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# Economic analysis of Garlic cultivation in Etawah District of Uttar Pradesh

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## Abstract

The study was conducted in A. N. D. University of Agriculture & Technology, Kumarganj, Ayodhya, Uttar Pradesh. The enquiry pertained to the agricultural year 2021-22. District and block namely, Etawah & Takha and Basher were selected due to higher concentration of garlic area. 120 respondents along with acreage under garlic cultivation were selected from each category i.e. marginal (below 1 ha), small (1-2 ha) and medium (2-4 ha & above). Overall average size of farms was 1.56 ha, 0.81 ha marginal, 1.74 ha small and 4.60 ha medium farms. The total cultivated area was observed 187.48 ha on sample farms. Personal interview technique with pre-structured approved schedule method was adopted for data collection. On an average, the cost of cultivation of garlic per hectare came to Rs. 59998.16. The maximum cost of cultivation (Rs.68797.29) was observed on marginal farms followed by small farms (Rs. 47292.88). Calculated value of Cost-$C_3$ came to Rs. 68797.29, Rs. 47292.88, and Rs. 48581.26 on marginal, small and medium size groups of farms, respectively. On an average cost $A_1$, $B_1$, $B_2$, $C_1$, and cost $C_2$ worked out were Rs. 43171.70, 43407.57, 51407.57, 46543.79 and 54543.79 apiece ha, respectively. Average input-output ratio on cost $A_1$, cost $B_1$, cost $B_2$, cost $C_1$, cost $C_2$ and cost $C_3$ were worked out and came to 1:4.45, 1:4.42, 1:3.67, 1:4.11, 1:3.46 and 1:3.14, respectively.

**Keywords:** Cost, gross income, net income, quintal, B:C ratio

## Introduction

After onions, garlic (*Allium satium* L.) is one of the most popular spices second most significant bulb crop in the Amaryllidaceae family. The subsurface development component known as bulbs is where the economic yield is found. The garlic is a complex or multiple bulb made up of bulbs or bulblets that are commonly known as cloves (Patidar *et al.,* 2018) [8]. It is extensively grown in Central Asia and Eastern Region (Meena, 2013) [7]. This food is high in carbohydrates (0.57 g), protein (0.57 g), phosphorus (13.77 mg), potassium (36.09 mg), calcium (16.29 mg), magnesium (2.25 mg), and all of the other nutrients (2.98 g). Ascorbic acid is present in green garlic in a significant amount (1%). It is a significant source of human nutrition and offers significant health benefits and playing a crucial role in the immune system (Diriba and Shiferaw, 2016) [3]. India is the world's greatest producer of garlic and grows it in mild to cold climates. When cooked, clove's unique pungent, spicy flavour greatly softens and sweetens. When

used medicinally, it strengthens the immune system, lowers blood pressure, lowers cholesterol, enhances cognitive function, and more. In Indian medicine (Ayurvedic, Unani, and Siddha), it is used as a carminative and stomach stimulant to help digestion and absorption of meals. It provides for domestic necessities as well as being a substantial source of foreign exchange (Yewatkar, 2019) [10]. Highest garlic production for the year 2022 across the India was recorded in Madhya Pradesh amounting over two million metric tons followed by Rajasthan, Uttar Pradesh and Gujarat (Anonymous, 2022) [2]. India would need to grow 30 lac tonnes of nutritionally rich garlic than other bulb crops by the year 2050 in order to feed its expanding population and satisfy export and processing demands (Kumud *et al.,* 2019) [6]. Keeping the importance of garlic cultivation in the view, the present study was carried out in Etawah district with objectives to find out the various aspects of costs of garlic cultivation and various aspects of income from garlic cultivation.

## Materials and Methods

The multistage stratified purposive cum random sampling procedure was adapted to select district, block, village and respondents. Takha and Basher blocks of Etawah district of Uttar Pradesh ware selected. A total of 120 respondents were selected alongwith acreage of garlic cultivation and arranged as per the farm size i.e. marginal farm size (below 1 ha), small farm size (1 to 2 ha) and medium farm size (2 to 4 ha). The selection of respondents was based on proportionate random sampling technique. The primary data was collected by surveying in study area through personal interview with use of pre-structured schedule; while secondary data was collected from published data.

