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Effect of plant growth substances on growth and flowering attributes of African marigold (*Tagetes erecta* Linn.)

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Floriculture is now emerging as an important venture in the world, especially as a potential money spinner. Many flowers and ornamental plants grown for domestic as well as for export market provide more returns per unit area than other horticultural crops. Marigold (*Tagetes sp.*) is on annual flowers to cultivate easily and have wide adaptability to different soil and climatic conditions. It belongs to family Compositeae and native of India. It has a great economic potential for loose flower trade. It is especially used for making garland, decoration and induced in landscape plans due to its variable height and colour. Marigolds have also great medicinal importance *i.e.* leaf extract is good remedy for ear-ache and flower extract is used as blood purifier and against bleeding piles. Besides, it is also found important in controlling nematodes because, it produce *thiophenes,* which are naturally occurring biocides. Application of plant growth substances showed tremendous potential in modulating growth and related processes. They are considered bio-soft wards, which elicit rapid as well as long term responses in crop plants (Yadav *et al.*, 1994 and Malik *et al.*, 1996). NAA is an important growth substance, which stimulates the cell division, cell enlargement and cell elongation in apical region. BA and kinetin are cytokinin which has been found essential for growth and development of plant organs, retention of chlorophyll, translocation of nutrient (Pandey and Sinha, 1986). Considering the importance of plant growth substances, to find out the best growth substance and its concentration in response of growth and flowering of African marigold.

The experiment was undertaken on African marigold (*Tagetes erecta* Linn.) var. Cracker Jack" at Horticultural Farm, Department of Horticulture, SKN College of Agriculture, Jobner. The soil of experimental plot was loamy sand with 8.10 pH and 1.20 dSm^{-1} EC at 25°C. The experiment was laid out in a RBD (Randomized Block Design) with three replications. The randomization of the treatments was done with the help of random number table. Crop was raised during *rabi* season of 2009-10 in 2.4 x 1.8 m^2 plot size maintaining 60 x 45 cm spacing. The treatments comprised of three level each of NAA (100, 200, 300 ppm), BA (25, 50, 75 ppm) and kinetin (50, 100, 150 ppm) thus, making 10 treatments including absolute control. For preparation of solution, 1N NaOH with fresh water (Chawla, 2009) was used as sticking agent. Two successive spray of these growth substances was done at 30 and 45 DAT (days after transplanting) of seedlings. All essential cultural practices were followed to maintain optimum plant stand. The mean plot data recorded on five randomly selected plants on growth and flowering traits were subjected to statistical analysis (Panse and Sukhatme, 1995).

The application of growth substances brought perceptible variation in plant growth and flowering attributes of marigold as compared to control (Table 1). Spray of NAA had maximum plant height (40.82, 73.95 cm), number of branches/plant (10.59, 13.93) and plant spread (32.64 x 29.51, 58.31 x 54.62 cm) at 45 and 90 DAT, respectively. Number of flower per plant (55.04) and longevity of intact flowers (17.29 days) also recorded maximum with NAA application. This increase in plant growth and flowering with the application of NAA might be due to active cell division, cell elongation, cell enlargement and osmotic uptake of water and nutrients (Pandey and Sinha, 1984). These results are in close conformity with those of Kumar *et al.* (2008) in gladi olus, Mukhopadhayay and Mukhopadhayay (1990) in Carnation and Singh and Kumar (2003) in Rose. The application of kinetin had more pronounced effect on number of days taken to first flower appearance was recorded lowest with kinetin (58.66 DAT) as compared to NAA and BA application. Therefore, kinetin had maximum number of pickings (8.10), which was significantly higher over NAA and statistically at par with BA. This change in first flowering appearance and number of pickings was might be due to cell division and cell elongation promoted by cytokinin. These results have also been inconsonance with Sonvir *et al.* (2002) and Kim *et al.* (2003).

