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ORIGINAL ARTICLE / ORIGINALBEITRAG

The Link Between Geographic Indication, Sustainability, and Multifunctionality: The Case of Table Olive Groves in Western Turkey

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Abstract
As in all branches of agricultural production, it is thought that the concepts of sustainability, geographical indication, and multifunctionality are very important in table olive farming. The main purpose of this study is to examine the holistic and organic link between geographic indication, sustainability, and multifunctionality parameters in table olive cultivation. Table olive production supplied by Manisa has unique attributes. Of the 12 varieties of table olives with geographical indication registration in Turkey, two belong to Akhisar district. These cultivars are named 'Akhisar Domat Zeytini' and 'Akhisar Uslu Zeytini'. Therefore, Akhisar district was chosen as the study area. A survey was conducted with a total of 121 olive farmers between February and July 2020. In the survey questions, besides continuous and discrete data, the answers and data obtained from the questions formed with the yes/no options were evaluated. Basic descriptive statistics such as arithmetic mean and percentage rates were used in the analysis. It can be emphasized that table olive farming in the region has become an important habit and culture that has a long cultivation experience. The effects of parameters such as marketing possibilities and price advantages are very important. The fertilization and plant protection practices are carried out in a coordinated manner in the region and with as little damage to the environment as possible. It is clarified that geographical indications are an important tool in the sustainability of table olive cultivation and that the principle of multifunctionality in agriculture is ensured by keeping the farmers in table olive farming.

Keywords Multifunctionality · Entrepreneurship · Farmer motivations · Olive farming · Sustainability · Product label

Introduction

The concept of sustainability applied to the agricultural production system is an approach and value system that has preserved its social/economic and environmental importance for quite some time. The concept of sustainability and its assessment are constantly being discussed and updated. Sustainability refers to the net market benefit of agriculture for producers (i.e., individual net benefit, individual benefit minus individual costs), as well as other components like consumers, public institutions, and community; it is also attempted to reveal the market and non-market net benefit (public net benefit) related with the multifunctionality of agriculture (Dietz and Neumayer 2007). This represents a measure of sustainability as to the social net benefit of farming.

Agricultural production poses significant environmental impacts and problems both inside and outside of farms or agricultural holdings. This phenomenon increases the structural sensitivity of agriculture to risks that may cause serious economic losses. Therefore, if measures are not taken to solve the environmental problems arising from agricultural production, the sustainability of agricultural production and food supply, and even the achievement of sustainable development goals related to food and agriculture, may be seriously threatened (Bamoi and Yılmaz 2020).

On the other hand, in addition to sustainable agricultural production, important studies have been carried out for the arable use of some important inputs such as fertilizers, pesticides, and water. Some of these publications are mentioned below.

The studies examined in detail the economic and toxicological aspects of pesticide management practices for sus-

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tainable wheat (Yılmaz et al. 2016) and chickpea (Yilmaz 2021). In addition, the environmental attitudes of farmers towards pesticide use, pesticide use practices, and problems were determined in the studies. As a result, the concept of sustainability has been discussed in a comprehensive framework.

On the other hand, Yilmaz et al. (2010) analyzed the levels of chemical fertilizer used in some agricultural products and the economic losses caused by excessive fertilizer by comparing the recommended amount of fertilizer with the fertilizer application of the farm. Ertek and Yilmaz (2014) defined that the ratio of water used in agricultural production can be reduced with the condition of sustainable approaches.

Geographical indication (GI) means the labeling of crops that have certain characteristics, attributes, or reputations arising from their geographical territory. The diversity of crops is taken as the basis of matchless territorial characteristics, past or prominent features connected to native and human beings reasons such as soil, climate, local knowledge, and tradition (Vandecandelaere et al. 2020). GI can be applied as an instrument to promote food systems' sustainability, particularly in donor-supported rural development projects (e.g., FAO: Food and Agriculture Organization of the United Nations).

