



Impact of Differential Methods and Time of Pinching on Vegetative Characteristics of Cut Carnation (*Dianthus caryophyllus* L.) under Kashmir Conditions

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ABSTRACT

Present investigation entitled "Impact of differential methods and time of pinching on vegetative characteristics of cut carnation (*Dianthus caryophyllus* L.) under Kashmir conditions" was conducted in a polyhouse located at Experimental Farm of the Division of Floriculture and Landscape Architecture, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar, Srinagar, during 2017 and 2018. The experiment was laid out in randomized complete block design with 12 treatments replicated thrice. Two cultivars (Red King and Dark Dona) were subjected to first pinch at 20, 25 and 30 days after planting (DAP) followed by a pinch and a half thus amounting to 12 treatments in three replications. The results revealed that carnation cv. Red King with first pinch at 20 DAP resulted highest (4.42mm) diameter of side shoots, internodal length (3.80cm) of side shoots, length (21.00cm) of side shoots before second pinching and number of leaf pairs (9.600) of side shoots before second pinching. Results of the present investigation had led to the conclusion that treatment V₁F₁P₁ (cv. Red King with first pinch at 20 DAP) recorded optimum vegetative characteristics.

Key words: Carnation, Red King, Dark Dona, Pinching, Vegetative, Single pinch

Carnation (*Dianthus caryophyllus* L.) belongs to the family *Caryophyllaceae* and order *caryophyllales*. The family consists of 80 genera and 2000 species which are either annual or perennial. It is one of the leading cut flower crops in the global florist trade and ranks second among the top ten cut flowers in International Flower Market. The generic name *Dianthus* is derived from Greek words 'dios' (divine) and 'anthos' (flower). Carnations are grown

commercially in India in places having mild climate like Solan, Shimla, Kalimpong, Kodaikanal, Mandi, Kullu, Srinagar, Ooty and Yercaud. In Pune and Bangalore, it is grown under controlled condition (Singh *et al.* 2013). Development of axillary shoots and flower production in carnation is influenced by the presence of apical dominance. Generally carnations produce one main shoot which terminates into flower bud. After the cessation of the

terminal growth, axillary shoots (laterals) develop which also bear flower buds (Rajhansa *et al.* 2013). To induce early production of laterals, the apical portion of the shoot is removed at initial stage of growth thus forcing out large number of axillary shoots resulting in more number of flower stalks (Tanase *et al.* 2012). Pinching is an important cultural operation for the successful production of more number of quality flowers under protected conditions. Pinching has direct relationship with number of flowers and regulation of flowering for successful marketing. This operation reduces plant height and promotes axillary shoots. Pinching of carnation has also been found highly beneficial in regulating the flowering duration and increasing flower yield (Rajyalakshmi and Rajyasekhar 2014). Production of carnation flowers under polyhouse conditions is becoming popular among growers in Kashmir valley. Plant canopy management in carnation under Kashmir conditions has not been standardized so far. The present investigation was therefore taken up to generate data regarding response of carnation cultivars to differential pinching methods under Kashmir conditions.

MATERIALS AND METHODS

The investigation was conducted at Experimental Farm of the Division of Floriculture and Landscape Architecture, Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar, Srinagar, that lies between 34° 05' N latitude and 74° 98' E longitude at an altitude of 1587 meters above mean sea level. In the present

study, experimental details comprised of main factor (varieties; V₁: Red King, V₂: Dark Dona), Sub-Factor I (Days to first pinch; F₁: 20 days, F₂: 25 days, F₃: 30 days), Sub-Factor II (Pinching; P₁: Single pinching, P₂: Pinch and a half). The layout was designed in randomized completely block design with factorial split plot replicated 03 times and 12 total number of treatment combinations.

Lay Out						
V ₁	F ₁ P ₁	F ₁ P ₂	F ₂ P ₁	F ₂ P ₂	F ₃ P ₁	F ₃ P ₂
V ₂	F ₁ P ₁	F ₁ P ₂	F ₂ P ₁	F ₂ P ₂	F ₃ P ₁	F ₃ P ₂

Cultivation practices including preparation and fumigation of beds, mixing of media, planting of uniformly grown well rooted plants (Cultivars : Red King and Dark Dona), irrigation, netting, fertigation and pinching were carried out uniformly. Data on various growth parameters were subjected to statistical analysis.

RESULTS AND DISCUSSION

The data pertaining to number of bottom breaks after first pinching, diameter of side shoots (mm), basal internodal length of side shoots (cm), length of side shoots before second pinching (cm) and number of leaf pairs of side shoots before second pinching in carnation were evaluated under polyhouse at Experimental Farm of Sher-e-Kashmir University of Agricultural Sciences and Technology of Kashmir, Shalimar, Srinagar, during 2017 and 2018 are presented in (Table 1).

