgrass species and varieties, and to assess the turf performance of these for Mediterranean climate conditions.

Material and Methods

In this study, 9 different C3 turfgrass species/subspecies belonging to 21 varieties were used as material. The research area had the characteristics of a Mediterranean climate, with an average rainfall of 668 mm. Although the average relative humidity was 66%, it rose to over 90% during the summer season. The trial area soil was generally loam. The soil at the experimental site had a clay texture and the organic matter level was very low. The experiment was conducted at the experimental area of the Department of Field Crops at the Agricultural Faculty of Çukurova University (37°57′N, 35°30′E, altitude 20 m) during the 2005–2006 and 2006–2007 growing seasons in Adana, Turkey, according to a randomized complete block design with 3 replications. The size of each plot was 2 m^2 (2 × 1 m). Before seeding, a 1/1 silt and sand mixture was incorporated into the ground as a seedbed and then 100 kg ha^{-1} of N, P_2O_5, and K_2O were applied as a starter fertilizer using 15.15.15. Seeds were sown by hand in the first week of November 2004, and then all of the plots were irrigated by a pop-up sprinkler irrigation system that was activated when the turfgrasses required water, with the express purpose of diminishing heat stress. Invading weeds were hand removed systematically during the all of the growing periods. In order for the plants to sufficiently grow in terms of their vegetative and root parts, 3–

5 g m^{-2} of N (as urea; 46% nitrogen) was applied monthly after cutting, except during the turfgrasses' dormant period in the summer months. The plots were mown to a 3–4 cm height when the turfgrass was 6–7 cm tall using a lawn mower. Analysis of variance of the experimental results was performed using MSTAT-C statistical software and means were compared using least significant difference multiple range test at a significance of $P < 0.05$.

Results

Variation analyses indicated that there were significant influences of the year, season, and turf alternatives on the turf characteristics. As shown in Tables 1–4, the clipping weight, turf coverage rate, and turf color and quality values were observed in different C3 species and varieties, and different seasons.

Table 1. Clipping weight (kg m^{-2}) of Different Cool-Season Turfgrass in from 2005 to 2007.

Turfgrass	**2005-2006**					**2006-2007**					**Mean**				
Species/ Varieties	**Sp**	**Su**	**Au**	**Wi**	**M**	**Sp**	**Su**	**Au**	**Wi**	**M**	**Sp**	**Su**	**Au**	**Wi**	**M**
A.tenuis/Tracenta	1.69	1.04	1.08	2.13	**1.49**	3.57	1.50	1.50	1.96	**2.13**	2.63	1.27	1.29	2.05	**1.81**
A.tenuis/Highland	1.55	0.89	0.88	2.10	**1.36**	3.61	1.56	1.59	1.90	**2.17**	2.58	1.23	1.23	2.00	**1.76**
A.stolonifera/ Kromi	1.85	0.94	1.40	2.24	**1.61**	3.65	1.42	1.39	1.62	**2.02**	2.75	1.18	1.40	1.93	**1.82**
F.arundinacea/ Apache	3.51	1.75	3.16	3.01	**2.86**	4.83	1.91	3.50	3.24	**3.37**	4.17	1.83	3.33	3.12	**3.12**
F.arundinacea/ Cochise	3.83	2.09	3.62	3.18	**3.18**	4.80	1.89	3.41	3.29	**3.35**	4.31	1.99	3.52	3.24	**3.26**
F.arundinacea/ Tomahawk	3.80	1.64	3.13	3.35	**2.98**	4.90	1.85	3.52	3.25	**3.38**	4.35	1.74	3.32	3.30	**3.18**
F.rubra rubra/ Franklin	2.96	0.53	0.00	0.00	**0.87**	2.27	0.54	0.00	0.00	**0.70**	2.61	0.53	0.00	0.00	**0.78**
F.rubra rubra/ Diego	2.68	0.41	0.00	0.00	**0.77**	2.37	0.55	0.00	0.00	**0.73**	2.52	0.48	0.00	0.00	**0.75**
F.rubra rubra/ Engina	2.94	0.69	0.00	0.00	**0.91**	2.23	0.52	0.00	0.00	**0.69**	2.59	0.61	0.00	0.00	**0.80**
F.rubra comm./ Raymond	1.83	0.32	0.00	0.00	**0.54**	2.41	0.46	0.00	0.00	**0.72**	2.12	0.39	0.00	0.00	**0.63**
F.rubra comm./Medina	2.18	0.45	0.00	0.00	**0.66**	2.29	0.47	0.00	0.00	**0.69**	2.23	0.46	0.00	0.00	**0.67**
F.rubra trich./ Suzette	3.76	0.59	0.00	0.00	**1.09**	2.51	0.58	0.00	0.00	**0.77**	3.13	0.58	0.00	0.00	**0.93**
L.perenne/ Ovation	4.31	0.87	1.18	2.93	**2.32**	3.86	1.15	1.38	1.82	**2.05**	4.09	1.01	1.28	2.38	**2.19**
L.perenne/ Amadeus	4.34	0.70	1.08	2.78	**2.22**	3.99	1.29	1.41	1.83	**2.13**	4.16	1.00	1.25	2.30	**2.18**
L.perenne/ Delaware dwarf	5.03	0.78	1.21	3.17	**2.55**	4.10	1.32	1.31	1.82	**2.14**	4.57	1.05	1.26	2.49	**2.34**
L.perenne/ Esquire	4.07	0.69	0.91	2.55	**2.06**	4.30	1.19	1.25	1.83	**2.15**	4.19	0.94	1.08	2.19	**2.10**
L.perenne/ Sauvignon	3.92	0.94	0.93	2.60	**2.10**	3.73	1.17	0.96	1.54	**1.85**	3.83	1.05	0.94	2.07	**1.98**
Poa pratensis/ Geronimo	1.14	0.75	0.43	0.80	**0.78**	1.50	0.57	0.86	1.09	**1.01**	1.32	0.66	0.64	0.94	**0.89**
Poa pratensis/ Enprima	1.67	0.98	0.12	0.00	**0.69**	0.96	0.47	0.18	0.00	**0.40**	1.31	0.72	0.15	0.00	**0.55**
Poa pratensis/ Conni	1.27	0.68	0.41	0.89	**0.81**	1.91	0.70	0.75	0.92	**1.07**	1.59	0.69	0.58	0.90	**0.94**
Poa trivialis/ Dasas	2.20	0.09	0.00	0.00	**0.57**	2.02	0.11	0.00	0.00	**0.53**	2.11	0.10	0.00	0.00	**0.55**
Mean	**2.88**	**0.85**	**0.93**	**1.51**		**3.13**	**1.01**	**1.10**	**1.24**		**3.01**	**0.93**	**1.01**	**1.38**	
LSD 5%	C.V.: 2.29	Y:0.01**	SV:0.03**	YxSV:0.02**		S:0.01**	YxS:0.01**	SVxS:0.03**	YxSVxS:0.02**						

Sp: Spring Su: Summer Au: Autumn Wi: Winter Y: Year SV: Species and variety S: Season *: P<0.05, **: P<0.01

Table 2. Turf Coverage Rate (%) of Different Cool-Season Turfgrass in from 2005 to 2007.

Turfgrass	**2005-2006**					**2006-2007**					**Mean**				
Species/Varieties	**Sp**	**Su**	**Au**	**Wi**	**M**	**Sp**	**Su**	**Au**	**Wi**	**M**	**Sp**	**Su**	**Au**	**Wi**	**M**
A.tenuis/Tracenta	68	79	75	92	**79**	94	76	74	82	**82**	81	78	74	87	**80**
A.tenuis/Highland	58	82	70	91	**75**	92	78	69	77	**79**	75	80	70	84	**77**
A.stolonifera/ Kromi	68	80	76	89	**78**	92	73	62	62	**73**	80	77	69	76	**75**
F.arundinacea/ Apache	85	94	85	90	**89**	91	86	79	85	**85**	88	90	82	88	**87**
F.arundinacea/ Cochise	83	94	86	88	**88**	90	87	82	84	**86**	87	90	84	86	**87**
F.arundinacea/ Tomahawk	87	95	78	84	**86**	84	88	79	83	**84**	85	91	79	84	**84**
F.rubra rubra/ Franklin	89	46	0	49	**46**	83	34	0	0	**29**	86	40	0	25	**38**
F.rubra rubra/ Diego	87	42	0	37	**41**	81	33	0	0	**29**	84	38	0	18	**35**
F.rubra rubra/ Engina	82	43	0	43	**42**	81	32	0	0	**28**	82	37	0	21	**35**
F.rubra comm./ Raymond	89	50	0	46	**46**	79	34	0	0	**28**	84	42	0	23	**37**
F.rubra comm./Medina	87	54	0	38	**45**	77	37	0	0	**28**	82	45	0	19	**36**
F.rubra trich./ Suzette	85	45	0	47	**44**	87	39	0	0	**32**	86	42	0	24	**38**
L.perenne/ Ovation	91	82	48	75	**74**	74	68	42	37	**55**	83	75	45	56	**65**
L.perenne/ Amadeus	91	79	41	66	**69**	76	68	49	43	**59**	84	74	45	54	**64**
L.perenne/ Delaware dwarf	91	80	51	76	**74**	80	62	44	34	**55**	86	71	48	55	**65**
L.perenne/ Esquire	89	83	40	69	**70**	77	68	47	40	**58**	83	76	43	54	**64**
L.perenne/ Sauvignon	83	66	27	53	**57**	63	57	39	38	**49**	73	61	33	46	**53**
Poa pratensis/ Geronimo	65	84	38	53	**60**	58	54	38	32	**46**	62	69	38	43	**53**
Poa pratensis/ Enprima	71	70	13	46	**50**	69	53	16	0	**34**	70	62	14	23	**42**
Poa pratensis/ Conni	76	88	50	66	**70**	74	58	36	35	**51**	75	73	43	50	**60**
Poa trivialis/ Dasas	73	24	0	0	**24**	88	16	0	0	**26**	81	20	0	0	**25**
Mean	**81**	**69**	**37**	**62**		**80**	**57**	**36**	**35**		**81**	**63**	**37**	**49**	
LSD 5%	C.V.: 4.63	Y:0.50**	SV:2.70**	YxSV:1.91**		S:0.93**	YxS:0.66**	SVxS:2.14**	YxSVxS:1.51**						

Sp: Spring Su: Summer Au: Autumn Wi: Winter Y: Year SV: Species and variety S: Season *: P<0.05, **: P<0.01

Table 3. Turf Color (1-9 scale) of Different Cool-Season Turfgrass in from 2005 to 2007.

Turfgrass	**2005-2006**					**2006-2007**					**Mean**				
Species/ Varieties	**Sp**	**Su**	**Au**	**Wi**	**M**	**Sp**	**Su**	**Au**	**Wi**	**M**	**Sp**	**Su**	**Au**	**Wi**	**M**
A.tenuis/Tracenta	7.2	5.3	6.5	7.4	**6.6**	7.1	6.3	6.6	6.4	**6.6**	7.2	5.8	6.6	6.9	**6.6**
A.tenuis/Highland	7.3	5.7	5.9	7.6	**6.6**	7.0	6.5	6.4	6.5	**6.6**	7.2	6.1	6.1	7.0	**6.6**
A.stolonifera/ Kromi	6.9	5.7	6.7	7.1	**6.6**	6.9	6.7	5.8	6.0	**6.3**	6.9	6.2	6.2	6.5	**6.5**
F.arundinacea/ Apache	8.1	7.8	7.1	7.8	**7.7**	7.9	7.7	7.9	7.8	**7.8**	8.0	7.8	7.5	7.8	**7.7**
F.arundinacea/ Cochise	8.1	7.6	7.3	7.6	**7.7**	7.9	7.8	7.9	7.9	**7.9**	8.0	7.7	7.6	7.7	**7.7**
F.arundinacea/ Tomahawk	8.1	7.4	6.9	7.6	**7.5**	7.7	7.7	7.7	7.5	**7.6**	7.9	7.5	7.3	7.5	**7.6**
F.rubra rubra/ Franklin	7.2	3.0	1.0	1.0	**3.0**	6.7	2.9	1.0	1.0	**2.9**	7.0	2.9	1.0	1.0	**3.0**
F.rubra rubra/ Diego	7.5	2.9	1.0	1.0	**3.1**	6.6	2.8	1.0	1.0	**2.9**	7.1	2.8	1.0	1.0	**3.0**
F.rubra rubra/ Engina	6.9	2.8	1.0	1.0	**2.9**	6.8	2.6	1.0	1.0	**2.9**	6.8	2.7	1.0	1.0	**2.9**
F.rubra comm./ Raymond	8.0	3.5	1.0	1.0	**3.4**	6.8	2.9	1.0	1.0	**2.9**	7.4	3.2	1.0	1.0	**3.2**
F.rubra comm./Medina	7.9	3.7	1.0	1.0	**3.4**	6.9	3.0	1.0	1.0	**3.0**	7.4	3.3	1.0	1.0	**3.2**
F.rubra trich./ Suzette	7.3	3.0	1.0	1.0	**3.1**	6.7	3.0	1.0	1.0	**2.9**	7.0	3.0	1.0	1.0	**3.0**
L.perenne/ Ovation	7.6	5.8	6.0	7.2	**6.6**	6.8	5.8	6.0	6.7	**6.4**	7.2	5.8	6.0	7.0	**6.5**
L.perenne/ Amadeus	7.4	5.4	5.8	7.4	**6.5**	7.1	6.1	5.8	6.3	**6.3**	7.3	5.7	5.8	6.9	**6.4**
L.perenne/ Delaware dwarf	7.5	6.4	6.0	7.4	**6.8**	6.9	6.1	6.1	6.4	**6.4**	7.2	6.3	6.1	6.9	**6.6**
L.perenne/ Esquire	7.3	5.8	5.9	7.2	**6.5**	6.8	6.6	6.1	6.6	**6.5**	7.1	6.2	6.0	6.9	**6.5**
L.perenne/ Sauvignon	7.4	5.0	5.2	6.9	**6.1**	7.3	6.2	6.0	6.7	**6.5**	7.3	5.6	5.6	6.8	**6.3**
Poa pratensis/ Geronimo	7.6	6.2	5.3	6.1	**6.3**	7.0	5.7	5.3	6.4	**6.1**	7.3	5.9	5.3	6.2	**6.2**
Poa pratensis/ Enprima	7.8	4.9	1.8	1.0	**3.9**	7.0	4.9	2.2	1.0	**3.8**	7.4	4.9	2.0	1.0	**3.8**
Poa pratensis/ Conni	8.0	7.2	4.9	6.6	**6.7**	7.0	5.6	4.8	6.5	**6.0**	7.5	6.4	4.9	6.6	**6.4**
Poa trivialis/ Dasas	6.4	1.9	1.0	1.0	**2.6**	6.0	1.3	1.0	1.0	**2.3**	6.2	1.6	1.0	1.0	**2.5**
Mean	**7.5**	**5.1**	**4.2**	**4.8**		**7.0**	**5.1**	**4.4**	**4.6**		**7.3**	**5.1**	**4.3**	**4.7**	
LSD 5%	C.V.: 4.50	Y:0.04**	SV:0.17**	YxSV:0.12**		S:0.08**	YxS:0.06**	SVxS:0.19**	YxSVxS:0.14**						

