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THE EFFECTS OF AGRICULTURAL POLICIES APPLIED IN DURUM WHEAT CULTIVATION ON THE FARMER'S DECISION: THE CASE OF GAZIANTEP PROVINCE

Araştırma / Research

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Abstract

In Turkey, durum wheat production is not sufficient to meet the needs of the wheat industry. Therefore, durum wheat is imported although it varies according to years. The aim of this study is to determine farmer problems and agricultural policies that limit durum wheat production. By identifying these problems, it is aimed to realize the production required by the durum wheat industry. The study was conducted in Gaziantep province, where durum wheat production was previously made intensively. Durum wheat producers in the study area constituted the main population. Since the field widths were not the same size, the sample size was determined as 240 by stratified random sampling. Neyman allocation method was used to share the sample size. Survey data were collected by face to face interviews with producers. Chi-square and t-test were used for data analysis. The upper limit for significance level was taken as $p < 0.05$.

According to research results; 70,1% of the producers stated that wheat prices should be determined before sowing in order to increase durum wheat planting areas. 66,7% of producers stated that net income in durum wheat production should be higher than net income in other crops. It was determined that there was a significant difference between the yields obtained when using certified and non-certified seeds ($p <0.05$). It was concluded that by using high quality and efficient seeds developed by the private sector, 2,48 kg / da less seeds were used per decare. This reduced production costs by 4,59 TL per decare compared to 2018 certified seed prices ($p <0.05$).

Keywords:
Factors limiting production, Gaziantep, net profit

Makarnalik Buğday Tariminda Uygulanan Tarim Politikalarinin Üretici Karari Üzerine Etkisi: Gaziantep İli Örneği

Özet

Türkiye'de makarnalık buğday üretimi buğday sanayisinin ihtiyacını karşılayacak düzeyde değildir. Bundan dolayı, yıllara göre değişmekle birlikte makarnalık buğday ithal edilmektedir. Bu çalışmanın amacı, makarnalık buğday üretimini sınırlayan çiftçi problemleri ve tarım politikalarının belirlenmesidir. Bu problemlerin belirlenmesi ile makarnalık buğday sanayisinin ihtiyacı olan üretimin gerçekleştirilmesi hedeflenmektedir. Çalışma, makarnalık buğday üretiminin daha önce yoğun olarak yapıldığı Gaziantep ilinde yürütülmüştür. Ana popülasyonu, çalışma alanındaki makarnalık buğday üreticileri oluşturmuştur. Arazi genişlikleri aynı büyüklükte olmadığından, örneklem büyüklüğü tabakalı rastgele örnekleme ile 240 olarak belirlenmiştir. Örneklem büyüklüğünün paylaştırılmasında Neyman paylaştırma yöntemi kullanılmıştır. Anket verileri üreticiler ile yüz yüze görüşülerek toplanmıştır. Verilerin analizinde ki-kare ve t-testi kullanılmıştır. Anlamlılık düzeyi için üst sınır 0.05 olarak alınmıştır.

Araştırma sonuçlarına göre; üreticilerin %70,1'i buğday fiyatlarının ekim öncesinde belirlenmesi, %66,7'si ise makarnalık buğday üretimindeki net gelirin diğer bitkisel ürünlerde daha fazla olması durumunda makarnalık buğday ekim alanını arttıracaklarını belirtmişlerdir. Analizler sonucunda, sertifikalı tohum ve sertifikasız tohum kullanımı ile verim arasında arasında istatistiksel olarak ilişki olduğu belirlenmiştir ($p <0.05$). Özel sektör tarafından geliştirilen kaliteli ve verimli tohumların kullanılmasıyla dekar başına 2,48 kg/da daha az tohum kullanıldığı sonucuna varılmıştır. Bu da 2018 yılı sertifikalı tohumluk fiyatlarına göre üretim masraflarından dekar başına 4,59 TL daha fazla tasarruf sağlamıştır ($p<0.05$).