The increasing concentrations of plant growth

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Table: 1 Effect of PGSs on growth and flowering attributes of African marigold

Treatments	Plant height (cm)		Number of branches/plant		Plant spread (cm^2)				Days taken to flowering	Number of flowers per plant	Number of pickings	Longevity of intact flower (days)
					45 DAT		90 DAT					
	45 DAT	90 DAT	45 DAT	90 DAT	N-S	E-W	N-S	E-W				
Control	33.66	64.40	7.86	10.93	26.93	6.81	48.53	45.66	67.66	41.93	61.33	13.66
Rest	38.97	71.51	9.93	13.02	31.04	7.73	56.11	52.17	60.44	51.81	69.41	16.29
SEm+	1.63	3.02	0.48	0.55	1.32	0.31	2.27	2.11	2.50	2.10	2.80	0.66
CD	4.63	NS	1.36	1.56	3.73	0.88	6.43	5.99	7.09	5.94	7.92	1.87
NAA	40.82	73.95	10.59	13.93	32.64	7.32	58.31	54.62	62.33	55.04	65.23	17.29
BA	36.49	69.68	8.82	12.11	29.28	7.77	52.75	49.51	60.33	45.37	70.00	15.17
Kinetin	39.62	70.89	10.37	13.02	31.19	8.10	57.26	52.40	58.66	55.02	73.00	16.42
SEm+	0.77	1.42	0.23	0.26	0.62	0.15	1.07	1.00	1.18	0.99	1.32	0.31
CD (p=0.05)	2.18	4.04	0.64	0.74	1.76	0.41	3.03	2.82	3.34	2.80	3.73	0.88

NS=Non-significant, N-S=North-South, E-W=East-West, DAT=Days after transplanting

Table : 2 Effect of various concentrations of PGSs on growth and flowering attributes of African marigold

atments	Plant height (cm)		Number of branches/plant		Plant spread (cm^2) 45 DAT		90 DAT		Days taken to flowering	Number of flowers per plant	Number of pickings	Longevity of intact flower (days)
	45 DAT	90 DAT	45 DAT	90 DAT	N-S	E-W	N-S	E-W				
A 100 ppm	38.06	70.00	9.66	13.20	31.33	7.00	55.46	51.86	65.33	52.40	63.00	16.40
A 200 ppm	41.13	74.60	10.86	14.06	32.80	7.37	58.66	55.13	62.66	55.13	64.35	17.46
A 300 ppm	43.26	77.26	11.26	14.53	33.80	7.59	60.80	56.86	59.00	57.60	68.33	18.00
n±	1.33	2.47	0.39	0.45	1.07	0.25	1.85	1.73	2.04	1.71	2.28	0.54
(p=0.05)	3.78	6.99	1.11	1.28	NS	0.72	5.25	4.89	5.79	4.85	6.47	1.52
25 ppm	34.33	65.06	8.13	10.66	27.86	7.33	50.00	46.80	63.66	42.18	66.00	14.26
50 ppm	36.73	69.66	8.93	12.60	29.46	7.88	52.93	49.73	60.00	45.76	71.00	15.33
75 ppm	38.40	74.33	9.40	13.06	30.53	8.11	55.33	52.00	57.33	48.16	73.00	15.93
n±	1.33	2.47	0.39	0.45	1.07	0.25	1.85	1.73	2.04	1.71	2.28	0.54
(p=0.05)	3.78	6.99	1.11	1.28	NS	0.72	5.25	4.89	5.79	4.85	6.47	1.52
etin 50 ppm	37.86	67.73	9.73	12.60	30.26	7.66	54.73	49.80	62.00	51.97	69.00	15.80
etin 100 ppm	39.60	71.00	10.66	13.00	31.26	8.14	57.66	52.73	58.33	55.86	73.33	16.60
etin 150 ppm	41.40	73.93	10.73	13.46	32.06	8.51	59.40	54.66	55.66	57.22	76.66	16.86
n±	1.33	2.47	0.39	0.45	1.07	0.25	1.85	1.73	2.04	1.71	2.28	0.54
(p=0.05)	NS	NS	NS	NS	NS	0.72	NS	NS	5.79	4.85	6.47	1.52

