

Full Length Research Paper

The effects of agricultural subsidies applied in Turkey on sunflower cultivation area and the producers' income

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Accepted 14 January, 2013

Sunflower takes an important place in terms of raw materials provided for the oil industry and of added value, as well as bring-in income for producers in Turkey's economy. Sunflower is an important source of income by standing the main product in alternation of the wheat in the sense of manufacturers in Thrace Region which constitutes the European part of Turkey. In this study, the effect of premium support application on sunflower cultivation area and production amount in Thrace where approximately 65% of sunflower production in Turkey is met and also the effect of support payments on producer income are investigated. In this study, it is concluded that premium supports are inefficient in increasing sunflower cultivation area and production whereas it is concluded that it has an important role on producer income and on the determination of the market price. In fact, from a survey that was carried out, it emerges that the area-based support (diesel oil, fertilizer etc. support) together with premium support increase the revenue of sunflower up to 27.74% per area unit and the gross profit in proportion to 98.87%. This study indicates that in order to increase the sunflower production in Turkey the amounts of sunflower premium support, diesel oil and fertilizer should be rearranged in compliance with current market conditions. Moreover, as well as for other agricultural products, the use of certified seed should also be included into agricultural support programmes, production on well irrigated areas should be widened and the use of oil crops varieties with high oil ratio should be extended.

Key words: Oil crops, sunflower, agricultural subsidy, agricultural income, gross profit.

INTRODUCTION

Alike food sector, agriculture sector has a significant role in national economics because of its contribution to employment and income, its role in meeting the needs of industrial raw materials and its direct or indirect benefits on exports. According to 2009 data, in Turkey the agricultural sector account for 51 billion US\$ of gross domestic product and sunflower is one of the leading

agricultural products for manufacturers and oil industry especially in Thrace, at the European side of the Turkey (MARA, 2011a, b). Turkey which accounts for 2.46% of sunflower world cultivated area and 3.26% of production is among the top ten countries for production of sunflower according to production data from the year 2009 (Anonymous, 2011a).

Sunflower which accounts for 3.60% of field crops cultivated areas in Turkey, also meets approximately 55% of vegetable oil production (TURKSTAT, 2011; Ozcelik and Fidan, 2003). Besides, 4.99% of 2,328,731 farmers in the country are working on sunflower production (MARA, 2011a). Despite the high agricultural production potential, the self-sufficiency rate of sunflower in our country is only 46.60% (Anonymous, 2011b). In 2008, 3 billion US\$ of vegetable oil and oil seeds was imported in order to meet the current deficit (Anonymous, 2009).

Because of the low elasticity of demand, exposure to climate conditions, intense economic instability (price and income) of agricultural sector, government interventions are carried on cultivation areas and the sector is diversely supported across the globe (Gunaydin, 2006). Turkey is one of the countries supporting the agricultural sector in line with the various agricultural policies implemented in accordance with the developments in the world (Zemheri, 2010). Use of certified seeds, premium support system, diesel oil and fertilizer compose are the main factors of agricultural subsidy studies in Turkey especially since the early 2000's in order to ensure an increase in the production of products which are in short supply. However, it is not exactly known the extent these practises reflect to manufacturer agricultural income and how the agricultural production is affected.

By the study carried out in Thrace where approximately 65% of sunflower for oil industry is produced in Turkey, the effects of premium supports on sunflower cultivation areas and amount of production with the aim of increasing oleaginous seeds production was investigated. In addition to this, in this study, it is also put forth the contribution of support payments to manufacturer prosperity for increasing sunflower production. In some studies conducted in various countries, support of agricultural production and the effects of these supports on agricultural production, farmer's welfare and the trade of agricultural products were analyzed (Hennessy, 1998; Mayrand et al., 2003; Anderson et al., 2006; Keeny, 2009). Some studies reside in Turkey related to agricultural support effects on sunflower production, reflection to producer income and foreign trade regime (Gaytancioglu, 1999; Koc, 2005; İlkdogan, 2008).