Anahtar Kelimeler:
Gaziantep, net kar, üretimi sınırlayan faktörler

1. INTRODUCTION

In Turkey, 23.4 million hectares of land is cultivated. Excluding fallow land, 66.4% (15.5 million hectares) of our agricultural land is allocated to field agriculture. Approximately 71% (11.1 million hectares) of these areas are grown grain. Wheat takes the first place with a share of 69% in total grain cultivation areas. Wheat takes the first place among grain cultivation areas with a share of 69% (Anonim, 2019). Although no precise statistical figures relating to the share in the durum wheat production in Turkey, approximately 1.7 million hectares planting area, it is estimated that about 4 million tons of production. Approximately one third of the total wheat cultivation area in Turkey is allocated to durum wheat (*Triticumum durum*). However, with the spread of high-yield bread wheat varieties in production, there has been a decrease in durum wheat production (Kün, 1988). It is stated that durum wheat production in wheat agriculture has a share of 20-30% (Uysal, 1999). Wheat is widely used in raw materials of bread and pasta, in animal fattening and in industry. Therefore, production, consumption and trade are of great importance for the country's economy. In addition, thanks to its wide and adaptable ability with appropriate and inexpensive nutrition value, it is the main nutrient in many countries (Anonim, 2019). The main factors causing decrease in durum wheat production are; development of high-yield bread wheats, low price difference between durum wheat and bread wheat can be listed as reasons (Bağcı and Ekiz, 1993; Eser, 2009). The reason for the fact that durum wheat is less compared to bread wheat is shown to be less resistant to cold and less productive than bread wheat (Fabrani and Lintas, 1988). Yield and quality of durum wheat are significantly affected by environmental conditions (Sade et al., 1999; Anonim, 2012; Öztürk et al., 2017).In a study in which environmental conditions were evaluated in terms of suitability for growing quality durum wheat, they reported that the most suitable climatic region in terms of all quality criteria was the Southeast-3 climatic region (Atlı et al., 1993). It was stated that the wheat with the most superior characteristics was obtained from Kahramanmaraş region in the main durum wheat varieties taken in 1990 and 1991 in the Agricultural Management Directorates (Ercan and Bildik, 1993). They stated that durum wheat production potential is high in terms of both ecology and gene source of our country and it is very important for production using high quality and standard products to be grown for industrialists and producers (Aydemir et al., 2003). In a study, the factors that will affect the increase in durum wheat production, high quality durum wheat seeds are provided, fertilization is done at an adequate level and the determination of durum wheat price is listed as (Tekin, 2010).Turkey, in terms of durum wheat production is advantageous position compared to many countries. This is due to the climatic conditions and the gene center of durum wheat. On the other hand, the pasta industry supplies some of its raw material needs through imports. This shows that the policies applied for durum wheat production are not sufficient. Therefore, durum wheat price policies should be determined well and should be in favor of producers (Ayçicek and Yürür, 1995; Anonim, 2001). In a study conducted in Konya, almost all of the producers stated that Turkish Grain Board (TMO) purchase prices before planting will have a positive effect on production decisions (Karakuş, 2017). It was determined that the increase in government purchase prices was effective in increasing wheat production. This contributed to investing in wheat production and creating a more attractive production area (Elasraag and Alarcón, 2015). As a result of the decrease in durum wheat production, pasta factories had to buy quality durum wheat from outside (Anonim, 2008). In our country, pasta sector has an important place in the export of agricultural products and contributes to national income and employment. However, our pasta industry is experiencing great difficulties in supplying raw materials from the domestic market and tends to export (Subaşı, 2001). Agricultural price volatility disrupts the optimal allocation of resources (Smith, 1997) and causes serious socio-economic problems (Jayne, 2012). Bread and durum wheat production in Turkey and their share in production are given in Table 1 according to 2018 data.

Table 1. Wheat production by region in 2018 (Thousand Tons)

Region	Bread Wheat		Durum Wheat	
	Quantity	%	Quantity	%
Marmara	2,706	16,4	1,0	0,0
Aegean	1,890	11,5	321,0	9,2
Central Anatolia	5,680	34,4	1,362	38,9
Mediterranean	1,190	7,2	20,0	0,6
Eastern Anatolia	1,647	10,0	92,0	2,6
Southeastern Anatolia	2,241	13,6	1,237	35,4
Black Sea	1,146	6,9	467,0	13,3
Total	16,500	100	3,500	100

Source: Estimated production by TMO according to 2018 data of TÜİK

When Table 1 is examined, it is seen that bread wheat is widely produced in the Central Anatolia Region (34,4%). This is followed by Marmara Region with 16,4% and Southeast Anatolia Region with 13,6%. The lowest production was made in Black Sea and Mediterranean Regions. When the durum wheat production is analyzed, it is seen that Central Anatolia Region takes the first place with 38.9%. Southeast Anatolia Region followed this region with a rate of 35.4%. On the other hand, the regions where durum wheat production is least produced are Mediterranean (0.6%) and Eastern Anatolia (2,6%). According to 2018 data, durum wheat production is not produced in Marmara Region.

