



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; SP-11(6): 96-99
© 2022 TPI
www.thepharmajournal.com
Received: 02-04-2022
Accepted: 05-05-2022

Madhusudan Tiwari
Department of Agricultural
Economics, Sam Higginbottom
University of Agriculture,
Technology and Sciences,
Prayagraj, Uttar Pradesh, India

Ramchandra
Department of Agricultural
Economics, Sam Higginbottom
University of Agriculture,
Technology and Sciences,
Prayagraj, Uttar Pradesh, India

Estimate resources used, cost returns structure and resource use productivity of soybean in Sagar district, Madhya Pradesh

Madhusudan Tiwari and Ramchandra

Abstract

The study was designed with the conspicuous objectives of evaluate the costs involved in soybean cultivation and repayment from soybean in study area production. Primary data were collected from 80 soybean growers stationed in 10 randomly selected villages of purposively selected one block of sagar district. The respondents were grouped into three size categories marginal small medium. Founded on their size of holding. The secondary data were collected from various sources. it was observed that total cost of cultivation for marginal small and medium soybean grower was Rs 23071.85, 25919.21, 26602.55 respectively on an average cost of cultivation 26394.69 on one hectare of land for soybean the yield of soybean procured by the producer in the study period was found to be 11.44 qt/ha on the overall basis and higher yield in medium farms. Gross income from per hectare of soybean cultivation was ejective at Rs 39598.08 and net return was Rs 13203.39 per hectare cost of production of soybean was calculated 26394.69 qt/ha benefit cost ratio was found out to be 1:1.50.

Keywords: Cost of cultivation, cost of production, gross returns, net profit, benefit-cost ratio

Introduction

Soybean (*Glycine max*) is one of the most important oil crops of the world which also has tremendous importance as a food legume. Soy oil finds a variety of uses for domestic and industrial purposes besides its use in several food preparations and animal feed. Having 53% global production share of all oilseed crops, soybean finds an important place in most of the agricultural production systems of major countries including USA, China, Brazil, Argentina and India. It has found an important place in major crop improvement programs and consequently, there has been a considerable increase in its production and productivity over the last two decades. A number of stable, high-yielding and biotic and a biotic stress resistant variety have been developed using various traditional and modern crop improvement tools. Herbicide-tolerant transgenic soybean has witnessed a huge commercial success and made it a leading biotech crop. At the same time, modification of fatty acid profile of soy oil and improvement in protein content and nutritional quality have established soybean as one of the most viable commercial crop. Soybean is a native of China. Farmers have realized that there had been exceptionally good prices on soybean in the year 2020. Hence, there has been a decision on having 10-12% higher area under soybean cultivation. Local soybean prices have been more than double since the start of 2020-21 marketing year on October 1 and hit a record high of nearly 8100 rupees per 100kg on a sharp rise in soy meal exports.

Materials and Methods

The survey method will be adopted for collecting the data on cost of production and cost of marketing of soybean. The data will be collected by personal visits and interviewing the selected cultivators, intermediaries in the marketing of soybean. The data in respect of area, production and productivity of soybean will be collected. Yearly and district wise data for the entire period will be recorded from various issues of Season and Crop Reports and Epitomes published by the Department of Agriculture, Madhya Pradesh State and from various Government publications.

Analysis of data/ analytical tools used

The secondary data were analyzed from selected district to obtain estimates of growth rates in area, production and productivity of soybean and the primary data were compiled and analyzed

Corresponding Author
Madhusudan Tiwari
Department of Agricultural
Economics, Sam Higginbottom
University of Agriculture,
Technology and Sciences,
Prayagraj, Uttar Pradesh, India

to work out the cost of production and marketing of soybean.

Analytical techniques employed

For achieving the stated objectives, following analytical procedure was adopted:-

Cost of cultivation

The data pertaining to the cost of cultivation of soybean crop are those which are generally adopted in the farm management studies. The various cost concepts are determined by agricultural economists who were used while analyzing the data as:

The economics of production and marketing was work out by using various cost concepts i.e. Cost-A₁, Cost-A₂, Cost-B₁, Cost-B₂, Cost- C₁ and Cost-C₂.