GI and origin definitions are industrial property rights that define a product originating from any region or that can be evaluated specific to any region due to its quality, reputation, or other characteristics. GI guarantees consumers the geographical origins of raw materials or final products and reveals the level of quality. Two types of GI have been specified: Protected Designation of Origin (PDO) and Protected Geographical Indication (PGI). In addition, products that cannot be registered as origin name or geographical indication can be registered as a guaranteed Traditional Specialty Guarantee (TSG) product specialization if it can be proven that the products in question have been in the traditional market for at least 30 years (Ucuncuoglu 2020). The GI and TSG are important instruments of the European Union's (EU) product quality policy. These are PDO and can be defined as 'covering agricultural products and foodstuffs using recognized knowledge'; PGI 'covers at least one stage of agricultural products and foodstuffs closely linked to the geographic area'; TSG is expressed as 'emphasizes traditional character in composition or production' (Ucuncuoglu 2020).

Olive farming has been concentrated around the world, especially in the Mediterranean basin. Olive farming is still among the major agricultural production activities in the Mediterranean basin as an important source of income (Iofrida et al. 2018; Berg et al. 2018). The production system is mostly carried out in the form of extensive production (Rodriguez Sousa et al. 2020).

As compared to the previous production period (2018–2019), the world table olive production in 2019/20 period was 3.06 million tons and increased by 5.5% to the previous production period. Among the member states of the International Olive Council (IOC), Egypt ranked first with a share of 24.5%, followed by Spain (15%). In the 2020/21 production period, compared to the previous one, it is predicted that production will increase by 2.5% to 3.13 million tons and consumption will increase by 0.4% (IOC 2021).

Olive production in Turkey has shown an upward trend until 2019. The most important reason for this is thought to be the increase in olive production areas over the years. In recent years, olive production areas have increased with the support of the new olive orchard facility and certified olive nurseries. In 2020, Turkey's olive production was reported to be 1.32 million. In Turkey in 2019, 0.879 million hectares of olive cultivation was performed. Approximately 75% of the total olive production consists of olives for oil. In 2020, 867,000 tons of olives for oil were produced. It can be stated that the provinces that rank first in olive production are Aydın, İzmir, Muğla, Balıkesir and Hatay (DAEPDI 2021).

According to the literature, there are a limited number of studies revealing the geographical indication, sustainability, and the relationship between them in the production of table and oil olives. Traditional olive production models—a precise traditional agricultural production system that represents many regions in the Mediterranean basin (Belletti et al. 2015). Traditional olive production is a good example of multifunctional agriculture. Today, in most countries, traditional olive cultivation is carried out with good management and practice systems such as organic farming and good agricultural practices (Belletti et al. 2015). The IOC (2019) has created a technical-legal study for geographical markings for olive oil and table olives according to different countries.

Mattas et al. (2020) identified PDO olive oil products as a powerful tool for farmers and rural areas. They declared that consumers' awareness of quality and health is driving the agri-food market towards a food market that will meet consumer expectations. As such, many manufacturers and companies in Euro-Mediterranean countries prefer various quality and origin assurance schemes. Among these, PDO certification, which is a successful differentiation tool for agricultural products, plays an important role and is widely preferred by Euro-Mediterranean olive oil producers due to its effective contribution to promoting high-quality olives. PDO certification for olives and olive oil is a decisive motivation for a significant consumer base, as it is associated with high-quality olives. In general, olive and olive oil production, which is an important food in the Mediterranean diet and is widespread throughout the Mediterranean region, plays a very important social, economic, and environmental

role in producing countries, together with its nutritional and sensory properties.

There are 19 GI table olives of Turkey that are also registered in the EU. General features, characteristics of the olives, cultivation techniques, and marketing methods are appreciated.

