Cost analysis of oily sunflower production: the case of Tekirdag Province, Turkey

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Abstract

In Turkey, oilseeds are the leading of the supply deficit in agricultural products. In 2016, the country's oilseeds and derivatives imports amounted to 3,4 billion USD while sunflower and sunflower oil imports amounted to 1.3 billion USD. The amount of oilseed production in Turkey was 3,9 million tons in 2017 and the share of sunflower production was 50,56%. According to data from the same year, the area of sunflower oil production was 681.000 ha in Turkey, production and yield were 2,64 tons and the amount was 1,8 million tons / ha. The share of sunflower oil production area of the Thrace region in Turkey was 49,26%, while the share in production amount was 44,81%. Tekirdag province designated as an area of research is the first in terms of cultivation areas for oil sunflower and the production amount in the country while it holds 23% of the sunflower fields of Turkey and 20,45% of amount of sunflower oil production. Supporting policies aimed at increasing production of oilseeds are applied across Turkey. In this study, the oil sunflower cost in Tekirdağ Province, one of the most important oil sunflower production centers of the country, was examined in detail; in particular, the effects of the implementation of deficiency payment on producer income were examined. Turkey is placed on the top of vegetable oil consumption. However, the country's self-sufficiency rate in sunflower production is 64%. In this study, the amount of oil sunflower production in the province of Tekirdag in 2009 was determined as 1.060,50 USD / ha, the cost per ton was 620 USD, and for 2017, these values were determined as 957 USD / ha and 420 USD, respectively. In 2009, the increase in production income in the enterprises examined was realized as 239,4 USD per hectare with the deficieny payment application while the share of difference support in oil sunflower income was 21,88%. In 2017, these values were realized as 253 USD and 18,33% respectively. However, in 2017, the unit prices in the deficiency payment applied in the oil sunflower decreased about 14% compared to 2009. This situation has negatively affected the income obtained from the production of sunflower oil.

Keywords: Oil Seeds, Sunflower, Cost, Tekirdag, Turkey.

1. Introduction

One of the important energy sources in human nutrition is fats. When it comes to the world's oilseed plants, soybeans, peanuts, sunflower, canola, corn, olive, sesame, palm seed, oil ketene, safflower, coconut and castor oil plants come to mind. Soybean, canola,

cottonseed, peanut, sunflower and palm kernel plants are the first in terms of production quantities. The products falling within the group of production in Turkey oilseeds sunflower, cottonseed, soybean, peanut, poppy, sesame, rapeseed and safflower are the products in the group of oilseeds produced in Turkey. These products are not only cotton seed (cigit) oil plants, but they are also in terms of the important contribution to the vegetable oil industry in the country.

Changes in world trade bring about different practices in the agricultural policies of countries. Therefore, policies applied in crop production may change over time. In Turkey, the studies have begun to focus on the basis of vegetable product groups in recent years. One of these product groups is oilseed plants. The sunflower in oilseed crops in Turkey is leading of the indispensable quality of the products. In the group of vegetable oils, which is an important source of energy in meeting human needs sunflower has a separate importance for Turkey. Oil sunflower production activities in Thrace region in Turkey, especially in Tekirdag province,.is among the leading manufacturers of revenue sources,

According to the data of Vegetable Oil Manufacturers Association of Turkey (BYSD) in 2016 world oilseeds production was 554 million tons while soybeans took first place with 60,83% share in production. Following colza, sunflower, in the area of 26.630.000 hectares, took the 3rd place with a share of 8,12% and a production amount of 45.000.000 tons. In 2016, palm oil has a share of 34,76% in 187.000.000 tons of vegetable oil produced worldwide, following soybean oil and colza oil, sunflower oil, took 4th place. World sunflower oil production was 17.751.000 tons in 2016 (TBYSD, 2018). According to Turkish Statistical Institute (TSI) data of 2017, oilseeds produced in Turkey (cotton, flax, hemp and poppy fields is taken into account) were 925.170 ha in the field. In the production areas, sunflower was the first with a share of 84,27%. In oil seed production, the first three ranks are sunflower (50,56%), cottonseed (37,83%) and peanut (4,26%).

According to the data by TSI of 2017, sunflower planting area was 779.439 ha in Turkey, and the amount of production was 1.964.385 tons. Unflower oil had 87,41% of the planting area and 91,63% of amount of the production (TSI, 2017). According to data of 2016, Turkey has 2,70% of the world sunflower cultivation areas constitutes and 3,71% of the amount of production (FAO, 2018). In Turkey sunflower yield is 2,32 tons / ha, which is higher at a rate of 27,38%.than the world average (1,69 t/ha). Tekirdag province designated as an area of research is the first in terms of oil sunflower cultivation areas and the amount of

production. Tekirdağ province has 23% of sunflower cultivation areas and about 20% of amount of sunflower oil production (FAO, 2018; TÜİK, 2017).

Sunflower oil, one of the most important plants in the world, is an oil crop plant and also has the maximum cultivation area and amount of production. Containing a high rate (40-50%) of oil amount in its seed, sunflower is an important oil plant in terms of vegetable raw ol production. Sunflower oil is one of the oils with the highest nutritional value. According to data of 2016, 9% of world vegetable raw oil production is met from sunflower. In Turkey, 46% of vegetable raw oil production is met from sunflower.

