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TITLE: Examination of crop pattern change in the economic sustainability of agriculture

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PAGES: 596-606

ORIGINAL PDF URL: <https://dergipark.org.tr/tr/download/article-file/3293411>

# Examination of crop pattern change in the economic sustainability of agriculture

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**Citation:** Tok, N., Tunalıoğlu, R., Cobanoğlu, F. (2023). Examination of crop pattern change in the economic sustainability of agriculture. *International Journal of Agriculture, Environment and Food Sciences*, 7 (3), 596-606

**Received:** July 28, 2023

**Revised:** August 20, 2023

**Accepted:** August 22, 2023

**Published Online:** September 23, 2023

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## Abstract

Türkiye, in the 1980s, passed from an import substitution economic model to a free market economy. The agriculture sector has been the most affected by this transition. In this period, it was decided to abandon some production activities on the grounds that the deficit in the was due to country's budget was due to price supports in agriculture. Farmers whose agricultural potential has narrowed their field of activity have changed their crop patterns by embarking on new searches. In this study, the results of the product pattern changes of the local farmers after the national policy change were examined in a sample field (Akhisar), and the problems experienced after the unplanned production pattern changes and the solution proposals in the transition period from Turkey's protectionist agricultural policies to the liberal agricultural policies were examined. It is intended to be an example and a guide. In total, the opinions of 42 olive producers regarding their expectations from the state and other stakeholders in solving the problems they are experiencing after this change were analyzed with the qualitative method using the data obtained using the semi-structured question technique and the inductive approach. As a result, it was determined that the individual and courageous decisions taken by the farmers about product change forty years ago were not wrong, but in this process, the farmers experienced decreases in productivity and quality in production due to changes in climate, land structure and diseases. It has been determined that farmers need medium and long-term policies (structural and social tools) rather than short-term policies (price tools) currently applied. In addition, it has been concluded that the state should share the cost of crop pattern choices with farmers in order to ensure the sustainability of agriculture in the country.

**Keywords:** Agricultural policy, Crop pattern, Farmers' choice, Table olive, Qualitative method

## INTRODUCTION

Agriculture, when Türkiye as in the world is evaluated, in terms of economic and social structures, is a sector of strategic importance to its geography and biodiversity (Atamer Balkan and Meral, 2017). Today, developed countries in the agricultural sector of the world have started to use knowledge (technology)-intensive production techniques by completing labor-intensive and capital-intensive production techniques. Türkiye has not yet completed the first and second production techniques. For this reason, it frequently updates its agricultural policies by renewing local programs and regional and national development plans. In this update, it acts in accordance with the constraints of international organizations (WTO, EU, IMF, etc) and agreements with obligation (Çağatay et al., 2010).

Due to the importance of agriculture in the economy and structural features in Türkiye, it has been supported by different policies since 1923 when the Republic was established. Although the main purpose is supplying security, the welfare of the producers and increasing efficiency, the applications have always been different. Because the number of populations living in the countryside for many years was considerable and the level of education was low, the political and economic sanctions of the country created differences. However, regardless of the liberal or protectionist policies, state support in the agricultural sector has always continued and has shown a change (Eğri, 2014).

The biggest change in agricultural policies in Türkiye, apart from the structural policies in the first years of the Republic founded, was experienced in the 1950s, 1980s and 2000s. The most important of these is the change in national economic policies under the name of "24 January Stabilization Program Decisions" and the most affected was the agricultural sector. Because in accordance with the liberal policies adopted in 1980 and the free market economy understanding, structural-social changes are foreseen in agriculture. The state decided to support the agricultural sector less, on the grounds of reducing intervention in the economy (Kılıç, 2020).

In accordance with this stabilization program, the number of agricultural crops supported in 1980 decreased from 24 to 18 in 1985 to 10 in 1990 (tobacco, wheat, barley, rye, maize, paddy, oat, sugar beet, poppy and chickpea). In this period, the decrease in the ratio of the amount of crop purchased to the total production amount adversely affected the producer as well as the decrease in the number of supported crops. For example, this decrease caused tobacco production to decrease from 75% to 39% and wheat production from 10% to 3% between 1980-1990 (Öztürk et al., 2008).

After the agricultural policies implemented after the 24 January 1980 decisions led to a decline in tobacco production, international tobacco companies entered the domestic market. These companies with eye-catching advertising activities led to an increase in cigarette consumption, in other words, policies relating to tobacco control in Türkiye kept the Turkish tobacco producers away from production and encouraged foreign entrepreneurship.

#### *Tobacco production in Türkiye in the ongoing years*

-In 1996 'Law numbered 4207 on the Prevention of the Harms of Tobacco Products and Control',

-In 2002 with 'the law numbered 4733 on the Organization and Duties of Tobacco and Alcohol Market Regulatory Agency', eliminating Tekel's (Institution that buys tobacco on behalf of the state) effectiveness,

-In 2004 with 'World Health Organization Framework Contract on Tobacco Control', it was taken continuously

under control (Saraçoğlu and Öztürk, 2020).

