

Full Length Research Paper

Evaluation of carnation (*Dianthus caryophyllus* L.) varieties under naturally ventilated greenhouse in mid hills of Kumaon Himalaya

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Among eight Carnation varieties viz. Diana, Aurturo, White Dona, Pink Dona, Soto, Red King, Tuareg and Dona., evaluated under naturally ventilated greenhouse and subjected to uniform treatment and cultural package of practices, the variety Red King was found best with respect to number of branches (8.0), number of flowers/plant (35.6), fresh weight of flower (8.38 g), dry weight of flower (2.66 g), flower diameter (7.83 cm) and vase life an important post harvest quality parameter was observed to be the superior in variety Red King (29.3 days) followed by cv Tuareg (24 days) and Pink Dona (21.3 days). On the basis of present experiment it was concluded that cultivar Red King were found to be promising with respect to yield as well as flower quality parameters and found suitable for commercial cultivation under naturally ventilated green house in mid hills of Kumaon Himalayas.

Key words: Carnation, greenhouse, varieties, vase life.

INTRODUCTION

Carnation (*Dianthus caryophyllus* L.), a member of family Caryophyllaceae is one of the leading cut flower crops in the world florist trade and ranks with in top ten cut flower of the world. It is half hardy perennial with branching stems and timid joints, leaves are linear, glaucous, in opposite or decussate pairs. Each stem forms terminal flowers which is bisexual or occasionally unisexual. The hybrids have remarkable long flowering period which produces blooms continuously in mild weather.

The crop grown in open field is exposed to aberration of environmental conditions and attack by different pest and diseases, resulting in poor quality flowers. A carnation variety varies with region, season, genotypes and growing environment. In India, depending upon the regions, there is a wide difference in temperature, light intensity and humidity which not only affect the yield and quality of the flowers but also limit their availability for a particular period of a year. To produce quality flowers,

carnation need to be grown under cover, that is, in greenhouse which provides the plants with the optimum condition of light, temperature, humidity and carbon dioxide etc for proper growth and to achieve maximum yield of best quality flowers (Bhalla et al., 2006). Though, there are different types of the greenhouses, naturally ventilated polyhouses are preferred in mild climate in which temperature is reduced by ventilation (Ryagi et al., 2007).

The mid hills of Uttarakhand provides an ideal condition for growing variety of flowers and quality carnation cut flowers can be grown under naturally ventilated green houses. Considering the importance of the flower crop, an experiment was conducted during 2010-12 to evaluate eight carnation varieties for their yield and quality attributes under naturally ventilated green house condition at Research Station and KVK, Lohaghat, (GBPUA&T, Pantnagar), Champawat, Uttarakhand which

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Table 1. Effect of growing condition on flower yield attributes of eight carnation varieties under naturally ventilated greenhouse.

Varieties	No. of branches/plants	No. of flowers/plants	Stem length (cm)	No of leaf pairs/stem	Fresh weight of flower (g)	Dry weight of flower (g)	Flower diameter (cm)	Vase life (days)
Diana	3.66	27.00	66.30	9.00	5.70	1.19	7.30	20.30
Aurturo	5.00	23.30	69.30	9.00	6.70	1.55	7.00	19.30
White Dona	5.60	23.60	56.60	8.00	4.00	1.01	7.00	18.30
Pink Dona	7.30	29.30	53.40	10.30	5.70	1.01	6.80	21.30
Soto	5.60	24.00	62.30	9.30	5.30	1.22	6.80	17.60
Red King	8.00	35.60	75.00	9.60	8.30	2.66	7.80	29.30
Tuareg	5.33	22.00	68.30	11.00	6.80	1.63	5.70	24.00
Dona	6.60	28.00	65.50	10.60	6.60	1.63	7.50	20.00
SEm	0.53	5.90	4.71	0.47	0.54	0.152	0.27	0.68
CD at 5%	1.61	10.54	14.29	1.45	1.65	0.46	0.83	2.08

is situated at an latitude of 29 60'; Longitude of 80 1' and altitude of 1700 to 1800 m from MSL in North West Himalaya of India.

MATERIALS AND METHODS

The eight varieties of carnations viz. Diana, Aurturo, White Dona, Pink Dona, Soto, Red King, Tuareg and Dona were evaluated for their yield and quality attributes. The raised beds of 80 cm width with 50 cm path in between were made under greenhouse. The planting of rooted cuttings of eight varieties were done in four rows on a bed with spacing of 15 × 15 cm. Experiment was designed in randomized block design with eight varieties as treatments and three replication of each treatment. Uniformly two pinching has been done in all treatments with first pinching all main shoots were pinched retaining six pair of leaves from base at 21 to 25 days after planting and second pinching with half pinching of the laterals produced from single pinching has been done to all the varieties. Uniform package of practices were followed throughout the cropping season to grow a successful crop. Flowers are harvested at paint brush stage retaining 2 to 3 nodes at the base of the stalk.

