Bulgarian Journal of Agricultural Science, 17 (No 4) 2011, 484-490
Agricultural Academy

AN ECONOMIC ANALYSIS OF OPEN-FIELD MELON *(CUCUMIS MELO* L.*)* PRODUCTION IN CANKIRI PROVINCE OF TURKEY

H. YILMAZ[1*], V. DEMIRCAN[1] and S. KURTLUK[2]
[1]*Department of Agricultural Economics, Faculty of Agriculture, Suleyman Demirel University, 32260 Isparta, Turkey*
[2]*Provincial Directorate of Ministry of Agriculture and Rural Affairs, 18100 Cankiri, Turkey*

Abstract

YILMAZ, H., V. DEMIRCAN and S. KURTLUK, 2011. An economic analysis of open-field melon *(Cucumis melo* L.*)* production in Cankiri province of Turkey. *Bulg. J. Agric. Sci.,* 17: 484-490

The melon traditionally has been one of Cankiri's best known produce items. The aim of this study is to make an economic analysis of melon grown in open field by determining the production cost and return in Cankiri province of Turkey. The data used in the study were obtained from 87 local melon growers using a questionnaire. The farms were chosen by random sampling method. The results revealed that labor and machine power used were 231.60 and 27.60 h ha^{-1} in melon production period, respectively. Average production costs was 2320.60 \$ ha^{-1}. Gross profit, net profit and relative return were found to be 1261.25, 1024.23 \$ ha^{-1}, 1.44, respectively. This study showed that melon production is profitable in the study area. As a conclusion the growers should continue to focus more attention on open-field melon production. In addition farmers should take necessary steps to improve production efficiency.

Key words: melon, production cost, return, economic analysis, Turkey

Introduction

Melon (*Cucumis melo* L.) is a product of economic importance in both Turkey and the world. According to 2006 FAO statistics, melon production in the world was realized in 1.3 million ha area. In the same year, the melon production in the world was 26.7 million tones. The most important share in production belongs to China (51%), Turkey (6%), USA and Spain (4%), respectively (FAOSTAT, 2009). Turkey has a suitable climate for growing many vegetables and fruits. The major vegetables are melon, watermelon, cucumber and squash from field grown in Turkey. The percentage of these vegetables production is approximately 40%. The melons are grown in open fields and low tunnel in Turkey.

The provinces where open field melon growing is mostly done in Turkey are Ankara, Manisa, Diyarbakir, Balikesir and Cankiri, respectively. Cankiri is the one of the important open field melon growing centers. In 2008, 1750000 tons melon was produced in Turkey. In Cankiri, 52128 tons (with this production is ranked 5th in Turkey) of these melons production were produced (TURKSTAT, 2009).

**e-mail: hyilmaz@ziraat.sdu.edu.tr ; hsn_ylmz@yahoo.com*

Because of soil structure and climatic conditions, produced melons in Cankiri are very tasty and sweet. These melons are demanded a lot by consumers, because of its specific aroma and flavors. However, due to excess supply, price is low in the melon harvest season. Melon is one of the most products which affected by price fluctuations in Turkey (Anonymous, 2009).

Customer demand for melon does not increase proportionally with population growth since melon is not a staple food. Therefore, seasonal price fluctuations are one of the major factors that limit the melon production in Turkey. As the prices increase, so do melon planted fields and production; as the prices decrease, so do planting and production. In this case, depending on the price, melon growers get high profits and loss in some years.

The fact that the agricultural production in Turkey depends on natural conditions and the fluctuations in prices makes growers' cost and return relationship unknown. Besides, the yield obtained on a unit-field and return connected to this is far below the potential level. To get sufficient and regular income from the unit-field growers should watch ever charging economic conditions and make necessary adjustments in their operations. When making these adjustments, it will be useful to understand the input use and production costs used in primarily agricultural production. To obtain reliable and useful information for producer organizations, researchers and policy makers it is necessary to study scientific and regularly production cost and returns relationships. Purpose of this study was to make an economic analysis of melon production in Cankiri province that is an important center for traditionally melon production in Turkey. In the study, economic analysis of melon production was determined with calculating of the cost of production, cost for production of 1 kg melon, gross profit, net profit, relative profit. Under the light of obtained findings, some technical and political suggestions for enhancing productivity, profitability and sustainability of open-field melon production were improved.