Considering the specific studies on olive farming, many are carried out on social expectations for multifunctionality and non-market components in Andalusia (Rodriguez-Entrena et al. 2014). The multifunctionality of olive cultivars has been analyzed by different frameworks, like ecology, landscape planning and sociology, organic agriculture, and tourism improvement (Alonso Mielgo et al. 2001). GI protection attributes to the maintenance of the traditional olive production system, thereby decreasing the risk of not taking responsibility and losses caused by adverse environmental impacts (Belletti et al. 2015). Tsimidou (2019) declared that PDO and PGI target to introduce jointly information on natural olive oils and table olives, the matchless traits of products with a higher commercial value in the international olive oil market. In terms of table olives in European countries, it is reported that there are four cultivars of PDO in Italy, two cultivars in Portugal, five cultivars of PDO in France, 10 cultivars of PDO, and one cultivar of PGI in Greece, two cultivars of PDI and one cultivar of PGI certificate in Spain.

The Republic of Turkey, the Ministry of Industry and Technology, Turkish Patent and Trademark Office (TURKPATENT) is the only authorized institutions in Turkey for protecting industrial property rights such as patent, utility model, trademark, design, geographic signs, and traditional product names (Ucuncuoglu 2020). The global commodity chain analysis approach, the disintegration process, the people which form factors, and the traditional commodity chains/industrial chains inserted and noted that instead of the west of Turkey connects the GI chain (Nizam 2017). According to the latest data of TURKPATENT, there are 12 table olive varieties registered and/or applied for PDO and PGI in Turkey (Table 1). PDO or PGI registered in the system in Turkey and/or convenience which is referenced 12 olive cultivars (Table 1). Hazarhun and Tepeci (2018) declared that 'Akhisar Domat Zeytini' and 'Akhisar Uslu Zeytini' are registered to the PDO system. Akhisar, the largest of Manisa, Turkey is also the eighth largest district. Out of 125 million olive trees in Turkey, 15 million are grown in Akhisar, and therefore the role of the province's economy in olive and olive oil production is greater. The reputation of Akhisar in olive and olive oil production has spread all over the world. About 100 thousand tons of olives are produced in Akhisar for table and olive oil. In addition, there are 192 olive enterprises and 15 olive oil enterprises in Manisa province. It exports to 60 countries around the world.

Table 1 Table olive cultivars registered as and/or applied for PDO or PGI in Türkiye. (Source: TURKPATENT 2021)

No	Table olive cultivars	PDO or PGI	Status
1	'Akhisar Domat Zeytini'	PDO	Registered
2	'Akhisar Uslu Zeytini'	PDO	Registered
3	'Antalya Tavşan Yüreği Zeytini'	PDO	Registered
4	'Edremit Körfezi Yeşil Çizik Zeytini'	PDO	Registered
5	'Gemlik Zeytini'	PDO	Registered
6	'Milas Yağlı Zeytini'	PDO	Registered
7	'Tarsus Sarıulak Zeytini'	PDO	Registered
8	'Aydın Memecik Zeytini'	PDO	Applied
9	'Aydın Yamalak Sarısı Zeytini'	PDO	Applied
10	'Hatay Halhalı Zeytini'	PGI	Applied
11	'Samanlı Zeytini'	PDO	Applied
12	'Yarımada Hurma Zeytini'	PDO	Applied

PDO Protected Designation of Origin, *PGI* Protected Geographical Indication

In this study, the concepts and practices of sustainability and geographical indication in the production of table olives in Akhisar district, which gave its name to two table olive varieties with GI, are evaluated at the farmer level. After this introduction section, materials and methods, results, discussion, and finally, conclusions took place.

Materials and Methods

Study Area

Turkey olive farming in some important provinces based on the number of trees, the production amount of data relating to olive oil production is presented below (Table 2). On the other hand, in Akhisar district, the table olive farming culture owned by the farmers is very old and it is known that good practices and sustainability parameters are tried to be applied as much as possible in agricultural activities within the framework of multi-functionality. Of the 12 types of table olives with GI registration in Turkey, two belong to Akhisar district. These table olives are 'Akhisar Domat Zeytini' and 'Akhisar Uslu Zeytini'. The geographical indication of 'Akhisar Domat Zeytini' and 'Akhisar Uslu Zeytini', was registered in 2012 (TURKPATENT 2021) as PDO. In light of this information, Akhisar district is chosen as the study area.

