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Short Research Article

Performance of Different Carnation (*Dianthus Caryophyllus* L.) Cultivars Grown from Seed in the Plains of West Bengal, India

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Abstract

The suitability of 6 spray carnation cultivars namely Chabaud Extra Mix, Enfont De Nice, Chabaud Mix, Chabaud Super Mix, Chabaud Finest Mix and Lilipot Mix grown from seeds were studied in the plains of West Bengal, India in this experiment. Plants of the variety Enfont De Nice was found longest (73.84 cm) and dwarfing nature was noticed with Lilipot Mix (47.38 cm). Highest numbers of side-shoots were recorded with Chabaud Extra Mix (18.12) and lowest with Enfont De Nice (12.80). Chabaud Mix produced highest number of leaves shoot^{-1} (21.38). Leaf length and leaf width were found highest with Enfont De Nice and lowest with Lilipot Mix. The plants of Lilipot Mix reached the Flower Bud Initiation (FBI) stage earliest (54.37 days) and the plants of Chabaud Extra Mix reached the FBI stage last of all (89.54 days). The shortest time period required for FBI to Colour Showing (CS) stage (34.75 days) was found with Chabaud Finest Mix. Cultivar Chabaud Mix required the most delayed time period to reach the full bloom stage (5.08 days) and Chabaud Finest Mix reached the full bloom stage earliest (4.00 days). Longevity of flower *in-situ* was recorded maximum with Lilipot Mix (7.29 days). Bud length and bud diameter was found highest with Chabaud Super Mix (4.25 cm and 67 cm respectively). Flower diameter was found highest with Chabaud Super Mix (5.91 cm) and lowest flower diameter was recorded with Lilipot Mix (4.56 cm). Chabaud Extra Mix was found the highly floriferous variety producing 47.38 flowers plant^{-1}. Longest stalks were produced by Chabaud Super Mix (35.43 cm). Higher fresh weight of 100 flowers was noticed with Enfont De Nice (254.88 g). Maximum post-harvest longevity was recorded with Lilipot Mix (4.63 days). Lilipot Mix is found to be better as pot plant for its short stalk length, earlier blooming with maximum *in-situ* longevity of flowers. The other cultivars are suitable for loose and cut flower production. Chabaud Super Mix can be used for quality flower production but the recommended most floriferous variety is Chabaud Extra Mix.

1. Introduction

Carnation (*Dianthus caryophyllus* L.) belongs to the family caryophyllaceae is an one of the important ornamental crop having great demand worldwide. It is of two types namely standard and spray. There are several classes of spray type of carnations like perpetual flowering, Chabaud, Border, Picotee, Mlmaison, Liliput etc. Though the standard types are grown in protected condition, the spray types are sometimes grown under open field condition in India. It is a winter flowering crop for the Indian plains. The performance of Carnation cultivars differs with region, season, genotypes and growing environment (Gharge, 2009). To assess the suitability and adaptability of different spray carnation cultivars grown from seeds with respect to growth, development, flowering, flower quality, and yield parameters in the plains of West Bengal, India this experiment was conducted.

2. Materials and Methods

Seeds of Six popular spray carnation cultivars were collected and grown under open field condition to evaluate their performance in the plains of West Bengal, India during winter seasons of 2006-07 and 2007-08. The name of the cultivars along with notations are presented namely; Chabaud Extra Mix, Enfont De Nice, Chabaud Mix, Chabaud Super Mix, Chabaud Finest Mix and Lilipot Mix in RBD replicated for four

times. The experiment was conducted at the Jaguli Horticulture Farm of BCKV, Mohanpur, Nadia, West Bengal, India for consecutive two years and pooled analysis of the results of both the individual years were considered for evaluation.

Seedlings were raised in earthen pans of 20 cm diameter in the month of September. 150 numbers of seeds were sown in each pot and watered thoroughly and covered with moistened sieved husk. The pots were then covered with a polythene sheet tightly. After complete germination, the seedlings were sprayed with blitox @ 2 g l^{-1} of water and spraying was continued at weekly intervals as a prophylactic measure against damping off. After 2 weeks they were hardened and placed permanently on the sunny situation. After 4 weeks the seedlings were transplanted . 24 numbers of raised beds measuring 0.9×0.9 m^2 were prepared and a path of 0.3 m was left on either side of the beds which were acted as irrigation channels afterwards. Well rotten and screened FYM @ 4 kg $plot^{-1}$ was thoroughly mixed. A square planting at 30×30 cm^2 with 9 plants were accommodated. The rate of fertilizer applied was 10 g N, 10 g P_2O_5 and 10 g K_2O m^{-2}. rrigation was applied as and when required. Staking was done with the help of bamboo sticks. Pinching was done twice in all cultivars-one at 4 weeks after planting and second at 2 weeks after first pinching.