Sunflower oil is one of the vegetable oils with high nutritional value due to the fact that it contains 70% of unsaturated fatty acids. As a by-product, sunflower residue which is obtained about 40-45%, contains 30-40% protein and is used as a valuable feed for animal nutrition. In addition, sunflower oil is used in soap and paint industry, its stalks can be used as fuel. In addition to this, 2,6% of world production of sunflower and 8,37's% of Turkey's production is consumed as appetizer (GTB 2017; TSI, 2017). Sunflower is most produced in Thrace and Marmara region in Turkey (49,26%); in provinces Tekirdağ (20,45%), Edirne (13,59%), Kırklareli (10,77%) and other provinces (4,45%) (TSI, 2017).

This research primarily includes information about oilseeds and crude vegetable oil production and trade in the world and Turkey. Within the scope of this study, changing process of sunflower and its oil production after 2000s are specifically investigated. In this research, sunflower data compiled from 233 agricultural enterprises via surveys determined by Stratified Sampling Method and obtained from 2009-2010 production and marketing period in Tekirdağ having highest sunflower production in Turkey has been comparatively revealed with the cost of sunflower production for oil table prepared in the production period of 2017 considering the data of Republic of Turkey Ministry of Agriculture and Forestry within the cost of production and subsidies given sunflower for oil. As a conclusion, suggestions aimed at increasing the sunflower production at the much higher productivity level in the research field are provided.

2. Literature Review

There are several studies regarding cost analysis in sunflower production and commerce of the product. In Pririnççioğlu's research (1973) about sunflower production in Edirne, Tekirdağ and Kırklareli, 46 agricultural enterprises were analyzed and mean values

belonging to these enterprises were found such; the average size of terrains in which sunflower produced at enterprises was 7,05 ha., 12,50 kg seeds per a hectare and 67,80 kg fertilizers (N+P) were used. 0,75 of a day a person and 0,15 of a day tractor workforce were used. The average yield value at enterprises was 0,17 tons /ha.

In a research above 100 enterprises producing sunflower in Tekirdağ, average population per an enterprise and the labour force (EİGB) were respectively found 5,39 and 3,61. In the research, average land size at enterprises as 9,13 ha, number of parcel as 7,40, ratio of self property as 89,62%, average sunflower cultivation area as 3,7 ha, productivity as 2,11 tons/ha., seed utilisation as 3,770 kg per a hectare, fertilizer utilisation 228 kg as composite and 110,7 kg as ammonium nitrate and ure as 113,2 kg/ha, agrochemical as 1604,1 ml were detected (Semerci, 1998).

In a research executed at Thrace Region, the average scale of the enterprise as 14,77 ha, number of parcel as 8,2 and the ratio of self property as 83,4% were detected at the enterprises producion sunflower for oil. Sunflower was planted 45,5% of the total land size. In this research, the average yield value was found 1,58 tons /ha; seed utilization as 4,07 kg/ha, use of fertilizer as 155,9 kg/ha and chemicals use as 870 gr/ha were identified. In the research, 30,97% of cost element in sunflower production was determined as soil preparation; 29,50 % of maintanence work, 31,18% of field rent and 8,35 of harvest and blend expenditure (TEAE, 2001).

In a research conducted by Bayramoğlu and et al. (2005), physical production information about some important field crops (sunflower, wheat, onion and sugar beet) and their prime costs to unit area were calculated. In a research fulfilled production year of 2015 in Edirne, Kırklareli and Tekirdağ by Semerci and Süzer (2007) about the use of agricultural sources on the sunflower production and their effects, data are gathered from 182 enterprises. According to data of Kırklareli Atatürk Soil and Water Resources Institute (2010), it is ascertained that 27,02% of input use, 26,25% of soil cultivation and planting, 16,25% of maintanence and 11,02 % of harvesting constitute the cost of reared sunflower in Thrace Region. The ground rent becomes the first cost element in watery production (29,86%), afterwards input use, soil cultivation and planting follow the ground rent and lastly harvesting (9,18%) (KATSKAE, 2010).

In a study conducted by Kaya and et al. (2010), cultivation area, current output, yield average and foreign trade of sunflower in the world and Turkey were analyzed by dividing 1980-2008 into 5 yearly periods. In the study, it was emphasized that Turkey is the importer

country of sunflower despite the positive developments. Sav and Sayın (2016) examined production potential of oil seeds, its development, the position of sector in economy, problems in sector within the foreign trade and applied politics in their study and they suggested recommendations in regard to these problems.

Gül et al. (2006) stated that sunflower requirement is supplied from imported sunflower seed and oil due the the fact that Turkey do not reach the level of providing the sufficient sunflower oil for production in their study. The importance of sunflower and its role about compensating the oil deficit among the oil-seeded plants in Turkey were prsented in the study.

In Top and Uçum's study (2016), they determine the state of actualization about year-end stock by giving the syptoms for production, utilisization (consumption), export, import and prices of sunflower in the world and Turkey and they also present the possible developments for the next year.

In the report prepared by Ministry of Customs and Trade (2017), information about sunflower production knowledge, its trade, its consumption and price formation have been given. This study also includes comprehensive information about support policies for sunflower.

3. Materials and Methods

Primary data used in the research are gathered from surveys made with the sunflower producting enterprises which were chosen by random sampling in Tekirdağ province. "Premium Supports of Sunflower for Oil" lists acquired from Ministry of Agriculture and Forestry are used for the determination of the survey numbers to be applied.