Cost- A₁ = includes value of hired labour, value of owned bullock labour, value of hired bullock labour, value of owned machinery, value of hired machinery, hired machinery charges, value of fertilizer, value of manure (owned and purchased) value of seed (both farm produced and purchased), value of insecticides and pesticides, irrigation charges, canal water charges, land revenue, and other taxes, depreciation of farm implements, farm buildings, farm machinery and irrigation structure, interest on working capital and miscellaneous expenses, marketing cost and rent on land. Cost- A₂ = Cost A₁ + Rent paid for leased in land. Cost- B₁ = Cost A₂ + Interest on fixed capital (excluding land).

Cost- B₂ = Cost- B₁ + Rental value of owned land + Rent for Leased in land.

Cost- C₁ = Cost- B₁ + Imputed value of family labour. Cost- C₂ = Cost- C₁ + 10 percent of cost- C₁ as managerial cost.

(Note: Cost- A = Cost- A₁ + Cost- A₂, Cost- B = Cost- B₁ + Cost- B₂)

Cost concept

Wages of hired human labour were calculated at prevailing wage rates of area for male and female labour. The charges of bullock labour both owned and hired were Calculated at the prevailing rate in the concerned villages. In case of FYM the actual value paid was considered, if purchased.

The value of fertilizer and plant protection chemicals were calculated at the actual price paid by the farmers.

Income measure

Following income measure will be used.

- 1. Gross income:** It is the total value of main product and by- product.

$$GI = (Q_m \times P_m) + (Q_b \times P_b)$$

Where, GI = Gross Income.

Q_m = Quantity of main product.

P_m = Price of main product.

Q_b = Quantity of by-product.

P_b = Price of by-product.

- 2. Return over variable cost (RVC) =** Gross income – Cost- A₁.
- 3. Farm business income (FBI) =** Gross income – Cost- A₂.
- 4. Family labour income (FLI) =** Gross income – Cost- B₂.
- 5. Net income:** This was defined as the difference between gross income and total cost incurred by the farmers. (NI = Gross income - Cost C₂)

Result and Discussion

Cost of Production and Profitability of Soybean

The decision and choice of crops to be grown on a farm and the area to be allocated under a crop depends to a large extent on the prices of output, productivity level, technology available and the level and prices of inputs used in their production. The knowledge of input use, cost structure and returns from the cultivation of crops helps in formulating the policies at macro and micro levels. Such knowledge is more useful for crops taken mainly for the market viz. the cash crops, oilseed crops, spices crops, fruits crops, vegetables and other high value crops. The input use, cost structure and profitability of soybean crop were discussed in the following heads.

Economics of soybean crop

Soybean is one of the major oilseed crops occupying a prominent place in the economy of cultivators. Therefore, cost of soybean cultivation has paramount importance in determining the net income from it.

The physical inputs are necessary in growing any crop per hectare. The physical inputs used by the sampled cultivators are presented in Table 1.

Table 1 explained the pattern of input use in cultivation of soybean in Madhya Pradesh. The use of average hired labour were 2.79, 3.39 and 4.55 male labour days used per hectare and 0.65, 0.86 and 2.73 female labour days used per hectare in case of marginal, small and medium size farm group, respectively. Overall hired labour were 3.73 male and 1.44 female labour days per hectare. The bullock labour utilization in case of marginal, small and medium size groups was 2.55, 1.72 and 1.14 pair days per hectare, respectively. The bullock labour utilization was more in small size group and at overall level, it was 1.57 days.

The details of per hectare component wise costs for soybean cultivation on different size of farms were studied and the results furnished in Table 1.

It could be inferred from the table 1 that per hectare total cost was found highest (Rs. 27702.33/ha) on medium farms and lowest (Rs. 23642.83/ha) on marginal farms with an overall total cost of Rs. 26394.69/ha. Relatively more utilization of hired labour, PP chemical charges and other input might have inflated the higher total cost on medium farms as compared to other farm size groups. Among the different items of cash expenditure, the overall rental value of owned land ranked first with 25.84 per cent of the total cost. Another major cost of soybean cultivation was machine charges (13.88 per cent). The overall maximum per hectare expenditure was on fertilizers cost (Jointly) (10.70per cent) which was followed by seed cost (10.70 per cent), managerial costs (8.79 per cent), interest on fixed capital (8.60per cent), interest on working capital (6.14 per cent), FYM/ manure cost (3.38 per cent), hired labour cost of male and female (2.53 per cent), family labour (2.30 per cent), bullock labour charges (3.78 per cent), PP chemical cost (2.09 per cent), miscellaneous cost (2.46 per cent), depreciation (0.891 per cent) and growth regulators (0.10 per cent).