Prior to changing agricultural policies in Türkiye, the largest tobacco producer province is Manisa. Even in some districts of Manisa such as Akhisar, tobacco production is carried out as monoculture (Anonymous, 2021d; Şahin and Taşlıgil, 2013). Tobacco production restricted by law in the said process negatively affected the economies of many regions, towns and small towns with a high income such as Akhisar. Hence, before "1980-24 January stability decisions" and the legislation on tobacco, while tobacco was the primary crop in all villages and towns of Akhisar, afterward tried to earn income, the production pattern has necessarily changed in favor of olives. In the 1990s in Akhisar, the tobacco cultivation area, which was 11 thousand hectares, decreased approximately 72% to three thousand hectares (Karabacak, 2017). In contrast to the contraction in valid production areas for many crops, when olive came to the top of the most important crops in agriculture in the world in recent years, olive gloves increased rapidly (Doğan, 2017).

Thus, Akhisar farmers tried to earn the income they lost in tobacco production, instead of the one-year crop plant, which has lost value with political decisions and laws since the 1990s, by substituting the *perennial olive plant*, which has become increasingly important in the world (Güner et al., 2010). In this change, from before 2000 to today, a farmer's trust in the knowledge and experience of many years plays a major role in olive cultivation as in tobacco (Ünsal, 2008). In addition, the farmer's crop pattern preference is also important to the aim of maintaining the current quality of life by providing an adequate level of income to her family (Günden, 2016).

The agricultural sector due to the low elasticity of supply and demand has been supported in Türkiye as in all the developed and developing world countries. Yet, there are some problems in Türkiye's agricultural policy. These problems are the insufficiency of structural and social policies that cause national planning and difficulties in production. For this reason, producers try to solve their problems locally and individually. Farmers who rely on their traditional knowledge and experience, especially in regions with high agricultural potential, change their production patterns themselves when national planning is delayed. Farmers who produce under risky conditions in rural areas endure only production costs in the short term, while they have to undertake all the costs arising from long-term agricultural policy changes. Therefore, making such important decisions in agriculture forces farmers to deal with many different problems in the long run. This research was precisely for this very reason, and the short, medium and long term problems experienced by the farmers in the field were evaluated by interviewing them personally.

In this study, it was aimed to examine the situation of the farmers with high agricultural production experience in Akhisar, which was chosen as the sample area, after

they changed their product patterns from tobacco planting (annual) to olive planting (perennial). In this process, the progress of farmers in olive cultivation, the problems they experience during and after the crop pattern change, the individual solutions they developed against these problems, detailed problems including their expectations from the state, non-governmental organizations and private sector, and the collected data were analyzed in accordance with the qualitative research method.

