The Journal of Animal & Plant Sciences, 26(5): 2016, Page: 1411-1417
ISSN: 1018-7081

ANALYSIS OF FACTORS RELATED TO FARMERS' BENEFITING FROM SAFFLOWER *(Carthamus Tinctorius L.,)* PRODUCTION SUPPORT: THE CASE OF CENTRAL ANATOLIA IN TURKEY

H. Yilmaz[1*], M. B. Comak[1] and F. Turgut[1]

[1]Department of Agricultural Economics, Faculty of Agriculture, Süleyman Demirel University, Isparta, Turkey.
[*]Corresponding Author e-mail: hasanyilmaz@sdu.edu.tr

ABSTRACT

Despite the efforts of the government to increase oil seed production, Turkey continues to be import-dependent due to a net deficit in oilseeds and products. For this reason, The Turkish government began supporting oilseeds production in 2001 and continues to support oilseed production with production premium programs. The government of Turkey pays a premium per kilogram of oilseeds to producers. This study aims to analyze the factors related to farmers' benefiting from oilseeds production support of safflower growers in the Central Anatolia region of Turkey. Data were collected by a questionnaire administered to 83 safflower growers selected by simple random sampling method. Chi-square test was used to analyze the existence of association between "benefiting or not" and each of the socio-economic variables. The result of the analyses showed that size of safflower cultivation area, state of dealing with livestock, agricultural credit use and practice of crop rotation are all important. Certainly, the potential of safflower production is tremendous in Turkey, but that potential can be obtained only through effective and more specific support policies. Safflower marketing and low price appears to be a major problem requiring attention in research area. For this reason, government should give support and guarantees on the marketing of safflower to increase the safflower production.

Keywords: Oilseed crops, Safflower Production, Support Policy, Turkey.

INTRODUCTION

Safflower (*Carthamus tinctorius* L.) is one of the most important oilseed crops in the world. According to 2014 FAO statistics, safflower production in the world was realized in 1 010 180 ha area. In the same year, the safflower production in the world was 867 659 tons. The most important share in production belongs to Kazakhstan (22.59%), Mexico (16.64%), India (13.02%), USA (10.91), Russian Federation (10.04%), Argentina (7.64%), Turkey (7.15%) and China (4.14%), respectively (FAOSTAT, 2016). The crop has been traditionally grown for its flowers and oilseed as a source of edible oil, animal feed, medicine, fabric dyes and food coloring. It has also found medicinal and industrial applications such as bio fuel (Dajue and Mundel, 1996; Golkar, 2014).

Oilseeds cultivation is an important part of crop production in Turkey, but Turkey is foreign dependent and a net importer of oilseeds products. Total oilseeds production was 2.96 million tons produced from 1.16 million ha. Turkey oilseeds production is insufficient to meet demand, so Turkey is a major importer with imports of oilseeds and its derivatives rising from 5.1 million tons in 2013, rising to 6.2 million tons in 2014. Turkey has to import oils and oilseeds, at a cost of US$ 503 million in 2003, expanding to US$ 2.7 billion in 2013 and rising to US$ 4.3 billion in 2014 (Anonymous, 2015).

Though safflower was introduced into Turkey as early as the 1930s, successful commercial planting started only in the 1970s (Esendal, 2001). Very limited research has been done on safflower in Turkey because of its small acreage and low economic importance. In order to reduce deficiency in oil production, oilseed crop production areas and oil yield should be increased or alternative oil crops should be introduced. Safflower has the potential to meet much of Turkey's oil demand. Regarding growth conditions, safflower is not selective and is more tolerant to drought and low temperatures than other oil crops. In particular, in arid conditions, it can be planted in fallow areas. It is mostly grown on arable dry land following cereals or lentils, chickpea and tobacco. Therefore, safflower has a great potential for arid areas of Turkey (especially in Central and South Eastern Anatolia). Also, bio-fuels projects are one of the most important opportunities to increase of the safflower production. (Akınerdem and Ozturk, 2008).

