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EFFECT OF PLANT GROWTH REGULATORS ON FLOWERING AND YIELD ATTRIBUTES OF AFRICAN MARIGOLD (*TAGETES ERECTA* L.) CV PUSA NARANGI GAINDA

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Abstract

A field experiment was carried out during winter season of 2012 at the Main Experiment Station, Department of Horticulture, Narendra Deva University of Agriculture & Technology, Narendra Nagar (Kumarganj), Faizabad, U.P., India. The experiment was conducted in randomized block design with ten treatments comprising of 3 levels each of GA_3 (100, 200, 300 ppm). Ethrel (200, 300, 400 ppm) and Maleic hydrazide (200, 300, 400 ppm) replicated thrice to evaluate the effect of plant growth regulators on flowering attribute and yield characters in African marigold. Among all the treatments GA_3 300 ppm resulted in the early flower bud initiation, opening of first flower and maximum duration of flowering, flower stalk length, number of flowers per plant weight of flower, weight of flower per plant and flower yield per hectare followed by GA_3 200ppm.

Key words : Plant growth regulator, flower yield, flowering characters, marigold.

Introduction

Marigold (*Tagetes erecia* 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 churches, temple and used in festival for beautification of landscape. 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 posses 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 growth and flowering in chrysanthemum (Gautam *et al*., 2006). Ethrel retard plant height, number of nodes and internodal length, increase branching and delayed flowering (Sachs, 1961). Maleic hydrazide is also axillary bud controller and retards growth of plants. The experiment was carried out to know the optimum concentration of various growth regulators to cause beneficial effect on growth and flowering behaviour of marigold.

Materials and Methods

The experiment was conducted during winter season of 2012-13 at Main Experiment Station, Horticulture, N.D. University of Agriculture & Technology Kumarganj, Faizabad (Uttar Pradesh), India. Recommended doses of NPK and other inputs were applied at appropriate time. The treatments comprising of three doses each of GA_3 (100,200 and 300 ppm) Ethrel (200,300 and 400ppm) and MH (200,300 and 400ppm). Spraying of growth regulators were done 30 days after transplanting. The experiment was laid out in a randomized block design with three replication having a plot size of 2.0 × 2.0 m. Twenty days old seedling of African marigold (*Tagetes erecta* L.) cv. Pusa Narangi Gainda were planted at a distance of 40 × 40 cm. The important flowering characters viz. days taken to first flower bud initiation, days taken to opening of first flower, duration of flowering, length of flower stalk (cm), diameter of flower (cm), number of flower per plant and yield characters such as weight of flower (g), flowers yield per plant (g) and flower yield per hectare (q) were recorded in five randomly

Table 1 : Effect of plant growth regulators on flowering characters of marigold.

Treatments	Days taken tofirst flower bud initiation	Days taken to opening of first flower	Duration of flowering (Days)	Length of flower stalk (cm)	Number of flowers per plant	Diameter of flower (cm)
T_1 - Control	5S.73	99.40	36.20	7.47	45.13	6.74
T_2 - GA_3(100ppm)	53.93	91.67	46.33	7.67	50.60	7.15
T_3 - GA_3(200ppm)	49.00	91.47	47.40	7.93	56.60	8.00
T_4 - GA3 (300 ppm)	48.00	89.87	50.47	8.95	60.33	8.73
T_5 - Ethrei (200 ppm)	58.20	101.73	43.00	8.00	46.93	7.43
T_6 - Ethrei (300 ppm)	60.67	104.67	43.47	7.63	49.60	7.50
T_7 - Ethrei (400 ppm)	71.33	111.47	45.93	7.33	50.80	7.58
T_8 - MH (200 ppm)	61.53	100.60	39.33	8.00	46.60	7.77
T_9 - MH (300 ppm)	62.20	103.53	40.33	7.89	48.10	7.62
T_{10} - MH (400 ppm)	65.53	114.53	41.80	7.50	50.00	7.10
S.Em.±	2.66	2.53	1.04	0.24	2.35	0.54
CD at 5%	7.92	7,53	3.11	0.79	6.98	1.60

Table 2 : Effect of plant growth regulators on yield attributes of marigold.

Treatments	Weight of flower (g)	Flower yield per plant (g)	Flower yield per hectare (q)
T_1 - Control)	9.27	418.35	209.17
T_2 - GA_3(100ppm)	10.87	550.02	275.01
T_3 - GA_3 (200 ppm)	11.07	623.57	311.78
T_4 - GA_3 (300 ppm)	13.13	792.13	396.06
T_5 - Ethrel (200 ppm)	10.67	500.74	250.37
T_6 - Ethrel (300 ppm)	10.90	540.64	270.32
T_7 - Ethrel (400 ppm)	11.00	558.80	279.40
T_8 - MH (200 ppm)	11.00	512.60	256.30
T_9 - MH (300 ppm)	10.95	526.69	263.34
T_{10} - MH (400 ppm)	10.73	536.50	268.25
S.Em.±	0.54	24.67	12.13
CD at 5%	1.60	73.32	36.04

selected plants per replication in each treatment. The data were analyzed by method suggested by Fisher and Yates (1949).

Results and Discussion

All the parameter were influenced significantly due to various plant growth regulators (table 1). Earliest bud initiation and flowering was observed with the application of GA_3 300 ppm. Gibberellins reduces juvenile period and with the termination of juvenile phase, the shoot apical meristem instead of producing leaves and branches start producing buds. Similar finding were also reported by Dahiya and Rana (2001). Minimum number of days taken to opening of first flower was observed with the application of GA_3 300 ppm. GA_3 was found most effective in extending the flower duration (50.47 days) especially with GA_3 300 ppm. It might be due to advanced stage of flowering in marigold. Dutta *et al*. (1998). Significantly maximum flower stalk length (8.95 cm) and flower diameter were recorded with foliar spray of GA_3 300 ppm. The increment in stalk length and flower diameter might be due to enhanced cell division and cell enlargement, promotion of protein synthesis coupled with higher dry matter of apical dominance (Dalai *et al*., 2009). Similar result was also reported by Tyagi and Kumar (2006). Maximum number of flowers per plant were recorded with application of GA_3 300 ppm (60.33). The enhancement in number of flowers per plant might be due to the production of large number of laterals at early stage of growth which had sufficient time to accumulate carbohydrate for proper flower bud differentiation due to enhanced reproductive efficiency and photosynthesis restrictive plant type. The result was in close conformity with Sunitha *et al*. (2007).

Weight of flower was reported significantly maximum (13.13g) with application of GA_3 300 ppm (table 2). Significantly maximum weight of flower, yield of flower per plant and flower yield per hectare were recorded with foliar application of GA_3 300 ppm. Verma and Arha (2004) and Devadanam *et al*. (2007) also observed maximum flower yield per hectare with GA_3 treatment in African marigold.

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