Farmers Survey

The survey is conducted with a total of 121 olive farmers between 2020/February-July 2020. In the selection of the farmers, attention has been paid to the high level of expe-

Table 2 The basic indicators of olive cultivation in Turkey, annual average 2013–2019. (Source: Ozturk et al. 2021)

Provinces	Productive trees	Production (ton)		
		For table olive	For olive oil	Total
Balıkesir	10,492,272	35,046	118,919	153,965
Çanakkale	4,476,547	6752	55,829	62,581
Manisa	9,941,050	101,844	94,097	195,940
Aydın	21,710,646	37,210	105,749	142,958
Muğla	13,544,649	5400	58,043	63,442
İzmir	14,154,970	8955	74,514	83,468
Bursa	8,915,205	92,103	21,809	113,913
Tekirdağ	1,011,471	10,822	1542	12,364
Gaziantep	3,048,000	6096	24,384	30,480
Hatay	8,679,016	36,037	94,148	130,185
Antalya	2,328,254	6754	16,529	23,283
Mersin	4,272,022	12,816	29,904	42,720
Kilis	1,646,000	3292	13,168	16,460

rience in table olive farming. In the questionnaire, various socio-economic characteristics of the farmers, and their attitudes towards different activities related to olive farming are tried to be examined. Olive farmers in the Akhisar district formed the sampling frame. In defining the sample, a non-probabilistic, targeted sampling method is chosen. In the preliminary field studies, it is predicted that the selected sample size is sufficient to reveal the producer's views, perceptions, and attitudes in the region. In the survey questions, besides continuous and discrete data, the answers, and data obtained from the questions formed with the yes-no options are evaluated. Basic descriptive statistics such as arithmetic mean and percentage rates are used in the analysis and evaluation of the data.

Results and Discussion

Socio-economic Characteristics of the Farmers

First, responses showing continuous data features of some socio-economic characteristics of the farmers are revealed (Table 3). These attributes of the farmers whose answers are discrete data are presented below (Table 4). The average age of the farmer is determined as 54.03 years. This result is consistent with some studies (Giourga et al. 2008). Duarte et al. (2008) defined that the farmers are old, about 50 years older in the OLIVERA region (Trasmos-Montes—Portugal, Cordoba, and Granada/Jaen-Spain, Basilicata/Salerno—Italy, and West Crete-Greece). While the number of individuals living in the household is 3.38, the number of individuals engaged in agriculture in the household is 1.76. The experience in farming and olive cultivation among the farmers is over 30 years. In this case, Artukoglu (2002), in the western part of Turkey's study of olive oil farmers obtained the same findings. Similar results are found in Greece, by Giourga et al. (2008) and Berg et al. (2018).

Of the total number of farmers (67), 55.3% had primary school studies, 22 (18.20%) secondary, and 25 (20.70%) high school. It is found that only 6 (5.00%) of the farmers are at undergraduate and graduate levels. It can be stated that the education level of many of the farmers is relatively low. These results, in many important countries Turkey and olive training can be stated like the research results obtained in the Mediterranean countries (Artukoglu 2002; Ligvani and Artukoğlu 2015; Sousa et al. 2020). While 49 (40.50%) olive farmers have any off-farm income, 72 (59.50%) farmers are found to have any off-farm income. It is found similar results by Giourga et al. (2008), EC (2012).

Although it is defined that there are a limited number of studies synthesizing multifunctionality, geographical indi-

Table 3 Some attributes of the farmers and/or their families

Variables	Mean	Standard deviation	Minimum	Maximum
Age (year)	54.03	11.69	27.00	80.00
Individuals living in the household	3.38	1.32	1.00	9.00
Individuals engaged in agriculture	1.76	0.97	1.00	5.00
Experience dealing with agriculture (years)	36.07	14.99	1.00	70.00
Olive growing experience (years)	33.12	49.11	3.00	55.00

Table 4 Responses showing discrete data features of some characteristics of the farmers