In 2001, the Turkish government introduced a premium support system for sunflower seeds, rapeseeds, cottonseeds, olive oil and soybeans in order to encourage farmers into oilseeds production. The Turkish government began supporting safflower production in 2006 and continues to support oilseed production with production premium programs. In Turkey, the government stimulates oilseeds crop production through crop subsidies (fertilizer, diesel and certified seeds), premium supports, customs tariff rates, support for soil

analysis and to promote organic production and direct income support. Use of certified seeds, premium support, and diesel and fertilizer subsidies are the main supports for safflower production in Turkey (especially since 2006) in order to ensure an increase in safflower production.

In 2013, safflower producers received US$ 37/ha towards the cost of fuel, US$ 37/ha for fertilizer, US$ 21.2/ha for certificated safflower seed support, and US$ 52.9/ha to promote organic production. It is estimated that all together, supports for safflower production amount to US$ 148.1/ha, excluding premium supports. The premium support for safflower farmer 2013, 2014 and 2015 years was US$ 238.00/tons, 212.26/tons and 171.10/tons, respectively (TOJ; 2013, 2014, 2015). In 2010 done a study by Polat *et al*. (2012), found that the average cost of safflower production in both dry and irrigated conditions are US$ 675.10/tons and 518.19/tons (in Eskisehir, Turkey), respectively. The average safflower price received by farmers was US$ 575.16/tons in 2015 (ATB, 2016). With the support policies applied to safflower production, important increases have occurred in safflower cultivation areas and production in Turkey. Turkey's safflower cultivation area, which was 30 hectares in 2000, increased to 44 305 hectares in 2014 with these supports. The safflower production increased around 3 444 fold from 18 tons to 62 000 tons during the 2000–2014 periods (TURKSTAT, 2016).

However, only about 1.52% of total oilseeds production was safflower. There has been growing interest in oilseeds and safflower in Turkey because of recent nutritional aspects and its multiple uses resulting in a request for increased quantities of oilseeds. It is expected that production of safflower in Turkey is going to increase in the years ahead. Bio-fuel production is one of the most important opportunities for its improvement. In the case of production increase, safflower seems most likely destined for arid areas.

The government's continuing production premiums for oilseeds and support to persuade farmers to plant more of the crop has had limited success. Safflower was first planted in the research area in 2007. Konya province's safflower cultivation area, which was 210 hectares in 2007, increased to 1 683 hectares in 2013. The safflower production increased around 8.6 fold from 206 tons to 1 780 tons during the 2007–2013 periods. In 2014 safflower production was 3 849 tons produced on 3 526 ha in Konya Province (TURKSTAT, 2016).

In particular, in arid conditions, safflower can be planted in fallow areas. Therefore, safflower has great potential for the research area. In the Central Anatolian region, farmers are reportedly moving away from planting sunflower seed due to low precipitation and higher returns on other crops such as potatoes and sugar beets. For this reason, safflower is ideal, as it is an oil seed plant which can be brought up in arid conditions. Particular emphasis should be laid on safflower as it is a potential raw material source both for vegetable oil and compound feed for livestock sectors, it can be brought up in alternative areas, alternation can be applied to it and safflower can be planted in fallow lands in the research area (Ilkdogan, 2012). Since safflower is resistant to drought, it could be grown successfully on the dry lands of the research area in Central Anatolia that have insufficient precipitation. Its cultivation is much easier and cost of production is far lower than wheat, sunflower and rapeseed. In addition, safflower will gain importance in biodiesel production in Turkey (Akınerdem and Ozturk, 2008).

The Turkish government began supporting safflower production in 2006 and continues to support the industry with production premium programs. Determining which factors most affect the farmers in benefiting from the support is very important in terms of finding out if these supports are achieving their purpose. Furthermore, it is also necessary to evaluate the results of oilseeds production support implementation in terms of putting objectives of production planning forward with respect to the research area. To this end, the focus of this survey was to determine and evaluate the benefiting of safflower farmers from oilseeds production support premium in the Central Anatolia region of Turkey.