In the research, the data from World Food and Agricultural Organization (FAO), Ministry of Agriculture and Forestry (MAF), Ministry of Customs and Trade (MCT), Turkish Statistical Institute (TSI), Turkish Vegetable Oil Manufacturers Association (TVOMA) were used. Moreover, the publications and various reports of commissions relevant to this issue were used. Within the scope of this study, generally oil seeds in the World and Turkey and specifically sunflower production within the production of vegetable raw oil were presented as tables.

Generally, oil seed and varieties in Turkey and sunflower and its foreign trade are distinctively analysed. This study also includes unit prices concerning deficiency payment

applied to oil seeds in the period of 2008-2017 in Turkey. As a part of the study, research findings of 2009-2010 production and marketing period are comparatively given with the cost of sunflower produced under dry conditions by preparing according to data of Tekirdağ Directorate of Ministry Agriculture and Forestry and the production cost based upon agricultural supports and its reflection to producer's income.

"Stratified Random Sampling Method (Neyman Method)" is used for determining the survey figures in the study (Yamane, 2010). The data gathered from surveys are cross-sectional data belonging to 2009-2010 production and marketing period 95% confidence interval and 1 % average deviation are taken into consideration.

$$n = \frac{[\Sigma(N_h * S_h)]^2}{N^2 * D^2 + \Sigma(N_h * S_h^2)} \qquad D^2 = (d / t)^2$$

n= Sample size

$N_{h=}$ Enterprise number in the sampling frame of h-layer.

$S_{h=}$ Standart deviation of the data in h-layer

S_h^2 = Data variance of h-layer

t= Table value for a certain confidence interval

N= Total Number of Enterprises in Sampling Frame

d=. The % deviation from an average

The main reason for using this method in sampling is to be heteregenous of population (average sunflower planting area per enterprise and not to display a normal distribution. Therefore, using stratified random sampling method in heteregenous population can be much more correct (Erkan and Çicek, 1996). Within the scope of the research, 233 surveys are applied throughout Tekirdağ province.

In the research, the cost of sunflower is calculated according to the following method (Yılmaz, 1997; Özkan ve Yılmaz, 1999; Yılmaz ve Yılmaz, 1999; Alemdar, 2014).

Total Income (TI): Yield (ton)*Production Sale Price-USD- (including subsidies).

Variable Costs (VC): Soil Cultivation Cost + Plantation+ Fertilization+Transport+Seed+ Fertilizer+ Drug

Fixed Costs (FC): Ground Rent+Miscellaneous Expenses+ Loan Interest+ Management Cost

Total Expenses (TE-Variable Expenses-): Soil Cultivation and Planting, Harvesting, sum of seed, fertilizer and drug expenses

Variable Costs (VC): Sum of Expenses*0,05

Loan Interest (LI):(Variable Expenses) * (%7 for the year 2009; (%2 for the year 2017)

Management Expenses (ME): (Total Costs) *0,03

In the sunflower productive activity, general management costs are calculated as 3% of the total variable costs. It can be possible to raise this rate up to 7% at the enterprises with high level of intensity (Kıral and Kasnakoğlu, 1999). For this research, total sunflower expenses, various expenditures and 3% of the total ground rent value are taken as a management cost into consideration. Gross and net profits are also calculated to assess the income of enterprises from sunflower production in the research. The methods used in the calculation are given below (İnan, 2016).

Net Profit (NP): TI- (VC+FC)

Gross Profit (GP): TI-VC

In the determination of the product purchase price, average sunflower for oil purchase price of Tekirdağ Commercial Exchange and unit price of sunflower for oil which is applied to enhance the development of oil seeds production.

4. Results and Discussion

4.1. Oil Seeds in the World and Production of Vegetable Raw Oil

According to data of Turkish Vegetable Oil Manufacturers Association of 2016, the production of oil seeds is 554.000.000 tons/year in the world and soya is on the first rank with the share of 60,83%. Sunflower ranks number three with the share of 8,12% by the production amount of 45.000.000 tons in the field of 26.630.000 ha after rape seed (Table 1).

Table 1: Oilseeds Production of the World (Million Tons)

Oil Seeds	2012	2013	2014	2015	2016
Soya Bean	268	283	320	313	337
Sunflower Seed	36	43	40	40	45
Rape Seed	63	71	71	70	68
Cotton Seed	46	45	44	37	40
Other Seeds	62	63	62	66	64
Total	475	505	537	526	554

Source: TBYSD. Turkish Vegetable Oil Manufacturers Association (access:http://www.bysd.org.tr/; access date: 02.06.2018), 2018.

The USA, Brasil and Argentina share the first place in the production of oil seeds. Ukraine is the first place in sunflower production with 14.000.000 tons, Russia is the second with 10.000.000 tons and the EU is the third place with 8.250.000 (GTB, 2017).

In 2016, 187.000.000 tons vegetable raw oil were produced around the world. Palm oil is the first place with the share of 34,76%. Sunflower oil is the fourth place after soya and rape seed oils (Table 2). Indonesia, China and Malaysia are the leading countries in the output.

Table 2: Raw Vegetable Oil Production of the World (Million Tons)

Oil Varieties	2012	2013	2014	2015	2016
Soya Oil	43	45	49	52	54
Cotton Oil	5	5	5	5	5
Sunflower Oil	14	16	15	16	17
Colza Oil	25	27	28	28	27
Palm Oil	56	59	52	59	65
Others	19	20	28	17	19
Toplam	162	172	177	177	187

Source: TBYSD. Turkish Vegetable Oil Manufacturers Association (access:http://www.bysd.org.tr/; access date: 02.06.2018), 2018.