Variables	Descriptions of variables	Frequency (*n*)	Percent (%)
ED	*Education*		
	1: Literate	0	0.00
	2: Primary school graduate	67	55.30
	3: Middle school graduate	22	18.20
	4: Lycee graduate	25	20.70
	5: High school graduate	1	0.80
	6: Undergraduate and graduate education	6	5.00
OAI	*Off agriculture income*		
	0: No	72	59.50
	1: Yes	49	40.50
PRK	*Farmers record keeping*		
	0: No	56	46.30
	1: Yes	65	53.70
MPC	*Membership of the farmers in any cooperative*		
	0: No	31	25.60
	1: Yes	90	74.40

ED Education, *OAI* Off agriculture income, *FRK* Farmers record keeping, *MPC* Membership of the farmers in any cooperative

cation, and sustainability approaches in olive oil production (Belletti et al. 2015; Mairech et al. 2020), it is determined that the number of studies that deal with these components together in table olive production is much less (Giourga et al. 2008; Carmona-Torres et al. 2016; Rodriguez Sousa et al. 2020; Abdallah et al. 2021). Ozturk et al. (2021) reported botanical characteristics, phytochemicals, and the eco-physiological attributes of olive production in Turkey about sustainability, multifunctionality, and geographical indication registration, to assist in making interpretation and synthesis of olive production in a detailed way.

Farmer Attitudes and Perceptions Within the Framework of Multifunctionality, Sustainability, and Geographical Indications in Table Olive Production

First, the reasons the farmers grow table olives are tried to be put forward in general terms. While the options with no answer concentrate on marketing possibilities, heritage, profitability, and easy-to-cultivate parameters, it is determined that the answer of yes is obtained mostly in the traditions and habits parameter (Fig. 1). At this point, traditions and habits appear to be the most important factor in farmers' decision on olive cultivation. As we have seen, especially olive farming in Akhisar, Turkey, is emerging as an important factor in the region. It can be said that olive farming has become a tradition in the region and has turned into a way of life for the farmers. In this respect, the importance of the concepts of sustainability, geographical indication registration, and multifunctionality in table olive farming is once again revealed. These approaches are intertwined with traditional production in table olive cultivation. Giourga et al. (2008) declared similar findings and implications. According to their research results, besides social factors, there is generally a strong and continuous relationship between the farmer and his business in traditional olive groves. Nizam (2017), also in olive farming in Turkey, has stressed the importance of remaining heritage from the traditional approach to manufacturing and ancestors.

Training Received by the Olive Farmers

In today's technology age, it is very important for farmers to train and improve themselves, as in every profession. Pruning of olive trees shows a different approach from fruit trees. Mistakes in pruning can conclude in yield losses or higher increasing costs. Pruning also defines the education system, which is one of the main principles for smart tree

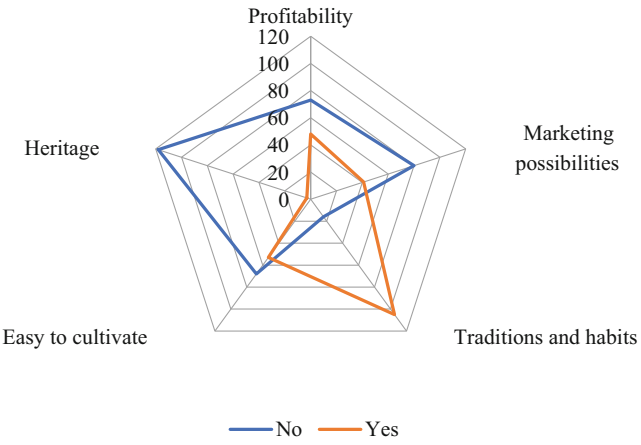

Fig. 1 The options that the farmers concentrate on are olive farming

growing and orchard profitability. In this study, it is defined that 65 (53.71%) farmers stated that they received training in agricultural growing and olive farming. These educational activities: it has been defined that it is concentrating on issues such as cultivation, plant protection, fertilization, pruning, and pickled olive processing. At this stage of the study, farmer practices and attitudes in olive farming in different agricultural production periods are examined. First, the growing period is examined.

