



## Research Article

# INPUT USE, COSTS STRUCTURE AND RETURN ANALYSIS OF SOYBEAN IN SOUTH GUJARAT

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**Abstract-** Present study was designed to measure input use, cost structure and return in soybean production of South Gujarat division of Gujarat, India. In present investigation the sample of 144 soybean farmers were selected from study area with a view to examine the input use, cost structure and returns in production and marketing of soybean growers in year 2014-15. The present study was undertaken in Surat and Tapi district of south Gujarat because the new introduced crop in this area. The results of study revealed that the average total cost of cultivation of soybean was Rs. 25539.95. The average overall farm harvest price received by the soybean growers was Rs. 3317.56 per quintal. It varied from Rs. 3247.44 on marginal farms to Rs. 3385.00 on medium farms. The average net profit/ha over (cost-C<sub>2</sub>) was Rs. 14058.13 and it increased with the increase in size of farms. The overall input – output ratio was 1:1.55 on the basis of cost-C<sub>2</sub>. It was the highest (1:1.58) on medium farms, followed by small farms (1:1.54), and marginal farms (1:1.51). The average cost of production per quintal of soybean was about Rs. 2232.51 which was lowest than the market price of soybean ranging from Rs. 3000 to Rs. 3300 per quintal.

**Keywords-** Input use, Cost structure, Returns, Production and soybean.

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## Introduction

Oil seed crops have a vital role to play in the Indian agriculture industry and export trades. The important oilseeds grown in Gujarat are groundnut, mustard, rapeseed, soybean, castor, sesame, sunflower and safflower. (Source: Centre for Management in Agriculture (CMA), 2014) In India 10.8 percent of area is under oilseed crops. India is a second largest producer of oilseed crop in the world next to China, with a share of 19.25 percent of total world production. (Source: USDA Report 2013-14)

Gujarat occupies a prominent place in the oilseed map of the country with a production of 30.94 million tones with an area of 26.46 million ha. Soybean share is 4.3 percent of the total production of oilseed crops. Major area of production of soybean in India is Madhya Pradesh. [1] Gujarat stands 7<sup>th</sup> position in area and production of soybean crop. During 2012-13 the area under soybean in Gujarat was 0.09 million ha with 0.09 Mt. production and productivity was observed 1050 kg/ha. (Source: Soybean Processors Association of India) So we conducted this study for remedial measures for better management and to earn higher returns from soybean crops. Therefore, the proposed investigations taken special objective of examine the cost of production and profitability of soybean in South Gujarat.

## Materials and Methods

Surat and Tapi districts were selected purposively as the districts have sizable area under cultivation with good irrigation facilities. Soybean is a newly introduced crop in these districts of the South Gujarat. Multistage random sampling technique was followed for the selection of districts, Talukas, Villages and respondents. Out of nine Talukas viz; Mangrol and Umarpada were selected on the basis of area

under soybean cultivation. Out of six Talukas in the Tapi district, two Talukas viz; Vyara and Songadh were selected. In order to select the villages, Taluka development officer was contacted and lists of the soybean growing villages were prepared. From the prepared list, six villages were selected randomly from the each selected taluka. Thus total 24 villages were selected for the study. A list of all soybean growing farmers of the selected villages were obtained from the village Talathi cum Mantri. A sample of one hundred forty four farmers was selected adopting the multistage stratified random sampling technique. [3]

## Data Analysis

**A. 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 being used while analyzing the data as. [2]

Cost A<sub>1</sub>: It includes value of hired human labour, Value of hired and owned bullock labour, Value of hired and owned machine labour, Value of seed (both farm seed and purchased), Value of manures (owned and purchased), Cost of fertilizers, Plant protection charges (insecticide/pesticide), Irrigation charges, Land revenue, Interest on working capital, Miscellaneous expenses, Depreciation.

Cost A<sub>2</sub>: Cost A<sub>1</sub> + rent paid for leased in land.

Cost B<sub>1</sub>: Cost A<sub>2</sub> + interest on fixed capital (excluding land).

Cost B<sub>2</sub>: Cost B<sub>1</sub> + rental value of owned land + rent for leased in land.

Cost C<sub>1</sub>: Cost B<sub>1</sub> + imputed value of family labour.

Cost C<sub>2</sub>: Cost C<sub>1</sub> + 10 percent of cost C<sub>1</sub> as management cost.