## MATERIALS AND METHODS

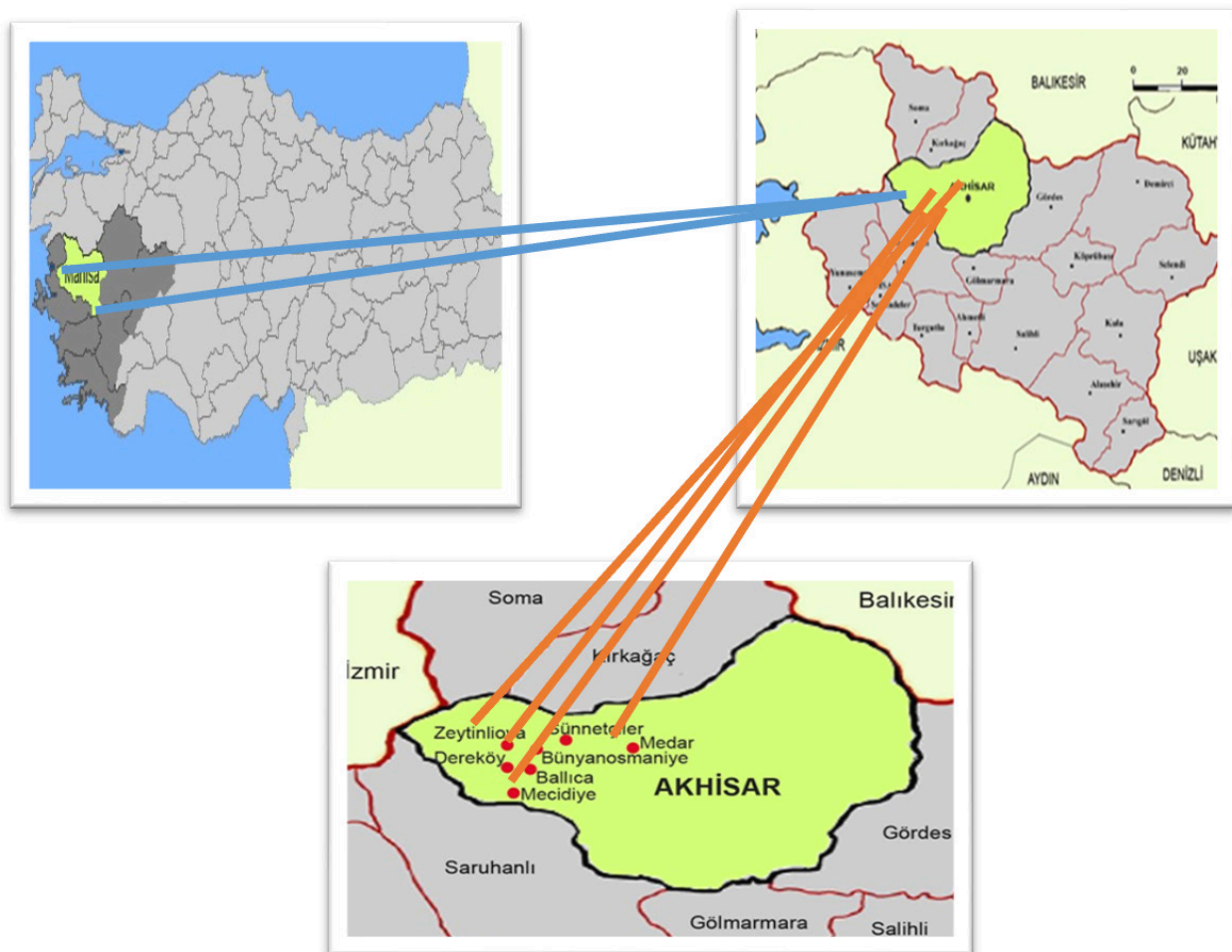
### Research area

The Aegean region has 47,5% of the table olive production area in Türkiye. Manisa province has 53,3% of the Aegean region. Akhisar district has 59,9% of Manisa province's production area. In other words, Akhisar district has 31,4% of the table olive production area, 14,9% of the table olive production area in Türkiye. Olive cultivation is still carried out in 63% of the current agricultural area in Akhisar. In Akhisar, 75% of the olives are evaluated as table olives and the varieties of Domat, Gemlik, Ayvalık and

Uslu are commonly produced (Tiryakioğlu Ligvani and Artukoğlu, 2015). Akhisar produces 80% of production (Domat predominantly and Ayvalık) in Türkiye's green table olives, and 35% of black olive production (Gemlik, Uslu) (Kayalı et al, 2008). The research area has 30% of the olive area of the Akhisar district which is seven villages (Zeytinliova, Medar, Mecidiye, Ballica, Dereköy, Büryanosmaniye, Sünnetçiler) (Anonymous, 2021a; Anonymous, 2021d) (Figure 1).

### Data collection

This research was carried out by Aydın Adnan Menderes University in the Akhisar district/Manisa/Aegean region with the same support (non-monetary support-transportation and technical interview support) of the Akhisar Chamber of Agriculture. The purposeful and snowball sampling technique (Patton, 2015) was used to select information-rich participants and comprehensive questions were prepared for the purpose of the research. Thus, the survey was supported by a qualitative natural query design within the existing area (Guba and Lincoln, 1994). The sample in accordance with the purpose of the research includes 42 table olive producers who have



**Figure 1.** Research Area (Türkiye-Manisa-Akhisar and villages map)

**Table 1.** Farmers interviewed within the scope of the research

Interview No	Akhisar (villages)	Age (Year)	Education	Professional Experience (years) (Olive cultivation)	Non-agricultural activity
F1	Zeytinliova	62	University	45	Yes (supply)
F2	Zeytinliova	62	Middle School	50	Yes (Commerce)
F3	Zeytinliova	63	Middle School	35	-
F4	Zeytinliova	48	High school	25	-
F5	Zeytinliova	55	High school	35	-
F6	Zeytinliova	35	University	19	Yes (Commerce)
F7	Zeytinliova	32	University	8	Yes (Agricultural Engineer)
F8	Zeytinliova	50	Middle School	40	-
F9	Zeytinliova	58	Middle School	45	Yes (Formerly-Mayor)
F10	Zeytinliova	54	High School	30	---
F11	Zeytinliova	76	High School	40	---
F12	Zeytinliova	67	Primary School	1	
F13	Medar	56	University	40	Yes (Teacher)
F14	Medar	42	Primary School	5	Yes (Handicraftsman)
F15	Medar	48	Middle School	25	----
F16	Medar	64	University	30	Yes (Retired teacher)
F17	Medar	75	Middle School	70	--
F18	Dereköy	40	Primary School	30	---
F19	Dereköy	29	High School	20	Yes (Commerce)
F20	Dereköy	54	High School	30	--
F21	Dereköy	58	Primary School	30	--
F22	Dereköy	50	Primary School	40	--
F23	Dereköy	48	College	30	Yes (Commerce)
F24	Dereköy	56	Middle School	35	--
F25	Dereköy	31	Middle School	16	--
F26	Balıca	68	Primary School	50	Yes (Commerce)
F27	Balıca	60	Primary School	35	--
F28	Balıca	53	Primary School	45	--
F29	Balıca	65	Primary School	50	--
F30	Balıca	58	Primary School	35	--
F31	Balıca	40	High School	10	--
F32	Balıca	52	Primary School	20	--
F33	Balıca	54	Primary School	44	--
F34	Balıca	50	Primary School	40	--
F35	B.Osman	65	Primary School	40	--
F36	B.Osman	66	Primary School	55	--
F37	B.Osman	62	Primary School	30	--
F38	Mecidiye	55	Primary School	40	--
F39	Mecidiye	53	Middle School	18	--
F40	Mecidiye	67	Primary School	55	--
F41	Sünnetçiler	59	Primary School	49	--
F42	Sünnetçiler	63	Primary School	25	--

