

PERCEIVED CONSEQUENCES OF ADOPTION OF MENTHA CULTIVATION IN CENTRAL UTTAR PRADESH

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ABSTRACT

India is the largest producer of mentha oil in the world contributing almost 80% of total production in the world and Uttar Pradesh is the highest producing state contributing almost 80-90 % of total production of mentha oil in the country. The study was taken up in Barabanki and Lucknow districts of UP to understand the consequences of adoption of mentha cultivation by the farmers. The overall adoption score was found to be 31.63 percent. The extent of adoption was much higher in Barabanki as compared to Lucknow. Decrease in water table was the most important undesirable consequence reported followed by decline in soil fertility & yield and increased incidence of pest attack in other crops. Increased divide between the rich and poor was also expressed. Desirable consequences of mentha cultivation include high economic profit leading to increase in socio-economic status. The respondents also expressed increase in social relations and contact with extension agents. Decreased attack by animals was another desirable consequence. Efforts need to be made to do away with the undesirable consequences to make mentha cultivation socially, economically and environmentally sustainable.

KEYWORDS: Mentha, Adoption, Consequences

INTRODUCTION

Mentha (*Mentha arvensis*) popularly known as mint or *pudina* is an aromatic herb having pleasant odour leaves. Mentha oil, the major derivative of mentha leaves is of very high economic and medicinal value. India is contributing 75-80% of total global production of mentha and rest is contributed by China (15-18%) followed by Brazil and USA (Ventura Commodities Pvt. Ltd., 2007). Exports of mint products from India are increasing over the years. Mentha derivatives finds use several purposes in the food, perfumery, flavouring and pharmaceutical industry.

Mentha is native of Japan. After Japan, its cultivation began in Argentina, Brazil and China. In India, mentha cultivation started in 1964. Commercial cultivation started only after 2000. On global front, India remains in top position in terms of mentha oil production and exports are concerned. Uttar Pradesh is the highest mentha oil producing state in the country contributing 80-90% of total production in India (Karvy Commodity Limited, 2011).. For the maximum share, U. P is known as export basket for mentha oil.

The large scale commercial cultivation of Mentha in U. P. is done in tarai belt namely Moradabad, Badaun, Rampur and Bareilly districts and in central part namely Barabanki, Sitapur and Lucknow districts. According to data obtained from the Department of Horticulture and Food Processing U. P, total sowing area of mentha crop in whole U. P was about 264657 hectare and production of mentha oil was 26469 mt in the year 2012-13.

Any new activity or development is accompanied by certain consequences thereof, may be desirable or undesirable. Consequences are as the changes that occur to an individual, organization or social system as a result of the adoption or rejection of an innovation (Rogers, E.M., 1995). There are very few literatures available on consequences of adoption of agricultural technology. Through this study, an attempt is made to find out and analyse the perceived consequences of adoption of mentha cultivation by the farmers.

METHODS

The study was carried out in Barabanki and Lucknow districts of Central Uttar Pradesh. As per the data of the Department of Horticulture and Food Processing (2012-13) Barabanki has the highest area and production under mentha cultivation while Lucknow has comparatively lower acreage and production. The area under mentha cultivation and the production of mentha oil in the two districts were 71589 ha & 7159 MT and 6809 ha & 681 MT respectively. From each of the two selected districts, the block having the highest area under mentha cultivation was purposively selected. The selected blocks were Banki block from Barabanki district and Baksi ka talab (B.K.T.) block from Lucknow. Three villages were randomly selected from each block by using the table of random numbers. The selected villages were Rampur Joga, Patmau and Sursanda from Banki block and Kumhava, Roodhi and Bibipur from B.K.T. Random proportionate sampling method was used to select 60 farmers from the three selected villages of each block. Thus a final of 120 farmers were interviewed for the study. Data were collected using structured and semi-structured interview schedule in the year 2014.

