## International Journal of Chemical Studies

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# An economic efficiency of soybean production in Malwa region of Madhya Pradesh

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### Abstract
Madhya Pradesh is one of the largest soybean producing states in India, where soybean accounts for more than 55 per cent of total oilseeds produced in the state. On the basis of agro-climatic conditions, Madhya Pradesh is divided into eleven regions. Among all regions, Malwa region occupies the highest area under soybean crop. Though Malwa region is a major producer of soybean in the Madhya Pradesh, but its productivity is lower in comparison to other regions in the state. The productivity differentials across regions may be attributed to low level of technology adoption, non-availability of high yielding varieties and good quality seed, low and unbalanced use of chemical fertilizers and uneconomic nature of the crop. As the country is in short supply of edible oil and about 50 per cent of its edible oil consumption is fulfilled by imports of different vegetable oils, therefore, there is a need to promote the production of oilseeds like soybean. There has been a slow growth in soybean production in India, which is subject to erratic rainfall, poor management, incidence of pests and disease, shattering of pods *etc*. For soybean production to be a remunerative enterprise farmer should be able to get a considerable net profit over all costs and thus it is the farmer's chief concern to ensure a satisfactory margin between the cost of various inputs and selling price of the product.

**Keywords:** economic efficiency, soybean production, Malwa, Madhya Pradesh

## Introduction
Soybean is also known as "golden bean", "miracle crop" *etc*, because of its several uses. It is an excellent source of protein and oil. It contains about 43 per cent of good quality protein, 21 per cent carbohydrates, 5 per cent minerals, 8 per cent moisture, 20 per cent fat, 4 per cent fiber and reasonable amounts of vitamins. Soybean is mainly used as vegetable, but it can also be used in oil industry where it occupies first place in the world vegetable oil production. Soy based food products are suitable for diabetic patients as they contain less carbohydrates and low cholesterol. Soy protein is also good for the peoples who are allergic to animal protein. Therefore, it is one of the most economical protein sources in the world. It is a versatile crop with innumerable possibilities of improving agriculture and supporting industry (Hemchand, 1989) [2].

The soybean protein is rich in Lysine content (4-6 per cent) and the extracted oil is edible one. Soybean protein is receiving more attention than any other source of protein today. India is in short supply of proteins and large proportion of the population is vegetarian. In this context crop like soybean with high yield potential along with high protein content has emerged an important crop in India.

Soybean also contains several vitamins, calcium, phosphorous and iron. They are ideally suited for human beings. Food uses of soybean include beverages; fermented products like soya souce and yoghurt; cheese analogous like fried and roasted nuts, sprouts *etc*. Small quantities of soybean flour are already being used in baked goods, primarily in biscuits and in snacks. Soya flour is also used in substantial quantity in place of besan in sweets, pappads and similar products. Industrial uses of Soya in the pharmaceutical, farming, plywood glues, asphalt cements, detergent products, paper boards and laminations, fibre boards. Soybean is a major oilseed crop in the world covering an area of 120.77 m ha and contributing around 64 per cent (251.5 million metric tons) of the total oil seed production (390.39 million metric tons), which makes it as the leading oilseed crop in the world, ahead of cotton, rapeseed, groundnut, sunflower *etc*.

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## Methodology

Madhya Pradesh is one of the largest soybean producing states in India, where soybean accounts for more than 55 per cent of total oilseeds produced in the state. On the basis of agro-climatic conditions, Madhya Pradesh is divided into eleven regions. Among all regions, Malwa region occupies the highest area under soybean crop. Though Malwa region is a major producer of soybean in the Madhya Pradesh, but its productivity is lower in comparison to other regions in the state.

Madhya Pradesh is the leading producer of soybean in the country. On the basis of agro- climatic condition, Madhya Pradesh is divided into eleven regions. In the year 2011-12, Malwa region enjoyed the highest area under soybean amongst all regions of the state. The present study, therefore, tell within the jurisdiction of Malwa region of Madhya Pradesh. A four stage sampling technique was employed for constructing sampling plan of the study. The first stage of sampling plan was the selection of locale of the study from the Malwa region followed by selection of blocks (second stage) from the district, selection of villages (third stage) from the selected blocks and the selection of respondents- farmers (fourth stage) from the selected villages.

