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Flowering parameters of carnation (*Dianthus caryophyllus* L.) varieties under protected condition influenced by NPK nutrients through foliar spray

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Abstract

Studies were conducted on the flowering parameters of carnation (*Dianthus caryophyllus* L.) varieties under protected condition influenced by NPK nutrients through foliar spray. The experiment consisted of three varieties with five levels of fertilizers and it was laid out in Factorial Completely Randomized Design (FCRD) with three replications. The results of present investigation on flowering parameters revealed that variety Don Pedro Rapido with nutrient level 6000 N: 4000 P₂O₅: 2000 K₂O ppm recorded significantly maximum harvesting span of flowers, fresh and dry weight of single cut flower, number of petals per flower, minimum days taken to flower bud initiation and minimum days taken to open of first flower.

Keywords: Carnation, nutrients, protected condition, varieties

Introduction

Carnation (*Dianthus caryophyllus* L.) is one of the commercially important cut flowers of the world and ranks second in the cut flower trade after rose. Carnation having great commercial value as a cut flower due to its excellent keeping quality, wide array of colour and forms. Carnation, apart from producing cut flowers can also become useful in gardening for bedding, edging, borders, pots and rock gardens. From medicinal point of view, the carnation flowers are considered to be cardiotoxic, diaphoretic and alexiteric (Shiragur *et al.*, 2004). Plants absorb nutrients through both roots and foliage. Foliar application of nutrients is gaining more importance in fertilization of various field and flower crops. The advantages of the foliar fertilizers were more obvious under growing conditions restricting the absorption of nutrients from the soil, as reported by Verma *et al.* (2003) [30]; on carnation. The application of foliar fertilizer is the quickest way to deliver nutrients to the tissues and organs of the crops.

Materials and methods

The experiment was carried out in polyhouse at Department of Horticulture, College of Agriculture, Junagadh Agricultural University, Junagadh during the year 2013. There were fifteen treatment combinations comprising of three varieties viz., V₁ (Don Pedro Rapido), V₂ (Bacarat) and V₃ (Madame Colette) and five levels of nutrients levels viz., F₁(0 N : 0 P₂O₅ : 0 K₂O ppm) (control), F₂ (1000 N: 600 P₂O₅ : 300 K₂O ppm), F₃(2000 N: 1200 P₂O₅ : 600 K₂O ppm), F₄ (4000 N: 2400 P₂O₅ : 1200 K₂O ppm) and F₅ (6000 N: 4000 P₂O₅ : 2000 K₂O ppm) were allocated in Completely Randomized Design with Factorial concept in three replications. The foliar application of nutrients were applied in the form of urea, mono ammonium phosphate and sulphate of potash for nitrogen, phosphorus and potassium respectively. These sources of nutrients are water soluble and easily available in market. The treatment solutions were applied in five sprays at an interval of 25 days during the growth period which started five days after first pinching of the plants and applied uniformly to the subtending leaves till they were wet with the help of hand sprayer.

Results and discussion

Effect of varieties

This study revealed that flowering parameters like days taken to bud initiation, days taken to open first flower, harvesting span, fresh weight of single cut flower, dry weight of single cut flower and number of petals per flower were differed significantly among the varieties. Significantly maximum harvesting span of flowers (78.58 days), fresh and dry weight of single

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cut flower (18.00 and 1.27 g, respectively), maximum number of petals per flower (74.24) and minimum days taken to flower bud initiation and open of first flower (111.69 and 129.21 DAT, respectively) was observed in variety Don Pedro Rapido (V₁). Such a range of variability in flowering parameters among the varieties is mainly due to early to reach their peak grand growth stage, as a result it flower bud initiated and development was early, hence, flower bud opening was also early. Variation in harvesting span due to genotype of the plant with the influence of environment and other management factors are responsible for increase in harvesting span. The ultimate effect of all these factors resulted into strong and large sized buds and flower and finally increase in fresh and dry weight of flower. Similar variations have also been recorded by Atanassova and Batchvarova (1995) [1], Krishnappa (2000) [8], Mahesh (1996) [10], Naveenkumar *et al.* (1999) [12], Patil (2001) [15], Sahakar and Sable (2003) [18], Reddy *et al.* (2004) [17], Shiragur (2002) [23], Singh and Sangama (2003) [27] and Shiragur *et al.* (2004) [24], Gill and Arora (1988) [4], Sanjay (2004) [19], Simrat (2008) [25] in carnation; Luna (2009) [9] in gerbera and Krishanswaroop (2005) [7] in China aster.