The world sunflower oil production in 2016 is 17.751.000 tons. Ukraine with 32,57%, Russia with 24,98% and the EU with 17,60% have become the first three countries in the production (GTB, 2017).

4.2. Consumption of Sunflower Oil in the World and Turkey

The world sunflower oil consumption in 2016 is at the level of 17.300.000 tons. While the countries of European Union consume approximately 4.100.000 tons, 2.400.000 tons are consumed in Russia. In Turkey, approximately 970.000 tons' sunflower oil is consumed. The crushing capacity of sunflower for oil of Turkey has been actualized as 1.750.000 tons in 2016 (GTB, 2017).

4.3. The production of Oil Seeds in Turkey

Acoording to data of Turkish Statistical Institute (TSI) in 2017, the oil seeds are produced in 925. 170 ha field in Turkey (without considering cotton, linen, cannabis and

hash). Sunflower becomes the first with 84,27% in the production area. In the same year, the total amount of the products was evaluated under the oil seeds group by TSI is 3.885.386 tons. Sunflower (50,56%), cottonseed (37,83%) and peanut (4,26%) has ranked first three places in the production (Table 3).

Table 3: Turkey's Oilseeds Production in the Last Two Decades (Tons)

Year/Criteria	Sunflower	Cottonseed	Peanut	Soya	Safflower	Colza	Sesame	Opium	Total
1998	860.000	1.334.778	90.000	60.000	72	300	34.000	27.964	2.409.112
2002	850.000	1.457.122	90.000	75.000	25	1.500	22.000	19.000	2.516.649
2007	854.407	1.320.831	86.409	30.666	2.280	28.727	20.010	8.981	2.354.318
2012	1.370.000	1.373.440	122.780	122.114	19.945	110.000	16.221	3.844	3.140.356
2017	1.964.385	1.470.000	165.330	140.000	50.000	60.000	18.410	15.244	3.885.386
Ratio (%)	50,56	37,83	4,26	3,60	1,29	1,54	0,47	0,39	100,00

Source: TÜİK, 2018. Vegetable Production Data, Turkish Statistical Institute. (databases/statistical tables/statistics of vegetable production/ oil seeds, http://www.tuik.gov.tr/PreTabloArama.do

In the last 20 years in Turkey (1998-2017), the production of oil seeds increased 61,28%. The remarkable increase with regards to production area and production amount has been occurrred in sunflower with 128,42%. Yield value of sunflower has reached from 1,468 tons/ha to 2,520 tons/ha within the same period. In terms of production amount, cottonseed has become the nearest oil seed to sunflower. The production amount of the other products in 2017 occurred under 165.000 tons. In response to oil seeds production, 780.000 tons of vegetable raw oil is produced throughout Turkey in 2016 according to data of Turkish Vegetable Oil Manufacturers Association

4.4. Sunflower Production in Turkey

According ro data of FAO in 2016, Turkey constituted 2,70% of world sunflower cultivation area and 3,71% of the output. The sunflower yield in Turkey is 2,32 ton/ha and it is 27,38% higher than the average world value (1,69 ton/ha). Sunflower cultivation area in Turkey is 779.439 ha and the output is 1.964.385 tons according to data of TSI in 2017. The sunflower for oil has composed 87,41% of cultivation area and 91,63% of output (Table 4).

Table 4: Sunflower Production of Turkey, Thrace Region and Tekirdağ Province (2017)

Dwelling Unit	Harvested Area (ha)	Production (tons)	Yield (ton/ha)
Tekirdağ	156.733	368.125	2,35
Edirne	100.811	244.655	2,43
Kırklareli	78.059	193.784	2,48
Total	335.603	806.564	2,40
Turkey	681.345	1.800.000	2,64
Share of Region (%)	49,26	44,81	-

Source: TÜİK, 2018. Vegetable Production Data, Turkish Statistical Institute. (databases/statistical tables/statistics of vegetable production/ oil seeds, http://www.tuik.gov.tr/PreTabloArama.do

The production of sunflower for oil in Turkey reached the highest level with 1.800.000 tons in 2017. Tekirdağ, Edirne and Kırklareli are the first three provinces in the production of sunflower for oil. While the share of Thrace Region in the cultivation area of sunflower for oil in Turkey is 49,26%; the share of output is 44,81%. Tekirdağ province analysed within the scope of this research ranks the first place in both cultivation area of sunflower for oil and output around the country. Tekirdağ constitutes 23% of cultivation area for sunflower and 20,45% of output for sunflower in Turkey.

4.5. Import of Oil Seeds and Derivatives of Turkey

The absence of a stable planing for the production of oil crops in Turkey has caused not to utilize adequately the production potential, increase the deficit of vegetable oil and make the industry more dependent to the outside. According to the data of Turkish Vegetable Oil Manufacturers Association, there is no foreign trade deficit in agricultural porducts but foreign trade deficit in oil seeds and derivatives are the level of 2,3 billion USD. The sunflower seeds for oil in Turkey and the numbers of sunflower oil import and export are given below. Turkey paid approximately 11 billion USD to oil seeds and derivatives between the years 2014-2016. According to data of 2016, raw oil takes 46,29% and oil seeds takes 40,79% share (Table 5).

Table 5: Turkey's Oilseeds and Derivatives Import (Million USD)

Oil Seeds and Their Variations	2014	2015	2016
Oil Seed	1.800	1.417	1.401
Raw Oil	1.890	1.663	1.590

Pulp	596	420	444
Total	4.286	3.500	3.435

Source: TBYSD. Turkish Vegetable Oil Manufacturers Association. (access:http://www.bysd.org.tr/; access date: 02.06.2018), 2018.