## Costs and returns analysis

Farmers differ with respect to extent of resources owned and their use. Some resources are owned by them while others are purchased or hired in different proportions. Farmers give different weightage to different resources for making production decisions. Some farmers are interested to know the returns over the direct costs involved in crop production while others are interested in considering the indirect costs as well. So, it was considered worthwhile to work out the net returns over various costs concepts adopted by the Commission for Agricultural Costs and Prices (CACP). The various cost concepts used have been summarized as follows:

Cost $A_1$: It is calculated by summing the following costs:

a. Value of hired human labour (casual labour)
b. Value of hired and owned machine power
c. Value of manures (owned and purchased)
d. Value of fertilizers
e. Value of seed (farm produced and purchased)
f. Value of plant protection chemicals
g. Irrigation charges
h. Interest on working capital
i. Depreciation on farm implements
j. Land revenue
k. Miscellaneous expenses

**Cost $A_2$:** Cost $A_1$ + Rent paid for leased-in land
**Cost $B_1$:** Cost $A_1$ + Imputed interest on the value of owned capital assets (excluding land)
**Cost $B_2$:** Cost $B_1$ + Imputed rental value of owned land (Net of land revenue) + rent paid for leased-in land
**Cost $C_1$:** Cost $B_1$ + Imputed value of family labour
**Cost $C_2$:** Cost $B_2$ + Imputed value of family labour
**Cost $C_2^*$:** Cost $C_2^*$ was estimated by taking into account statutory minimum or actual wage rate whichever is higher.
**Cost $C_3$:** Cost $C_2^*$ + 10 per cent of cost $C_2^*$ on account of managerial function performed by farmer.

The returns were computed over various cost concepts specified above. Gross returns were calculated at the price to which the soybean produce was sold by the producers. Net returns were calculated by subtracting Cost $A_1$, $A_2$, $B_1$, $B_2$, $C_1$, $C_2$, $C_2^*$ and $C_3$ from gross returns.

## Total cost of production

It includes operational costs, material costs and other costs in the production of soybean crop. In operational costs, the cost of hiring human labour, machine power, bullock charges, irrigation charges were estimated at prevailing rate during the period of investigation in the study area. Charges of hired labour were estimated based on the actual wage paid in cash and payment made in kind was converted into monetary terms at the prevailing market price. Imputed value of family labour was also calculated using the prevailing wage rate in the study area. The total wages include payment made in both cash and kind. In case of bullock, tractor and other machinery, the hiring charges were applied to all who don't own these and who own these, the cost of fuel, repairing and maintenance costs were taken into account.

In case of material costs, the cost of seeds, manure, chemicals, fertilizers were calculated at the prevailing price at the time of their application. In case of own seeds, cost was computed at the prevailing rate in the village at the time of sowing. Fixed costs included depreciation and interest on fixed assets, rental value of land and land revenue paid to government. Simple interest was calculated on working capital at the rate of 10 per cent per annum as it prevailed at the time of investigation. The interest on working capital was calculated for half of the period the crop occupied the field (3 months). Rental value of land that prevailed in the study area during study period was taken into account. Depreciation on fixed assets was calculated using straight line method. Annual depreciation and interest earned on the fixed assets was allocated to soybean crop based on the hours used in it out of the total hours of asset used during the year.

## Gross and net returns

Gross returns were computed on the basis of actual prices at which individual farmers sold their main products and by products. Where only a part of the output was sold, the unsold output was valued at the rate at which a part of the output was sold. In the case of output not sold at all, modal prices that prevailed during the season at the regulated market were used for evaluation. These model prices were ascertained from the Agricultural Product Market Committee (APMC) of the Block to which the farmers belonged. For calculating the net returns on per ha basis total cost was deducted from gross returns.