Material and Methods

In this research 87 melon growers were surveyed in Kizilirmak and Merkez districts of Cankiri province. Data were collected from the melon growers belong to 2008-2009 production season. In addition survey results, previous research studies and secondary sources were also used in the study. The questionnaire was implemented in October 2009 with 87 randomly selected melon producers in Cankiri province, Kizilirmak and Merkez districts and 11 villages in these districts. Villages of Kizilirmak and Merkez districts were selected to represent the melon growing area (Anonymous, 2009). Districts chosen for research purpose constituted 98.41 % of melon production in Cankiri province (TURKSTAT, 2009). For sampling, growers were randomly selected from the villages using the stratified random sampling method (Yamane, 1967).

In this study the partial budgeting analysis method is used in calculation of production cost. According to this method, costs and returns of production were calculated only for the production of melons. In this study, the cost items of melon production was classified into variable and fixed cost. The variable costs associated with melon growing were all inputs that directly related to the production of melon and covered labor and machinery power, fertilizer, pesticide, seed, transport, etc. costs. Variable costs were calculated by using current inputs prices and labor and machinery power, as well as the interest on variable costs. When calculating equivalence of labor cost for family work, wage rate for hired worker was taken as base (Kiral et al., 1999). In this study, interest on total variable costs was calculated. This interest is called revolving fund interest and reflects the opportunity cost of capital invested for production. Revolving fund interest was taken as half the interest rate (5.63%) applied by Turkish Republic Agricultural Bank to variable costs for crop production credits. Fixed costs included administrative costs and land rent. An administrative cost was assumed to be 3% of

variable costs. This method was applied in most of the previous studies (Kiral et al., 1999; AERI, 2001; Engindeniz, 2007).

Analytical Tools

The tools of analysis used for this study were:

Descriptive statistics

The data acquired from farmers by this survey were analyzed and evaluated by Excel software (Excel, 2003). These involve the use of central tendency like the mean, the absolute and relative distributions. The obtained findings were interpreted with tables.

Economic Analysis

This was used to determine the cost and profit for melon production in the area. Total production costs are the sum of fixed and variable costs. Total variable costs were subtracted from total gross production value to calculate the gross profit. The net profit is the difference between gross production value and the total cost of production. Gross production value was divided by total costs to calculate the relative profit (Kiral et al., 1999)

Results and Discussion

General characteristics of the farmers

The average age of the farmers was 47.59 years and average experience of farmers in agriculture was 27.75 years. Their average years of education were 6.34. The average size of the farms was 11.94 ha of which 13.90% was devoted to melon production. 33.33% are members of agricultural cooperatives. Melon yield varied between 5000 and 24000 kg ha^{-1} and average yield was 13936.80 kg ha^{-1}.

Melon Growing Techniques and Operations in Farms

Melon growing techniques which were applied in researched farms and operations were given in Table 1. Farmers were growing melon, especially the Kirkagac, Altinbas and Kinali variety in research area. Soil has usually been ploughed 4 times in melon growing. First plough is made in September with plow, second plough is made in October and November with sweep and third plough is made in March and April with harrow. In addition, rotary hoeing is made in May and June with hoeing

Table 1
Melon production techniques and operations in research area

Item	Time	Number	Equipment
First ploughing	September	1	plow
Second ploughing	October-November	1	sweep
Third ploughing	March -April	1	harrow
Sowing	April	1	drill
Hoeing and making rare	May	2 and 2	hand hoe and hand
Neck filling	May	1	hand hoe
Fertilization	April -June	2	fertilizer distributor
Rotary hoeing	May- June	1	hoeing machines
Pesticide application	May- June	2	Sprayer
Irrigation	May- July	3	classical irrigation
Harvest	September - October	1	hand

