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Research Note

Economic Analysis of Menthol Mint Cultivation in Uttar Pradesh: A Case Study of Barabanki District

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Abstract

The present study has been carried out in the Barabanki district of Uttar Pradesh on economic analysis of menthol mint cultivation in the year 2010. The economics has been worked out by comparing costs and returns at different stages by the conventional method. The linear production function has been fitted to evaluate the resources-use efficiency in the production of menthol mint. The study has shown that the major portion of operational cost is shared by hired labour, interculture operations, distillation charges, irrigation and machine / tractor charge. The overall benefit-cost ratio has been found to be 2.55, which indicates a higher profit for farmers on less investment in mint cultivation. The independent variables like human labour, machinery, manures and fertilizer, irrigation charges and intercultural operations have shown a positive and significant impact on the returns of mentha crop in the study area. The major problems faced by the farmers are high input cost, erratic supply of electricity, lack of adequate information, infrastructural facilities, regulated markets and energy-efficient distillation units.

Key words: Menthol mint, Medicinal and aromatic plants, Mentha crop, Barabanki district, Economic analysis

JEL Classification: Q 12, Q, 18

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*., 2008a;b). The *Mentha arvensis* (menthol mint) is an important essential oil bearing plant and the *l*-menthol crystallized from the essential oil, de-mentholated oil and specific terpene fractions thereof are widely used in food, flavour, pharmaceutical and cosmetic industries (Singh *et al*., 2007). Menthol 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 in Uttar Pradesh (Khanuja *et al*., 2005). The major districts in Uttar Pradesh where this crop is being cultivated are Badaun, Bareilly, Sahajanpur, Pilibhit, Lakhimpur Khiri, Barabanki and Ambedker Nagar. The estimated area and production of menthol mint are given in Table 1.

The present study was specially focused on the following aspects of the menthol mint cultivation: (a) socio-economic status and resource structure of the farmers, (b) comparative economics of menthol mint cultivation, and (c) production constraints and suitable policies for promotion of menthol mint cultivation.

Methodology and Design of the Study

For the study conducted during the year 2010, the Barabanki district of Uttar Pradesh was selected purposively because of its highest area under menthol mint cultivation. From the district, two blocks Dewa and Masauli and from these blocks, 60 farmers (30 from each block) were selected purposively. The

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Table 1. Estimated area and production of menthol mint in India during 1995 – 2009

Year	Approx. area (ha)	Approx. production of mentha oil (tonnes)
1995	80000	7000
1996	120000	9000
1997	170000	14000
1998	133000	12000
1999	125000	11000
2000	150000	14000
2001	155000	14500
2002	150000	14000
2003	150000	15000
2004	150000	15000
2005	160000	16000
2006	160000	16000
2007	170000	17000
2008	180000	18000
2009	160000	16000

Source: Singh and Khanuja (2007)

primary data were collected through personal interview using a pre-tested questionnaire, while the secondary data were collected from the publication of government and other agencies. To study the economics of menthol mint, simple cost accounting method was followed. The prices used in the analysis were average for the crop harvesting period 2010. The linear production function [Equation (1)] was fitted to evaluate the resource-use efficiency in the production of menthol mint.

$$Y = aX_1b_1 + X_2b_2 + X_3b_3 + X_4b_4 + \ldots\ldots\ldots\ldots + X_nb_n \quad \ldots(1)$$

where,

a = Intercept,
X_1 = Human labour (₹/ha),
X_2 = Machine/Tractor hours (₹/ha),
X_3 = Suckers / slip (₹/ha),
X_4 = F.Y.M & fertilizer (₹/ha),
X_5 = Irrigation (₹/ha),
X_6 = Interculture (₹/ha), and
X_7 = Distillation charges (₹/ha).

Results and Discussion

Socio-economic and Resource Structure

Data from the selected farmers were collected and analysed in respect of average family size, literacy status, occupation, caste, average landholding size, cropping pattern, average farm assets and comparative economics of menthol mint production and are discussed below.