## Result

The profitability of a crop depends on the level of costs and returns. The allocation of area under a particular crop by farmers besides other factors depends on the level of net profit generated per unit area. Hence, study of costs and returns of various crop enterprises exercises an important role in determining the level of profit and identifying the relative profitability of various crop enterprises.

Soybean appeared as the most important crop in the kharif season in the study area. In view of this fact, it was thought pertinent to evaluate costs and returns from production of soybean. A detailed picture of costs and returns as found on the sample farms in case of soybean is presented in the Table 5.1. The total cost of production *i.e.* cost $C_3$ was estimated at Rs. 17321.06 per ha on overall basis of the total cost $C_3$. Operational cost and material cost amounted to Rs.16252.60 per ha (26.08 per cent) and Rs.15193.18 per ha (24.38 per cent) respectively. Other cost constituted 42.39 per cent (Rs. 26424.14) of total cost $C_3$.

**Table 1:** Operational Costs of Soybean on different size groups of farms (Rs. /ha.)

| Particulars | Small | Medium | Large | Overall |
|---|---|---|---|---|
| A. Operational cost | | | | |
| 1. Human labour | | | | |
| a) Family labour | 4424.11 (7.55) | 3715.87 (6.06) | 2338.54 (3.53) | 3005.66 (4.82) |
| b) Hired labour | 2384.03 (4.06) | 2917.82 (4.76) | 4375.00 (6.61) | 3708.64 (5.95) |
| Sub Total | 6808.14 (11.61) | 6633.70 (10.81) | 6713.54 (10.14) | 6714.30 (10.76) |
| 2. Machine charges | 5110.44 (8.72) | 5511.14 (8.98) | 8616.47 (13.02) | 7331.25 (12.18) |
| 3. Miscellaneous expenses | 1098.13 (1.87) | 1231.19 (2.01) | 1257.10 (1.89) | 1222.64 (1.96) |
| 4. Interest on working capital | 881.70 (1.50) | 917.29 (1.49) | 1040.48 (1.57) | 984.39 (1.58) |
| Sub Total | 13898.43 (23.71) | 14293.33 (23.31) | 17627.61 (26.63) | 16252.60 (26.08) |

**Table 2:** Material Cost of Soybean on different size groups of farms (Rs. /ha.)

| B. Material cost | Small | Medium | Large | Overall |
|---|---|---|---|---|
| 1. Seed | 4550.66 (7.76) | 4922.46 (8.02) | 5490.16 (8.29) | 5200.58 (8.34) |
| 2. Manure | 2250.00 (3.84) | 2750.00 (4.48) | 2772.00 (4.18) | 2671.93 (4.28) |
| 3. Fertilizer | 1950.00 (3.32) | 2210.00 (3.61) | 2220.00 (3.35) | 2168.52 (3.48) |
| 4. Plant protections & chemicals | 4306.94 (7.35) | 4657.38 (7.59) | 5057.90 (7.46) | 4837.47 (7.76) |
| 5. Electricity charge | 282.42 (0.48) | 293.87 (0.49) | 331.43 (0.53) | 314.68 (0.50) |
| Sub Total | 13340.03 (22.76) | 14833.71 (24.19) | 15871.51 (25.88) | 15193.18 (24.38) |

**Table 3:** Other Costs of Soybean on different size groups of farms (Rs. /ha.)

| C. Other costs | Small | Medium | Large | Overall |
|---|---|---|---|---|
| 1. Land revenue | 24 (0.04) | 24 (0.04) | 24 (0.04) | 24 (0.04) |
| 2. Rental value of land | 23445.42 (40.01) | 23445.42 (38.23) | 23445.42 (35.42) | 23445.42 (37.61) |
| 3. Depreciation on fixed assets (excluding land) | 1235.35 (2.10) | 1562.39 (2.54) | 1656.37 (2.50) | 1428.05 (2.29) |
| 4. Interest on capital investment in fixed assets | 1325.16 (2.26) | 1456.89 (2.37) | 1674.89 (2.53) | 1526.66 (2.45) |
| Sub Total | 26029.93 (44.42) | 26488.70 (43.20) | 26800.68 (40.49) | 26424.14 (42.39) |

