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Influence Of Biostimulants In Carnation Under Polyhouse Condition

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ABSTRACT: The preharvest management studies were undertaken to study the effect of pre harvest management in carnation to improve the growth and yield parameters and post harvest techniques at the Department of Floriculture and Landscaping, Horticultural College and Research Institute to elucidate the effect of post harvest qualities of flowers in carnation (*Dianthus caryophyllus* L.) cv. Malaga. In the preharvest treatments, Panchagavya 2 % + Manchurian mushroom tea 4% with RDF (NPK 19:19:19 @ 8g, calcium nitrate 1.5g, potassium nitrate 1.0g, mono potassium phosphate 1.5g, borax 0.5g, magnesium sulphate 2.5g) proved superior in respect of the growth, flowering and yield parameters *viz.*, maximum plant height (85.51 cm), early bud opening (157.76 days), maximum bud length (5.00 cm), highest number of flowers per plant (11.53), longest duration of flowering (80.87 days), maximum stalk length (84.90 cm), maximum number of flowers /m^2 (415.20), minimum calyx splitting (3.18 per cent) and disease incidence (2.42 per cent) and the longest vase life (14.46 days).

Key words: Carnation, Pre harvest Management, biostimulants, growth parameters.

INTRODUCTION

Carnation (*Dianthus caryophyllus* L.), a high value flower which ranks among the top three cut flowers in the global trade is increasingly becoming popular in the domestic market besides establishing external demand. Carnation, being a nutrient exhaustive crop requires regular supply of nutrients in small doses that favours better growth and flower production. Quality of the flower is influenced by the application of nutrients. The recent energy crisis and the hike in the prices of inorganic fertilizers further necessitate the use of organic source. Among the organic source, Panchagavya and Manchurian mushroom tea provide good quality of organic matter, plant nutrients and also acts as biostimulant. Hence in this organic era, at nutrient management needs to be effectively used both in increasing the production and improving the quality and longevity of flowers in view of both environment security and economic feasibility assumes importance in carnation for obtaining quality flowers. In a view of this, the present study on "Studies on the effect of pre harvest management techniques in carnation under polyhouse condition" was undertaken with an attempt to enlighten on the effect of biostimulants on carnation.

MATERIALS AND METHODS

The experiment was carried out at Thummanatty, The Nilgris (Sigaram Self HelpGroup). The experiment was laid out in a Ran domized Block Design with nine treatments and replicated three times with each plot size of 1.0 x 1.0 m. Carnation cv. Malaga, a standard type was chosen for this study. Healthy rooted cuttings were obtained from Florance Flora Floriculture unit, Bangalore. Before planting, the experimental plots were applied with 1 kg vermicompost, 200g neem cake, 3kg farmyard manure, 100 g CAN, 200 g superphosphate, 150g muriate of potash, 50 g magnesium sulphate and 2 g borax per square meter were mixed in the beds and the rooted cuttings were planted at a spacing of 15 X 15 cm. Single pinch method were employed. After pinching, fertigation was scheduled and applied one month after planting.

Schedule A (Monday & Thursday) - 1.5g Calcium Nitrate, 1.0g Potassium Nitrate, 8g of 19:19:19 NPK per square meter. Schedule B (Tuesday & Friday) -1.5g Monopotassium phosphate, 0.5g Borax, 2.5g Magnesium sulphate. Panchagavya and Manchurian mushroom tea were applied as foliar spray in different doses at 15 days interval starting from one month after planting. The treatments were :T_1-Panchagavya @ 2%, T_2-Panchagavya@4%,T_3-Manchurian mushroom tea @2%, T_4-Manchurian mushroom tea @ 4%,T_5- Panchagavya @ 2% +Manchurian mushroom tea @ 2%, T_6- Panchagav

ya @ 2% +Manchurian mushroom tea @ 4%, T_7- Panchagavya @ 4% + Manchurian mushroom tea @ 2%, T_8 Panchagavya @ 4% + Manchurian mushroom tea @ 4% and T_9 - Control. The observations were recorded on ten randomly selected plants every month after planting to harvest. To estimate the strength of the flower stalk, cut flower stalk were held horizontally at a point 25 cm above the base and deviation of the flower head below the horizontal line was recorded and expressed in degrees and the cut flower with deviation less than 15^o was kept under A grade. The experiment was conducted to study the effect of preharvest management techniques in carnation under polyhouse condition.