The average family size was about 8.53 persons in the Dewa block and 7.02 persons in the Masauli block (Table 2). About 10.94 per cent population was found to be illiterate in Dewa block as compared to 13.88 per

Table 2. Socio-economic and resource structure of mint farmers in Barabanki district

Particulars	Dewa block	Masauli block	Average
Average family size (No.)	8.53	7.02	7.78
Literacy status family members (%)			
Illiterates	10.94	13.88	12.41
Literates	89.06	81.12	85.09
Occupation (%)			
Agriculture	66.67	76.92	71.80
Others (Dairy + Services)	33.33	23.08	28.21
Caste composition (%)			
General	40.00	20.00	30.00
Other backward castes	40.00	63.33	51.67
Schedule castes	20.00	16.67	18.34
Average landholding (ha)	1.23	1.91	1.57
Cropping pattern in hectare (%)			
Agricultural crops (paddy, wheat, etc.)	58.41	62.23	60.32
Aromatic crop (mentha)	41.59	37.77	39.68
Average farm assets (farm building, irrigation structure, tractor/equipment, distillation units) (₹)	48223	103438	75830

Table 3. Cost structure of mentha cultivation in Barabanki district

(₹/ha)

Particulars	Dewa block	Masauli block	Average
Hired labour	3135 (19.86)	3396 (21.03)	3265 (20.45)
Machine/Tractor hours	1463 (9.27)	1266 (7.84)	1364 (8.55)
Seed/ slip	1255 (7.95)	1304 (8.07)	1279 (8.01)
Manure	1034 (6.55)	1206 (7.47)	1120 (7.01)
Fertilizers	1267 (8.03)	1238 (7.67)	1253 (7.85)
Irrigation	1563 (9.90)	1851 (11.46)	1707 (10.69)
Interculture	3088 (19.56)	3200 (19.82)	3144 (19.69)
Distillation charges	2087 (13.22)	1760 (10.90)	1924 (12.05)
Interest on working capital	894 (5.66)	925 (5.73)	909 (5.70)
Total cost	15787 (100.00)	16145 (100.00)	15966 (100.00)

Note: Figures within the parentheses are percentage to total

cent in Masauli block. More than two-third population in the study area was solely dependent on agriculture for livelihood. The average landholding size was found to be 1.23 ha and 1.91 ha in Dewa and Masauli blocks, respectively. Menthol mint occupied an important position in the cropping pattern by representing about 40 per cent area during the year 2010. The major investment was made by the farmers on the farm asset like tractor, farm equipments, irrigation facility and distillation units.

Cost Structure of Mentha Cultivation

The per hectare costs and returns of mentha cultivation calculated at current prices have been presented in Table 3. The operational cost of mentha cultivation was found to be slightly higher in Masauli block (16145 / ha) than in Dewa block because of higher expenditure on irrigation and manuring in Masauli block. In operational cost, the maximum share was of hired labour (20.5%), followed by interculture operations (19.7%), distillation charges (12.0%) and irrigation (10.7%).

Economics of Mentha Cultivation

The costs on and returns from mentha cultivation in both the blocks are presented in Table 4. The costs A_1 & A_2, B_2 and C_2 were found to be higher in Masauli than Dewa block. It was found that the farmers got about 113 kg of mentha oil from crop in one hectare of land, which amounted to total return 56615 (Table 5). The net return over cost A_1 was more in the Dewa block (43243 / ha) than Masauli block (38055 / ha). The benefit-cost ratio was on cost A_1 was also found to be more in Dewa (2.74) than Masauli (2.36) block.

Estimated Production Function for Mentha Cultivation

The independent variables like human labour, machinery, manures and fertilizer, irrigation charges and interculture operations had positive and significant

Table 4. Economics of mentha cultivation in Barabanki district

(₹/ ha)

Particulars	Dewa block	Masauli block	Average
Cost A_1	15787	16145	15966
Rent paid in leased land	0	0	0
Cost A_2	15787	16145	15966
Interest on capital assets	1200	1325	1263
Cost B_1	16987	17470	17228
Rental value of own land	5000	5000	5000
Cost B_2	21987	22470	22228
Estimated cost of family labour	697	582	640
Cost C_1	17684	18052	17868
Estimated cost of family labour	697	582	640
Cost C_2	22684	23052	22868