**Table 4:** Returns of Soybean on different size groups of farms (Rs. /ha.)

| Total cost of production at: | Small | Medium | Large | Overall |
|---|---|---|---|---|
| Cost $A_1$ | 24073.70 | 27120.76 | 32717.75 | 28689.34 |
| Cost $A_2$ | 24073.70 | 27120.76 | 32717.75 | 28689.34 |
| Cost $B_1$ | 25398.87 | 28577.65 | 34392.64 | 30216.01 |
| Cost $B_2$ | 48844.28 | 52023.07 | 57838.06 | 53661.43 |
| Cost $C_1$ | 29822.97 | 32293.52 | 36731.18 | 33221.66 |
| Cost $C_2$ | 53268.39 | 55738.95 | 60176.60 | 56667.08 |
| Cost $C_3$ | 58595.23 (100) | 61312.84 (100) | 66194.26 (100) | 62333.79 (100) |
| Yield of main product (Q/ha) | 21.41 | 22.46 | 24.87 | 23.74 |
| Selling price of main product (Rs./Q) | 3368.57 | 3300.88 | 3428.00 | 3365.81 |
| Yield of by product (Q/ha) | 9.92 | 12.10 | 12.01 | 11.64 |
| Selling price of by product (Rs./Q) | 307.89 | 302.35 | 313.00 | 307.748 |
| Gross returns | 75224.59 | 77911.96 | 87512.57 | 79654.86 |

**Table 5:** Net returns of Soybean over Cost C3 on different size groups of farms (Rs. /ha.)

| Net returns over | Small | Medium | Large | Overall |
|---|---|---|---|---|
| Cost $A_1$ | 51150.89 | 52481.17 | 54794.81 | 51315.83 |
| Cost $A_2$ | 51150.89 | 52481.17 | 54794.81 | 51315.83 |
| Cost $B_1$ | 49825.73 | 50791.20 | 53119.92 | 49789.16 |
| Cost $B_2$ | 26380.30 | 27578.86 | 29674.50 | 26343.74 |
| Cost $C_1$ | 29822.97 | 47308.40 | 50781.38 | 46783.50 |
| Cost $C_2$ | 21956.20 | 23862.98 | 27335.96 | 23338.08 |
| Cost $C_3$ | 14257.97 | 16599.11 | 21318.30 | 17321.06 |
| Net returns (Rs/ha) | 14257.97 | 16599.11 | 21318.30 | 17321.06 |
| Cost of production at Cost $C_3$ (Rs/Q) | 2736.18 | 2670.62 | 2718.61 | 2649.84 |
| Gross return/Cost $C_3$ | 1.28 | 1.29 | 1.32 | 1.28 |

**Note 1:** Figures in the parentheses are percentage to total cost $C_3$.
**2:** The figures w.r.t. costs and returns have been rounded off to nearest Rs.

A perusal of the table further reveals that rental value, seed, human labour (family and hired) and plant protection and chemicals were the important items of cost on all categories of farms in the area. Machine charges and expenditure on manures and fertilizers were the other important items of cost. Returns from soybean production for different categories of farms are also shown in Table 5.4. The net return per ha over total cost *i.e.,* cost $C_3$ was found to be highest for large farmers with Rs. 21318.30 followed by medium and small farmers with Rs. 16599.11 per ha and Rs. 14257.97 per ha, respectively. On overall basis, net returns over cost $C_3$ was estimated at Rs. 17321.06 per ha.

The net return over direct cost i.e., cost $A_1$ on overall basis was found to be Rs. 51315.83 per ha and it was highest for

large farmers (Rs. 54794.81 per ha) and lowest for the small farmers (Rs. 51150.89 per ha).

At aggregate level the ratio of gross returns to the cost $C_3$ was calculated as 1.28 indicating that there was Rs. 0.28 net profit for every one rupee investment in soybean production. These are in agreement with findings of (Singh, 1971) [5].

**Conclusion**
High cost of seed material of recommended varieties is restricting farmers from adopting recommended variety seeds thus subsidy should be provided on seeds of recommended variety soybean which also improves the yield level.

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