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Determination of the Factors Affecting Turkish Olive Producer's Adoption of Good Agricultural Practices in Marmara Region of Turkey

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ABSTRACT

This study was carried out with 63 farmers using good agricultural practices (GAP) in olive production in five districts of Balıkesir, Bursa and Tekirdag provinces located in the Marmara Region of Turkey by conducting a questionnaire survey. The farmers with GAP certificate produce either Gemlik (71.4%) or (28.6%) Ayvalık varieties. Survey forms were handed out to contract-based producers in November 2017 during olive harvest period. The data were evaluated using SPSS statistical program. The results showed that average size of farms producing olive oil with GAP are generally 60-65 decares (da) in size. The average age of olive producers is 58.7, who have been producing olives for an average of 39 years with an average GAP experience of 2.4 years. A positive relationship was evident between lower level of education and late adoption of GAP. The most important problem faced by growers was *Verticillium* wilting, followed by olive fly in recent years. The study revealed that the absence of a significant difference in the prices of olives and olive oils grown with or without GAP reduced the attractiveness of GAP production. Moreover, because of the lack of price policy in olives grown with GAP, olives are marketed along with conventionally produced ones in an equal conditions in the domestic market.

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ÖZET

Bu çalışma, Marmara Bölgesi'nde yer alan Balıkesir, Bursa ve Tekirdağ illerinin beş ilçesinde zeytin üretiminde iyi tarım uygulamaları (İTU) kullanan 63 çiftçi ile anket çalışması şeklinde gerçekleştirilmiştir. İTU sertifikalı çiftçiler çoğunlukla Gemlik (% 71.4) veya (% 28.6) Ayvalık çeşidi yetiştirmektedir. Anket formları Kasım 2017'de zeytin hasat döneminde sözleşmeye dayalı üreticilere dağıtılmıştır. Veriler SPSS istatistik programı kullanılarak değerlendirilmiştir. Sonuçlar, İTU ile zeytinyağı üreten zeytin bahçelerinin ortalama büyüklüğünün genellikle 60-65 dekar olduğunu göstermiştir. Zeytin üreticilerinin ortalama yaşı 58.7 yıl, zeytin üreticiliği yaptığı süre 39 yıl ve İTÜ deneyimleri 2,4 yıldır. Daha düşük eğitim seviyesi ile İTU'nın geç benimsenmesi arasında pozitif bir ilişki görülmüştür. Yetiştiricilerin karşılaştığı en önemli sorun *Verticillium* solgunluğudur ve bunu son yıllarda zeytin sineği takip etmektedir. Çalışma, İTU ile veya İTU olmadan yetiştirilen zeytin ve zeytinyağı fiyatlarında önemli bir fark bulunmamasını İTU üretiminin çekiciliğini azalttığını ortaya koymuştur. Ayrıca, GAP ile yetiştirilen zeytinlerde fiyat politikasının bulunmaması nedeniyle, zeytinler, geleneksel olarak üretilenler ile iç pazarda eşit koşullarda pazarlanmaktadır.

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INTRODUCTION

Consumer demands and tendency of the global markets require reliable production of agricultural production. People also demand that production be done without harming the environment, human and animal health (Lang et al., 2002; Walley et al., 2000).

Olive, which is consumed for table and oil, is an important agricultural product both in the domestic market and export. Therefore olive cultivation with GlobalGAP certificate is extremely important (Anonymous, 2017).

Total olive production in Turkey is 2.1 million tons, and this production is made in 837.000 da areas (Anonymous, 2018). According to the statistics of the Ministry of Agriculture and Forestry, the number of GlobalGAP producers in Balıkesir, Bursa and Tekirdağ provinces in Turkey is 2.083 persons, and 552 of them are olive producers (Anonymous, 2017).

A research was carried out to determine effective factors on decision making behavior for organic olive cultivation in the İzmir, Aydın and Çanakkale provinces in Turkey where organic olive production is done intensively. Based on the data obtained from 125 organic and 125 conventional olive farmer's income, type of land ownership, machinery estates, economic situation and environmental factors were found significant to decide making for organic olive cultivation (Köksal, 2009).

A survey was conducted with firms in production and export of fresh fruit export area in 10 sub-Saharan African countries. The results showed that firms with GlobalGAP certification had appreciable higher export revenues, and it is suggested that the return on new investments may be higher (Henson et al., 2011).