3. Results and Discussion

The six different carnation varieties raised through seedlings differed significantly in respect to all the qualitative and quantitative parameters observed in this experiment except flower length. The pooled result represented Enfont De Nice as the tallest plant producing variety (73.84 cm), which was statistically at par with the effects of Chabaud Super Mix (73.68 cm) and Chabaud Extra Mix (72.73 cm). The rest varieties were found non-effective regarding plant height as compared to the above (Table 1). The minimum plant height was obtained from the plants of the variety Lilipot Mix (47.38 cm).

Chabaud Mix was found as the highest leaf producing variety (21.38) which was statistically at par effective with Chabaud Super Mix (20.13) and Chabaud Finest Mix ((20.02). The next effective variety was Chabaud Extra Mix produced (18.57 leaves $shoot^{-1}$). The lowest number of leaves (15.48) was obtained from the plants of the variety Lilipot Mix that showed statistically at par results with Enfont De Nice (15.80 leaves $shoot^{-1}$). Cultivar Enfont De Nice was observed as the longest leaf producing variety (9.88 cm), which was statistically at par effective with the rests except Lilipot Mix, produced the shortest leaves (6.25 cm). Enfont De Nice was also identified as the widest leaf producing variety (0.67 cm), statistically at par with Chabaud Extra Mix (Table 1) and Chabaud Mix (0.62 cm). The next performers were Chabaud Super Mix (0.60 cm) and Chabaud Finest Mix (0.61 cm). The narrowest leaves were obtained from the plants of the variety Lilipot Mix (0.53 cm).

The proficiency of side-shoot production of carnation varied significantly from variety to variety (Table 1). The pooled effect represented the variety Chabaud Extra Mix as the highest side-shoot producer (18.12) followed by Enfont De Nice (14.21). The other varieties showed statistically at par less effective results including Chabaud Super Mix produced the minimum number of side-shoots $plant^{-1}$ (12.41). Plants of the cultivar Lilipot Mix reached the flower bud initiation stage earliest (54.37 days) followed by Chabaud Super Mix (76.74 days) which was statistically at par with Chabaud Finest Mix (78.63 days), Chabaud Mix (79.59 days) and Enfont De Nice (81.38 days). The most delayed effect was observed with the plants of Chabaud Extra Mix (89.54 days). Chabaud Finest Mix required the shortest time period from FBI to colour showing stage (34.75 days) which was statistically at par with Lilipot Mix (35.77 days) and Chabaud Mix (37.02 days). The next performers were Chabaud Super Mix (38.50 days) and Enfont De Nice (40.75 days). Plants of the variety Chabaud Extra Mix showed the most delayed effect (41.98 days). On the other hand, plants of Chabaud Finest Mix required the lowest (4.00 days) and Chabaud Mix required the highest time period (5.08 days) to reach the full bloom stage from colour showing stage (Table 2).

Spray carnation Varieties differed significantly regarding the *in-situ* longevity of flowers (Table 2). Cv Lilipot Mix showed the maximum period of field-life of carnation flowers (7.29 days) followed by Chabaud Super Mix (6.14 days), which was statistically at par with Chabaud Mix (5.81 days) and Chabaud Extra Mix (5.65 days). The flowers of Chabaud Finest Mix were found to produce the minimum period of field-life (5.16 days) that was statistically at par with the performance of Enfont De Nice (5.38 days). Data revealed that Chabaud

Table 1: Comparison of growth parameters of different spray carnation cultivars (pooled data of year 2006-07 and 2007-08)

