

## **Economics of soybean cultivation and its marketing pattern in Malwa plateau of Madhya Pradesh**

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### **ABSTRACT**

The study was undertaken with the objective to find out the economics of production of soybean on various sizes of farms, its marketing behaviour and to analyse the costs, returns and price spread in the marketing of soybean of farmers in Madhya Pradesh. Study revealed that the total cost increased with the increase in the farm size. The total cost and its component in large farmers was relatively higher than those in medium and small farmers. The net return was found higher for large farmers followed by medium and small farmers since large farmers used more resources in production process. In the marketing of soybean middleman's margin was highest in channel III followed by channel IV, II and I. The producers share in consumers rupee was highest in channel I (73.17 per cent) followed by channel IV, II and III. The marketing channels II and III were complicated involving a number of middlemen and market functionaries between the producer and consumer as compared to channels I and IV. The marketing efficiency was highest in channel I followed by channel IV, II and III. In this channel a large number of intermediaries were involved resulting in higher marketing cost and lower market efficiency. Study concluded that there was immense scope for soybean processing industry which should be promoted in order to generate gainful income and employment in the study area.

**Keywords:** Soybean; production; marketing; price spread

### **INTRODUCTION**

Soybean (*Glycine max* L) is the most important rainy season oilseed crop grown on vertisols of the semi-arid tropical region of central India. Though the area under soybean has increased eight folds during 1982-1996 the productivity gap

between an achievable potential grain yield of 3 tons/ha and the current yield levels of 1 ton/ha still remains very wide (Gupta and Rajput 2001). India ranks third after Argentina and Brazil in production of soybean. Soybean was a minor crop during the early 1970s but at present it occupies third place in oilseed production in India.

To the edible oil pool soybean has attained a prominent position in India's agro-economy with 12 per cent contribution. Soybean is making a head way in oilseed front both in area and production immediately after groundnut, rapeseed and mustard. The area under soybean in India has rapidly increased from 0.03 million ha in 1990 and to 7.46 million ha in 2004-05. Presently in India 9.63 million ha area is under soybean producing about 12.74 metric ton with the average yield of 1,327 kg/ha. Soybean is the main oilseed crop grown in the country. It is extensively cultivated in the state of MP, Rajasthan, Maharashtra and Uttar Pradesh. Though the crop was introduced in Madhya Pradesh during the later part of 1960s its spread in the state has been remarkable. Currently Madhya Pradesh accounts for nearly 58.0 per cent of the total area under this crop in the country and contributes about 52.0 per cent of the total national production (2010-11)(Anon 2011). The present study was undertaken with the objectives of studying the economics of production of soybean on various categories of farms and to find out the marketing behaviour of soybean growing farmers and study the costs, returns and price spread in the marketing of soybean in the state.

## METHODOLOGY

District Indore and Dhar of Malwa plateau agro-climatic zone was purposively selected for the present study. A multistage

stratified random sampling was used to select the block, cluster of villages and the respondents viz soybean growers under the command area of Krishi Upaj Mandi Sameti, Indore and Dhar. A list of the soybean growing farmers from these villages was prepared and in total 60 growers were selected from the universe of 2 villages of Indore block of district Indore and similarly from Dhar district. The respondents were divided into three groups viz small farmers (< 2 ha) medium farmers (2-4 ha) and large farmers (> 4 ha) based on land holding size of the farmers. Thus 80 small, 80 medium and 80 large farmers were selected randomly in proportion to their total number in each farm size group. The primary data required for the study were collected from selected farmers, village merchants, wholesalers, processors and retailers through personal interview method with the help of well structured and pre-tested schedule. The market behavior of the soybean growing farmers and breakup of the consumer's rupee, cost of marketing and margins of different intermediaries involved in soybean marketing channels were worked out.

The collected data was subjected to various statistical and econometric analyses to draw meaningful inferences. The tabular presentation technique was followed to study the costs and returns expressed by the farmers in case of soybean. For studying the economics of soybean cultivation tabular presentation was