Sp: Spring Su: Summer Au: Autumn Wi: Winter Y: Year SV: Species and variety S: Season *: P<0.05, **: P<0.01

Table 4. Turf Quality (1-9 scale) of Different Cool-Season Turfgrass in from 2005 to 2007.

Turfgrass	**2005-2006**					**2006-2007**					**Mean**				
Species/ Varieties	**Sp**	**Su**	**Au**	**Wi**	**M**	**Sp**	**Su**	**Au**	**Wi**	**M**	**Sp**	**Su**	**Au**	**Wi**	**M**
A.tenuis/Tracenta	5.8	5.6	6.5	7.9	**6.5**	7.5	6.1	6.3	7.0	**6.7**	6.7	5.8	6.4	7.4	**6.6**
A.tenuis/Highland	5.1	6.0	5.8	8.2	**6.3**	7.5	6.2	6.3	7.0	**6.8**	6.3	6.1	6.0	7.6	**6.5**
A.stolonifera/ Kromi	5.4	6.0	6.7	7.9	**6.5**	7.7	6.5	5.9	5.4	**6.4**	6.6	6.2	6.3	6.7	**6.4**
F.arundinacea/ Apache	8.2	8.2	7.3	7.6	**7.8**	7.7	7.1	7.7	7.6	**7.5**	8.0	7.7	7.5	7.6	**7.7**
F.arundinacea/ Cochise	7.9	8.2	7.3	7.6	**7.7**	7.6	7.3	7.7	7.6	**7.6**	7.7	7.7	7.5	7.6	**7.7**
F.arundinacea/ Tomahawk	8.1	7.8	6.1	6.8	**7.2**	7.0	7.1	7.4	7.3	**7.2**	7.6	7.5	6.8	7.1	**7.2**
F.rubra rubra/ Franklin	7.9	3.5	1.0	1.0	**3.4**	6.9	2.5	1.0	1.0	**2.8**	7.4	3.0	1.0	1.0	**3.1**
F.rubra rubra/ Diego	7.7	3.3	1.0	1.0	**3.3**	6.7	2.7	1.0	1.0	**2.8**	7.2	3.0	1.0	1.0	**3.1**
F.rubra rubra/ Engina	7.1	3.2	1.0	1.0	**3.1**	6.9	2.4	1.0	1.0	**2.8**	7.0	2.8	1.0	1.0	**3.0**
F.rubra comm./ Raymond	8.1	4.2	1.0	1.0	**3.6**	6.8	2.9	1.0	1.0	**2.9**	7.5	3.5	1.0	1.0	**3.3**
F.rubra comm./Medina	7.7	4.3	1.0	1.0	**3.5**	6.7	2.9	1.0	1.0	**2.9**	7.2	3.6	1.0	1.0	**3.2**
F.rubra trich./ Suzette	7.4	3.5	1.0	1.0	**3.2**	6.8	2.9	1.0	1.0	**2.9**	7.1	3.2	1.0	1.0	**3.1**
L.perenne/ Ovation	8.1	6.7	4.6	6.3	**6.4**	6.3	4.4	3.3	3.8	**4.4**	7.2	5.6	3.9	5.0	**5.4**
L.perenne/ Amadeus	8.2	6.3	3.8	5.8	**6.0**	6.0	4.9	3.1	3.7	**4.4**	7.1	5.6	3.4	4.7	**5.2**
L.perenne/ Delaware dwarf	7.9	6.7	5.1	6.4	**6.5**	6.3	5.3	3.3	3.9	**4.7**	7.1	6.0	4.2	5.1	**5.6**
L.perenne/ Esquire	8.0	6.7	4.4	5.7	**6.2**	6.0	5.3	3.4	3.5	**4.5**	7.0	6.0	3.9	4.6	**5.4**
L.perenne/ Sauvignon	7.5	5.4	3.2	5.4	**5.4**	5.5	4.7	2.7	3.5	**4.1**	6.5	5.1	2.9	4.4	**4.7**
Poa pratensis/ Geronimo	5.7	7.0	3.9	4.5	**5.3**	5.6	4.2	2.9	3.4	**4.0**	5.6	5.6	3.4	3.9	**4.6**
Poa pratensis/ Enprima	5.7	5.5	1.8	1.0	**3.5**	5.5	3.8	1.8	1.0	**3.1**	5.6	4.6	1.8	1.0	**3.3**
Poa pratensis/ Conni	6.5	7.8	4.3	5.8	**6.1**	6.0	4.4	3.2	3.4	**4.3**	6.2	6.1	3.8	4.6	**5.2**
Poa trivialis/ Dasas	5.8	1.7	1.0	1.0	**2.4**	6.7	1.6	1.0	1.0	**2.6**	6.2	1.6	1.0	1.0	**2.5**
Mean	**7.1**	**5.6**	**3.7**	**4.5**		**6.6**	**4.5**	**3.4**	**3.6**		**6.9**	**5.1**	**3.6**	**4.0**	
LSD 5%	C.V.: 5.20	Y:0.05**	SV:0.29**	YxSV:0.20**		S:0.09**	YxS:0.06**	SVxS:0.21**	YxSVxS:0.15**						

Sp: Spring Su: Summer Au: Autumn Wi: Winter Y: Year SV: Species and variety S: Season *: P<0.05, **: P<0.01

Discussion and Conclusion

In this study, tall fescue and perennial ryegrass had quicker growth than the bentgrass species, Kentucky bluegrass, red fescue subspecies, and rough bluegrass, respectively. Perennial ryegrass is known as a starter grass due to its high-speed germination and ability to provide fast green cover (Turgeon, 2002). Hence, although all of the species were affected negatively in some way because of high temperatures, tall fescue and perennial ryegrass gave the highest clipping weight values. Cross et al. (2013) indicated that the tall fescue species exhibited superior summer stress-tolerance under field conditions, mainly as the result of superior heat tolerance. Ervin et al. (2006) indicated that the heat tolerance of newer bentgrass cultivars have improved, but it is still the primary factor limiting summer performance and survival. Thus, our results have widely

parallel findings with those reported. The highest coverage rates and turf quality scores in tall fescue, colonial bentgrass, and creeping bentgrass, respectively, were obtained in this study. Kir et al. (2010) reported that the regularity of turf coverage and turf quality ranked best to worst from: tall fescue, perennial ryegrass, colonial bentgrass, and Kentucky bluegrass (Salman et al., 2011), while the lowest values were obtained in the red fescue subspecies. Varieties of the red fescue subspecies had turf quality traits which, due to environmental stress acting on plant development, performed better in winter and autumn than in other seasons. Demiroglu et al. (2010) indicated the same results and our findings were also generally similar to those of these studies. While turfgrasses with more green color and higher quality during the summer months will provide more covetable aesthetic values than dormant lawns to home owners or turf managers (Islam et al., 2013), leaf discoloration together with decreased plant density are crucial troubles associated with heat stress injury in C3 turfgrasses. Hence, tall fescue, colonial bentgrass, and creeping bentgrass will be more desirable in this respect according to our results. Our findings were generally in agreement with the results of Kir et al. (2010) and Demiroglu et al. (2010). On the other hand, when exposed to prolonged periods of high temperature, bentgrass thins, and the plant leaves become weak and may turn dark green, as one or more physiological processes is disrupted. Eventually, chlorophyll is destroyed, and the aerial shoots turn yellow, and then brown (Brosnan et al., 2014). Thus, our findings were not in agreement with the indications of Brosnan et al. (2014). In conclusion, the best scores in terms of turf quality, turf color, and coverage were obtained from tall fescue, colonial bentgrass, and creeping bentgrass, followed by perennial ryegrass, respectively. Perennial ryegrass and tall fescue also maintained high values with respect to the clipping weight. Some varieties, for example, Apache, Cochise, Tracenta, Highland, Ovation, Delaware dwarf, Esquire, Raymond, Medina, Franklin, Geronimo, and Conni, exhibited higher scores than others when averaged over the 2 years. However, the red fescue subspecies with all of its varieties and rough bluegrass are not recommendable for growth under Mediterranean climate conditions.

Acknowledgements

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Green Tobacco Sickness in Turkey Tobacco Farmers

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Abstract
The purpose of this study was to examine the presence of green tobacco sickness in tobacco producers living in Manisa, Tokat, Amasya and Samsun province and their level of knowledge of green tobacco sickness. In this study, simple random sampling was employed to gather and analyze the results of the surveys that had been conducted face-to-face with tobacco producers. As a result, it was understood that tobacco producers living in all location province did not have knowledge of green tobacco sickness. The main reasons why green tobacco sickness is not encountered in the region are common usage of protective equipment during harvest, low amount of rainfall and drizzle in vegetation period, and growing tobacco with low nicotine content. It is required to make up deficiencies in relation to green tobacco sickness and occupational health and safety and to make agricultural mechanization widespread in tobacco growing.

Keywords: Green Tobacco Sickness, Oriental tobacco, *Nicotiana tabacum* L., Nicotine, Turkey

Introduction

Tobacco is an annual crop plant within the genus Nicotiana of the family Solanaceae. Being the useful part, tobacco leaves differ from other crop plants in terms of the amount of nicotine they contain. Nicotine, which is a pleasure-inducing substance contained in tobacco leaves, is synthesized in roots (Kevseroğlu, 2000; Kınay, 2010). Being more important than other agricultural products in terms of production, usage, and foreign trade, tobacco has been a matter of debate both in Turkey and in the world in recent years especially due to its adverse effects on health. In the world's tobacco production, Virginia, Burley and Maryland, and Oriental are the leading tobacco types with a share of 70%, 15%, and 4%, respectively. They are followed by tobacco types such as Puroluk, Kentucky, Havana, Beneventeno, etc. (Anonymous, 2013a). Approximately 97% of the tobacco grown in Turkey is Oriental, followed by Virginia, Burley, Tömbeki, and Hasankeyf (Anonymous, 2013b). All over the world, 7.3 million tons of tobacco is produced in an area of approximately 4.3 million hectares. In Turkey, it is 88.222 tons produced in an area of approximately 102.035 hectares (Anonymous, 2013b).

Green tobacco sickness occurs as nicotine dissolves during planting, hoeing, harvesting, stacking, and curing and is absorbed by skin (McBride et al., 1998; Arcury and Quandt, 2006). The sickness was reported in the medical literature for the first time in 1970 by Weizenecker and Deal (Karafakoğlu, 2004). During harvest, tobacco producers break off mature leaves and carry them under their armpits. They rarely use protective equipment such as gloves by the reason that it makes harvesting more difficult. As a result, especially tobacco producers' hands are exposed to nicotine. During harvest, which is performed mostly in the early morning, tobacco producers' clothes are moistened by the dew that accumulates on leaves. It is thought that, dissolved by dew and absorbed by skin, nicotine causes the symptoms of green tobacco sickness. They include weakness, headache, nausea, vomiting, dizziness, abdominal cramps, breathing difficulty, abnormal temperature, pallor, diarrhea, chills, fluctuations in blood pressure or heart

rate, and increased perspiration and salivation (Gehlbach et al., 1975; Ballard et al., 1995; McBride et al., 1998; Arcury et al., 2001a; Trape´-Cardoso et al., 2003).