Numerous research were done on the ability of Kenyan farmers to obtain GlobalGAP certification to export of fresh fruit and vegetables from Kenya to EU countries, but the results showed that majority of Kenyan farmers did not have capabilities to get certificate (Dannenberg, 2011).

It was determined that GlobalGAP certification increases workers daily wages and employment periods in exporter producer companies in Senegal (Colen et al., 2012).

It was reported that only a few small-scale fresh mango producer in Peru supported by exporters complied with GlobalGAP standards and mostly demanded contract farming, including technical assistance and certification costs (Lemeilleur, 2013).

The income and benefits of the producers certified from producer-organized groups are better than those included in the exporter-managed groups and smaller farmers. The most important factors to renewal of the GlobalGAP certificate are support of exporters and scale of the farming operation (Holzapfel and Wollni, 2014).

The effects of GlobalGAP on the fruit and vegetable production sector were studied in Latin America and it was indicated that it is crucial to raise awareness on the importance of its application in the innocuousness aspects, the safety and the health of the workers and risk management of the environmental impact (Parra et al., 2015).

GlobalGAP and Malaysian Good Agricultural Practices (MyGAP) standards were compared to determine which one is more suitable for local producers, and the GlobalGAP standards was determined more appropriate (Tey et al., 2016).

The aim of the study was to determine the factors affecting olive producer's adoption of GlobalGAP standards within a Private Control Certification Group.

MATERIALS and METHODS

Material

The study was conducted with 63 olive farmers adapted GAP in 5 districts of Balıkesir, Bursa and Tekirdağ provinces, estimated to cover approximately 3.997.02 da (Table 1). The main production areas where data was mostly gathered were in Nilüfer and Gemlik districts of Bursa, and Erdek district of Balıkesir. The primary data that obtained as a result of a face-to-face survey with randomly selected sample farmers were used predominantly. The data acquisitioned from other sources on the subject was formed the secondary data. The survey was conducted in 2017 production period.

Method

The questionnaire provided the data about the production techniques (pest control, fertilizing, tillage, irrigation, maintenance etc.), inputs (fertilizer, chemicals, growth regulators) and their costs, marketing conditions and channels, problems faced by the producers before adopting the GlobalGAP program, advantages and disadvantages of GAP.

The producers were also asked about the information they need. The information needed in olive cultivation is gathered under 5 main headings: a) technical information (diseases and pests, fertilization) b) marketing (price, demand, market situation and others), c) consultancy (product packaging, preservation, storage, record keeping), d) diversification of production (garden establishment and cultivar selection) and e) legal information (Agricultural supports).

Table 1. The survey was carried out in 2017 production season in Tekirdağ, Balıkesir, and Bursa provinces, number of producers in each districts and production areas were given.
Çizelge 1. Anket 2017 üretim sezonunda Tekirdağ, Balıkesir ve Bursa illerinde gerçekleştirilmiş, her ilçedeki üretici sayıları ve üretim alanları verilmiştir.

Province *Şehir*	Number of districts *İlçe sayısı*	Districts *İlçeler*	Number of producers *Üretici sayısı*	Total olive area (da) *Toplam zeytin alanı (da)*
Tekirdağ	1	Şarköy	2	583.71
Balıkesir	1	Erdek	16	2.127.40
Bursa	1	Gemlik	16	838.95
	2	Nilüfer	28	351.04
	3	Orhangazi	1	95.92
Total *Toplam*	5		63	3.997.02

Analysis of data

The data were evaluated using SPSS statistical program. The frequency distributions, tables and graphical representations, averages and percentage were also calculated. In addition, the factors affecting the early or late adoption of GlobalGAP were also analyzed using Logit regression (Stock and Watson, 2007). The self-decision of olive producers to make GlobalGAP was taken as a dependent variable. People who made the decision themselves (early adopters) was given '1' score and the producers that involved in the project (late adopters) was given '0' score. The dependent variable is explained by 12 independent variables. As explanatory variables, age (year), education (year), total amount of land (da), total income of farms (TL) and presence of cattle were accepted as continuous variables. The number of individuals in the family (person), the professional experience of the producers (years), the number of agricultural organizations to which the producers are members (number), the number of mechanical tools (number), place of residence, non-agricultural work and attitude towards innovation are included in the model as discrete variables (Table 2).