Among the different farm size groups comparatively more expenditure on different operations was incurred by medium size farm group. That total expenditure incurred was Rs. 27702.35 per hectare. The main items of expenditure were machine charges (12.86 per cent), fertilizer (10.99 per cent), seeds (9.24 per cent), interest on working capital (6.62 per cent), human labour (3.47 per cent), FYM (2.83 per cent), PP

chemical (2.11 per cent), miscellaneous (2.01 per cent) and bullock labour (3.60 per cent).

The total expenditure was comparatively less in marginal size farm group i.e; Rs. 23643.83 per hectare. Out of that maximum share was on machine charges, seeds, fertilizer,

FYM, bullock labour, interest on working capital, PP chemical, human hired labour and miscellaneous cost was 13.42 per cent, 10.90 per cent, 10.22 per cent, 4.04 per cent, 4.12 per cent, 3.40 per cent, 2.15 per cent, 1.90 per cent and 2.10 per cent of the total expenditure, respectively.

Table 1: Item wise- break up of cost of cultivation/ha in soybean crop

Sr. No	Item	Physical unit	Size groups									Wt. Average (N=80)		
			Marginal			Small			Medium					
			Qty.	Value (Rs.)	%	Qty.	Value (Rs.)	%	Qty.	Value (Rs.)	%	Qty.	Value (Rs.)	%
Hired labour														
1.	Male	Days	2.79	365.70	1.53	3.39	440.70	1.69	4.55	612.50	2.20	3.73	484.90	1.83
	Female		0.65	84.50	0.35	0.86	111.80	0.42	2.73	354.90	1.27	1.44	187.20	0.70
2.	Bullock labour charges	Days	2.55	975.90	4.12	1.72	995.90	3.84	1.14	997.90	3.60	1.57	997.90	3.78
3.	Seed (kg.)	Kg	50	2600	10.99	52.09	2708.68	10.45	49.25	2561	9.24	51.13	2658.76	10.07
4.	FYM/Manures	Tonnes	7.64	1146	4.04	6.21	931.50	3.59	5.24	786	2.83	5.96	894	3.38
Chemical Fertilizer														
5.	N	Bag	0.57	153.90	0.65	0.65	175.50	0.67	0.78	210.60	0.75	0.69	186.3	0.70
	P		1.59	1987.50	8.41	1.80	2250	8.68	2	2500	9.02	1.86	2325	8.80
	K		0.53	275.60	1.16	0.60	312	1.20	0.65	338	1.22	0.61	317.20	1.20
6.	Growth regulator	Kg	0.20	50	0.21	0.20	50	0.19	0.20	50	0.18	0.20	50	0.10
7.	Machine charges	Hr.	6.91	3176.30	13.42	7.52	3332.30	12.85	8	3563	12.86	7.65	3433.30	13.00
8.	PP chemical	Rs	-	508.36	2.15	-	538.13	2.07	-	586.41	2.11	-	552.18	2.09
9.	Miscellaneous	Rs.	-	500	2.10	-	600	2.39	-	780	2.01	-	690.83	2.46
10.	Depreciation	Rs.	-	163	0.68	-	225	0.86	-	265	0.95	-	235.35	0.891
11.	IOWC @ 7%	Rs.	-	805.52	3.40	-	1615.83	6.23	-	1835.51	6.62	-	1620.83	6.14
	COST-A	Rs.	-	12792.28	-	-	14287.39	-	-	15440.22	-	-	14592.42	-
12.	RVOL	Rs.	-	5790.93	24.49	-	6455.04	24.90	-	6994.76	25.24	-	6600.64	25.00
13.	IOFC @ 10%	Rs.	-	2100	8.88	-	2230	8.60	-	2377	8.58	-	2271.42	8.60
	COST-B	Rs.	-	2683.19	-	-	22972.38	-	-	24811.98	-	-	23464.48	-
14.	Family labour	Rs.	6.64	863.20	3.65	5.08	660.40	2.54	3.63	471.90	1.70	4.68	608.4	2.30
	COST -C ₁	Rs.	-	21546.39	-	-	23632.78	-	-	25283.88	-	-	24072.81	-
15.	Managerial cost @10%	Rs.	-	2097.44	8.87	-	2286.43	8.82	-	2418.45	8.73	-	2321.81	8.79
16.	Total COST- C ₂	Rs.	-	23071.85	100	-	25919.21	100	-	26602.95	100	-	26394.69	100

