Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development
Vol. 18, Issue 2, 2018
PRINT ISSN 2284-7995, E-ISSN 2285-3952

COST AND PROFITABILITY OF GARLIC PRODUCTION IN KASTAMONU PROVINCE

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Abstract

In this study, the aim was determined the garlic production cost and profitability of farmers in Kastamonu province. The data were obtained from 105 farmers surveyed. Data belonged to the 2014 production period. According to findings, garlic cultivation area in the average of farmers was 1.13 hectares. The garlic area accounted for 18.2% of total farmland. The level of education of farmers was usually primary school. The average garlic yields per hectare for farmers were 8,208 kg. Farmers were doing garlic producing for more than 22 years. N fertiliser use was about 187 kg per hectare, P amounted to 151 kg, and K was calculated as 105 kg per hectare. 1412 hours workforce per hectare was used for garlic production. Machine power use was calculated as 25 hours per hectare. The 80.84% of the total labour force was hired labour force. The production cost of 1 kg of garlic was calculated as 3.22 TRY. The 20% of farmers were not got profit from garlic production.

Key words**:** *garlic, cost, profit, farmer, Taşköprü, Kastamonu, Turkey*

INTRODUCTION

Garlic is a non-substitute product regarding market characteristics. Garlic has long been used for medical purposes and primarily because of its antimicrobial effect. However, garlic has been widely consumed in recent years due to its cholesterol-lowering, toxic effect inhibitor, antioxidant high-tension regulator, anti-cancer, regulating cardiovascular effects [9].

Garlic is a two-year-old scentful plant. Garlic is the first year of the onion formed by a few teeth, the second year, flowers and seeds. However, since garlic is taken for cultivation, it is produced not from seed but the clove of garlic [8].

As of 2016, Kastamonu province ranks first regarding garlic production and cultivated area in Turkey. The share of Kastamonu garlic cultivation area and production is 20.6% and 22%, respectively in Turkey.

Taşköprü district was chosen as a research area. Because Taşköprü district has 2,200 hectare planting area and 22,000 tons garlic production, and the district is close to nearly the whole production and harvested area in Kastamonu province. The share of Taşköprü district in Kastamonu province garlic cultivation area and production is 89.7% and 91.6% respectively.

Taşköprü Garlic is a high quality and storage resistant variety with white, pink - white colour, very hard and sharp scent, depending on the medium in which the shell colour is grown.

Studies on economy about garlic are very few. In this study, the technical and economic structure of the farmers' level of garlic cultivation was analysed.

MATERIALS AND METHODS

The data of the survey were obtained by the face-to-face survey with the farmers in the village of Taşköprü, Kastamonu province. The data were taken for the 2014 production period.

A layered sampling method [13][2] was used to determine the number of farmers for the study. In all, a total of 105 garlic farmers were interviewed, and primary data were collected

using a well-structured questionnaire. Garlic farms were grouped according to their sizes with the group I ranges between 0.10-0.7499 ha (34 farmers), 0.750-1.50 ha (55) being the group II and group III 1.51 ha (16) and above. Descriptive statistics such percentages, mean, frequency distribution and tabulation were used to analyse socio-economic and farm characteristics of the respondents. We used a single Farm Budget Analysis to determine the net farm income of the garlic farmers whiles profitability was used to measure the production performance of the garlic farmers. In an agricultural enterprise, production activities which are carried out through the use of various inputs and services constitute the expenditure which is termed as production costs. The general administrative cost was obtained by taking three percent of the total variable costs.

The profitability analysis was calculated by calculating total production cost, gross margin, net profit and relative profit were as follows formulas [1][11][6][7]:

Total Production Cost = Variable cost (VC) + Fixed cost (FC)

Gross Margin (GM) = Gross Production Value (GPV) - Variable cost (VC)

Net Profit (NP) = Gross Margin (GM) - Fixed Cost (FC)

Relative Profit (RP) = Gross Production Value (GPV) / Total Production Cost (TPC).