RESULTS AND DISCUSSIONS

Extent of adoption was measured against 22 items of improved mentha cultivation practices as recommended by Central Institute of Medicinal and Aromatic Plants (CIMAP). The adoption score of a respondent is determined as percentage of sum of the scores obtained by the respondent against each of the 22 Items to the maximum possible adoption score. The extent of adoption of each of the farmers was calculated and the farmers were grouped into three categories based on the mean and standard deviation of the adoption score. Details are presented in Table 1.

Table 1: Distribution of Respondents According to their Extent of Adoption

Districts	Low (Less than 15.64)	Medium (15.64 to 47.62)	High (Greater than 47.62)	Mean Adoption Score (%)
Barabanki	0 (0.00)	38 (63.33)	22 (36.67)	40.34
Lucknow	19 (31.67)	31 (51.67)	10 (16.67)	22.92
Total	19 (15.83)	69 (57.50)	32 (26.67)	31.63

Figure in parenthesis indicate percentage to the total number of respondents

It is observed that more than half of the respondents (57.50 %) had medium level adoption score followed by 26.67 percent in the high adoption category. The mean adoption score of Barabanki district (40.34%) was recorded to be much higher than that of Lucknow (22.92%). The overall adoption score was 31.63 percent.

The consequences of adoption of mentha crop as identified by the respondents are listed in the Table 2 and grouped into two broad categories viz, socio-economic and agro-ecological. The number of respondents who have expressed is presented against each consequence.

There were five socio-economic consequences among which four were desirable consequences and one was undesirable i.e., increase divide between rich and poor. Majority of respondents in both the districts have expressed all the five consequences. However, significant difference was observed only in the case of increase divide between rich and poor where the number of respondents reporting this consequence was found more in Lucknow.

Eight consequences were there in the agro-ecological category. The undesirable consequences which were mentioned by large number of respondents include decrease in water table (100 per cent), increased cost of cultivation (98.33 per cent), increased divide between the rich and poor (96.67 per cent), decrease in fertility and quality of soil (95 per cent), increased pest incidence and decrease in yield incidence of inter-crops (90 per cent) and decrease in yield of next/ subsequent crop (74.17 per cent). Undesirable consequences of lesser degree include decrease in availability of other crops (5.83 per cent) and changes in existing cropping pattern (13.33 per cent).

Table 2: Consequences of Adoption of Mentha Cultivation

Consequences	Frequency and Percentage		
	Barabanki (n=60)	Lucknow (n=60)	Pooled (N=120)
Socio-Economic Consequences			
1. Highly profitable	59 (98.33)	60 (100.00)	119 (99.17)
2. Improvement in social status	57 (95.00)	59 (98.33)	116 (96.66)
3. Increased divide between the rich and poor	56 (93.33)	60 (100.00)	116 (96.66)
4. Increase social relations	60 (100.00)	60 (100.00)	120 (100.00)
5. Increase contact/accessibility with change agents	59 (98.33)	59 (98.33)	118 (98.33)
Agro-Ecological Consequences			
6. Decrease in availability of other crops	5 (8.33)	2 (3.33)	7 (5.83)
7. Changes in existing cropping pattern	12 (20.00)	4 (6.67)	16 (13.33)
8. Decrease in yield of next crop	33 (55.00)	56 (93.33)	89 (74.17)
9. Decrease in soil fertility and quality	57 (95.00)	57 (95.00)	114 (95.00)
10. Increase in pest incidence and decrease in yield incidence in the other inter-crops	50 (83.33)	58 (96.67)	108 (90.00)
11. Decrease in water table	60 (100.00)	60 (100.00)	120 (100.00)
12. Decreased attack and crop destruction by animals	52 (86.67)	60 (100.00)	112 (93.33)

Figure in parenthesis indicate percentage to the total number of respondents

The consequences are described in detail hereunder.