Table 2
Use of labor and machine power melon growing in farms

Item	Human power use		Machine power use	
	h ha^{-1}	%	h ha^{-1}	%
Soil preparation	5.70	2.46	19.00	68.84
Sowing	1.80	0.78	1.00	3.62
Hoeing and making rare	84.50	36.49	-	-
Neck filling	36.80	15.89	-	-
Rotary hoeing	0.90	0.39	0.90	3.26
Fertilization	14.50	6.26	0.70	2.54
Pesticide application	0.20	0.09	1.50	5.43
Irrigation	23.70	10.23	-	-
Harvest	56.30	24.31	-	-
Transport	7.20	3.11	4.50	16.30
Total	231.60	100.00	27.60	100.00

machines. Melon seed sowing is usually made in April with seed drill. Growers usually use their own seed production or seed which they bought from seed firm. In the research region, chemical fertilizer was typically applied two times as a basal fertilizing and a top fertilizing. Base fertilizer (generally Di Ammonium Phosphate/ DAP) is used while sowing. Top fertilizer (generally Calcium Ammonium Nitrate/N 26 or Urea/ N 46) is made with hand and fertilizer distributor. Due to the fact that seed sowing is made directly on the field, making rare is made in May. After making rare, neck filling is made by hoeing the plants roots. Hoeing is made for weed control. Besides, pesticides are used to struggle with weeds, diseases and pests. But, the growers don't don't pay necessary attention to the pest control. Melon was irrigated by the classical method an average of 3 times per season depending on weather conditions. Melon harvest is usually made with hand in September and October. For harvest, generally family labor and casual workers are used. Harvested products are sold to wholesalers in the market hall or brokers.

Use of labor and machine power in melon growing

According to melon growing processes, the amount of used labor and machine power are given Table 2. The results revealed that soil preparation, pesticide application and transport were the major items for machine power use. Hoeing and making rare, harvest, neck filling and irrigation were the major items for human power use. It was calculated that 231.60 h of human power and 27.60 h of machine power are used per hectare of melon production in the research area. Of the total human power, 36.49% is used for hoeing and making rare, 24.31% for harvest operations and 15.89% for neck filling. Of the total machine power, 68.84% is used for soil preparation, 16.30% for transportation, 5.43% for pesticide application, 3.62 seed sowing, and 3.26% for rotary hoeing. According to these results, it can be said that, intensive labor in the growing of melon is used in farms.

Economic analysis of Melon Production

Production costs related to melon production were analyzed by classifying production costs as variable and fixed costs. Variable costs are costs that occur when production is made and increase or decrease depending upon production volume. Fixed costs are costs that do not change with respect to production volume or the costs that occur

Table 3
Costs of melon growing in farms, US$ ha -1

Cost items	US$ ha^{-1}	%
1. Labor and machine power costs		
Soil preparation	607.52	26.18
Sowing	35.75	1.54
Hoeing and making rare	213.74	9.21
Neck filling	93.08	4.01
Rotary hoe	30.39	1.31
Fertilization	58.53	2.52
Pesticide application	47.32	2.04
Irrigation	59.93	2.58
Harvest	142.42	6.14
Transport	158.69	6.84
Total	1447.37	62.37
2. Input costs		
Seed	194.97	8.40
Fertilizer	188.69	8.13
Pesticide	141.57	6.10
Total	525.23	22.63
3. Interest on total variable costs	110.98	4.78
A-Total variable costs (1 + 2 + 3)	2083.58	89.79
Administrative costs (A*0.03)	62.51	2.69
Land rent	174.51	7.52
B-Fixed costs	237.02	10.21
C-Total costs (A+B)	2320.60	100.00

whether production is made or not (Inan, 2006).