As tobacco production continues, green tobacco sickness is probable to occur among tobacco producers. For this reason, it is necessary to determine its prevalence and to respond in case of presence. This study aims to to ascertain the awareness and prevalence of green tobacco sickness among tobacco producers of the regions.

Materials and Methods

Materials

The data which is obtained from face-to-face interviews with tobacco producers forms the material of this study. The results of the surveys prepared accordingly and made face-to-face with tobacco producers were gathered and analyzed.

Method

The area of study was determined to be the districts of Turkey province which had the largest area and highest amount of tobacco production according to the 2011-2012 production year contracts. In the study, the number of tobacco producers to take part in the survey was determined to be 712, using simple random sampling method (Formula; $N= (N*(S)^2*t^2) / ((N-1)d^2+(S)^2*t^2)$) (Çiçek and Erkan, 1996). Data was collected by visiting 5 districts and conducting face-to-face interviews with tobacco producers. Survey results were analyzed on SPSS 17.0; data was presented as crosstabs.

Results and Discussion

Tobacco is a social plant because all family members contribute to the process of cultivation (nursery, planting, hoeing, harvesting, stacking, curing, boxing, and storage). In the study, it was found that all family members contributed to tobacco production.

Green tobacco sickness occurs as nicotine on tobacco leaves is absorbed as a result of contact with skin. The key factors that help nicotine absorption are failure to use protective equipment, breaking off tobacco leaves when they have dew on them, and collecting tobacco leaves under armpits. In the study conducted in the region, it was ascertained that, of the tobacco producers, 88.8% did not harvest in case of dew, 77.8% used protective equipment, and 89% did not snack during harvest (Table 1).

It was seen that almost all (89.0%) of the tobacco farmers in the region had not ever heard of green tobacco sickness and that, after harvest, a great majority (96.2%) of them had not ever encountered such a sickness.

In the study, there was an inverse proportion among snacking during harvest, protective equipment, post-harvest sickness and having heard of green tobacco sickness. An direct proportionate relationship was observed between harvesting after rainfall and tobacco leaf stringing, post-harvest sikness and having heard of green tobacco sickness. There was also a directly proportionate relationship between post-harvest sickness and harvesting after rainfall, the adverse effects of using protective equipment during harvest and snacking during harvest. The results obtained were found to be statistically significant (Table 2).

Table 1. Some harvesting behaviors which may cause green tobacco sickness, recognition and prevalence of green tobacco sickness among tobacco producers

	Post-Harvest Sickness			
	Yes		No	
	Frequency	*Percent*	*Frequency*	*Percent*
Have you ever heard of green tobacco sickness?				
Yes	3	15%	17	85%
No	24	3,5%	668	96,5%
Total	27	3,8%	685	96,2%
Tobacco leaf stringing				
Yes	19	%3,2	527	%96,8
No	8	%4,8	158	%95,2
Total	27	%3,8	685	%96,2
Protective equipment during harvest				
Yes	21	%3,4	592	%96,6
No	6	%6,1	93	%93,9
Total	27	%3,8	685	%96,2
Harvest after rainfall or dew				
Yes	3	%7,5	37	%92,5
No	24	%3,6	648	%96,4
Total	27	%3,8	685	%96,2
Snacking during harvest				
Yes	4	%1,5	258	%98,5
No	23	%5,1	427	%94,9
Total	27	%3,8	685	%96,2

Table 2. Correlations between green tobacco sickness and tobacco producers

Harvest after rainfall or dew	,130**				
Protective equipment during harvest	-,156**	-,113**			
Tobacco leaf stringing	,178**	,067	-,078*		
Post-Harvest Sickness	-,090*	,047	-,048	-,059	
Have you ever heard of green tobacco sickness?	-,077*	,032	,068	-,085*	,100**
	Snacking during harvest	Harvest after rainfall or dew	Protective equipment during harvest	Tobacco leaf stringing	Post-Harvest Sickness

As a result of the study, no green tobacco sickness was encountered among tobacco producers living in Turkey province. The main reasons why green tobacco sickness was not encountered in the region are usage of protective equipment during harvest, low amount of rainfall and drizzle in vegetation period, and growing tobacco with the lowest nicotine content in Turkey. Additionally, it was understood that tobacco producers living in Turkey province did not have knowledge of green tobacco sickness. Thus, it is required to inform them about green tobacco sickness and give occupational health and safety training to them. For protecting the health of individuals working in tobacco production, it is of high importance to conduct national and international campaigns intended to raise public awareness of green tobacco sickness. Besides,

generalizing and diversifying the use of mechanical methods especially in harvesting tobacco shall considerably hinder the incidence of green tobacco sickness.

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Rainfall Erosivity in Bosnia and Herzegovina

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Abstract

The problem of soil erosion has been recognized as one of the most important problems of soil degradation nowadays. Despite significant predisposition for the development of soil erosion, the studies of this phenomenon are poorly represented in Bosnia and Herzegovina. At the same time they are necessary in order to define ways to combat this problem. The most commonly used models for predicting soil erosion worldwide are USLE and RUSLE in which rainfall erosivity is one of the factors necessary for soil erosion assessment. Rainfall erosivity represents potential ability of rain to cause loss of soil.

The aim of this study is to determine rainfall erosivity in Bosnia and Herzegovina on the basis of several models applied around the world to compare their applicability in the research area. All models as input data use monthly and/or annual precipitation. We used data from 68 meteorological stations with different data series (5-39 years). Using Geographic Information System (GIS) interpolation of values was performed and maps of spatial variability of rainfall erosivity in Bosnia and Herzegovina were obtained.

Keywords: Rainfall erosivity, (R)USLE, GIS, Bosnia and Herzegovina.

Introduction

Soil erosion is a serious environmental and social problem all over the world (Pimentel et al., 1995; Pimentel, 2006). Estimation of soil erosion is an extremely important component of the process of making decisions as to how to combat this problem. Numerous models to estimate erosion have been developed, starting from very complex to those that are much simpler. Those simple ones, which are also most used, include USLE (Wischmeier and Smith, 1978) and RUSLE (Renard et al., 1997). USLE method (model) is defined by the following formula: A=R*K*L*S*C*P. Factors of R (rainfall erosivity), K (erodibility of soil), L (length of slope), S (slope inclination) are considered as natural factors, while C (cover) and P (conservation practice) are anthropogenic factors (Oliveira et al., 2012).

Rainfall erosivity being a natural factor, represents an extremely important parameter for the estimation of erosion as rain is a driving force of erosion due to the activity of rain drops, surface and ground runoff (Zachar, 1982; Lal, 2001; Diodato and Bellocchi, 2010; Oliveira et al., 2012). Rain erosivity (R) is a numerical indicator of rain's potential to erode the soil (Wischmeier, 1958). In (R)USLE model, R factor is defined as a long-term average of the product of total rainfall energy (E) and the maximum 30 min rainfall intensity (I_{30}) for storm events (Weischmeier and Smith, 1978; Renard et al., 1997). Its calculation requires detailed data in order to calculate the maximum 30 min rainfall intensity for individual storms (the maximum 30 min rainfall intensities for individual storms) which are not available everywhere in the world, therefore some simpler models were proposed (developed) for the calculation of rainfall erosivity that are based on monthly and/or annual precipitation which is widely available. Numerous studies have shown a good correlation between rainfall erosivity and annual precipitation which made these simple models applicable around the world (Renard and Freimund, 1994; Yu and Rosewell, 1996; Ferro et al., 1999; Igawe et al., 1999; Van der Knijff et al., 1999; Silva, 2004; Zhang et al., 2005; Torri et al., 2006; Lee and Heo, 2011).

The purpose of this paper is to determine the rainfall erosivity factor for the area of Bosnia and Herzegovina (BiH) as an essential factor in the calculation of erosion by (R)USLE model. Several models that were applied in different parts of the world were used with a view to verifying their applicability to BiH. The end objective is to develop a map of spatial variability of rainfall erosivity for the territory of BiH. The rainfall erosivity maps are very important for agronomists as well as some other technical professions (primarily the construction workers).

Material and Methods

In this paper we used data from 68 meteorological stations with different series of measurements. The network of meteorological stations uniformly covers all parts of BiH. Twenty stations have the measurement sequence shorter than 10 years, and 41 station have the measurement sequence ≥20 (of which 32 stations have the measurement sequence longer than 30 years). The rainfall erosivity values for all stations were calculated by the models taken from the reference books:

1) $R= 0{,}0483P^{1.61}$ in the case where P<850 mm
   $R=587{,}8 – 1{,}219P+0{,}004105P^2$ in the case where P≥850 mm
   (Renard and Freimund, 1994)
2) $R=-944+3{,}08P$
   (Torri et al., 2006)
3) $MFI=\sum p^2/P$ p – monthly precipitation
   Modified Fournier Index (Arnoldus, 1980) P – annual precipitation

Classes used for the interpretation of the rainfall erosivity factors are same as in Silvo (2004), and for the interpretation of MFI as in Lobo Lujan and Gabriels (2005).

Spatial variability of rainfall erosivity is shown in the maps produced using ArcGIS 9.3 software. Interpolation by the method of Kriging was used to develop erosivity maps for other parts of the world.

Results and Discussion

The annual precipitation in the territory of BiH during the observed period varies from 710 mm in the northern parts (Orašje) to 1902 mm in the southern ones (Ljubinje), with the average amounting to 1118 mm. Results of the analysis of used data are consistent with previously known results for spatial distribution of precipitation (Čustović, 2005; Drešković, 2011), and confirm the reduction of precipitation from the west to the east and from the south to the north. Spatial distribution of precipitation is largely influenced by the relief characteristics of BiH – isohyets follow the direction of major relief structures (from the north-west to the south-east).

The rainfall erosivity levels calculated by the model of Torri et al (2006) range from 1245 and 2496 MJ mm $year^{-1}$ ha^{-1} h^{-1} (SI units of mega joules mm per hour per hectare per year), where the lowest levels were recorded in the northern, north-eastern and eastern parts of BiH, and the highest in the southern and south-eastern parts (Figure 1.). Border line between two identified classes of erosivity follows, for its most part, the 1000 mm isohyets with a deviation in the area of Prijedor-Sanski Most-Banja Luka. Data obtained using this model indicate a very high degree of correlation with annual precipitation – r=0,999 (Figure 2.). Downside of this model is poor differentiation into just two categories: low (spatial representation 59%) and medium erosivity (spatial representation 41%).

The rainfall erosivity levels calculated by the model of Renard and Freimund (1994) vary between 1971 and 13596 MJ mm $year^{-1}$ ha^{-1} h^{-1} noting that the lowest levels were recorded in the north-eastern and eastern parts of BiH, and the highest in the southeast (Figure 3.). Border line between the classes of medium and moderate-to-high erosivity for its most part also follows the 1000 mm isohyets with one major deviation in the north-western part of BiH. Data obtained using this model indicate a very high correlation degree with annual precipitation – r=0,988 (Figure 4.). The advantage of this model compared to the one by Torri et al. (2006) is reflected in better differentiation of the erosivity categories. Five erosivity categories were differentiated by this method, of which the category of medium erosivity accounts for the largest spatial participation (55%).

Data obtained by the calculation of MFI were classified in four categories, noting that the lowest category with the amounts below 60, was not represented. The map of spatial distribution of MFI (Figure 5.) indicate high level of correspondence with spatial distribution of precipitation which is also confirmed by the calculated correlation coefficient (r=0,984) (Figure 6.).

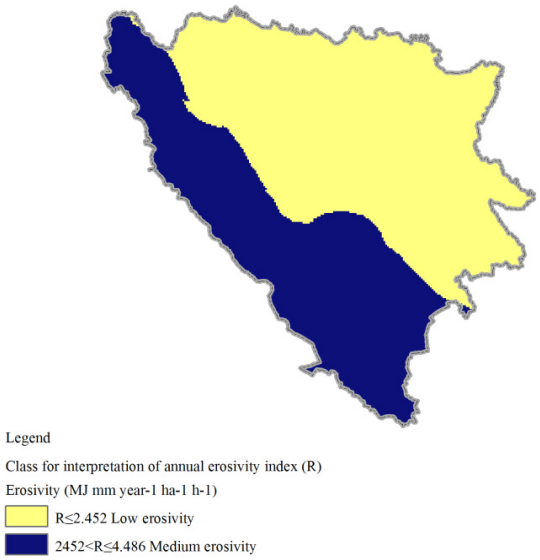

Figure 1. R factor-Torri et al. (2006) model.

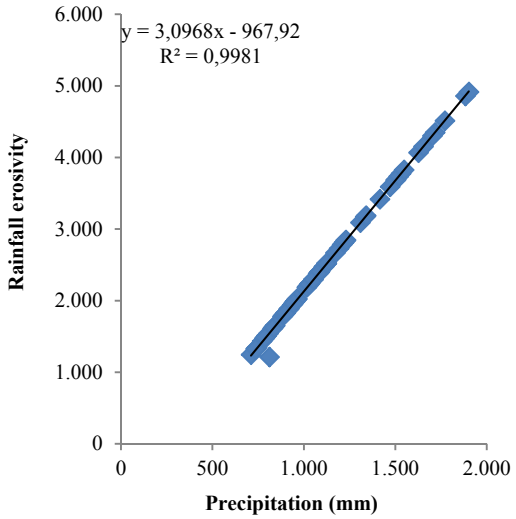

Figure 2. Correlation between erosivity Torri et al.

