Economic and Technical Analysis of Fresh Bean Cultivation in Turkey

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Abstract: This study investigates socio-economic situation of fresh bean growers, inputs and outputs related to bean growing, production and marketing problems faced by farmers, etc. In addition, profitability of fresh bean production was determined. Data were collected from 86 farms located in Tokat province of Turkey via survey. It was carried out in September-October 2008. Research shows that fresh bean cultivation is profitable. Selling price ranges from \$0.6 to \$1.5 kg^{-1}. Fresh bean growers are open to innovation.

Keywords*: Fresh bean, economic and technical analysis, Turkey

Introduction

Bean is cultivated widely in Turkey and consumed as fresh, freezed, canned and dried. According to 2007 data, production area, production amount and yield of green bean in Turkey were 60 000 ha, 499 298 tons, and 8 321.6 kg ha^{-1}, respectively (FAO 2009). Tokat province was chosen as research area because it produces nearly 6.0% of Turkey's fresh bean production. Production area was 2576 ha in Tokat province (Anonymous 2009).

Literature review shows that many studies were carried out in agricultural faculties and research institutes established in different regions of Turkey but majority of them investigate relationships between yield and yield components, adaptation ability of genotypes, etc. Number of studies focus on economic analysis of fresh bean is very limited. Therefore, the aims of this study were to determine current situation and profitability of fresh bean production and problems faced by farmers.

Material and Methods

Data were collected from 86 farms located in Tokat province of Turkey via survey. Questionnaires were carried out in September-October 2008. The method of simple random sampling was used to determine farms to be surveyed (Dixon & Massey 1969):

$$n = \frac{N.S^2.t^2}{(N-1).E^2 + S^2.t^2}$$

Where, n is sample size, N is number of farm in the population, S is standard deviation, t is table value (1.86) at 95% significance level and 10% error, E is error.

Production cost, yield, output price, gross-margin and net profit were calculated while analysing

profitability of fresh bean. Amount and price of both input and output were taken into consideration while analysing cost. Capital interest was accepted as half of credit interest for crops (13.13%) applied by TR Agricultural Bank (Gunes et al. 1988, Kiral et al. 1999). Administration cost was accepted as 3% of variable costs.

Research Findings

Amount of yield and type of agricultural applications can be changed due to having different and wide agro-ecological region in the research area.

Socio-economic characteristics

Age categorises of bean growers are: less than 30 years old (18.60), between 31 and 40 years old (18.60%), between 41 and 50 years old (30.24%), 50 years and old (32.56%). Average age of farmers was 43.88 years old. In terms of education, majority (83.72%) of the bean growers was graduated from primary school. The ratio of fresh bean growers having secondary and high school were 6.98%, and 9.30%, respectively.

Technical characteristics

Fresh bean is generally grown as main crop in the research area. Only small percentage of producers grows it as second crop.

Investigated farms have used commonly certified varieties (69.77%). More than half of them use new seeds every year. It means that growers are open to innovation in the subject of seed and aware of advantage of using certified seeds. Fresh bean growers get seed from different sources: Private sector (53.49%), Own Farms (41.86%), Branch of Ministry of Agriculture (16.28%), and Neighbour Farms (13.95%). Nearly 63% of the growers prefer dwarf types of fresh bean, 40% green bean-indeterminate, 16% kidney bean-indeterminate, and 2% kidney bean-dwarf. Average seed usage was calculated as 80.4 kg ha^{-1} for green bean-dwarf, 46.25 kg ha^{-1} for green bean-indeterminate, 70.0 kg ha^{-1} for kidney bean-dwarf, and 60.0 kg ha^{-1} for kidney bean-indeterminate when fresh bean is sown as main crop. It was 81.8 kg ha^{-1} for green bean-dwarf, and 67.0 kg ha^{-1} for kidney bean-indeterminate when bean is grown as second crop.