## Soybean cultivation and marketing

Table 1. Operational and overhead costs in the cultivation of soybean crop on sample farms

| Particulars                        | Farm size group       |                      |                      |                      |
|------------------------------------|-----------------------|----------------------|----------------------|----------------------|
|                                    | Small (< 2 ha)        | Medium (2-4 ha)      | Large (> 4 ha)       | Overall              |
| <b>A. Operational cost (₹/ha)</b>  |                       |                      |                      |                      |
| Family labour                      | 4,653.60<br>(16.03)   | 901.43<br>(2.82)     | 350.67<br>(1.06)     | 2,272.76<br>(7.20)   |
| Hired human labour                 | 1,593.90<br>(5.49)    | 3,241.05<br>(10.14)  | 3,686.50<br>(11.15)  | 2,861.60<br>(9.06)   |
| Bullock labour                     | 549.20<br>(1.89)      | 491.60<br>(1.54)     | 300.50<br>(0.91)     | 363.60<br>(1.15)     |
| Machine labour                     | 4,041.30<br>(13.92)   | 6,165.65<br>(19.29)  | 6,618.85<br>(20.03)  | 5,721.38<br>(18.12)  |
| Seed                               | 4,406.50<br>(15.18)   | 4,285.02<br>(13.41)  | 4,370.72<br>(13.22)  | 4,285.58<br>(13.57)  |
| Fertilizer                         | 2,560.00<br>(8.82)    | 3,224.22<br>(10.09)  | 3,288.70<br>(9.95)   | 3,224.64<br>(10.21)  |
| Plant protection                   | 1,438.00<br>(4.95)    | 1,928.60<br>(6.03)   | 2,053.60<br>(6.21)   | 1,534.85<br>(4.86)   |
| Weedicide                          | 1,560.00<br>(5.37)    | 2,101.20<br>(6.57)   | 2,143.22<br>(6.48)   | 2,101.47<br>(6.65)   |
| Manure                             | 791.60<br>(2.73)      | 877.56<br>(2.75)     | 938.99<br>(2.84)     | 889.52<br>(2.82)     |
| Culture                            | 105.00<br>(0.36)      | 158.10<br>(0.49)     | 161.26<br>(0.49)     | 158.12<br>(0.50)     |
| Interest on working capital (10 %) | 2,231.64<br>(7.69)    | 2,337.44<br>(7.31)   | 2,391.30<br>(7.24)   | 2,341.35<br>(7.41)   |
| Sub-total variable cost            | 23,930.74<br>(82.430) | 25,711.87<br>(80.44) | 26,304.31<br>(79.59) | 25,754.87<br>(81.55) |
| <b>B. Overhead costs (₹/ha)</b>    |                       |                      |                      |                      |
| Land revenue and taxes             | 6.18<br>(0.02)        | 9.6<br>(0.03)        | 11.8<br>(0.04)       | 9.16<br>(0.03)       |
| Rental value of land               | 4,057.42<br>(13.98)   | 4,517.95<br>(14.13)  | 5,423.73<br>(16.41)  | 4,560.60<br>(14.44)  |

|                                 |                       |                       |                       |                       |
|---------------------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| Depreciation                    | 192.61<br>(1.01)      | 784.01<br>(2.45)      | 448.8<br>(1.36)       | 475.14<br>(1.50)      |
| Interest on fixed capital (12%) | 743.3<br>(2.56)       | 940.19<br>(2.94)      | 861.5<br>(2.61)       | 781.66<br>(2.48)      |
| Sub-total of fixed cost         | 5,099.51<br>(15.44)   | 6,251.75<br>(19.56)   | 6,745.83<br>(20.41)   | 5,826.56<br>(18.45)   |
| Total cost (A+B)                | 29,030.25<br>(100.00) | 31,963.62<br>(100.00) | 33,050.14<br>(100.00) | 31,581.43<br>(100.00) |

Figures in parentheses are the percentage of total

followed. The cost data incurred in soybean production were tabulated under cost A, B and C (Raju and Rao 1993).

where

Cost A<sub>1</sub>= All actual expenses (cash and kind) incurred in farming

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 owned fixed capital (excluding land)

Cost B<sub>2</sub>= Cost B<sub>1</sub> + rental value of owned land + rent paid 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 B<sub>2</sub> + imputed value of family labour

Cost C<sub>3</sub>= Cost C<sub>2</sub> + 10 % cost of C<sub>2</sub> to account for managerial input of the farmer

#### Producer's Share in consumer's rupee

Producer's share in consumer's rupee was worked out by the following method (Acharya and Agrawal 2004):

$$Ps = (P_f/P_r) 100$$

where

Ps= producer's share in consumer's rupee (₹/q)

P<sub>f</sub>= producer's price (₹/q)

P<sub>r</sub>= price paid by the consumers (₹/q)

#### Marketing efficiency

The marketing efficiency of different channels of marketing was estimated by using the formula as mentioned below (Acharya and Agrawal 2004):

$$ME = FP/MC + MM$$

where

ME= Index of marketing efficiency

FP= Price received by the farmer (₹/q)

$$MC = \frac{\text{Total marketing costs (₹/q)}}{\text{Net marketing margins (₹/q)}} MM =$$

