

## CULTIVATION PROSPECTS OF *MENTHA ARVENSIS* Linn. AT PESHAWAR

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### ABSTRACT

*Mentha arvensis* is a well-known plant reputed for its menthol content all-over the world. In order to determine the possibility of its cultivation as a crop, introduction and fertilizer trials were conducted for two consecutive years at Medicinal Plants Farm, Peshawar. Yield data indicated that 3-cuttings proved better as compared to two cuttings/annum. Application of split doses of NPK at the rate of 150:30:30 kg/ha significantly increased the yield of green herb as compared to other doses. The mint oil content are comparable with the main producing countries like Japan, India and China. Pilot-scale cultivation of Japanese mint in the irrigated areas is recommended to the farmers for growing as specialized crop.

### INTRODUCTION

*Mentha arvensis* (Japanese mint) is a strongly scented essential oil bearing plant reputed for its high menthol content extracted from mint oil. It is cultivated on commercial scale in the tropical and subtropical regions of Argentina, Brazil, South America, China and Japan for commercial utilization of its essential oil and

menthol contents. *M. arvensis* has been recently introduced in Pakistan and trials were conducted to determine its cultural and agronomical requirements at Peshawar. The crop is gaining importance for commercial utility of mint oil and its conversion in Menthol and other valuable by-products widely used in perfume, pharmaceutical products, foods, cosmetics, aftershave lotions and tooth pastes industries. Presently Pakistan imports Menthol and by-products of mint oil worth Rs.15 - 20 million every year from Japan and other countries to meet the requirements of pharmaceutical and other industries in the country.

Japanese mint can be cultivated under a wide range of soil and climatic conditions in tropical and subtropical countries (Hussain *et al* 1968). The climate of Peshawar valley is congenial for the cultivation of *M. arvensis* crop. The extraction of mint oil can easily be carried out with an investment of about Rs.0.25 million by installation of a distillation unit and thus a sizeable amount of foreign exchange can be saved on the import of mint oil and menthol from abroad.

The percentage of essential oil ranges from 0.45 to 0.6% extracted from freshly wilted leaves



of *M. arvensis* Chopra *et al* 1946 has reported that foliage yield increased by the application of phosphatic fertilizer. Bains *et al* (1971) conducted cultural and fertilizer trials at Ludhiana and concluded that maximum foliage yield could be obtained when planted at 45 cm row to row distance and recommended application of 150 kg N/ha in two split doses for vegetative growth of the plant. Later, Shelke and Morey (1978) described the effect of four levels of nitrogen application with 3 topping treatments on the growth and essential oil content. They found that yield of leaves and oil content was maximum with an application of 40 kg N/ha. It was further observed that plants topped at 42 days after planting gave highest oil yield (19.19 kg/ha) in the first cutting. Singh and Singh (1979) determined the effect of varying levels of nitrate on the growth and nitrogen metabolism in *M. arvensis*. They found that growth was maximum at 16 mg/litre of nitrate beyond which (32.0 & 64.0 mg/l) it reduced considerably. Bhardwaj *et al* (1980) studied the effect of different levels of nitrogen on herbage yield and oil content in *Mentha* species and found that highest herbage yields of *M. piperita* and *M. citrata* for two years were obtained with the application of 225 kg N/ha and 300 kg N/ha respectively.

Keeping in view, the economic importance and potential for development as minor cash crop, cultivation and fertilizer trials were conducted for two consecutive years (1985-87) under irrigated conditions at Medicinal Plants Farm, Peshawar. Results of these trials are presented in this article.