Cultivar	PH (cm)	LN	LL (cm)	LW (cm)	SS	DFBI
Chabaud extra mix	72.73	18.57	9.66	0.62	18.12	89.54
Enfont de nice	73.84	15.80	9.88	0.67	14.21	82.46
Chabaud mix	69.35	21.38	9.52	0.62	13.00	79.38
Chabaud super mix	73.68	20.13	9.74	0.60	12.41	76.74
Chabaud finest mix	62.58	20.02	9.70	0.61	12.86	78.63
Lilipot mix	47.38	15.48	6.25	0.53	12.80	54.37
SEm±	0.85	0.59	0.21	0.02	0.47	2.02
CD (p=0.05)	2.45	1.70	0.62	0.06	1.34	5.82

PH: Plant height; LN: Leaf number $shoot^{-1}$; LL: Leaf length; LW: Leaf width; SS: No. of side shoots $plant^{-1}$; DFBI: Days required for FBI

Super Mix produced longest buds (4.25 cm), which was statistically at par with the buds of Chabaud Finest Mix (3.98 cm), Enfont De Nice (3.93 cm) and Chabaud Extra Mix (3.91 cm, followed by Chabaud Mix (3.49 cm). Buds of Lilipot Mix were observed as the lowest in length (2.89 cm). The variations in bud diameter as resulted by different varieties were found statistically significant (Table 2). The pooled effect revealed that cv Chabaud Super Mix produced the buds with highest diameter (1.67 cm) followed by Chabaud Extra Mix (1.44 cm). Other cultivars were found statistically at par less effective including Chabaud Mix produced the least bud diameter (1.16 cm). The variation in flower length derived by different carnation cultivars was found to be statistically non-significant (Table 2). Cv Chabaud Extra Mix produced the longest (4.54 cm) and cv Chabaud Finest Mix produced the shortest flowers (3.98 cm).

The floriferousness of the spray carnation cultivars grown from seeds differed significantly after pooled analysis of the data (Table 3). Cv Chabaud Extra Mix was found as the highly floriferous cultivar (47.38 flowers plant^{-1}) followed by Enfont De Nice (37.88), Chabaud Mix (37.25), Chabaud Super Mix (37.13) and Chabaud Finest Mix (34.13 flowers plant^{-1}) respectively. The lowest (12.50) number of flowers plant^{-1} was obtained from cv Lilipot Mix.

Significant differences were observed between the diameter of flowers produced by different cultivars of carnation (Table 3). The pooled effect established Chabaud Super Mix as the best performer regarding flower diameter (5.91 cm) followed by Chabaud Extra Mix (5.64 cm), Chabaud Finest Mix (4.97 cm), Chabaud Mix (4.86 cm) and Enfont De Nice (4.85 cm). Cv Lilipot Mix produced the flowers with minimum diameter (4.56 cm). Plants of cv Chabaud Super Mix produced the longest stalks (35.43 cm) which was statistically at par with the cv Chabaud Extra mix (34.21 cm). The shortest flower stalks (5.00 cm) were obtained from cv Lilipot Mix. Data showed that cv Enfont De Nice as the best performer regarding the fresh weight of flowers (254.88 g), which was statistically at par with the fresh weights of flowers of Chabaud Extra Mix (251.18 g) and Chabaud Super Mix (242.04 g). Chabaud Mix (225.42 g) and Chabaud Finest Mix (214.53 g) performed moderately well. Cv Lilipot Mix produced the flowers having minimum fresh weight (191.32 g). The pooled effect proved Lilipot Mix as the most effective (Table 3) regarding the vase-life (4.63 days) of flowers followed by Chabaud Super Mix (4 days), which was statistically at par with Chabaud Mix (3.88 days), Chabaud Finest Mix (3.75 days) and Chabaud Extra Mix (3.63 days). The minimum post-harvest longevity of cut flowers was obtained from Enfont De Nice (3.38 days).