IOWC- interest on working capital, RVOL- rental value of owned land, IOFC- interest on fixed capital

Cost structure

Estimates of different costs

Estimation of different costs such as cost- A, cost- B cost- C₁, cost- C₂ is presented in table 2

Table 2: Estimation of different cost

Category of Farm	Different costs (Rs. Per hectare)			
	Cost- A	Cost- B	Cost- C ₁	Cost- C ₂
Marginal	12792.26 (54.10)	20683.21 (87.47)	21546.41 (91.12)	23643.85 (100)
Small	14287.39 (55.12)	22972.38 (88.63)	23632.78 (91.12)	25919.21 (100)
Medium	15440.32 (55.73)	24811.98 (89.56)	25283.88 (91.26)	27702.33 (100)
Overall (Average)	14592.42 (55.28)	23464.48 (88.89)	24072.88 (91.20)	26394.69 (100)

Figure in parenthesis indicate percentage to Cost- C₂

Source: Field Survey

It could be inferred from the Table 2 that overall per hectare expenditure on Cost- A came to Rs. 14592.42 The highest per hectare Cost- A was Rs. 15440.32 on medium farms and lowest was Rs. 12792.26 on marginal farms. The study also shows that the overall total expenditure on soybean production was found to be Rs. 26394.69 per hectare. Out of the total cost share of Cost- B was Rs. 23464.48 and on Cost- C₁ was Rs. 24072.88 On an average, Cost- C₂ came to Rs. 26394.69 per hectare which was highest on medium farms (Rs. 27702.33 per hectare) and lowest on marginal farms (Rs. 23643.85 per hectare). Higher costs on medium farms were

associated with intensive use of human labour, seed, FYM/ manures, fertilizer charges and miscellaneous items. No particular trend was observed in different cost concept on various categories of soybean cultivators.

Yield, price, gross income and net gains

Yield, farm harvest price and value of gross income from soybean production on different farm size groups are presented in Table 3.

Table 3: Yield level, Farm harvest price and Gross income per hectare

Category of farm	Yield (quintal)	Harvest price (Rs./ quintal)	By product (Rs.)	gross income (Rs.)
Marginal	11.23	3247.44	1556.74	34745.58
Small	12.52	3289.00	1597.43	38730.24
Medium	13.01	3385.00	1754.80	41968.60
All Farms	11.44	3317.56	1645.20	39598.08

Source: Field survey

The yield of soybean obtained by the producer in the study period was found to be 11.44 quintals per hectare on the overall basis. It ranged from 13.01 quintals on medium farms to 10.23 quintals on marginal farms. Higher yield level on medium farms may be due to optimum level of inputs utilized by them along with timely weeding operations, proper selection of varieties of soybean, as compared to other farms. The results (Table 3) also indicated that per quintal overall farm harvest price received by the soybean growers was Rs.

3317.56. The overall gross returns per hectare on soybean farms amounted to Rs. 39598.08. It varied from Rs. 34745.58 on marginal farms to Rs. 41968.60 on medium farms. The gross income was high on medium farms followed by small and marginal farms. This might be due to sale of soybean by medium farmers through the channel - I i.e. producer sale to wholesaler and they sale directly oil processor industry and cost of production of per quintal of soybean was less than other categories because of optimal use of input resources.

Table 4: Net gains over different costs per hectare

Category of farm	Net gains over different costs (Rs.)			
	Cost- A	Cost- B	Cost- C ₁	Cost- C ₂
Marginal	21953.32	14062.37	13199.17	11101.73
Small	24442.85	15757.86	15097.46	12811.03
Medium	26528.28	17156.62	16684.72	14266.27
Overall	25005.66	16133.60	15525.20	13203.39

Source: Field survey

A perusal of above table 4 shows that per hectare net returns over operational cost (Cost- A) was the highest on medium farms (Rs. 26528.28) and lowest on marginal farms (Rs. 21953.32) with an overall of Rs. 25005.66 on sample farms. Net returns from soybean farms on the basis of Cost- B, Cost- C₁ and Cost- C₂ were Rs. 16133.6, Rs. 15525.2 and Rs. 13203.39 per hectare, respectively. It is apparent from the table that per hectare net returns on soybean farms over Cost- C₂ ranged from Rs. 14266.27 on medium farms to Rs. 11101.73 on marginal farms with an overall of Rs. 13203.39. No particular trend was observed in different cost concepts on various categories of soybean cultivation.