When the period of 2014-2016 is analysed, it is understood that there is a decrease in sunflower for oil import in parallel with the sunflower porduction throughout the country. Sunflower seeds constitute the large part of the export (Table 6).

Table 6: Turkey's Sunflower Seed Import and Export

Years	Import		Export	
	Amount (Tonnes)	Value (000 USD)	Amount (Tonnes)	Value (000 USD)
2014	556.909	406.154	33.521	111.730
2015	340.192	237.984	35.202	78.875
2016	382.263	263.925	48.259	48.259

Source: TBYSD. Turkish Vegetable Oil Manufacturers Association. (access:http://www.bysd.org.tr/; access date: 02.06.2018), 2018.

Turkey imported 6.230.000 tons' oil seeds and derivatives in 2016. The share of oil seeds in total import is 50,79 %. The other imported products are raw oil and cossene. Sunflower is the second place at the oil seed import with 382.000 tons. The numbers about sunflower import and export of Turkey are given in Table 7.

Table 7: Turkey's Sunflower Oil Import and Export

Years	Import		Export	
	Amount (Tonnes)	Value (000 USD)	Amount (Tonnes)	Value (000 USD)
2014	812.401	1.177.993	665.241	790.130
2015	798.170	1.101.230	618.525	680.701
2016	738.417	1.015.306	600.777	637.448

Source: TBYSD. Turkish Vegetable Oil ManufacturersAssociation. (access:http://www.bysd.org.tr/; access date: 02.06.2018), 2018.

As it is shown in Table 7, it is found out that the import of sunflower oil is approximately 1 billion USD in 2016 and the export is 640 million USD. Turkey has spent circa 3,3 billion USD to sunflower oil import between 2014-2016 years. In the same period, Turkey has generated approximately 2,1 billion USD income (Table 7). In 2016, the total vegetable oil export of Turkey is 943 million USD and the share of sunflower is 67,60% (TBYSD, 2018).

4.6. The Status of Turkey's Self-Sufficiency in Oil Seeds

In a study conducted by TSI, the status of self-sufficiency has been estimated for significant oil seeds in Turkey. The status of self-sufficiency is as 101,00% in cottonseed, as 64% in sunflower and as 7,10% in soya calculated in the study using 2016 data (Table 8).

Table 8: Turkey's Oilseed Plants Balance (2016)

Criteria	Sunflower
Production (Tons)	1 670 716
Area sown (Hectare)	720 108
Harvest losses (Tons)	13 366
Supply=Use (Tons)	4 521 357
Supply	
Usable production (Tons)	1 657 350
Import (Tons)	2 864 007
EU 28 (Tons)	181 979
Use	
Domestic use (Tons)	2 588 937
Human consumption (Tons)	2 526 357
Seed use (Tons)	10 802
Animal feed (Tons)	-
Industrial use (Tons)	-
Losses (Tons)	51 779
Export (Tons)	1 974 923
EU 28 (Tons)	21 015
Changes in stocks (Tons)	- 42 503
Human consumption per capita (Kg)	31,7
Degree of self-sufficiency (%)	**64,0**

Source: TÜİK, 2018. Balance Sheet of Vegetable Product; "Cereals ve Other Vegetable Products", 2016-2017. (https://biruni.tuik.gov.tr/medas/?kn=104&locale=tr, access date: 30.05.2018)

4.7. Research Area

Tekirdağ Province which is embraced as a research area is located in Thrace Region of Turkey and it holds the position of most grown sunflower for oil in the country. Processing facilities in the province supply with especially the country's raw and refined sunflower oil.

233 surveys are made according to sampling method determined in the research area. The age average of panel producers is 51,60; period of the study is 3,31; average number of person residing in the same house is 4,15 and 2,18 of 4,15 attend the productive acticity of the

enterprises. The owners of enterprises have worked 81,34 days in vegetable production and 27,42 days in sunflower production in a year. The ownership status and land size of enterprises participating the survey are given in Table 9.

Table 9: Land size and Ownership Status in Research Area

Features	Area/Number
Self Property Land Size (ha)	3.224,3
Number of Enterprises (number)	230
Rental (da)	2.258,2
Number of Facilities. (number)	126
Sharecropper (da)	483,1
Number of Facilities. (number)	44
Total Land Size. (da)	5.965,6
Number of Facilities (number)	233

When Table 9 is analysed, it is drawn attention that the rate of enterprises' self property in the total land size is much higher (54,05). The partiteness status of the producing sunflower oil enterprises is given Table 10.

Table 10: The Partiteness Status of Enterprises in Research Area

Features	Number
The number of Self Porperty Land Part	1.948
Number of Enterprises.	230
Sharecropper	8,47
The Number of Rented Land Part	1.062
Number of Enterprises	126
Sharecropper	8,43
The Number of Common Land Part	286
Number of Enterprises	44
Sharecropper	6,50
Total Part Number	3.296
Number of Enterprises	400
Sharecropper	8,24

It is confirmed that average parcel number per an enterprise is 8,47 in self-property facilities and is 8,43 in rented lands and is 6,50 in the facilities handling by sharecroppers. The average parcel number is 8,24 for 400 enterprises when they are evaluated separately as self-property, rental and sharecropper. The average parcel number is 5,63 and average parcel

size is 18,53 per an enterprises used for sunflower production for oil. As it is known, increase in the parcel numbers in agricultural enterprises means escalation of the agricultural product costs.