MATERIALS AND METHODS

Characteristics of the study area: The study area, Konya, is located in Central Anatolia, Turkey. A large part of the Konya province is located on the high plains of Central Anatolia. Geographically, Konya lies between 36° 41' and 39° 16' north latitude and 31° 14' and 34° 26' east longitude, respectively. The average height of the city above sea level is 1,024 meters. Average altitude is 1,016 m in Konya. Konya has a continental climate with cold, snowy winters and hot dry summers. Rainfall occurs mostly during the spring and autumn. Konya has a semi-arid climate. Summers temperatures average 30 °C. Winters average −4.2 °C. Due to Konya's high altitude and dry summers, nightly temperatures in the summer months are cool. Precipitation levels are low, but precipitation can be observed throughout the year. The average total precipitation is 319.2 mm/year. Konya is located in the lowest precipitation receiving region of Turkey. Konya province has the largest barley and wheat growing area in the semi-arid Central Anatolian region of Turkey (Anonymous, 2006).

Sampling technique and data collection: Data were collected mainly from primary sources using structured questionnaires sent to the producers at safflower farms in the Beyşehir, Derebucak, Sarayönü, Yunak, and Tuzlukçu district of Konya province in the Central

Anatolia region of Turkey. The questionnaire was implemented in January–March 2014 with 83 randomly selected safflower farmers in the selected districts of Konya province and six villages were selected to represent the safflower growing area (Anonymous, 2011). During the sampling process, following identification of the study population, the sample frame was defined and sample size was determined by the simple random sampling method (Yamane, 2001). The selection criterion was the safflower cultivation area size of farms. Selecting farms randomly, the sample size was determined to be 83.

Data Analysis*:* This research was carried out with 83 farmers, of whom 57 were still benefiting from safflower production support premium and 26 were not, and analyzed accordingly. This study aims to explore the factors affecting the safflower farmers' benefiting from oilseeds production support premium using chi-square test. Both descriptive and inferential statistics were used in analyzing the data. Descriptive statistics include mean, frequency tables, and percentages. Chi-square test was used to analyze the existence of association between "benefiting or not" and each of the socio-economic variables. The SPSS software program was also used to determine significance levels of the variables. The chi-square ($\chi 2$) test statistic is given in formula (Koseoglu and Yamak, 2008). (Eq. 1):

$$\chi^2 = \Sigma_{ij} \frac{(O_{ij}-E_{ij})^2}{E_{ij}} \quad \text{(Eq.1)}$$

where:
χ^2 = calculated chi-square value
O_{ij} = observed frequency value
E_{ij} = expected frequency value

RESULTS AND DISCUSSION

General characteristics of the farms: The descriptive statistics of farmers receiving support and those not receiving support are presented in Table 1. Farmer's averaged age is 48.25 years old for farmers receiving support and 42.27 for those not receiving support. Average educational level for farmers receiving support and farmers not receiving support was 6.30 and 3.50 years, respectively. This meant that the educational level of farmers receiving support was higher than those not receiving support. The average family size in farms not receiving support was 9.00 people, higher than the average (4.63 people) in farms receiving support. The average farm land size was 8.28 hectare for farms not receiving support, which is lower than that of the farms receiving support (13.07 hectare). Average irrigated land size for farmers receiving support and farmers not receiving support was 4.13 and 1.07 ha, respectively. Average safflower sizes for farmers receiving support and those not receiving support were 6.05 and 3.38 ha, respectively. The rate of safflower in field crop cultivation area was 49.23% for farmers receiving support and 45.55% for those not receiving support. The rate of farms that engage in animal husbandry on farms not receiving support was higher than that of farms receiving support (Table 1).