The different aspects of growth, development and flowering of six different carnation cultivars grown from seed were studied in this experiment. The growth and development of a particular flowering plant mainly depends on light, temperature and humidity. These conditions were more congenial for the variety Chabaud Super Mix, which produced quality blooms in respect of diameter of flowers (5.91 cm) and stalk length (35.43 cm) in the plains of West Bengal. But more number of side-shoots (18.12) and flowers (47.38) plant^{-1} was recorded with the variety Chabaud Extra Mix. Patil (2001) reported variation among the different carnation cultivars in respect of number of side shoots plant^{-1}. Shiragur et al. (2004) reported that varieties like West Pretty, Desio, Aicardi and Candy exhibited production of more number of shoots, however, cultivar Sugar Baby had exhibited less number of shoots plant^{-1}. Variety Enfont De Nice reported greater plant height (73.84 cm). The variation in plant height during evaluation of spray carnation cultivars was also noticed by Kaicker (1998), reported that plant height of Chaubad Giants and Enfant de Nice were 50 cm, Fantasie was 50-60 cm tall, Dwarf Frangrance about 30 cm tall while plant height of Malmaison Giant was 40 cm. Patil (2001) and Reddy et al.

Table 2: Comparison of earliness and flower characters of different carnation cultivars

Cultivar	DF-BICS	DFB	FL (days)	BL (cm)	BD (cm)	FlL (cm)
Chabaud extra mix	41.98	4.50	5.65	3.91	1.44	4.54
Enfont de nice	40.75	4.88	5.38	3.93	1.18	4.21
Chabaud mix	37.02	5.08	5.81	3.49	1.16	4.34
Chabaud super mix	38.50	4.27	6.14	4.25	1.67	4.49
Chabaud finest mix	34.75	4.00	5.16	3.98	1.18	3.98
Lilipot mix	35.77	4.40	7.29	2.89	1.20	4.04
SEm±	0.90	0.28	0.24	0.17	0.05	0.14
CD (p=0.05)	2.60	NS	0.71	0.48	0.14	NS

DFBICS: Days required for FBICS; DFB: Days required to full bloom; FL: Field life; BL: Bud length; BD: Bud diameter; FlL: Flower length

Table 3: Comparison of flower quality of different spray carnation cultivars

Cultivar	NFP	FD (cm)	SL (cm)	FWF (g)	VL (days)
Chabaud extra mix	47.38	5.64	34.21	251.18	3.63
Enfont de nice	37.88	4.85	26.99	254.88	3.38
Chabaud mix	37.25	4.86	24.95	225.42	3.88
Chabaud super mix	37.13	5.91	35.43	242.04	4.00
Chabaud finest mix	34.13	4.97	25.45	214.53	3.75
Lilipot mix	12.50	4.56	5.00	191.32	4.63
SEm±	2.16	0.08	0.93	5.81	0.14
CD (p=0.05)	6.23	0.23	2.68	16.78	0.40

NFP: No. of flowers plant^{-1}; FD: Flower diameter; SL: Stalk length; FWF: Fresh weight of 100 flowers; VL: Vase life

(2004) also noticed the difference in plant height among various cultivars of carnation. Bhautkar (1994) observed differences in flower production among carnation cultivars where maximum number of flowers were produced by cv Eveline followed by cv Furore and cv Starligtht, whereas minimum number of flowers was recorded in cultivar Lena. Atanassova and Batchvarova (1995) and Lal et al. (1998) also reported variation in flower production among different carnation cultivars. The *in-situ* (6.14 days) longevity of cut flowers of the cultivar Chabaud Super Mix were found better as compared to the others might be due to the initial growth phases which were far more suited to the environmental conditions. Steinbacher and Dinkel (1987) reported similar type of observations. Cv Enfont De Nice produced the highest fresh weight of carnation flowers (254.88 g) among the six different spray carnation cultivars. Krishnappa et al. (2000) also reported the differences in fresh weight of carnation flowers among the different cultivars. Plants of the variety Lilipot Mix produced the smallest plants (47.38 cm) with lesser number of side-shoots (12.80) and flowers and the plants reached the flower bud initiation stage earliest (54.37 days after transplanting) might be due to earlier completion of vegetative growth phases. Lilipot Mix showed the maximum period of vase life of cut blooms (4.63 days) which is a varietal character. Mahesh (1996) and Singh and Sangama (2003) also reported differences in post-harvest longevity of cut blooms in carnation cultivars.

4. Conclusion

All the six cultivars were suited in the agroclimatic conditions under open field condition among which, Lilipot Mix is found to be better as pot plant for its short stalk length, earlier blooming with maximum *in-situ* longevity of flowers. The other cultivars are suitable for loose and cut flower production. Chabaud Super Mix may be used for quality flower production but the recommended most floriferous variety is Chabaud Extra Mix.

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