## Methods and Techniques of Analysis

### (i). Average

The simplest and important measures of average which have been used into statistical analysis were the weighted average. The formula used to estimate the average is as below-

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

Where,
W. A. = Weighted average
$X_i$ = Variable
$W_i$ = weights of $X_i$

### (ii). Cost Concepts

**Cost $A_1$:** This cost includes actual expenditure incurred in cash and kind.
1. Value of hired human labour and machinery labour.
2. Value of seed (both form produced and purchased).
3. Value of manure (owned and purchased).
4. Value of insecticides, pesticides and chemical fertilizer.
5. Deprecation on implements, form machinery and farm buildings.
6. Irrigation charges.
7. Land revenue, and other taxes.
8. Interest on working capital.
9. Miscellaneous expenses.

**Cost $A_2$:** Cost $A_1$ + rent paid for leased in land.
**Cost $B_1$:** Cost $A_2$ + interest on value of owned fixed capital assets (Excluding land).
**Cost $B_2$:** Cost $B_1$ + rental value of owned land.
**Cost $C_1$:** Cost $B_1$ + imputed value of family labour.
**Cost $C_2$:** Cost $B_2$ + imputed value of family labour.
**Cost $C_3$:** Cost $C_2$ + 10% of $C_2$ (managerial cost).

### (iii). 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.
Net income = gross income - cost $C_3$.

**Family labour income:** = Gross income - cost $B_2$.

### Farm business income
Gross income - cost $A_1$ or Cost $A_2$ in case of leased in land.

### Farm investment income
Farm business income – Imputed value of family labour

### (iv). Cost Benefit Ratio
It is the ratio of gross return and gross cost.

$$\text{Benifit cost ratio} = \frac{Gross\ return}{Gross\ cost}$$

## Results

### Average holding size of sample farms

The size of holding is supposed to positively correlate with volume of garlic production. The farmers having larger size of holding are economic better off and they are in a position to adopt easily the improved farm practices. On the other hand, the farmer having smaller farm unit have been desired to produce as much they can with a view to marketing both their ends meet and also to improve their economic condition. The overall average size of farms was observed 1.56 ha, marginal 0.81 ha, small 1.74 ha and medium farms 4.60 ha along with total cultivated area 187.48 ha on sample farms (Table 1).

**Table 1:** Average size of holding on sample farm in the study area

| S. No. | Size group of farms | Number of farms | Total cultivated area (ha) | Average size of farm (ha) |
|---|---|---|---|---|
| 1 | Marginal | 70 | 57.26 (30.54) | 0.81 |
| 2 | Small | 35 | 61.11 (32.59) | 1.74 |
| 3 | Medium | 15 | 69.11 (36.86) | 4.60 |
| | Total | 120 | 187.48 (100) | 1.56 |

**Note-** Figures in parenthesis are the per cent to corresponding total

### Cost of cultivation of garlic

The maximum cost of cultivation was observed on marginal farms (Rs.68797.29) followed by small farms (Rs. 47292.88). On an average, the cost of cultivation of garlic per hectare was found Rs. 59998.16. Per hectare cost of cultivation was highest (Rs.68797.29) on marginal farms, mainly due to maximum investment on fixed capital compared to small and medium farms. On an average the study further reveals that major components on which maximum cost was incurred being 31.53 per cent on planting material followed by manures and fertilizer 25.50%, Human labour 7.76%, machinery charges 6.35%, plant protection 1.68%, and irrigation 1.39%, respectively. A similar trend indicated on all categories of sample farms too.

The cost incurred on interest on working capital, rental value of owned land, interest on fixed capital and 10% cost managerial cost of sub-total was calculated 2.97, 13.33, 0.39 and 9.09 per cent of total costs, respectively. The maximum share among these costs was rental value of owned land being 13.33 per cent of total cost per hectare (Table 2).

