



ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2022; 11(6): 575-577
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www.thepharmajournal.com
Received: 01-03-2022
Accepted: 10-04-2022

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Performance of M3 mutants of menthol mint cv Kosi during rabi season

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Abstract

The present investigation was conducted during *rabi* - 2020 at Kittur Rani Channamma College of Horticulture, Arabhavi, Belagavi district, Karnataka. Considering the requirement of locally adoptive superior type, cv. Kosi was subjected to irradiation using gamma rays. Nineteen advanced mutants of cv. Kosi along with two checks cv. Kosi and CIM Kranthi were selected from M₂ generation and assessed for growth parameter and their superiority over the checks during M₃ generation. Among all the mutants K₂₀P₃₃ recorded taller plant height at 45 and 60 DAP (19.00 and 32.53 cm respectively). The mutant K₂₀P₂₃ registered the maximum plant spread of about 31.88 cm and 33.57 cm at 45 and 60 DAP, respectively. More number of branches were recorded in mutant K₂₀P₃₃ at 45 DAP (8.20) and in K₂₀P₂₆ at 60 DAP (17.73). The research revealed that the gamma rays induced M₃ mutants showed the increased plant height, plant spread and number of branches during early growth period.

Keywords: Menthol mint, mutants, days after planting

Introduction

Mints are perennial, medicinal cum aromatic herbs belonging to the family *lamiaceae*, which is one of the largest families among the angiosperms (Singh, 2010) [1]. Among all the mint species five 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 cardiaca* L.) and Bergamot mints (*Mentha citrata* L.) (Kizil *et al.*, 2010) [5]. Mint crops are believed to be originated in the Mediterranean region and upon distillation yields, aromatic oil contains 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 and replicated thrice with nineteen mutant lines along with two checks *viz.*, cv. Kosi and CIM Kranthi. The plots of 3.6 m x 3.0 m size were prepared and planting was followed on a raised bed with the spacing of 30×60 cm using white stolons of 10-12 cm and sixty plants were planted in each plot. The field was amended with the recommended dose of FYM and fertilizer (15 tonnes and 150:60:60 kg/ha). The top-performing mutant lines from the 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

The mutant lines showed significant differences in growth parameters. Plant height at 45 DAP varied significantly among the mutants (Table 1) which ranged from 10.27 (K₄₀P₁₆) to 19.00 cm (K₂₀P₃₃) and the later was *on par* with K₂₀P₂₆ (18.77 cm) and K₂₀P₁₉ (18.43 cm) and the check cv. Kosi recorded 15.93 cm. Plant height at 60 DAP varied significantly among the genotypes. Taller and shorter plant height was recorded in K₂₀P₃₃ (32.53 cm) and K₂₀P₁₁ (23.03), respectively, against the parental check cv. Kosi (29.13 cm) with K₂₀P₂₆ (31.90 cm) and K₂₀P₁₉ (31.73 cm) being *on par* with the farmer one. These results are in harmony with findings of 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 as reported by Rekha *et al.* (2009) [2] in patchouli.

The plant spread for 45 DAP varied significantly with a grand mean of 18.98 cm (Table 2). The maximum and minimum plant spreads were noticed in K₂₀P₂₃ (31.88 cm) and K₄₀P₁₆ (11.95 cm), respectively. Maximum plant spread was followed by K₂₀P₄₁ (23.48 cm), K₂₀P₃₀ (23.08 cm) against 16.30 cm in the check cv. Kosi. The maximum plant spread was noticed in K₂₀P₂₃ (33.57 cm) at 60 DAP, which was *on par* with K₂₀P₄₁ (31.87), K₂₀P₃₀ (31.13) and the minimum was

noticed in K₄₀P₂ (20.80 cm) against 27.40 cm in the parental check cv. Kosi. 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 and their pleiotropic action as suggested by Rekha *et al.* (2009) [2] in patchouli.

