

Socio-Economic Structure of Buckwheat Farms in Turkey

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Abstract: Buckwheat has gained importance as a result of the people's demand for healthy foods. Buckwheat, which is grown in many countries as an annual plant, is a pseudo cereal. Its importance and commercial value are increasing so far. In Turkey, the cultivation of buckwheat has evolved in recent years. Statistics related to the product are inadequate. It intended to identify the trend of continual improvement by determining the technical and economic situation of buckwheat production at the producer level. In this context, this study was presented socio-economic and technical structures of buckwheat farmers and proposals were developed for the improvement identified problems in Konya, Karaman and Çankırı province. The main material of this study was obtained through a survey from the buckwheat farms in Turkey. Data were obtained from 47 farmers by survey method and belonged to the 2016 production season. A single budget method was used for the calculation of the production cost. The relative profits in the production of buckwheat by the interviewed farmers were calculated as 1.71. The profitability of the farmers in continuing to produce buckwheat was significant and profited on the present conditions. But buckwheat farming has just begun to develop in the region. For continuity in buckwheat farming, farmers need to gain experience in growing buckwheat, and the government and non-governmental organizations need to increase knowledge of the farmers in buckwheat farming.

Keywords: Buckwheat, Farmers, Absolute profit, Relative profit, Turkey

Introduction

Buckwheat belongs to *Polygonaceae* family *Fagopyrum esculentum* Moench. Buckwheat is a very old plant, rooted in Central Asia. In general, it began to be cultivated in China and Japan, then spread to Russia and Europe (Oplinger et al., 1989; Izydorczyk et al., 2005; Tomar et al., 2008).

Having a good chemical composition distinguishes buckwheat grains, which are particularly rich in fiber and protein content. The fact that it is a plant used especially by celiac disease also gives different importance to buckwheat (Dizlek et al., 2009). It increases the functional features and nutritive values of the product that the buckwheat added with its phenolic materials, antioxidant and fibre components (Hayıt and Gül, 2015).

World buckwheat production was about 3.8 million tons in 2000, but declined by 38% in 2013 to about 2.35 million tons (FAO, 2016). The most important cause of this tension in world buckwheat production is the decline in production in China and Ukraine. As a matter of fact, Chinese buckwheat production decreased by 62%, Ukrainian buckwheat production by 63% and Russian production by 16%. In the world buckwheat production, Russia ranks first with 35.5% share in 2013. In 2000, this share was 26.4%. In 2000, China achieved more than half of world buckwheat production. Today, the share of China in buckwheat production has decreased to 31.2%. Ukraine is the third largest producer of buckwheat with 7.6% share. The share of Ukraine in world buckwheat production was 12.7% in 2000. Therefore, the Ukrainian buckwheat production has also experienced some recession. On the other hand, there was an increase in the production of buckwheat in France, Lithuania, Poland, USA, Nepal, Latvia, Tanzania, Japan, Brazil, and Kazakhstan.

The world buckwheat cultivation area was 3.46 million hectares in 2000, while in 2013 it decreased by 34% to 2.27 million hectares. The most important factor in the reduction of this sowing area is the reduction in the sowing area of 68% of Ukraine, 39% of China and 37% of Russia in the mentioned period. Russia is in the first place in world buckwheat production as well as in the sowing area (share 39.8%). This is followed by 31.0% in China, 7.4% in Ukraine, 3.6% in Kazakhstan, 3.4% in the USA and 3.1% in Poland. There is no official information on buckwheat production in Turkey and FAO. As a result of interviews with researchers working on the subject, it was stated that there is growing of buckwheat in Turkey and that they have turned to production of buckwheat in recent years.

In Turkey, buckwheat has shown significant improvement over the last four years. There are some researches on usage of buckwheat flour, whole flour or its bran in the production of breads, pasta, cakes, noodles, biscuits, breakfast cereals, ice cream cones, tarhana and gluten-free foods (Bilgiçli, 2009; Atalay et al., 2013; Hayit and Gül, 2016a; Hayit and Gül, 2016b). As a result of the literature search, no economic studies have been found about the subject. At this point, the study aims were expressed as follows: (i) determining the socio-economic structure of the farmers in the field of buckwheat production; (ii) determining the technical structure of the buckwheat production activity; (iii) determining the economic structure of the buckwheat production activity; and (iv) identifying problems and developing solutions.

Materials and methods

The main material of this study was obtained by questionnaire method in Konya, Karaman, Çankırı provinces among the farmers who cultivated buckwheat. Secondary data related to the study were research findings on the subject at the national and international level. The data used in the research belong to the production period of 2016.