According to a study based on a 'Theoretical Microeconomic Model' whose data were obtained from 1,000 agricultural enterprises in Norway, it is concluded that agricultural subsidies have significantly positive effects on input use and the level of output (Henningsen et al., 2009). As a result of research conducted in Czech Republic, despite the country's agriculture having a competitive market, in comparison to some of European countries it emerges that agricultural subsidies have low share in producer income. In this study, it is determined that the lower percentages of support level weaken the competitiveness of agricultural area, and the regeneration and modernization of agriculture. As a result, it is concluded that the subsidies which are applied according to type of

production might affect the production diversity (Střeleček et al., 2009). A Premium support system is an alternative support model that can be applied by assuring stability in the sense of prices and the producer in agriculture of Turkey, depending on the research work of Sahinoz et al. (2007). In a study published by the Vegetable Oils and Fats Industrialists Association, sunflower production is supposed to be decreasing at an average annual rate of 6% in the period 2010 to 2013 whether premium supports which is being paid to oil seed producers in Turkey will not be paid (Koc, 2005). In another study which investigates the effects of premium support systems in terms of agricultural subsidies in Turkey, it is deduced that the subsidy got by farmers has significant effects on increasing the sunflower cultivated area and premium supports paid for sunflower are efficient in protecting the producers against to market prices (Erdal and Erdal, 2008).

Recently, agricultural production support policies applied in Turkey have actually changed a lot are deeply changing. A new model of agricultural production and support model (Turkey Agricultural Basin Production and Support Model) has just begun to be implemented in Turkey. The aims of the new model are; determination of the agricultural basins, preparation of a clear agricultural inventory, provision of opportunities for production planning, and making projections of demand for the future (Sahin et al., 2010).

The amount of resources allocated to support agricultural production varies depending on the development levels of countries. Direct payments are the largest item with 74% of agriculture subsidies (approximately €55 billion) in the European Union's budget in 2008. Direct payments are allocated with a share of 99% to agricultural markets, 0.5% to fisheries sector and 0.5% to plant and animal health. The second largest item which has a 23.5% share with €12.9 billion is rural development. The amount of direct subsidies that USA farmers have received in the years from 1996 and 2001 is 70 billion US\$. In the period from 2002 to 2008, the farmers are estimated to have benefited from direct state assistance of 100 billion US\$ and 80 billion US\$ is planned to be distributed before 2012 (Acar and Bulut, 2009). The amount of resources allocated to agricultural subsidies in 2010 in Turkey is given in the Table 1. Premium support payments in Turkey in 2010 account for 36.95% of agricultural support payments and 24.57% of total agricultural subsidies. The share of total agricultural support payments stood at 0.82% of Gross Domestic Product. The support payments for development of oil seed production in 2008 in Turkey are given based on the products in Table 2. In terms of premium supports the price sunflower seed is ranked second in oil seed support payments in Turkey.

MATERIALS AND METHODS

The primary data used in this study were obtained by question-

Table 1. Funds Allocated to Agricultural Support in Turkey (2010).

Criteria	US\$
Premium supports	1.340.745.000
Agricultural support payments	3.627.382.000
Implementation of low interest rate credit	487.536.000
Total agricultural support payments	5.455.663.000
Total gross domestic product	665.891.300.000

Kaynak: MARA, General Directorate of Agricultural Production and Improvement, 2009.

Table 2. Premium support payments on oil seed plants and olive.