their own olive orchards in seven villages (at an average distance of 15 km from each other) of the Akhisar district and actively work in the district suggested by the Akhisar Chamber of Agriculture. The sample size in the research is well above the norms in qualitative research (Saunders

and Townsend, 2016). All interviews with these producers between 2020/February-July 2020 (It took a long time as the interviews had to be suspended due to the covid 19 outbreak) were held face-to-face and voice recordings were taken (Miles and Huberman, 1994). The 24,5-hour

data obtained from these interviews took an average of 30-40 minutes each. Each interviewer (farmer) has been given a code number in accordance with the research ethics (Farmer 1=F1 etc) (Table 1).

### Semi-structured interviews

In this study, in-depth semi-structured interviews were chosen similar questions to all the participants were asked and a guide was created. Thus, it was possible to ask more questions in the flexible structure to clarify the subject (Patton, 2003). All interviews are digitally recorded and put down on paper. The producers who communicate with stakeholders (public, non-governmental organizations, universities etc) in determining the innovations with leadership in each village and solving the problems were interviewed in more detail. The special notes taken during and after these interviews have turned into new research questions and codes (Patton, 2015). In a sense, these notes have enriched the encodings.

### Data analysis

The data collected in this study were analyzed with a qualitative method and the stage of thematic qualitative data analysis defined by Miles and Huberman (1994) was applied. Qualitative data analysis includes the analytical meticulousness of the researcher, creativity, analytical thinking ability, professional equipment and discipline. Therefore, reducing the raw information by creating a framework from the data obtained constitutes the first part of the analysis (Patton, 2015). Although thematic analysis includes a coding process used in many qualitative research methods, it requires a systematic structure. The researcher can interpret different concepts and ideas by associating them with each other using thematic analysis (Boyatzis, 1998). In this study, first of all, the producer interviews in the villages where the study was carried out and notes taken on the field were examined. Then, familiarization, coding, generating themes, reviewing/renaming themes etc. steps were followed. After that, the data obtained were categorized as first-order, second-order and illustrative data. With this approach, first-order codes are the codes that define the 'analytic concepts' that characterize the specific problems and expectations for a solution that farmers experience in cultivation and marketing in the field. Second-order codes are codes that associate with specific problems in first codes within the framework of theoretical concepts and categories. It is used for (Corbin and Strauss, 2015). Illustrative data, on the other hand, are defined as auxiliary codes that are defined from specific to general (induction) in dealing with specific problems and recommendations (Gioia et al., 2013). (Figure 2). In fact, the purpose of Inductive analysis is to reveal the underlying concepts of the data and the relationships between these concepts through coding. This process is called the "theory building process" (Strauss and Corbin, 1990).

## RESULTS AND DISCUSSION

The first order code (specific deduction) is grouped under three headings according to the qualitative analysis method. These are cultivation, marketing and recommendation codes. This each specific deduction (illustrative data) is also a summary of the most repetitive general deductions in farmer interviews and is detailed in almost all of the research areas (Table 2).

If the farmers in the region are defined by their socio-demographic characteristics, the average age of all men table olive producers is 55 years, their average education is 7,8 years and their professional experience is 33,7 years. 52% of these producers are primary school graduates, 19% secondary school, 14% high school and 15% university graduates (Table 1). These results coincide with the producers' information in the study on olive establishments in the Aegean region, their average age is 54,4 years, their education average is 6,13 years (Adıgüzel and Kızılaslan, 2019), and the average age in Çanakkale 53,6 years, the average education 7,5 years, and the professional experience of the producers 24,9 years (Özsayın et al., 2018).

### Cultivation

The most important elements of success in the garden facility are the geographical location and structure of the land and the planting of local species and varieties adapted to the region. As with many other plants olive plant also has many varieties, but geography is the biggest limiting factor in cultivation (Barranco and Rallo, 2000). The biggest success in cultivation is the correct and timely cultural processes (irrigation, fertilization, spraying and pruning) and harvesting. In this context, the general and common problems of table olive producers in the region related to cultivation have been evaluated under four main headings; efficiency in production, input, irrigation and labor.