The data were recorded for flower yield attributes like number of branches per plants, number of flower per plant, stem length (cm), number of leaf pairs per stem and flower quality attributes like flower diameter (cm), flower fresh weight (gm), flower dry weight (gm) and flower vase life (days) using the standard method. The collected data were subjected to statistical analysis as suggested by Cochran and Cox (1992).

RESULTS AND DISCUSSION

Among eight varieties of carnations, significantly maximum number of branches per plants was recorded with variety Red King (8.0) which was at par with variety Soto (7.3). Significantly higher cut flower stem length was recorded with variety Red King (75 cm) as compared to all other varieties (Table 1). The similar results with respect to varieties were reported by Bhautkar (1994), Mahesh (1996) and Patil (2001). This may be due to fact that removal of apical portion by pinching which

neutralizes the effect of apical dominance. Similar variations with pinched variety were reported by Patel and Arora (1983), Khanna et al (1986) in carnation. Among the eight varieties, the significantly more number of flowers per plant were recorded in Red King (35.6) and minimum flowers per plant were observed with Variety Tuareg (22). Similar flower yield variations in carnation varieties were reported by Gill and Arora (1988), Naveen et al. (1999) and Patil (2001). Ubukata (1999) reported that single and half pinching increased the number of flowers in three carnation varieties which may be due to fact that there was increase in the temperature under greenhouse from February month onwards and in single and half pinching affects in increase of the laterals which might be due to high temperature (Figures 1 and 2). Similarly, Ramesh et al. (2002) reported that pinching twice increase the number of the flowers per plants compared to single pinching. The increase in the number of flowers per plants and yield of flower might be attributed to the development of large number of auxillary shoots as a result of cessation of the terminal growth by pinching (Narayana and Jayanthi, 1991). These results are in conformity with Yassin and Pappiah (1990) and Singh and Baboo (2003) in Chrysanthemum.

Variety Redking has significantly higher flower fresh weight and dry weight followed by variety Turang (Table 1). Similar results were also observed by Ateeque et al. (1994), El-Shafei (1977), Singh and Sangama (2003), where they observed that increase in leaves dry matter may be related to the increase in the number of leaves. Flower quality with respect to flower diameter and flower vase life was significantly higher in variety Red King as compared to all varieties grown under similar growing condition in greenhouse. Maximum flower diameter (7.83 cm) and flower vase life (29.33 days) were observed with Red King. Variation in vase life could be attributed to the variation in ability to produce ethylene and sensitivity to it among the different varieties. The similar variation in flower diameter and vase life of the different varieties of

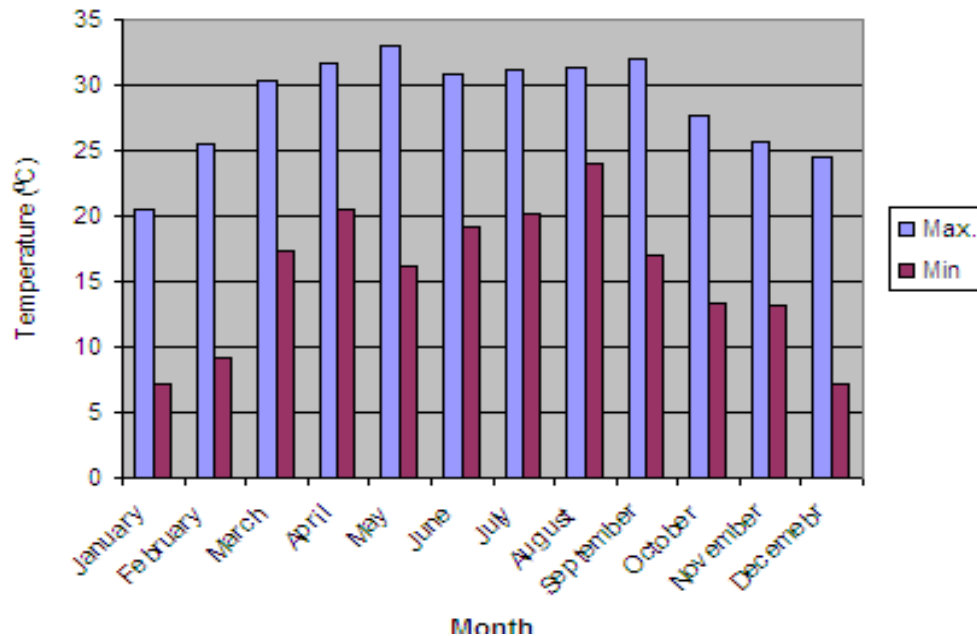


Figure 1. Average monthly temperature under greenhouse.