It is essential to have the right information and make the right decision in scientific researches. Therefore, it is necessary to reach the right information and to generalize the obtained information (Arıkan, 1994). Data were obtained from 47 farmers in Konya, Karaman, Çankırı provinces. The data required for the analysis were obtained through questionnaires from farmers operating in the field of buckwheat cultivation. In the questionnaire, the following information was collected from the farmers. This information were farmers' household size and family labour force status, labour force status, farmer's land property and land saving style, crop production status of farmer and usage of crops, evaluation of the buckwheat production, buckwheat marketing structure of the farmer, labour force and periods in buckwheat cultivation, input use and periods in buckwheat cultivation, cost structure and profitability of buckwheat farming, interest of farmer with technology, loan amount used by farmer, the problems faced by farmers in buckwheat cultivation, the expectation of farmers about the future of buckwheat farming, the judgments and attitudes of the farmers regarding the cultivation of buckwheat.

Single-product budget analysis was used in cost analysis of farmers. Gross production value includes agricultural products of the farmer with sales value and productive value increases (Erkuş et al., 1995). The statement of the owner of the farm was taken as basis for determining the debt of the farmer. The daily wages paid to the salaried workforce were taken as a precedent in order to calculate the daily working allowances of farm

owners and family members in the farm. General administrative costs were calculated as 3% of the total variable costs (Kiral et al., 1999). Gross profit was obtained by subtracting variable costs from gross production value and net (absolute) profit was calculated by subtracting production costs (Aras, 1988, Oktay, 1989).

Absolute Profit: Profit is the difference between income and expense. Gross Profit = Gross Production Value - Variable Costs formula was used (Açıl and Demirci, 1984; Kiral et al., 1999). Absolute profit = Gross production value (GPV) - Production cost (Kiral et al., 1999). **Relative profit:** Relative profit is the ratio of gross production value to production cost. Relative profit measures the productivity of production activities better (Kiral et al., 1999). Relative Profit = Gross Production Value / Production Cost (Kiral et al., 1999).

Regression Analysis: According to Gujarati (2006) and Greene (2008) the primary objective of regression analysis is to determine the various factors which cause variations of the dependent variable. The multiple regression analysis was used to identify the factors that affect buckwheat production's relative profit in the study area. The data were presented as linear functions. The regression model in its implicit form is given as: $Y = F(x_1, x_2, x_3, x_4, u)$. Where Y = Relative profit of buckwheat production; X_1 = Yield of buckwheat in kilogram per decares; X_2 = Farmers age in years; X_3 = GPV of buckwheat production in Turkish Liras; U = Error term. The functional forms are Linear Regression Model. $Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + U$

Results and discussion

The results showed that the age of the respondents range between 23 and 66 years. The mean age was 45.57. One can infer from this result that the buckwheat farmers in the study area were at their economic active age (Table 1). The mean of household size was about 5 persons per house which indicate that the study area was an extended family dominated (Table 1). Küçükçongar et al. (2014) in their study in Konya also revealed that the average household size was 5 members. This implies that the respondents have a relatively large household sizes which they utilize as a source of family labour. Educational level of the respondents in the study area was 8.38 years. The education levels of the farmers interviewed were higher than the findings of Küçükçongar et al. (2014) and Çelik et al. (2016). The farmers experience on buckwheat production in the study area was very low (1.70 years). That the farmers who were interviewed had just begun cultivation of buckwheat, so that there might be shortcomings in the technical issues related to the breeding. The buckwheat cultivation area of farmers interviewed was 27 decares (2.7 hectares) and the number of parcels was 2. The share of buckwheat cultivation area in total arable land was 5.9%. The irrigation rate of buckwheat cultivation area was 86.1%. The share of agricultural income in farmers' income was 92.5% and the share of the gross production value obtained from buckwheat in the total GPV was 17.2% (Table 1).

Information source of the respondents on the production of buckwheat in the study area was generally from Ministry of Food, Agriculture and Livestock, agricultural research institutes. The interviewed farmers were influenced by the Provincial Directorates of Agriculture and the Agricultural Research Institute in the starting of buckwheat farming. Kara et al. (2016) carried out with aim to determination the efficient of nitrogen forms on nitrogen use efficient for buckwheat in Isparta and found that the highest grain yield (1456

and 1325 kg ha⁻¹) were obtained from ammonium sulphate. They identified that ammonium sulphate was positive effect to yield and some quality parameters of buckwheat. Kara and Telli (2016) also obtained highest grain yield (132.3 kg da⁻¹) from 8 kg da⁻¹ phosphorus dose. Okudan and Kara (2015) found that highest grain yield (1254 kg ha⁻¹) of buckwheat were obtained from 75 kg ha⁻¹ N doses. In various regions, research such as fertilizer use and planting distance in buckwheat production is required. This kind findings need to be transferred to farmers.