Discrete variables are included in the model as follows;

Place of residence: a) village b) district c): province,

Whether it is non-agricultural work: (0) no and (1) yes,

Attitude towards innovation: (1) I accept it immediately, (2) I wait till other farmers in the village to accept it, (3) last I accept after everyone accepts it.

The validity of the obtained model was checked by Hosmer Lemeshow test. As a result of the test, the square-value was calculated as 3,891 and p = 0.877> 0.05. The results showed that the model was appropriate.

RESULTS

The results showed that the effect of age, years of education, experience, number of organizations, innovation attitudes and number of mechanical devices were significant while the number of family members, non-agricultural activities, residence and amount of land were insignificant on tendency to adopt the content and application of GAP (Table 2).

The average experience of families for farming is 42.2 years, for olive cultivation 38.7 years, and for GAP 2.4 years. The mean family size is 4 persons with a mean age of 58.7 years and education period of 9.8 years. The 57.14% of the producers graduated from primary school, 19.05% from high school and 22.2% from university.

A positive relationship was found between low level of education and late adoption of GAP. While the rate of late adoption of GAP among primary school graduates was 85.71%, this rate was 7.14% for high school graduates and 3.57% for university graduates. Medium-income producers first adopted GAP with 37.14%, followed by very high-income ones with 25.71%, low-income ones with 22.86% and high incomes ones with 14.29%.

Among the olive growers with GAP, 49.21% grow only olives. In addition to olive, 7.94% produce grain, 7.94% livestock and 34.9% fruit (figs, pears and peaches) to get additional income.

While the rate of making GAP was 95.29% in members of associations and farmers' organizations, the rate of non-members was 84.71%.

The 59% of the producers with GAP keep records about their businesses.

Of the GAP producers, the average of land size was 63.4 da, of trees number was 1.586.11, of tree age was 47.1. The 71.42% of the varieties were Gemlik and remaining were Ayvalık. The 65.07% of the olives were grown at 6x6 m, 19.04% at 7x7 m and 15.87% at 8x8 m planting distances.

In olive groves, the soil tillage was made 4 times a year where 68.25% of the olive groves were cultivated at 10-15 cm depth while 31.74% at 15-20 cm depth. The 18.3% of the soil tillage was performed with cultivator, 32.7% with plow, 35.3% with rotavator and 15.5% with harrow.

Table 2. Estimate results of logistic regression model
Çizelge 2. Lojistik regresyon modelinin tahmini sonuçları

	Coefficient *Katsayı*	Standard error *Standard hata*	Wald statistic *Wald istatistiği*	P value *P değeri*	Probability ratio (odds rate) *Olasılık oranı*
Constant/*Sabit*	-8.186	2.138	17.553	.000	.000
Age/*Yaş*	.115	.026	21.164	.000*	1.123
Education time/*Eğitim süresi*	.168	.061	6.277	.012**	1.186
Number of family member/*Aile birey sayısı*	.011	.124	0.006	0.722	1.032
Experience/*Deneyim*	-.051	.025	6.370	.005*	.740
Non-agricultural activity/*Ziraat dışı aktivite*	-.35	.455	.501	.338	.597
Residence/*İkamet*	.53	.441	1.523	.123	1.437
Number of organizations/ *Organizasyon sayısı*	.607	.228	7.859	.003*	2.030
Innovation attitude/ *Yenilik tutumu*	-.996	.381	6.353	.022**	.308
Number of mechanical tools/*Mekanik alet sayısı*	.603	.226	5.654	.043***	1.504
Amount of land/*Arazi miktarı*	-.001	.001	1.889	.170	.987
Grand total/*Genel toplam*	0	0	16.151	.000*	1.000
BBHB	-.602	.561	1.369	.211	.495
R square: 0.65					
-2 Log likelihood: 126.68					
X^2: 3.891, P: 0.877					

Significant at *1%, **5%, ***10%

The 69.8% of the producers irrigate their olive groves with drip irrigation and 3.17% with mini spring while 26.9% grow under rainfed conditions. The 73% of the producers get water analysis done used in irrigation.