Although the cultivation area and production of durum wheat in Turkey varies according to years, it is a self-sufficient country. However, due to the increasing export of durum products, the necessary raw materials are met through imports. The increase in the exports of finished goods plays an important role in the increase of durum wheat imports over the years. In periods of excess supply in our country's wheat production, TMO also exports as well as other intervention methods in order to regulate the markets. In 2018, durum wheat import of our country was 405 thousand tons.Durum wheat exports reached 345 thousand tons in 2010 at the highest level. Our country's export of durum wheat for 2018 is approximately 24 thousand tons. Most of the wheat import in Turkey is made from Russian Federation due to freight and competitive price advantage, and from Lithuania, Germany and Latvia due to high protein (Anonim, 2019).

Table 2. Durum wheat import and export amount in Turkey

	Import			Export		
Years	**Quantity (ton)**	**Value (thousand $)**	**Average price ($/Ton)**	**Quantity (ton)**	**Value (thousand $)**	**Average Price ($ /ton)**
2009	111,342	48,694	437	100,335	28,573	285
2010	80,632	25,373	315	345,345	63,085	183
2011	24,440	9,465	387	1.883	814,00	432
2012	217,583	83,425	383	43,00	32,00	748
2013	588,539	228,563	388	135,00	102,00	755
2014	592,852	214,257	361	32,134	17,522	545
2015	463,989	187,016	403	48,077	22,487	468
2016	756,361	203,583	269	16,982	6,060	357
2017	419,094	103,681	247	10,845	4,274	394
2018	405,291	103,804	256	23,633	8,193	347

Source: Anonim, 2019

In The Table 2 gives information on condition wheat import and export data of our country. When the table is analyzed, it is seen that the highest (756,361 tons) durum wheat import was realized in 2016. At least durum wheat import was 24,440 tons in 2011. The increase in exports of finished goods (pasta, bulgur, biscuit, semolina and noodle) played an important role in the increase of durum wheat imports over the years (Anonim, 2019). Durum wheat is not as strategic as bread wheat. However, it is emphasized that the authorities directing agricultural policy should take precautions and develop policies on the supply of the foods that consumers need (Unnevehr, 2003).

Gaziantep, which is located in the west of Southeastern Anatolia Region, is suitable for high quality durum wheat production due to climatic conditions. On the other hand, in Gaziantep, as in our country, changes have been observed in durum wheat cultivation area and production compared to the past. In this study, the reason of the changes in production is tried to be revealed. The aim of this study is to; i) Determination of the factors affecting the decrease in durum wheat production, ii) Determining the factors that will affect the increase of durum wheat production, iii) Determination of socioeconomic variables affecting durum wheat production As a result of this study, it is expected to contribute to the support policies for wheat production, increase producer income and eliminate the lack of literature in this regard.

2. MATERIALS AND METHOD

2. 1. Data and sampling

The main population of the study consisted of wheat producers registered in Farmer Registration System of Gaziantep Ministry of Agriculture and Forestry. The sample size was determined by considering the land size. Stratified random sampling method was used in the study because the land size was not homogeneous according to districts and each district had to be represented in the study. The sample size was calculated as 240. Producers consist of enterprises that produce durum wheat, reduce production and abandon durum wheat production. The data consists of primary data obtained through surveys, secondary data obtained from the reports of institutions and organizations. Data were collected through a farmer survey (N = 240), administered in summer June-August 2017 in the Gaziantep region.

2. 2. Data and variables

In the evaluation of the general structure of durum wheat producer; indicators such as education of the producer, place of residence, non-agricultural income, income level of the enterprise, reasons for reducing durum wheat production and factors increasing production were examined. The variables considered in the study are given in Table 3 together with their definitions.