Effect of nutrient levels

This study revealed that, flowering parameters like days taken to bud initiation, days taken to open first flower, harvesting span, fresh weight of single cut flower, dry weight of cut flower and number of petals per flower were differed significantly by spraying different concentration of nutrient levels. Significantly maximum fresh and dry weight of single cut flower (22.35 and 1.36 g), harvesting span of flowers (81.01 days), number of petals (77.08) and minimum days

taken for the early appearance of first flower bud (117.86 DAT) and days taken for the early open of first flower (132.40 DAT) in the treatment F₅ (6000 N: 4000 P₂O₅: 2000 K₂O ppm). Such a range of variability due to optimum availability of the nutrients which are necessary for the synthesis of protein and cytokinin, consequently affect the cell division. Accumulation of carbohydrates coupled with a relatively lesser vegetative growth rate and promotes the translocation of phytohormones to the shoots which probably induce early flower bud differentiation and eventual initiation of flowering. Similar variation in flowering parameters due to the different levels of nutrient concentration was observed previously by Naggar (2009) [11], Papadimitrio and Manios (1984) [14], Starck *et al.* (1991) [29] and Ramesh *et al.* (2002) [16] in carnation; Singatkar *et al.* (1995) [26], Jamwal *et al.* (2008) [6], Gurjar *et al.* (2012) [5], Srinivasa and Reddy (2005) [28] and Dufour and Guerine (2005) [2] in anthurium; Pal and Biswas (2005) [13] in tuberose; Ghule *et al.* (2003) [3] in spider lily; Sehrawat (2003) [20] in gladiolus and Sekar *et al.* (1995) [21] in gerbera.

Interaction effect

Significantly minimum days taken for the appearance of first flower bud and open of first flower (105.53 and 123.46 DAT) was found in V₁F₄ [Don Pedro Rapido + (4000 N: 2400 P₂O₅ : 1200 K₂O ppm)].

From foregoing discussion, it can be inferred that under polyhouse condition for better flowering parameters of carnation the variety Don Pedro Rapido was found best with five spray of nutrients 6000 N: 4000 P₂O₅ : 2000 K₂O ppm at an interval of 25 days after first pinching of the plants.

Table 1: Effect of varieties and nutrients levels on flowering parameters of carnation under protected condition

Treatment details		Days to appearance of first flower bud	Days to open of first flower	Harvesting span (Days)	Fresh weight of single cut flower(g)	Dry weight of single cut flower(g)	Number of petals per flower
A. Varieties (V)							
V ₁	Don Pedro Rapido	111.69	129.21	78.58	18.00	1.27	74.24
V ₂	Bacarat	132.89	142.29	75.00	17.48	1.24	72.60
V ₃	Madame Colette	126.44	139.46	73.34	17.08	1.19	74.08
S.Em.±		0.20	0.32	0.92	0.05	0.02	0.19
C.D. at 5%		0.59	0.93	2.68	0.16	0.04	0.57
B. Nutrients levels (N, P₂O₅, K₂O ppm) (F)							
F ₁	0 : 0 : 0 Control (Water Spray)	129.84	142.61	69.51	14.82	1.08	68.48
F ₂	1000 : 600 : 300	127.06	139.86	72.75	15.62	1.19	73.33
F ₃	2000 : 1200 : 600	123.95	137.04	75.122	16.77	1.25	74.31
F ₄	4000 : 2400 : 1200	119.64	133.02	78.14	18.02	1.27	74.97
F ₅	6000 : 4000 : 2000	117.86	132.40	81.01	22.35	1.36	77.08
S.Em.±		0.26	0.41	1.20	0.07	0.02	0.25
C.D. at 5%		0.76	1.20	3.46	0.21	0.05	0.74
Interaction							
S.Em.±		0.45	0.72	2.07	0.12	0.03	0.44
C.D. at 5%		SIG	SIG	NS	NS	NS	NS
C.V. %		0.64	0.91	4.78	1.27	4.74	1.05

