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Performance evaluation of newly developed variety of menthol mint at farmer's field – A case study of mint cultivation in Central Uttar Pradesh

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ABSTRACT

The present study for performance evaluation newly developed varieties of CIM –Kranti and other varieties of menthol mint cultivation has been carried out at farmers' field of central Uttar Pradesh. Mints are commonly used as the source of fragrance, flavor and pharmaceuticals industry. During the study period 2017-18, 100 farmers cultivating CIM-Kranti and other varieties have been selected from the region of central Uttar Pradesh. The primary data were collected from the selected farmer's field on profitability comparison between CIM-Kranti and other varieties under cultivation. The highest area and production has been observed during 2012 and 2013. Simple statistical tools and techniques have been used for data analysis of the cost of cultivation and profitability. It has been observed during the study that CIM-Kranti gives higher returns (₹ .98491/- ha/year) over other varieties (₹ .70977/-ha/year). However, the input cost of CIM-Kranti is higher than other varieties of the crop but the net return of CIM-Kranti was more profitable than other varieties. The benefit cost ratio has been observed 1.45 and 1.74 of other varieties and CIM-Kranti respectively. The new variety "CIM-Kranti" of menthol mint is cold and frost tolerant and has the potential to produce 10-15% more oil i.e. 145-160 kg/ha in summer season as compared to all other popular commercial cultivars of menthol mint.It is suggested from the study that maximum profit is generated through CIM-Kranti cultivation followed by other varieties crop.

Key words: Menthol mint, CIM –Kranti, Uttar Pradesh.

INTRODUCTION

Mints belong to the genus *Mentha* (family Lamiaceae) varying in their aroma and have been known as useful plant species from the time immemorial. Mints are commonly used as the source of fragrance, flavor and pharmaceuticals especially for culinary preparations. Although many species of mints are being cultivated all over the world (Kumar *et. al.* 2008), among them only four species are predominantly cultivated in India. These include Menthol mint (*MenthaarvensisL.var.piperascens*), Peppermint (*M.piperita*), Bergamot mint (*M.citrata*) and Spearmint (*M.spicata*). India is a leading supplier of Menthol mint oil in the world and a large number of farmers in India are being benefitted by its cultivation. Generally, the crop is cultivated during January to July either directly by suckers or by transplanting plantlets for production of mint oil.The cultivation of menthol mint in this country dates back to about 48 years. Prior to 1960s, the requirement of menthol in India was met by import. It was introduced as a crop in India through the efforts of CSIR's Central Indian Medicinal Plants Organization (now CIMAP) and Regional Research Laboratory, Jammu (now IIIM). The project on the Mentha cultivation was taken up at the CIMAP's Pantnagar Research Centre which was established in 1962 near Haldwani in Uttarakhand state. As a result of transfer of technology through this centre large areas were brought under this crop especially in *terai* region, i.e. Kashipur, Moradabad, Rampur, etc. Some companies like Richardson Hindustan Ltd (now P&G) and Bhavana Chemicals Ltd. also organized cultivation and processing of the Japanese mint crop for its oil and menthol in *terai* UP. The cultivation of mint became popular progressively since then and spread gradually in vast areas of Uttar Pradesh, and small to large areas of Punjab, Haryana, Madhya Pradesh and Bihar (Khanuja *et.al.*, 2005). About five year back few multinational companies (e.g. Symrise, BASF) have also started production of menthol through synthetic route posing a serious threat to the natural menthol. Besides this, climate change may also affect the cropping pattern and yield potential of the existing cultivars. It is, therefore, imperative to steer the research for breeding improved and high yielding varieties which can be grown in adverse climatic conditions and improvised agro-technology for cultivation of this industrial crop with minimum inputs. The diversified usage of menthol has shown that this commodity will be required consistently in large volume to meet the domestic as well as global requirements. Recently the new variety CIM- Kranti of menthol mint was released by CSIR-CIMAP to make the sustainability in production and to compete with synthetic menthol.

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MATERIALS AND METHODS

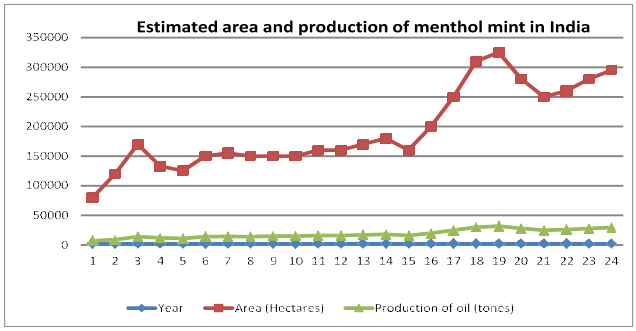
Three districts of Uttar Pradesh *viz.* Barabanki, Sitapur and Raebareli were selected purposively for the study where the new cultivar is adopted by farmers. The data were collected randomly from the 100 farmers in these districts, out of which 48were cultivating other varieties and rest 52 were cultivating Kranti variety. The 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.

Table 1: Sample farmers representing different regions.