**Table 2:** Per hectare input costs of cultivation of garlic in the study area. (Rs./ha.)

| S. NO. | Particulars | Size group of farms | | | |
|---|---|---|---|---|---|
| | | Marginal | Small | Medium | Average |
| 1. | Planting Material | 18056 (26.25) | 19857.21 (41.99) | 20752.84 (42.72) | 18918.64 (31.53) |
| 2. | Machinery Charge | 3648.17 (5.30) | 3983.61 (8.42) | 4158.19 (856) | 3809.76 (6.35) |
| 3. | Human Labour | 4666.35 (6.78) | 4805.58 (10.16) | 4268.02 (8.79) | 4657.18 (7.76) |
| a. | Family Labour | 3515.77 (5.11) | 2954.45 (6.25) | 1789.11 (3.68) | 3136.22 (5.23) |
| b. | Hired Labour | 1150.58 (1.67) | 1851.13 (3.91) | 2478.91 (5.10) | 1520.95 (2.53) |
| 4. | Manure and fertilizer | 24147.46 (35.10) | 2848.77 (6.02) | 3051.21 (6.28) | 15298.31 (25.50) |
| 5. | Plant protection | 980.51 (1.43) | 1018.17 (2.15) | 1101.37 (2.27) | 1006.60 (1.68) |
| 6. | Irrigation | 758.34 (1.10) | 911.31 (1.93) | 1025.64 (2.11) | 836.37 (1.39) |
| 7. | Total working capital | 52257.14 (75.96) | 33424.65 (70.68) | 34357.27 (70.72) | 44526.85 (74.21) |
| 8. | Interest on working capital | 2090.29 (3.04) | 1336.99 (2.83) | 1374.291 (2.83) | 1781.07 (2.97) |
| 9. | Rental value of Land | 8000.00 (11.63) | 8000.00 (16.92) | 8000.00 (16.47) | 8000.00 (13.33) |
| 10. | Interest on fixed capital | 195.56 (0.28) | 231.89 (0.49) | 433.219 (0.89) | 235.37. (0.39) |
| 11. | Sub total | 62542.99 (90.91) | 42993.53 (90.91) | 44164.78 (90.91) | 55543.39 (90.91) |
| 12. | 10% Cost managerial of sub-total | 6254.30 (9.09) | 4299.35 (9.09) | 4416.478 (9.09) | 5454.38 (9.09) |
| | Grand total | 68797.29 (100.00) | 47292.88 (100.00) | 48581.26 (100.00) | 59998.16 (100.00) |

**Note-** Figures in parenthesis are the per cent to corresponding grand total

**Per hectare of costs and returns of garlic in the study area:** The calculated value of Cost-$C_3$ was found Rs. 68797.29, Rs. 47292.88, and Rs. 48581.26 on marginal, small and medium size groups of farms, respectively along with average value i.e. Rs. 59998.16. On an average cost $A_1$, $B_1$, $B_2$, $C_1$, and cost $C_2$ worked out were Rs. 43171.70, Rs. 43407.57, Rs. 51407.57, Rs. 46543.79 and Rs. 54543.79 per ha, respectively (Table 3).