Average rainfall in Tokat province is about 400 mm for long years. Therefore, dry bean is generally irrigated in the area. Great Majority of the growers (97.67%) use surface irrigation system. Only 2.33% of the respondents used drip irrigation system.

Farmers face some technical problems during the growing of fresh bean and also marketing problems after harvesting it. Problems faced by fresh bean growers can be summarised as: high input price (60.47%), not being organised under umbrella of producers union or cooperatives (58.14%), pest and diseases (48.84%), market uncertainty (46.51%), inadequate labour (23.26%), low output price (20.93%), spring frost hazard (16.28%), lack of technical knowledge (16.28%), and inadequate finance (9.30%).

Growers sell their products in three ways: in cash (48.84%), forward sale (30.23%), mixed sale (20.93%).

Economic analysis

Total production cost was calculated as $11085.3 per ha for green bean-indeterminate, $7830.1 per ha for kidney bean-indeterminate, $4579.2 per ha for green bean-dwarf, $4375.4 per ha for kidney bean-dwarf. These are sown as main crop. On the other hand, total production cost was lower for green bean-dwarf ($4285.5 per ha) and kidney bean-indeterminate ($3488.8 per ha) which were sown as second crop. Variable costs constitute great majority of total production costs in all types of fresh bean. Especially tillage, seed, fertiliser and harvesting cost have the highest proportion within variable costs. Rent for land constitutes majority of the fixed costs (Table 1).

Within the main crop, the highest and the lowest yields were obtained as 22087.0 kg ha^{-1} for green bean-indeterminate and 12500.0 kg ha^{-1} for kidney bean-dwarf, respectively. On the other hand, within the second crop, the highest and lowest yields were calculated as 15930.6 kg ha^{-1} for green bean-dwarf and 10526.3 kg ha^{-1} for kidney bean-indeterminate (Table 2).

Fresh bean growing had positive net profit for all types of production. Indeterminate green bean ($15419.1 per hectare) sown as main crop had three times net profit compared to dwarf green bean ($4280.0 per hectare). Same result can be said for kidney bean sown as main crop.

For main crop, cost-effectiveness was calculated as 2.48 for kidney bean-indeterminate ($1 cost for fresh bean production leads to $2.48 income). On the other hand, for second crop, cost-effectiveness was calculated as 3.31 for kidney bean-indeterminate.

Selling price ranges from $0.6 to $1.5 kg^{-1}. For main crop, the highest selling price was determined as $1.5 kg^{-1} for kidney bean-indeterminate. For second crop, the highest price was $1.1 kg^{-1}. The lowest selling price was $0.6 kg^{-1} for all dwarf bean types.

Activities	Main Crop				Second Crop	
	Green Bean		Kidney Bean		Green Bean	Kidney Bean
	Dwarf	Indeterminate	Dwarf	Indeterminate	Dwarf	Indeterminate
Tillage	470.4	466.1	480.0	582.1	335.1	466.6
Cultivation	112.2	293.9	180.0	256.6	100.8	101.0
Nursing						
* Fertilisation	17.0	110.2	60.0	84.4	15.0	12.6
* Applying Pesticides	21.1	101.6	90.0	48.6	21.6	12.6
* Irrigation	31.4	84.2	210.0	76.2	35.6	6.3
* Hoeing	239.9	601.2	240.0	376.0	290.4	124.2
Various Inputs						
* Seed	632.6	382.6	560.0	537.9	590.8	517.0
* Fertiliser	347.3	520.8	326.0	378.5	294.9	227.4
* Pesticides	165.8	348.9	200.0	263.2	179.4	85.2
* Water	235.4	103.0	280.0	135.2	278.4	273.7
Harvest	997.6	3 673.0	600.0	1 586.2	930.6	703.4
Transportation	107.6	595.7	20.0	351.8	42.6	4.2
Total (A)	3 378.3	7 281.2	3 246.0	4 676.7	3 115.2	2 534.2
Capital interest (B=A*0,0656)	221.6	477.7	212.9	306.8	204.4	166.2
Total Variable Cost (C=A+B)	3 599.9	7 758.9	3 458.9	4 983.5	3 319.6	2 700.4
Rent for land (D)	859.4	1 168.6	800.0	1 158.6	854.9	635.8
Administrative cost (E=C*0.03)	108.0	232.8	103.8	149.5	99.6	81.0
Other cost (Tax, stake, etc.) (F)	11.9	1 925.0	12.7	1 538.5	11.4	71.6
Total Fixed Cost (G=D+E+F)	979.3	3 326.4	916.5	2 846.6	965.9	788.4
Total Production Cost (H=C+G)	4 579.2	11 085.3	4 375.4	7 830.1	4 285.5	3 488.8

