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An Economic Analysis of Soybean Production in Rajnandgaon District of Chhattisgarh, India

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The Present study is to examine An Economic Analysis of soybean Production in Rajnandgaon district of Chhattisgarh, India. The study was undertaken by taking 80 sample farmers during the year 2020-21. To collect information from the sample area, an interview schedule and survey approach were utilized. The objective was achieved by using cost concepts and income measures. The cost of cultivation of soybean was observed highest in case of large farm and lowest in case of marginal farms. The overall cost of production was Rs. 1785.71 per quintal. Gross return from

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soybean was found to be Rs. 68670.84 per hectare. The net return of overall farmers was observed Rs. 32135.15. The Input-output ratio was highest in case of large farmer 1:2.16 and lowest in case of marginal farmer 1:1.98. None of the soybean farmer was applying potash fertilizer to soybean crops, but it plays an important role in nodule formation. Therefore it is required that farmers should apply potash fertilizer to the soybean crop.

Keywords: Cost and return; input-output ratio; potash fertilizer; income measures.

1. INTRODUCTION

Oilseed crop have been the backbone of several agricultural economics from antiquity and play a prominent role in agricultural industries and trade throughout the world. India is fortunate in having a verity of oilseed crops grown in its distinctive rich agro climatic zones. India fifth ranks in the world vegetable oil economy, next to China, Brazil and Argentina. The two main interventions, which have very significantly contributed to the enhancement of the oilseed sector in India, are Technology Mission on Oilseeds (TMO) called oilseed production program (OPP), initiated by the Govt. of India in May 1986, during 8th Five-Year plan in order to enhance the oilseed production in the nation and liberalization of trade in oilseeds in the post-WTO period. The TMO launched special initiatives on several critical fronts such as improvement of oilseed production and processing technology, additional support to oilseed farmers and processors and enhanced customs duty on the import of edible oil and additionally, a program was created to support state government efforts to increase production and productivity of various oilseed crop such as groundnut, soybean, safflower, sunflower, sesame, rapseed-mustard, castor linseed and Niger seed.

"India is one of the largest producers of oilseed accounting for about 20 % of the global area and 10 % of the global production in the world and occupied fourth position in the Indian agricultural economy" (NABARD 2014). "There are 9 oilseed crop grown in India out of 7 are edible oils (soybean, groundnut, rapseed, mustard, sunflower, seasum, safflower and Niger) and 2 of them are non-edible oils (castor and linseed). India ranks 1st in the production of groundnut, 3rd in rapssed-mustard and 5th in soybean. Indian vegetable oil economy is the 4th largest economy in the world. The country accounts for 12-15 % of global oilseed area 6-7 % of vegetable oil production (next to USA, China and Brazil) and 9-10 % of total edible oils consumptions" [1]. Sonnad et al. [2] studied "India accounts for 6.8 % of the oil meal production, 5.9 % of the oil meal export, 6.1% of the vegetable oil export, 9.0% of the vegetable oil import and 9.3 % of the edible oil consumption of the world". Naidau and Sankar [3] observed "the groundnut, soybean and rapseed-mustard accounts for about 80% of area and 87 % of production of oilseed in the country. Oilseed crops accounts for 13 % of gross cropped area, 3% of gross national product, 10 % of total value of output from agricultural crops and 6.0% of value of output from agriculture and allied sector". Department of Sugar and Vegetable oils; DG, CI and S, Dept of Commerce, Kolkata according to a study, the amount of edible oil available per person increased from 3.5 kg/person/year in 1970–1971 to 19.30 kg in 2017–2018. During the financial year 2021 over 36 million metric ton of oilseed were produced in the south Asian country of India. Soybean was the highest produced oilseeds were nearly 13 million metric ton produced in the country that year [4]. Soybean is considered to be world most important seed legume, which contributes to 25 % of the global edible oil and about two-third of the worlds protein concentrate for livestock feeding. Soybean has become an important oilseed crop in India in a very short period with 113.98 lakh ha area under its cultivation during kharif 2019-20. The major soybean growing state Madhya Pradesh, Maharastra, Rajsthan, Karnataka and Telangana. Agarwal and Singh [5] reported that the cost of soybean cultivation was higher in Madhya Pradesh. According to research by Agarwal and Singh [6], Madhya Pradesh's small farmers had the lowest input-output ratios. Kumar et al (2018) reported that "the soybean is one of the important oilseed crops of Chhattisgarh with an area of 107.77 thousand hectares, production 111.86 thousand tons and productivity 1038 kg/ha Rajnandgaon is major soybean growing district of Chhattisgarh".