The result of the chi-square test analysis according to selected socio-economic characteristics of farmers: Table 2 shows chi-square (χ^2) tests of relationships between farmers benefiting and none benefiting from safflower production support and their selected socio-economic characteristics. The result of the analyses show that size of safflower cultivation area ($p<0.05$), state of dealing with livestock ($p<0.01$), agricultural credit use ($p<0.10$) and practice of crop rotation ($p<0.05$) variables were significantly related with farmers' utilization of safflower production support. However, farm land size, education, age of famers, cooperative membership of farmer, status of non-agricultural income of farmer, family population size, the number of family people employed, participation in training activities, use of the internet, watching TV, reading printed materials, and certified seed usage variables were not significantly related (Table 2).

Problems encountered by farmers and reasons why farmers are not benefiting from safflower production support: Table 3 shows the problems encountered by farmers and reasons why farmers are not benefiting from safflower production support. The research results showed that the most important problems of farmers were not being registered with the farmer registration system, too many bureaucratic procedures and safflower production support could not be given for lack of proper documents.

Problems and challenges encountered by farmers in safflower production: Table 4 shows the problems and challenges encountered by safflower farmers in safflower production. The research results showed that the most important problems of farmers in safflower production were low prices for safflower, inadequate marketing facilities, financial difficulties, lack of technical knowledge, expensive agricultural inputs, lack of agricultural subsidies, shortage of irrigation water, poor tools and farm machines, difficulties in getting seeds, and crop losses due to disease, pests and weeds, respectively (Table 4). To remove challenges and provide solutions for these problems, the government should give more importance to safflower production because it is vital that producers be given guarantees regarding the marketing of produce. For this reason, the government should create marketing facilities for safflower, raise premium prices and provide cheap credit to farmers. On the other hand, the government should give subsidies to agricultural

inputs like fertilizer, diesel, pesticides, farm equipment, seeds, irrigation and other productivity enhancing factors in safflower production.

Table 1. General characteristics of the farms in safflower growing.

Indicators	farmers which benefiting from safflower production support (N=57)		farmers which not benefiting from safflower production support (N=26)	
	Average	Standard Deviation	Average	Standard Deviation
Age of farmers (year)	48.25	10.18	42.27	8.28
Education level (year)	6.30	2.82	3.50	0.86
Family population (person)	4.63	1.36	9.00	2.94
Size of total farm land (ha)	13.07	16.07	8.28	3.49
Size of field crop cultivation area(ha)	12.29	15.33	7.42	3.71
Fallow land (ha)	0.78	1.77	0.86	1.46
Irrigated land (ha)	4.13	7.10	1.07	1.93
Non-irrigated land (ha)	8.94	13.08	7.21	3.83
Number of parcel	21.16	20.12	23.12	12.19
Owned land(ha)	5.11	7.42	3.28	3.54
Rented land(ha)	7.89	13.25	4.23	2.91
Common/shared land(ha)	0.07	0.53	0.77	0.39
The rate of farms which engaging animal husbandry (%)	35.09	-	69.23	-
Livestock number (head)	5.04	9.40	10.08	8.33
Sheep and goat number (head)	1.37	6.95	0.50	1.82
Cropping System (hectare)				
Safflower	6.05	6.14	3.38	2.43
Wheat	5.09	10.33	2.65	3.89
Corn	0.03	0.26	0.00	0.00
Barley	0.62	2.02	0.42	1.20
Sugar beets	0.14	1.06	0.68	1.85
Chick peas	0.26	1.42	0.00	0.00
Dry beans	0.88	0.66	1.15	0.43
The rate of safflower in field crop cultivation area (%)	49.23	-	45.55	-

Table 2. Results of chi-square (χ^2) showing associations between benefiting from safflower production support or not, and each of the socio-economic variables.

