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Response of Different Varieties of Carnation (*Dianthus caryophyllus* L.) to Different Types of Pinching

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A B S T R A C T

An experiment entitled "Response of different varieties of carnation (*Dianthus caryophyllus* L.) to different types of pinching" was conducted in naturally ventilated polyhouse, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology And Sciences, Prayagraj. The experiment was conducted in Factorial Randomized Block Design (FRBD) with five varieties replicated thrice. The varieties used were White Liberty, Marvellous, Purple Sky, Vanity and Baltico. The results revealed that the variety Baltico was found to be the most promising variety with respect to maximum no. of leaves (165.68), maximum flower diameter (7.42 cm) and maximum vase life (9.56 days). Among pinching, single pinching was found to be the most efficient because the single pinched plants were significantly taller (90.35 cm), bore maximum number of leaves (182.73), maximum plant spread (25.17cm), earliness in bud initiation (91.4 days), maximum flower diameter (7.19 cm), maximum flower stalk length (86.6 cm) and had maximum vase life (8.33). Among interaction, maximum plant height (102.60 cm) was recorded in treatment combination of V4 x P1 (Vanity X single pinching), maximum no. of leaves (194.00) was recorded in V5 x P1 (Baltico X single pinching), maximum flower diameter (8.03 cm) was recorded in V5 X P1 (Baltico X single pinching) and maximum vase life (10.67 days) was recorded in treatment combination of V5 x P1 (Baltico X single pinching).

Introduction

Carnation (*Dianthus caryophyllus* L.), belonging to the family *Caryophyllaceae* is one of the most important cut flower in the world. It accounts for almost 50% of world cut flower trade along with roses and chrysanthemum. The flowers are known for their wide range of forms and colours, have an excellent keeping quality and have ability to rehydrate after long distance transportation. To produce quality flowers, carnation needs to be grown under cover in polyhouses (Ryagi *et al.*, 2007).

Apical dominance is one of the serious problems for commercial carnation growers, as it does not permit lateral buds to develop, resulting in limited number of lateral branches and flowers (Pathania *et al.*, 2000). Pinching

is one of the most important cultural operations in carnation under protected cultivation. Pinching has direct relationship with production of flower and regulation of flowering for successful marketing (Dalal *et al.,* 2006). In pinching, terminal growing shoots about 2-3 cm long is removed to overcome apical dominance and to promote side branching, when the plants are of 6-8 leaf pair stage. When the plant attains 5 nodes, the first pinch is given, known as 'single pinch'. This would give rise to 6 lateral shoots.

With 'pinch and a half', 2-3 lateral shoots are pinched again. For 'double pinch', all the lateral shoots are pinched off. Depending on the need of crop spread, single pinch, pinch and a half or double pinch is given. Single pinch is done for early flower production, pinch and a half is done to increase the duration of flowering and provides steady production of flowers without any peak time and double pinching is done to delay flowering period.

Materials and Methods

An experiment entitled Response of different varieties of Carnation (*dianthus caryophyllus* l.) to different types of pinching, was carried out in naturally ventilated polyhouse under Prayagraj agro climatic condition in the Department of Horticulture, Sam Higginbottom University of Agriculture, Technology And Sciences during November 2019 - May 2020. Rooted terminal cuttings were planted in raised beds of 6 m length, 0.8 m width, 30 cm height and with a spacing of 20 cm between the rows and 20 cm apart. There were 15 treatment combinations consisting of five varieties *viz.*

White Liberty (V1), Marvellous (V2), Purple Sky (V3), Vanity (V4) and Baltico (V5) and three types of pinching i.e., single pinch (P1), pinch and half (P2) and double pinch (P3). The experiment was laid out in Factorial Randomized Block Design (FRBD) with three replications.

Single pinch was given when the plants attained 6 nodes i.e. about 30 days after planting. Pinching was done at the 6^{th} node, it gave rise to 5-6 lateral shoots. Again, after 55 to 60 days, "pinch and a half" was done in which 2-3 lateral shoots were pinched off again. For "double pinch", all the lateral shoots were pinched off.

Results and Discussion

The data presented in Table 1 shows that the maximum plant height was recorded in variety Vanity (92.38 cm). Variability in plant height among the varieties prevails due to genetic nature, growing environmental conditions, production technology and cultural practices. Similar results were obtained by Bhalla *et al.,* (2007); Gharge *et al.,* (2011) and Singh *et al.,* (2016) in carnation. Maximum number of leaves was recorded in variety Baltico (165.68). This might be due to taller plant with higher number of internodes and climatic condition inside the polyhouse favouring increased growth rate of plants. Similar results were obtained by Kamble (2001), Reddy *et al.,* (2004) and Singh *et al.,* (2016) in carnation.

Among pinching, single pinched plants were significantly taller (90.35 cm), bore maximum number of leaves (182.76) and maximum plant spread (25.17 cm). Variation in number of leaves might be due to taller plant and more number of internodes per stem. Similar results were obtained by Singh *et al.,* (2016) in carnation. Maximum plant height was recorded in the treatment combination of V4 X P1 (102.60cm), number of leaves in V5 X P1 (194.00) and plant spread in V3 X P1 (27.6 cm).

