



Research Paper

Economic analysis of mint cultivation in Madhepura district of Bihar

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ABSTRACT : The present study of mint variety-CIM-Karnti demonstrated for cultivation of Madhepura district of Bihar. Mint is an essential oil bearing plant. Oil and its derivatives are extensively used in food, pharmaceutical, perfumery and flavouring industry. During the study period, 55 farmers of mint cultivation have been demonstrated on the farmer's field of five villages under Madhepura district of Bihar during 2018-19. The primary data were collected from the selected farmer's field. Simple analytical tools and technique has been used for data analysis and for carried out the cost of cultivation according different cost concepts. The multiple linear production function was used to evaluate the resource use efficiency in the production of mint. It was observed that medium level adoption of mint cultivation has been found higher followed by high and low level adoption. The total cost of cultivation and gross return has been found Rs. 52,804 /- and Rs. 1, 59,268/- ha⁻¹, respectively. The net return on cost A₁ C, Rs. 1,06,464/- and Rs. 90,640/-ha⁻¹. The benefit cost ratio has been observed 2.02 and 1.32 at cost A₁ and Cost C, respectively. The independent variables like sucker and nursery raising, manures and fertilizers and distillation charges were positive indicating significant impact on the returns from mint crop in the study area. Thus, profitable returns through cultivation of mint may attract large number of farmers to cultivate this crop to enhance their income and employment in the study area with integrated farming traditional crops.

KEY WORDS : Economics of mint, Cost, Returns, Adoption

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INTRODUCTION :

Medicinal and aromatic plants (MAPs) are receiving considerable attention all over the world because of their vast untapped economic potential, especially in the use of herbal medicines (Kumar *et al.*, 2008 a and b). The *Mentha arvensis* (menthol mint) is an important essential oil bearing crop, de-mentholated oil and specific terpene fractions there of are widely used in food, flavour,

pharmaceutical and cosmetic industries (Singh and Khanuja, 2007). *Mentha* is an aromatic herb, which also goes by the name Japanese pudina in India. Steam distillation and filtration of dried *Mentha arvensis* leaves produces mentha oil, which can be processed to yield menthol and other derivatives. Oil and its derivatives are extensively used in food, pharmaceutical, perfumery and flavouring industry. Mint is cultivated in a large area in

the Indo-Gangetic Plains in the states of Punjab, Haryana, Uttarakhand, Uttar Pradesh and Bihar, with maximum area cultivation in Uttar Pradesh. The major districts in Uttar Pradesh where this crop is being cultivated are Badaun, Bareilly, Shahjahanpur, Pilibhit, Lakhimpur Kheri, Barabanki and Ambedker Nagar etc (Kumar *et al.*, 2011). This crop was introduced in Madhepura district of Bihar by CSIR-Central Institute of Medicinal and Aromatic Plants (CSIR-CIMAP) in a under CSIR-Aroma Mission. The present study was focused on the following aspects of the mint cultivation: Adoption pattern of production technology, socio-economic status and resource structure of the farmers and benefit and cost analysis of mint cultivation at Madhepura district of Bihar.

MATERIALS AND METHODS :

The demonstrations were conducted on 55 farmer's field in five villages of Madhepura, district Bihar during the year 2018-19. The recommended package of practices (PoP) for mint cultivation developed by CSIR- Central Institute of Medicinal and Aromatic Plant (CIMAP), Lucknow were demonstrated through hand on training on the farmer's field. The primary data were collected from the selected farmer's on adoption pattern and profit of mint cultivation. To examine the cost and returns of mint cultivation, simple analytical tool and technique has been used for data analysis method was followed. The economics was worked out by comparing costs and returns at different stages of economic life. The Multiple Linear Production function was used to evaluate the resource use efficiency in the production of mint cultivation.