Products	Number of enterprises	Production area (ha)	Amount due to supports (ton)	Sum of supports (US\$)	Product rate in sum of support (%)
Safflower	292	1.399	1.733	248.552	0.04
Corn for grain	65.929	383.650	3.557.650	46.460.339	8.18
Canola	1.610	6.868	16.704	2.403.263	0.42
Cotton Unseed	69.208	441.581	1.905.437	422.260.035	74.35
Soybean	950	5.199	16.180	2.647.695	0.47
Sunflower	89.984	420.505	705.216	92.108.143	16.22
Olive	5.126	27.610	13.845	1.810.883	0.32
Total	227.973	1.286.812	6.216.765	567.938.910	100.00

Resource: MARA, General Directorate of Agricultural Production and Improvement, 2009

naires from specified 571 agricultural enterprises in 53 locations on the European side of provinces of Edirne, Kırklareli, Tekirdağ, İstanbul and Çanakkale with Stratified Random Sampling Method in production period of 2009. In determination of stratified random sampling method, two different techniques are commonly applied by agricultural economic studies. These are: Neyman Method and Proportional Distribution Method (Erkan and Cicek, 1996). Because of the incompliance of sunflower cultivation areas in locations and enterprises to normal distribution, Neyman Method is used in this research. The equality of Neyman Method is given below (Yamane, 1967).

$$n = \frac{\sum (N_h S_h)^2}{N^2 D^2 + \sum N_h (S_h)^2}$$

In the formula; n = sample size, N_h = number of units in layer h (frequency of farm size); S_h = standard deviation of layer h; N = total number of units; $D = d/z$; d = a certain percentage of deviation from average (1%-5%-10%), and z = degrees of freedom in t-distribution scale (N-1) and expresses "t value" belongs to a certain confidence limit (90%-95%-99%).

Within the scope of the research, the effects of premium supports applied in Turkey on the cultivation areas and production amount of sunflower for the next production period were investigated. To that end, taking account of two periods as premium supported and unsupported, the relationship between cultivation areas and production amount was investigated with "correlation analysis" by using SPSS programme (Green et al., 2000). With this purpose, sunflower production periods in Turkey were divided into two parts; unsupported (1988 to 1998) and premium supported (1999 to 2008). The dummy variable is taken to be "0" in 1988 to 1998 period and taken to be "1" in 1999 to 2008 period.

In the determination of effects of supports on producer welfare applied for sunflower production; Trakya Birlik's purchase price is taken as product price and the support unit price applied in 2009 by the Ministry of Agriculture and Rural Affairs is taken as the support unit prices. However, in the study, besides the purchase price of sunflower and premium support price, also the unit price variations of diesel fuel, fertilizer (20-20-0 compound fertilizer), seed and agricultural pesticides were researched between the years 1999 to 2010.

RESULTS AND DISCUSSION

Relationship between premium support, cultivated area and production amount of sunflower

In this study, in the period from 1988 to 2010, it is investigated whether there is a relationship between non-supported period of oil sunflower (1988 to 1998) and supported period (1999 to 2010) on sunflower cultivation area and the amount of production. For this purpose, the dummy variable for the unsupported period (1988 to 1998) is taken to be "0" and for the supported period (1999 to 2010) is taken to be "1".

The correlation between dummy variable related to support and sunflower production areas is found to be significant, and the correlation between the dummy variable related to support and the amount of sunflower production is found to be statistically insignificant in this study (Table 3). This situation can be explained with the

Table 3. The relationship between premium support periods and nonsupported periods with cultivation areas and production amount of sunflower in Turkey.

Variable	Criteria	Dummy variable
Sunflower production area (ha)	Correlation	-0.535(*)
	Significance level	0.008(*)
	Observation numbers	23
Sunflower production quantity (ton)	Correlation	0.092
	Significance level	0.677(**)
	Observation numbers	23

*P < 0.01; **Non-significant.

Table 4. Price variation occurred in the factors that determine product cost, in premium support, and price of sunflower.