Table 3. Variables and their descriptions

Variable	**Defination**
Education	1=Primary, 2=Middleschool, 3=High school, 4=University
Place of residence	1=Rural, 2=City
Off-farm income	1=No, 0=Yes
Annual income status	1= low, 2=medium, 3=high
Land size	1=(≤ 75]; 2=[75, 150]; 3=[151-225]; 4=[≥225]
Production of Durum Wheat	1= Yes, 2= No, 3= Decrease
Previous Production of Durum Wheat	1=Yes, 2=No
Reasons of decrease in durum wheat production	**1=insignificant, 2= moderately important, 3= important**
	Durum wheat price low Other products profitable Impairment of quality in production Low yield Bread wheat is more profitable Lack of land
Reasons to increase durum wheat production	**1=insignificant, 2=moderately important, 3= important**
	Determination of wheat prices before sowing Providing more income in other crops products Providing high quality and high yield seeds Providing more income than bread wheat Produce quality durum wheat

2. 3. Data Analysis

Likert-type scale was used to determine the attitudes and behaviors of producers. Likert scale has negligible, moderately important and important evaluations. Normality and variance homogeneity assumptions were examined by Kolmogorov-Smirnov and Levene tests, respectively (Gamgam and Altunkaynak, 2017). Independent samples t-test was used in independent samples to compare the yield of seed per decare and the amount of seed used per farmer using and without certified seed (Özkan et al., 2019). The socioeconomic characteristics of the farmers were presented with descriptive statistics. The upper limit for statistical significance level was taken as 0.05.

3. RESULTS

The results of the survey conducted in the research area consist of three sections. These; socio-economic characteristics of durum wheat producers, causes of decrease in durum wheat production and conditions of increasing production possibilities are discussed. In the study, 47,5% of durum wheat producers were primary, 25,8% secondary, 17,9% high and 8,8% university graduates. It was determined that 77,9% of the producers lived in rural areas and 22,1% lived in the city center. The rate of non-agricultural producers was determined to be 69,2%. The ratio of the producers who stated the income status of the enterprise as low was determined as 20,4%. The ratio of middle-income producers was 44,6% and that of high-income was 35,0%. It was determined that the lowest yield amount obtained in dry conditions in the study area was 300 kg / da, the highest yield amount was 470 kg / da and the average yield amount was 391,75 kg / da. The lowest yield amount obtained in irrigated conditions is 450 kg/da, the highest yield 800 kg/da, the average yield amount was determined as 691,04 kg / da.

Amounts obtained in terms of yield, average of Turkey (322 kg / ha) are quite higher. It can be said that this situation is effected by the fact that durum wheat production is carried out under irrigated conditions and that the region is suitable for durum wheat production. The amount of seed used per decare is between 25-35 kg and the average amount is determined as 26,4 kg. There was a large difference between the amount of seed recommended by the experts and the amount of seed used by the producer. It was determined that this situation increased production costs. Although the producers have stated that the yield will decrease if less seeds are used, the most important factor affecting this situation is that they cannot abandon the traditional production approach. It can be said that this situation is still continuing in different regions of our country. 51,3 % of the producers are

a seed variety, while the other producers 48,7% used two seed variety. Although there are many durum wheat varieties developed by the private and public sector in the region, it can be said that the number of cultivated varieties is low. It was concluded that this was caused by the cultivation of different cultivars. The ratio of durum wheat varieties produced widely in the study area is shown in the following Figure 1.

