Original Research Article

Costs and Income Analysis of Maize Cultivation in Bahraich District of Uttar Pradesh, India

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A B S T R A C T

Study was conducted in Tejwapur block of Bahraich district of U. P. A sample of 100 respondents was chosen through purposive cum proportionate random sampling and were categorised as marginal, small and medium size group of farms. A survey was conducted by personal interview method with use of pre-structured schedule. Simple tabular analysis was done to find out the result. It was found that maize cultivation was profitable at all categories of farm. The total costs of cultivation and gross income per hectare were positively related with size of farms, whereas negative trend of net income with farm size should that resources are not efficiently used in maize cultivation at larger size group of farm, technical, managerial and financial problem were noticed as major constraints.

Keywords
Maize, Costs, Income, Farm size, Tabular analysis, Weighted mean

Introduction

Maize is one of the most important cereal crop in the world agricultural economy both as food for man and feed for animals. It is a miracle crop having high yield potential. There is no cereal on the earth which has so immense potentiality and that is why it is called ‘Queen of Cereals’. Maize is the only cereal which can be grown throughout the year in all three season of kharif, rabi and zaid.

Maize crop is utilized in many ways like other grain crop. Over 85% of maize produced in the country consumed as human food. Several food dishes including ‘Chapattis’ are prepared out of maize flour and grains. Green cobs are roasted and eaten by people with great interest. The special variety called ‘Popcorn’ the grains of which are converted into the popped form which is the favorites food for children in cities. It is also a good source of feed and fodder for cattle, Poultry and piggery. The green fodder can be fed to milch cattle to boost the milk production to a considerable extent; “South African Maize” is a best suited variety for fodder. The crop has to be harvested when the grains are in milky stage, this variety is supposed to have
Lactogenic effect hence specially suited for milch cattle. The digestibility of maize fodder is higher than sorghum, bajra and other non-leguminous forage crops. Maize plant does not have any problem of poisoning due to hydrocyanic acid, hence if necessary crop can be harvested and fed to cattle at any stage of its growth.

The high carotene content of yellow maize is considered to be very useful in importing yellow colour to egg yolk and yellow tinge to the milk. No other concentrate is yet known to substitute maize in this respect.

Maize stand on second place among all the kharif crops after rice, and on third place after rice and wheat among the food grown crops. Seeing the importance of the crop, it seems necessary to study the economics of maize cultivation in order to find the costs involved in its cultivation and profit received from a hectare, the result of the study can guide the farmers to allocate the opportunity area of this crop in his crop production plan the study on costs and income analysis was conducted in Bahraich district with following objectives:

To study the different type of costs involve in maize cultivation.

To study the various income measure received from maize cultivation.

To study the major constraints affecting the maize cultivation.

**Materials and Methods**

**Sampling technique**

Purposive cum random sampling technique was used to select the 100 respondents, from 5 villages of Tejwapur block of Bahraich district. For the further study all selected sample farmers were grouped in three categories of marginal, small and medium. To justify the representation of all category of farmers’ proportionate random sampling technique was applied. A sum of 52 marginal, 35 small and 13 medium size of sample farms were studied. Details of sampling are presented in Table 1.

**Analytical tools**

The data collected from the sample farmers through personal interview with the help of pre-structured scheduled were analysed and estimated with certain statistical and economical technique like:

**Average**

The simplest and important measures of average which have been used into statistical analysis were the simple mean and weighted average. The formula used to estimate the average is:

$$\bar{X} = \frac{\sum X_i}{N},$$

$$\text{W.A.} = \frac{\sum W_i X_i}{\sum W_i}$$

Where, $W. A. = \text{Weighted average, } X_i = \text{Variable, } W_i = \text{Weights of } X_i$

**Cost concepts**

The cost concepts and the items of cost included under this study are given below:

**Cost A1**

This cost approximates and actual expenditure incurred in cash and kind.

Values of hired/owned human, bullock and machinery & implements laborers
Value of seed (both farm produced and purchased)

Value of manure (owned and purchased)

Value of insecticides and pesticides and chemical fertilizers

Depreciation on implements and farm buildings

Irrigation charges

Land revenue, assets and other taxes

Interest on working capital

Miscellaneous expenses (artisans, etc.)

Cost A₂: Cost A₁ + rent paid for leased in land

Cost B₁: Cost A₂ + interest on value of owned fixed capital assets (Excluding land)

Cost B₂: Cost B₁ + rental value of owned land (net land revenue) and rent paid for leased in land.

Cost C₁: Cost B₁ + imputed value of family labour

Cost C₂: Cost B₂ + imputed value of family labour

Cost C₃: Cost C₂ + 10% of C₂ (managerial cost).

Income concepts

Gross income: Value of farm output (main product and by product) whether sold or utilized by the farm family.

Net income: It is the difference between gross income and total cost, i.e. gross income minus cost C₁ or Cost C₂ or Cost C₃.

Family labour income: Gross income minus cost B₂.

Farm business income: Gross income minus cost A₁ or cost A₂ in case of land, leased in farm.