**B. Cost of production:**

$$\text{Cost of production/Qt} = \frac{\text{Cost of cultivation}}{\text{Quantity of main product}}$$

**C. Income measures:** Following income measure and were used:

1. Gross income: It is the total value of main product as well as of 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. Returns over variable cost (RVC) = Gross income - Cost  $A_1$

3. Farm business income (FBI) = Gross income - Cost  $A_2$

4. Family labour income (FLI) and management = Gross income - Cost  $B_2$

5. Net income (NI) = Gross income - Cost  $C_2$

$$6. \text{Returns per rupee (RPR)} = \frac{\text{Gross income}}{\text{Cost } C_2}$$

**D. Benefit Cost Ratio (BCR):** The benefit cost ratio (BCR) was worked out by using following formula [2]:

$$B: C \text{ ratio} = \frac{\text{Discounted cash inflows}}{\text{Discounted cash outflow}}$$

**Results and Discussion****Pattern of input use in cultivation of soybean crop**

It could be inferred from the [Table-1] that per ha total cost was found highest (Rs. 26602.95) on medium farms and the lowest (Rs. 23071.85) on marginal farms with an overall total cost of Rs. 25539.95. Relatives more utilization of hired labour, chemical fertilizer and plant protection might have inflated the high cost on medium farms as compared to other farm size groups [5]. Rental value of own land ranked first with Rs. 25.84 percent of the total cost due to the cultivation of soybean because now a day increases in value of land. Tractor charges ranked second with 12.88 per cent of the total cost due to increase in diesel prices.

The other per hectare expenditure were expenditure on chemical fertilizer (11.07 per cent), seed (10.41 per cent), managerial costs (9.09 per cent), fixed capital (8.89 per cent), interest on working capital (6.14 per cent) FYM and manure (3.50 per cent), bullock labour (2.32 per cent), miscellaneous (1.55 per cent), depreciation (0.92 per cent) and growth regulators (0.20 per cent).

**Table-1** Pattern of input use in cultivation of soybean crop (Rs/hectare)

Sr. No.	Item	Category of farm			
		Marginal	Small	Medium	Overall
1	Total human labour	1310.40 (5.68)	1212.90 (4.82)	1418.30 (5.32)	1280.50 (5.01)
	a. Family	863.20 (3.74)	660.40 (2.63)	471.90 (1.77)	608.40 (2.38)
	b. Hired	447.20 (1.94)	552.50 (2.19)	946.40 (3.55)	672.10 (2.63)
2	Bullock labour	963.90 (4.18)	650.16 (2.59)	430.92 (1.62)	593.46 (2.32)
3	Tractor charges	2971.30 (12.88)	3233.60 (12.86)	3440.00 (12.93)	3289.50 (12.88)
4	Seed	2600.00 (11.27)	2708.68 (10.77)	2561.00 (9.63)	2658.76 (10.41)
5	FYM and Manures	1146.00 (4.97)	931.50 (3.70)	786.00 (2.95)	894.00 (3.50)
6	Fertilizer	N 153.90 (0.67)	175.50 (0.70)	210.60 (0.79)	186.30 (0.73)
		P 1987.50 (8.61)	2250.00 (8.95)	2500.00 (9.40)	2325.00 (9.10)
		K 275.60 (1.19)	312.00 (1.24)	338.00 (1.27)	317.20 (1.24)
7	Insecticide and pesticide	508.36 (2.20)	538.13 (2.14)	586.41 (2.20)	552.18 (2.16)
8	Growth regulator	50.00 (0.22)	50.00 (0.20)	50.00 (0.19)	50.00 (0.20)
9	Miscellaneous	300.00 (1.30)	375.00 (1.49)	450.00 (1.69)	395.83 (1.55)
10	Depreciation	163.00 (0.71)	225.00 (0.89)	265.00 (1.00)	235.35 (0.92)
11	Interest on working capital	653.52 (2.83)	1516.83 (6.03)	1776.51 (6.68)	1568.00 (6.14)

12	Interest on fixed capital	2100.00 (9.10)	2230.00 (8.87)	2377.00 (8.94)	2271.42 (8.89)
13	Rental value of owned land	5790.93 (25.10)	6455.04 (25.67)	6994.76 (26.29)	6600.64 (25.84)
14	Managerial cost	2097.44 (9.09)	2286.43 (9.09)	2418.45 (9.09)	2321.81 (9.09)
15	Total	23071.85 (100.00)	25150.77 (100.00)	26602.95 (100.00)	25539.95 (100.00)