4.7.1. Crop Production Pattern

The products undertaken within the scope of vegetable production pattern in research area are given in Table 11. Wheat takes the most significant share with 52,66 % from the production pattern in the total land size. The sunflower for oil cultivation area in the enterprises is the second place with 40,94%.

Table 11: Vegetable Production Pattern in Enterprises (da)

Product Name	Production Area (ha)	Share (%)
Wheat	3.126,4	52,66
Sunflower	2.430,6	40,94
Barley	64,2	1,08
Corn (Dane)	26,8	0,45
Corn (Silage)	13,7	0,23
Fruits	11,3	0,19
Clover	10,4	0,17
Vicia Sativa	7,8	0,13
Oat	6,6	0,11
Paddy	4,7	0,08
Vegetables	2,2	0,04
Vineyard	1,9	0,03
Other	230,9	3,89
Total	5.937,4	100,00

The value of vegetable products yielded in analysed enterprises are given in Table 12. While wheat takes the first place with the share of 61 %, sunflower takes the second place with the share of 30,47%.

Table 12: The Value of Vegetable Production Gross Output in Enterprises (USD)

Products	Production Value (USD)	Share (%)
Wheat	1.033.545,21	60,57
Sunflower	520.045,45	30,47

Fruits	23.176,62	1,36
Barley	19.355,75	1,13
Corn (Dane)	15.204,81	0,89
Corn (Silage)	7.012,27	0,41
Paddy	6.756,36	0,40
Clover	2.835,88	0,17
Oat	1.730,90	0,10
Vegetables	1.194,97	0,07
Vicia Sativa	1.148,99	0,07
Grape	922,15	0,05
Other	73.554,14	4,31
Total	1.706.483,51	100,00

In 2009, Turkey did not move into Basin-based Support System. Diesel Fuel and fertilizer backing are placed near the top in the supporting factors. In this study, it is observed that the rate of utilisation from the support of diesel fuel and fertilizer in the sunflower producing enterprises is above 90 %, whereas this rate remaines under 30 % in the crop insurance.

Table 13: The Status of Enterprises benefiting from Agricultural Supports

Supporting Factors	The Number of Enterprises	Ratio to Total Number of Enterprises (%)
Diesel Fuel	213	91,41
Fertilizer	213	91,41
Crop Insurance	66	28,33

It is ascertained that almost whole production of the sunflower production for oil (99,37) has been produced under dry conditions. Producers explains the main reason for this situation as “receiving adequate rain in the period of sunflower for oil production”. In the study, the year in which cross section data (2009) is compared with the production data from the previous year (2008) (Table 14).

Table 14: The Comparison of Sunflower Cultivation Area between 2008 and 2009 in Research Field

Year/Difference	Cultivation Area (ha)	Output (tons)	Yield (ton/ha)
2009	2.430,6	4.155,79	170,98

2008	2.385,7	4.345,18	182,13
Difference	44,9	-189,39	-11,15
Difference (%)	1,88	-4,36	-6,12

In the study, it is clear that there is 1,88% increase in the sunflower for oil cultivation area of 2019 as to 2008. There is also 4,36% decrease in the output. In other words, there is 6,12% decrease in yield of 2009 in respect to 2008.

4.7.2. The Cost of Sunflower in the Research Field and Province

The cost of sunflower for oil are shown in Table 15. 4.155,790 tons sunflower are produced in the total 24.305,50 da field at inspected enterprises. Cost factors constituting the production are presented in detail as follows:

Table 15: The Production Cost of Sunflower for Oil in Tekirdağ Province (USD/ha)

A.Incomes	**Criteria**	**Values**
1.Yield	tonnes/ha	1,71
2.Product price (product price 500 USD/tonnes+ premium support 140 USD/ton)	USD/tonnes	640
3. Value og Gross Output	USD/ha	1.094,4
B.Total Costs		
B.1 Total Variable Costs	USD/ha	**658,1**
Deep Ploughing	USD/ha	76,6
Doubling	USD/ha	46,3
Harrowing	USD/ha	34,2
Planting+ Fertilizing	USD/ha	62,3
Disinfestation	USD/ha	26,4
Hoeing (by machine+by hand)	USD/ha	66,6
Harvesting	USD/ha	68,3
Transport (Warehouse+Bazaar)	USD/ha	70,1
Seed	USD/ha	68,3
Fertilizer 20.20.0 Compound Fertilizer	USD/ha	122,3
Drug	USD/ha	16,6
B2.Total Fixed Costs	USD/ha	**402,4**
Ground Rent	USD/ha	278,9
Various Expenses	USD/ha	32,9
Loan Interest	USD/ha	67,9
Management Cost	USD/ha	22,8
Total Production Costs	USD/ha	**1060,5**
Gross Profit (Gross Production Value-Total Variable Costs)	USD/ha	436,2

Net Profit (Gross Production Value -Total Production Costs)	USD/ha	33,8
Cost (ha)	USD/ha	1060,5
Cost (ton)	USD/ton	620
Relative Profit		1,03

In general, while average gross profit at sunflower for oil in the enterprises analysed within the research field is 436,2 USD/ha, net profit is 338 USD. Cost per unit area as 1.060,5 USD/ha and cost per ton as 620 USD are calculated. In the calculation, 140 USD deficiency payment given for sunflower price per ton is added. The application of deficiency payment has provided 239,4 USD at producer's income per decare in the analysed enterprises. In other words, the share of deficiency payment at the producer's income of sunflower for oil has become 21,88.