### Production

Significant decreases are observed in the quality and quantity of olive production in the region. The reasons for this decline are the drought in the region, irrigation difficulties and tree drying. However, the Akhisar region has been known as a district with a high agricultural potential for a long time since its ground water is high (Güryıldız, 2021). As a matter of fact, one of the factors in the producer's transition from tobacco to table olive production is the presence of ground water in the region. Although producers use this water carefully with the drip irrigation technique, they have started to experience problems due to the decrease in ground water and climate change. Irrigation has reached serious proportions in some villages. On the other hand, *Verticillium dahliae* (wilt) disease in the soil caused the drying of the olive trees over time due to the cultivation of cotton or vegetables on this land. This disease spreads rapidly with

**Table 2.** Table olive farmers data structure

First order codes	Second order codes	Illustrative data
<b>Cultivation</b>	<i>Production</i>	Decreases in efficiency, quality and drying of trees are a problem in production. The causes are insufficient ground water, continual variation and verticillium disease. Raw size is directly related to irrigation in table olives. Groundwater reduction and climate change are growing concerns (F1) (F3).
	<i>Input</i>	The most important input items in olive production are considered as pesticides, fertilizer and diesel oil. These items are also supported by the state. (F2).
	<i>Labor</i>	Skilled labor and labor costs in pruning and cultivation, and harvesting are referred to here as a labor (F23).
<b>Marketing</b>	<i>Storage</i>	A storage system must be established by the state or non-governmental organizations (F4) (F7).
	<i>Organization</i>	Farmers need cooperatives where they can exchange information, market and sell without intermediaries under one roof (F1) (F8) (F10).
<b>Recommendation</b>	<i>Climate</i>	Special measures need to be taken due to climate change and a decrease in ground water. Individual solutions should be supported in these measures (F5) (F8) (F10) (F25)
	<i>Price</i>	Import of all inputs used in production, high exchange rate, high costs, and insufficient support negatively affect prices (F27) (F33).
	<i>Training</i>	Special trainig is needed for the farmer to include sustainable production techniques and technology (F13) (40) (42).

heavy tillage and pruning residues from irrigation water. Therefore, the farmer in production sees the certified olive sapling support given by the state as a remedy for the decrease in productivity and the drying of the trees and has started new plantings. Locally adapted (local) table olive varieties for new plantings: Domat, Uslu (both geographically indicated) and the use of Cherry varieties were not a problem. Yet, the planting of Gemlik/Trilye and Ayvalık/Edremit varieties, whose adaptation is not known but whose sapling supply is easily and quickly rooted, has caused problems (Türkyarar et al., 2008).

The farmer states her problems and individual solutions in production as follows:

*'Climate change is my biggest problem. There have been no seasonal rains for seven years here. Low ground water and even drip irrigation are troublesome. I have land in two different places. There is no irrigation cooperative in the village where I have the second land. Therefore, I can irrigate half of my total land because I have to do everything individually' (F22).*

*'Climate change, rainfall times and weather conditions changed. I have a problem with irrigating and my orchard, has dropped yields because it is no easy for me to reach underground water as before. I also have drying of trees in my orchard, but I don't know the reason, I am planting*

*saplings instead' (F5).*

*'Climate change related diseases have increased in olive trees in recent years. My trees are drying up and my yield and grain quality have dropped' (F8).*

*'I made a variety change with my own decision to increase efficiency. I converted Domat variety to Gemlik variety with the vaccine but Gemlik variety is quickly affected by the cold in this region, then I regretted it' (F2).*

*'The yield in my orchard, has dropped. I planted a Gemlik variety in my garden, which is a Domat variety, inherited from my father to increase it, but I am not satisfied expect for the dusting benefit' (F3).*

*'I planted Gemlik and Ayvalık saplings because I think they are more durable than Domat variety in order to increase my yield in my newly established garden after the support of certified saplings from the state' (F25) (F40).*

### Input

As in other agricultural production activities, fertilizers, pesticides and diesel oil are the most important components of olive cultivation. In a study conducted in the Aegean region, it was found that variable costs (fertilizer, pesticide, diesel oil, pruning) accounted for almost half (47,17%) of the total costs (Adigüzel and Kızılaslan, 2019). In all villages interviewed, all of the

farmers stated that the inputs are imported and they are constantly affected by the increase in the exchange rate, so the cash support of the state for diesel oil, fertilizer and pesticide is not sufficient.