Table 1: Early growth performance of menthol mint cv. Kosi mutants for plant height

Accessions	Plant height (cm)	
	45 DAP	60 DAP
K ₂₀ P ₂₁	17.92	31.57
K ₄₀ P ₁₁	14.17	25.67
K ₂₀ P ₁₆	15.87	27.83
K ₂₀ P ₂	14.73	28.73
K ₄₀ P ₃₆	15.33	27.93
K ₄₀ P ₂	12.60	24.10
K ₂₀ P ₁₃	15.93	30.40
K ₂₀ P ₁₉	18.43	31.73
K ₂₀ P ₁₁	13.37	23.03
K ₄₀ P ₂₂	14.37	27.37
K ₂₀ P ₇	15.33	28.13
K ₂₀ P ₂₃	16.90	30.27
K ₂₀ P ₃₀	16.93	29.43
K ₂₀ P ₄	15.47	29.53
K ₂₀ P ₃₃	19.00	32.53
K ₄₀ P ₁₆	10.27	23.13
K ₄₀ P ₄₆	15.83	30.20
K ₂₀ P ₄₁	18.33	31.00
K ₂₀ P ₂₆	18.77	31.90
cv. Kosi	15.93	29.13
cv. CIM Kranti	14.37	28.53
Mean	15.71	28.67
S.Em±	0.97	1.32
CD (p=0.05)	2.77	3.78

Table 2: Early growth performance of menthol mint cv. Kosi mutants for plant spread

Accessions	Plant spread (cm)	
	45 DAP	60 DAP
K ₂₀ P ₂₁	18.99	30.90
K ₄₀ P ₁₁	16.53	25.33
K ₂₀ P ₁₆	17.17	27.00
K ₂₀ P ₂	18.38	29.32
K ₄₀ P ₃₆	18.67	28.70
K ₄₀ P ₂	14.05	20.80
K ₂₀ P ₁₃	16.13	28.87
K ₂₀ P ₁₉	17.97	30.83
K ₂₀ P ₁₁	16.28	25.13
K ₄₀ P ₂₂	15.95	26.30
K ₂₀ P ₇	20.44	27.53
K ₂₀ P ₂₃	31.88	33.57
K ₂₀ P ₃₀	23.08	31.13
K ₂₀ P ₄	20.67	28.83
K ₂₀ P ₃₃	21.47	30.27
K ₄₀ P ₁₆	11.95	22.18
K ₄₀ P ₄₆	21.05	28.50
K ₂₀ P ₄₁	23.48	31.87
K ₂₀ P ₂₆	21.12	27.97
cv. Kosi	16.30	27.40
cv. CIM Kranti	17.10	28.83
Mean	18.98	28.16
S.Em±	1.67	1.92
CD (p=0.05)	4.77	5.51

Table 3: Early growth performance of menthol mint cv Kosi mutants for number of branches

Accessions	Number of branches	
	45 DAP	60 DAP
K ₂₀ P ₂₁	6.13	15.80
K ₄₀ P ₁₁	4.33	13.07
K ₂₀ P ₁₆	5.93	16.27
K ₂₀ P ₂	5.53	13.67
K ₄₀ P ₃₆	6.07	15.00
K ₄₀ P ₂	3.93	8.33
K ₂₀ P ₁₃	4.47	14.60
K ₂₀ P ₁₉	5.80	16.40
K ₂₀ P ₁₁	4.13	7.80
K ₄₀ P ₂₂	4.33	13.67
K ₂₀ P ₇	5.00	10.13
K ₂₀ P ₂₃	6.53	11.33
K ₂₀ P ₃₀	5.93	10.20
K ₂₀ P ₄	6.60	14.93
K ₂₀ P ₃₃	8.20	17.60
K ₄₀ P ₁₆	3.60	9.80
K ₄₀ P ₄₆	6.40	15.67
K ₂₀ P ₄₁	5.73	13.00
K ₂₀ P ₂₆	6.80	17.73
cv. Kosi	4.13	12.87
cv. CIM Kranti	4.40	12.33
Mean	5.43	13.34
S.Em±	0.49	0.98
CD (p=0.05)	1.41	2.81

The number of branches varied significantly at 45 DAP (Table 3), which was more (8.20) in K₂₀P₃₃, which was in turn significantly *on par* with K₂₀P₂₆ (6.80) and followed by K₂₀P₄ (6.60). The mutant K₄₀P₁₆ recorded less in number of branches (3.60), which was lesser than the check cv. Kosi (4.13). At 60 DAP, the number of branches per plant ranged from 7.80 (K₂₀P₁₁) and 17.73 (K₂₀P₂₆). later was *on par* with K₂₀P₃₃ (17.60), K₂₀P₁₉ (16.40) and the check cv. Kosi recorded about 12.87. 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 changes in the phenotypic parameters 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 K₂₀P₃₃, K₂₀P₂₆ and K₂₀P₁₉ performed better for plant height and the number of branches during the early stages and the mutants K₂₀P₂₃, K₂₀P₄₁ and K₂₀P₃₀ showed maximum plant spread at the early growth period. The positive result from the study will help in further breeding programme for developing new variety.

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