Variables	farmers which benefiting from safflower production support (N=57)		farmers which not benefiting from safflower production support (N=26)		Calculated χ^2 Value	*p*
Age (year)	N	%	N	%		
Age (year)						
30-40	14	24.56	10	38.46	1.678	0.195
41+	43	75.44	16	61.54		
Education						
Primary or Middle school	49	85.96	21	80.77	0.365	0.546
High school or university	8	14.04	5	19.23		
Size of total farm land(ha)						
1-5	19	33.33	6	23.08	0.892	0.345
5.1+	38	66.67	20	76.92		
Size of Safflower cultivation area (ha)						

1-5	34	59.65	21	80.77	3.563	0.059**
5.1+	23	40.35	5	19.23		
Cooperative membership of farmer						
Yes	30,00	52.63	13	50.00	0.050	0.824
No	27,00	47.37	13	50.00		
Status non-agricultural income of farmer						
Yes	34	59.65	17	65.38	0.248	0.619
No	23	40.35	9	34.62		
Family population size (person)						
1-3	16	28.07	6	23.08	0.229	0.633
4-6	41	71.93	20	76.92		
The number of family people employed						
1-2	51	89.47	20	76.92	2.274	0.132
3-5	6	10.53	6	23.08		
Agricultural credit use						
Yes	22	38.60	15	57.69	2.635	0.105*
No	35	61.40	11	42.31		
State of dealing with livestock						
Yes	20	35.09	18	69.23	8.386	0.004***
No	37	64.91	8	30.77		
Information-seeking Behavior						
Participating in training activities						
Yes	37	64.91	16	61.54	0.088	0.767
No	20	35.09	10	38.46		
Use of the Internet						
Yes	22	38.60	7	26.92	1.070	0.301
No	35	61.40	19	73.08		
Watch of the TV						
Yes	44	77.19	23	88.46	1.457	0.227
No	13	22.81	3	11.54		
Reading printed materials						
Yes	25	43.86	8	30.77	1.277	0.258
No	32	56.14	18	69.23		
Certificate seed usage						
Yes	10	17.54	5	19.23	0.035	0.853
No	47	82.46	21	80.77		
Practice crop rotation						
Yes	20	35.09	15	57.69	3.741	0.053**
No	37	64.91	11	42.31		

*** p<0.01, ** p<0.05, * p<0.10

Table 3. Reasons why farmers not benefiting from safflower production support

Reasons	N	%	Rank
Not registered with the farmer registration system (with shareholding lands and land register problem reasons)	19	73.08	1st
Too much bureaucratic procedures	7	26.92	2nd
Safflower production support cannot be given for lack of proper documents	3	11.54	3rd

*Multiple responses allowed. N = 26

Table 4. The major problems and the challenges encountered by farmers in safflower farming.

Problems/Barriers/Constraints	N	%
Lower prices for safflower	67	77.91
Inadequate marketing facilities for safflower	61	70.93
Financial difficulties	47	54.65
Lack of technical knowledge	40	46.51
Agricultural inputs are very expensive	38	44.19

Lack of agricultural subsidies	38	44.19
Shortage of irrigation water	24	27.91
Poor tools and farm machines	20	23.26
Difficulties in getting seeds	18	20.93
Crop losses due to diseases, pest and weeds	12	13.95

*Multiple responses allowed. N = 83

Conclusion: In this study, we determined the factors related to farmers' benefiting from oilseeds production support of safflower growers in the Central Anatolia region of Turkey. The data used in this study were obtained by survey from 83 farms engaged in safflower cultivation in the Konya Province in the Central Anatolia region of Turkey. The result of the analyses shows that size of safflower cultivation area, state of dealing with livestock, agricultural credit use and the practice of crop rotation are all important.

Safflower farmers in this research area have structural, technical, growing, high agricultural input prices and marketing problems. In particular, insufficient and ineffective marketing channels prevent farmer from being active at the price determining stage, which gives rise to low prices for producers.

Farmers in Turkey do not produce safflower on a large scale because it does not have any market guarantee and was without support from the government up to the year 2006. Recently, the Government has supported biodiesel production and encouraged oilseed farmers to increase production and productivity of oilseeds crops by providing premium support, supporting the use of certified seed, and giving diesel and fertilizer subsidies. For this reason, production of safflower in Turkey is expected to increase further in the years ahead. To achieve this, farmers' problems and needs should be taken into consideration and priority given to agricultural policy applications. As a significant oilseed crop, to increase oilseeds production in Turkey, supporting safflower growing with the proper agricultural political tools ensuring sustainability of the crop is essential for the farmers. In light of these results, Turkey could improve its ability to meet future demand for vegetable oil products by implementing government policies that increase the availability of oilseeds and quality vegetable oil. Safflower marketing and low price appears to be a major problem requiring attention in research area. Most of farmer indicated that they would consider safflower if price and market issues were improved. For this reason, government should give support and guarantees on the marketing of safflower to increase the safflower production.