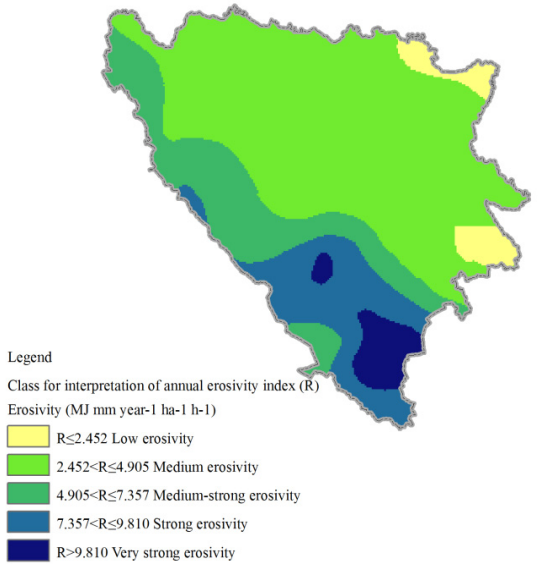

Figure 3. R factor-Renard and Freimund (1994) model.

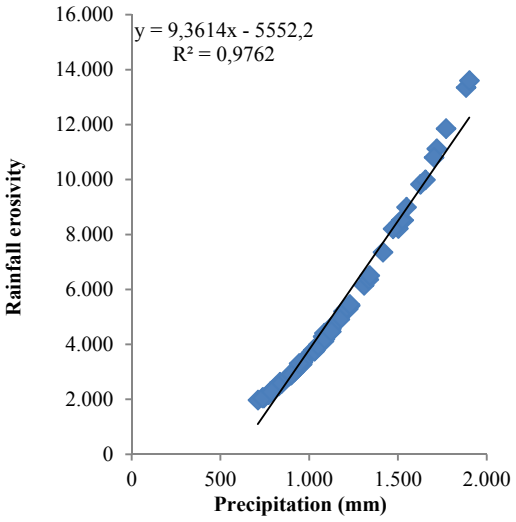

Figure 4. Correlation between erosivity Renard and Freimund.

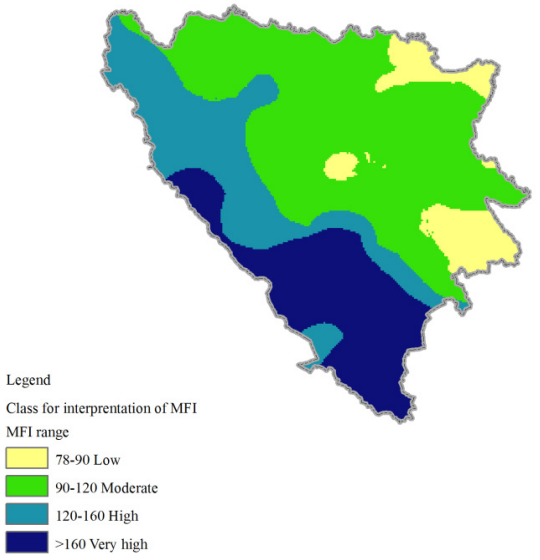

Figure 5. MFI for the territory of BiH.

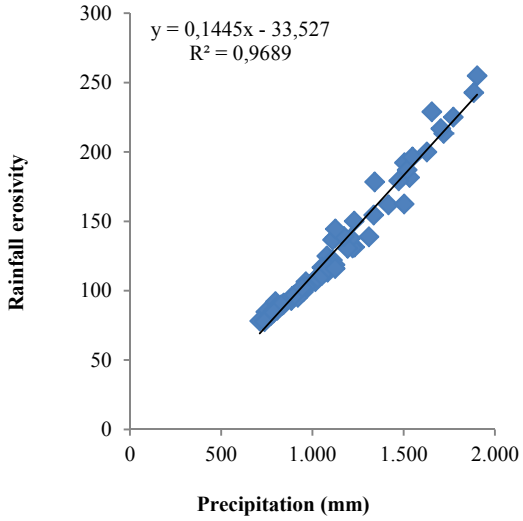

Figure 6. MFI and annual precipitation

Conclusion

In this paper the rainfall erosivity factor was calculated using data from 68 meteorological stations uniformly distributed across the territory of BiH. R factor was calculated according to the models used in Italy (Torri et al., 2006) and USA (Renard and Freimund, 1994). Additionally, the amount of rainfall erosivity was determined using Modified Fournier Index – MFI (Arnoldus, 1980) as the calculation method that is widely used around the world, with a view to comparing these two models. Determination coefficient indicates a very high correlation in all three classes and ranges from 0.984 for MFI to 0.999 for the model of Torri et al (2006). The higher levels of erosivity factor are related to the area of Outer Dinarides which, being a karst area with typically shallow soils, is particularly susceptible to erosion. The results indicate that the model by Renard and Freimund (1994) and MFI are more suitable for the calculation of erosivity in the territory of BiH as they enable differentiation of more erosivity categories which provides better opportunities for the interpretation and decision making.

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Development of Edible Oil Quality in Kale (*Brassica oleracea* var. *acephala*), a Traditional Vegetable at the Black Sea Region

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Abstract

Kale (*Brassica oleracea* var. *acephala*) is an traditional vegetable plant at the Eastern Black Sea Region and mainly the leaves of this plant are used to prepare traditional meal. On the other hand, we know that cabbage (*B. oleracea* L.) is one of the diploid parents of rapeseed (*B. napus* L.). The traditional oil quality of rapeseed have been changed using the low erucic acid mutants found in the gene pool of rapeseed (*B. napus* L.) and with time the 00-qualiy forms were developed in rapeseed (*B. napus* L.). İn *B. oleracea* low erucic acid mutants were detected in the 1990's and these cabbage genotypes were used to develop interspecific hybrids with low erucic acid content. These three cabbage genotypes, namely Kashirka, Ladozhskaya and Eisenkopf will now be used to transfer the edible oil quality to kale (*B. oleracea* var. *acephala*) using classical and biotechnological methods within the frame of a new starting project with the aim to develop a kale plant (*B. oleracea* var. *acephala*) with double use for the Eastern Black Sea Region.

Keywords: Brassica, kale, quality, edible oil

Introduction

The *Brassica oleracea* group includes several cross compatible species and subspecies (Bothmer et al. 1995), both within the group and with cultivars. They share a common chromosome number ($2n = 18$) and probably form an evolutionary unit: the *B. oleracea* cytodeme (Harberd and McArthur, 1976). Snogerup et al. (1990) states that this group contains ten species and three subspecies.

Kale is widely grown in the Black Sea Region. Kale production is not common in other regions of Turkey. In the Black Sea Region, kale is one of the most important crops, mainly for use as green vegetable as fresh or cooked and also farmers often use the most tender leaves for feeding of farm animal.

Genome relationships in Brassica

The chromosomal relationships among the A, B and C genomes of the diploid *Brassica rapa* (genome AA, 2n = 20; turnip rape, turnip, Chinese cabbage), *B. nigra* (genome BB, 2n = 16; black mustard) and *B. oleracea* (genome CC, 2n = 18; cabbage, cauliflower, broccoli, kale, kohlrabi, brussel sprouts) and their natural spontaneous amphidiploids *B. carinata* (genome AABB, 2n = 34; Abyssinian or Ethiopian mustard), *B. napus* (genome AACC, 2n = 38; oilseed rape, swede) and *B. juncea* (genome BBCC, 2n = 36; Indian or brown mustard) were elucidated through interspecific crosses and meiotic analyses made by the Asian cytogeneticists Morinaga and U in the early 20th century (U, 1935). Because the Brassica amphidiploid species can be generated synthetically with the help of embryo rescue techniques, this complex of the three diploid species and their polyploids (Fig. 1) is today one of the most useful model systems for investigations of polyploidy in crop plants (e.g. Song et al. 1995; Lukens et al. 2006). Fig.1 shows the genome relationships between *B. oleracea, B. rapa* and *B. napus* (Snowdon, 2007).

Vegetable brassicas include *B. oleracea* (cauliflower, broccoli, kohlrabi, kale, cabbage, brussel sprouts) and *B. rapa* (turnip, pak-choi, Chinese cabbage), while the seeds of *B. nigra* (black mustard), *B. carinata* and *B. juncea* are also used as a condiment. *Brassica* species are rich in dietary fiber, vitamin C, phytosterols and other beneficial substances such as anticarcinogenic compounds (Fahey and Talalay, 1995; Gül and Amar, 2006; Verkerk et al., 2009).

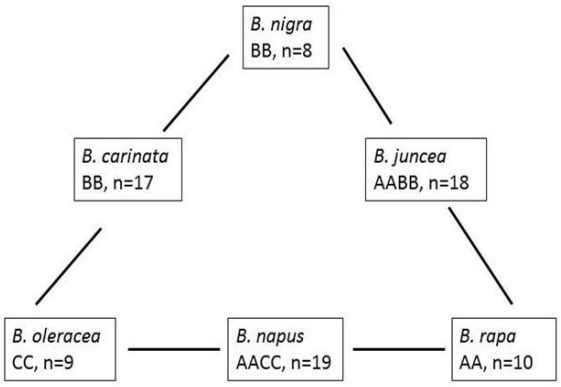

Fig. 1: Genome relationships in Brassica (adapted from U, 1935)

History of Canola Quality in the Brassica family

B. napus was cultivated by ancient civilisations in Asia and the Mediterranean. Its use has been recorded as early as 2000 BC in India and has been grown in Europe since the 13th century, primarily for its use as lamp oil (Colton and Sykes, 1992). *B. napus* was first grown commercially for use as a lubricant on war ships. Traditionally, *B. napus* is unsuitable for human food or animal feed due to the presence of two naturally occurring toxicants, erucic acid and glucosinolates.

Plant breeding programs initiated in Canada resulted in the identification of Liho, a rapeseed line containing low levels of erucic acid in 1959. A program of backcrossing and selection was conducted to transfer the low erucic acid trait into agronomically adapted cultivars (Przybylski et al., 2005). This led to the first low erucic acid cultivar of *B. napus*, Oro, in 1968 and the first low erucic acid *B. rapa* cultivar, Span, in 1971. Because of the health concerns related to high levels of erucic acid, over 95% of the rapeseed grown in Canada in 1974 were low erucic acid varieties. Glucosinolates were also considered detrimental in rapeseed meal fed to poultry, swine, and ruminants. The hydrolyzed products of glucosinolates, namely, isothiocyanates and other sulphur-containing compounds, were shown to interfere with the uptake of iodine by the thyroid gland, contribute to liver disease, and reduce growth and weight gain in animals. Consequently, plant breeders realized that if rapeseed meal was to be used as animal feed, the glucosinolate content should be reduced. A Polish line with a low-glucosinolate trait, Bronowski, was identified by Dr. Krzymanski in the late 1950s. Breeding efforts to introduce this trait into low erucic acid lines made by Dr. Baldur Stefansson at the University of Manitoba resulted in the release of the world's first low erucic acid, low glucosinolate cultivar of *B. napus*, often called the double-zero rapeseed. This was followed in 1977 by the release of the first low erucic acid, low glucosinolate cultivar of *B. rapa*, Candle, by Dr. Keith Downey of the National Research Council of Canada in Saskatoon (Przybylski et al., 2005).

Inheritance of erucic acid in Brassica

The erucic acid content of seeds of the amphidiploid species *Brassica napus* (2n=38) has been shown to be governed by two genes which act in an additive fashion (Harvey and Downey, 1964). Digenic inheritance of 22:1 was confirmed in *B. juncea* (Kirk and Hurlstone, 1983) and in *B. carinata* (Getinet et al., 1997). Jönsson (1977), Pourdad and Sachan (2003) reported that in rapeseed (*B. napus*) 22:1 content is controlled by alleles at one, one or two and two loci leading to 5-10%, 10-35% and more than 35% 22:1, respectively. At least five alleles govern the erucic acid in Brassica, including; e, Ea, Eb, Ec and Ed . Therefore, levels of erucic acid can be fixed at a large number of values ranging from < 1% to >60% (Jönsson, 1977).

Detection of *B. oleracea* genotypes displaying edible oil quality

Due to substantial progress in breeding and cultivation practice in rapeseed and mustards-derived from several locally distributed members of the genus *Brassica*-have become one of the most important source of vegetable oil worldwide. Especially in several European countries with cool-temperate climates oilseed rape (*B. napus*) with 'double-low' seed quality (canola) dominates field crop production (Seyis et al., 2004). Regarding this quality characters, low-erucic acid mutants were found in *B. rapa* (AA) (Downey, 1964), *B. napus* (AACC) (Stefansson *et al.* 1961; Stefansson and Hougen, 1964) and *B. juncea* (AABB) (Kirk and Oram 1978). Low-erucic acid forms of the monogenomic species *B. nigra* have not been detected yet.

B. oleracea genotypes displaying zero erucic acid character were first mentioned by Lühs et al. (2000). Two of these genotypes, namely Ladozshkaya and Kashirka, were described by Seyis et al. (2004). Further, Seyis and Friedt (2010) described the fatty acid composition of three *B. oleracea* genotypes including Kashirka and Ladozskaya; the third accessions was Eisenkopf. They obviously emphasized the varying fatty acid composition of these genotypes which ranged from zero up to over 45% of erucic acid.