Table 1. Some social-economic indicator in buckwheat production

Some indicators	Average
Farmers age (year)	45.57
Farmers education level (year)	8.38
Household size (head)	4.49
Farmers experience on buckwheat production (year)	1.70
Irrigated land (%)	34.90
Non-irrigated land (%)	65.10
Irrigated land for total buckwheat cultivated area (%)	86.10
Buckwheat land (%)*	5.90
Gross production value of buckwheat production (%)	17.20
Agricultural income (%)	92.50
Parcel numbers of buckwheat cultivated area (per)	2.00
Buckwheat cultivated area (decares)	27.00

A specific amount of inputs and services are required in order to produce a good or service. Cost can be defined as the amount and value of the altruistic behaviours in order to produce goods and services. Production costs can be defined as the monetary value of the inputs required for the buckwheat production. Accordingly, some economic indicator for buckwheat was given in Table 2. The production cost were examined under variable and fixed cost of which variable cost had the highest share of total production cost with 69.69% while fixed cost was amounted to 30.31%.

The interviewed farmers market the buckwheat they produce with different distribution channels such as merchants, brokers. However, some producers market their products directly or through electronic commerce in the study area. The production cost per kg, gross margin, absolute profit and relative profit were given in Table 2 below. The production cost per kg in the study area was TRL3.89. The mean average gross margin value was amounted to TRL508.56. Production cost varies in the farms with TRL519.11 being the average mean of the total production cost. The absolute profit mean average was calculated to be TRL353.89. The relative profit also varies from 0.64 to 3.93 with 1.71 as the average mean of the relative profit. In the study area, lack of technical know-how was the most pressing problem. The problems with planting materials, diseases and pests were the most pressing problem for the buckwheat farmers. Insufficiencies support policies by the government and marketing were the secondary problems.

Table 2. Some economic indicators in the buckwheat production

	Average
Relative profit	1.71
Production cost per kilogram (TRL)	3.89
Gross profit per decares (TRL)	508.56
Absolute per decares (TRL)	353.89
Production cost per decares (TRL)	519.11
Variable cost (%)	69.69
Fixed cost (%)	30.31

Regression analysis was carried out to determine the factors that affect relative profit of buckwheat production in the study area. The model specified relative profit of buckwheat production Y as a function of buckwheat yield (X_1), farmer's age (X_2) and GPV of buckwheat (X_3). The summary of the linear form of production function result was given in Table 3 below. The result of the estimated parameter can be written thus: $Y = -0.1648445 + 0.0051250X_1 + 0.0203014 X_2 + 0.0000069X_3$. The value of co-efficient of determination R^2 of 0.52526 (52.526%) indicates that about 53 percent of variation in relative profit of buckwheat could be explained by the explanatory variables in the stated regression model. The F-test was statistically significant at the 1% level, meaning that the production function existed ($F_{\text{Calculated}} > F_{\text{Scale value}}$, $15.888 > 4.01$); that is, all the explanatory variables jointly explained the variations in the output. Buckwheat yield, farmer's age and GPV of buckwheat production were identified as the significant factors affecting the relative profit score of buckwheat production in the study area. The positive coefficient of the variable indicates increase in these parameters to their buckwheat farm increases the relative profit of buckwheat.

Table 3. Showing the regression analysis of buckwheat output

	Coefficient	Standard error	t-values	P values
Constant	-0.1648445	0.3864798	-0.4265	0.6719
Yield (kg per decares)	0.0051250	0.0009818	5.2200	0.0000
Farmer's age	0.0203014	0.0072875	2.7858	0.0079
Gross production value of buckwheat (TL)	0.0000069	0.0000029	2.3989	0.0209
F test	15.888			0.000
Adjusted R Square	0.49214			
R Square	0.52526			

Conclusions

The farmers who were interviewed should make profit to continue producing buckwheat. In the present case this is possible. Relative profit must be greater than one (1) and relative profit was 1.71 which indicates that buckwheat production in the study area is profitable. However, buckwheat cultivation began only recently known, for continuity in buckwheat farming, farmers must gain experience in growing buckwheat. The government and non-governmental organizations need to increase the knowledge of producers about buckwheat agriculture. The use of buckwheat in gluten-free products should be widespread. Therefore, the farmer can increase the production amount.

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