Multiple linear production function:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \dots + \beta_n X_n$$

α = Intercept

X_1 = Human manpower charges (Rs./ha)

X_2 = Machine/Tractor (Rs./ha)

X_3 = Suckers (Rs./ha)

X_4 = Manure and fertilizer (Rs./ha)

X_5 = Irrigation (Rs./ha)

X_6 = Distillation charges (Rs./ha)

X_7 = Transportation charges (Rs./ha)

RESULTS AND DATA ANALYSIS :

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Adoption pattern of improved production technology of mentha cultivation:

It is observed from the study that 45.46 per cent farmers shown their strong interest in the adoption of the cultivation practices of mint due to the economic return and market availability of the final produce of the crop *i.e.* essential oil. It is recommended that this crop is now being well adopted by the sample farmer at high adoption rate.

Socio-economic and resource structure of study areas:

Data from the selected farmers were collected and analysed in respect of average family size, literacy status, occupation, caste, average land holding, cropping pattern, average farm assets etc. are discussed in Table 2. This table revealed that the overall average family size was found 3.58 persons, literacy status of family member was 80.87 per cent, More than two third of population of the study area was solely dependent on agriculture. The average land holding of the sample farmers were found as 2.39 hectares. Mint, vetiver, satavar and lemongrass occupied an important position in the cropping pattern by representing about 23.68 per cent area during the year. The major investment was made by the farmers on the farm asset like farm building, irrigation structure, tractor, farm equipment and distillation units etc.

Cost structure of mint cultivation:

Cost structure of mint cultivation calculated at current price prevailing in market has been presented in

| Categories of adoption level | Frequency | Cumulative frequency |
|------------------------------|-------------|----------------------|
| Low level adoption | 15 (27.27) | 15 |
| Medium level adoption | 25 (45.46) | 40 |
| High level adoption | 15 (27.27) | 55 |
| Total | 55 (100.00) | - |

Table 3. The observed operation cost of mint cultivation was found to be Rs. 52804/- ha⁻¹ as a four months crop. In operation cost, the maximum share was of irrigation charges (23.84 %), followed by Suckers and nursery raising (17.28%), manures and fertilisers (14.28 %) and hired manpower charges (14.16 %), respectively.

Table 2 : Socio-economic profile of the farmers

| Particulars | | Averages |
|--|-------------------------------------|----------|
| Average family size (No.) | | 3.58 |
| Literacy status of family members (%) | | 80.87 |
| Occupation (%) | Agriculture | 86.79 |
| | Allied sector (dairy plus services) | 13.21 |
| Caste composition (%) | General | 3.64 |
| | Other backward castes | 94.55 |
| | Schedule tribal castes | 1.82 |
| Average landholding (ha) | | 2.39 |
| Cropping pattern (%) | | 76.32 |
| Agriculture crops (%) | Paddy | 37.04 |
| | Wheat | 14.15 |
| | Maize | 18.25 |
| | Potato | 4.89 |
| | Mustred | 1.99 |
| Medicinal and Aromatic crops (MACs) (%) | | 23.68 |
| MACs (%) | Satavar | 0.79 |
| | Lemongrass | 0.53 |
| | Vetiver | 5.82 |
| | Mint | 16.54 |
| Average farm assets Rs. (farm building, irrigation structure, farm equipment and distillation units) Rs. | | 246382 |

Table 3: Cost structure of mint cultivation in Madhepura district of Bihar

| Particulars | Amount (Rs.) | (Rs. ha ⁻¹) |
|--------------------------------------|----------------|-------------------------|
| Hired manpower charges | 7478 (14.16) | |
| Machine /Tractor | 4907 (9.29) | |
| Suckers and nursery raising | 9124 (17.28) | |
| Manures and fertilizers | 7502 (14.21) | |
| Irrigation | 12578 (23.82) | |
| Distillation charges | 7401 (14.02) | |
| Transportation | 2028 (3.84) | |
| Interest on working capital @7% | 1786 (3.38) | |
| Cost A1 | 52804 (100.00) | |
| Rent paid in leased land | - | |
| Cost A2 | 52804 | |
| Interest on fixed capital assets@12% | 1413 | |
| Cost B1 | 54217 | |
| Rental value of own land | 8333 | |
| Cost B2 | 62550 | |
| Cost of family labour | 6078 | |
| Cost C | 68628 | |