Table 1 Effect of pinching time and pinching method on vegetative growth of cut carnation

Treatments	No. of bottom breaks after first pinching	Diameter of side shoots (mm)	Basal internodal length of side shoots (cm)	Length of side shoots before 2 nd pinching (cm)	No. of leaf pairs of side shoots before 2 nd pinching
Variety					
V ₁ : Red King	7.203	3.830	3.675	18.758	8.533
V ₂ : Dark Dona	6.333	3.757	3.603	13.945	8.100
C.D(_p ≤0.05)	0.069	0.013	0.016	0.832	0.008
Days to first pinch					
F ₁ : 20 days after planting	7.215	3.973	3.725	17.543	9.400
F ₂ : 25 days after planting	6.765	3.823	3.685	16.075	8.300
F ₃ : 30 days after planting	6.325	3.585	3.508	15.438	7.250
C.D(_p ≤0.05)	0.016	0.029	0.022	0.543	0.010
Pinching					
P ₁ : Single pinching	6.770	4.143	3.708	16.372	8.400
P ₂ : Single pinch and a half	6.767	3.443	3.570	16.332	8.233
C.D(_p ≤0.05)	N.S	0.008	0.015	N.S	0.009

Pinching at 20 DAP (Days after planting) resulted highest (7.215) number of bottom breaks after first pinching, diameter (3.973mm) of side shoots, basal internodal length (3.725 cm) of side shoots, length (17.543 cm) of side shoots before second pinching and highest (9.400) number of leaf pairs of side shoots before second pinching. Superior vegetative growth of plants pinched at 20 days after planting might be because of the optimum stage of the plants that allowed release of side shoots from apical dominance. Pinching at 25 or 30 days after planting resulted delayed

sprouting of axillary buds (Rao 2006). Similar results were recorded by Singh and Baboo (2003) in chrysanthemum who reported improved diameter of side shoots with first pinch at 20 days after planting compared to 10 DAP and 30 DAP. Improved basal internodal length was recorded in plants pinched at 20 DAP, thus pointing to importance of optimum stage of growth for pinching operation. The increased number of leaf pairs of side shoots before second pinching might be attributed to early release of axillary buds at physiologically right stage (Sharma *et al.* 2012). These

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results are in conformity with Pushkar and Singh (2012) in marigold who observed maximum vegetative growth with pinching at early intervals.

Cultivar Red King recorded highest (7.203) number of bottom breaks after first pinching, diameter (3.830 mm) of side shoots, internodal length (3.675cm) of side shoots, length (18.758 cm) of side shoots before second pinching

and highest (8.533) number of leaf pairs of side shoots before second pinching. Cultivar Red King recorded to be more vigorous growing type with stout stem and quick to release growth of axillary shoots after pinching (Singh *et al.* 2013). Variable performance of carnation cultivars have been reported before in many studies Ramesh (2002), Reddy (2004), Patil (2001) in carnation.

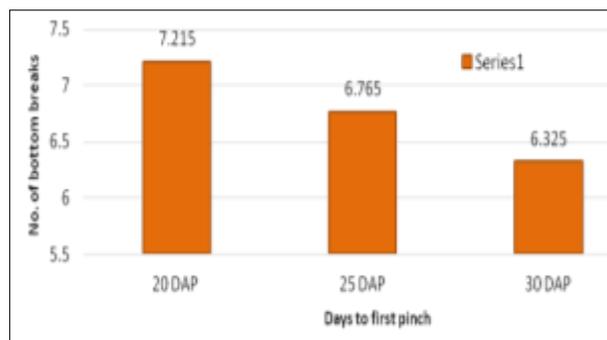


Fig 1 Effect of pinching time on number of bottom breaks after first pinch

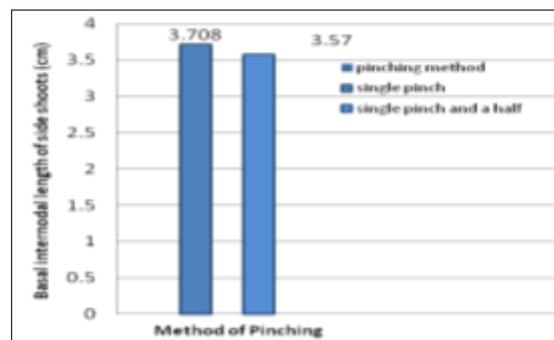


Fig 2 Effect of pinching method on basal internodal length of side shoots (cm)

Single pinch resulted highest (4.143 mm) diameter of side shoots, basal internodal length (3.70 cm) of side shoots and number of leaf pairs (8.400) of side shoots before second pinching. Shoots released in primary branches that received second pinch and a half recorded lowest (3.44 mm) diameter of side shoots, basal internodal length (3.57 cm) of side shoots and number of leaf pairs (8.23) of side shoots

before second pinching. Pinching resulted in breaking of apical dominance and sprouting of axillary buds (Maharnor 2011). These analogous results are in close conformity with Ryagi *et al.* (2007) in carnation. Single pinched plants developed highest length of laterals with more nodes and internodes directly increased the number of pairs of leaves before second pinching (Rao 2006).