#### Farmers' views on input costs;

*'Input prices are very very high, supports are insufficient. The state provides diesel oil and fertilizer support, but very insufficient, there are problems with plant protection. Plant husbandry costs are high' (F1).*

*'Agricultural inputs are expensive and state subsidies are insufficient. This is reflected in our investments and we can not make our investments when the support is not enough' (F5).*

*'The most important problem in olive production is high input prices. I've been tired of struggling with climate change \* related diseases in recent years' (F8).*

*'Input prices are high. The input is imported and its price is increasing with foreign currency. The farmer continuous with the minimum wage' (F33).*

*'Input prices have been increasing since 2002, the price of the crop I sell is the same. No one protects us' (F34).*

#### Labor

Table olive production in olive cultivation requires more care for quality fruit. As in all fruit cultivation, the biggest cost item is labor costs in pruning and harvesting. Professional labor in harvesting and pruning is important as the olive tree produces fruit in two-year shoots, as which affects the fruit quality of the following year. Therefore, both skilled workers supply is difficult and the cost is high. As a matter of fact, Tiryakioğlu Ligvani and Artukoğlu (2015) found that labor wages in table olive establishments were 16%, Adigüzel and Kızılaslan 14,18%, Artukoğlu et al. (2010) found the ratio of workforce expenses 19,31% to harvest costs 29,55% within variety costs, once again Artukoğlu et al. (2012) calculated the harvest labor as 25,26% in another study.

Farmers with regard to workforce quality and costs;

*'I have a workforce problem, especially in pruning, labor wages are very high' (F6).*

*'I can not find the number of workforce I want when I want, especially in the harvest, I say I need 15 people today, but 10 people come and my work is not done' (F26).*

*'I can not find workforce as before. Professional pruners got old or pass away. I employ more women workers in the harvest because the table oil harvest is gentle and we use ladders as the crowns of the trees are short. After the start of immigration from Syria, I prefer them because of low wages, but they are not as qualified as I would like' (F34).*

*'I have a lot of workforce problem. Two workers fell off the stairs this year, they have no insurance, I always paid the health expenses, unfortunately there is no support from the*

*state' (F33).*

#### Marketing

As in other fields of activities, the quality of the crop is important in marketing-oriented agricultural production. Yet, the most important thing is to produce in accordance with the target group that this production appeals to. The principle of modern marketing that started at the end of the 20th century, 'Produce and sell with the quality you can sell' instead of 'I sell whatever I produce' is the basic principle of the strategic remarketing methods (Aslan Çetin, 2018). Since olive fruit is not consumed raw, it is processed into table and oil. Therefore, it must be processed before marketing. The three biggest problems of farmers in raw grain supply in marketing are the price problem due to the limitation of individual storage facilities and lack of organization.

#### Storage

In Türkiye, in "2005 dated and 5300 numbered on Agricultural Crops Licenced Storage" law, with the possibility of producers' safe, insured and healthy warehouse, instead of selling their crops during harvest season when prices are low, it is aimed to provide the opportunity to market the crop when the prices are high. Farmers in this region complain about the lack of licensed warehouses. After harvesting, they find a solution by placing the raw grain in low-capacity tanks and pools with their own means to wait for the price to rise (Anonymous, 2005).

*'I have no raw sales. I don't sell my crop right away and keep 95% of it in a polyester tank in less salt water, so I make my own storage' (F1).*

*'The most important thing to do is to be licensed warehousing and sponsored by the state. There are big companies in the market and I don't want to be crushed. Large supplies must be made in warehousing, the state or the exchange of commerce should make the storage' (F6).*

#### Organization

There is only one agricultural development marketing cooperative established in the region according to the law 'Cooperatives dated 1969 and numbered 1163' (Anonymous, 1995). Therefore, the producer does not have any power in the grain sales price. However, in agricultural marketing, the greatest power is the producer organization (Türkyarar et al., 2008).

In Türkiye, farmers have traditional problems regarding coming together, establishing a cooperative and continuing the cooperative established.

*'We established a cooperative twice exactly, it just didn't work out. We established a third cooperative, but I don't think it will be successful, either' (F6).*

*'Since there is no cooperative in marketing, we sell at the price of the trader. Since our crop is for export, it has been*

*affected by the exchange rates. In marketing, companies set a specific price for raw grain. The producer sells at this price necessarily. We must have a cooperative. The producer must be organized; otherwise, we will dependent on the trader' (F12).*

*'The marketing problem is too much, but if there is a cooperative, it can be solved. Yet, unfortunately, there is not much cooperative. The state should support this issue. There should be a cooperative system like Spain' (F15).*

### Recommendation

Years ago farmers relied on geographical limitations, land structure and fund of knowledge in their preferences for table olive production instead of tobacco. Because they took a serious economic risk with the transition decision from one-year plant to perennial plant production in agriculture. Yet, farmers in the region are interested and curious producers who follow television programmes and social media that care about training that is open to innovations. For this reason, they share thoughts, experiences and trainings on changing variety, use of inputs, irrigation, climate change, prices and training in their conversations with each other in village cafes.