Table.1 Effect of different types of pinching on plant height, no. of leaves and plant spread of different varieties of carnation

Treatments	Plant height (cm)	No. of leaves	Plant spread (cm)
Varieties (V)			
V1–White liberty	71.59	154.44	21.76
V2- Marvellous	80.22	154.93	22.47
V3- Purple sky	71.58	149.17	24.64
V4- Vanity	92.38	165.51	22.50
V5- Baltico	64.94	165.68	21.82
C.D.	1.35	1.74	0.75
SE (d)	0.66	0.85	0.366
SE (m)	0.47	0.59	0.26
Pinching (P)			
P1- Single pinch	90.35	182.76	25.17
P2-Pinch and a half	71.62	154.41	22.90
P3- Double pinch	66.45	136.67	19.84
C.D.	1.05	1.35	0.58
SE (d)	0.51	0.66	0.28
SE (m)	0.36	0.46	0.20
Interaction (VXP)			
V1 P1	87.83	186.00	23.93
V1 P2	67.87	148.67	22.17
V1 P3	59.07	128.67	19.17
V2 P1	92.80	178.57	25.50
V2 P2	75.80	151.23	23.53
V2 P3	72.07	135.00	18.37
V3 P1	86.93	163.22	27.63
V3 P3	59.30	135.80	21.50
V4 P1	102.60	192.03	24.70
V4 P2	87.83	166.82	22.37
V4 P3	86.70	137.67	20.43
V5 P1	81.60	194.00	24.10
V5 P2	58.10	156.83	21.63
V5 P3	55.13	146.20	19.73
C.D.	2.35	3.01	1.31
S.E. (d)	1.14	1.47	0.63
S.E. (m)	0.81	1.04	0.45

Table.2 Effect of different types of pinching on earliness, flower diameter, stalk length and vase life of different varieties of carnation

Treatments Varieties (V)	Earliness in bud initiation (days)	Flower diameter (cm)	Stalk length (cm)	Vase life (days)
V1–White liberty	109.56	6.66	74.11	7.67
V2- Marvellous	104.00	6.14	84.33	6.22
V3- Purple sky	102.33	6.52	78.44	7.33
V4- Vanity	107.78	6.71	85.22	8.56
V5- Baltico	105.78	7.42	66.89	9.56
C.D.	1.38	0.36	1.29	0.85
S.E. (d)	0.67	0.18	0.62	0.41
S.E. (m)	0.48	0.12	0.44	0.29
Pinching (P)				
P1- Single pinch	91.40	7.19	86.60	8.33
P2-Pinch and a half	110.80	6.90	78.53	7.87
P3- Double pinch	115.47	5.98	68.27	7.40
C.D.	1.07	0.28	0.99	0.66
S.E. (d)	0.52	0.14	0.48	0.32
S.E. (m)	0.37	0.09	0.34	0.23
Interaction (VXP)				
V1 P1	95.00	7.41	85.33	8.33
V1 P2	115.33	6.71	73.00	8.0
V1 P3	118.33	5.87	64.00	6.67
V2 P1	92.67	6.23	92.67	6.33
V2 P2	106.67	6.33	86.33	6.33
V2 P3	112.66	5.87	74.00	6.00
V3 P1	87.33	7.37	88.67	7.67
V3 P2	107.67	6.77	78.33	7.33
V3 P3	112.00	5.43	68.33	7.00
V4 P1	96.00	6.93	92.00	8.66
V4 P2	111.00	6.97	86.00	8.33
V4 P3	116.33	6.23	77.67	8.67
V5 P1	86.00	8.03	74.33	10.67
V5 P2	113.33	7.73	69.00	9.33
V5 P3	118.00	6.50	57.33	8.67
C.D.	2.39	0.62	2.23	N/A
S.E. (d)	1.16	0.30	1.08	0.72
S.E. (m)	0.82	0.21	0.76	0.51

Earliness in bud initiation was recorded in variety Purple Sky (102.33 days), maximum stalk length was recorded in variety Vanity (85.22 cm) and maximum flower diameter (7.42 cm) and vase life (9.56 days) were recorded in the variety Baltico. Variation in vase life among the varieties could be due to the ability of the varieties to produce ethylene and sensitivity to it. Among pinching, earliness in bud initiation (91.4 days),

maximum stalk length (86.6 cm), flower diameter (7.19 cm) and vase life (8.33 days) were recorded in single pinched plants (Table 2).

Earliness in bud initiation and maximum stalk length in single pinched plants might be due to removal of the plant shoots only once. Flowers obtained from the single pinched plants have significantly longer stalk length which resulted in absorption more water from the vase, thus, resulting in longer vase life. The best treatment combination with regard to earliness in bud initiation (86.00 days), maximum flower diameter (8.03 cm) and maximum vase life (10.67 days) were recorded in V5 X P1 (Baltico X single pinching).

Based on findings of the experiment, it is concluded that the maximum no. of leaves (194.00), maximum flower diameter (8.03 cm) and maximum vase life (10.67 days) was recorded in interaction between V5 x P1 (Baltico X single pinching) making it the best treatment combination.

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