2. MATERIALS AND METHODS

The study was finite to Rajnandgaon district of Chhattisgarh state. Out of 9 blocks Khairgarh block of Rajnandgaon district were selected on the basis of maximum area among all the oilseed

crops of soybean in kharif season. The list of soybean grower villages was obtained from the office of Deputy Director of Agriculture, Rajnandgaon for the year 2020-21. There were 80 soybean growers, which comprised of 18, 22, 28 and 12 soybean growers of marginal, small, medium and large size categories, respectively. The primary data were collected from sample farmers on all the relevant aspects by using well structured interview schedule to fulfill the objectives of the study. Costs of cultivation of soybean in the sampled farms were analyzed and examined using cost concepts and income measures of the soybean growing farmers.

3. RESULTS AND DISCUSSION

The present section deals with the variable cost and fixed cost for cultivation of soybean in the study area. Table 1 represents the total cost of cultivation for Rajnandgaon district respectively. These are clearly shows that input cost for cultivation of soybean per hectare which is highest in case of large farms and lowest in case of marginal farms. In case of large farmers, they could acquire more income expenditure on modern farm inputs like quality seed, fertilizer, plant protection chemical and machinery etc. The input cost used for soybean cultivation under sample farms was estimated in Rs. per hectare. Table reveals that overall cost of input used for soybean was found to be Rs. 8954.50 (26.91 percent) Which varies from Rs. 8221.54 per hectare (27.45 percent) at marginal farmer, Rs. 8801.06 per hectare (27.28 percent) at small farmer, Rs. 9152.22 per hectare (26.48 percent) at medium farmer and Rs. 9873.89 per hectare (26.59 percent) at large farmer. The cost list item of input for cultivation of soybean crop was human labour which was 24.14 percent to total. The overall human labour cost was noticed to be Rs. 8032.14 per hectare. Family labour cost was Rs. 3830.49 per hectare (12.79 percent) at marginal farms, Rs. 2906.07 per hectare (9.01 percent) at small farms, Rs. 2360.80 per hectare (6.83 percent) at medium farms and Rs. 1154.32 per hectare (3.11 percent) at large farms. Hired labour cost was Rs. 2958.94 per hectare (9.88 percent) at marginal farm, Rs. 4541.43 per hectare (14.07 percent) at small farms, Rs. 6412.06 per hectare (18.55 percent) at medium farm and Rs. 8085.41 per hectare (21.78 percent) at large farms this result was in line with Bhopale et al. [7] Per hectare variable cost increasing trend with increase size of farms was found to be Rs.19107.97 at marginal farmer, Rs. 21275.56 at small farmer, Rs. 23472.81 at medium farmer and Rs. 25864.97 at large farmer similarly found in Agarwal and Singh [5]. The overall machine labour (15.80 percent), Table shows that seed cost was (12.79 percent), manure and fertilizer was (5.89 percent), irrigation was (2.88 percent) and plant protection chemical was (2.77 percent) cost observed. The estimates on operational cost of soybean for different size of group showed that there was a gradual increase in cost of cultivation from Rs. 29952.94 at marginal farmer, Rs.32267.13 at small farmer, Rs. 34560.43 at medium farmer and Rs. 37127.18 at large farmer according to Nahatkar [8], Jaiswal and Hugar [9].

3.1 Cost on the Basis of Cost Concept at Sample Households

The cost and return on the basis of cost concept in the production of soybean is presented in Table 2. On an overall Cost-A1, Cost-A2, Cost-B1, Cost-B2, Cost-C1, Cost-C2 and Cost C3 as Rs. 19859.78 per ha., Rs. 19859.78 per ha., Rs. 20617.64 per ha., Rs. 30617.64 per ha., Rs. 23278.10 per ha., Rs. 33278.10 per ha. and Rs. 36605.91 per ha for soybean respectively, on the sample farms. All costs were comparatively higher at large farms followed by marginal, small and medium farms. It shows that capital spending on production increased with increase in the farm size. This was because the large famers purchased more inputs in each and every season which were required for production of soybean.