Table Olive Growing

First, the farmers are asked about the most common problems encountered during the growing period (Table 5). As it will be noted, when the problems perceived by the farmers in table olive farming are examined, it can be stated that the practices that are generally regarded as a problem are relatively less. It is explored that only high input costs are perceived as one of the most important problems comprehended by the farmers. It is thought that this is due to the volatility in agricultural input and product prices, especially in recent years, both at national and international levels. This situation also caused an increase in input costs. It is predicted that the COVID 19 outbreak also triggered this process. It can be stated that the farmers are very satisfied with the olive farming activity during the growing period, and they do not encounter any significant problems. In this case, it can be stated that sustainability can be achieved in table olive farming, and the effect of a geographical indication is very important, especially in meeting the economic, environmental, and social sustainability parameters. Similar results, Artukoglu (2002), Belletti et al. (2015), Ligvani and Artukoğlu (2015) are also approved.

Table 5 The most important perceived problems

Variables	Descriptions of variables	Frequency (*n*)	Percent (%)
VF	*Cultivar features*		
	0: No	90	74.40
	1: Yes	31	25.60
TA	*Tree age*		
	0: No	88	72.70
	1: Yes	33	27.30
FE	*Fertilization*		
	0: No	88	72.70
	1: Yes	33	27.30
IR	*Irrigation*		
	0: No	86	71.10
	1: Yes	35	28.90
SP	*Spraying*		
	0: No	92	76.00
	1: Yes	29	24.00
FL	*Fruit load*		
	0: No	82	67.80
	1: Yes	39	32.20
HM	*Harvesting method*		
	0: No	84	69.40
	1: Yes	37	30.60
HT	*Harvesting time*		
	0: No	87	71.90
	1: Yes	34	28.10
OM	*Orchard management*		
	0: No	48	39.70
	1: Yes	73	60.30
CC	*Climate change*		
	0: No	43	35.50
	1: Yes	78	64.50

VF Cultivar features, *TA* Tree age, *FE* Fertilization, *IR* Irrigation, *SP* Spaying, *FL* Fruit load, *HM* Harvesting method, *HT* Harvesting time, *OM* Orchard Management, *CC* Climate change

Drying of trees, climate change, water problems and labor problems are perceived as a very important phenomenon by olive growers in the Akhisar region, as in all of Turkey. This, in fact, reveals that the concept of sustainability can be fulfilled as much as possible in the production of table olives. Marketing problems are not seen as important by farmers; it is thought that geographical indication has an important effect on two-table olives in the Akhisar region. Farmers can sell their table olives at all times of the year and with relatively favorable market conditions. On the other hand, it is determined that government support is also considered by the farmers to meet their needs, albeit to a certain extent.

Periodicity describes that olive trees yield more in one year and less in the following year (IOC 2019). As in many countries with olive cultivation, the production of table olives in Turkey as well, as periodicity, is very important in terms of ensuring efficiency, sustainability, and competitiveness (Durmuş and Dokuzlu 2019). At this stage of the study, the factors affecting the periodicity of olives