Material and Method

Development of kale genotypes with low erucic acid content:

Flowering plants of Kashirka, Ladozshkaya and Eisenkopf will be crossed with plants of selected different kale genotypes. There are only one registered kale genotype Temel. But we will introduce local genotypes from Trabzon and Rize in our study aiming to develop genotypes with a broader genotypic base.

Erucic acid alleles are defined wit EEEE for high erucic acid and with eeee for low erucic acid content. Naturally, local Brassica forms contains high amounts of erucic acids. After the cross of both material we will develop a *B. oleracea* hybrid containing the erucic acid structure of EeEe. This material will be selfed for obtaining segragation. The second step will be the molecular characterisation of the developed material. After the detection of suitable markers for distingusihing present material both molecular and quality selection will be used. Crossed genotypes will also be analysed for their fatty acid compositions. With further selection individuals sharing the genotype of kale and fatty acid composition of cabbage will be selected to develop a kale similar genotype for double use.

Results:

The main income of the farmers in the Eastern Black Sea Region is tea (*Camellia sinensis*). Besides tea, local farmers are producing additive products like kiwi and blueberry. But overall we can see kale planted for vegetable consumption. Nearly all farmers are reserving their own seed for the next year. The planted area of every farmer is of course not big, but if we will be able to develop the desirable genotype, the famers will profit from this plant in the context of its double use: leaves as vegetable and from the oil in its seeds for edible oil.

Discussion and Conclusion

Plant breeders work with all kinds of crops, such as agricultural (or field) crops, horticultural crops (including ornamentals), forage and turf crops and forest crops. Crops producing medicines or providing environmental remedies are also within their sphere of action. In order to find and create enough genetic variation, they are involved in the collection of germplasm around the world. They preserve, evaluate and distribute the germplasm to those interested in working with the crop. The products of plant breeding can be found everywhere in the form of new varieties of useful crops for growers, farmers, and gardeners. Plant breeders develop new cultivars which give higher yield, earlier maturity, better adaptation, improved quality, and

higher resistance to disease, insects, and environmental stress, just to name a few of the characteristics that benefit mankind.

Plant breeders have adapted crops in many different ways, and here are a few examples. Brussels sprout hybrids have been developed with uniform ripening and size to make them suitable for machine harvesting; monogerm sugar beet varieties have been developed, thus reducing the need for laborious thinning and enabling fully mechanized cultivation and taste in vegetables has been greatly improved, as well as the number of health components.

İn our case, we are aiming to introduce the edible oil quality of three cabbage genotypes into kale to present local farmers a new crop quality.

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The Comparison of Phenotypic Characteristics of Improved and Wild Blackberry Genotypes

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Abstract
The aim of this study was to compare the major pomological and antioxidant properties of fruits that were comparatively studied in wild blackberries from natural habitats and commercially important varieties grown in the Una – Sana Canton (Bosnia and Herzegovina): Navaho, Jumbo and Loch Ness. It also aims to point out the potential superiority of the wild forms, how they are rich in vitamin C, phenol and anthocyanins, so that they would be considered as a potential source of natural antioxidants. It was found that, according to morphometric characteristics of the fruit, the fruits of wild blackberry exhibited significantly lower values, while the chemical composition of the fruit showed superiority. The highest value of vitamin C was found in wild species *Rubus fruticosus* L. (23.06 mg/100g). The high content of anthocyanins (238.7mg/100g) was found in Navaho blackberry. In the case of the examined blackberry genotypes, species or variety was not a factor that affects the content of phenol and anthocyanins in the fruit, so it can be assumed that the original features of these components have not been lost during the selection and breeding of new varieties. The variety Jumbo proved to be a variety with a very large fruit, and thus can be recommended to blackberry growers because of its attractiveness and the possibility of achieving high yields. Wild blackberry genotypes constitute the genetic potential of particular importance for the conservation of biological diversity of certain areas, as well as for the selection and breeding of cultivated fruit.

Keywords: Blackberry, antioxidant properties, pomological properties, genetic resources

Introduction
The healing properties of blackberry are known from the earliest times of civilization. In recent years, there is an increased interest in the fruits of blackberry, which contains high concentrations of polyphenol, due to their favorable effects on health. The presence of antioxidants represents a new important parameter of fruit quality. Numerous clinical studies highlight the importance of certain groups of phenolic compounds and vitamin C, which have anti-inflammatory, anti-allergic and anti-cancerous effect due to a number of mechanisms.

Genetic background (species and variety) is an important factor in determining the nutritional quality of the fruit, but the influence of environmental factors, the intensity of application of agro and pomotechnical measures, the degree of fruit ripeness, and storage conditions after harvest are important as well. By improving the structure of blackberry assortment in production plantations, i. e. by introducing varieties that, apart from good physical and sensory attributes of fruit quality, have a high nutritional and antioxidant value, would allow the consumption of fruits with strong healing properties and an undiminished commercial effect of such production.

This research gives us a clear picture of pomological characteristics of current blackberry varieties in intensive fruit production in growing conditions of the Una - Sana Canton answers the question which varieties are noteworthy. Furthermore, this research contibutes to the evaluation of wild blackberry fruits regarding the amount of antioxidant value, which has not been done before in this area.

During the research, the best genotypes representing the potential for blackberry processing were singled out from natural populations. Thus, new and improved varieties with a higher content of antioxidant components can be created.

Material and Methods

Of current varieties of blackberrs, Navaho, Jumbo and Loch Ness were selected for this survey, while wild blackberry Rubus fruticosus L was used for the comparison. The experimental research took place at the area of the municipalities of Bihać, Cazin, Bosanska Krupa and Velika Kladuša. The following methods were used in the paper: methods for the analysis of pomological properties (morphometric methods), methods for the analysis of antioxidant properties (chemical analysis), and methods of statistical analysis. When it comes to pomological characteristics, fruit weight was measured using analytical scales, while height and width of the fruit were measured with a caliper square (Vernier scale). A sample of 30 fruits was taken from each genotype. Chemical analyses were performed to determine the content of vitamin C using the iodometric titration method, the content of phenol with Folin - Ciocalteu method, and the content of anthocyanin (Wrolstad et al., 2001). The analysis of morphometric and phytochemical properties of fruit of blackberry species and varieties was performed using a single-factor variance analysis at the significance level $\alpha \leq 0.05$. The significance of the differences among treatments was determined using Tukey-test, the test at the significance level 0.05. The research data were processed by computer statistical software Past (Hammer et al., 2001).

Results

Table 1: Descriptive statistics for pomological properties of the studied blackberry species and varieties

	Wild blackberry			Loch Ness			Jumbo			Navaho		
	mean	max	CV %	mean	max	CV %	mean	max	CV %	mean	max	CV %
Fruit weight (g)	1.48	2.55	33.9	6.40	9.16	17.3	7.5	9.70	14.0	3.54	4.83	18.6
Fruit width (cm)	1.25	1.60	15.5	2.03	2.30	8.4	2.10	2.30	5.6	1.68	2.10	12.5
Fruit length (cm)	1.11	1.40	17.5	2.64	3.40	12.3	2.88	3.40	10.3	1.88	2.30	13.5

Table 2: Results of One –Way ANOVA and Tukey test of pomological properties of fruit of blackberry species and varieties

Factor	Fruit weight (g)	Fruit width (cm)	Fruit length (cm)
Species/Variety	*	*	*
Species/Variety	Fruit weight (g)	Fruit width (cm)	Fruit length (cm)
Wild blackberry	1.489 c	1.253 c	1.113 c
Loch Ness	6.407 b	2.033 a	2.640 a
Jumbo	7.464 a	2.100 a	2.883 a
Navaho	3.543 d	1.687 b	1.887 b

*- significant impact of factor, ($p < 0.05$)

Table 3: Descriptive statistics for phytochemical properties of the studied blackberry species and varieties

	Wild blackberry			Loch Ness			Jumbo			Navaho		
	mean	max	CV %	mean	max	CV %	mean	max	CV %	mean	max	CV %
Vitamine C	23.06	23.1	0.25	16.16	16.5	2.17	13.4	13.7	2.69	14.1	14.2	0.7
Phenols	32.10	38.8	19.9	23.8	25.5	6.34	25.6	27.4	6.66	21.1	27.3	25.7
Anthocy anins	117.0	152.2	31.4	16.95	226.7	30.5	153.0	236.7	47.5	238.7	337.2	37.4

Table 4: Results of One –Way ANOVA i Tukey test of phytochemical properties of blackberry species and varieties fruit

Factor/chem. components	Phenols content (mgGAE/100g)	Anthocyanins content (mg/100g)	Vitamine C (mg/100g)
Species/Variety	NS	NS	*
Species/Variety	Phenols content (mgGAE/100g)	Anthocyanins content (mg/100g)	Vitamine C (mg/100g)
Navaho	21.1 a	238.7 a	14.100 a
Jumbo	25.6 a	153.0 a	13.400 b
Loch Ness	23.8 a	169.5 a	16.167 c
Wild berry	32.1 a	117.0 a	23.067 d

*- significant impact of factor ($p < 0,05$), NS– no significant impact

Discussion and Conclusion

Jumbo variety (7.46 g) had the highest average fruit weight, while *Rubus fruticosus* L. - wild berry had the smallest (1.49 g). Considering the variation coefficient, it can be concluded that *Rubus fruticosus* L. - wild blackberry had the highest relative variability of fruit weight (CV 33.9%), and Jumbo variety had the lowest (CV 14.04%). The determined weight of blackberry fruit is smaller compared to the fruit weight research results conducted by Milivojević et al (2010) in Serbia (2.47 g), higher in comparison to the results obtained by Yilmaz et. al. (2009) in the southern part Turkey (1.1 g), and higher compared to the ones obtained by Ochmian et. al. (2009) in Poland, who had wild blackberry fruit with the average weight of only 1.23g. Variance analysis showed that the species/variety factor affects the observed morphometric properties ($p <0.05$). 'Jumbo' variety had a significantly higher average fruit weight than the other two tested varieties and can be recommended to blackberry farmers because of the possibility of achieving high yields.

The highest vitamin C content in this study was found in the species *Rubus fruticosus* L. - wild blackberry (23.06 mg / 100g FW), while the lowest vitamin C amount was registered in Jumbo variety (13.4 mg / 100 g FW). Based on the comparison of the research results to literature data, it can be concluded that the samples of the studied species of *Rubus fruticosus* L. - wild berry collected in the area of the Una-Sana Canton are extremely rich in vitamin C. The determined vitamin C content in wild blackberry fruits is much higher than in many other samples, such as fruits from Poland (Ochmian et al., 2009) - 11 mg / 100 g FW, fruits from Greece (Pantelidis et al., 2007) - 14.1, mg / 100 g, the fruits from the area of Bratunac and Srebrenica (Marjanović - Balaban et al., 2012) - 17.45 mg / 100g. In contrast, commercial varieties of blackberry (Navaho, Loch Ness and Jumbo) investigated in this paper showed significantly low vitamin C concentration in comparison with published data.

The highest value of total phenol content in this study was found in species of *Rubus fruticosus* L. - wild berry (32.1 mgGAE / 100g), while the lowest concentration was observed in the Navaho variety (21.1 mgGAE / 100g). These values are significantly lower than the phenol content in Turkish wild blackberry populations (61.0 to 145.5) (Yilmaz et al., 2009) and in field populations of wild blackberry (137.8) (Ochmian et al., 2009). In Navaho variety, Yilmaz et al., (2009) registered a high concentration of phenol in relation to research conducted in this paper, and it is mgGAE 73.07/100g. In Montenegrin wild blackberry populations, Ćujić et al., (2011) found phenol content of 27.4 mg GAE / 100g, which was slightly lower than in this study. For *Rubus fruticosus* L. - wild blackberry in Croatian populations, Voća et al., (2008) have noted total phenol content mg GAE 37.06 / 100g, which is approximate to the results of this study. It can be concluded that the species of *Rubus fruticosus* L. - wild blackberry has higher total phenol content compared to commercial varieties; it is a source of natural antioxidants and thus can contribute significantly to human health.

The lowest anthocyanins content was found in the species of *Rubus fruticosus* L. - wild blackberry (117.0 mg / 100g), and the highest in Navaho variety (238.7 mg / 100g). A slightly

higher value of anthocyanins in the wild blackberry fruit has been found in the Croatian population (173.7 mg / 100g) by Voća et. al. (2008). In their research, Vulić et al., (2011) obtained a higher value of anthocyanins in wild blackberry (149.12 mg / 100g). According to the research carried out by Corona et al., (2011), the total content of anthocyanins in *Rubus fruticosus* L. - wild blackberry was 76.78 mg/100 g, which is significantly lower than the value in this research. Marjanović - Balaban (2012) noted the extremely lower values of anthocyanins for *Rubus fruticosus* L. - wild blackberry (35 mg / 100g) in 2011, and during the survey on the same samples in 2012, they obtained the values 125 mg/100g, which is slightly higher than the value in this research. In their research on the Montenegrin wild blackberry populations, Ćujić et al., (2011), obtained approximately equal value (119 mg / 100 g) of total anthocyanins content.