- **Economic Profitability:** Mentha is a commercial crop with very high economic profitability. The overall benefit-cost ratio was found to be 2.55 (Kumar *et al.*, 2011). It was the main reason for the rapid spread of the crop among the farmers.
- **Increased Social Status:** The economic profitability translated into changes in social status of the farmers with many of them able to afford better way of life.
- **Increase in Cost of Cultivation:** Despite its economic profitability, mentha cultivation is a very costly affair. Being an irrigation and labour intensive crop, farmers had to spend money on irrigation. Canal and bore well are the mostly used irrigation sources. To get water supply from these sources to mentha farm, farmers need pump set which cost them the price of the fuel as well as rental charge in case it is hired (Rs. 150/hour). Moreover, activities like transplanting, intercultural operations and harvesting require labour which could not be met from the family or friends and many go for hiring wage labour @ ₹ 120/day. It has been reported that farmers adopting mentha cultivation receives a remuneration of ₹ 11,250 per ha from the Government of Uttar Pradesh (Rawat, 2009) in its effort to popularize the crop. But farmers in the study area are not aware of this benefit. A study by CCSR in 2008-09 found that on an average a farmer had to spend Rs 42,885/- per ha of mentha, half of which was on pumping water (Anonymous, 2011).
- **Decrease in availability of other crops:** The crops farmers used to cultivate before adoption of mentha include sugarcane, wheat, tulsii etc. But only few farmers have reported that adoption of mentha has lead to decrease in availability of these crops despite the initial apprehension that there will be lack of food grains like wheat due to large scale replacement by mentha crop (Pata *et al.*, 2000 and Chand *et al.*, 2004).

In addition to the utility, demand and profits, what adds to the merit of the crop is the 90 days' time period within which the crop gets ready. This is what makes it ideal for plugging the gap between the rabi (wheat or potatoes) and kharif crop (rice), and farmers reap the 'bonus' from the cash crop that comes in addition to the traditional food crops (Srivastava, 2013).

- **Increase divide between the rich and the poor:** Mentha cultivation being a very remunerative enterprise, farmers growing mentha has been able to reap huge profits. But, there is huge difference in the profit earned by large and medium size farmers and by the small and marginal farmers due to differences in area under mentha cultivation, adoption of improved varieties, infrastructures available and other factors. These have lead to a creation of economic and social divide between the rich and the poor in the farming society of the selected villages.
- **Increased social relations:** Mentha cultivation has lead to increase social relation in that farmers are taking very keen interest in learning more about the crop from other farmers. Mentha farmers usually gather together with peer farmers or visit each other to discuss mentha farming issues and developments.
- **Increased contact with the extension agents:** Mentha cultivation is more profitable compared than other crops and mentha growers started contact to extension agents (VLEWs, BDO) in village and block office for searching new mentha cultivation practices to enhance production. Though only few farmers have attended any training programme, the day-to-day contact with the extension agents have reported to be increased.
- **Changes in existing cropping pattern:** Most of the farmers said that after a crop of paddy and wheat, they

usually lay their land fallow during the summer period before sowing paddy again. Transplanted mint has been found a filler crop during the *zaid* season which is well fitted between rice wheat cropping system and does not make any change to the existing cropping pattern (Kumar *et al*, 2011).