Farm investment income: Net income over cost C₂ plus rental value of owned land plus interest on owned fixed capital.

Imputation procedures: Some of the inputs used in the production process come from family sources. The procedures adopted for deriving imputed values are as given under:

Family labour: On the basis of wages paid to attached from servant.

Owned animal labour: On the basis of maintenance which includes the following:

Cost of green and dry fodder

Cost of concentrates

Depreciation on animals and cattle sheds

Labour charges

Other expenses, if any

Results and Discussion

The result of the present study as well as relevant discussion has been presented in cost and returns of Maize crop in the study area:

Cost and return

The cost and return have been summarized in this part on the sample farms. Beside the estimate of total costs, on the basis of six cost concept i.e. Cost A₁/A₂, cost B₁, cost B₂, cost C₁, C₂ and cost C₃, have been worked out for estimation of cost.
**Table.1** Village wise proportionate selection of sample farmers under Different size group of farms

| Sl. No. | Name of Villages | Marginal (< 1 ha.) | Small (1-2 ha.) | Medium (2-4 ha.) | Total |
|---------|------------------|--------------------|----------------|------------------|-------|
|         |                  | P S                | P S            | P S              | P S   |
| 1.      | Maraucha         | 45 14              | 44 13          | 11 3             | 100 30|
| 2.      | Singhi           | 22 7               | 13 4           | 3 1              | 38 12 |
| 3.      | Raipura          | 28 9               | 9 3            | 2 1              | 39 13 |
| 4.      | Aladadpur        | 19 6               | 21 6           | 9 3              | 49 15 |
| 5.      | Kirtanpur        | 52 16              | 28 9           | 18 5             | 98 30 |
| **Total** |                  | 166 52             | 115 35         | 43 13            | 324 100|

Note: P= Population and S= Sample.

**Table.2** Per hectare costs of different inputs used in Maize production (Rs.)

| S. No. | Particulars                  | Marginal | Small | Medium | Overall average |
|--------|------------------------------|----------|-------|--------|-----------------|
| 1.     | Human Labour                | 16786.26 (35.64) | 15697.08 (31.46) | 18332.33 (35.89) | 16865.13 (34.17) |
| a.     | Family Labour               | 8189.54 (17.39) | 2617.63 (5.25) | 1649.23 (3.23) | 5389.13 (11.09) |
| b.     | Hired Labour                | 8596.72 (18.25) | 13079.45 (26.22) | 16676.10 (32.66) | 11215.99 (23.08) |
| 2.     | Machinery Charges           | 8869.23 (18.83) | 9190.44 (18.42) | 7729.06 (15.14) | 8833.43 (18.18) |
| 3.     | Seed                        | 2549.48 (5.41) | 3147.95 (6.31) | 3376.32 (6.61) | 2866.43 (5.90) |
| 4.     | Manure and fertilizer       | 7303.01 (15.51) | 8661.31 (17.36) | 7937.17 (15.54) | 7860.85 (16.18) |
| 5.     | Irrigation                  | 402.12 (0.86) | 763.07 (1.53) | 1273.48 (2.49) | 641.73 (1.32) |
| 6.     | Plant Protection            | 340.98 (0.72) | 1376.96 (2.76) | 1339.66 (2.63) | 883.40 (1.71) |
| 7.     | Total working capital       | 28061.54 (59.58) | 36219.18 (72.60) | 38331.79 (75.06) | 32251.85 (66.37) |
| 8.     | Interest on working capital| 187.08 (0.40) | 241.46 (0.48) | 255.54 (0.50) | 215.01 (0.44) |
| 9.     | Rental value of land        | 6000.00 (12.74) | 6000.00 (12.03) | 6000.00 (11.75) | 6000.00 (12.35) |
| 10.    | Interest on fixed capital   | 377.70 (0.80) | 277.44 (0.55) | 187.48 (0.37) | 317.88 (0.65) |
| 11.    | Sub total                   | 42815.86 (90.91) | 45355.71 (90.91) | 46424.04 (90.91) | 44173.87 (90.91) |
| 12.    | Managerial Cost@10% of sub-total | 4281.58 (9.09) | 4535.57 (9.09) | 4642.40 (9.09) | 4417.38 (9.09) |
| **Grand total** |                  | **47097.44 (100)** | **49891.28 (100)** | **51066.44 (100)** | **48591.25 (100)** |
Table 3: Per hectare costs and income measures from maize production on various costs concept (Rs.)