### Climate

In Türkiye, in recent years as well as in the world, in dated disasters such as matingly increasing drought, frost, hail, tornado, flood, hurricane, flooding etc. are the most important problems (Bayraç and Doğan, 2016). In Türkiye, as in Aegean Region, some areas in the national drought map are the most troubled regions. It is estimated that vegetative production will be affected most by uneven rainfall or drought in the coming years. Although the olive is a Mediterranean plant that is resistant to heat and relatively drought, it takes place in this region. As a matter of fact, in a study conducted in the Aegean Region (Çolakoğlu and Tunaloğlu, 2010), it was stated that the climate limiting data that affect the yield in olive cultivation the most are average maximum temperature, humidity, wind and total precipitation, respectively. On the other hand, Tunaloğlu and Durdu (2012), as a result of possible climate change and drought, olive cultivation was intensive and foreseen that problems would be in seven cities in the west of Türkiye (Muğla, Aydın, İzmir, Manisa, Balıkesir, Çanakkale and Bursa). It was calculated that the drought in question would reduce the yield of olive plants by 61% in the Manisa region (Tunaloğlu and Durdu, 2012).

As a result of these expectations, TARSİM (Agricultural Insurance Pool) was established in order to protect the farmer against climate change within the scope of "Agricultural Insurance Law dated 2005 and numbered 5363". This organization guarantees farmers' crops by insuring them with 50% grant support from the Ministry of Agriculture and Forestry. Thus, a sustainable risk management strategy is implemented through

TARSİM against the risks of climate change in agriculture (Anonymous, 2021c).

In the production of table olives, the farmers in the region mostly complain about hoarfrost, frost, hail and drought and they take out insurance from TARSİM.

*'Climate changed, rainfall times and weather conditions changed. I have problems with irrigation. My trees are drying out' (F5).*

*'Climate change, frost and hail damage in winter, extremely cold during flowering and sometimes drought, I've been having bad days as a farmer for years' (F32).*

*'There is TARSİM and it is effective against hail and frost. Getting insurance from TARSİM provides (50%) state grant and bank loan interest rate cut. But even though I don't have state support and interest rate cut, I will get TARSİM done. Because my olive variety is Gemlik and I am in danger of frost when it is harvested late' (F21).*

*'I am getting TARSİM done. It is important in terms of protecting me against natural disasters and risks. I also benefit from the state support and interest rate cuts. I do it even with no interest rate cut because I feel safe' (F23).*

*'My olive trees in my orchard are productive for six years, I have been making TARSİM because of frost and hail damage against natural disasters and risks, so I also benefit from the state's discounted credit' (F29).*

*'Climate change is the biggest problem. There has been no seasonal rainfall in this village for 7 years. I have problems with irrigation from time to time. Fortunately, TARSİM has existed for 7 years and it protects against increasing natural disasters and risks. Even though the state didn't have a grant support (50% grant), I would have it done but if there was no interest rate cut, I would not have it done' (F30).*

*'The ground land are damaged in the first hoarfrost. Its risk is high. Even though there is no interest rate cut and state support, I can get TARSİM done because my land is on the ground' (F31).*

### Price

The most important marketing problem in the region is the low price and instability due to the inability to stock raw grain. Similar problems are similar in different regions. In a study conducted in the Aegean Region on this issue, it is suggested that the collection problem in forward sales of table raw grain olives where the state will play an important role in eliminating the fluctuations in product prices, can be solved by obtaining a bank guarantee (Adigüzel and Kızılaslan, 2019). In another study conducted in the Southeast Anatolia Region, it was stated that the instability in the product price is the most important problem affecting marketing activities negatively. It is also stated that the low price has a negative effect of 46,2% on marketing (Özgürsoy, 2006).

The opinions of the local producers on this issue are as

follows.

*'Traders in the region are very effective in terms of price. Large table olive processing enterprises agreed among themselves and shared the market. There was competition between them in the beginning. Now they get along with each other and make us buy from elsewhere' (F3).*

*'It must be cooperative and licensed warehousing' (F4).*

*'We have problems in marketing. Some years no traders come. When the trader does not come, the crop is waiting and I am looking for remedies' (F5).*

*'Another important problem I have in the region is related to marketing (sales). There are 4 big companies in the region. These companies determine the price and the farmer becomes victim' (F6).*

*'The price is low and there is a problem of trust between the buyer and seller' (F12).*

*'Product prices are very unstable. I sell my crop at the price almost 10 years ago, we are in a pathetic situation as raw grain' (F33).*

*'The price of the product I have been selling since 2002 is the same. They should audit the prices' (F34).*

### Training

Local olive farmers are extremely sensitive to training. In the first years when the farmers started producing table olives, they participated in the training given by the Manisa Agriculture and Forestry Provincial Directorate, Akhisar District Directorate of Agriculture and Forestry, Akhisar Chamber of Agriculture and the Olive Research Institute in Bornova/Izmir. These trainings have been in the nature of courses, seminars and conferences, especially on the use of correct input, pruning and harvesting. However, in countries such as Egypt (Anonymous, 2021b) which has recently begun to have a say in the production of table olives, farm visits, group meetings and practical demonstration practices are preferred in training (Mansour et al., 2019).

In recent years, farmers have preferred training that they can reach via television or social media. Their expectations from training are mostly aimed at solving the problems they experience due to climate change.