RESULTS AND DISCUSSIONS

The farmers' age was 41.98 while 48.57 percent had primary education. The mean of farming experience in garlic production amounted to 22.11 years, but group III had the highest farming experience with 25.50 and group I had the mean 20.88 years. The mean of household size was six persons per house which indicate the study area was an extended family dominated. Group III was the populated modal group with about eight persons per family. The average farm garlic size in the study area was 1.13 ha with group III having the largest farm size of about 2.68 ha. The majority (72.13%) of the land in the study area was owned land. Group III had the highest percentage 75.69 of owned land whiles group I, on the other hand, had the highest rented of land with 29.31 percent. Nearly half of the farmland (48.68%) was irrigated. The 18.19% of the farmland was garlic planted. Group III had the highest percentage 26.65 of garlic cultivation land, whiles group I had 11.22 percent (Table 1). Erkal et al. [3] found that the farmers had an average of 8.9 hectares of land and that they produced garlic in about 7% of the land based on data obtained from 60 garlic farmers in 7 provinces of Turkey.

Approximately 1183.79 kg of seeds were used in garlic production. Yazgan [14] reported that 1,535.2 kg seeds were used for the year 2009 in the same area. The amount of seed used in hectare was 630 kg in Thrace Region [10]. This means that the amount of seeds used in Kastamonu is considerably above Thrace Region. The reason for this is that the planting was done as sprinkling because the producer was producing in the fields with scattered and fragmented soil structure. This was also the biggest obstacle in front of the machinery in production. Because when the machine was used in sewing, the distance between the rows grows, which is not very efficient for the local producer with small and scattered land and therefore not used [14].

Farms employed family labour and hired labour in garlic production. Averagely, 1,411.71 hours per hectares employed labour. The first group got the highest of family labour 26.55 percent. Only 19.16 percent employed family labour while 80.84 percent hired employed labour. The majority of the farmers in the region employed family labour and hired labour types. The mean 25.32 hours of machine power were required per hectare in garlic production. The first group had the highest with 51.80 hours whiles group III, on the other hand, had the smallest with 13.17 hours (Table 1).

Erkal et al. [3] determined that 1,624 labour hours and 34 hours of machine power per hectare be required for garlic production.

Güneş et al. [5] determined that the labour force for one-hectare garlic growing in Kastamonu province was 2,755.3 hours and the machine power was 49.6 hours. They reported that as the size of the enterprise increased, the labour and machine power used in the hectare decreased.

Samavatean et al. [12] reported that 1,397.21 hours of human power and 32.62 hours of machine power were required per hectare of garlic production in Iran. They found that majority of human labour in the farms was used in the harvest (39%) and planting (22%) operations. They determined that share of family labour be 14% and hired human labour was 86% in garlic production in Iran.

Table 1. Some social-economic-technical indicators of farmers

Indicators	Groups of farms			Average
	I	II	III	
Farmers age (year)	44.32	40.56	41.88	41.98
Farmers education level (primary school, %)	44.12	50.91	50.00	48.57
Household size (head)	6.41	5.93	7.88	6.38
Farmers experience on garlic production (year)	20.88	21.89	25.50	22.11
Owned land (%)	70.69	71.19	75.69	72.13
Rented land (%)	29.31	28.81	24.31	27.87
Irrigated land (%)	47.28	49.68	47.81	48.68
Garlic cultivated area (%)	11.22	17.25	26.65	18.19
Parcel numbers of garlic cultivated area (per)	1.10	1.62	3.38	1.69
Garlic cultivated area (hectares)	0.49	1.07	2.68	1.13
The seed used amount per hectare (kg)	1,120.36	1,196.38	1,191.19	1,183.79
The N used amount per hectare (kg)	185.13	185.20	191.42	187.44
The P used amount per hectare (kg)	148.63	148.70	155.35	151.10
The K used amount per hectare (kg)	102.63	102.70	109.88	105.29
Education level in family (primary school, %)	53.61	57.39	55.36	55.78
The family labour used amount in garlic production per hectare (hour)	556.65	281.70	143.59	270.45
The temporary labour used amount in garlic production per hectare (hour)	1,540.12	1,105.60	1,034.97	1,141.27
The total labour used amount of garlic production per hectare (hour)	2,096.77	1,387.30	1,178.55	1,411.71
The family labour share in garlic production (%)	26.55	20.31	12.18	19.16
The total machinery used amount of garlic production per hectare (hour)	51.80	26.66	13.17	25.32

Source: Own calculation.