Cost items of melon production are given in Table 3. In this study, the average production costs of melon in 87 farms were calculated to be 2320.60 US$ ha^{-1}. Variable cost was the main contributor of production cost. Proportion of variable cost in total production cost was 89.79% and fixed cost was 10.21%. Similar study were conducted by AERI (2001) who found that variable and fixed cost constituted 62.51 and 37.49% of total cost, respectively. Reason why variable cost had a high share in total cost was labor and machine costs. Because, proportion of total labor and machine costs in total cost was 62.37%. The rate of labor and machine costs in total cost was 37.13% and 25.24%, respectively. Similar study were conducted by AERI (2001) who found that proportion of labor and machine costs in total cost was 8.93 % and 24.02 %, respectively. Soil preparation is 26.18 % of total human power and machine power costs, then comes respectively, hoeing and making rare (9.21%), transport (6.84%), harvest (6.14%) and neck filling (4.01%). Because the diesel price is very high, the cost of machine power is more than other cost items. It was determined that the most important cost was land rent in fixed costs (7.52%).

The rates of input costs in the cost of total production were 22.63%. In another study, this rate was found as 16.88% (AERI, 2001). Of all inputs cost, share of seed, fertilizer and pesticides were 8.40%, 8.13% and 6.10%, respectively. However, these rates can change depending on the climatic conditions and variation in input prices each year. It was determined that as a result of observations and interviews in the research area, because of high pesticide prices, the growers did not pay necessary attention pest control and make enough pesticide application for diseases and pests.

Table 4
Gross profit, net profit and relative return obtained from melon growing

Item	US$
A.Melon production, kg ha $^{-1}$	13936.80
B.Average melon price, US$ kg^{-1}	0.24
C.Gross production value, US$ ha^{-1} (A*B)	3344.83
D.Variable costs value, US$ ha^{-1}	2083.58
E.Total cost, US$ ha^{-1}	2320.60
F.Total cost, US$ kg^{-1} (E/A)	0.17
Gross profit, US$ ha^{-1} (C-D)	1261.25
Net profit, US$ ha^{-1} (C-E)	1024.23
Relative return (C/E)	16072

Gross profit, net profit and relative return for melon production are given in Table 4. The approximate price received by the producer is 0.24 US$ kg^{-1} and approximate yield for hectare is 13939.80 kg ha^{-1}. Therefore, gross production value from melon production is 3344.83 US$ ha^{-1}. Then by subtracting variable cost from gross production value, gross profit from melon production was calculated. Gross profit from melon production was determined to be 1261.25 US$ ha^{-1}. Gross profit is an important indicator that determines competitive edge of the production activity of the farm in terms of insufficient resources use. In another word, gross profit is an indicator that shows the success of the enterprise (Erkus et al., 1995).

Net profit was calculated by subtracting the total cost from gross production value. Net profit from melon production was determined to be 1024.23 US$ ha^{-1}. The production cost for 1 kg melon was calculated as 0.17 $ kg^{-1}. It was calculated that profit margin for 1 kg melon was 0.07 $. Relative return was calculated by dividing gross production value to total cost (Rehber, 1993; Erkus et al., 1995). Relative return is another indicator that measures the success of a farm enterprise. Relative return shows return obtained for every 1 unit invested. Thus values lower than 1 means that total production cost exceeds gross product value leading a loss. If this value is larger than 1, this indicates that this enterprise is profitable. Relative return from melon production was determined to be 1.44. Similar a study was conducted by AERI (2001) who found that relative return was 1.95.