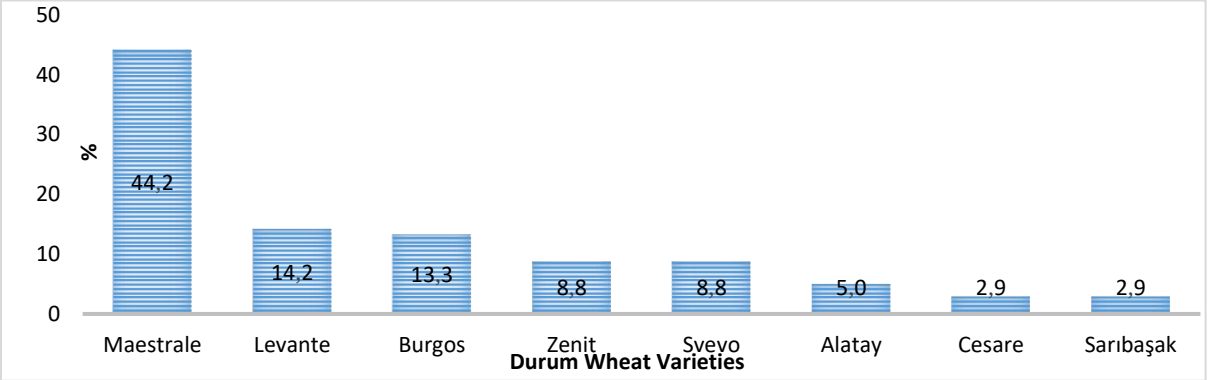

Figure 1. Durum wheat varieties produced in the study area

When the figure 1 is analyzed, it is seen that the most cultivated cultivars are Maestrale (44,2%) followed by Levante (14,2%) and Burgos (13,3%) varieties. The least cultivated varieties were Cesare (2,9%) and Sarıbaşak (2,9%). According to these data, 97,1% of the durum wheat varieties produced in the study area were found to be produced in durum wheat varieties developed or obtained by the private sector. This situation can be said to be effective in recent years by the private sector. In a study conducted by Labarthe and Laurent (2013), it was stated that privatization of agricultural extension services may have negative effects on small farms in Europe. It can be said that there is a difference between this study and our study. Because it can be said that the extension study conducted by the private sector on certified seed is effective on adopting innovation. In the study area, almost all durum wheat production was carried out under irrigated conditions. Therefore, yields obtained in non-certified seed and certified seed use in irrigated conditions is given in Table 4.

Tablo 4. Yield of certified and non-certified seed in the irrigated areas

Used Seed	n	Mean	SD	t
Non-certified Seed	240	558,27	51,697	- 32,813*
Certified Seed	240	691,04	59,314	

* Statistically significant at 1% level

In our study, as seen in Table 4, it was determined that there was a statistically significant difference between the yields obtained when using certified and non-certified seeds ($p < 0.05$). When the average values are taken into consideration, it is seen that the yield obtained in the use of certified seed is significantly higher than that of the non-certified seed. The average yield was 558,27 kg / da when non-certified seeds were used in durum wheat production in irrigated conditions, whereas this amount increased to 691,04 kg / da with the use of certified seed. According to this result, yield difference between certified seed use and non-certified seed use was 132,77 kg / da (691,04 - 558,27) per decare. When this yield difference is evaluated according to 2019 durum wheat prices (TMO Buying: TL 1,43), TL 189,86 per decare more income was determined. According to this result, it can be said that the gross production value of the enterprise increases with the use of certified seeds (Table 4). In order to evaluate the use of certified and non-certified seeds in terms of production costs, the following Table 5 was established.

Tablo 5. Comparison of the amount of certified and non-certified seed used in irrigated areas

Used Seed	n	Mean	SD	t
Non-certified Seed	240	28,92	2,143	19,904*
Certified Seed	240	26,44	2,399	

* Statistically significant at 1% level

When table 5 was examined, it was found that there was a statistically significant difference between certified and non-certified seed usage amounts ($p < 0.05$). Considering the average values,

average certified seed use was found to be significantly lower than non-certified seed use. While the average amount of non-certified seed used in irrigated conditions was 28,92 kg/da, the average amount of certified seed used decreased to 26,44 kg/da. Therefore, with the use of certified seeds, 2,48 kg/da (28,92 - 26,44) less seed per decare was used. When this amount is evaluated according to average wheat germ prices in 2018 (Merchant: TL 1,850), It has been determined that production costs will be saved as 4,59 TL per decare. As a result, with the decrease in the amount of seeds, it was determined that production costs of 2018 decreased by 9,4% per decare. According to these results, it can be said that production cost decreases with the use of certified seeds.

Turkey durum wheat sowing areas, in some regions, is known to be limited. Our province of Gaziantep is suitable for the cultivation of durum wheat and is one of the regions where the highest production is made. In this region, it has been determined that decreases in production occur and this situation changes according to years. Therefore, the factors affecting the decrease in durum wheat production in the research area were tried to be determined. Producers were asked about low wheat prices, higher net income from other crops, poor quality of crops, low yield, low profitability of bread wheat and the availability of sufficient land. With answers from the manufacturers, see Figure 2 was created.

