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Original Research Article

Effect of Plant Growth Regulators on Vase Life of Marigold cv. Calcutta Marigold under Konkan Conditions

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A B S T R A C T

The present study entitled, "Influence of plant growth regulators on growth and yield of marigold (*Tagetes erecta* L.) under Konkan conditions" with cv. Calcutta Marigold was carried out at College of Horticulture, Dapoli research farm during the *rabi* season during 2019-20. The experiment was laid out in Randomized Block Design with nine treatments replicated thrice. The treatments applied were GA_3 (100 ppm and 200 ppm), TRIA (20 ppm and 30 ppm), CCC (4000 ppm and 5000 ppm) and NAA (10 ppm and 20 ppm) along with control. Regular common cultural practices were adopted during the experimental trial. Observations were recorded on five randomly selected plants from each plot and data was compiled to see the effect on vase life due to different treatments. The maximum vase life (7.87) and (7.80) was noticed in treatment of TRIA @ 30 ppm and TRIA @ 20 ppm respectively as compared to other treatments and control.

Introduction

The flowers are the natures beloved gift to human being. Flowers are recognized as a token and symbol of love, respect, purity, beauty, peace and passion. The flowers play major role to please the god and beloved ones.

The importance of flowers in the sociocultural and religious lives of the people is absolutely immense and can hardly exaggerate. Flowers have traditional use as well as significance in India. Many flowers are medicinally important and used in various pharmaceuticals for harvesting essential oils, honey and preparation of numerous medicines. In India, floriculture industry is growing day by day both in terms of area as well as production. In India, the area under cultivation of floriculture is about 3,39,000 hectors with the production of 19,91,000 tonnes loose flowers and 8,67,000 tonnes of cut flowers (Anonymous, 2019).

With the export of 19726.57 MT of floriculture produce worldwide with the net income of Rs. 571.38 crores (Anonymous,

2019). Maharashtra state has about 5,485 ha area under different flower crops with a production of 29,080 MT of loose flowers and 56,990 MT of cut flowers (Anonymous, 2019).

Konkan is narrow strip of land situated along the bank of Arabian Sea at West and Sahyadri mountains range in east that has got distinct Agro-climatic condition than rest of Maharashtra.

The non-traditional Konkan region, has only 528 ha area is under different flower crops with a production of 3140.95 MT (Anonymous, 2019).

African marigold (*Tagetes erecta* L.) belongs to family Asteraceae. Marigold flowers are single and fully double with large globular heads. The florets are either 2-lipped or quilled. Flower colour varies from lemon yellow to yellow and golden yellow to orange.

The flower has habit of free flowering, short duration to produce flowers, wide spectrum of attractive colours, shape, size and also good keeping quality (Shirsath *et al.,* 2017). The loose flowers are mostly used during religious festivals and also for worshiping, garland making, decoration purpose, extraction of essential oils, perfumes, pigments and dyes.

The plant growth regulators (also known as plant bioregulators) are compounds used to alter the growth of a plant or a plant part. The use of plant growth regulators to increase the productivity of horticulture crops is very common.

Among the plants growth regulators, gibberellins (GA) are the most widely used and proven growth regulators in horticulture crops. Among the gibberellins, GA_3 influences a range of development processes like germination, breaking dormancy, stem elongation, flowering, enzyme induction, leaf and flower senescence, etc. (Brian, 1959) and (Gupta and Chakrabarty, 2013). The plant growth regulator triacontanol (TRIA) has a great role in enhancing growth, yield, photosynthesis, nitrogen fixation, enzymatic activities and level of free amino acids, reducing sugars and soluble proteins.

TRIA application increases plant growth, the number of inflorescences and the quality of flower in Chrysanthemum (Skogen *et al.,* 1982) and (Naeem *et al.,* 2012). 1-Naphthalene acetic acid i.e., NAA is a plant growth regulator used for thinning in horticulture crops as well as used for root formation (Widayani and Ansari, 1990 and Khandekar *et al.,* 2017). Cycocel (2-Chloroethyl trimethyl ammonium chloride) i.e., CCC an anti-gibberellin gives dwarfing effect and restricts the growth of the internodes and regulates the plant physiology (Cockshull and Emden, 1969 and Bhat *et al.,* 2011).

Keeping in view the scope and increased demand of African marigold (*Tageteserecta* L.) flowers, the present investigation was undertaken to evaluate the effect of different plant growth regulators on vase life of marigold flowers.