Years	Fuel (US\$/lt)	Fertilizer (US\$/kg)	Pesticide (US\$/lt)	Seed (US\$/kg)	Sunflower (US\$/kg)	Premium support (US\$/kg)
1999	0.369	0.170	2.948	5.528	0.268	0.029
2000	0.622	0.333	4.000	6.370	0.293	0.048
2001	0.415	0.311	3.111	3.457	0.278	0.022
2002	0.664	0.155	4.019	5.480	0.326	0.046
2003	0.998	0.203	4.706	10.338	0.426	0.080
2004	1.149	0.265	5.191	11.864	0.478	0.096
2005	1.445	0.277	4.817	12.597	0.504	0.130
2006	1.563	0.281	3.874	13.029	0.511	0.141
2007	1.948	0.421	5.127	18.799	0.876	0.171
2008	1.863	0.727	4.624	16.515	0.673	0.125
2009	1.639	0.348	4.684	18.066	0.642	0.141
2010	1.922	0.399	5.178	19.417	0.777	0.149

Resource: MARA, Costs of agricultural products in Trakya Region 1999-2010. Kirklareli Ataturk Soil and Water Resources Research Institute. Kirklareli.

decline at the ratio of 10.88% on average of sunflower cultivation areas to 559.456 ha before supported period (1988 to 1998) in comparison with the supported period (1999 to 2010). In other words, the premium support applied for oil sunflower since 1999 is inadequate in preventing the reduction of the cultivation areas which began before the support period. This circumstance also shows that the amount of support given to agricultural production is not in a level sufficient to promote the production. Therefore, the enhancement of sunflower plantations can be possible by providing continuous support and satisfactory reorganization to current conditions. As an example, in early 2000s the support policy applied to corn has successfully resulted in making Turkey self-sufficient over a period of 3 to 5 years whereas before 2000 it was foreign-dependent for corn production.

As a part of the research, attitude and the level of expectations of manufacturers to "Premium Support" are also analysed. 97.25% of manufacturers in the survey

(536 Businesses) expressed their opinion that Premium Support applied by Agricultural and Rural Affairs should be continued. The expectation of 69.52% of companies (390 enterprises) for Premium Support unit prices of oil sunflower as a product of the year 2010 was 20.17 cent/kg. However, the expounded Premium Support unit price was 30% lower than the expected value of producers, that is to say 14.12 cent/kg. This shows that the value of stated unit price is far from the manufacturer expectations. In a study carried out on the subject, excepting premium support, diesel fuel and fertilizer support paid in Turkey within the scope of agricultural support is concluded to be insufficient (Ozcelik and Ozer, 2007).

The variation occurred between 1999 to 2010 on the prices of sunflower production input and the premium support which has been granted since 1999 in Turkey is given in Table 4. When the data is analysed, it is conspicuous that especially the price of diesel fuel input has increased 5.2 times in the period 1999 to 2010, while

Table 5. Effects of sunflower support payments to producer welfare on enterprices in field of survey (2009).

Sunflower's income (excluding subsidizing payments)	
Number of enterprises (survey)	571
Sunflower production area (ha)	5.349.75
Production (ton)	9.487.08
Yield (ton/ha)	1.773
Price (US\$/ton)	504.27
Gross production value (US\$/ha)	894.24
Variable expenses (US\$/ha)	575.54
Gross profit (US\$/ha)	318.70
Sunflower's income (including subsidizing payments)	
Fertilizer support (US\$/ha)	36.98
Fuel support (US\$/ha)	36.98
Premium support(US\$/ton)	140.00
Price (sales price+Premium support price) (US\$/ton)	644.27
Gross production value (US\$/ha)	1.142.29
Total supports (US\$/ha)	322.18
Variable expenses(US\$/ha)	575.54
Gross profit (US\$/ha)	640.71
Share of subsidies in Gross Profit (%)	50.28

the price increase for the same period was recognized to be 3.5 times for seed, 2.3 times for fertilizer and 1.8 times for pesticides. Despite the 5.1 times increase on unit price of premium support in 2010 in comparison with 1999, the increase in purchasing price of the sunflower seed remained at the level of 2.9 times. Because of the diesel fuel and the product prices lower than the seeds which take important part of the costs, fluctuations are observed on sunflower cultivations areas. In the other studies carried in the region, in accordance with the evidences identified in the study, it is concluded that the purchase price of sunflower has significantly decreased in real terms in response to real increase especially in the price of diesel fuel (Aksoy and Gaytancioglu, 1996; Semerci and Kaya, 2010).

