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Original Research Article

Effect of Date of Planting and Planting Geometry on Growth and Yield of Mentha (*Mentha arvensis* L.)

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Keywords

Growth, Mentha, Planting time, Plant spacing and yield

A B S T R A C T

The experiment was laid out in Factorial Randomized Block design assigning time of planting (Factor A), planting geometry (Factor B) with four replications to assess the effect of date of planting and planting geometry on growth and yield of Mentha. The experiment was conducted at Experimental farm, College of Horticulture, Noorsarai, Nalanda (Bihar Agricultural University, Sabour) in the year 2013-14 and 2014-15. Factor A consisted of three time of planting viz., 15th Feb, 01st March and 15th March and factor B consisted of two levels of spacing S_1 (40 x10 cm) and S_2 (40 x15 cm). Pooled data on different growth and yield characters revealed 15th Feb. as best time of planting of Mentha suckers and proclaimed highest values for plant height (50.19cm), Plant girth (8.37mm), no. of secondary branches, no. of leaves per plant and green herb yield (259.79 q/ha). on the other hand spacing level of S_2 (40x15cm) also recorded highest values for plant height (38.97 cm), plant girth (6.81 mm), no. of secondary branched/plant, no. of leaves/plant and green herb yield (190.07 q/ha). The treatment combination of 15th Feb. as time of planting of suckers and plant spacing of 40 x15 cm found best for planting of Mentha suckers in the growing conditions of the Nalanda. It was followed by planting time as 15th Feb. and plant spacing of 40 x10 cm for higher growth and yield of Mentha.

Introduction

Mentha (*Mentha arvensis* L.) is one important essential oil bearing plant belonging to family Labiatae. The essential oil obtained from distillation of this plant is commercially used in preparation of cosmetic goods, ointments, mouth wash, flavouring of foods, flavouring of Bettle Vine, as drink in summer season, cough and cold etc. Medicinally, it is an excellent carminative and gastric stimulant. When applied externally, it acts as a mild analgesic (Farooqi and Sreeramu 2001). Due to

increase in the demand in the markets its cultivation is gaining popularity day by day among the farmers of Uttar Pradesh, Madhya Pradesh, Rajasthan and Bihar even in dry areas of Bundelkhand region specially Orai and Jaluan. Farmers of Ara and Bihta regions of Bihar cultivating Mentha on commercial scale and showing interest in further extension in the cultivation of the this crop. Other than this, the crop provides remunerative prices to the farmers in a very short period. Foreign money can also be obtained by export of essential oil to foreign countries. In general cultural practices and environmental conditions affect the plant productivity and oil content. The successful production of mint plants depends on establishment of good stand and intensive care throughout its growth cycle. Proper choice of the location, variety and suitable cultural practices are also important for mint production. A climate with adequate and regular rainfall and good sunshine during its growing period ensures a good yield (Sharma, 2012). In addition, yield and the essential oil composition of mint species were influenced by interaction between the genotype and environment, method of distillation, kind of storage, crop age, time of harvest and season (Alsafar and Hassan, 2009). Keeping in view the demand and multifarious uses of mint in flavouring and pharmaceuticals industries, the present investigation was planned to be carried out to provide line information to grower of Nalanda region of Bihar.

Materials and Methods

The present investigation was carried out at Experimental farm, Nalanda College of Horticulture, Noorsarai, Nalanda a unit of Bihar Agricultural University, Sabour in Factorial Randomised Block Design with three time of planting viz, 15th Feb., 01st March, 15th March designated as factor A and two levels of spacing S_1 (40x10cm) and S_2 (40x15cm) designated as factor B with four replications in the year 2013-14 and 2014-15. The experimental soils are newly formed alluvial soil with pH 7.14 rich in organic matter. Rooted suckers of Mentha cv. CIMAP (Central Institute for Medicinal and Aromatic Plants, Lucknow) Saryu were obtained from CIMAP, Lucknow. 5 cm long rooted suckers were planted in plot size of 3 x 3 meters on three different planting time and two levels of spacing. Before planting of suckers, a root dip treatment with Bavistin @ 2gm/lit was given to avoid rotting of suckers. All the standard recommended cultivation practices were followed for cultivation of the crop including fertilization with 150 kg Nitrogen, 80 kg Phosphorus and 50 kg of Potash. ½ nitrogen and full P and K were applied at the time of final field preparation. Remaining nitrogen was applied by broadcasting at 40 days intervals. The crop was irrigated just after planting of suckers and further irrigation was given at 10-12 days intervals. All the growth parameters viz. Plant Height, number of secondary branches, plant girth, number of leaves per plant, Green herb yield were recorded at first cut 100 days after planting. The obtained data was analysed for Factorial Randomised Block Design and result was interpritated for effects and interactions (Panse and Sukhatme 1989).