3.2 Yield, Cost and Return of Soybean at Sampled Farms

The data of farm measure is presented in Table 3. The overall production was worked out as 18.87 quintal per ha. And by product was 21.87 quintal per ha. Which ranges from about 16.09 quintal per ha and by product 19.20 quintal per ha at marginal farms to 21.89 quintal per ha. and by product 24.89 quintal per ha at large farms. The overall cost of cultivation for soybean was observed to be 33278.10 per ha. The overall gross income was observed as Rs. 68670.84 per ha. In the study area which ranges from Rs. 59195.00 per ha at marginal farms to Rs. 80329.00 per ha at large farms. The overall cost of production was found to be Rs.1785.71 per quintal which range from Rs.1861.59 per quintal at marginal farms to Rs. 1696.08 per quintal at large farms Agarwal and Singh [6] was also studied. On an overall net income estimated was Rs. 32135.15 per ha. Which ranges from Rs.

26362.06 per ha at marginal farms to Rs. 39487.82 per ha. at large farms. Overall family labour income was Rs.38053.20 per ha which varies from Rs. 33072.55 per ha. in case of marginal farms to Rs. 44356.14 per ha at large farms. It shows that family labour income was higher at large farms followed by medium, small and marginal farms. Overall farm business income was Rs. 48811.06 per ha ranges from Rs. 43700.67 per ha at marginal farms to 55268.78 per ha at large farms. Farm business income was calculated by separating Cost A1 from gross income which was higher at large farms. Overall farm investment income was found to be Rs. 46150.60 per ha ranges from 39870.18 per ha at marginal farms to 54114.46 per ha at large farms. The overall price received per quintal for soybean was observed to be Rs. 3500 per ha. Overall input-output ratio for soybean crop was 1:2.06 which ranges from 1:1.98 at marginal farms, 1:2.04 at small farms, 1:2.08 at medium farms and 1:2.16at large farm its indicating that soybean crop is highly profitable enterprise [10-12].

Table 1. Cost of cultivation of soybean (Rs./ha.)

S. N.	Farm size					
	Particulars	**Marginal (18)**	**Small (22)**	**Medium (28)**	**Large (12)**	**Overall (80)**
1	Family Human labour	3830.49 (12.79)	2906.07 (9.01)	2360.80 (6.83)	1154.32 (3.11)	2660.46 (7.99)
2	Hired Human labour	2958.94 (9.88)	4541.43 (14.07)	6412.06 (18.55)	8085.41 (21.78)	5371.69 (16.14)
	Total Human labour	6789.43 (22.67)	7447.50 (23.08)	8772.86 (25.38)	9239.73 (24.89)	8032.14 (24.14)
3	Machine power	4097 (13.68)	5027 (15.58)	5547.73 (16.05)	6751.35 (18.18)	5258.66 (15.80)
	Total labour cost	10886.43 (36.35)	12474.50 (38.66)	14320.59 (41.44)	15991.08 (43.07)	13290.80 (39.94)
4	Seed	4182 (13.96)	4265 (13.22)	4273 (12.36)	4321 (11.64)	4257.53 (12.79)
5	Manure +fertilizer	1804.87 (6.03)	1906.07 (5.91)	1932.04 (5.59)	2361.62 (6.36)	1960.72 (5.89)
7	Irrigation	890 (2.97)	933.70 (2.89)	977.38 (2.83)	1059.46 (2.85)	958.02 (2.88)
8	Plant protection	609.75 (2.04)	878 (2.72)	1067 (3.09)	1137 (3.06)	922.64 (2.77)
9	Interest on working capital	734.92 (2.45)	818.29 (2.54)	902.80 (2.61)	994.81 (2.68)	855.59 (2.57)
	Sub total	8221.54 (27.45)	8801.06 (27.28)	9152.22 (26.48)	9873.89 (26.59)	8954.50 (26.91)
	Variable cost	19107.97 (63.79)	21275.56 (65.94)	23472.81 (67.92)	25864.97 (69.67)	22245.30 (66.85)
B	**Fixed cost**					
1	Land Revenue	12 (0.04)	12 (0.04)	12 (0.03)	12 (0.03)	12 (0.04)
2	Depreciation on implement	204.85 (0.68)	251.35 (0.78)	277.39 (0.80)	337.57 (0.91)	262.93 (0.79)
3	Rental value of owned land	10000 (33.39)	10000 (30.99)	10000 (28.93)	10000 (26.93)	10000 (30.05)
4	Interest on fixed capital	628.12 (2.10)	728.22 (2.26)	798.23 (2.31)	912.64 (2.46)	757.86 (2.28)
	Sub-total	10844.97 (36.21)	10991.57 (34.06)	11087.62 (32.08)	11262.21 (30.33)	11032.80 (33.15)
C	Total cost (A+B)	29952.94 (100)	32267.13 (100)	34560.43 (100)	37127.18 (100)	33278.10 (100)