Materials and Methods

The present investigation was conducted during *rabi* season, of the year 2019-20 at Department of Floriculture and Landscape Architecture, College of Horticulture, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli to elucidate information on effect of different growth regulators on vase life of marigold. This experiment was carried out in randomized block design (RBD) replicated thrice with 9 treatments.

The crop African marigold variety Calcutta Marigold was taken for the study with the treatments.

The stock solution of $GA_3$was prepared before actual application of treatments. For preparing 1000 ml of stock solution, 1 g GA_3 was added and dissolved in 10 ml of NaOH solution and then this solution was transferred into one litre of volumetric flask and then total volume one litre was prepared with distilled water.

For preparation of concentration of 100 ppm GA_3 solution, 100 ml of stock solution was taken in volumetric flask and 1 lit volume was made up by using distilled water. By adopting similar procedure, the 200 ppm GA_3 solution was prepared.

The remaining three plant growth regulators (PGR) were available in liquid form; therefore, these were dissolved in distilled water. Accordingly, different concentrations were prepared.

The following method was used for vase life observations

Five flowers were randomly selected from each treatment at full bloom stage. The selected flowers were cut along with the stalk of 5 cm length.

The lower leaves were removed to avoid the transpiration losses and then the cut flowers were immediately kept in glass bottles with distilled water. The number of days was recorded upto which the flowers remained in fresh condition.

Results and Discussion

The maximal vase life of marigold was noted in flowers treated with T_4 - TRIA @ 30 ppm (7.87 days) and was at par with T_3 - TRIA @ 20 ppm (7.80 days), T_2 - GA_3 @ 200 ppm (7.70 days). It was then followed by T_1 - GA_3 @ 100 ppm (7.50 days) and T_9 - Control (7.13 days) (Table 1).

The treatments T_8 - NAA @ 20 ppm (6.87 days) and T_7 - NAA @ 10 ppm (6.77 days) were on par with each other. The minimal vase life was observed in T_6 - CCC @ 5000 ppm (6.40 days) which was at par with T_5 - CCC @ 4000 ppm (6.33 days).

The vase life is a quality parameter of the cut flowers from market point of view. Along with the moisture content, the vase life and keeping quality of flowers may be related to effect and action of different treatment of PGRs.

Higher vase life is essential for reducing the post-harvest losses. The effect of PGR is much visible on vase life of flowers. The table 2 represents the data on vase life of marigold. The influence of different PGRs on the flower vase life or storage life of marigold is significantly shown in the data given below. Among the various concentrations and PGR, remarkably highest vase life of flowers was achieved by plants treated TRIA @ 20 and 30 ppm, followed by GA_3 and NAA. The lowest vase life was noticed in CCC treated plants.

The results obtained by TRIA treatment on vase life was close to the observation of Wuryaningsih *et al.,* (1997) on rose, Deshmukh (2000) on marigold. Maximum average shelf life of marigold was recorded in GA_3 treated flowers. These results were in conformity with Patel (1998), Dabas (2000) and Dobaria (2012). Pandya (2000) recorded that CCC treated flowers had improved vase life, while Wadgave (2016) put forth that CCC and NAA treated plants have significantly improved vase life of marigold flowers.

Table.1 Plant growth regulator solutions were prepared as follows

Chemicals	Conc.	Chemical used in ml	Water used in ml
Triacontanol 0.1 % W/W	20 ppm	20	980
Triacontanol 0.1 % W/W	30 ppm	30	970
CCC 50 % SL	4000 ppm	08	1000
CCC 50 % SL	5000 ppm	10	1000
NAA 4.5 % SL	10 ppm	0.24	1000
NAA 4.5 % SL	20 ppm	0.48	1000

Table.2 Effect of plant growth regulators on vase life of marigold cv. Calcutta Marigold

Treatments	Treatment details	Vase life
T_1	GA_3 @ 100 ppm	7.50
T_2	GA_3 @ 200 ppm	7.70
T_3	TRIA @ 20 ppm	7.80
T_4	TRIA @ 30 ppm	7.87
T_5	CCC @ 4000 ppm	6.33
T_6	CCC @ 5000 ppm	6.40
T_7	NAA @ 10 ppm	6.77
T_8	NAA @ 20 ppm	6.87
T_9	Control	7.13
	Mean	7.15
	S. Em. ±	0.06
	C.D. at 5%	0.17

From these studies, it could be concluded that marigold plant cv. Calcutta Marigold can be successfully grown with increased flower quality and increased vase life/shelf life when treated with Triacontanol PGR.