Acknowledgments: The authors thank the Scientific and Technological Research Council of Turkey (TÜBİTAK BİDEB - 2209) for financial support.

REFERENCES

Akınerdem, F. and O. Ozturk. (2008). Safflower and Biodiesel Quality in Turkey. 7th Int. Safflower Conf. Waga Wagga, New South Wales (Australia). p.1-7.

Anonymous. (2006). Konya Agriculture Master Plan. Ministry of Agriculture and Rural Affairs, Konya Agriculture Administrative Province Directorate. (unpublished). (Turkey).

Anonymous, (2011). Working Reports of Konya Provincial Directorate of Food, Agriculture and Livestock. (unpublished). (Turkey).

Anonymus, (2015).Working Report. Bitkisel Yag Sanayicileri Dernegi (BYSD). (unpublished). (Turkey).

ATB, (2016). Aspir Alım Fiyatları. Ankara Ticaret Borsası (ATB). http://www.ankaratb.org.tr

Daju, L. and H.H. Mundel. (1996). Safflower (Carthamus tinctorius L.). Promoting the conservation and use of underutilized and neglected crops. Monogr. 7. Institut fur Pflanzengenetik und Kulturpflanzenzuchtung (IPK), Gatersleben. Germany and International Plant Genetic Resources Institute. (Rome).

Esendal, E. (2001). Safflower Production and Research in Turkey. Vth Int. Safflower Conf. Williston, (U.S.A.). p: 203-206.

FAOSTAT (2016). The statistics division of the Food and Agriculture Organization (FAO).
http://faostat3.fao.org/download/Q/QC/E

Gilbert, J. (2008). International Safflower Production- An Overview. 7th Int. Safflower Conf. Waga Wagga, New South Wales (Australia). p.1-7.

Golkar, P. (2014). Breeding improvements in safflower (Carthamus tinctorius L.): A review. Aust. J. Crop Sci. 8(7):1079-1085.

İlkdogan, U. (2012). The Necessary Conditions For Safflower Production and The Formation Of Polices in Turkey. Gıda, Tarım ve Hayvancılık Bakanlığı Tarımsal Ekonomi ve Politika Geliştirme Enstitüsü, TEPGE Yayın No: 205. (Turkey). 180 p.

Köseoglu, M. and R. Yamak (2008). Uygulamalı İstatistik. Celepler Matbaacılık, 3. Baskı. Trabzon, (Turkey). 341 p.

Polat, M. Türkseven, E. Çakırer, E (2012). Determination Input Production and Costs of Oilseeds Crops

for Eskişehir Region. Tarım Bilimleri Araştırma Dergisi 5 (1): 139-142.

Singh, V., N.M. Kolekar, N. Nimbkar (2008). Breeding Strategy for Improvement of Flower and Seed Yield in Safflower. 7th Int. Safflower Conf. Waga Wagga, New South Wales (Australia).

TOJ. (2013, 2014, 2015). The "Implementing Communique and Decision of the Ministerial Council on Agricultural Support. Turkish Official J. (2013, 2014, 2015 years) Ankara (Turkey).

TURKSTAT. (2016). Turkish Statistical Institute. http://tuikapp.tuik.gov.tr/bitkiselapp/bitkisel.zul

Yamane, T. (2001). Basic Sampling Methods, Translation, Translated by; Esin A, Aydin C, Bakir MA, Gurbuzsel E, Literature Yayinlari: 53, First Edition, ISBN 975-8431-34-X, Istanbul, (Turkey).