## MATERIALS AND METHODS

Root stocks of exotic *M. arvensis* were procured and stored in moist sand for three days. The variables to be tested were number of cuttings (3 vs 2) per annum and effect of application of N, P and K in 3 different combinations on the

growth and herb yield. The experiment was designed in a factorial randomized complete block design with three replications. The size of the plot was kept at 25 m<sup>2</sup>. Stolons were cut 8 - 10 cm long pieces and planted in rows 30 cm apart and covered by 5 cm layer of soil in November, 1985. First irrigation (10 cm) was provided immediately after planting and 12 subsequent irrigations (8 cm each) at an interval of fourteen days were applied till the end of November next year. In addition 250 mm average rain was received annually. Half of quantity of different doses of NPK fertilizers was given in March, while the second half quantity was applied as a side dressing in July according to lay out plan every year. Green herb was cut 2 and 3 times in the month of May, August and November every year as per experimental design. Yield of green herb under different treatments were recorded in kg/plot. Statistical analysis of yield data was carried out to determine the effect of various treatments.

## RESULTS AND DISCUSSION

Data on fresh herb yield for two consecutive years is tabulated as under:

Mean fresh herb yield of *M. arvensis* in kg/plot (25 m<sup>2</sup>) as affected by cultural and fertilizer treatments.

Results of the study during two consecutive years indicated that 3-cuttings of green herb proved its superiority over 2-cuttings per annum. Projection of yield data on hectare basis gave an estimated yield of 36.0 tonnes/ha from three cuttings as compared to two cuttings (28.8 tonnes/ha) per annum. Application of 150:30:30 NPK kg/ha gave significantly higher yield of green herb (36.8 tonnes/ha) as compared to other doses i.e., 100:20:20 NPK kg/ha. (32.8 tonnes/ha) against control treatment (21.6 tonnes/ha). No significant differences were observed in the mean



yield of treatments 150:30:30 NPK and 300:60:60 NPK kg/ha respectively. Therefore, fertilizer mixture having NPK in the ratio of 150:30:30 NPK kg/ha was economical and would provide more income to the cultivators.

Fertilizer for treatment			3-cutting	2-cutting	Mean	Pooled mean for fertilizer treatment
N	P	K	1985-86			
0			64	45	55	-
100	20	20	96	78	87	-
150	30	30	113	88	101	-
300	60	60	100	90	95	-
Mean			93	75	-	-
			1986-87			
0			56	49	52	54
100	20	20	85	66	76	82
150	30	30	104	79	92	97*
300	60	60	103	77	90	93
Mean			87	68	-	-
Pooled mean			90*	72	-	-
LSD (5%) for :			1985-86			
Fertilizer treatment			9.07		10.36	
Effect of cuttings (3vs2)			6.42		7.33	
Fertilizer X cutting			NS		NS	

\* Significant at 5% probability level.

The plant is perennial and showed luxuriant vegetative growth in the first year and a decline in the yield of green herb (8%) was observed during second year's growth which might be due to successive cuttings and age of plant. Therefore replanting is necessary after two year's growth.

Average yield of green herbs obtained in 3-cuttings/annum was calculated to be 28 tonnes/ha which would yield 126 kg essential oil. The economics of cultivation of this plant is given below. It is based on current market rates of sale of oil, yield and cost of production of fresh herb.

Yield of fresh herb	28 tonnes/ha
Average yield of oil @ 0.45 percent.	126 kg/ha
Cost of cultivation	Rs.6100/-
Land rent/annum	Rs.4000/-
Cost of extraction of mint oil from 28 tonnes green herb @ Rs.250/tonne	Rs.7000/-
Total expenditure	Rs.17100/-
Income from sale of 126 kg oil @ Rs.300/kg	Rs.37800/-
Net profit per hectare	Rs.20700/-

Cultivation of Japanese mint is an economically feasible proposition as it can provide net income of Rs. 20700/- per hectare annually to the cultivator.

## CONCLUSION

*Mentha arvensis* is an important essential oil bearing plant with a variety of uses in various industries. Cultivation trials conducted at Peshawar, indicated that the Japanese mint having potential of industrial utilization can be introduced as crop in irrigated areas. Keeping in view the net income from the crop it is recommended that pilot-scale cultivation of this crop may be taken up by progressive farmers who are in a position to install their own distillation unit. The marketing of mint oil be ensured before taking up this venture.

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