References

Anonymous (2019). Statistic Report of Area and Production by National Horticultural Board, Horticulture Statistic Division, Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Government of India.

Anonymous (2019). Statistic Report of Floriculture Export, Agril. and Processed Food Products Export Development Authority (APEDA - 2018-19), Ministry of Commerce and Industry, Government of India.

Anonymous (2019). Statistic Report of Horticulture Crops presented in research review meeting of Dr. BSKKV, Dapoli, 2019.

Bhat, M. A., Tahir, I., Shahri, W. and Sheikh, T. I. (2011). Effect of Cycocel and B-nine (growth retardants) on growth and flowering of *Erysium marshallii* (Henfr.) Bois. *Journal of Plant Science,* Volume 6 (2): 95-101.

Brian, P. W. (1959). Effect of gibberellins on plant growth and development. Biological Reviews. 34, (1).

Cockshull, K. E. and Emden, H. F. (1969). The effect of foliar application of (2-Chloroethyl)-trimethylammonium

chloride of leaf area and dry matter production by the brussels sprout plant. *Journal of Experimental Botany*, Vol. 20, (3), 648-657.

Dabas, H. K. (2000). Effect of growth regulators on growth, flowering and flower yield of African marigold (T*agetes erecta* L.). Thesis Master of Science, Indira Gandhi Krishi Vishwa vidyalaya, Raipur., pgs. 128.

Deshmukh, S.K. (2000). Effect of pinching and Triacontanol on growth, quality and yield of African Marigold (T*agetes erecta* L.) cv. Pusa Narangi Gainda. Thesis Master of Science, J.N.K.V.V. Jabalpur. pgs. 112.

Dobaria, P. D., (2012). Effect of plant growth regulators on vegetative growth, flowering and yield of marigold (*Tagetes erecta* L.) cv. Pusa Narangi Gainda. M.Sc. Thesis JAU, Junagadh. Pg – 116.

Gupta, R. and Chakrabarty, S. K. (2013). Gibberellic acid in plant. Published online on *Plant Signal Behav*. 8(9): e25504.

Khandaker, M. M., MohZuraini, Rasdi M.D., Naeimah Nik Nur, Nashriyah Mat. (2017). Effects of Naphthalene Acetic Acid (NAA) on the plant growth and sugar effects of the cut flowers *MokaraCharkKaun* Orchid. *Bioscience Journal*, 33 (1): 19-30.

Naeem, M. M. Masroor A. Khan, Moinuddin, A. S. (2012). Triacontanol: A potent plant growth regulator in agriculture. *Journal of Plant Interactions*, 7 (2): 129-142.

Pandya, P. N. (2000). Effect of growth regulators on growth, yield and vase life of African marigold (*Tagetes erecta* L.) cv. 'Lemon Yellow'. MSc. Thesis. AAU, Anand. pgs – 73.

Patel, J. K. (1998). Effect of plant growth regulators on vegetative and reproductive growth of French marigold (*Tagetes patula* L.) var. "Local". MSc. thesis. Department of Horticulture N. M. College of Agriculture, Navsari Agricultural University. Pgs -120.

Shirsath, H. L. and Bhosle, A.V. (2017). Marigold cultivation guide for farmers. Article submitted to IndiaAgroNet.com.

Skogen, D., Erisken, A. B. and Nilsen, S. (1982). Effect of triacontanol on production and quality of flowers of *Chrysanthemum morifolium* Ramat. *Scientia Horticulturae*, 18 (1): 87-92.

Wadgave, A. R. (2016). Effects of pinching and plant growth regulators on growth and yield of African marigold (*Tagetes erecta* L.) cv. Calcutta Orange in Krishna Command Area MSc thesis submitted to University of Horticultural Sciences, Bagalkot.

Widayani, H and Ansori, N. (1990). Effect of plant growth regulator IBA and NAA on growth and flowering of *chrysanthemum morifolium*. *Buletin Agronomi (Indonesia).* 19 (2): 17-23.

Wuryanigsih and Kusumo, S. S. (1997). Application of triacontanol to improve yield and quality of rose flower. *Journal Horticultural (Indonesia).* 7(2): 673-677.