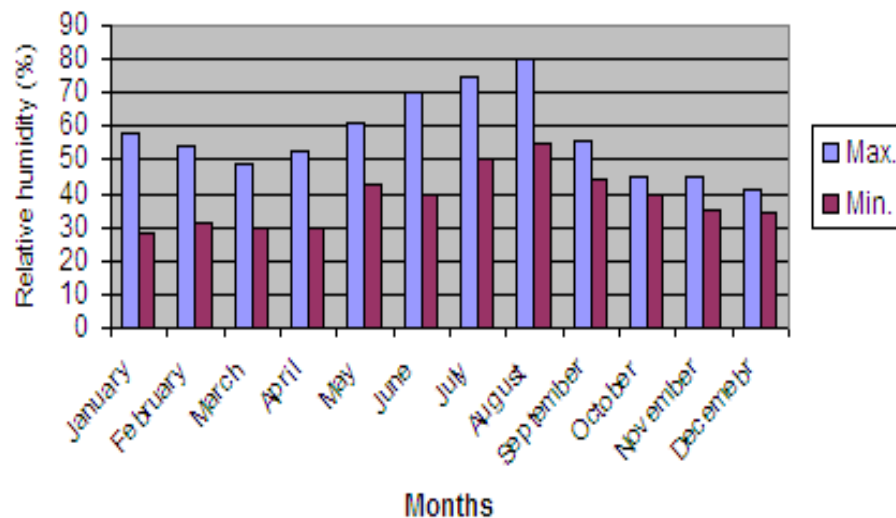


Figure 2. Average monthly relative humidity under greenhouse.

the carnation was reported by Reddy et al. (2004), Ramesh et al. (2002), Singh and Sangama (2003), Naveen et al. (1999), Sathisha (1997) and Gill and Arora (1988).

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REFERENCES

- Ateeque M, Malewar U, More M (1994). Influence of phosphorous and boron on yield and chemical composition of sunflower. *Soils Fert. Abstr.* 57:10373.
- Bhalla R, Sharma S, Dhiman SR, Ritu J (2006). Effect of biofertilizers and bstimulant on growth and flowering in standard carnation (*Dianthus caryophyllus* Linn.). *J. Ornam. Hortic.* 9(4):282-285.
- Bhautkar R (1994). Carnation cultivation in green house under

- Mahabaleshwar condition. J. Maharashtra Agric. Uni. 19:292-293.
- Cochran WG, Cox MC (1992). Experimental design. John Wiley Sons, Inc, New York. pp. 106-117.
- El-Shafei SA (1977). The effect of spacing and fertilization levels on the growth and flowering of carnation. Arch. Fer. Gartenbau 25:347-54.
- Gill APS, Arora JS (1988). Performance of sim carnation under subtropical climate condition of Punjab. Indian J. Hortic. 45:292-93.
- Khanna K, Arora JS, Singh J (1986). Effect of spacing and pinching on growth and flower production of carnation. Indian J. Hortic. 43:148-52.
- Mahesh K (1996). Variability studies in carnation (*Dianthus caryophyllus* L.) M.Sc (Agri.) Thesis, University of Agricultural Sciences, Bangalore, India.
- Narayana GJV, Jayanthi R (1991). Effect of cycocel and Meleic Hydrazide on growth and flowering of African marigold (*Tagetes erecta*). Prog. Hortic. 23(1-4):114-18.
- Naveen KP, Singh B, Siddhu SS, Voleti SR (1999). Effect of growing environment on carnation flowering. J. Ornamental Hortic. 2:139-40.
- Patil RT (2001). Evaluation of standard carnation (*Dianthus caryophyllus* L.) cultivars under protected cultivation M.Sc (Agric.) Thesis, University of Agricultural Sciences, Dharwad, India.
- Patel KS, Arora JS (1983). Effect of pinching, sources and doses of N on growth and flower production of carnation (*Dianthus caryophyllus*) Cv. Marguerite white. Indian J. Hortic. 40: 92-97.
- Ramesh K, Singh K, Reddy BS (2002). Effect of planting time, Photoperiod, GA3 and pinching on carnation. J. Ornament. Hortic. 5:20-23.
- Reddy BS, Patil JRT, Kulkarni BS (2004). studies on vegetative growth, flower yield and quality of standard carnation (*Dianthus caryophyllus* L.) under low cost polyhouse condition. J. Ornament. Hortic. 7(3-4):217-220.
- Ryagi VY, Mantur SM, Reddy BS (2007). Effect of pinching on growth yield and quality of flower of carnation varieties grown under polyhouse. Karnataka J. Agric. Sci. 20(4):816-818.
- Sathisha S (1997). Evaluation of Carnation (*Dianthus caryophyllus* L.) cultivar under low cost green house. M.Sc (Agri.) Thesis. University of Agricultural Sciences, Bangalore, India.
- Singh KD, Sangama (2003). Evaluation of post harvest quality of the some cultivars of carnations flowers grown in greenhouse. J. Ornamental Hortic. 6(3):274-276.
- Singh MK, Baboo R (2003). Response of Nitrogen, potassium and pinching levels on growth and flowering of Chrysanthemum cv. Jayanthi. J. Ornamental Hortic. 6(4):390-93.
- Ubukata M (1999). Evaluation of one half pinch method of spray carnation cultivation in Hokkaido. Bull. Hokkaido Prefectural Agric. Exp. Station. 77:39.
- Yassin G Md, Pappiah CM (1990). Effect of pinching and manuring on growth and flowering of chrysanthemum cv. MDU-1. South Indian Hortic. 38(4):232-233.