RESULTS AND DISCUSSION

Growth parameters

The increased vegetative growth was observed in the treatment Panchagavya @ 2% +Manchurian mushroom tea @ 4% which recorded the maximum plant height (85.51 cm), number of leaves per plant (386.5) and number of laterals (11.53) and showed a marked increase in height all over the stages of observations (Table 1). This may be due to cell division and rapid increase in cell expansion as nitrogen plays an important role in cell division, which ultimately results in maximum vegetative growth as reported by Lale *et al*. (2003) and Patel (1998) in Golden rod. In addition to inorganic application, this foliar spray enhanced the growth rate of plants since it contains favourable micro and macronutrients, growth hormones and bio fertilizers in the liquid formulation. The observations of the present investigation are similar with the earlier reports of Thamaraiselvi (2001) in rose and Waheeduzzama (2004) in anthurium. Increase in number of laterals might be due to varying factors like combined application of organic and inorganic fertilizers with foliar spray of biostimulants might have been a determining factor for the production of more cytokinin would have led to an increase in number of laterals as reported by Hunmili and Paswan (2003) in Gerbera. The early bud initiation (127.33 days) was recorded in the treatment Panchagavya @ 2% + Manchurian mushroom tea @ 4% and early flowering (157.76 days). Earliness of flowering is a vital character apart from the other quality aspects and the deciding factor in clinching the market. Days taken for first flowering, indicates the potential of the plant for early yield. The commencement of early flowering might be due to foliar application of nutrients being a constituent of proteins, amino acids, nucleic acid, various enzymes and coenzymes which are associated with the increased shoot length and leaf area resulted in more photosynthesis and thus increased the transformation of manufactured food material from source (leaf) to sink (flower bud) as by the reports of Beniwal *et al*. (2005) in chrysanthemum.

A desired cut flower must have long stalk and good vase life to meet the attitudes and traditions of different markets with those flowers with stalk length more than 55 cm as 'A grade'. The increase in stalk length (84.90 cm), stem girth (0.75 cm) and flower stalk weight (30.84 g) was higher in the treatment Panchagavya @ 2% +Manchurian mushroom tea @ 4%. This might be due to auxin being elemental that resulted in increased cell division and cell elongation as the production of auxin in panchagavya application resulted in cell enlargement due to plasticity of cell wall. This reduces the wall pressure around the cell wall and turgor pressure caused by osmotic forces in the vascular sap which led to entry of water into the cell resulting in cell enlargement and thereby resulted in improved floral characters as observed by Gayathiri (1997) in carnation. Also increase in stem girth might be due to the increased availability of nutrients and effective utilization of nutrients by the stem especially nitrogen, due to the nourishment of nitrate and nitrite by the organic spray resulted in stem thickness (Cox and Reisenaur, 1973). Flower stalk weight increase might be due to the carbohydrate serves as energy source for growing bud, flower opening and longevity. The ultimate effect of all these factors resulted into strong and long flower stalk, large sized buds and flowers and finally increase in stalk weight was observed by (Kumar *et al.*, 1999) in carnation and (Beniwal *et al*., 2005) in chrysanthemum.