Table 2 Effect of first order interaction of varieties, pinching time and pinching method on vegetative growth of cut carnation

Treatments	No. of bottom breaks after first pinching	Diameter of side shoots (mm)	Internodal length of side shoots (cm)	Length of side shoots before 2 nd pinching (cm)	No. of leaf pairs of side shoots before 2 nd pinching
Variety × Days to first pinch					
V ₁ F ₁	7.605	4.005	3.750	20.905	9.500
V ₁ F ₂	7.200	3.850	3.710	18.145	8.500
V ₁ F ₃	6.805	3.635	3.565	17.225	7.600
V ₂ F ₁	6.825	3.940	3.700	14.180	9.300
V ₂ F ₂	6.330	3.795	3.660	14.005	8.100
V ₂ F ₃	5.845	3.535	3.450	13.650	6.900
C.D(_p ≤0.05)	0.022	N.S	0.031	0.768	0.014
Variety × Pinching method					
V ₁ P ₁	7.217	4.197	3.753	18.800	8.600
V ₁ P ₂	7.190	3.463	3.597	18.717	8.467
V ₂ P ₁	6.323	4.090	3.663	13.943	8.200
V ₂ P ₂	6.343	3.423	3.543	13.947	8.000
C.D(_p ≤0.05)	0.016	0.012	0.021	N.S	0.012
Days to first pinch × Pinching method					
F ₁ P ₁	7.220	4.390	3.760	17.585	9.500
F ₁ P ₂	7.210	3.555	3.690	17.500	9.300
F ₂ P ₁	6.760	4.235	3.720	16.100	8.300
F ₂ P ₂	6.770	3.410	3.650	16.050	8.300
F ₃ P ₁	6.330	3.805	3.645	15.430	7.400
F ₃ P ₂	6.320	3.365	3.370	15.445	7.100
C.D(_p ≤0.05)	N.S	0.014	0.025	N.S	0.015

Table 3 Effect of second order interaction of varieties, pinching time and pinching method on vegetative growth of cut carnation

Treatments	No. of bottom breaks after first pinching	Diameter of side shoots (mm)	Internodal length of side shoots (cm)	Length of side shoots before 2 nd pinching (cm)	No. of leaf pairs of side shoots before 2 nd pinching
Variety × Days to first pinch × Pinching method					
V ₁ F ₁ P ₁	7.620	4.420	3.800	21.000	9.600
V ₁ F ₁ P ₂	7.590	3.590	3.700	20.810	9.400
V ₁ F ₂ P ₁	7.210	4.280	3.750	18.180	8.400
V ₁ F ₂ P ₂	7.190	3.420	3.670	18.110	8.600
V ₁ F ₃ P ₁	6.820	3.890	3.710	17.220	7.800
V ₁ F ₃ P ₂	6.790	3.380	3.420	17.230	7.400
V ₂ F ₁ P ₁	6.820	4.360	3.720	14.170	9.400
V ₂ F ₁ P ₂	6.830	3.520	3.680	14.190	9.200
V ₂ F ₂ P ₁	6.310	4.190	3.690	14.020	8.200
V ₂ F ₂ P ₂	6.350	3.400	3.630	13.990	8.000
V ₂ F ₃ P ₁	5.840	3.720	3.580	13.640	7.000
V ₂ F ₃ P ₂	5.850	3.350	3.320	13.660	6.800
C.D.(p≤0.05)	N.S	0.020	N.S	N.S	0.021

Data pertaining to first and second order interactions are presented in (Table 2, 3). The interaction treatments also significantly influenced the number of bottom breaks, plants that received first pinch at 20 DAP recorded highest (7.60) number of bottom breaks in comparison to other treatments. These results are similar to Patil (2001), Shiragur *et al.* (2004) and Shahakar *et al.* (2004) in carnation. Red King plants pinched at 20 DAP recorded highest basal internodal length (3.800 cm) of side shoots. These results are in conformity with Grawal *et al.* (2004) in chrysanthemum cv.

Flirt. Cultivar Red King plants pinched at 20 DAP recorded highest (20.90 cm) length of side shoots in comparison to other treatments. The highest length of side shoots before second pinching might be due to early sprouting of buds and better utilization of resources that resulted in better length of side shoots before second pinching (Rao 2006). Cultivar Red King pinched at 20 DAP recorded highest (9.600) number of pairs of leaves of side shoots. Similar results were also reported by Singh and Baboo (2003) in chrysanthemum cv. Jayanthi.



Fig 3 Bottom breaks of cut carnation after first pinch



Fig 4 Standing carnation crop in polyhouse

It could be concluded from the aforementioned investigation that moderately vigorous cultivar like Red King pinched at 20 days after planting (DAP) performed better in terms of plant canopy build up than slow growing cv. Dark Dona. The treatment V₁F₁P₁ (cv. Red King with

first pinch at 20 DAP) recorded optimum vegetative characteristics in carnation under polyhouse conditions. The study underlines the importance of timely pinching operation for optimizing vegetative growth of carnation under Kashmir valley conditions.

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