Table 2. Cost concept wise cost in soybean at the sample farm (Rs./ha)

S.N.	Cost	Marginal	Small	Medium	Large	Overall
1	Cost A1	15494.33	18632.84	21401.40	25060.22	19859.78
2	Cost A2	15494.33	18632.84	21401.40	25060.22	19859.78
3	Cost B2	16122.45	19361.06	22199.63	25972.86	20617.64
4	Cost B2	26122.45	29361.06	32199.63	35972.86	30617.64
5	Cost C1	19952.94	22267.13	24560.43	27127.18	23278.10
6	Cost C2	29952.94	32267.13	34560.43	37127.18	33278.10
7	Cost C3	32948.23	35493.84	38016.47	40839.90	36605.91

Table 3. Yield, cost and return of soybean on the sample farm (Qtl/ha & Rs./ha)

Particulars	Marginal		Small		Medium		Large		Overall	
	Qt/ha	Rs/ha	Qt/ha	Rs/ha	Qt/ha	Rs/ha	Qt/ha	Rs/ha	Qt/ha	Rs/ha
Main yield	16.09	3500	17.95	3500	19.57	3500	21.89	3500	18.87	3500
Income-1	56315.00		62825.00		68495.00		76615.00		66045	
By- product yield	19.20	150	20.65	150	22.87	150	24.76	150	21.87	150
Income-2	2880		3097.50		3430.50		3714		3280.5	
Gross-income	59195.00		65922.50		71925.50		80329.00		68670.84	
Cost of cultivation	29952.94		32267.13		34560.43		37127.18		33278.10	
Net income	26362.06		30557.87		33934.57		39487.82		32135.15	
Cost of production (Rs/qt)	1861.59		1797.61		1765.99		1696.08		1785.71	
Family labour income	33072.55		36561.44		39725.87		44356.14		38053.20	
Farm business income	43700.67		47289.66		50524.10		55268.78		48811.06	
Farm investment	39870.18		44383.59		48163.30		54114.46		46150.60	
Input output ratio	1:1.98		1:2.04		1:2.08		1:2.16		1:2.06	

Table 4. Income over different cost

S.N.	Cost	Marginal	Small	Medium	Large	Overall
1	Cost A1	43701.26	47289.66	50524.10	55268.78	48811.06
2	Cost A2	43701.26	47289.66	50524.10	55268.78	48811.06
3	Cost B2	43073.14	46561.44	49725.87	54356.14	48053.20
4	Cost B2	33073.14	36561.44	39725.87	44356.14	38053.20
5	Cost C1	39242.65	43655.37	47365.07	53201.82	45392.74
6	Cost C2	29242.65	33655.37	37365.07	43201.82	35392.74
7	Cost C3	26247.36	30428.66	33909.03	39489.10	32064.93

3.3 Income over Different Cost at Sample Farms

The incomes over different costs were also worked out Table 4. The overall per hectare income over CostA1, CostA2, CostB1, CostB2, CostC1, CostC2 and CostC3 calculated was Rs. 48811.06, Rs. 48811.06, Rs. 48053.20, Rs. 38053.20, Rs. 45392.74, Rs. 35392.74 and Rs. 32064.93 respectively.

4. CONCLUSION

The result revealed that cost of cultivation of soybean was highest on large farmer followed by medium, small and lowest on the marginal size farm, large farmers has the highest expenditure incurred on human labour and seed while the large farmer has highest expenditure on machinery labours, fertilizer and plant protection chemical. Time of survey it observed that farmers are growing soybean under rain fed condition and some of farmers were applying irrigation water. Due to uneven distribution of rainfall, soybean crop faced water stress during the critical stage of crop, resulting low yield. To sustain soybean production soybean growers should provide some irrigation when required. The Input-output ratio of soybean was increasing at increase farm size group.

HIGHLIGHTS

- Cost of cultivation of soybean was highest in case of large farmers.
- The Input-output ratio was increasing at increase farm size group.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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