*'I certainly follow and apply new varieties and cultivation practices. My social environment is very wide. I get information from my acquaintances' (F1).*

*'I formerly received many trainings on cultivation and table olive processing, but now I have trouble in adapting to technology. Trainings should be more technological, I need them' (F2).*

*'I attended courses on olive cultivation and technical issues at regular intervals. I last attended training in 2008, but I want training on drought' (F10).*

*'I never miss plant protection and pruning training' (F16).*

*'I get training from (local) state of agriculture, but I mainly get help from relatives and family elders' (F19).*

*'If my head is stuck, I will go to university (Aegean University), I will go to Chamber of Agriculture and District Agriculture. I also don't need to attend training' (F23).*

*'I learn from books, I watch radio and television and youtube, and I get my own training' (F26).*

*'I decide everything myself, because I often watch agricultural programs on television early in the morning and learn a lot from farmer programs on the internet' (F30).*

### CONCLUSION

Agriculture is a risky sector. Productivity and efficiency in production are very important for minimizing the mentioned risks and for economic sustainability. Therefore, countries have to adapt to different uses of tools (price, social, structural) in national and international agricultural policies. Adaptation to these changes is provided by the state and institutionally in developed countries and by farmers and locally in developing countries. When it comes to crop pattern changes in local adaptation, just as in this research, the individual decisions of the farmers are valid. As a matter of fact, farmers in Akhisar made a pattern change about forty years (1980-2020) ago, relying on their knowledge and the adaptation of the preferred crop in the region to adapt to the change in national policy. However, they lost their income in preferring *perennial* olive fruit from the *one-year* tobacco plant. For this reason, they migrated to nearby cities and towns in order to compensate for the economic losses they experienced until they were harvested from olives. As a result, farmers have tried to adapt to a new production activity on the one hand, and to their new social life with migration on the other hand. Today, Akhisar farmers have completed the transition from labour-intensive production to capital-intensive production in olive cultivation, despite all the risks and devoted efforts they took forty years ago, farmers are being tested again with their crop pattern preferences. In fact, the basis of the problems, as mentioned above, is that the state prefers structural and social tools in agricultural policies more than the price tool. However, there are mostly middle and long-term problems in perennial plants such as olives. The effective policy tool to be used in solving these problems should be structural and social tools, not prices.

The problems faced by farmers in their production can be grouped into two groups general and specific problems. General problems; frequent devaluation due to the functioning of the national economy, the persistently preferred floating exchange rate and input is also external dependency. Actually, input support (plant, pesticide, fertilizer) is provided by the Ministry of Agriculture and Forestry in order to alleviate these problems in the general economy in Türkiye. However,

these supports are within the scope of price tools and lose their importance before reaching the farmer. Therefore, the table olive producer has to endure constantly increasing costs. Specific (local) problems are related to product quality and yield. The most important of these are the disasters experienced due to climate change (drought, hail, frost, etc.), reduced groundwater, drying of trees caused by *Verticillium dahliae*, credit problems (very high private bank loan rates, low interest and low loan rates for state banks) in some investments such as irrigation, infrastructure or new garden facilities, for raw/semi-finished olives lack of institutional stocking establishment, frequent variation in order to increase yield and quality.

Farmers state that due to the mentioned issues above, a new crop pattern in the region will not be healthy in the short or medium term from now on. As long as climate change does not force them, they will continue table olive production. However, in order to make sustainable production, they need structural policies and the costs of this process to be undertaken by the state. In fact, these demands are highly viable. Because the executing agency which is responsible for agricultural policy is the Ministry of Agriculture and Forestry in Türkiye. In this sense, Türkiye is a lucky country because the ministry is one of the most well-organized ministries in the country. There are currently geographically present 81 provinces and organized directorates in 911 districts. In addition, there are Agricultural faculties of Bornova Olive Research Institute, Aegean University and Aydın Adnan Menderes Universities working on R&D in olives in the region. It is sufficient for the ministry to establish a functional structure that takes into account regional and local problems and to lead it, with only this existing infrastructure and organization presence. It is possible to provide *training and consultancy* services through the existing R&D institutions and universities within its structure, to provide *surveillance services* with well-organized district organizations, and to receive the support of the Chamber of Agriculture, the Commercial Exchange and the Chamber of Commerce in the region for the *sustainability and success* of these services.

## COMPLIANCE WITH ETHICAL STANDARDS

### Peer-review

Externally peer-reviewed.

### Conflict of interest

The authors declared that for this research article, they have no actual, potential or perceived conflict of interest.

### Author contribution

The contribution of the authors to the present study is equal. All the authors read and approved the final manuscript. All the authors verify that the text, figures, and tables are original and that they have not been published before.

### Ethics committee approval

Ethics committee approval is not required. This article does not contain any studies with human participants or animals

performed by any of the authors.

### Funding

No financial support was received for this study.

### Data availability

Not applicable.

### Consent for publication

Not applicable.

### Acknowledgments

Many thanks to, The Head of the Akhisar Chamber of Agriculture and the technical staff for their support in selecting the villages, farmers to be interviewed in this research and in transportation also all farmers.

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