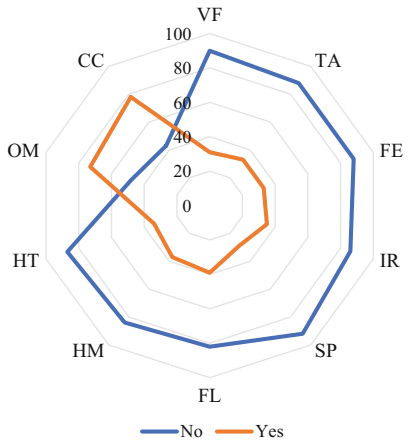

Fig. 2 The factors affecting periodicity perceived by the farmers

are tried to be determined from the farmer's point of view (Fig. 2). While it is defined that only orchard management and climate change parameters are the most important components affecting periodicity for the farmers, the effect of the remaining variables is determined to be relatively insignificant. It can be easily seen the high periodicity, which is one of the major problems in Turkey. On the other that Artukoglu (2002) stated that in relative terms, compared with the world's other olive-producing countries, it is stated that the periodicity is lower than in Turkey. When the factors affecting periodicity are examined in terms of producers, it is determined that the effect of other components is not very important, except for orchard management and climate change. At this stage, the following inferences can be made. First, although periodicity is seen periodically in the region, it can be stated that this is not considered very important for the farmers. Among the reasons for this, it is thought that this is because farmers perform their agricultural practices as smoothly, on time, and effectively as possible. As a result, it can be stated that the sustainability principles are fulfilled as much as possible. In addition, it is predicted that farmers sell their products in the market at a better price compared to other alternative agricultural products and that the said olive varieties are under geographical indication registration is a good source of motivation.

Of the farmers, 81 (66.90%) stated that they planted and established the olive orchard themselves, and the remaining 40 (33.10%) stated that the olive was already planted when they started to be farming the orchard. It is defined that 54 of the farmers cultivated the geographically marked 'Akhisar Domat Zeytini', 17 also the geographically marked 'Akhisar Uslu Zeytin', 56 'Gemlik', and 20 'Edremit' table olive varieties. The reason for the total number of farmers exceeding 121 is thought to be that the same farmer cultivates more than one olive cultivar. It is thought that the main reason why 'Edremit' and 'Gemlik' table olive varieties, which do not have geographical indication protection, are preferred by the farmers, is that these varieties are those that are in demand in the market. Pruning, fertilizing, harvesting and, if done, irrigation, etc. practices are similar for these varieties.

Fertilization, Plant Protection, and Harvesting Operations

Fertilization is a general and important process in olive farming. Because it is aimed to meet this deficiency in cases where the nutrients required for the growth of the tree cannot be taken from the soil in sufficient amounts. The age of the trees, soil structure, and ecological conditions, local features are the most important features that affect fertilization. However, it should be emphasized that repetitive fertilization programs in many olive-growing areas are traditional. Fertilization differed between systems due to the use of different products and methods (soil, foliar spreading, and/or fertilizing) used for distribution (Abdallah et al. 2021).

While 54 (44.60%) of the farmers performed soil analysis to determine the most suitable fertilization program, the remaining 67 (55.40%) did not. The distribution of the number of chemical fertilizers applied to olive orchards in a production period is given below (Fig. 3).

It is defined that there is one farmer who does not apply any fertilizer, while there are 29 farmers who apply fertilizer once, 43 apply it twice, 38 apply three times, and six apply it four times in a production year. In the region, it can be stated that the sustainability rules are paid attention to as much as possible in table olive farming, and this care also manifests itself in the use of fertilizers. In addition, since 2018, farmers have been paying more attention to

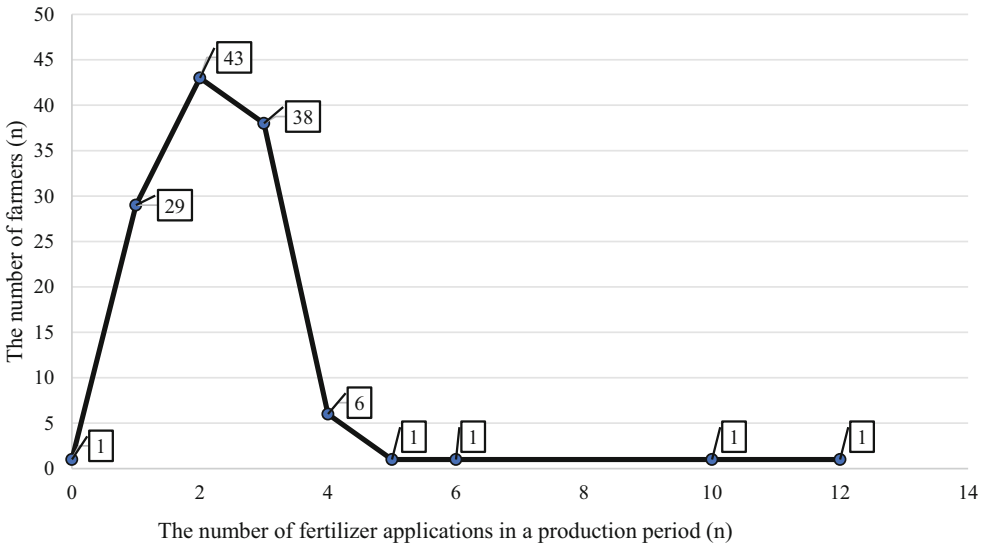

Fig. 3 The number (*n*) of fertilizers applied to the olive orchards during a production period