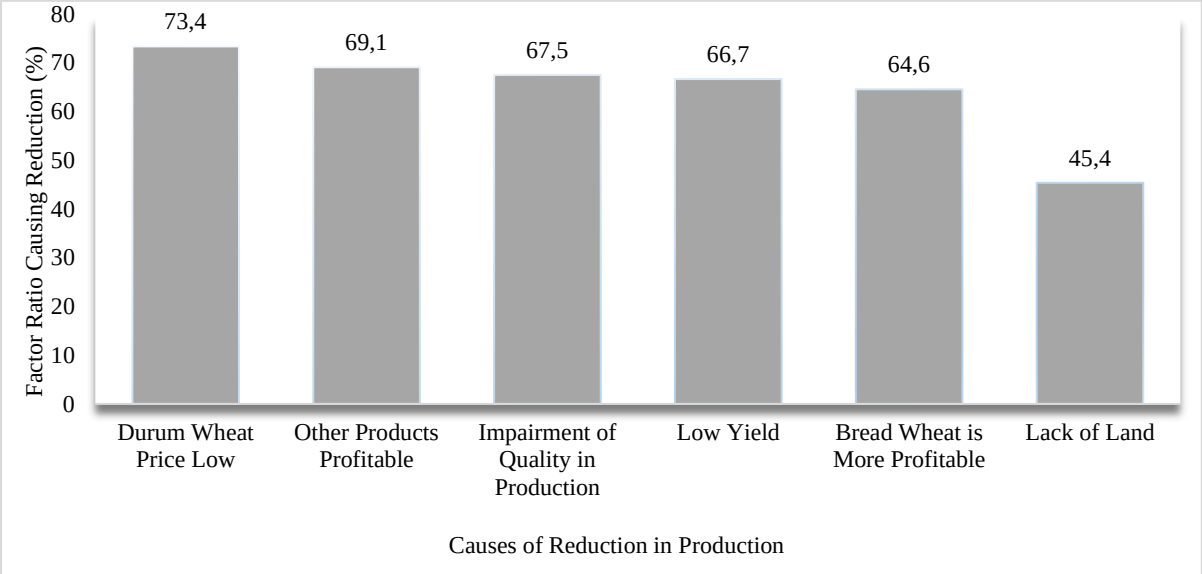

Figure 2. Factors affecting the reduction of durum wheat production

Factors causing the decrease of durum wheat cultivation areas are shown in Figure 2 in proportion. When Figure 2 is analyzed, it is seen that the most important factors affecting the decrease in production are low wheat prices. This factor was found to be 73,4%. The second factor (69,1%) affecting the decrease in production is the high net profit from other products.

When other factors are examined, it is seen that they have similar values in ratio. Inadequacy of land amount was the lowest (45,4%) factor affecting the decrease in durum wheat production. According to these results, it can be said that the most important factor affecting the decrease in durum wheat production is the cultivation of plant products with low purchase price and high gross production value.

In the study area, the factors that will affect the increase of durum wheat production are tried to be determined. In this context, when the conditions are met, do you increase the durum wheat planting area? the question was posed. The questions were asked according to the Likert scale (no importance, moderately important and important). The questions were asked to the producers about the determination of wheat prices before planting, to provide more net income from other crops produced in the enterprise, to provide seeds with high quality and yield, to provide more net income from bread wheat and to obtain high quality durum wheat production. The responses obtained were evaluated proportionally and are shown in Table 6 below.

Factors affecting the increase of durum wheat sowing area are shown in table 6 above. When the table is examined, it is seen that the most important factor that will affect the increase of the cultivation area is the determination of wheat prices before sowing. The rate of producers who find this factor important is 70,1%. The rate of producers who found it to be of medium importance was 20.4%.

Table 6. Distribution of responses to factors to increase durum wheat cultivation area

Reasons for increasing production	Important	Moderately important	No importance	Toplam
Determination of wheat prices before sowing	70,1	20,4	9,5	100
Providing more income in other crops products	66,7	25,4	7,9	100
Providing high quality and high yield seeds	62,9	32,3	4,8	100
Providing more income than bread wheat	62,3	36,6	1,1	100
Produce quality durum wheat	53,3	40,4	6,3	100

According to these results, if 90,5% of producers find that durum wheat prices are more advantageous than bread wheat prices, we can say that durum wheat cultivation areas will increase. In a previous study, it was concluded that one of the important factors affecting wheat production was insufficient state support (Yıldız et al., 2013). Although there is a proportional difference between the other variables examined, it is seen that they have similar rates in terms of effecting the increase in production. This shows that the problems of durum wheat producers in the study area are the same. According to other factors, the rate of obtaining high quality durum wheat production was found to be low. This is an indication that the study area is suitable for durum wheat production. We can say that similar results were obtained from previous studies. In a study in which environmental conditions were evaluated in terms of suitability for growing quality durum wheat, they reported that the most suitable climatic region in terms of all quality criteria was the Southeast-3 climatic region (Atlı et al., 1993). It has been stated that durum wheat varieties are obtained from Kahramanmaraş and its region with the most superior characteristics (Ercan and Bildik, 1993).

