

## EFFECT OF PLANTING TIME AND DENSITY ON YIELD AND QUALITY OF PEPPERMINT (*MENTHA PIPERITA* L.) UNDER SU-TROPICAL CONDITION

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**Abstract:** A field trial was conducted at the research farm of RRL, Jorhat during 1995 and 1996 to study the performance of *Mentha Piperita* under varying dates of planting and row spacings, maximum herbage and oil yield were obtained from January plants crops. Yield decreased when planting was delayed planting at a closer row spacing of 45 cm recorded the maximum herbage yield of 61'92 q/a while the yield was reduced with wider row spacing of 360 cm or 75cm. However, the quality of oil as measured by the menthol content (71'0 – 72'3% was not affected by planting time as well as spacings.

**Key words:** *Mentha piperita* menthol, essential oil, planting time, row spacing

### INTRODUCTION:

Peppermint (*Mentha piperita* L.) is an annual herb belonging to the family labiateae. The chief constituent of the oil is menthol which is used extensively in pharmaceutical, confectionery and flavour industries. At present India contributes about 40% of total world production of this oil. The area occupied in our country is estimated to be 35000-40000 ha with annual production of around 5000 tonnes of oil valued at Rs 125 crores (Singh 1996) cultivation of *Mentha Piperita* has been taken up in tarai districts of Uttar Pradesh, parts of Punjab and himachal Pradesh but its commercial cultivation has remained restricted to U.P stte mainly in tarai district. However, its economic cultivation has not grown to a sizable area in North east region, perhaps due to several factors including the lack of information of the agronomic aspects of this crop. Among the various factors which affect growth time of planting and proper

spacing are important. Keeping the above in view studies were undertaken to know the effect of planting time and row spacing on the growth and yield of *M. Piperita* under jorhat condition.

### MATERIAL AND METHODS

The trial was conducted at the research farm of RRL Jorhat. India located at 26'45°N latitude and 94'46°E longitude at 87 m above man sea level during 1995 and 1996. the climate was characterized as sub-tropical with a temperature range of 11 to 28°C. The relative humidity averaged 78 percent and annual precipitation was 1800mm.

The experiment was laid out in randomized block design (RBD) having four dates of planting (January 15, January 30, February 14 and March 1 and four row spacings 30,45,60 75 cm replicated five times. The soil of experimental area was sand loan in

texture with 6.0pH medium in available nitrogen and phosphorus and rich in potassium respectively and weeding was done manually as and when required while phosphorus and potash were applied at planting time, nitrogen was applied in two equal splits half at planting time and half after harvesting. Fresh splits with roots were planted in the experimental plots of 3sq.m. size in the rows in shallow furrows. Which were level afterwards and irrigated. The crop was harvested twice, first when it was 120 days of planting (early blooming stage) and second 90 days thereafter. There was no flowering during second harvest. On five random plants data were recorded on plant height and number of branches and 200g random plant samples were used for estimation of leaf stem ratio. The fresh herbage yields were recorded and essential oil content on v/w basis was extracted by hydrodistillation using a Clevenger glass apparatus at each harvest. Qualitative and quantitative analysis for menthol content of essential oil was carried out in a 10% OV-101 (2m\*2mm) column at initial temperature 110° hold for 10 min and then programmed at a rate of 30/min to final temperature of 210°C. The carrier gas (N<sub>2</sub>) flow was 25ml/min.

## RESULTS AND DISCUSSION:

**Effect of date of planting:** the plant height, number of branches and leaf stem ratio were affected significantly by different planting dates (Table 1) planting on 15<sup>th</sup> January recorded the maximum plant height (64'43cm) number of branches (34'56) and leaf stem ratio (1'42), which was significantly higher to other planting. The growth of the plant was linear from 15<sup>th</sup> January to 1s March and the same trend was observed with leaf stem ratio also. The better growth in the earlier planting dates could be attributed to equitable climate

throughout the growth period by the early planted crops (Kohari et al. 1996).

The average yield data (table 2) indicated that the crop planted in 15<sup>th</sup> January recorded maximum herb 61'92 q/ha over the yield obtained from crop planted on later date. The higher yields might be due to better establishment and to longer period available for vegetative growth of the plants in earlier plants which were more conducive (Muni Ram et al 1997). Relatively lower temperature and optimum relative humidity associated with early planting were suitable for growth and development of early planted crop (Rao et al 1990). Similar results have been reported in Japanese mint by Gulati and Duhan 1971. Planting dates had more effect on the yield obtained from first cuttings i.e flowering stage as compared to second cutting.