## RESULTS and DISCUSSION

### Cost of cultivation

The cost of cultivation for soybean has been given in Table 1 for small, medium and large farmers as well as for all farmers. It can be observed from the data that the total cost of cultivation of soybean was ₹31,273.24 per hectare of which variable cost and fixed cost formed about 81.37 and 18.63 per cent respectively. The total cost increased with the increase in the farm size. It was also observed that among the costs, cost of machine labour was the major component followed by human labour (hired + family) rental value of land and seed. Similar pattern of components of total cost of cultivation was observed in all categories of farmers namely small, medium and large farmers. However the extent of total cost and its component in medium farmers was relatively higher than that in large and small farmers.

### Returns

The details of yields and various income measures for soybean were worked out and the data are presented in Table 2. It was observed that the gross returns as well as yield per hectare increased with the increase in the size of farms. It was observed that the highest gross return per hectare was obtained in large size of holding which was ₹73,733.00 per hectare followed by

medium ₹69,500.0 per hectare and in small ₹68,735.0 land holding. Various measures of farm profits were also estimated viz net, family labour, farm business and farm investment income according to size of farms for soybean cultivation. It can be observed from the Table 2 that net, family labour, farm business and farm investment income increased with increase in farm size.

The benefit cost ratio was higher in case of large farmers at Cost  $C_2$  level followed by medium and small farmers. Similar pattern was observed at Cost  $C_3$  level. It is evident from the table that benefits are higher per rupee invested in case of large farmers as they used resources more efficiently as compared to medium farmers who invested heavily for less proportionate returns. As small farmers used fewer resources they could maintain good yield. At average level the benefit cost ratio was found to be 1:2.12 and 1:1.92 at Cost  $C_2$  and Cost  $C_3$  levels respectively. This ratio indicates that the return to every rupee of investment in soybean cultivation increased with increase in farm size.

### Costs, margins and price spread in marketing of soybean crop

Efficient marketing of soybean plays an important role in increasing the producer's share in consumer's rupee and maintains the tempo of increased production. Soybean marketing in particular is mainly in the hands of middlemen like

Table 2. Costs, returns and profitability measures of soybean cultivation for different size of farmers

| Particulars                               | Farm-size groups |                 |                |           |
|-------------------------------------------|------------------|-----------------|----------------|-----------|
|                                           | Small (< 2 ha)   | Medium (2-4 ha) | Large (> 4 ha) | Overall   |
| <b>Yield (q/ha)</b>                       |                  |                 |                |           |
| Main product                              | 20.50            | 20.65           | 21.94          | 21.03     |
| By product                                | 20.90            | 22.80           | 23.50          | 22.40     |
| <b>Returns (₹/ha)</b>                     |                  |                 |                |           |
| Main product                              | 65,600.00        | 66,080.00       | 70,208.00      | 67,296.00 |
| By product                                | 3,135.00         | 3,420.00        | 3,525.00       | 3,360.00  |
| Gross returns (₹)                         | 68,735.00        | 69,500.00       | 73,733.00      | 70,656.0  |
| <b>Cost concepts (₹)</b>                  |                  |                 |                |           |
| Cost A <sub>1</sub>                       | 23,930.74        | 25,711.87       | 26,304.31      | 25,754.87 |
| Cost A <sub>2</sub>                       | 23,930.74        | 25,711.87       | 26,304.31      | 25,754.87 |
| Cost B <sub>1</sub>                       | 24,674.04        | 26,652.06       | 27,165.81      | 26,536.53 |
| Cost B <sub>2</sub>                       | 28,731.46        | 31,170.01       | 32,589.54      | 31,097.13 |
| Cost C <sub>1</sub>                       | 29,327.64        | 27,553.49       | 27,516.48      | 28,809.29 |
| Cost C <sub>2</sub>                       | 33,385.06        | 32,071.44       | 32,940.21      | 33,369.89 |
| Cost C <sub>3</sub>                       | 36,671.84        | 35,278.59       | 36,234.23      | 36,706.88 |
| <b>Profitability measures (₹)</b>         |                  |                 |                |           |
| Gross Income                              | 68,735.00        | 69,500.00       | 73,733.00      | 70,656.00 |
| Net income at cost C <sub>2</sub>         | 35,349.94        | 37,428.56       | 40,792.79      | 37,286.11 |
| Net income at cost C <sub>3</sub>         | 32,063.16        | 34,221.41       | 37,498.77      | 33,949.12 |
| Family labour income                      | 40,003.54        | 38,329.99       | 41,143.46      | 39,558.87 |
| Farm business income <sup>4</sup>         | 4,804.26         | 43,788.13       | 47,428.69      | 44,901.13 |
| <b>Benefit Cost Ratio</b>                 |                  |                 |                |           |
| Benefit cost ratio at cost C <sub>2</sub> | 1:2.06           | 1:2.17          | 1:2.24         | 1:2.12    |
| Benefit cost ratio at cost C <sub>3</sub> | 1:1.87           | 1:1.97          | 1:2.03         | 1:1.92    |