Conclusion

1. The average area under soybean crop for the different category (Marginal, small, medium) was 1.41 ha. The result revealed that the overall total cost per hectare of soybean was amounted Rs. 26394.69. The total cost was more in medium size farms followed by small and marginal size farms. The different component of cost of cultivation the expenditure incurred on family labour was more in case of marginal farms and share of hired labour was more in medium size farms. The analysis of cost of cultivation shows that on an average, the total cost (Cost C₂) per hectare of soybean cultivation was Rs. 26394.69 for the sample farms of the study area. The cost C₂ was the highest on medium size farms followed by small and marginal farms.
2. The overall gross income per hectare of soybean cultivation was Rs. 39598.08. This was higher on medium farms as compared to the small and marginal farms size group.
3. The result concluded that the overall total cost per quintal of soybean production was more in marginal farmer (Rs. 2257.52) followed by medium and small farms (Rs. 2239.31, Rs. 2227.70, respectively) and overall basis it was Rs. 2232.51.
4. On an overall basis, the farm business income was Rs. 25005.66 per hectare. It was higher on medium farms, followed by small and marginal farms size group.
5. The family labour income also shows the same trend i.e. it was higher on medium farms as compared to small and marginal farms size group. On an overall basis, the family labour income was Rs. 16133.6 per hectare.
6. On an overall basis, the net income per hectare of

soybean cultivation was Rs. 13203.39. It was observed that medium farms earned more profits per hectare followed by small and marginal farms.

7. The returns per rupee investment were Rs. 1.50. It was maximum on medium farms (Rs. 1.57), followed by small (Rs. 1.49) and marginal (Rs. 1.46) farms.

At the overall level, the cost of production was Rs. 26394.69 (Cost-C₂). The major items of cost of cultivation were rental value of owned land, human labour, bullock labour, machine charges, plant protection, and interest on working capital, fertilizer, and manure/FYM. Cost of production was highest in medium size farms followed by small and marginal size farm groups of holdings. The profit at cost- C₂ was highest on medium size farms. Thus, net profit was not increased with increase in the size of farm group but with the proper utilization of the inputs.

References

1. Babhulkar P, Wandire RM, Badole WP, Balpande SS. Residual effect of long terms application of FYM and fertilizer on soil properties (Vertisols) and yield of soybean. *Journal of Indian Society of Soil Science*. 2000;48(1):89-92.
2. Behera UK. Studied integrated nutrient management for Sustaining productivity, quality and profitability of wheat-soybean cropping system. *Indian Farming*, 2006, Dec.
3. Dodke M. The resource use efficiency in the cultivation of turmeric and its productivity. College of Agriculture, Nagpur, India. *Journal of Soils and Crops*. 2002;12(1):124-126.
4. Ganesh K. Evaluation of alternative farming systems in Gazani lands of Karnataka: An economic analysis. M. Sc. (Agri.) Thesis (Unpublished), Univ. Agril, 2000.
5. Kunnal LB, Gaddi M, Olekar JN, Dabali SD. New cotton production technology in Karnataka: An econometric analysis. Paper presented in the symposium Strategies for Sustainable Cotton Production: A Global Vision; Univ. Agril. Sci., 2004.
6. Pol PB. Economics of Production and Marketing of ginger in Satara district. A thesis (unpublished) submitted to Mahatma Phule Krishi Vidyapeeth Rahuri, 2001.
7. Ramkumar K, Kumar V, Kumar K, Dhillion A. Organic produce marketing in Haryana. A success story. *Indian Journal of Agricultural Marketing*. Conference special, 2003, 70-71.
8. Saha H, Biswas T, Bera BK, Roy A. Studied comparative efficiency of rock phosphate and single super phosphate on release of available phosphorus and yield of soybean in an acid soil. *Indian Journal of Agricultural Science*. 2002;72(4):245-247.
9. Saikumar BC. Farming systems in the tank commands of north eastern Karnataka: An economic analysis of Jala Samvardhane Yojana, 2005.
10. Singh GB, Swarup S. Lessons from long term fertility experiments, *Fertilizers News*. 2000;45(2):21-24.
11. Veerapur. An economic analysis of integrated pest management in cotton in Raichur district, Karnataka. M.Sc. (Agri.) Thesis (Unpublished), Univ. Agril. Sci., 1999.