Table 2: Interaction effect of varieties and nutrients levels on days to appearance of first flower bud and days to open of first flower of carnation

Treatment details	Days to appearance of first flower bud	Days to open of first flower
V ₁ F ₁	118.60	135.00
V ₁ F ₂	115.53	131.80
V ₁ F ₃	111.00	129.40
V ₁ F ₄	105.53	123.46
V ₁ F ₅	107.80	126.40
V ₂ F ₁	138.33	146.13
V ₂ F ₂	136.53	143.86
V ₂ F ₃	134.20	142.06
V ₂ F ₄	129.80	140.80
V ₂ F ₅	125.60	138.60
V ₃ F ₁	132.60	146.70
V ₃ F ₂	129.13	143.93
V ₃ F ₃	126.66	139.66
V ₃ F ₄	123.60	134.80
V ₃ F ₅	120.20	132.20
S.Em.±	0.45	0.72
C.D. at 5%	1.32	2.09
C.V.%	0.64	0.91

References

- Atanassova BY, Batchvarova RB. Spray carnation breeding in Bulgaria. *Acta Hort.* 1995; 420:138-139.
- Dufour L and Guerin Nutrient solution effects on the development and yield of (*Anthurium andreaeanum* L.) in tropical soilless conditions. *Scientia Hort.* 2005; 105:269-282.
- Ghule AD, Patil PV, Kantharaju KT. Effect of different levels of nitrogen and phosphorus on growth and flowering of spider lily. *J Maharashtra Agric. Univ.* 2003; 28(2):128-130.
- Gill APS, Arora JS. Performance of Sim carnations under subtropical climatic conditions of Punjab. *Indian J Hort.* 1988; 45(3-4):59-143.
- Gurjar RA, Dhaduk BK, Chawala SL, Alka Singh. Standardization of foliar nutrients (NPK) spray in anthurium cv. Flame. *Indian J Hort.* 2012; 69(3):390-394.
- Jamwal M, Parmar AM, Mishra RL, Singh DB. Effect of foliar application of urea on vegetative growth of gladiolus cv. American Beauty. *Agric-stiinta. Si. Practica.* 2008; 3-4(67-68):21-25.
- Kishanswaroop Singh KP, Saxena NK, Krishan PS. Evaluation of China aster varieties under Delhi condition. *J Orn. Hort.* 2005; 7(1):127-128.
- Krishnappa KS, Shivreddy, Anjanappa. Effect of floral preservative on the vase life of carnation cut flower cultivars. *Karnataka J Agric. Sci.* 2000; 13(2):395-400.
- Luna Barooah, Madhumita Choudhury Talukdar. Evaluation of different gerbera (*Gerbera jamesonii* Bolus ex Hooker F.) cultivars under agro climatic conditions of Jorhat. *Assam J Orn. Hort.* 2009; 12(2):106-110.
- Mahesh K. Variability studies in carnation (*Dianthus caryophyllus* L.). M.Sc. thesis, UAS, Bangalore, 1996.
- Naggar AHE. Response of carnation (*Dianthus caryophyllus* L.) plants to foliar nutrition. *World J Agric. Sci.* 2009; 5(5):622-630.
- Naveenkumar PB, Singh SS, Voleti. Effect of growing environments on carnation flowering. *J Orn. Hort. (New Series).* 1999; 2(2):137-138.
- Pal AK, Biswas B. Response of fertilizer on growth and yield of tuberose (*Polianthes tuberosa* L.) cv. Calcutta Single in the plains of West Bengal. *J Interacademia.* 2005; 9(1):33-36.
- Papadimitriou MD, Manios. Effect of gibberellin GA₃ on outdoor White Sim carnation production. In: Proceeding of 3rd conference on protected vegetables and flowers, 1984, 28-29.
