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Effect of Growth Regulators on Flower Quality Parameters in African Marigold cv Culcatta Orange

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A B S T R A C T

An experiment was carried out during winter season in Department of Floriculture and Landscape Architecture, University of Horticultural Sciences, Bagalkot. The experiment was conducted in randomized block design with 5 treatments or growth regulators of different concentrations along with one control as water spray. Gibberellic acid (G_1- GA_3 at 200 ppm), NAA (G_2- at 60 ppm), Cycocel (G_3- CCC at 1000 ppm) and TIBA at 1000 ppm (G_4) replicated thrice to evaluate the effect of these plant growth regulators on flower quality parameters like flower diameter, individual weight of the flower and vase life was varied significantly due to various growth regulators. Flower quality parameters were best in the plants sprayed with GA_3 at 200 ppm. In the present study maximum chlorophyl and xanthophyll contents were noticed in the plants sprayed with the GA_3 at 200 ppm, followed by CCC at 1000 ppm in various crop periods.

Introduction

Marigold (*Tagetes erecta* L.) is an important commercial flower in India belongs to family *Asteraceae* (Compositae). It is very popular due to easy to grow and wider adaptability. In India, African marigold flowers are sold in the market as loose for making garland. Flowers are traditionally used for offering in temple, churches and used in festival for beautification of landscape (Dahiya and Rana, 2001). It is highly suitable for making flower beds in herbaceous border and also found ideal for newly planted shrubberies to provide colour and fill the gap in landscape. Both leaves and flowers possess medicinal values. Growth regulators find their extensive use in ornamental crops for modifying their developmental process. Plant growth regulators play an important role in flower production, which in small amount promotes or inhibits or quantitatively modifies growth and development. Gibberellic acid increased to be very effective in manipulating flower quality in marigold (Anonymous., 2012; Mithileshkumar *et al.,* 2014). The experiment was carried out to assess the optimum concentration of various growth regulators to cause beneficial effect on flower quality of marigold.

Material and Methods

The present experiment was conducted at the in the experimental field of Department of Floriculture and Landscape Architecture, University of Horticultural

Sciences, Bagalkot, during the year 2015-16. The experiment was laid out in randomized block design (R.B.D.). All treatments were randomly allocated among the plot and replicated five times. Four growth regulators namely gibberellic acid (G_1- GA_3 at 200 ppm), NAA (G_2- at 60 ppm), cycocel (G_3- CCC at 1000 ppm) and TIBA at 1000 ppm (G_4) were taken.

These four growth regulators along with one control (G_0- water spray), were taken for both the growth regulators. The marigold cultivar Calcutta Orange seedlings used for the experiment were collected from C.S. Biradar nursery, Ghataprabha.

One month old, healthy, uniform seedlings were used for transplanting. Seedlings were planted at a spacing of 60 x 45 cm and light irrigation was given soon after transplanting.

The operation of transplanting was carried out in the afternoon followed by a light irrigation to allow for proper establishment of seedlings. Well decomposed FYM @ 20 tonnes per hectare was applied at the time of land preparation. The recommended dose of fertilizer 225:60:60 kg NPK/ha (Anon, 2012). Seven and ten days after transplanting the gap filling was done twice with fresh seedling, in order to maintain 100 per cent plant population in each plot. Hence for whole experimental site necessitated 3L of growth regulator spray of mentioned concentration which are prepared out of respective stocks and diluted for 3L volume with distilled water. Only control treatment plot was water sprayed. The spraying was done in the morning hours with the help of hand sprayer.

Three spraying were done, first spray one week after transplanting, second spray 15 days after first spray and third spry 15 days after second spray.

Observations were recorded at 45 and 90 days after transplanting. The various flower quality parameters like flower diameter, individual weight of the flower and vase life, maximum chlorophyll xanthophyll contents were recorded for observation.

Results and Discussion

Flower Quality Parameters

Among the growth regulator sprays, the treatment GA_3 at 200 ppm (G_1) recorded significantly highest weight of flowers (8.30 g) which was followed by G_2 (7.35 g) and G_3 (6.90 g) but lowest weight of flower was obtained in G_0.Among the growth regulator sprays, the treatment GA_3 at 200 ppm (G_1) recorded significantly highest flower diameter (6.75 cm) which was followed by G_3.

Favorable effect of application of gibberellins on number of flowers and flower diameter is due to improved physiological efficiency, selective ion uptake, sufficient water uptake causing high rate of accumulate deposition.

Similar results and observations were reported by Rani and Singh (2013) in tuberose. Among the growth regulator sprays, the treatment GA_3 at 200 ppm (G_1) recorded significantly maximum shelf life of flowers (7.10) which was followed by G_2 (6.54). However, lowest shelf life of flower was obtained in G_0 (5.03) G_2 (6.40 cm) and G_3 (6.30 cm) but lowest flower diameter was obtained in G_0 (5.35 cm).

This enhanced vase life of flower stalks treated by GA_3 might be due to the enhanced efficiency of plants and better mobilization of metabolites under direction of growth substance (Sateesh, 1995; Sarhan and Sayed, 1983 in Snapdragon). The treatment GA_3 at 200 ppm (G_1) recorded significantly maximum total chlorophyll content (1.60 mg/g of leaf) which was followed by G_3 (1.19 mg/g of leaf).

However, lowest total chlorophyll content was obtained in G_0 (0.80 mg/g of leaf). Among the growth regulator sprays, the treatment GA_3 at 200 ppm (G_1) recorded significantly maximum xanthophyll content of flower (7.60 mg/g of flower) which was followed by G_3 (6.95 mg/g of flower) and G_2 (6.48 mg/g of flower). However, lowest total xanthophyll content of flower was obtained in G_0 (3.94 mg/g of flower).

As the chlorophyll content in leaf increases, anthocyanin content in petal also increases with application of GA_3 at 200 ppm, thus increased chlorophyll and xanthophyll content in marigold leaf and flowers, mainly influenced by GA_3 application. Similar results were reported by Anuradha and Ravikumar, (1998).

Spraying of GA_3 (200 ppm) or NAA (60 ppm) at 40 days after transplanting was found to be beneficial for obtaining higher flower yield and quality in African marigold cv. Calcutta Orange.Thus it was concluded that sparying with GA_3 at 200 ppm will result in better growth and yield and flower quality in african marigold.

Table.1 Effect of plant growth regulator flower quality parameters of marigold cv. Calcutta Orange

Treatments	Weight of flower (in g)	Flower diameter (in cm)	Shelf life of flower	Total Chlorophyll (mg/g leaf)	Xanthophyll content of the flower (mg/g)
Growth regulators					
G_0	4.70	5.35	5.03	0.80	3.94
G_1	8.30	6.75	7.10	1.60	7.60
G_2	7.35	6.40	6.54	1.05	6.48
G_3	6.90	6.30	6.03	1.19	6.95
G_4	5.48	5.80	5.76	0.81	4.53
SE.m±	0.27	0.16	0.40	0.09	0.35
CD at 5 %	**0.80**	**0.50**	**1.19**	**0.28**	**1.04**

Data Availability

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Declarations

Ethical Approval: Not applicable.

Consent to Participate: Not applicable.

Consent to Publish: Not applicable.

Conflict of Interest: The authors declare no competing interests.

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