Table 1: Total production cost for fresh bean growing ($ ha^{-1})

Activities	Main Crop				Second Crop	
	Green Bean		Kidney Bean		Green Bean	Kidney Bean
	Dwarf	Indeterminate	Dwarf	Indeterminate	Dwarf	Indeterminate
Yield (kg ha^{-1}) (A)	14 765.4	22 087.0	12 500.0	12 931.0	15 930.6	10 526.3
Price of Bean ($ kg^{-1}) (B)	0.6	1.2	0.6	1.5	0.6	1.1
Gross Product Value ($ ha^{-1}) (C=A*B)	8 859.2	26 504.4	7 500.0	19 396.5	9 558.4	11 578.4

Variable Cost ($ ha^{-1}) (D)	3 599.9	7 758.9	3 458.9	4 983.5	3 319.6	2 700.4
Production Cost ($ ha^{-1}) (E)	4 579.2	11 085.3	4 375.4	7 830.1	4 285.5	3 488.8
Gross-Margin ($ ha^{-1}) (F=C-D)	5 259.3	18 745.5	4 041.1	14 413.0	6 238.8	8 878.0
Net Profit ($ ha^{-1}) (G=C-E)	4 280.0	15 419.1	3 124.6	11 566.4	5 272.9	8 089.6
Cost-Effectiveness (H=C/E)	1.93	2.39	1.71	2.48	2.23	3.31

Table 2: Gross-margin and net profit for fresh bean

Conclusion and Recommendation

- More than half of the fresh bean growers use certified seeds. They are open to innovation.
- Educational level of growers is low. This should be isolated via theoretical and applied training course.
- Fresh bean cultivation is profitable. Especially, green bean-indeterminate and kidney bean-indeterminate had three times positive net profit, compared to green bean-dwarf and kidney bean-dwarf.
- Selling price ranges from $0.6 to $1.5 kg^{-1}. If fresh bean producers were organised under umbrella of producer union, selling of fresh bean at desired price and increase income of bean growers could be achieved.
- Growers sell their products in three ways: in cash, forward sale, mixed sale. In order to isolate negative effects of price fluctuations, growers should be informed about market structure or market boards should be established.

References

Anonymous (2009). Records of Tokat provincial directorate of Ministry of Agriculture and Rural Affairs, Turkey.

Dixon, W.J., & Massey, F.J. (1969). *Introduction to Statistical Analysis*. Kogakasha: McGraw-Hill Book Company.

FAO (2009). Statistical database (www.fao.org).

Gunes, T., Kiral, T., Arikan, R., Bulbul, M., Cetin, B., Tatlidil, F., Albayrak, N., Meshur, M., & Celen H. (1988). *Baslica Tarim Urunleri Maliyetleri Arastirma Projesi II*. TMO Aklasan Matbaasi, Ankara-Turkey.

Kiral, T., Kasnakoglu, H., Tatlidil, F., Fidan, H., & Gundogmus, E. (1999). *Methodology for Revenue and Cost Calculation for Agricultural Products and Data Base Guideline*. AERI Project Report 1999-13, Ankara-Turkey.