4.7.3. The Cost of Sunflower Production for Oil in the Research Field

Tekirdağ Province takes first place on the sunflower production in Turkey. The information concerning cost of sunflower for oil produced under the dry conditions in 2017 is presented in Table 16. Yield per unit area as 2,30 tons/ha, circulating capital interest as 5% and general management cost as 3% are taken for the preparation of cost sheet.

Table 16: Sunflower Cost in Tekirdağ Province in Dry Conditions in 2017 (ha)

Cultural Operations	Using Inputs				Labour and Machine Power Price (USD/ha)	Total Costs (USD/ha)
	Type	Amount	Unit Price (USD)	Sum (USD)		
Deep Ploughing (subsoiler or plow)	Diesel Fuel (lt)	35,00	1,01	35,20	57,60	92,80
Doubling (Sweep)	Diesel Fuel (lt)	15,00	1,18	17,70	35,40	53,10
Triplication	Diesel Fuel (lt)	10,00	1,20	12,00	19,80	31,80
Harrow	Diesel Fuel (lt)	5,00	1,20	6,00	9,90	15,90
Planting	Diesel Fuel (lt)	10,00	1,20	12,00	19,80	31,80
	Seed (kg)	4,00	17,24	69,00	39,80	108,80
Digging/Hoeing					39,80	39,80
Fertilizing	Diesel Fuel (lt)	5,00	1,20	6,00		6,00
	Fertilizer (kg)	300,00	0,27	79,60	13,30	92,80

Agricultural Contention and Labouring	Drug (kg)	1,500	21,20	31,80	13,30	45,10
Hasat						53,10
Taşıma						20,30
Total Variable Costs						**591,40**
Circulating Capital Interest (1)						29,60
General Management Costs (2)						17,70
Ground Rent						318,30
Total Fixed Costs						**365,60**
Total Production Costs						**957,00**
Sunflower Yield (ton/ha)						2,30
Sunflower Price (product price 490USD/ton+gradient support 110 USD/ton)						600,00
Gross Output Value (USD/ha)						**1.372,70**
Gross Profit (USD/ha)						781,30
Net Profit (USD/ha)						415,70
1 kg product cost (USD)						420,00
Rrlative Profit (3)						1,43

Source: MAF, 2017. Data of Tekirdağ Agriculture and Forestry Directorate.
(1): Half of Interest Rate for Vegetable Porduction Working Capital Loan by Ziraat Bank)5%)
(2) :3% of Total Costs is taken into consideration.
(3): The Value og Gross Output / Total Production Costs

When the table of sunflower cost is examined, it is understood that prices of seed and fertilizer within soil preparation in the cost factors of sunflower for oil play a crucial role in Tekirdağ province. Within the period of 10 years in Tekirdağ, average value of gross profit in sunflower for oil is 781,3 USD/da and net profit is 415,7 USD. The cost per unit price as 957 USD/ha and the cost per ton as 420 USD are calculated. The deficiency payment as 110 USD given per ton to the price of sunflower for oil is also added to the calculation. The application of deficiency payment has increased the producer's income as 253 USD per decare. In other words, the share of deficiency payment at the producer's sunflower for oil income is 18,33%.

4.8. Price Formation in Sunflower for Oil

While Trakya Birlik which is one of the agricultural sales cooperatives purchasing sunflower seed in Turkey has received 299.726 tons for 2016/17; Karadeniz Birlik has

received 32.259 tons for the same period. These numbers correspond to 22,15 % of the sunflower output for oil in Turkey.

The pre-purchase price of sunflower in 2017/2018 business year by the Governing Board of Trakya Birlik is determined as 483,61 USD/ton for a sunflower product which has 44% oil rate in the sector. Within the framework of oil premium to be calculated, the price is 524,67 USD/ton for sunflower product with 50% oil rate. This price is 456,23 USD/ton for sunflower product with 40 % standard oil rate.

In purchasing carried out according to raw oil rate, the products having 41% and above oil rate are considered as high-oil products. 1,5% premium is applied to product price of 40 % standard oil for each percentage point increase (Trakyabirlik, 2018). In this study, the average sunflower for oil price has been taken as 490 USD/ton and the deficiency payment unit price has been taken as 110 USD/ton in the period of September 2017 in Tekirdağ Commodity Exchange (TOBB, 2018).

4.9. The Subsidies for the Product of Sunflower for Oil in Turkey (T)

The subsidies given for the sunflower production in Turkey are given in Table 17. Deficieny payment is the most important support among the subsidies. In Tekirdağ province, deficieny payment per unit area (2,30 ton/ha *110 USD) is 253 USD/da considering that the average sunflower for oil yield is 2,30 tons in a year.

Table 17: Subsidies About Sunflower Production in Turkey (2017)

Type of Subsidy	Unit	Unit Price (USD)
Diesel Fuel	(USD/ha)	45,10
Fertilizer	(USD/ha)	10,60
Premium Supoort	(USD/ton)	110,00
Soil Anaysis	(USD/ha)	2,10

Source: MAF, 2018. Agricultural supports. (www.tarim.gov.tr)

The total given diesel fuel, fertilizer and soil analysis subsidies for sunflower production per hectare in 2017 has reached the level of 57,80 USD in Tekirdağ province when the other supporting factors are taken into consideration.