Variance analysis has shown that the species/variety factor does not affect neither the phenol content nor the anthocyanins content. But when it comes to vitamin C content, it has been found that the species/variety factor influences this property. It has been concluded that wild blackberry has a significantly higher content of vitamin C when compared to commercial varieties of blackberry. Wild fruits such as wild berry represent significant natural resources. It is a particularly important genetic potential for preservation and biodiversity of certain areas, as well as for the selection and processing of modern fruit varieties.

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Effects of Gibberellic Acid (GA_3) on Morphological Characteristics of Pelargonium (*Pelargonium x hortorum*)

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Abstract

Pelargonium (*Pelargonium x hortorum*) is extremely popular perennial because of its features which enable simple cultivation. Besides that, pelargonium inflorescence picked in the right moment, with only few apical flowers being opened, can be maintained fresh in water for longer period. Since pelargonium inflorescence stems are short, they cannot be used in combination with the other cut flowers, the aim of this paper was to follow effect of gibberellic acid (GA_3) application on plant height and stem elongation. Size of leaves and inflorescence was monitored as well, in order to check possibility of use of pelargonium as cut flower. Sample consisted of three groups of plants and control group. The plants were treated with three different concentrations of gibberellic acid (GA_3) 10 ppm, 20 ppm and 40 ppm. Neither one of used concentrations was not showed as toxic for pelargonium; the results indicated that effect of use of gibberrellic acid (GA_3) on length and size of inflorescence was statistically significant, while there was no significant effect on plant width.

Keywords: Pelargonium (Pelargonium x hortorum), giberellic acid (GA_3), inflorescence stem.

Introduction

Pelargonium (*Pelargonium x hortorum*) is popular perennial used for balcony and terraces decoration, while as an annual plant is used for green areas arrangement and interior decoration (Temim, 2009). Inflorescence appear in round clusters of different colours, therefore may be used as cut flowers too. Pelargonium inflorescence picked in the right moment, with only few apical flowers being opened can be maintained fresh in the water for a long time and if favourable conditions are achieved they can survive up to three weeks.

Since the pelargonium inflorescence stems are short, they cannot be used in combination with the other cut flowers, so the aim of this paper was to follow the effect of gibberellic acid (GA_3) application on stem elongation, plant height, size of leaves and inflorescence. It is very well known that gibberellins are hormones that influence stem elongation and flower induction (Sponsel, 2011)

Gibberellins influence stalk elongation and flower induction (Sponsel, 2011). During this research it was necessary to determine which concentration of GA_3 has the best effect on the plants, especially on stem elongation and on flowering induction (Bartolome, 2011). It was also necessary to determine whether some of used concentration is toxic for pelargonium (Mutasa-Gottgens, Hedden, 2009).

Material and Methods

The research was carried out over the period from April 2013 to August 2013. Effect of gibberellic acid (GA_3) was monitored on 120 plants of pelargonium (*Pelargonium x hortorum*). The plants were transplanted on the April 14th 2013, separated in four groups. Each group was consisted of 30 plants.

Three groups were treated with different concentrations of gibberellic acid (GA_3) solutions 10, 20 and 40 ppm and fourth group was treated with plane water. The plants were grown and treated in the greenhouse at the Agromediterranean faculty, Dzemal Bijedic Univestity of Mostar.

Substrate Potgrond H, produced by Klassmann-Deilmnn GmBH, was used as potting substrate. This substrate has high air capacity and porosity, stable pH and fine structure. The plants were fertilized twice with bio-metabolitic fertilizers Nextra and Plantella. Solutions of (GA_3) GIBBER 10 TB (gibberellic acid 10%) produced by PHYTORGAN SA, Athens. Plants at 3-4 leaf-stage and some with inflorescence stems with buds already developed were sprayed with 0 (Control), 10, 20 and 40 ppm concentrations of gibberellic acid (GA_3). The treatment was performed in the evening hours with air temperature 16-18 ^{o}C and it was repeated 15 days after. First control measurement was done five days prior to the first treatment, and all the other measurements were done every seventh day. The fifth measuring was performed for the parameters of inflorescence stalk and percentage of flowering plant 10 days after the fourth measuring (Lang, 1957). The following morphological characteristics were measured: plant height, plant width (diameter), inflorescence stem height and percentage of flowered plants. Besides the

mentioned metric parameters, flowers were cut during the experiment and their longevity in a vase was followed. Flower longevity was counted as the number of days from the day when they were cut to the day of abscission.

All the data obtained were processed by appropriate statistical - mathematical methods. ANOVA tests were made in order to analyse variance of every morphological characteristic aiming determination of their difference. The level of used statistical significance was $p< 0,01$ and $p < 0,05$. Based upon ANOVA results, Lsd test was conducted.

Results and Discussion

Plant Height

As it can be seen in the table 1., there was no significant difference in plant height prior to the treatment. The second measurement indicates that untreated plants significantly differ from the treated plants. The third measurement shows statistically significant difference between the plants treated with 40 ppm of GA_3 and all the other plants, treated and untreated. There was no statistical difference between the plants treated with 10 and 20 ppm solution of GA_3 and control group of plants. The last measurement shows that the highest plants are those treated with 40 ppm of GA_3, the group treated with 20 ppm was higher then the group treated with 10 ppm and the untreated plants. There was no significant difference between the plants in the group treated with 10 ppm of giberellic acid and the plants treated with plane water.

Table 1. Average height of pelargonium plants treated with giberellic acid GA_3

	10 ppm	20 ppm	40 ppm	Control
I measurement	12,93	12,81	11,88	12.71
II measurement	16,36 **a**	16,03 **a**	16,89 **a**	13.96 **b**
III measurement	18,65 **b**	22,32 **b**	26,1 **a**	21,87 **b**
IV measurement	22,95 **c**	28,08 **b**	32,2 **a**	22,26 **c**

Plant width (diameter)

Plant widt (diameter) was increased through the research period, but as presented in the Figure 1., there was no statistically significant influence of giberellic acid GA_3 on the plant width (diameter).

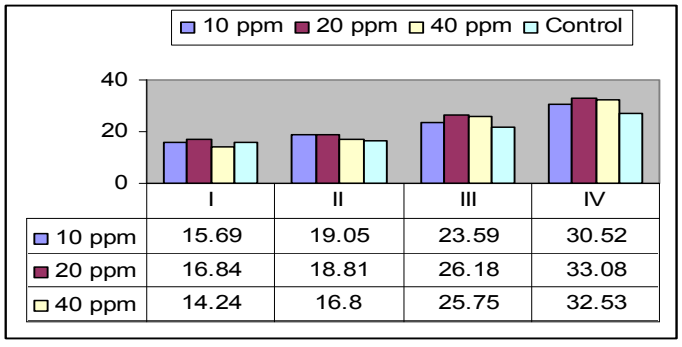

Figure 1. Average diameter of the pelargonium plants treated with different concentrations of giberellic acid.

Inflorescence stem height

Many authors concluded that giberellic acid is promoting stem elongation (Suge and Rapaport, 1968, Seitzmann, 2010). In this research, inflorescence stems height during the period covered with first two measurements was not statistically significantly different from each other. At the other measurements, significantly the highest inflorescence stem was observed for the plants treated with 40 ppm solutions of giberellic acid, while the height of the other groups of plants varied.

Table 2. Average height of inflorescence stem of pelargonium plant treated with three different concentrations of giberellic acid GA_3

	10 ppm	20 ppm	40 ppm	Control
I measurment	6.63	5.38	7.37	4.02
II measurment	8.87	9.00	9.97	8.06
III measurment	8.92 **b**	8.80 **b**	11.97 **a**	8.43 **b**
IV measurment	11.65 **b**	13.47 **a**	17.05 **a**	15.23 **a**
V measurment	14.39 **b**	13.12 **b**	19.91 **a**	16.65 **c**

Percentage of flowered plants

Some plants (groups selected for treatment with 10 and 20 ppm) had already developed inflorescence stems with some buds prior to the first treatment. It was obvious that the number of their inflorescence decreased after the treatments. The plants treated with 40 ppm solution of giberellic acid GA_3, had the highest percentage of inflorescence through all the measurements after the treatments, and it varied from 73% to 50 %. Untreated plants had the lowest percentage of plants in blossom, so this data indicate that there was an influence of treatment with giberellic acid on flowering of pelargonium plants. This result is in the accordance with the results of authors who concluded that giberellic acid positively influence flowering of many ornamental plants (Chen and Henny 2003, 2008). It is also in the accordance with findings of authors who proved that giberellic acid stimulates flowering (Harbaugh, and Wilfret 1979).

Table 3. Percentage of flowered pelargonium plants treated with giberellic acid GA_3

	10 ppm	20 ppm	40 ppm	Control
I measurement	70%	43%	36%	43%
II measurement	53%	66%	66%	53%
III measurement	40%	33%	50%	23%
IV measurement	33%	50%	73%	43%

Longevity of cut flowers

Pelargonium flowers were cut twice during the experiment, and their vase longevity was monitored. First cut flowers were collected after the first treatment with giberellic acid, and those flowers lasted in a vase for 15 days with no fallen petals. With regular removal of those petals, inflorescence lasted up to twenty days. Cut flowers collected during the month of July did not last longer then seven to ten days, which can be explained with high air temperatures.

Conclusion

In a conclusion, based upon statistical analyse of data, treatments with giberellic acid GA_3 in the solution concentrations of 10, 20 and 40 ppm had statistically significant effect on height of pelargonium plants, elongation of inflorescence stems and percentage of flowered plans. The treatments had no influence on width of pelargonium plants. The best influence of giberellic acid GA_3 was observed for the plants treated with 40 ppm who produced the longest inflorescence stems who could be used in combinations with the other type of cut flowers. Neither one of used concentrations appeared to be toxic for pelargonium.

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The Influence of Land Use Change on Some Soil Parameters

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Abstract

A study was conducted to examine the impact of land use on soil fertility in different soil types under a different soil management practice in Bosnia and Herzegovina. Natural grasslands served as a control against which changes in soil properties after cultivation were compared. Soil samples were collected from the soil profile genetic horizons at ten studied sites and analysed to obtain values of bulk density (BD), pH in KCl solution, soil organic carbon (SOC), base saturation (BS), available phosphorus (P_2O_5) and potassium (K_2O). Mean values of studied parameters in cultivated soils for all study sites did not differ significantly in compare to grassland soils. However, differences can be seen on a site level, where soil parameters are influenced by soil management practise. SOC stocks calculated within 30 cm of a soil depth were used to assess the effects of a land use, as well as to soil management practice. The results showed that small family farms with both animal and plant production have improved soil conditions, unlike to larger farms and forest nurseries in state ownership.

Keywords: Land use change, soil parameters, fertility, SOC

Introduction

The anthropogenic impact may have serious implications on soil (Grieve 2001). When one native soil is brought under cultivation, some properties related to soil fertility are starting to change. The rate of that changing process depends upon climatic factors, soil type and intensity of cultivation. Through deforestation and ploughing many natural grasslands and forests were converted into arable land. Consquently, a change of natural ecosystems led to an improvement or a decline of soil agro-ecological properties. Agricultural ecosystems have different soil properties compared to corresponding natural soils in an ecosystem. The type of land use is an important factor controlling soil organic matter (SOM) storage since it affects the amount and quality of litter input, the litter decomposition rates and the processes of organic matter stabilization in soils (Romkens et al., 1999, Six et al., 1999, Six et al., 2002). Although, there is incredibly large number of papers dealing with cultivation effects on SOM, there are still considerable uncertainties regarding the fertility maintains mainly due to a great heterogeneity and complexity of soil (B. John et al. 2004). The objectives of this paper were to compare a number of soil properties, in regard to a land use, in addition grassland and corresponding cultivated land, in some of the most representative soil types in Bosnia and Herzegovina (B&H), and examine the relationship between certain property changes, soil type and site specific soil management practice.

Materials and Methods

The material analyzed in this study represents soil samples of three separate studies collected from ten study sites in different regions of the B&H (Table 1). Two soil profiles were studied and sampled per site (grassland and cultivated land). Cultivated (arable) land at site 1 (Nišići highland in central B&H) representing private owned garden, was used for agricultural production. In site 2 (Sprečko polje in north B&H), cultivated (arable) land was found on a large farm of a former agricultural complex in state ownership and curently is being used for silage corn and oat production. In this site grassland represented 17 years ago abounded arable land. In site 3 Dubrava plateau (Herzegovina) cultivated land, also found in a private-owned farm, was used for a production of 4 to 6 crops rotating between plots. Manure was applied at all three cultivated plots of these three studied sites, including calk application in Sprečko polje.