village merchants, wholesalers and processors. Hence the producer is only a price receiver. In the process of marketing the producer has to incur various marketing costs. The costs are determined by the performance and efficiency of different market functionaries in different channels which in turn influences the return to the producer. In this context there is need to study the efficiency of marketing channels in the marketing of soybean that is cultivated and marketed extensively in the study area. From the preliminary survey conducted in the study area it was observed that the marketing of soybean was done through following channels:

- Channel I: Producer-retailer-consumer
- Channel II: Producer-processor-oil retailer-oil consumer
- Channel III: Producer-village merchant-processor-oil retailer-oil consumer
- Channel IV: Producer-wholesaler-retailer-consumer

The marketing costs in above channels were worked out and are presented below.

#### Marketing cost and margins

It is observed from the Table 3 that the total marketing charges paid by the producer and retailer of soybean in the marketing of soybean were ₹63.00 and ₹156.40 per q in Channel I. Marketing charges paid by the village merchant,

processor and wholesaler of soybean in the marketing of soybean were ₹87.60, 245.16 and ₹46.00 per q respectively in Channel II. Similarly in Channel III the marketing charges paid by the village merchant, processor and wholesaler of soybean in the marketing of soybean were ₹96.85, ₹250.20 and ₹62.30 per q respectively. In channel IV the marketing charges paid by the village merchant, wholesaler and retailer were ₹97.60, ₹178.20 and ₹58.20 per q respectively.

It may be observed from Table 3 that the profit earned by the retailer in soybean marketing was ₹585.6 in Channel I. It was also observed that in the Channels II and III the profit earned by the village merchant, processor and retailer in the marketing of soybean was ₹99.20, ₹105.90; ₹325.50, ₹393.60 and ₹354.50, ₹322.30 per q respectively. It may also be observed in Table 4 that the marketing cost was higher in Channel III and lowest in Channel I. Similarly marketing margin was highest in Channel III and lowest in Channel IV.

#### Price spread

Table 3 also indicates that the middleman's margin was highest in Channel III being ₹821.80 per q followed by Channel IV, II and I. The producer's share in consumer's rupee was highest in Channel I (73.17 per cent) followed by Channels IV, II and III. The marketing Channel II and III were complicated involving a

Table 3. Marketing charges paid by producer, village merchant, cooperative society mill owner, wholesaler and retailer in the marketing of soybean in identified channels (₹/q)

| Market functionaries                             | Channel      |               |               |               |
|--------------------------------------------------|--------------|---------------|---------------|---------------|
|                                                  | I            | II            | III           | IV            |
| <b>Marketing costs paid by the producer</b>      |              |               |               |               |
| Packing expenses                                 | 23.5         | -             | -             | -             |
| Loading and unloading charges                    | 14.5         | -             | -             | -             |
| Transportation charges                           | 19.5         | -             | -             | -             |
| Other charges                                    | 5.5          | -             | -             | -             |
| <b>Sub Total</b>                                 | <b>63.00</b> | -             | -             | -             |
| <b>Marketing costs paid by village merchants</b> |              |               |               |               |
| Packing expenses                                 | -            | 44.00         | 45.80         | 46.00         |
| Loading and unloading charges                    | -            | 20.00         | 18.75         | 17.80         |
| Storage charges                                  | -            | -             | 8.00          | 8.00          |
| Transportation charges                           | -            | 18.00         | 20.00         | 19.60         |
| Other charges                                    | -            | 5.60          | 4.30          | 6.20          |
| <b>Sub Total</b>                                 | -            | <b>87.60</b>  | <b>96.85</b>  | <b>97.60</b>  |
| <b>Marketing cost paid by processor</b>          |              |               |               |               |
| Packing expenses                                 | -            | 96.70         | 98.20         | -             |
| Transportation charges                           | -            | 36.80         | 39.00         | -             |
| Loading and unloading charges                    | -            | 15.00         | 15.00         | -             |
| Mandi tax (2%)                                   | -            | 13.66         | 14.00         | -             |
| Commission charges                               | -            | 4.00          | 4.00          | -             |
| VAT tax                                          | -            | 34.00         | 37.00         | -             |
| Other charges                                    | -            | 45.00         | 43.00         | -             |
| <b>Sub Total</b>                                 | -            | <b>245.16</b> | <b>250.20</b> | -             |
| <b>Marketing cost paid by wholesaler</b>         |              |               |               |               |
| Packing expenses                                 | -            | -             | -             | 87.30         |
| Transportation charges                           | -            | -             | -             | 37.50         |
| Loading and unloading charges                    | -            | -             | -             | 17.40         |
| Other charges                                    | -            | -             | -             | 36.00         |
| <b>Sub Total</b>                                 | -            | -             | -             | <b>178.20</b> |