A specific amount of inputs and services are required to produce garlic. Garlic farm provides a high level of gross production value per hectare. Concordantly, the amount of capital invested by the producers is also high compared to the other agricultural production, because the demand for labour force and other inputs are high and intense.

Garlic production is high labour-absorbing activity. We defined daily labour as eight hours on the farm site. A per hour wage was calculated as nearly six TRY in the research area.

The total production costs were the monetary value of the inputs required for the garlic production. Accordingly, the production cost per hectare for garlic was given in Table 2.

The production costs per hectare in garlic were identified to range between 25,585.06 TRY to 29,846.44 TRY with 26,397.37 TRY being the mean average of production cost per hectare in the study area.

The cost items were examined under the variable and fixed cost of which variable cost had the highest modal production cost with 22,226.25 TRY whiles fixed cost amounted to 4,171.12 TRY (Table 2).

Table 2. Production costs per unit area for garlic productions

Cost elements	I	II	III	Average
	Value (TRY per hectare)			
Seedlings	7,490.06	7,814.21	7,968.39	7,824.35
Temporary worker cost	8,815.87	6,400.96	5,910.06	6,563.57
Marketing	1,284.52	1,836.96	2,554.20	2,018.76
Machinery rents	1,660.50	1,652.48	1,681.11	1,663.97
Fertilizers	1,980.84	1,625.13	1,577.62	1,658.06
Irrigation	872.28	827.20	775.73	814.92
Pesticides	636.77	606.52	643.64	624.22
Working capital interest	1,137.04	1,038.17	1,055.54	1,058.39
Total variable costs	23,877.88	21,801.63	22,166.29	22,226.25
Land tenure	2,171.19	1,972.45	1,965.67	1,998.00
Permanent-family labour	3,081.04	1,582.97	788.11	1,506.33
General administrative expenses	716.34	654.05	664.99	666.79
Total fixed costs	5,968.56	4,209.47	3,418.77	4,171.12
Production costs	**29,846.44**	**26,011.10**	**25,585.06**	**26,397.37**
	The share in the production costs (%)			
Seedlings	25.10	30.04	31.14	29.64
Temporary worker cost	29.54	24.61	23.10	24.86
Marketing	4.30	7.06	9.98	7.65
Machinery rents	5.56	6.35	6.57	6.30
Fertilizers	6.64	6.25	6.17	6.28
Irrigation	2.92	3.18	3.03	3.09
Pesticides	2.13	2.33	2.52	2.36
Working capital interest	3.81	3.99	4.13	4.01
Total variable costs	80.00	83.82	86.64	84.20
Land tenure	7.27	7.58	7.68	7.57
Permanent-family labour	10.32	6.09	3.08	5.71
General administrative expenses	2.40	2.51	2.60	2.53
Total fixed costs	20.00	16.18	13.36	15.80
Production costs	**100.00**	**100.00**	**100.00**	**100.00**

1 Euro = 2,911 TRY (in 2014)
Source: Own calculation.

The variable cost items in the garlic production were seedling, labour, marketing,

machinery rents, fertilisers, irrigation, pesticide and working capital interest. The variable costs are those which increase or decrease depending on the production size. Seedling cost constitutes the highest modal with 29.64 percent of the total production cost and also variable cost followed by temporary labour cost with 24.86 percent and marketing cost which amounted to 7.65 percent of the production cost (Table 2).

The fixed cost of the garlic production was administrative cost, family labour and land renting.

Land renting cost was calculated as the highest share of the production cost with 7.57 percent followed by 5.71 and 2.53 percent as family labour and administrative cost respectively (Table 2).

Samavatean et al. [12] reported that highest shares of total production costs were 45% for human labour and 19% hired machinery in Iran.

The gross production value of garlic production in the average farmers interviewed was calculated as 34,098.31 TRY per hectare (Table 3). Gross margin in garlic growers was found by subtracting the variable cost from GPV [1] [4] [7]. Gross margin was calculated as TRY 11,872.06 per hectare in the average (Table 3). Gross margin ranged from -9,214.83 TRY to 49,547.85 TRY per hectare between investigated farmers. The 8.57% of the farmers received a negative gross margin value from garlic production. That is 8.57% of the farmers could not meet the variable costs of the 2014 production season.