Table 1. Characteristics of investigated sites

Nb.	Site	Soil type and parent material	Altitude (m)	Temp. °C	Precip. (mm)
1.	Nišići (highland)	Dystric cambisol; verfen sandstone	1080	6.2	812
2.	Sprečko polje (lowland)	Pseudogley (Stagnic Albeluvisol); diluvium	250	10.2	923
3.	Dubrava (plateau)	Terra Rossa (Rhodic Cambisol); limestone	250	15.0	1459
4.	Ajdinovići (highland)	Dystric cambisol; acid silicate colluvium	850	7.6	926.5
5.	Žepče (lowland)	Fluvisol; alluvial-coluvial deposits	235	11.2	838.6
6.	Busovača (lowland)	Fuvisol; alluvio-glacial deposits	385	8.4	848.4
7.	Crnaja (valley)	Stagnic cambisol on alluvial-deluvial clays	200	10.8	1245
8.	Šabići (hilly lowland)	Cambisol on micashist	350	10.8	1245
9.	Donja Lučka (hilly	Cambisol on shale	300	10.8	1245
10.	Baštra (hilly)	Dystric Cambisol on sandstone	165	10.8	1245

Site 4, 5 and 6 (Ajdinovići, Žepče and Busovača, all situated in central B&H) represented large state-owned forest nurseries, specialized for bareroot conifer seedlings production. Soil management involved mainly equal measures, such as absence of organic manures, application of mineral manures, pesticides, conifer sawdust mulch and no calcification. The last four sites (site 7, 8, 9 and 10) which were all situated in the region of Bosanska Krajina (north-west B&H) were attributed to acid silicate substrates. Cultivated soils in site 7 (Crnaja), 9 (Donja Lučka) and 10 (Baštra) were used as arable land and in site 8 (Šabići) as garden soil.

The research strategy adopted was to compare, in the same soil unit, plots with different land use (arable soil with conventional tillage, and native soils under grassland) and to evaluate the long term impact of cultivation on soil properties such as: bulk density (BD), available phosphorous (P_2O_5) and potassium (K_2O), pH, soil organic carbon (SOC) storage within 30 cm of depth and base saturation (BS). Soil texture was determined by pipette-B method (with 0.4 *M* $Na_2P_4O_7$ x $10H_2O$) and classified by US Soil Taxonomy, BD by gravimetric method, soil pH values were measured after extraction with 1*M* KCl, in ratio 1:2.5, available P_2O_5 and K_2O were determined by AL–method, SOC by dry combustion method using Element Analyzer (Heraeus vario EL.). Analysis of cation exchange capacity was made by using 1*M* NH_4Cl extraction procedure (König & Fortmann, 1996), except for sites 7, 8, 9 and 10 where total adsorption of cations and BS were determined by Kappen's procedure. Base saturation (BS) was calculated as relative value of sum of base cations. The SOC stock was calculated within 0-30 cm depth (Jiang et al. 2005). Soils were classified according to the National Soil Classification (Resulović et al. 2008). Kolmogorov-Smirnov Z test was conducted to test mean differences among different land use systems.

Results and Discussion

There are no substantial differences in soil texture between compared grassland and corresponding cultivated soils, as shown in Table 2. Also, the results showed that mean BD of ten studied sites, which all referred to conventional tillage, did not differ significantly if compared to grassland soils. Values of BD were the lowest in soils used as private owned gardens, while grater values were related to arable land in large farms in state ownership. Mean values of pH, P_2O_5, K_2O, SOC and BS for cultivated soils showed no significant difference compare to top layer of grassland soils. In state owned farms and forest nurseries (sites 2, 4, 5 and 6) cultivated soils were attributed to lower pH values in regard to native grassland soils. Cultivated soils, on the first place garden soil, than arable land in small private farms with animal and crop production (sites 1, 7, 8, 9 and 10), were attributed to higher values of pH in relation to native grasslands.

Table 2. Soil properties (texture; bulk density-BD, phosphorous-P_2O_5 and potassium-K_2O, pH, soil organic carbon-SOC storage, base saturation-BS and SOC stock in kgm^{-2} up to 30 cm dept) in relation to soil type and land use.

Depth (cm)	Horiz-on	Texture	BD gcm^{-3}	K_2O $mg10^{-2}g$	P_2O_5 $mg10^{-2}g$	pH *M* KCl	SOC %	BS %	SOC* kgm^{-2}
Site 1. Dystric Cambisol (Nišići highland) - Grassland									
0-23	Ah	Sandy loam	1.2	11.9	0.0	3.7	1.79	36.5	5.43
23-60	Bv	Sandy cl. loam	1.4	9.7	0.0	3.6	0.54	16.5	
Dystric Cambisol (Nišići highland) - Cultivated soil (garden)									
0-18	Ap	Sandy loam	1.0	27.8	0.5	3.9	2.50	78.2	5.64
18-38	Bv	Loam	1.6	20.9	0.0	3.6	0.49	40	
Site 2. Pseudogley (Sprečko polje) - Grassland (17 years ago abounded arable land)									
0-30	Ah	Loam	1.4	26.1	3.7	3.9	1.94	73.0	8.07
30-50	Sw	Loam	1.5	21.5	2.6	3.5	0.79	45.7	
Pseudogley (Sprečko polje) - Cultivated soil (arable land long term in state ownership)									
0-30	Ap	Loam	1.5	23.3	8.26	3.7	1.19	61.2	5.20
30-52	Sw	Loam	1.5	31.2	0.8	3.6	0.99	59.6	
Site 3. *Terra Rossa* (Dubrava plateau) – Grassland									
0-20	Ah	Clayey loam	1.4	20.5	0.0	4.6	1.66	97.9	5.77
20-40	Brz	Clay	1.5	16.5	0.0	4.4	0.82	97.4	
Terra Rossa (Dubrava plateau) - Cultivated (small farm with livestock, croping)									
0-23	Ap	Clayey loam	1.3	32.7	0.5	4.2	1.49	93,8	5.79
23-47	Brz	Clay	1.5	20.6	0.0	4.7	1.21	94.0	
Site 4. Dystric Cambisol (Ajdinovići) - Grassland (intact soil > 30 years)									
0-10	Ah	Silty loam	1.1	25.5	0.5	4.1	4.52	72.9	6.48
10-50	ABv	Silty loam	1.2	-	-	3.9	0.63	53.1	
Dystric Cambisol (Ajdinovići) - Cultivated (bareroot seedling production)									
0-20	Ap	Silty loam	1.1	19.2	3.6	3.9	2.37	39.4	5.85
25-60	Bv	Silty loam	1.1	-	-	4.2	0.57	58.1	
Site 5. Fluvisol (Žepče) - Grassland (intact soil > 30 years)									
0-30	Ah	Silty cl. loam	1.4	11.7	4.8	6.5	1.83	98.7	7.57
30-70	I	Clayey loam	1.4	-	-	6.2	0.46	99.0	
Cultivated (bareroot seedling production/state ownership)									
0-30	Ap	Clayey loam	1.5	8.0	2.6	5.0	1.36	97.2	5.83
30-65	I	Silty cl. loam	1.5	-	-	5.7	0.67	99.2	
Site 6. Fluvisol (Busovača) - Grassland (intact soil > 30 years)									
0-25	Ah	Loam	1.1	13.0	4.6	6.3	1.36	97.1	4.07
25-65	I	Loamy sand	1.5	-	-	6	0.29	93.6	
Cultivated (bareroot seedling production/state ownership)									
0-30	Ap	Sandy loam	1.3	4.7	3.1	5.1	1.06	93.8	4.03
30-70	I	Loam	1.4	-	-	5.1	0.73	94.0	
Site 7. Stagnic Cambisol, Crnaja - Grassland									
0–24	Ah	Sandy cl. loam	1.2	46.6	1.8	3.8	1.08	55.8	3.29
24–64	Bv	Clay	1.3	34.8	0.8	3.4	0.22	47.2	
Cultivated – arable land on small family farm									
0–23	Ap	Loam	1.1	17.6	2.7	3.9	1.36	52.9	3.72
23–65	Bv	Loam	1.4	7.8	0.9	3.9	0.28	38.6	
Site 8. Cambisol on micashist, Šabići - Grassland									
0–17	Ah	Clayey loam	1.3	11.5	1.4	4.3	1.02	66.9	2.63
17–60	Bv	Clayey loam	1.3	5.7	0.8	4.2	0.22	67.4	
Cultivated (garden)									
0–33	Ah	Loam	1.1	25.6	1.6	5.2	1.88	88.0	6.20
33–75	Bv	Clay loam	1.4	7.6	1.7	4.4	0.28	84.3	
Site 9. Cambisol on shale, Donja Lučka - Grassland									
0–29	Ah	Clayey loam	1.1	15.1	2.3	4.2	1.65	59.3	5.29
29–64	Bv	Clayey loam	1.4	7.4	0.3	3.8	0.22	65.8	
Cultivated (arable soil on small family farm)									
0–20	Ap	Clayey loam	1.1	18.7	3.0	5.5	1.65	51.6	4.22
20–54	Bv	Clayey loam	1.3	8.6	2.6	5.2	0.45	33.5	
Site 10. Dystric Cambisol on sandstone, Baštra - Grassland									
0–28	Ah	Loam	1.0	13.5	0.7	3.7	1.59	50.3	4.52
28–69	Bv	Clayey loam	1.3	8.6	0.2	3.8	0.28	44.9	
Cultivated (arable land on small family farm)									
0–20	Ap	Loam	1.3	10.8	0.8	5.7	1.08	86.2	3.09
20–43	Bv	Clayey loam	1.3	6.9	0.5	5.3	0.22	84.9	

Amounts of available P_2O_5 were extremely low in both anthropogenic and natural soils for all study sites, which can be explained by the phosphate-low substrates such as sandstones, shales and sedimentary rock in general (Šaćiragić 2000). Results of available K_2O showed mostly medium storage level what may have lithogenic origin and most differences between cultivated and grassland soils and may differ as a matter of soil management specifics. Soil management influenced greater amounts of K_2O in garden soils and at most of the studied sites (site 1 ,3, 8, 9), while soils cultivated for forest nursery production (site 4, 5 and 6) were attributed to lower values of K_2O, compare to grassland. The results showed mainly adjacent values of BS in both land use systems, which can be related to coherent properties of the parent material. However, the influence of soil management was registered in cultivated garden soil at site 1 and 8, where grater values of BS were found, and forest nursery soil at site 4 where lower values were found, in regard to grassland. Except from garden soils (site 1 and 8), reduced amounts of SOC after cultivation were recorded on all farms. Cultivated soil in former agricultural complex in state ownership (site 2) and soils used for bare root forest seedling production (site 4, 5 and 6) were all attributed to a substantial (10-40%) decrease of SOC stock. Decrease in SOC amounts in forest nurseries occurs as a consequence of harvest, where the whole forest seedlings are being removed from soil, including roots, leaving no organic debris in soil. This is a broadly recognized cultivation effect of forest nursery production, which alters a large variety of soil properties affecting seedlings yield and growth (Rose et al. 1995).

Conclusion

Agricultural practice is one of the most important factors controlling soil quality. A positive influence of soil management in most cases was found in garden soils as well as on small farms with animal and plant production, which apply organic fertilizers and avoid monocultures. Special attention should be paid to soil quality on big farms which are in state ownership, as well as on soils used for bare root seedling production. Investigated fertility parameters in these soils indicate reduced soil quality and a necessity for an enhancement of soil management practice. Therefore, one of the most important tasks of soil management practise for maintenance of good soil fertility in studied sites is SOC conservation.

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Comparison of the Alkaloid Production of In Vitro Propagated Indian Tobacco (*Lobelia inflata* L.) under Both Laboratory and Open Field Conditions

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Abstract

Lobelia inflata L. is a medicinally important species of the *Lobeliaceae* family. It is native to North America and contains numerous piperidine alkaloids. The main alkaloid lobeline has been used as a respiratory stimulant. The aim of our studies was to compare the lobeline production of in vitro propagated *L. inflata* under both laboratory and open field conditions. As a result of fertilization, the highest lobeline content in open field treatment was 682 µg/g (150 kg/ha N treatment). The highest alkaloid content of the herb was in the control (875 mg/100 g). Lobeline content was higher in herb of cultures cultivated on MS medium containing halved amount of KNO_3 (D1) than in control. Administration of magnesium at 740 mg/l resulted in the highest lobeline content in the herb.

Keywords: Lobelia inflata, lobeline, total alkaloid, in vitro, open field

Introduction

Indian tobacco (*Lobelia inflata*) is a native North American species (Canada and US. east countries) (Gottfried, 2001). It is mainly an annual plant (Felpin and Lebreton, 2004), but biennial populations can be found, too. Lobelia is named after Flemish Botanist Matthias de L'Obel (1538-1616) (Mottram, 2002).

The *Lobelia inflata* synthesize important medicinal materials. The herb contains several piperidine skeleton alkaloids (Kursinszki et al., 2008). Its main alkaloid is the lobeline that due to its stimulating effect on the respiratory centre is used in cases of gas- and narcotic poisoning (Glover et al., 2010). Recently, it has been come into the limelight due to research on CNS, drug abuse and multidrug resistance (Beckmann et al., 2010; Szőke et al., 2013). Another important active agent in the plant is an antidepressant known β-amirin-palmitate. To satisfy the market needs, it is important to increase the content values and the biomass of the plant (Bálványos, 2002; Takács-Hájos et al., 2007), for which a great opportunity arises through the nutrient supply of the plant.

The aim of our studies was to compare the lobeline and biomass production of in vitro propagated *L. inflata* under both laboratory and in open field conditions.