**Table 3:** Per hectare measures of costs and returns of garlic (in Rs.)

| S. No. | Particulars | Cost and farm profit | | | |
|---|---|---|---|---|---|
| | | Marginal | Small | Medium | Average |
| 1. | Cost $A_1$/ $A_2$ | 50831.66 | 31807.19 | 33942.45 | 43171.70 |
| 2. | Cost $B_1$ | 51027.22 | 32039.08 | 34375.67 | 43407.57 |
| 3. | Cost $B_2$ | 59027.22 | 40039.08 | 42375.67 | 51407.57 |
| 4. | Cost$C_1$ | 54542.99 | 34993.53 | 36164.78 | 46543.79 |
| 5. | Cost$C_2$ | 62542.99 | 42993.53 | 44164.78 | 54543.79 |
| 6. | Cost $C_3$ | 68797.29 | 47292.88 | 48581.26 | 59998.16 |
| 7. | Yield (qtl/ha.) | 47.00 | 49.00 | 45.00 | 47.33 |
| 8. | Gross income | 180950.00 | 188748.00 | 173295.00 | 182267.54 |
| 9. | Net income | 112152.71 | 141455.12 | 124713.74 | 122269.38 |
| 10. | Family income | 121922.78 | 148708.92 | 130919.33 | 130859.97 |
| 11. | Farm business income | 130118.34 | 156940.81 | 139352.55 | 139095.84 |
| 12. | Cost production (Rs/q) | 1463.77 | 965.16 | 1079.58 | 1270.32 |
| 13. | Input-output ratio | | | | |
| a. | On the basis of cost A1/A2 | 1:3.56 | 1:5.93 | 1:5.11 | 1:4.45 |
| b. | On the basis of cost$B_1$ | 1:3.55 | 1:5.89 | 1:5.04 | 1:4.42 |
| c. | On the basis of cost$B_2$ | 1:3.07 | 1:4.71 | 1:4.09 | 1:3.67 |
| d. | On the basis of cost $C_1$ | 1:3.32 | 1:5.39 | 1:4.79 | 1:4.11 |
| e. | On the basis of cost $C_2$ | 1:2.89 | 1:4.39 | 1:3.92 | 1:3.46 |
| f. | On the basis of cost C3 | 1:2.63 | 1:3.99 | 1:3.57 | 1:3.14 |
| 14. | B:C Ratio | 1:1.63 | 1:2.99 | 1:2.57 | 1:2.14 |

**Note-** Figures in parenthesis are the per cent to corresponding grand total

**Income from garlic production**

Incomes from garlic production were calculated and are given in Table 3 Per hectare gross income was observed maximum under marginal farms i.e. Rs. (180950.00) followed by small farms (Rs. 188748.00) and medium farms Rs. (173295.00), respectively. Per hectare gross income was highest on marginal farms due to higher investment on H.Y.V. seeds and manure & fertilizers resulted higher productivity. Productivity on these farms might be fallowing better management by the farmers. On an overall average, gross income came to Rs. 182267.54 whereas net income was Rs. 122269.38 per hectare. On an overall average, family income and farm business income were worked out to be Rs.130859.97, and Rs. 139095.85 per hectare,

respectively. Cost of production per quintal of garlic were computed to be Rs. 1463.77, Rs. 965.16 and 1079.58 on marginal, small and medium farms, respectively with an average of Rs. 1270.32. Average input-output ratio on cost $A_1$, cost $B_1$, cost $B_2$, cost $C_1$, cost $C_2$ and cost $C_3$ were worked out and came to 1:4.45, 1:4.42, 1:3.67, 1:4.11, 1:3.46 and 1:3.14, respectively. Input-output ratio related to cost $C_3$ was highest on marginal farms (1:2.63) followed by small farms (1:3.99), and medium farms (1:3.57). In respect of cost $C_2$, Input-output ratio (1:2.89) was highest on marginal farms followed by small farms (1:4.39), and medium farms (1:3.92). Cost $C_1$ input-output ratio (1:3.32) of cast $C_1$ was observed highest on marginal farms followed by medium farms (1:4.79) and small farms (1:5.39). In

respect to input-output ratio (1:3.07) of $B_2$ was found highest on marginal farms followed by small farms (1:4.71) and medium farms (1:4.09). Whereas, in cost $B_1$ the input-output ratio was highest on marginal farms (1:3.55) followed by medium farms (1:5.04) and small farms (1:5.89). In respect to Input-output ratio of Cost $A_1$, was highest on marginal farms (1:3.56) followed by medium farms (1:5.11) and small farms (1:5.93), respectively.

## Conclusion

Uttar Pradesh is one of the important garlic producing state in India. Cost of garlic cultivation $ha^{-1}$ of was found highest among marginal farms size which might be due to heavy investment of manure & fertilizers. Maximum input cost was incurred on manure & fertilizers with overall average of 23.71 per cent. Gross income $ha^{-1}$ was observed highest under marginal size of sample farms. Net return over cost $C_1$, net return over cost $C_2$, family labor income, farm business income and farm investment income was also higher under marginal size of sample farms. Cost of production per quintal was lower in marginal size of sample farms. Overall average cost of production per quintal was Rs. 1451.97. It can be concluded from the study that garlic cultivation in Etawah district can be a profitable venture by minimizing the cost of manure and fertilizer.

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