Table 5. Net return over comparative costs of mentha cultivation in Barabanki district

(₹/ ha)

Particulars	Dewa block	Masauli block	Average
Production			
Herbs (quintal)	310.65	288.60	299.62
Oil production (kg)	118.06	108.40	113.23
Total return @ Rs 500/ha	59030	54200	56615
Net returns over cost			
Cost A_1	43243	38055	40649
Cost A_2	43243	38055	40649
Cost B_1	42043	36730	39387
Cost B_2	37043	31730	34387
Cost C_1	41346	36148	38747
Cost C_2	36346	31148	33747
B - C ratio			
Cost A_1	2.74	2.36	2.55
Cost A_2	2.74	2.36	2.55
Cost B_1	2.48	2.10	2.29
Cost B_2	1.68	1.41	1.55
Cost C_1	2.34	2.00	2.17
Cost C_2	1.60	1.35	1.48

impact on the returns from mentha crop in the study area (Table 6). The high value of R^2 indicated that the selected variables explained most of the variations (Mal *et al.*, 2010).

Table 6. Estimated production function for mentha cultivation

Variables	Barbanki district
Intercept (a)	-5896.470 (4246.553)
Human labour (X_1)	4.903* (2.088)
Machine/Tractor hours (X_2)	9.893* (3.813)
Suckers/ Seed (X_3)	0.245 (8.585)
Manures & fertilizer (X_4)	11.378* (4.168)
Irrigation (X_5)	3.456* (1.472)
Interculture (X_6)	5.730* (2.816)
Distillation charges (X_7)	-0.329 (1.420)
R^2	0.968

Notes: Figures within the parentheses are standard errors
* Significant at 5 per cent level of probability

Major Constraints Faced by Farmers

The major constraints faced by the mint growers in the study area were specified into three categories, viz. production, infrastructural and policy-related constraints (Table 7). The major problems faced by the farmers in production were lack of support price,

Table 7. Constraints faced by farmers in menthol mint cultivation

S.No.	Constraints	Percentage of farmers
	Production constraints	
1.	Lack of training on cultivation methods, distillation and their awareness to farmers	60
2.	Climate Change	85
3.	Electricity problem	80
4.	High input costs	85
5.	Lack of trained labour for cultivation	75
6.	Inadequate market information	80
7.	Lack of support price system	90
	Infrastructural constraints	
1.	Lack of basic infrastructure and regulated marketing system	98
2.	Lack of improved and quality distillation unit	75
3.	High processing cost incurred by farmers	85
4.	High cost of good quality distillation machine	83
	Constraints related to policy, trade, etc.	
1.	Lack of awareness about export market	91
2.	Existence of intermediaries between farmers and processors/industries	75
3.	Illegal trade etc.	86

high input cost, climate change, erratic electricity supply, inadequate market information and lack of trained man power. Under infrastructural category, the major constraints were lack of basic infrastructure and regulated marketing system, high processing cost, high cost of good quality distillation machine and lack of improved and quality distillation units. The major policy-related constraints were lack of awareness about export market, illegal trade and existence of intermediaries between farmers and processors and industry.

Conclusions

The study has revealed that the major source of earning of farmers in the study area was agriculture. Menthol mint as transplanted mint has been found a filler crop during the *zaid* season in the district which is well fitted between rice-wheat cropping system. This crop has been found to give a higher return to the farmers. The inputs like human labour, machines, manures & fertilizers, irrigation and inter-culture operation have been observed to directly affect the production as well as income of the farmers. The major constraints being faced by the farmers have been reported as lack of basic infrastructure and regulated marketing system, high input costs, lack of awareness about export market, climate change, electricity supply problem, inadequate market information, lack of support price and poor quality of distillation units. Since the local distillation units give lower and poor quality oil, it is imperative to improve the quality of distillation units for installation in the mint-growing areas. The study has also underlined the need for adequate attention towards mitigating various constraints for overall development of mint cultivation which has occupied a major place in cropping system in the study area.

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