While 22.22% of the producers made regular and 14.2% occasional soil analysis, 63.49% do not have any soil analysis. Leaf analysis was made only by 3.1% of the producer. At the beginning of April, 22.90 kg/da N, 12.64 kg/da P and 15.65 kg/da K are used in the fertilization of olives. In addition, B is applied from leaves prior to flowering (March), B and Ca when fruits were at lentil size (June) and Ca when pit hardened (July).

While flies (18.6%), olive cotton lice (8.2%), olive moth (2.5%) and olive crustal lice (3.6%) damage were detected in some olive groves, no pests were identified in 67.1% of the groves. In order to protect against pests, the District Directorate of Agriculture and Forestry makes counting of pests in various regions and when the threshold is reached, producers start to protection practices. While 25.30% of the producers do not apply any chemicals against pests, 49.21% use different insecticides, 22.22% use sticky traps and 3.17% use pheromone traps.

While no diseases were encountered in 49.21% of the olive orchards, 30.15% had *Verticillium* wilt, 15.87% olive tree cancer and 4.76% olive ring spot disease. Against the diseases, 32.8% use bordeaux mixture, 11.5% calcitic and 20% sulfur. In addition, 27.4% remove infected branches and 8.3% decrease N application.

Pruning olive trees was carried out in February-March and pruning residues were shredded and mixed to the soil as organic matter. While 43.1% of the trees were pruned lightly and 22.2% heavily, only shoot tips of 34.6% of trees were cut. As a result of severe pruning, protective materials such as grafting paste are applied to the cutting sites.

For weed control in olive groves, 70.8% of the land was tillaged and 19.2% was mowed with lawn mower.

Of the olive fruits 60.9% were harvested by machine, 21% by stick and 17.9% by hand, and fruits were carried in plastic bags.

The 63% of the olives produced were processed for oil and remaining was for table. Table olives are sold according to their diameters. The 46% of olives were sold to Marmara Union, 35.9% to merchants, 10.2% to oil factories, 5.6% to wholesalers and 2.3% to direct customers.

Reasons of producer for making GAP

The main reasons why olive producers make GlobalGAP was economic factors with 61.90% (premium, price, purchase guarantee, cost savings and profitability), health factors with 44.44% (protecting the health of own, family, workers and consumers), innovation (desire to try new and different things) and environment protection factors (protection of soil, animals, plants and water) were followed it.

The majority of manufacturers adopting GlobalGAP stated that they need technical support. This rate was 91.43% in early adopters and 64.29% in late adopters.

The marketing of olive is one of the concerns of the producers. While the rate of most marketing information need of early adopting GlobalGAP producers was 80%, the rate was 8.57% in unneeded. On the other hand, most marketing information need in late adopters was 46.2% and in unneeded was 14.29% (Table 3).

Table 3. Marketing information need of olive producers in the form of GAP
Çizelge 3. GAP şeklinde zeytin üretimi yapan üreticilerin pazarlama bilgisi ihtiyaçları

Degree of Need for Marketing Information *Pazarlama bilgisine ihtiyaç duyma derecesi*	GAP Adoption Status/*GAP benimseme durumu*			
	Early Adoption *Erken benimseme*		Late Adoption *Geç benimseme*	
	Number *Sayı*	Rate (%) *Oran (%)*	Number *Sayı*	Rate (%) *Oran (%)*
Most needed/important (*En fazla ihtiyaç duyulan/önemli)*	28	80.00%	13	46.42%
Least needed/important *(En az ihtiyaç duyulan/önemli)*	4	11.43%	11	39.29%
Unneeded/unimportant *(İhtiyaç duyulmayan/önemsiz)*	3	8.57%	4	14.29%

The consultants employed in TARIS, the local agricultural dealers and the control certificate organizations meet the technical information needs of the olive producers. Therefore, the need for consultancy of olive producers is very low at 7.14%. On the other hand, producers feel the need of information about the legislation of the GlobalGAP Administration.

The 40-60% of olive producer growing the form of GlobalGAP demand to grow other products instead of olive.