- **Decrease in the yield of the next crop:** Mentha is generally followed by a crop of paddy or basi or wheat. It has been reported by some respondents that after a crop of mentha, there is decrease in the yield of the next crop to some extent. This may be attributed to the excessive utilization of water and nutrient by mentha crop leaving the next crop in want of these inputs.
- **Decrease in soil fertility and quality:** Mentha crop consumes large amount of soil nutrient and moisture. Thus, continuous cultivation of mentha had lead to decrease in soil fertility and quality.
- **Increase in pest incidence and decrease in yield incidence in the other inter-crops:** In the earlier years farmers used to intercrop mentha with sugarcane, but they observed increased incidence of insect and pest viz., white grub, termite, cut worm, white fly, *etc.* in sugarcane. This, along with competition with mentha for water and nutrient lead to decrease in the yield of the inter crop. As a result farmers have discontinued intercropping of mentha with other crops and have started to grow mentha solely during the crop season.
- **Decrease in water table:** This is one very significant consequence of mentha cultivation reported by the farmers and also in many literatures. It was also reported that in other districts, farmers have stated abandoning mentha crop due to this water crisis (Anonymous, 2011). A mentha crop requires 18 to 22 rounds of watering. One time watering needs eight to 10 hours of pumping water per acre (0.4 ha). Pump with 2.5-inch bore gives 20,000 to 25,000 litres of water in an hour, so a round of watering uses up 0.2-0.25 million litres of water. Thus, production of a litre of mentha oil requires 0.1 million to 0.125 million litres of water.
- **Decrease incidence of attack and crop destruction by animals:** Destruction of standing crops by animals is common. Crops like wheat, sugarcane, potato, basi are easily destroyed by wild animals like *nilgai* (*Boselaphus tragocamelus*) and also by domestic cows, buffalo, goats, sheep etc. Blue bulls and cattle, which are a constant threat to every other crop, do not affect mint at all (Srivsatava, 2013). However, things have changed since the cultivation of mentha. The aroma and taste of mentha leaves are generally unpalatable to the animals. This made them stay away from the fields and the crop is saved from destruction.

The respondents were further probed to describe what changes have been brought about in their lives because of the economic profitability which lead to increased social status. The responses were varied and include purchase of properties and assets like land, house, vehicle tractor, generator, pump sets and distillation units. Details are presented in Table 3. Some said they have invested the money while many have been able to clear debts from landlords and banks. Many of the respondents have stated that by the profit earned from mentha cultivation, they are able to send their kids to school and even to college. They are able to afford more healthy food, buy clothes/toys/books for children, buy clothes for wife as well as enjoy luxuries like going to cinema/fairs etc.

Table 3: Consequences of Economic Profitability (N = 120)

Consequences	Barabanki (n=60)		Lucknow (n=60)		Pooled (N=120)	
	No.	%	No.	%	No.	%
i. Bought new land	6	5	1	0.83	7	5.83
i. Bought new House	3	2.5	1	0.83	4	3.33
i. Bought new Vehicle	53	44.16	37	30.83	90	75.00
v. Made Investments	16	13.33	19	15.84	35	29.17
v. Paid debts from landlords	54	45	62	51.67	116	96.67
i. Paid debts from banks etc.	57	47.50	61	50.83	118	98.33
i. Started sending my kids to school	40	33.33	49	40.84	89	74.17
i. Started sending my kids to college	17	14.17	10	8.33	27	22.50
k. Afford a more luxurious life like go to cinema/fair, etc.	6	5	0	0	6	5.00
k. Eat more healthy food	58	48.33	61	50.84	119	99.17
i. Buy clothes/toys/books for children	54	45	60	50	114	95.00
i. Buy clothes for wife	57	47.50	62	51.67	119	99.17
i. Purchased tractor	40	33.33	11	9.17	51	42.50
v. Purchased Generator	1	0.83	1	0.83	2	1.66
v. Purchased Water pump set	46	38.33	43	35.84	89	74.17
i. Installed Distillation units.	45	37.50	26	21.67	71	59.17

CONCLUSIONS

Mentha farming is no doubt a very profitable enterprise. Nevertheless, the adoption of mentha farming comes with many desirable and undesirable consequences. Decrease in water table was the most important undesirable consequence reported followed by decline in soil fertility and yield and increased incidence of pest attack in other crops. Increased divide between the rich and poor was also expressed. Desirable consequences of mentha cultivation include high economic profit leading to increase in socio-economic status. The respondents also expressed increase in social relations and contact with extension agents. Decreased attack by animals was another desirable consequence. Due consideration need to be given on how to counteract the undesirable consequences, especially the declining water table to make mentha farming economically and environmentally sustainable. The perceived increased socio-economic divide between the adopters and non-adopters also need attention.

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