Results and Discussion

Data presented in the Table 1 showed significant (at 5% level of probability) effect of date of planting and spacing on growth and yield attributes of Mentha cv. CIMAP Saryu. Planting of suckers on 15th Feb. proclaimed the highest Plant height (50.19 cm) followed by planting on 01st March (32.32 cm) and lowest plant height was obtained with planting of suckers on 15th March (26.64 cm).

Table.1 Effect of date of planting and plant geometry on growth and yield characters of Mentha cv. CIMAP Saryu (Pooled Data for the year 2013-14 & 2014-15)

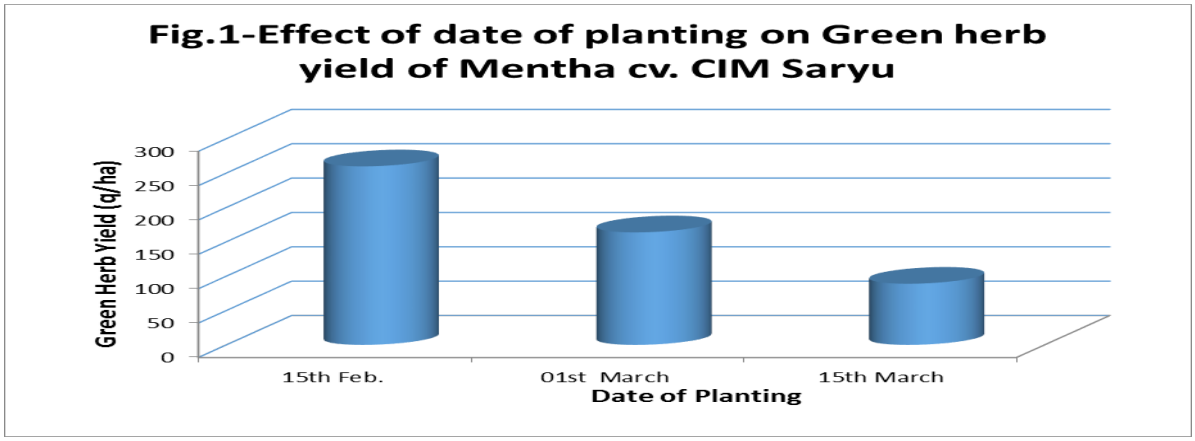
Treatments	Plant Height (cm)	Plant Girth (mm)	No. of secondary branches/ plant	No. leaves /plant	Plant Weight (g)	Green Herb yield (q/ha)
Date of planting						
15th Feb.	50.19	8.37	32.75	352.75	127.32	259.79
01st March	32.32	5.89	24.00	214.00	87.14	163.73
15th March	26.64	4.20	16.62	136.12	43.60	88.97
C. D. at 5%	**1.90**	**0.51**	**2.22**	**17.86**	**4.27**	**9.10**
SEm±	**0.62**	**0.17**	**0.73**	**5.87**	**1.40**	**2.99**
Spacings						
S_1(40 x 10) cm	33.80	5.49	20.87	209.33	71.47	151.59
S_2(40 x 15) cm	38.97	6.81	28.04	259.25	100.56	190.07
C. D. at 5%	**1.55**	**0.42**	**1.81**	**14.58**	**3.49**	**7.43**
SEm±	**0.51**	**0.13**	**0.59**	**4.79**	**1.14**	**2.44**

Table.2 Interaction effect of date of planting and plant geometry on yield characters and green herb yield of Mentha cv. Saryu (Pooled Data for the year 2013-14 & 2014-15)

Treatment	Green Herb Yield (q/ha)		Mean
	S_1 (40 x 10 cm)	S_2 (40 x 15 cm)	
15th Feb.	234.84	284.74	**259.79**
01st March	140.50	186.95	**163.73**
15th March	79.42	98.51	**88.97**
Mean	**151.59**	**190.07**	