Conclusion

Melon production is an important source of income for growers in Cankiri province. Data used in this study were collected from 87 farmers located in Cankiri province of Turkey. The results revealed that the significant cost items were human and machine power, land rent, seed and fertilizer costs. Labor and machine powers used were 231.60 and 27.60 h ha^{-1} in melon production period, respectively. Total production cost, variable costs and fixed cost were determined to be 2320.60, 2083.58 and 237. 02 US$ ha^{-1} respectively. Proportion of variable cost in total production cost was 89.79% and fixed cost was 10.21%. Therefore, gross profit, net profit and relative return were calculated to be 1261.25, 1024.23 $ ha^{-1}, 1.44, respectively. Economic analysis showed that net return per kilogram of melon was sufficient to cover costs of production in the research area**.** It can be advised that the growers should continue to grow melon in these conditions in terms of agricultural business principles in the research area. Even though positive gross profit and net profit are obtained in melon growing, it is necessary that yield increase should be ensured, profitability should be more increased by decreasing costs and modern melon growing should be improved. Based on findings and problems the following recommendations could be made:

Growers in the research area should continue to focus more attention on melon production. The level of growers' use of technology should be enhanced. Research, extension and growers' coordination should be ensured in order that the amount of input use is made in accordance with growing techniques.

Growers did not use certified seed sufficiently in the research area. Due to the fact that, growers use their own seed, yield is low. Therefore, growers should be encouraged to use certified seed.

Extension activities such as struggle of pest and disease should be done. Because there is no cold storage house, the growers are in difficulty to product enclosure. For this reason, storage facilities in the region should be increased.

The farmers should grow early varieties in order to ensure market and price advantages. There is no production and marketing organization among the growers. These kinds of organizations could increase the income of the farmers by lowering the cost of inputs and transportation and provide them higher price for their products. For this reason, the growers should organize in order to solve the

marketing problems.

Acknowledgements

The authors would like to express their appreciation and special thank to staff of Cankiri Provincial Directorates of Agriculture and Rural Affairs and farmers for helping to collect data in the study.

References

AERI, 2001. Input Use and Production Costs for Important Crops in Some Regions of Turkey. Agricultural Economics Research Institute, Ankara-Turkey, Research report, Publication No. **64**, 248 pp. (Tr).

Anonymous, 2009. **Anonymous**, 2004. Working Reports of Cankiri Province Office of the Ministry of Agriculture and Rural Affaires (Tr).

Engindeniz, S., 2007. Economic Analysis of Processing Tomato Growing: The Case Study of Torbali, West Turkey. *Spanish Journal of Agricultural Research*, **5** (1): 7-15.

Erkus, A., M. Bulbul, T. Kiral, A. F. Açil and R. Demirci, 1995. Agricultural Economics. *Ankara University Faculty of Agriculture Press*, (Tr).

Excel, 2003. Microsoft Office software. Microsoft Co., USA.

FAOSTAT, 2009. Web Page of the Food and Agriculture Organization of the United Nations. Statistic Database. Production statistics. http://faostat.fao.org/. (15 October 2009).

Inan, I. H., 2006. Agricultural Economics and Agribusiness. *Trakya University Faculty of Agriculture* Press (Tr).

Kiral, T., H. Kasnakoglu, F. Tatlidil, H. Fidan and E. Gundogmus, 1999. Data Base Guide and Production Cost Methodology for Agricultural Products. *Agricultural Economics Research Institute*, Publication no: **37**, 133 pp. (Tr).

Rehber, E., 1993. Agricultural Management and Planning. *Uludag University*, Publication no: **84**, (Tr).

SPO, 2001. Crop Production Special Commission Report, Eighth Development Plan, State Planning Organization, publications no: 2647-SCR:655, ISBN: 975-19-2911-3 (Tr).

TURKSTAT (Turkish Statistical Institute) 2009. Crop Production Statistics. http://www.tuik.gov.tr/bitkiselapp/bitkisel.zul. (23 September 2009).

Yamane, T., 1967. Elementary Sampling Theory. Prentice-Inc., Englewood. Cliffs, N. J., USA.

Received October, 28, 2009; accepted for printing February, 23, 2011.