The net profit was found by subtracting the total production cost for garlic production from GPV [6] [7]. The main aim of the business is to make a profit and to seek ways to make the highest profit. In the production of garlic, the average net profit of farms was calculated as 7,700.94 TRY per hectare (Table 3). This value was found to vary between TRY 4,890.09 and TRY 9,805.38 in the farmers' groups. As the garlic area increased, the net profit margin also increased (Table 3). The net profit per hectare between 105 farmers interviewed ranged from -22,361.47 TRY to 43,252.23 TRY. Net profit value obtained from garlic in 20% of farmers was the negative value. Therefore, 20% of the interviewed farms lost from garlic production.

The relative profit was found as the ratio of GPV to the total production cost. Relative profit shows proportionally how much one option is superior to the other. Relative profit measures the productivity of production activities better [7]. The relative profit for the 2014 production season in garlic production was calculated as 1.29. The relative profit value of farmer groups ranged from 1.16 to 1.38. The relative profit value also increased, garlic area increased (Table 3). The relative profit value among the 105 farmers interviewed varied from 0.47 to 2.50.

The relative profit value calculated in the average of garlic production farms for the 2014 production season indicates that the garlic production activity is profitable. The gross production value of 129 TRY is obtained against the total production cost of 100 TRY in garlic production during the review period in the region. Therefore, a profit of TRY 29 is provided for every TRY 100 production cost. However, about 20% of businesses in the region suffered losses. It is also available in high-profit farms.

The average cost of 1 kg of garlic in the study area was calculated to be 3.22 TRY. The condition for the above measure is that relative profit must be greater than one (1) and from the above result, relative profit was 1.29 which indicates that garlic production in the study area is profitable.

Özkan and Aydın [10] reported that the relative profit ranged between 0.82 and 2.09 in the Thrace Region in 1998-2012 with a mean relative profit of 1.44. Samavatean et al. [12] reported that total cost of production for 1 ha garlic production was around 6,969.11$ and, relative profit was 1.36 in Iran.

The mean output of garlic in the study area which is recorded to be 8,208.44 kg/ha in the 2014 production season. Group III recorded the modal output of about 8,391.47 kg/ha of garlic per year followed by the first group with 8,125.75 kg/ha. Yazgan [14] reported that the average yield for the year 2009 is 7,292.8 kg in the same area. Yazgan [14] determined that fertiliser, seed use and sowing

area be effective in the model, which takes garlic yield as a dependent variable.

Table 3. Profitability indicators and unit costs for garlic productions

Indicators	Groups of farms			Average
	I	II	III	
Gross production value per hectare (TRY)	34,736.53	32,976.23	35,390.44	34,098.31
Yield per hectare(kg)	8,125.75	8,098.47	8,391.61	8,208.44
Gross margin per hectare(TRY)	10,858.65	11,174.60	13,224.15	11,872.06
Net profit per hectare(TRY)	4,890.09	6,965.13	9,805.38	7,700.94
Relative profit	1.16	1.27	1.38	1.29
Unit production cost (1 kg) (TRY)	3.67	3.21	3.05	3.22
Unit sales price (1 kg) (TRY)	***4.27***	***4.07***	***4.22***	***4.15***

Source: Own results.

CONCLUSIONS

Majority of the farmers operate on the small scale less than 2 hectares producing less than eight ton of garlic per annum in the research area.

Mean average total cost per hectare was 26,397.37 TRY. The mean average gross production value amounted to 34,098.31 TRY; gross margin was 11,872.06 TRY, the mean average net profit was tantamount to 7,700.94 TRY relative profit was calculated to be 1.29 implying that garlic production was a profitable farm in the study area.

The following recommendations are made depend on the findings of this study:

Farmers should be encouraged to take advantage of economies of scale.

Private input dealers and public extension services should inform farmers on the safe and rational use of chemicals.

The government should give the more training facilities to the farmers with extension agents which will provide the farmers with needed technology improvements and facilities proper attention and consideration.

The government should ensure effective dissemination of scientific and social information to encourage the use of modern techniques by the farmers in garlic production.

As a result, the price level and the marketing background are the decisive factors in the sustainability of the garlic production. Despite the limitations in the field of production, the prevalence of consumption makes marketing activity important.

ACKNOWLEDGEMENTS

We would like to thank TÜBİTAK (2209-A) and Suleyman Demirel University, Faculty of Agriculture for their financial support.

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