| S. No. | Particulars             | Size group of farms | Overall average |
|--------|-------------------------|---------------------|-----------------|
|        |                         | Marginal           | Small           | Medium         |
| 1.     | Cost A1/A2              | 28248.62           | 36460.64        | 38587.33       | 32466.86       |
| 2.     | Cost B1                 | 28626.32           | 36738.08        | 40424.04       | 38172.82       |
| 3.     | Cost B2                 | 34626.32           | 42738.08        | 46424.04       | 44173.87       |
| 4.     | Cost C1                 | 36815.86           | 39352.71        | 40424.04       | 38172.82       |
| 5.     | Cost C2                 | 42815.86           | 45355.71        | 46424.04       | 44173.87       |
| 6.     | Cost C3                 | 47097.44           | 49891.28        | 51066.44       | 48591.25       |
| 7.     | Yield q/ha.             |                     |                 |               |
| a.     | M.P                     | 42.00               | 43.22           | 43.98          | 42.68          |
| b.     | B.P                     | 72.00               | 71.68           | 72.50          | 71.95          |
| 8.     | Grass Income            | 60360.00           | 61920.40        | 62974.00       | 61245.96       |
| a.     | M.P                     | 54600.00           | 56186.00        | 57174.00       | 55489.72       |
| b.     | B.P                     | 5760.00            | 5734.40         | 5800.00        | 5756.24        |
| 9.     | Net return over cost C3 | 13262.56           | 12029.12        | 11907.56       | 12654.71       |
| 10.    | Family Income           | 25733.68           | 19182.32        | 18199.19       | 22461.22       |
| 11.    | Farm Business income    | 32111.38           | 25459.76        | 24386.67       | 28779.10       |
| 12.    | Farm investment income  | 23921.84           | 22842.13        | 22737.44       | 23389.97       |
| 13.    | Cost of production (Rs./q.) | **1023.60**     | **1047.47**     | **1054.11**    | **1035.92**    |
| 14.    | Input-Output ratio      |                     |                 |               |
| a.     | On the basis of cost A1 | 1:2.13             | 1:1.70          | 1:1.63         | 1:1.88         |
| b.     | On the basis of cost B1 | 1:2.10             | 1:1.68          | 1:1.62         | 1:1.86         |
| c.     | On the basis of cost B2 | 1:1.74             | 1:1.45          | 1:1.40         | 1:1.57         |
| d.     | On the basis of cost C1 | 1:1.64             | 1:1.57          | 1:1.55         | 1:1.60         |
| e.     | On the basis of cost C2 | 1:1.41             | 1:1.36          | 1:1.35         | 1:1.38         |
| f.     | On the basis of cost C3 | 1:1.28             | 1:1.24          | 1:1.23         | 1:1.26         |

Similarly, the various measures of farm profits, such as net income, family labour income, farm investment income, farm business income, input-output ratio for maize crop have also been worked out.

The costs and returns generated by maize crop are displayed in Table 2 and 3.

Per hectare costs of cultivation of maize crop

Per hectare costs incurred on the various input factor in maize production was worked out and are given in Table 2.

Table 2 indicates that, costs of cultivation of maize was highest on medium farms (Rs.51066.44), followed by small farms (Rs.49891.28) and small farms (Rs.47097.44) respectively. The overall average costs of cultivation was observed (Rs.48591.25) on sample farms.

The major component of the cost were human labour (34.17 per cent), Machinery charge (18.18 per cent), rental value of owned land (12.35 percent), seed cost (5.90 per cent), plant protection (1.71 per cent) and irrigation charge (1.32 per cent) respectively of the total costs of cultivation. Per hectare cost of cultivation was found of positive trend with farm size. Costs of plant protection and irrigation were to less because the crop was not affected by insect pest and it was grown in kharif season. The cost increases with an increase in farm size was due to higher expenditure on human labour, seed and irrigation charges on medium size of farms, compared to small and marginal size of farm.
Per hectare costs and income from the production of maize crop

The Table: 3 revealed that, on an average cost $A_1/A_2$, cost $B_1$, cost $B_2$, cost $C_1$, cost $C_2$and cost $C_3$came to Rs.32466.86, Rs.32784.74, Rs.38784.74, Rs. 38172.82, Rs.44173.87 and Rs. 48591.25 respectively.

On an average, gross income was recorded Rs. 61245.96 and net income came to Rs.12654.71. On medium farms, gross income was highest, which was recorded Rs.62974.00, followed by small farms Rs. 61920.40 and lowest on marginal farms i.e. Rs.60360.00 respectively.

The net income was highest on marginal farms Rs. 13262.56, followed by small farms Rs. 12029.12 and medium farms Rs. 11907.56. On an average family labour income, farm business income and farm investment income were observed to Rs. 22461.22, Rs. 28779.10 and Rs. 23389.97, respectively. Family labour income was highest on medium farms followed by small and marginal farms & farm investment income was highest on marginal farms followed by small farm and medium farms and farm business income was highest on marginal farms, followed by small farms and medium farms. On an average, cost of production per quintal and yield per hectare were estimated to Rs. 1035.92 per quintal and 42.68 quintal respectively.

On an average input output ratio regarding costs $C_3$, $C_2$, $C_1$, $B_2$, $B_1$, and $A_2/A_1$ were recorded 1:1.26, 1:1.38, 1:1.60, 1:1.57, 1:1.86 and 1:1.88 respectively. On the basis of cost $C_3$input output ratio was highest on marginal farms (1:2.13), followed by small (1:1.70) and medium (1:1.63) respectively. It may be concluded the costs of cultivation on different size group of farm increases with an increase in farm size. But net return per hectare was found of negative trend with farm size. It was because of less increase in yield against the increased input factors at increasing size of farm.

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