DISCUSSION

The competition of any sector in agriculture depends heavily on its ability to adapt to consumption behaviors, segmentation of markets, and changing public opinion (Hinojosa-Rodríguez et al., 2013). Country- and/or sector-specific sustainability standards are replicated by governments or unions in light of sustainable development. . A limited adoption of sustainability standards at local level may hinder competition at global markets. Because, they have gone through changes in variables that define demand, due to dependency to the consumption habits (Tey et al., 2016). For this purpose, each country has begun to encourage growing in accordance with international standards in order to increase the income of its own producers. The first legislation of GAP in Turkey was issued by the Antalya Governorship in 05.01.2004 to conserve environment and biological diversity in the fresh vegetables, fruits and cut flowers growing, and to ensure consumer health and sustainability of exports. Then GlobalGAP regulations in Turkey was accepted in January 1, 2011 (Anonymous, 2010). Within the framework of this regulation, supports have been provided to producers.

Many researches have carried out to determine the effects of financial supports and the adoption of GlobalGAP farming with producers. The most important factor affecting the GlobalGAP program in Colombia was the lack of necessary infrastructure investments with 21.8%, followed by the high cost of investments with 10.7% (Gutiérrez-Guzmán et al., 2012). Olive producers in Andalusia was expressed low levels of knowledge and adoption of most of the available Certified Quality Systems (CQS) in the sector. They also confirmed the higher quality of integrated production (IP) olive products and processed since farmers adopting this CQS implemented better farming practices from an agronomic, environmental and economic point of view (Hinojosa-Rodríguez et al., 2013). Although a positive average impact of certification on both the quantities sold and the prices received by GlobalGAP certified producers, sharing was not homogenously distributed, and the number of certified farmers soon dropped in Madagascar's lychee producer (Subervie and Vagneron, 2013). Peach and cherry producers in Lapseki-Çanakkale had positive attitudes towards GlobalGAP but GlobalGAP applications increased costs more than traditional production (Aktürk et al., 2014). Despite public announcements, the direct participation of farmers to GlobalGAP were largely absent in smallholders and in Kenyan export horticulture (Tallontire et al., 2014). Lack of access to farm credits, high cost of farm inputs and high cost of labor were among the major constraints in GlobalGAP farming in smallholder pineapple farms in the Akuapem-South Municipal area in Ghana.

However, compliance is negatively influenced by age. Majority of Ghanaian smallholder pineapple farmers were not GlobalGAP certified (Annor et al., 2016). The study revealed that the absence of a significant price difference in the prices of olives and olive oil grown in the form of GlobalGAP was reduced the attractiveness of production.

Economic factors are the leading reasons for olive producers to make GlobalGAP, health, innovation and environmental protection factors follow it, respectively. The average duration of olive cultivation in the form of GlobalGAP was 2.4 years, which revealed that this mode of production has just begun to be adopted. 57.14% of the primary school graduates and 22.2% of the university graduates showed that low educated people were more likely to adopt GlobalGAP. This can be explained by the fact that medium and low-income producers adopt GlobalGAP at the rate of 60%. Because these producers search new methods for themselves while looking for a different revenue increase. Similarly, the fact that 64% of the cherry producers in 5 villages in Uluborlu-Isparta were primary school graduates and 50% of them had GlobalGAP certificate (Bal and Çerçinli, 2013) support this opinion. On the other hand, the late adoption rate of GlobalGAP in low educated people as high as 85.71% in olive, and university graduates adopt GlobalGAP early with 96.43%, which indicates that university graduates are more knowledgeable and conscious about GlobalGAP.

It is not sufficient that 59% of producers recording all kinds of information related to their enterprises as GlobalGAP rules dictate. This situation can be explained by the new beginning of cultivation and the insufficient record tracking.

Pruning, irrigation, fertilization, soil cultivation, weed control, disease and pest control, such as cultural procedures have not been fully performed according to the rules of GlobalGAP. Further studies are needed to correct this situation. In addition, 21% stick harvesting of olives is an important problem.

63% of the olives processed for oil and 37% for table is not a desired rate because the profitability of table olives is higher than oil. In order to increase the table rate, it is necessary to increase the fruit size by performing better cultural processes.

The marketing of olive is one of the concerns of the producers. New marketing methods such as selling directly to customers, export and e-marketing need to be encouraged. Otherwise, there may be a significant increase in the desire of producers to grow different products instead of olives.

Araştırmacıların Katkı Oranı Beyan Özeti

Yazarlar makaleye eşit oranda katkı sağlamış olduklarını beyan eder.

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