The higher herb yield in case of harvesting the crop at flowering stage might be due to the longer growth period producing longer taller plants with more number of branches and more leaf stem ratio. The results are in conformity with the earlier report (Gill and Randhawa 1992).

The oil content in leaf was maximum during first harvest i.e flowering stage. At this state plants had comparatively more matured leaves with less moisture content, eventually containing higher content of oil than that of the earlier stages of crop growth (Baskar and putievsky 1978). The oil yield of 1'20 kg/ha was recorded at flowering stage which was significantly higher than those obtained under vegetative stage (30'26 kg/ha).

These results are in the conformity to the findings of farooqui and naqui (1983). With the abscission of mature leaves during most flowering stage the oil concentration decreased. However, no marked effect was observed on the quality of the oil and

measured by the menthol content (71'0-72'3%).

**Effects of Spacing:**

Fresh herbage yield and oil yield was maximum in the case of 45 cm row spacing (Table2) compared to the wider row spacing of 60 cm and 75 cm and the closest spacing of 30cm. the treatment 45 cm row spacing recorded on the yield of 61'92 Q/ha with an oil yield of 37'40 kg/ha. The mobility of the plants to cover the space between the rows led to less planting density per unit area and resulted in lower yield in 60 and 75 cm row spacing (singh and Nand 1979). In case of 30cm row spacing high density of plants was observed which might have led to competition for space light inefficient utilization of nutrients etc. resulting into less

plant growth characters and lower herbage yield . the higher herbage yield under 15 cm row spacing might be due to optimum plant population, proper utilization of moisture and nutrients by the plants which resulted in more leaf growth per plant leading to higher herbage yield. Vadiel et al (1980) and Randhawa et al (1984) have also reported similar results.

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**Table -1**

Plant height, number of branches and leaf stem ratio of peppermint as influenced by data of Planting and row spacing (pooled over two years)

Treatments	Plant height (cm)		Number of branching/plant		Leaf stem ratio	
	C1	C2	C1	C2	C1	C2
Date of planting						
January 15	62'43	53'18	34'56	27'18	1'42	1'36
January 30	59'31	46'20	31'31	23'49	1'34	1'29
February 14	54'24	40'56	26'08	21'80	1'28	1'21
March 1	48'06	36'62	22'40	18'24	1'13	1'08
C.D at 5%	3'16	4'05	2'43	1'90	0'16	1'16
Row spacing						
30cm	64'46	51'63	31'46	24'61	1'33	1'29
45cm	68'32	56'08	35'29	29'54	1'46	1'38
60cm	56'28	47'70	26'91	22'90	1'24	1'21
75cm	53'84	42'26	23'57	18'36	1'08	1'06
C.D at 5%	3'18	3'21	2'27	1'85	0'14	0'14

C1 = First cutting

C2 = Second cutting

**Table -2**

Herb yield, oil content and menthol content of peppermint as influenced by data of Planting and row spacing (pooled over two years)

Date of planting	Herb yield (g/ha)		Oil content (%)		Oil Yield (kg/ha)		Menthol content (%)	
	C1	C2	C1	C2	C1	C2	C1	C2
January 15	68'32	54'24	0'603	0'558	41'20	30'26	71'2	71'3
January 30	59'70	46'52	0'600	0'563	35'82	26'19	72'0	71'0
February 14	46'28	38'29	0'605	0'560	28'00	21'44	72'3	71'5
March 1	41'82	35'18	0'603	0'556	25'22	19'56	71'0	72'3
C.D at 5%	4'10	3'29	-	-	2'29	2'10	-	-
Row spacing								
30cm	56'24	47'43	0'600	0'563	33'74	26'70	71'0	71'5
45cm	61'92	54'61	0'604	0'560	37'40	30'5	72'3	72'3
60cm	52'38	41'41	0'600	0'558	31'43	22'96	72'0	71'5
75cm	46'27	38'53	0'602	0'558	27'85	21'50	71'2	72'0
C.D at 5%	2'00	2'90	-	-	2'02	1'90	-	-

C1 = First cutting

C2 = Second cutting

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