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## Effect of pinching on growth of carnation varieties grown under protected condition

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**ABSTRACT :** An experiment was conducted to study the effect of pinching methods on carnation under protected condition. The results of present investigation revealed that variety Rendez-vous ( $V_4$ ) recorded significantly the highest plant height (28.99cm, 39.81 cm and 35.33 cm) at all the stages. Similarly, maximum number of leaves per plant (214.07), number of internodes per stem (17.20) was observed in variety Rendez-vous ( $V_4$ ). While, variety Gaudina ( $V_1$ ) recorded significantly the highest internodal length (12.26cm). Variety Liberty ( $V_2$ ) recorded significantly the maximum number of auxiliary branches per plant (5.35). Significantly the highest stem length (103.37 cm), were observed in variety Farida ( $V_3$ ).

**KEY WORDS :** Pinching, Internode, Stalk length

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Carnation (*Dianthus caryophyllus* L.) which is indigenous to the Mediterranean region is one of the most important cut flower in the World. Carnation belongs to the family Caryophyllaceae. Among the top three cut flowers in the international market, carnation ranks third.

Flowers are one of the God's most beautiful boon to mankind that bring joy and happiness to one and all. Flowers are symbol of beauty, love and tranquility. The flowers are soul of garden and convey the message of nature to man. No ceremony or function can be considered complete without use of flowers in way more than one. The importance of flower crops has been continuing uninteruptive since the very draw of civilization. Flowers are most appealing form of human expression as they devote beauty, purity, honesty and divinity. Flowers were referred extensively in ancient Sanskrit classics like Rigveda, Ramayana, Mahabharata, etc. where, beauty and divinity are described.

Further, there is need to evaluate suitable varieties and production technologies as suited to our conditions.

Hence, the present investigation was carried out under protected condition to know the influence of pinching on different varieties of carnation.

### RESEARCH METHODS

The present experiment was carried out at Hi-tech Horticulture Park (Greenhouse Unit-2), Department of Horticulture, College of Agriculture, Junagadh Agricultural University, Junagadh during 2011-2012.

The raised beds were of 1.0m width with 0.45m path in between. The planting of plants was done in five rows on a bed with spacing of 0.15 x 0.20 m. Planting was done during September 2011. There were 12 treatment combinations consisting of four varieties viz., Gaudina ( $V_1$ ), Liberty ( $V_2$ ), Farida ( $V_3$ ) and Rendez-vous ( $V_4$ ) and three types of pinching namely single pinching ( $P_1$ ), one and half pinching ( $P_2$ ) and Double pinching ( $P_3$ ). The experiment was laid out in Completely Randomized Design with Factorial arrangement with three replications.

In P<sub>1</sub> (Single pinching) treatment, pinching was carried out on 25 day after planting at 6<sup>th</sup> node by just bending at the node. In P<sub>2</sub> (One and half pinching) treatment, first pinching was done after 25 days of planting at 6<sup>th</sup> node and second pinching was done after 50 days of planting by removing half of lateral shoots retaining only three nodes and in P<sub>3</sub> (double pinching) treatment, first pinching was done after 25 days of planting at 6<sup>th</sup> node and second pinching was done after

50 days of planting by removing all lateral shoots retaining only three nodes.

The data for prevailing conditions of inside greenhouse during the crop period are given in Table A. In greenhouse condition the maximum temperature (36.0<sup>o</sup> C) was found in October and minimum temperature (23<sup>o</sup> C) in January month. The relative humidity was found highest (94%) in September and lowest (46%) in January month.