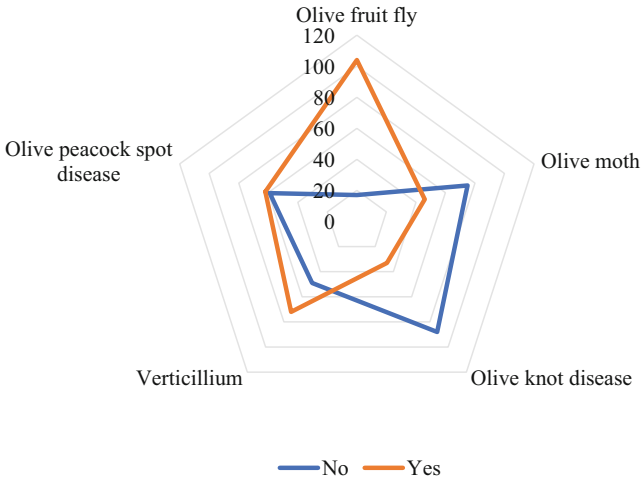

Fig. 4 Distribution of the pests commonly seen in olive orchards

the use of fertilizers in products such as fertilizers, whose raw materials are highly dependent on imports, due to the increase in exchange rates and volatility.

Unfortunately, poor management of pest control processes can often disrupt the agricultural ecosystem balance, leading to unsustainable olive cultivation. Olive pests that farmers encounter most intensely are listed below (Fig. 4).

The farmers stated that they saw the olive fruit fly more than the olive moth. On the other hand, they encountered verticillium and olive peacock spot disease more intensely than olive knot disease. In most orchards, the olive harvest is done by hand, with a comb, or by hitting the branches with sticks and shaking the olives. Nets are usually extended and spread under the tree to grab olives. Unfortunately, many olive fruits fall to the ground before harvest, especially when attacked by an olive fly. These olives are harvested with rakes or new machines (spiked rollers, vacuum, etc.). Since table olive farming is in question, it is concluded in this study that the harvesting process was carried out intensively by hand and using a comb.

Conclusion

Table olive farming in the region has become an important habit and culture that has a long growing experience. At the same time, many varieties that do not have protection indications are also grown at a significant level in the region. The effects of parameters such as marketing possibilities and price advantages are very important in the issue.

The olive farmers, who have received geographical indication or have applied for it, carry out planting, irrigation, pruning, fertilization, spraying, harvesting, and marketing activities more meticulously and appropriately. For sustainable olive cultivation, it is determined that they carry out all their operational activities as appropriately as possible and implement their future planning based on sustainability parameters. For this reason, it should be emphasized that there are direct and indirect links between having a GI certificate and sustainable olive cultivation practices in many ways.

These multi-functional characteristics of table olive farming in the region; its economic, social, and environmental effects set a good example. It is clarified that the concepts of sustainability, geographical indication registration, and multifunctionality are unique motivation factors that complement each other in table olive cultivation.

In the table olive market, which is an extremely competitive market with an ever-increasing level of competition, protected origin names are now of indispensable importance for the olive sector, as they offer a means of protection and promotion for the production and sustainability of quality table olives. Thus, the multifunctional structure of the process is revealed as table olive producers continue their lives in rural areas.

In the following studies, it is very important to demonstrate the effects and functions of sustainability, geographically marked product protection, and multifunctionality concepts at a measurable level.

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Conflict of interest N. Tok, F. Çobanoğlu, and R. Tunalıoğlu declare that they have no competing interests.

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