Note: Figures in parentheses indicated percentage to total

**Estimates of different costs**

Estimates of different costs such as Cost  $A_1$ , Cost  $B_1$ , Cost  $C_1$  and Cost  $C_2$  are presented in [Table-2]. It could be inferred from the above table that overall per hectare Cost-  $A_1$  came to Rs. 13737.68. The highest per hectare Cost-  $A_1$  was Rs. 14340.84 on medium farms and lowest was Rs. 12220.28 on marginal farms. The study also shows that (Cost -  $B_1$ ) and (Cost -  $C_1$ ) accounted for about 88.53 and 90.91 per cent of the total (Cost -  $C_2$ ). On an average, Cost -  $C_2$  came to Rs. 25539.95 per hectare, which was highest on medium farms (Rs. 26602.95) and lowest on marginal farms (Rs. 23071.85 per hectare).

**Table-2** Estimation of different cost

Category of Farm	Different costs (Rs. Per hectare)			
	Cost- $A_1$	Cost $B_1$	Cost- $C_1$	Cost- $C_2$
Marginal	12220.28 (52.97)	20111.21 (87.17)	20974.41 (90.91)	23071.85 (100)
Small	13518.90 (53.75)	22203.94 (88.28)	22864.34 (90.91)	25150.77 (100)
Medium	14340.84 (53.91)	23712.60 (89.14)	24184.50 (90.91)	26602.95 (100)
Overall (Average)	13737.68 (53.79)	22609.74 (88.53)	23218.14 (90.91)	25539.95 (100)

Figure in parenthesis indicate percentage to Cost-  $C_2$

**Yield, price, gross income and net gains**

It is revealed that the average yield of soybean was 11.44 quintals per hectare. It ranged from 10.22 quintals on marginal farms to 11.88 quintals on medium 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, which affect the output to a greater extent, as compared to other farms. The result in [Table-3] indicates that per quintal average farm harvest price received by the respondent soybean growers was Rs. 3317.56. The medium size growers realized higher prices per quintal (Rs. 3385.00) followed by small (Rs. 3289.00) and on marginal (Rs. 3247.44). generally, medium farm grower sell their produce at higher prices compared to small and marginal farms, which was mainly due to time of sale and agencies to which the produce was sold. The average gross return per hectare on soybean farms amounted to Rs. 39598.08 it varied from Rs. 41968.60 on medium farms and Rs. 34745.58 on marginal farms. The gross income was high on medium farms followed by small and marginal farms [4].

**Table-3** Yield level, Farm harvest price and gross income per hectare

Category of farm	Yield (quintal)	Harvest price (Rs./quintal)	By product (Rs.)
Marginal	10.22	3247.44	1556.74
Small	11.29	3289.00	1597.43
Medium	11.88	3385.00	1754.80
All Farms	11.44	3317.56	1645.20

**Table-4** Net gains over different costs per hectare

Category of farm	Net gains over different costs (Rs.)			
	Cost- $A_1$	Cost- $B_1$	Cost- $C_1$	Cost- $C_2$
Marginal	22525.30	14634.37	13771.17	11673.73
Small	25211.34	16526.30	15865.90	13579.47
Medium	27627.76	18256.00	17784.10	15365.65
Overall	25860.40	16988.34	16379.94	14058.13

A perusal of above [Table-4] shows that the per hectare net returns over operation cost (Cost- $A_1$ ) was the highest (Rs. 27627.76) on medium farms and lowest (Rs.

22525.30) on marginal farms with on an average of Rs. 25860.40 on sample farms. A net return from soybean farms on the basis of Cost B<sub>1</sub>, Cost C<sub>1</sub> and Cost C<sub>2</sub> was Rs. 16988.34, Rs. 16379.94 and Rs. 14058.13 per hectare, respectively. It is apparent from the [Table-4] that per hectare net returns on soybean farms over Cost C<sub>2</sub> ranged from Rs. 15365.65 on medium farms to Rs. 11673.73 on marginal farms with an overall f Rs. 14058.13. No particular trend was observed in different cost concepts on various categories of soybean cultivators.

[Table-5] narrated the overall per hectare farm business income, family labour income and farm investment income were Rs. 25860.40, Rs. 16988.34 and Rs. 16379.94 respectively. The data further revealed that the net profit per hectare (over Cost- C<sub>2</sub>) was Rs. 14058.13 for all farms.