Table A : Meteorological data recorded during the crop season of 2011-2012 at Junagadh in polyhouse condition (Fan and Pad Polyhouse)				
Meteorological week No.	Temperature ( <sup>o</sup> C)		Humidity (%)	
	Maximum	Minimum	Maximum	Minimum
<b>August 2011</b>				
32	29	28	89	88
33	32	30	77	72
34	32	28	90	76
35	32	30	88	79
<b>September 2011</b>				
36	32	30	85	79
37	31	28	94	84
38	32	27	93	67
39	34	31	83	64
<b>October 2011</b>				
40	34	31	66	51
41	35	34	57	56
42	36	33	60	50
43	36	33	62	51
44	35	29	80	58
<b>November 2011</b>				
45	33	31	65	50
46	32	29	59	53
47	32	30	59	53
48	31	29	62	52
<b>December 2011</b>				
49	30	29	63	51
50	31	29	63	57
51	31	28	76	56
52	28	24	81	77
<b>January 2012</b>				
01	25	23	80	64
02	26	24	69	63
03	25	24	69	56
04	25	23	54	49
<b>February 2012</b>				
05	26	24	49	46
06	24	23	57	47
07	24	23	62	56
08	25	24	54	51

## RESEARCH FINDINGS AND DISCUSSION

During all stages of crop growth *viz.*, before first pinching, before second pinching and after second pinching the plant of carnation was highest in variety Rendez-vous ( $V_4$ ), whereas the variety Gaudina ( $V_1$ ) recorded minimum plant height at all the stages (Table 1). Such a range of variability in plant height among the varieties is mainly due to genetic nature, growing

environmental conditions, production technology and cultural practices, is in accordance with the reports of Dwivedi and Kareem (2004), Talukdar *et al.* (2006); Bhalla *et al.* (2007); Kazaz *et al.* (2011) and Gharge *et al.* (2011) in carnation.

Among the varieties, number of leaves produced per plant was maximum in variety Rendez-vous ( $V_4$ ), while the minimum in variety Gaudina ( $V_1$ ) (Table 2).

Table 1 : Effect of varieties and pinching on plant height of carnation under protected condition				
Treatments	Plant height (cm)			
	Before first pinching	After first pinching	Before second pinching	After second pinching
<b>Varieties (V)</b>				
$V_1$ –Gaudina	23.08	10.18	34.44	29.80
$V_2$ – Liberty	26.48	10.61	37.19	32.61
$V_3$ – Farida	24.96	10.66	36.89	32.19
$V_4$ –Rendez-vous	28.99	10.68	39.81	35.33
S.E.±	0.83	0.34	0.86	0.80
C.D. (P=0.05)	2.42	NS	2.52	2.35
<b>Pinching (P)</b>				
$P_1$ – Single pinch	24.67	10.46	36.85	31.74
$P_2$ –One and a half pinch	25.80	10.66	37.24	33.10
$P_3$ –Double pinch	27.17	10.47	37.17	32.62
S.E.±	0.72	0.29	0.75	0.70
C.D. (P=0.05)	NS	NS	NS	NS
<b>Interaction</b>				
V x P	NS	NS	NS	NS
C.V.%	9.62	9.68	6.98	7.43

NS=Non-significant

Table 2 : Effect of varieties and pinching on number of leaves per plant, number of internodes per stem and intermodal length of carnation under protected condition			
Treatments	Number of leaves per plant	Number of internodes per stem	Internodal length (cm)
<b>Varieties (V)</b>			
$V_1$ –Gaudina	168.69	14.06	12.26
$V_2$ – Liberty	180.52	16.26	7.77
$V_3$ – Farida	181.11	16.06	9.80
$V_4$ –Rendez-Vous	214.07	17.20	8.26
S.E.±	4.62	0.30	0.37
C.D. (P=0.05)	13.48	0.87	1.07
<b>Pinching (P)</b>			
$P_1$ – Single pinch	204.90	16.78	10.49
$P_2$ –One and a half pinch	165.72	15.07	8.80
$P_3$ –Double pinch	187.67	15.86	9.28
S.E.±	4.00	0.26	0.32
C.D. (P=0.05)	11.68	0.75	0.92
<b>Interaction</b>			
V x P	NS	NS	NS
C.V.%	7.45	5.59	11.52

NS=Non-significant

This might be due to taller plant with higher number of internodes and the congenial microclimate that prevailed inside the polyhouse favouring increased growth rate of plants. Similar results were obtained by Naveenkumar *et al.* (1999); Patil, (2001); Kamble (2001) and Reddy *et al.* (2004) in carnation.