State	District	Sample	Variety	
			Other varieties	CIM-Kranti
Uttar Pradesh	Sitapur	30	14	16
	Barabanki	40	20	20
	Raebareli	30	14	16
	Total	**100**	**48**	**52**

RESULTS AND DISCUSION

The last 24 years data from 1994 to 2018 has been shown in the graph on area and production of menthol mint. The highest area and production has been observed during 2012 and 2013. After introduction of synthetic menthol in the market the area was reduced drastically from 3.25 lakhs hectares in 2013 to 2.50 lakhs hectares in 2015. Due to the introduction of new cultivars CIM Kranti and new scientific production techniques at farmers field, the cultivation of this crop shown and increasing trend in area and production. The economics of new cultivar over existing cultivars as discussed in the paper. The trend is shown in following graph.



Source: compiled from various publications of CIMAP and industry feedback.

Cropping patterns: As per the data obtained from the study area, it can be understood that farmers are shifting their focus towards the medicinal and aromatic crops from the traditional crops. About 29.14 percent farmers are growing medicinal and aromatic crops and remaining farmers are cultivating the traditional crops like paddy, wheat, potato, mustard and sugarcane etc. (Table 2).

Cost of cultivation: The cost of cultivation of menthol mint in the study area shown in Table 3. The cost of cultivation was observed higher ₹ 56509/-per hectare per year in CIM Kranti than the existing varieties which is ₹ 49023/-per

Table 2: Cropping pattern (%).

Crop	Area (%)
Traditional Crops (Paddy, wheat, Potato, Mustard, Sugarcane, etc)	70.86
Medicinal and Aromatic crops	29.14
Total	100

Table 3: Cost of cultivation (₹ /ha.).

Particulars	Other Varieties	%	CIM-Kranti	%
A. Variable cost				
Raising of nursery	354	0.72	555	0.98
Preparation of land	4947	10.09	5284	9.35
Manures and Fertilizers	7146	14.58	9782	17.31
Cost of planting material (suckers)	2731	5.57	2265	4.01
Transplanting	3689	7.53	4526	8.01
Weeding and hoeing	4732	9.65	8691	15.38
Crop Protection	1846	3.77	2046	3.62
Irrigation	13374	27.28	12578	22.26
Harvesting	3163	6.45	3138	5.55
Distillation cost @ [1]	3112	6.35	2711	4.80
Miscellaneous charges (including transportation cost etc.)	722	1.47	1237	2.19
Interest on variable cost @ 7% p.a.	3207	6.54	3696	6.54
Total	**49023**	100.00	**56509**	100.00
B. Fixed cost				
Rental value of land	12500		12500	
Depreciation of fixed item	16821		16821	
Interest on fixed cost @ 7% p.a.	11775		11775	
Total	**41096**		**41096**	
Total cost (A+B)	**90119**		**97605**	

hectare per year. The major portion of costs in both the cultivars was shared by irrigation, manures and fertilizers, intercultural operations, transplanting and harvesting. It can be concluded from the table that cost of cultivation in CIM-Kranti is higher than the existing varieties.

Comparative economics of other varieties and cim-kranti: The data shown in Table 4 indicate that the new variety CIM-Kranti came out as a beneficial enterprise for the farmers. The yield of CIM-Kranti was more than other varieties under cultivation. Hence, the net profit of CIM-Kranti was found 38.76 percent higher than the other varieties. It is observed that CIM-Kranti is more profitable over variable cost than other varieties under cultivation in the study areas.

Difference between other varieties of menthol mint and cim-kranti: CIM-Kranti variety has several superior characters than other varieties of mentha. The cost of cultivation of CIM-Kranti was higher than other varieties but at the same time, CIM-Kranti variety has another excellences over other varieties like it is tolerant to cold and frost, suitable for kharif season, Number of cuttings which can be taken is twice the other varieties and also the oil yield, oil percentage and menthol percentage is higher than other varieties of mint under cultivation.

Table 4: Comparative economics of other varieties and CIM – Kranti.

Particulars	Other Varieties	CIM – Kranti
Oil yield (Kg/ha.)	120	155
Oil price (₹ /kg)	1000	1000
Gross return (₹ /ha)	120000	155000
Net profit (₹) over variable cost	70977	98491
C:B Ratio	1:1.45	1:1.74

Table 5: Differences between other varieties of Menthol mint and CIM-Kranti.

Particulars	Other Varieties	CIM-Kranti
Cost of Cultivation (₹ /ha)	90119	97605
Resistant to cold and frost	No	Yes
Number of cuttings	1	2
Suitability in Kharif Season	Could not be grown	Can be grown
Sucker Production (Q/ha)	200-250	200-250
Oil Yield (Kg./ha)	120	155
Oil (%)	0.60-0.75	0.90
Menthol (%)	70-75	75-78
Gross Return (₹ /ha)	120000	155000
Net Profit (₹ /ha) over variable cost	70977	98491

CONCLUSION

The new variety "SIM Kranti" of menthol mint is cold and frost tolerant and has the potential to produce 10-15% additional oil i.e, 145-160 kg/ha in summer season as compared to all other popular commercial cultivators of menthol mint. It is also observed from study that during winter season (September- January) when all other mint varieties suffer senescence due to cold and frost condition, variety "SIM Kranti" remains green in the field and grow vigorously to yield two or three times more essential oil (100gm/ha) have with sukers production (200-250 q/ha). The new variety "CIM Kranti" of menthol mint has widened its scope of cultivation in khariff seasons also and thus reducing the cost of cultivation in terms of less irrigation requirement. However, newly developed variety is suitable for commercial cultivation of menthol mint to generate additional income to farmers without any additional input for cultivation during winter besides its usual cultivation as a summer crop.

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