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Early growth performance of M3 mutants of menthol mint cv. CIM Kranti during *Rabi* season

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Abstract
The present investigation was conducted during the *Rabi* season (2020), at Kittur Rani Channamma College of Horticulture, Arabhavi, Belagavi district. Among all the mutants CK20P22 recorded taller plant height at 45 and 60 days after planting (21.00 and 39.40 cm respectively). The maximum plant spread of about 21.27 cm and 32.63 cm was registered in CK40P17 and CK20P22 at 45 and 60 DAP respectively. The more number of branches was recorded in CK20P2 at 45 DAP (8.53) and 60 DAP and more number of branches were noticed in CK20P22 (25.20).

Keywords: Menthol mint, mutants, days after planting

Introduction
Mints are perennial, medicinal cum aromatic herbs belonging to the family lamiaceae, it's one among the largest family among the angiosperms (Singh, 2010). Among all the mint species five mints are grown commercially for their essential oil and constituents *i.e*., Japanese mint (*Mentha arvensis* L.), Peppermint (*Mentha piperita*), Spearmint (*Mentha spicata* L.), Scotch spearmint (*Mentha cardiac* L.) and Bergamot mints (*Mentha citrata* L.) (Kizil *et al*., 2010) [5]. Mint crops are believed to be originated in Mediterranean region and upon distillation yields aromatic oil contain various constituents like menthol, carvone, linalool and linalyl acetate (Farooqi and Sreeramu, 2004) [6].

Materials and method
The experiment was laid out in RCBD design, replicated three times with nineteen mutant lines along with two checks cv. CIM Kranthi and cv. Kosi. The plots of 3.6 m width and 3.0 m length were prepared and planting was followed in raised bed with the spacing of 60×30 cm using white stolons of 10-12 cm and sixty plants were planted in each plot. The field was amended with recommended dose of FYM and fertilizer (15 tonnes and 150:60:60 kg/ha). The top performing mutant lines from M2 generation were selected based on growth, fresh herbage yield and essential yield. The observations were recorded at 45 and 60 days after planting.

Results and discussion
Performance of the mutants for growth parameters
The mutant lines showed significant difference for growth parameters. Plant height at 45 DAP varied significantly among the genotypes (Table 1) and ranged from 14.73 (CK40P23) to 21.00 cm (CK20P22) and the later was *on par* with CK40P17 (20.87 cm) and CK20P41 (20.53 cm) and the check cv. CIM Kranti recorded 17.20 cm. Plant height at 60 DAP varied significantly among the genotypes. Taller and shorter plant height was recorded in CK20P22 (39.40 cm) and CK20P63 (19.80), respectively, against the parental check cv. CIM Kranti (32.53 cm) with CK40P17 (36.20 cm) and CK20P2 (35.47 cm) being *on par* with the former one. These results were found in harmony with Minh *et al.* (2015) [3] in peppermint, Lal *et al.* (1999) [7] in Isabgol, Lal and Khanuja (2007) [4] in chamomile. The observed differences in the morphological traits in mutant genotypes might be due to the pleiotropic action of mutated genes which indicated the potentiality and scope for genetic improvement for specific traits, Rekha *et al.* (2009) [2] in patchouli.

Table 1: Early performance of menthol mint cv. CIM Kranti mutants for plant height

Accessions	Plant height (cm)	
	45 DAP	60 DAP
CK40P23	14.73	28.60
CK40P8	19.20	33.73
CK40P17	20.87	36.20
CK40P54	16.93	32.07
CK40P7	17.60	32.20
CK40P5	18.27	32.13
CK20P1	18.20	34.93
CK20P43	19.00	33.67
CK20P134	18.93	34.00
CK20P63	19.80	19.80
CK20P41	20.53	34.73
CK20P113	19.87	33.67
CK20P125	17.73	31.87
CK20P88	16.27	31.00
CK20P110	14.87	30.27
CK20P42	15.93	31.00
CK20P22	21.00	39.40
CK20P2	19.47	35.47
CK20P79	19.53	35.27
cv. CIM Kranti	17.20	32.53
cv. Kosi	14.40	28.20
Mean	**18.11**	**32.42**
S. Em±	1.26	2.15
CD (p=0.05)	3.61	6.16