In durum wheat agriculture, in order to obtain high and quality yield from the unit area, cultivation technique should be applied well. The cultivation technique practices; good soil preparation, sowing the seed varieties suitable to the region in appropriate amount and time, suitable fertilization, timely combat with weeds and diseases and the appropriate harvest period, It is performed. In this context, it has been tried to determine the application level of durum wheat producers' cultivation technique. The cultivation technique practices of the producers in the study area are shown in Figure 3.

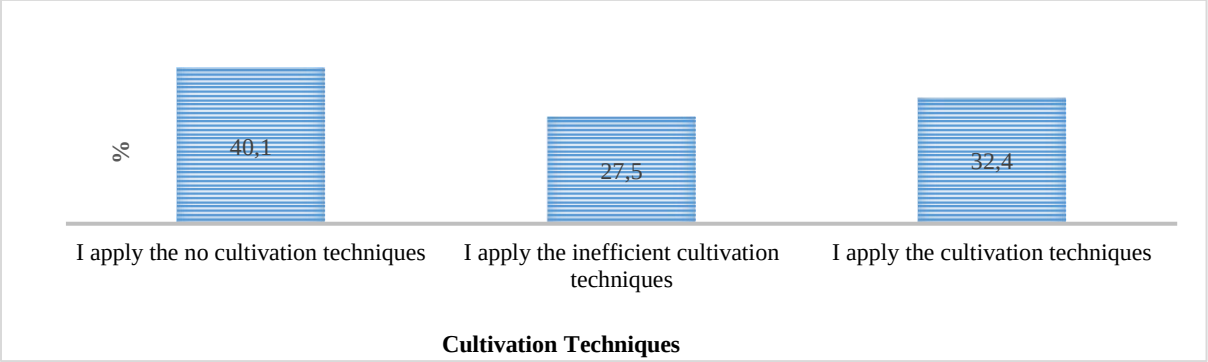

Figure 3. Application of Cultivation Techniques in Durum Wheat Production

The application of cultivation technique of durum wheat producers in the study area is shown in Figure 3. 40,1% of the producers do not apply the cultivation technique according to the variety, inadequate application by 27,5% and 32,4% were fully applied. Producers who do not apply cultivation technique do not discriminate between seed varieties, therefore, it was determined that they continued production with traditional production methods. It is seen that the cultivation technique applications obtained in the research area are not sufficient (Figure 3). In a similar study, it was concluded that ecological factors and cultivation techniques directly or indirectly affect the quality criteria in wheat (Güleç et al., 2010).

4. CONCLUSION AND DISCUSSION

In this study, the problems of durum wheat production in Gaziantep were examined and the variables for increasing the production amount were determined. By determining these variables, agricultural policies in durum wheat production were determined. According to the results of the research, intervention purchase prices were found to be the most important factor in increasing durum wheat production, except climatic conditions. In case other conditions remain the same, it is determined that

purchase price of durum wheat intervention is higher than bread wheat prices as the most important factor affecting production increase. One of the most important factors leading to a decrease in durum wheat production is the high net profit from other crops. The reason for this was determined that industrial crop cultivation was widespread in the study area and net income was higher than durum wheat production. It has been determined that producers prefer durum wheat varieties developed by the private sector more recently. The preference of these varieties was also influenced by the fact that the private broadcasting institutions carried out more publishing activities. In addition, the high quality and efficiency of the private sector varieties has been effective in the choice of producers. This has contributed to lower production costs and increased net income in wheat production through the use of certified seeds developed in recent years. This situation can be said to be effective in increasing durum wheat cultivation areas in the region. The Discussion; The fact that TMO wheat purchase policies are at the level that encourages the producer to produce durum wheat will contribute to the increase of durum wheat production areas. The share of seed in durum wheat production cost is 10-12%. This situation should be taken into consideration when determining seed prices and durum wheat prices. The high seed price will direct the durum wheat producer to poor quality varieties. This will cause a decrease in the quality and yield level of durum wheat production. In terms of cultivation technique, durum wheat production is a plant that needs more attention than other products. Further publication studies on growing technique will increase the quality durum wheat production.

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