Returns from mint cultivation:

The costs and returns from mint cultivation are presented in Table 4. It was found that the farmers have got 110 kg of mint oil from ha⁻¹ of land, which amounted to total return Rs. 1,59,268/- ha⁻¹. The net return over different costs A₁, A₂, B₁, B₂ and C were Rs. 1,08,300/-, Rs.1,08,300/-, Rs.1,05,600/-, Rs.97,266/-, Rs. 91,188/- ha⁻¹, respectively. The B : C ratio over cost A₁ and C were found 2.02 and 1.32. Thus, profitable returns through cultivation of mint may attract large number of farmers to cultivate this crop to enhance their income and employment in the study area with integrated farming traditional crops.

Estimated resource use efficiency for mint cultivation:

The estimated resource use efficiency in mint production is presented in Table 5. The determination of regressions co-efficient's (R²) value was estimated at 0.764 which indicates 76 per cent of the variations in mint yield, were influenced by the explanatory variables included in the model. The independent variables like sucker and nursery raising, manures and fertilizers and distillation charges were positive indicating significant impact on the returns from mint crop in the study area. The transportation charges were negative significant at 1 per cent (p<0.01) it implies that increase the production and decrease the transportation charges.

Marketing of mint oil:

The important marketing channels involved in the mint oil marketing system were found to be as under:

| Particular | Amount (Rs.) |
|----------------------|--------------|
| Oil production (kg) | 110 |
| Price rate (Rs./kg) | 1450 |
| Total return | 159268 |
| Net return over cost | - |
| Cost A ₁ | 106464 |
| Cost A ₂ | 106464 |
| Cost B ₁ | 105051 |
| Cost B ₂ | 96718 |
| Cost C | 90640 |
| B-C ratio | |
| Cost A ₁ | 2.02 |
| Cost A ₂ | 2.02 |
| Cost B ₁ | 1.94 |
| Cost B ₂ | 1.54 |
| Cost C | 1.32 |

| Variables | Co-efficients | Standard error | t Stat | P-value |
|---|---------------|----------------|--------|---------|
| Intercept (α) | 12320.998 | 6374.126 | 1.933 | 0.059 |
| Manpower charges (X ₁) | 1.935 | 1.350 | 1.433 | 0.158 |
| Machine /Tractor (X ₂) | 4.900 | 4.440 | 1.104 | 0.275 |
| Suckers and nursery raising (X ₃) | 0.837* | 0.442 | 1.896 | 0.064 |
| Manures and fertilizers (X ₄) | 3.969** | 1.685 | 2.356 | 0.023 |
| Irrigation (X ₅) | -0.343 | 0.375 | -0.915 | 0.365 |
| Distillation charges (X ₆) | 10.543*** | 3.407 | 3.094 | 0.003 |
| Transportation (X ₇) | -14.375*** | 6.528 | -2.202 | 0.033 |
| R ² | 0.764 | | | |
| N | 55 | | | |

Figures in parenthesis are standard errors *, ** and *** indicate significance of values at P=0.1, 0.05 and 0.01 level of probability, respectively

Channel-I: Producer- Local buyers- Industry

Channel - II: Producer -Industry.

It was observed that about 80 per cent of mint growers used Channel-I and only 20 per cent used Channel- II to sell their produce at study area. It is, therefore, apparent that local buyers act as middle man in this trade slicing away a major portion of the profit which may have gone to the producer. It is, therefore, imperative to link the producers directly with the user industries to ensure better market price to the producers.

Conclusion:

It is concluded from the study that the major source of livelihood of the farmers has been found agriculture and allied activity. The farmers' are inclining to adopt new crops and technologies for their livelihood improvement. The mint cultivation was found to be profitable for the selected farmers of the study area. The mint crop is also well fitted between the traditional cropping patterns as a summer (zaid) season crop. However, it was recommended from the present study that the mint cultivation can be promoted in study area. So the cultivation of this crop improves their livelihood life.

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