Table 2: Early performance of menthol mint cv. CIM Kranti mutants for plant spread

Accessions	Plant spread (cm)	
	45 DAP	60 DAP
CK40P23	15.70	25.90
CK40P8	20.83	30.00
CK40P17	21.27	32.10
CK40P54	18.27	29.37
CK40P7	21.10	28.33
CK40P5	19.17	29.07
CK20P1	19.87	28.17
CK20P43	18.73	30.00
CK20P134	20.43	30.70
CK20P63	2013	27.57
CK20P41	18.83	27.07
CK20P113	19.63	28.13
CK20P125	17.97	25.93
CK20P88	15.70	24.03
CK20P110	16.20	25.80
CK20P42	16.57	28.80
CK20P22	19.87	32.63
CK20P2	20.13	31.23
CK20P79	18.10	29.32
cv. CIM Kranti	15.83	28.60
cv. Kosi	14.40	23.07
Mean	18.51	28.37
S. Em±	1.49	1.80
CD (p=0.05)	4.27	5.15

The plant spread for 45 DAP varied significantly with a grand mean of 18.51 cm (Table 2). The maximum and minimum plant spread was noticed in CK40P17 (21.27 cm) and CK40P23 (15.70 cm), respectively. Maximum plant spread was followed by CK40P7 (21.10 cm) and CK40P8 (20.83 cm) and the check cv. CIM Kranti registered about (15.83 cm). The maximum plant spread was noticed in CK20P22 (32.63 cm), which was *on par* with CK40P17 (32.10 cm), CK20P2 (31.23 cm) and the minimum was noticed in CK20P88 (24.03 cm) at 60 DAP against the parental check cv. CIM Kranti (28.60 cm). similar results were reported by Minh *et al.* (2015) [3] in peppermint, Lal *et al.* (1999) [7] in Isabgol, Lal and Khanuja (2007) [4] in chamomile. The observed differences in the morphological traits in mutant genotypes might be due to mutation in several genes as well as the pleotropic action of mutated genes, Rekha *et al.* (2009) [2] in patchouli.

Table 3: Early performance of menthol mint cv. CIM Kranti mutants for number of branches

Accessions	Number of branches	
	45 DAP	60 DAP
CK40P23	4.87	17.40
CK40P8	5.93	17.27
CK40P17	8.00	24.07
CK40P54	5.13	17.53
CK40P7	7.47	16.40
CK40P5	5.53	19.00
CK20P1	4.93	22.60
CK20P43	6.07	18.40
CK20P134	5.40	23.40
CK20P63	8.00	24.07
CK20P41	4.87	17.67
CK20P113	4.87	18.93
CK20P125	4.13	23.10
CK20P88	4.87	21.60
CK20P110	4.87	21.93
CK20P42	5.40	23.20
CK20P22	8.20	25.20
CK20P2	8.53	25.00
CK20P79	6.60	24.27
cv. CIM Kranti	4.53	19.53
cv. Kosi	5.80	18.93
Mean	6.33	20.17
S. Em±	1.17	2.51
CD (p=0.05)	3.35	7.16

The number of branches varied significantly at 45 DAP and more (8.53) number of branches were recorded in CK20P2, which is significantly *on par* with CK20P22 (8.20) and followed by CK40P17 (8.00) and CK20P125 (4.13) recorded less in number in comparison with the check cv. CIM Kranti (4.53). At 60 DAP, number of branches per plant ranged from 16.40 (CK40P7) to 25.20 (CK20P22) later was *on par* with CK20P2 (25.00), CK20P79 (24.27) and the check cv. CIM Kranti recorded about 19.53 (Table 3). Similar outcomes were reported by Minh *et al.* (2015) [3] in peppermint, Lal *et al.* (1999) [7] in Isabgol, Lal and Khanuja (2007) [4] in chamomile. The observed differences in the morphological traits in mutant genotypes might be due to the pleiotropic action of mutated genes which indicated the potentiality and scope for genetic improvement for specific traits, Rekha *et al.* (2009) [2] in patchouli.

Conclusion

The mutants CK20P22, CK40P17and CK20P2 performed better for plant height, plant spread and number of branches during early stages of the growth period.

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