ANOVA for Interaction

Factors	C.D. at 5 %	SE(d)	SE(m)±
Factor(A) Date of Planting	9.10	4.23	2.99
Factor(B) Plant Spacings	7.43	3.45	2.44
Factor(A X B) Interaction	12.87	5.98	4.23



Other growth characters like Plant girth (8.37 mm), no. of secondary branches (32.75), no. of leaves per plant (352.75), plant weight (127.32 gm) and green herb yield (259.79 q/ha) were noted highest with 15th Feb. as planting date. Among the different spacings, planting of suckers at 40x15 cm gave highest values for plant height (38.97 cm), plant girth (6.81 mm), no. of secondary branches (28.04), no. of leaves/plant (259.25), plant weight (100.56 gm) and green herb yield (190.07 q/ha) followed by S_1 i.e. planting of suckers at the spacing of 40 x10 cm

Data the different interaction for green herb yield of Mentha cv. CIMAP Saryu has been presented in Table 2 (Fig.-1), the treatment combination of 15th Feb. planting date and spacing of 40x15 cm gave highest green herb yield (284.74 q/ha) followed by planting on 15th Feb and spacing of 40x10cm (234.84 q/ha). However, least green herb yield was obtained with planting of suckers on 15th of March in both the levels of spacing S_1 (40x10 cm) and S_2 (40x15cm) i.e. 79.42q/ha and 98.51q/ha, respectively. The highest values of growth characters on 15th Feb. planting date and wider spacing i.e. 40 x15 cm (S_2) might be attributed to better establishment of suckers in the field, congenial temperature and vast open area for growth of the plant. Further reduction in growth and yield of plants with further planting dates may be due to sharp increase in the temperature and desiccation of suckers. In agreement to findings of the present investigation, Kumar and Sood (2011) also mentioned 15th Feb. as best time for planting of suckers of *Mentha piperita* L. under growing conditions of Himanchal Pradesh for growth and yield attributes at the plant spacing of 30x45 cm. In contrast to our findings, Sharma (2012) while studying on Effect of dates of transplanting on the growth and oil yield of *Mentha arvensis* L. under growing conditions of Lucknow mentioned 15th March as best time for planting of suckers with respect to plant height, herb and oil yield. With respect to plant geometry, Salim *et al.*, (2014) studied on Effect of Spacing and Seasonal Variation on Growth Parameters, Yield and Oil Content of Mint Plants and mentioned that wider spacing (30 and 40 cm) promoted branching without changes in oil content. Summer season proved to be the best for growth, herb production and oil yield of mint plants followed by autumn and winter. Sharma and Sharma (2014) also proclaimed highest herb yield in 40x35 cm spacing with the mean oil yield percent ranged from 0.61-0.63% with or without irrigation.

References

Alsafar, M.S. and Al-Hassan, Y.M. (2009). Effect of nitrogen and phosphorus fertilizer on growth and oil yield on indigenous mint (*Mentha longifolia* L.). *Biotech*, 8:380-384.

Farooqi, A.A. and Sreeramu, B.S. (2001). Cultivation of Medicinal and Aromatic plant crops. University Press Hyderabad, pp 410-411.

Kumar, V and Sood, M. (2011).Effect of transplanting time, spacing and fertilizers on herbage and oil yield of *Mentha piperita* L. *International Journal of Farm Sciences* 1(2): 68-74

Panse, V.G. and Sukhatme, P.V. (1989). Statistical methods for Agricultural workers, 5th Ed. ICAR, New Delhi.

Salim, Elrasheed A., El Hassan, Gaafer M. and Hassan El, Subki Khalid. (2014). Effect of Spacing and Seasonal Variation on Growth Parameters, Yield and Oil Content of Mint Plants. *Journal of Forest Products & Industries*, 3(2):71-74

Sharma, A. and Sharma, H. (2014). Spacing and Irrigation Effect on Herbage Yield

and Essential Oil Content of *Mentha citrata* Ehrh. *Journal of Environmental Science and Technology*, 7: 84-89

Sharma, S. (2012). Effect of dates of transplanting on the growth and oil yield of *Mentha arvensis* L. *Scholarly Journal of Agricultural Science,* Vol. 2(7), pp. 130-132