NS=Non-significant, N-S=North-South, E-W=East-West, DAT=Days after transplanting

substances significantly increased growth and flowering parameter of African marigold (Table 2). NAA @ 300 ppm recorded highest plant height (43.26, 77.26 cm), number of branches/plant (11.26, 14.53) and plant spread (33.80 x 30.46, 60.80 x 56.86 cm^2) at 45 and 90 days after transplanting of seedlings, respectively. NAA @ 300 ppm also recorded maximum number of flowers per plant and highest longevity of intact flower (18.00 days). The minimum number of days taken to first flower appearance (55.66 days) and highest number of pickings (8.51) was observed with kinetin @150 ppm. Similar results have also been obtained by Chodhaury and Khandelwal (2008) in gladiolus, Singh and Kumar (2003) in rose and Singh (2003) in French marigold. Sharma *et al.* (1995) found increase in plant height of chrysanthemum with increasing levels of NAA from 25 to 100 ppm spray.

References

Chawla, H.S. 2009. Introduction to plant bio-technology. Published by oxford and IBH Publication Pvt. Ltd. New Delhi. pp.- 18-27.

Choudhary, D.K. 2008. Effect of plant growth regulators on growth, floral characters, vase life and corm production of gladiolus (*Gladiolus grandiflorum* L.). M.Sc. Thesis (Horticulture), submitted to Rajasthan Agricultural University, Bikaner Campus- Jobner.

Kim, S.D., Kim, H.H., Lee, H.D., J.W. and Yun, T. 2003. Effect of growth regulators on occurrence of suckers, lateral shoot elongation and cut flower quality in secondary flowering of *Dendranthema grandiflorum 'Beagkwang'. Journal of the Korean Society of Horticultural Sciences,* 44 (4): 335-538.

Kumar, P.S., Bhagawati, R., Kumar, R., and Ronya, T, 2008. Effect of plant growth regulators on vegetative growth, flowering and corm production of gladiolus in Arunachal Pradesh. *Journal of Ornamental Horticulture,* 11 (4): 265-270.

Malik,C.P., Sanjeev, K and Bhatia, D.S., 1996. Alternating plant archetypes with PGRs and genetic transformation biological soft wards in agro biotechnology. *Agro Annual Review of Plant Physiology*, 2: 13-64.

Mukhopadhyay, A. and Mukhopadhyay, A. 1990. Response of carnation to foliar application of NAA and gibberellic acid. *Haryana Journal of Horticultural Sciences,* 19 (3-4): 280-283.

Panse, V.G. and Sukhatme, P.V. 1995. Statistical Methods for Agricultural Workers. ICAR, New Delhi.

Pandey, S.N. and Sinha, B.K., 1984. Role of Auxin. Plant Physiology. Vikash Publishing House, New Delhi. pp. 432-436.

Singh, A. K. 2003. Effect of plant bio-regulators on growth, biomass and flowering in French marigold (*Tagetes petula*). *Indian Perfumer,* 47 (3): 279-284.

Singh, A.K. and Kumar, S. 2003. Effect of NAA on growth and flowering in rose cv. Super Star. *Journal of Ornamental Horticulture*, 6 (3): 248-251.

Sonvir, S., Ramesh, K., Manreet, S., Sooch, S., Kumar, R., Sooch, M., Misra, R.L. and Sanyat, M. 2002. Effect of NAA and kinetin on plant growth and flower production in carnation. Floriculture Research Tend in India. in: Proceedings of the National Symposium on Indian Floriculture in New Millennium held at Bangalore from 25-27 February, 295-297.

Yadav, N., Yadav, N.K. and Kumar, A., 1994. Effect of BA on transpiration, water potential and its components in genotypes of wheat contrasting in drought tolerance. *Journal of Agronomy and Crop Science*, 173: 61-68.