- Patil RT. Evaluation of standard carnation (*Dianthus caryophyllus*) cultivars under protected cultivation. M. Sc. (Agri.) thesis submitted to UAS, Dharwad, Karnataka, 2001.
- Ramesh Kumar, Singh K, Reddy BS. Effect of planting time, photoperiod GA₃ and pinching on carnation. *J Orn. Hort.* 2002; 5(2):20-23.
- Reddy BS, Patil RT, Jhologiker P, Kulkarni BS. Studies on vegetative growth, flower yield and quality of standard carnation (*Dianthus caryophyllus* L.) under low cost polyhouse condition. *J Orn. Hort.* 2004; 7(3-4):217-220.
- Sahakar AW, Sable AS. Evaluation of carnation cultivars under naturally ventilated greenhouse. In: National Symposium on recent Advances in Indian Floriculture. 12-14 November, KAU, 2003.
- Sanjay KD, Abdul Kareem. Introduction and evaluation of carnation (*Dianthus caryophyllus* Linn.) varieties under cold arid region of India. *J Orn. Hort.* 2004; 7(2):207-209.
- Sehrawat SK, Dahiya DS, Sukhbir Singh, Rana GS. Growth, flowering and corm production in gladiolus as influenced by NPK application. *Haryana J Hort. Sci.* 2003; 32(3&4):222-224.
- Sekar K, Dileepkumar M, Mohideen Kader, Kuppaswamy G, Kiran KG. Effect of graded levels of nitrogen and potassium on yield and quality of gerbera (*Gerbera jamesonii* L. Bolus). *Res. Review.* 1995; 53(3):105-113.
- Shahakar AB. Collection, maintenance and evaluation of different varieties of carnation. M.Sc. (Agri.) Thesis, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola, Maharashtra, 2003.
- Shiragur M. Performance of standard carnation (*Dianthus caryophyllus* L.) cultivars under protected conditions for second flush. M.Sc. (Agri.) thesis submitted to UAS, Dharwad, Karnataka, 2002.
- Shiragur M, Shirol AM, Gorabal K, Reddy BS, Kulkarni BS. Evaluation of standard carnation cultivars for their flowering, flower quality and yield parameters under protected cultivation. *J Orn. Hort.* 2004; 7(3-4):206-211.
- Simrat Singh, Ramesh Kumar, Poonam. Evaluation of chrysanthemum (*Dendranthema grandiflora* Tzevlev) open pollinated seedling for vegetative and floral characters. *J Orn. Hort.* 2008; 11(4):271-274.
- Singatkar SS, Sawant, Ranpise SA, Warhal KN. Effect of different levels of N, P and K on growth and flower production of gallardia. *J Maharashtra Agric. Univ.* 1995; 20(3):392-394.
- Singh KP, Sangama. Evaluation of post-harvest quality of some cultivars of carnation flowers grown in greenhouse. *J Orn. Hort.* 2003; 6(3):274-276.
- Srinivasa, Reddy. Effect of fertilizer on growth and flowering in anthurium cv. Chaco. *Progressive. Hort.* 2005; 37:82-84.

29. Starck JR, Lukaszuk, Maciejewski. Effect of fertilizer nitrogen and potassium upon yield and quality of carnations grown in peat and sawdust. *Acta Hort.* 1991; 294:289-296.
30. Verma VK. Response of foliar application of nitrogen and gibberellic acid on growth and flowering of carnation (*Dianthus caryophyllus* L.). *Himachal J Agri. Res.* 2003; 29(1-2):59-64.