Material and Methods

Plant material

Both in vitro and seed propagation were applied (seed origin: Richters, Canada). In vitro propagation was initiated from seedlings by adventitious shoot induction. Methods of both culturing have been published. Under laboratory conditions the concentrations of NH_4NO_3 (990 mg/l) and KNO_3 (1140 mg/l) in Murashige-Skoog (MS) medium were halved or doubled, as follows: A_1 [NH_4NO_3 (990 mg) + KNO_3 (1140 mg)] (control); B_1[NH_4NO_3 (1980 mg) + KNO_3 (1140 mg)]; C_1 [NH_4NO_3 (990 mg) + KNO_3 (2280 mg)]; D_1 [NH_4NO_3 (990 mg) + KNO_3 (570 mg)]; E_1 [NH_4NO_3 (495 mg) + KNO_3 (1140 mg)]. Under laboratory conditions the concentrations of $MgSO_4$ in MS medium as follows: 0, 185, 370 (control base), 740, 1480, 2960 mg/l concentrations.

In open field trials nitrogen (NH_4NO_3, 34%) or magnesium ($MgSO_4$, %) ground fertilizers were applied in the soil at 50, 100, 150 kg/ha concentrations. Untreated in vitro propagated plants were used as control.

Alkaloid extraction

Lobelia inflata (1 g), dried and powdered, was extracted with 1x20 ml, and 2x10 ml of 0.1 N HCl-methanol (1:1, v/v) by sonication for 3x10 min. After centrifugation and filtration the methanol was evaporated off and the remaining aqueous phase was made up to a stock solution with 0.1 N HCl. Samples of this solution were purified by solid-phase extraction (SPE). The total alkaloid content was determined by a spectrophotometric method elaborated by Mahmoud and El-Masry (1980) and modified by Krajewska (1986).

Lobeline content was determined by HPLC method, after a solid-phase purification step (Kursinszki et al., 2008). Supelclean LC-8 columns (Supelco Bellefonte, PA, USA) were used for SPE. Aliquots (10 mL) of the stock solution were loaded on to octyl SPE micro-columns previously activated with 5 mL methanol, and 5 mL water. The columns were then washed with 2.5 mL water to remove matrix. After air drying of the cartridge, the alkaloid containing fraction was eluted from the tube with 2x2.5 mL methanol.

Instrument: Surveyor (Thermo Finnigan, San Jose, CA, USA) HPLC system consisting of a quaternary gradient pump with an integrated degasser, a PDA detector, and an autosampler. Thermo Finnigan Chrom Quest 4.0 software used for data acquisition, processing, and reporting. Column: Knauer Eurospere 100-C8 (250mm x 3mm I.D.; 5µm), with precolumn (5x3 mm I.D.). Column temperature: 25 °C. Injection volume: 5 µL. Mobile-phase: acetonitrile: 0.1 % trifluoroacetic acid (30:70, v/v). Flow-rate: 0.8 mL 1/min.

Analysis was performed in positive ion mode on an Agilent 6410 Triple Quad LC/MS system using electro spray ionization. Alkaloids were separated on a Knauer Eurospher 100-C8 (5µm) reversed-phase column (250mm x 3mm I.D.), with precolumn (5 mm x 3 mm I.D.), with 30:70 (v/v) acetonitrile: 30 mM ammonium format, pH 2.80. The solvent flow rate was 0.8 ml/min and column temperature was set at 25 °C. The injection volume was 10 µL. By solvent splitting, 40 % eluent was allowed to flow into the mass spectrometer. The conditions of the LC-MS/MS analysis were as follows: nebulizer pressure 45.0 psi, drying gas flow rate 9 L 1/min , drying gas temperature 350 °C, capillary voltage 3500 V, scan range from m/z 50 to 700 at collision energy of 15 or 20 eV depending on the molecular structure.

Results

Open field trials

Figure 1 illustrates the alkaloid production of plants in the open field experiments. It could be observed that the addition of 150 kg/ha N fertilizer increased the lobeline content of the herb by over 30 %. Remarkably the alkaloid content of the control was the highest (875 mg/100g). The lowest alkaloid and lobeline content was in the 50 kg/ha N fertilizer treatment.

Table 1 demonstrated the herb biomass production. The lowest biomass production was seen in the 50 kg/ha Mg treatment.

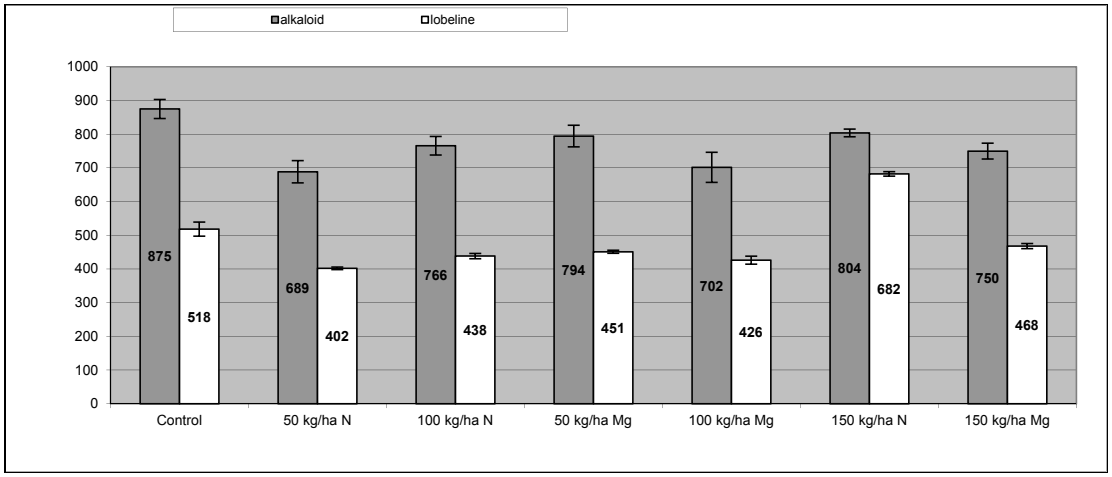

Figure 1. Alkaloid (mg/100g) and lobeline (µg/g) production of in vitro propagated *Lobelia inflata* herb under open field conditions (2012).

In vitro experiments

Administration of magnesium at 740 mg/l resulted in the highest lobeline contents in the herb (Figure 2).The lowest alkaloid and lobeline content was in the 2960 mg/l $MgSO_4$ fertilizer treatment.

Figure 3 illustrates the alkaloid production of NH_4NO_3 and KNO_3 treatments. Lobeline content was higher in herb of cultures cultivated on MS medium containing halved amount of KNO_3 (D1) than on control (A1). The value of B1 treatment (doubled amount of NH_4NO_3) was lowest.

Table 1 presents the herb biomass production of $MgSO_4$, NH_4NO_3 and KNO_3 treatments. The lowest biomass value was in the 0 mg/l $MgSO_4$ fertilizer treatment. The biomass value of B1 treatment (NH_4NO_3 and KNO_3) was lowest.

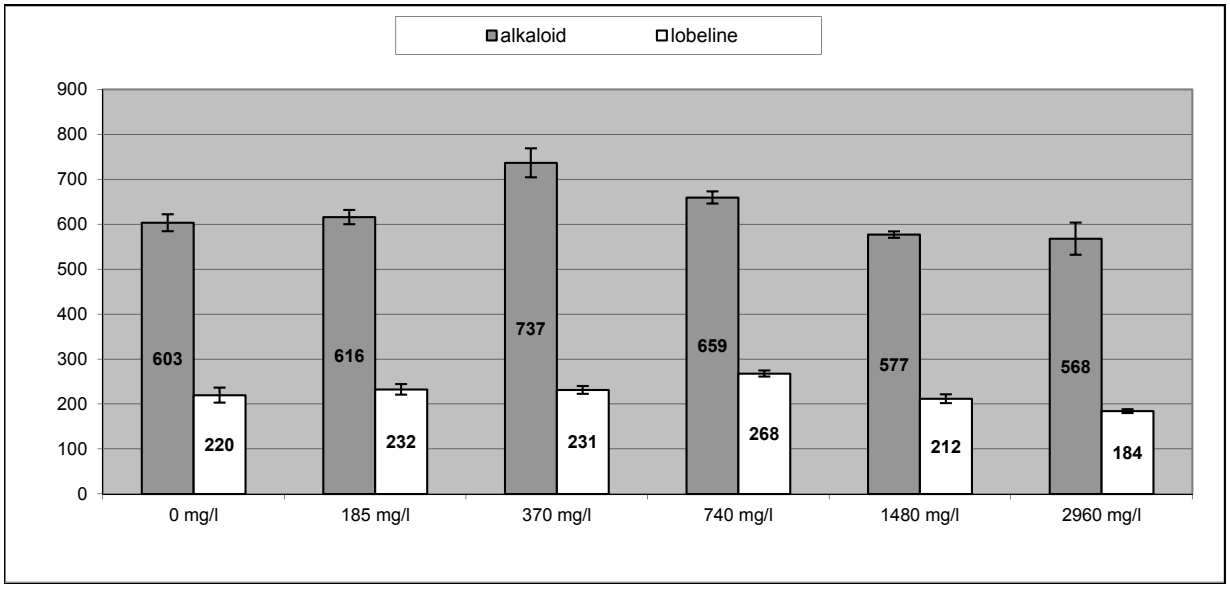

Figure 2. Effect of $MgSO_4$treatment on the alkaloid (mg/100g) and the lobeline (µg/g) production of in vitro *L. inflata* herb in MS medium (2012).

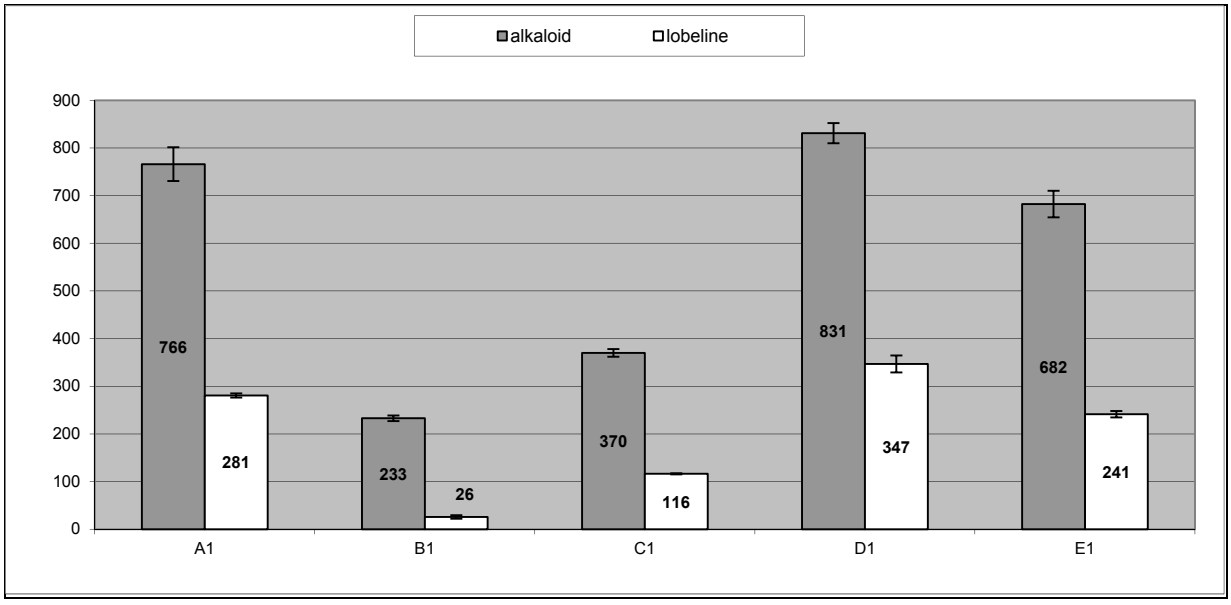

Figure 3. Effect of NH_4NO_3 and KNO_3 treatments on the lobeline (µg/g) and the alkaloid (mg/100g) production of in vitro cultured *L. inflata* herb in MS medium (2012).

Table 1. Biomass (g) production of in vitro propagated *Lobelia inflata* herb in MS medium and under open field conditions (2012).

$MgSO_4$		NH_4NO_3+KNO_3		Open field	
mg/l	g/plant	mg	g/plant	treatments	g/plant
0	0.53	A1	0.84	Control	5.34
185	0.96	B1	0.14	50 kg/ha N	3.55
370	0.79	C1	0.20	50 kg/ha Mg	3.16
740	0.70	D1	1.00	100 kg/ha N	12.7
1480	1.09	E1	0.41	100 kg/ha Mg	11.4
2960	0.76	-	-	150 kg/ha N	10.5
-	-	-	-	150 kg/ha Mg	10.2

Discussion and Conclusion

Based on the experiments it can be estimated, that the lobeline content of open field grown plants was higher than in under laboratory conditions. N treatment resulted increase in lobeline content, compared to control (682 vs. 518 µg/g lobeline).

The highest values for total alkaloid content were recorded in in vitro herb, in the treatment D1 on reduced KNO_3 containing MS medium. Among the $MgSO_4$ treatments, the highest alkaloid production was obtained in the 370 and 740 mg/l variants, respectively.

The conclusions of our experiments are that under laboratory and open field conditions $MgSO_4$, NH_4NO_3 and also KNO_3 treatments were successful for the increase in the lobeline production of *Lobelia inflata*.

In terms of magnesium, the highest $MgSO_4$ medium (1480 mg/l) was the best in increasing the herb biomass production.

The highest biomass value was reached in D1 NH_4NO_3 and KNO_3 treatment.

The biomass content of open field plants was the highest in the 100 kg/ha N ground fertilizer treatment.

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