Effects of applied agricultural supports to producer welfare in sunflower production

Sunflower in Thrace is ranked as the second in the production pattern of agricultural enterprises with a ratio of 42.74% after the wheat. The contribution of sunflower to enterprises total agricultural income is calculated to be approximately 30%. These data clearly reveal the importance of sunflower for the producers in the field of research (Sahin et al., 2010). In this context, as well as the contribution of premium support and other support applications to welfare of sunflower producers, product cost reduction effect is also important.

The variations generated by support applications on Gross Production Values and Gross Profit of enterprises are examined by calculating the sunflower income both in per supported and unsupported unit area (ha) with the help of data acquired from 571 agricultural enterprises in scope of the research. In the study, the average sunflower yield of enterprises was calculated as 1.773 tons/ha. In case that the support is disregarded, the average GPV of sunflower is calculated to be 894.24 US\$/ha, variable costs calculated to be 575.54 US\$/ha and Gross Production Value is calculated to be 318.70 US\$/ha (Table 5).

Conclusion

Among the farms of the survey, Gross Production Value of sunflower reaches on average the level of 1,142.29 US\$ per hectare with an increase of 27.74% on the unsupported level in consideration of the average yield (1.773 ton/ha) and of the payments of oil seed supports. In conjunction with the support payments, sunflower Gross Profit reaches up to the level of 640.71 US\$/ha with a growth of 98.87%. The share of subsidies in "Gross Production Value of New Sunflower" of which was calculated in consideration of supports is 50.28%. This rate clearly reveals the contribution and importance of support payments on Gross Profit and even in Gross Production Value of sunflower. Other studies in this issue reveal that although support payments (premium supports

and field-based supports) are directly not efficient on increasing sunflower production, they play an important role on the formation of healthier sunflower purchase prices and on farmer's income. It also reveals that abolition of support payments will result in an absolute decrease on sunflower production (Erdal and Erdal, 2008; Koc, 2005).

Today, agriculture is a sector that should be supported because of its nature especially in developing countries. Turkey is one of the countries that have special emphasis on support of agricultural production. Agricultural support systems which are carried out in Turkey are in accordance with international rules. However, over time, due to the insufficiency of agricultural support policies, innovations of systems and fundamental changes have become inevitable. In the light of developments in recent years, a new agricultural production support system "Turkey Agricultural Basin Production and Support Model" was adopted since 2011 in Turkey. The basic expectations from the new system implemented are to provide an increase in producer income and availability to meet shortage of products supply (oil seeds etc.) with domestic production by supporting them in higher levels as well as an increase in agricultural production and productivity.

Agricultural subsidies for producers in Turkey comprise approximately 6% of total agricultural production value and 0.82% of Gross Domestic Product. In this case, as of now, the usage of support tools and field based supports and also the compliance with the rule of "de minimis" constitute a hindrance for the country. However, both the study findings and the evidences of previous researches demonstrate that premium supports and supports unit prices of diesel fuel and fertilizer are insufficient to increase sunflower production and they thereby reveal that unit support prices should definitely be increased.

This study carried out proves that the premium support applied in Turkey has no effect on increasing the cultivation areas of sunflower. It only shows that the supports of diesel fuel and fertilizers have significant increasing effects on producer income and decreasing costs for sunflower with premium supports. In consequence of the study, dissemination of production in watery conditions, encouragement usage of varieties with high oil content, usage of appropriate fertilizer according to results of soil tests, and the seed use should be proposed to be incorporated to agricultural subsidy system for sunflower production like in other products.

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