**Table-5** Farm Business income, Family labour income, Farm investment income and Net profit over Cost-C<sub>2</sub> (Rs/hectare)

Category of farm	Marginal	Small	Medium	Weighted cost
Farm business income	22525.30	25211.34	27627.76	25860.40
Family labour income	14634.37	16526.30	18256.00	16988.34
Farm investment income	13771.17	15865.90	17784.10	16379.94
Net profit	11673.73	13579.47	15365.65	14058.13

### Input- Output Ratio

The input- output ratio reflects the criteria for economic viability of the crop based on return per rupee investment. The input- output ratios were worked out on the basis of different cost concepts and the same are presented in [Table-6]. The overall input- output ratio was 1: 1.55 on the Cost- C<sub>2</sub>. It indicates that an investment worth Rs. 1 on all the input used in the cultivation of soybean yielded an output worth 1.55. The input- output ratio was the lowest (1: 1.51) on marginal farms and the highest (1: 1.58) on medium farms. Further, it was observed that the input- output ratio on the basis of Cost- A<sub>1</sub> i.e. paid out cost, was highest (1: 2.93) on medium farms followed by small (1: 2.86) and marginal farms (1: 2.84).

**Table-6** Input- Output Ratio

Category of farm	Cost-A <sub>1</sub>	Cost-B <sub>1</sub>	Cost-C <sub>1</sub>	Cost-C <sub>2</sub>
Marginal	1:2.84	1:1.73	1:1.66	1:1.51
Small	1:2.86	1:1.74	1:1.69	1:1.54
Medium	1:2.93	1:1.77	1:1.74	1:1.58
Overall	1:2.88	1:1.75	1:1.71	1:1.55

### Costs per quintal

It is the cost- price relationship (the cost- price ratio) that generally decides the economic prosperity and the degree of commercialization on these farms. Given the price, offered by the market mechanism to a unit of output, the farmers' prosperity depends upon his capacity to produce his output at a lesser cost than the market price.

The estimated cost of production per quintal of soybean is given in [Table-7]. The overall paid out cost (Cost- A<sub>1</sub>) per quintal was Rs. 1200.85, which were 53.79 per cent of the total cost. The overall cost- B<sub>1</sub> came to Rs. 1976.38 per quintal which was 88.53 per cent of total cost. The overall total cost of production (Cost- C<sub>2</sub>) per quintal of soybean was about Rs. 2232.51. Cost of production per quintal was highest on marginal farms (Rs. 2257.52), followed by medium farms (Rs. 2239.31) and small farms (Rs. 2227.70).

**Table-7** Cost of production per quintal on the basis of different cost concepts

Category of Farm	Different costs (Rs. Per quintal)			
	Cost-A <sub>1</sub>	Cost-B <sub>1</sub>	Cost-C <sub>1</sub>	Cost-C <sub>2</sub>
Marginal	1195.72 (52.97)	1967.83 (87.17)	2052.29 (90.91)	2257.52 (100)
Small	1197.42 (53.75)	1966.69 (88.28)	2025.19 (90.91)	2227.70 (100)
Medium	1207.14 (53.91)	1996.01 (89.14)	2035.73 (90.91)	2239.31 (100)
Overall (Average)	1200.85 (53.79)	1976.38 (88.53)	2029.56 (90.91)	2232.51 (100)

Note: Figures in parentheses indicate the percentages to Cost- C<sub>2</sub>

Here, there was a decreasing trend in cost according to size. The market price of soybean for producer ranged from Rs. 3000 to Rs. 3450 per quintal. Therefore, it can be concluded that the soybean cultivation was quite remunerative even if the lowest market price is considered.

### Conclusion

The present investigation was intended to depict the picture of the soybean growing enterprise in Surat and Tapi districts. The per hectare soybean cultivation, it was observed that use of hired human labour, machine or tractor, plant protection chemical and chemical fertilizer are more utilized as increased in size of farms. It was also noticed that per hectare bullock labour decreased with increased in size of farms because of more utilized machine or tractor used. At the overall level, the cost of production was Rs. 25539.95 (Cost-C<sub>2</sub>). Cost of production was highest on medium size farms followed by small and marginal size farm groups of holdings. The profit at Cost C<sub>2</sub> 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.

### Conflict of Interest: None declared

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