Maximum number of internodes per plant was observed in variety Rendez-vous ( $V_4$ ), while it was minimum in variety Gaudina ( $V_1$ ). Similar variations in number of internodes have been recorded by Bhautkar (2000), Patil (2001) and Ryagi *et al.* (2007) in carnation.

Variety Gaudina ( $V_1$ ) recorded significantly the highest internodal length. While, the lowest internodal length was recorded in variety Liberty ( $V_2$ ). Similar variation due to varieties with respect to internodal length was also recorded by Patil (2001) and Ryagi *et al.* (2007) in carnation.

Variety Liberty ( $V_2$ ) recorded significantly the maximum number of auxiliary branches per plant, while it was minimum in variety  $V_4$  (Rendez-vous) (Table 3). Such a range of variability in number of auxiliary branches per plant among the varieties is mainly due to genetic nature, growing environmental conditions, production technology and cultural practices. This is in accordance with the reports of Bhautkar (2000); Patil (2001); Reddy *et al.* (2004); Shahakar *et al.* (2004) and Ryagi *et al.* (2007) in carnation.

Significantly the highest stem length was observed

in variety Farida ( $V_3$ ). While, the lowest stem length was noticed under variety  $V_1$  (Gaudina). This might be due to taller plant and the congenial microclimate that prevailed inside the polyhouse favouring increased growth rate of plants. Similar results were obtained by Naveenkumar *et al.* (1999); Bhautkar (2000); Singh and Sangama (2003); Dwivedi and Kareem (2004) and Bhalla *et al.* (2007) in carnation.

The growth parameters like number of leaves per plant, number of internodes per plant, intermodal length, number of auxiliary branches per plant and stalk length significantly differed for various pinching treatments in carnation.

The treatment  $P_1$  produced highest number of leaves per plant, while it was minimum in treatment  $P_3$ . This might be due to taller plant and more number of internodes per stem. Similar results were obtained by Chavan (2003) in carnation.

Maximum number of internodes per plant was observed in treatment  $P_1$ , while it was minimum in treatment  $P_3$ . Similar variations in number of internodes have been recorded by Ryawest internodal length was recorded in treatment  $P_2$ . Similar, variations due to pinching with respect to internodal length were also recorded by Pathania *et al.* (2000) and Chavan (2003) in carnation.

Treatment  $P_3$  recorded significantly the maximum number of auxiliary branches per plant, while it was

**Table 3 : Effect of varieties and pinching on leaf length, number of auxiliary branches per plant and stem length of carnation under protected condition**

Treatments	Leaf length (cm)	Number of auxiliary branches per plant	Stem length (cm)
<b>Varieties (V)</b>			
$V_1$ –Gaudina	10.13	4.32	84.06
$V_2$ – Liberty	10.41	5.35	94.94
$V_3$ – Farida	10.18	4.72	103.37
$V_4$ –Rendez-vous	11.00	3.45	84.07
S.E.±	0.29	0.16	1.28
C.D. (P=0.05)	NS	0.48	3.74
<b>Pinching (P)</b>			
$P_1$ – Single pinch	10.65	3.16	99.24
$P_2$ –One and a half pinch	10.56	4.38	92.25
$P_3$ –Double pinch	10.07	5.85	83.35
S.E.±	0.25	0.14	1.11
C.D. (P=0.05)	NS	0.42	3.24
<b>Interaction</b>			
V x P	NS	NS	NS
C.V.%	8.43	11.05	4.19

NS=Non-significant

minimum in treatment P<sub>1</sub>. Such a range of variability in number of auxiliary branches per plant among the different pinching methods might be due to removal of apical dominance twice in double pinching which resulted in more number of branches per plant with reduced height. This is in accordance with the reports of Rameshkumar *et al.* (2002); Seharawat *et al.* (2003), Singh and Singh (2005) and Dalal *et al.* (2006) in carnation.

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