4.10. Deficiency Payment Unit Prices in Sunflower for Oil

Deficiency payment unit prices implemented by Ministry of Agriculture and Forestry throughout the country are given in Table 18. When the table is analysed, it has been seen that the highest increase of deficient payment unit price in the period of 2008-2017 is occurred in cotton unseed; the lowest increase has been seen in corn.

Table 18: Deficiency Payment Subsidy Unit Prices in some crops in Turkey (USD/ton)

Products	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	Variance (2017/2008)
Cotton Unseed	177,6	281,9	272,7	222,2	258,4	234,7	236,1	222,6	213,1	212,2	19,46
Sunflower (For Oil)	124,3	140,9	149,4	121,7	134,8	112,7	128,8	102,7	113,6	106,1	-14,67
Soya	136,2	184,6	227,3	264,6	280,9	234,7	214,6	171,2	170,5	159,2	16,86
Canola	136,2	154,4	178,6	211,6	224,7	187,8	171,7	137,0	142,0	132,6	-2,61
Safflower	136,2	167,8	194,8	211,6	224,7	211,3	193,1	154,1	156,3	145,9	7,13
Corn	237,0	268,0	260,0	212,0	225,0	188,0	172,0	137,0	57,0	80,0	-66,4

Source: Ofifcial Gazette, (2007-2017). Decision based on Agricultural Supports in 2017. (18 August 2018 date ve 30158 numbered, Decision Number of Cabinet: The other official gazettes published in 2017/10465 and 2007-2016).

TOB,2018.Agricultural Supports (https://www.tarim.gov.tr/Haber/1213/2017-Yilinda-Yapilacak-Tarimsal-Destekler-Belirlendi, access 29.05.2018)

Turkey which was a corn-importing country at the beginning of 2000s has become an self-sufficient counrty in this product with its support policies. Therefore, the deficiency payment for corn has demonstrated a decrease over the years. The deficiency payment unit price for sunflower has descreased 14,67% in 2017 pursuant to 2008.

4.11. Reflection of Sunflower for Oil Subsidies to Product Cost and Income of Producer

In the production of sunflower for oil in 2017, gross output of the product in reply to 2,30 ton/ha yield is 1.127 USD/ha in Tekirdağ. When the other subsidies has affiliated with this value (253 USD deficiency payment +10,6 USD fertilizer backing+ 45,1 diesel fuel subsidy+ 2,1 USD soil analysis support), the income level can reach 1.437,8 USD/ha. In other words, there is 310,8 USD increase on the income obtained from sunflower for oil unit area

within these subsidies. 21,62% increase is provided on the income from unit area with the application of agricultural supports. 18,33% increase is observed on the income of sunflower for oil with merely the application of deficiany payment.

Although there is a 21,28% increase in the level of income from unit area with the application of deficieny payment for the sunflower for oil producers in 2009, the total increase of the deficieny payment and the other subsidides into the producers‘ income is 22% level. This situation reveals that while the share of deficiency payment application on the producer income in the sunflower for oil production are gradually decreasing, the other supports are unsatisfactory for the producers.

5. Conclusion and Recommendations

Sunflower oil ranks the first place with the share of 50% among vegetable oil sources in Turkey. This condition privileges the production of sunflower for oil and its support. Turkey is far from vegetable oil supply and demand. This circumstance appears clearly in the sunflower oil. The ratio of meeting the sunflower supply and demand is approximately 65% in Turkey. 500.000-550.000 tons of 900.000 tons which are consumed in the country are met from the country's production. The oil deficit is compensated with the import of sunflower seed for oil and sunflower oil. Therefore, meeting the need of oil seeds of Turkey as domestically is extremely important. The product increase policies become necessary for the oil seeds which are critical importing elements. The policies to be applied require capable to compete with the standards of the world conditions, coherent and permanent.

According to results of this study, there are significant developments on the yield from unit area within the period of 2009-2017 in Tekirdağ which is the leading production center of sunflower for oil of Turkey and this condition has been effective on the decrease of product cost. While the average sunflower for oil yield in the research area is 1,71 tons/ha in 2009; this value has raised the level of 2,30 tons/ha in 2017. Production under watery conditions and using other products with high oil rate has been influential on this increase. As a natural result of these developments, the product cost was 1.060,5 USD/ha, cost per ton was 620 USD, Gross profit per unit area was 436,2 USD/ha in 2009. This values is calculated as 957 USD/ha for product cost, as 420 USD for cost per ton and as 781,30 USD/ha gross profit per unit area in 2017. In other words, the increase on the yield has affected positively gross profit value of the product. An another factor positively influencing gross profit value of the product is the

application of deficiency payment in the sunflower for oil. This implementation has caused 21,88% increase on gross output value of sunflower for oil in 2009. 18,33% increase has been observed via this implementation in 2017. The application of deficiency payment which directly enhances the value of sunflower for oil gross output has decreased at the level of 14% in 2017 with regard to 2009. This situation leads to wend sunflower producers' way into the production of other crops.

The deficiency payment given sunflower production should be higher especially the other regions except Thrace region in order to increase the sunflower production throughout the country; unit prices of supporting premium should be determined by taking factors of yield and parity into consideration in favour of oil seeds; operations should be done (for instance Aegean Region) in the other regions for the sunflower production as a second product; it should be given particular importance to sunflower production in one of our important basins called Southeast Anatolia Region (GAP); it should be concentrated on the breeding and dissemination of the varieties which have high oil rate and higher reactivity to water and fertilizer; the production of oleic sunflower which have many positive features should be encouraged. The implementations to promote the sunflower production especially under watery conditions should be given primacy.

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