**Marketing cost incurred by the retailer**

|                               |               |               |               |               |
|-------------------------------|---------------|---------------|---------------|---------------|
| Packing expenses              | 56.00         | -             | -             | -             |
| Loading and unloading charges | 29.00         | 10.00         | 16.00         | 22.00         |
| Storage charges               | 10.00         | 10.00         | 15.00         | 10.00         |
| Transportation charges        | 12.50         | 16.00         | -             | -             |
| Other charges (Mandi tax)     | 43.90         | 10.00         | 13.80         | 16.20         |
| Shop rent                     | 5.00          | -             | 17.50         | 10.00         |
| <b>Sub Total</b>              | <b>156.40</b> | <b>46.00</b>  | <b>62.30</b>  | <b>58.20</b>  |
| <b>Grand Total</b>            | <b>219.40</b> | <b>378.76</b> | <b>409.35</b> | <b>334.00</b> |

number of middlemen and market functionaries between the producer and consumer as compared to the Channel I and IV.

**Marketing efficiency**

The marketing efficiency is directly related to the cost involved to move the goods from producer to consumer and quantum of service provided or desired by the consumers. If the cost compared with the services involved is low then it will be termed an efficient marketing and vice-versa. An improvement that reduces the cost of a particular function without reducing consumer's satisfaction indicates an improvement in the marketing efficiency. It may be observed from Table 4 that marketing efficiency of marketing Channels I, II, III and IV was 2.73, 1.95, 1.86 and 2.00 per cent respectively. The marketing efficiency index was highest in Channel I followed by Channel IV, II and III. In this channel a large number of intermediaries were involved resulting in higher marketing cost and lower marketing

efficiency. The lowest marketing efficiency was found in Channel III.

**CONCLUSION**

The findings of the study clearly show that the total cost decreased with the increase in the farm size. The total cost and its component in small farms was relatively higher than those in medium and large farms. The net return was found higher for large farmers followed by medium and small farmers since large farmers used more resources in production process. Output input ratio indicates that the return to every rupee of investment in soybean cultivation increased with increase in farm size. Middleman's margin was highest in Channel III followed by Channels IV, II and I. The producer's share in consumer's rupee was highest in Channel I (73.17 per cent) followed by Channels IV, II and III. The marketing Channels II and III were complicated involving a number of middlemen and market functionaries between the producer and the consumer as compared to the Channels I and IV. The

Table 4: Producer's share in the consumer rupee and marketing efficiency of per quintal of soybean in the identified channels (in ₹)

| Market functionaries                 | Marketing Channel |          |          |          |
|--------------------------------------|-------------------|----------|----------|----------|
|                                      | I                 | II       | III      | IV       |
| Total marketing charges              | 219.40            | 378.76   | 409.35   | 334.00   |
| Middleman margin                     |                   |          |          |          |
| Village merchant margin              | -                 | 99.20    | 105.90   | -        |
| Processor margin                     | -                 | 325.50   | 393.60   | -        |
| Wholesaler margin                    | -                 | -        | -        | 326.30   |
| Retailer margin                      | 585.60            | 354.50   | 322.30   | 458.80   |
| Total margin of middleman            | 585.60            | 779.20   | 821.80   | 785.10   |
| Net amount received by producer      | 2,195.00          | 2,258.00 | 2,290.00 | 2,241.00 |
| Price paid by the consumer           | 3,000.00          | 3,415.96 | 3,521.15 | 3,360.10 |
| Producer share in consumer rupee (%) | 73.17             | 66.10    | 65.04    | 66.69    |
| Marketing efficiency                 | 2.73              | 1.95     | 1.86     | 2.00     |

marketing efficiency index was highest in Channel I followed by Channels IV, II and III. In Channel I a large number of intermediaries were involved resulting in higher marketing cost and lower marketing efficiency.

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