Yield parameters

A maximum bud length (5 cm) and bud circumference (8.67 cm) was recorded in the treatment Panchagavya @ 2% +Manchurian mushroom tea @ 4%. Enlargement of flower size was caused by drawing photosynthates to the flower as a consequence of intensification of sink due to foliar spray of panchagavya along with inorganic fertilizers, as it would have carried beneficial microbes produced during fermentation that helped in the synthesis of growth promoting substances. Similar results were interpreted by Muthamizhselvi (2006) in chrysanthemum.

The number of flowers per/m^2 with stem length more than 55cm was recorded in the treatment Panchagavya 2% + Manchurian mushroom tea 4% with 410.7 flowers/m^2 lie under A grade of the total number of flowers (415.20/m^2). Since, there was an improvement of anabolic activities as well as modification and redistribution of organic manures and inorganic fertilizers. Immediately after the onset of reproductive process, the vegetative growth might have led to further development. These results were also confirmed with the findings of Beniwal *et al*. (2005) in chrysanthemum. Even though more number of petals was present in the flowers this treatment exhibited less calyx split showing the compactness of the bud.

The study revealed that maximum vase life of 14.46 days in the treatment Panchagavya 2% + Manchurian mushroom tea 4% as against the control with minimum vase life of 10.00 days. The flower remained fresh for a longer period due to greater mobilization of assimilates towards the reproductive organs. This variation in vase life among the treatments might be attributed to variations in ability to produce ethylene, accumulation of carbohydrates and sensitivity to it among the treatments. Addition of organic manures altered the nutrient availability and water release pattern of the soil. As a result, slow and steady release of nutrients and moisture to the plant would have helped in maintenance of turgor in the leaf and flower would favourably extend the shelf life of carnation as reported by Kumar *et al.* (1999).

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Table 1. Mean performance of growth and flowering parameters in Carnation cv. Malaga

Treatments	Plant height (cm)	Number of leaves per plant	Number of laterals per plant	Flower bud initation (days)	Flower stalk length (cm)	Flower stalk girth (cm)	Bud length (cm)	Bud circumference (cm)
T1	77.62	271.27	7.47	129.57	77.11	0.75	4.13	8.11
T2	82.05	348.70	8.33	129.20	81.85	0.62	3.67	8.59
T3	78.56	287.75	8.07	131.07	76.68	0.72	3.67	7.61
T4	76.89	296.47	9.03	130.67	77.50	0.62	3.77	7.61
T5	80.37	280.62	7.90	134.23	78.61	0.60	3.93	8.25
T6	85.51	386.50	11.53	127.33	84.90	0.75	5.00	8.67
T7	81.43	315.35	8.40	132.00	80.92	0.72	3.93	7.45
T8	80.89	345.43	10.43	129.17	79.59	0.75	3.95	7.57
T9	77.3	209.77	7.23	136.23	75.78	0.48	3.12	6.93
SEd	0.94	3.630	0.19	131.05	0.54	0.02	0.06	0.05
CD at 5%	1.98	6.420	0.42	0.866	1.15	0.04	0.13	0.09

Table 2. Mean performance of yield parameters and economics in Carnation cv. Malaga

Treatments	Number of flowers per plant	Vase life (days)	Weight of the flower stalk (g)	Number of flowers/m^2	Gross return (Rs/ha)	Net return (Rs/ha)	B:C ratio
T1	7.47	10.63	21.83	268.80	324908	213638	2.92
T2	8.33	10.40	27.50	300.00	309622	197032	2.75
T3	8.07	12.26	26.21	290.40	330044	217784	2.94
T4	9.03	12.60	25.67	325.20	362400	249150	3.20
T5	7.90	12.36	24.72	284.40	377152	264232	3.34
T6	11.53	14.46	30.84	415.20	426023	312113	3.74
T7	8.40	12.60	27.54	302.40	352098	238518	3.10
T8	10.43	13.00	25.85	375.60	389538	274968	3.40
T9	7.23	10.00	21.95	260.40	238410	126480	2.13
SEd	0.20	0.100	25.79	313.60			
CD (0.05)	0.42	0.220	0.560	5.766			