



*Short communication*

## Effect of pinching and growth retardants on growth and flowering in African marigold cv. Pusa Narangi Gaiinda

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### ABSTRACT

A study on the effect of pinching and application of growth retardants on growth and flowering in African marigold cv. 'Pusa Narangi Gaiinda' was carried out in the experimental field of Division of Floriculture and Landscaping, Indian Agricultural Research Institute, New Delhi. Treatments comprised pinching, CCC applied at 1000ppm, 1500ppm or 2000ppm, MH at 500ppm, 1500ppm or 2000ppm; B-9 at 500ppm, 750ppm or 1000ppm, and a Control (no pinching). CCC at 2000ppm recorded minimum plant height (46.0cm), maximum plant-spread (56.0cm) and maximum number of branches (19.0), whereas, maximum plant height (67.0cm), minimum plant-spread (29.66cm) and minimum number of branches (5.33) were recorded in Control (non-pinching). As for flowering and yield, application of CCC at 2000ppm recorded maximum flowering-duration (25.33 days), number of flowers per plant (40), single-flower weight (119.46g), flower yield per plant (408.10g), flower yield per unit area (17.83t/ha) and seed yield per plant (17.80 g), Maximum flower diameter (7.93cm) was recorded with application of CCC 2000ppm, whereas, minimum was recorded with pinching (6.2cm). Spray of growth retardants enhanced flower yield compared to that in Control (no pinching). Maximum shelf-life of flower was recorded with CCC 2000ppm (3.66 days), whereas, minimum was recorded with pinching and non-pinching (2.33 days). Thus, application of CCC at 2000ppm is superior to other treatments tested for increasing flower yield in marigold.

**Key words:** Marigold, pinching, non-pinching, growth retardants

Marigold is one of the most popular flowering annuals cultivated in India. It is one of the commonly grown flowers, and is used extensively in religious and social functions in different forms. It has gained popularity among gardeners and flower dealers on account of ease of cultivation. In the recent past, the enterprise has become highly remunerative to traditional floriculture in India on account of various commercial uses of this flower. Marigold is often referred to as the versatile crop with golden harvest. Flower yield is mainly dependent on the number of flower-bearing, branches which can be manipulated by arresting vertical growth of the plant and by encouraging side shoots to develop, with apical-bud pinching. Such side shoots have a better chance of bearing flowers and, in turn, lead to higher flower yield. Similarly, application of growth retardants in horticultural crops has a marked broad-range of effects, both morphological and physiological. Effect of growth retardants varies with plant species, variety, concentration, method of application, frequency of application and various other

factors influencing uptake and translocation of nutrients. In view of its importance in commercial flower production, the present investigation was initiated with an objective to develop suitable agro-techniques for enhanced flower production in African marigold cv. Pusa Narangi Gaiinda.

An experiment was conducted at the research farm of Division of Floriculture and Landscaping, ICAR-Indian Agricultural Research Institute, New Delhi. Eleven treatments were imposed viz., Chloremequat chloride (CCC) at 1000ppm (T1), 1500ppm (T2), 2000 ppm (T3); Malic hydrazide (MH) at 500ppm (T4), 1000ppm (T5), 1500ppm (T6); Alar (B-nine) at 500ppm (T7), 750ppm (T8), 1000ppm (T9); Pinching (T10), and non-pinching [Control] (T11). The experiment was laid out in Randomized Block Design, with three replications. Seedlings were transplanted at a spacing of 45cm x 45cm. Meristematic bud was pinched three weeks after transplant. Freshly-prepared growth retardants were sprayed at different concentrations. The first spray was

**Table 1. Effect of pinching and growth retardants on growth and flowering in marigold**

Treatment	Plant height (cm)	Plant spread (cm)	No. of branches per plant	Days to first flowering	Flowering duration	Number of flowers per plant	Flower diameter (cm)	Single flower weight (g)	Flower yield per plant (g)	Flower yield per unit area (t/ha)	Seed yield per plant (g)	Shelf-life of flower (days)
T1-CCC 1000ppm	46.83	50.00	16.67	63.66	22.61	33.33	7.56	101.27	361.66	16.50	15.61	2.00
T2-CCC 1500ppm	48.00	50.66	17.00	64.33	24.33	34.33	7.60	104.60	376.10	16.96	16.86	3.00
T3-CCC 2000ppm	46.00	56.00	19.00	66.66	25.33	40.00	7.93	119.46	408.10	17.83	17.80	3.66
T4-MH 500ppm	48.00	35.66	14.66	63.66	21.66	26.66	6.63	101.83	350.00	16.53	16.18	3.00
T5-MH 1000ppm	48.00	44.00	15.66	66.66	22.66	27.33	7.00	107.23	341.03	14.53	16.86	3.33
T6-MH 1500ppm	49.00	47.33	17.66	60.00	23.33	30.33	7.46	101.73	345.70	15.03	17.03	2.66
T7-B-nine 500ppm	48.00	37.33	10.66	61.66	22.00	31.33	7.10	94.87	385.46	16.56	17.73	3.00
T8-B-nine 750ppm	54.33	39.83	14.00	56.00	22.33	30.00	7.40	98.13	378.90	14.96	17.48	3.00
T9-B-nine 1000ppm	56.33	44.66	16.33	62.00	22.66	28.33	7.60	104.73	382.43	15.16	16.78	3.00
T10-Pinching	52.33	34.00	9.33	60.00	23.00	24.00	6.20	93.90	388.30	13.13	13.01	2.33
T11-Non Pinching (Control)	67.00	29.66	5.33	50.33	21.00	17.00	6.23	90.55	243.23	10.03	7.33	2.33
CD ( $P=0.05$ )	16.15	6.02	2.96	4.22	2.99	5.31	0.42	10.68	38.91	1.98	0.76	0.75

applied three weeks after transplanting, while the second spray was scheduled at five weeks after transplanting. Five plants were randomly selected in the net plot area and tagged with labels in each treatment to record observation on growth and yield. Crop management practices like nutrient irrigation weed management and plant protection measures were included as per requirement of the crop. Data on various parameters were recorded and subjected to statistical analysis.

Data presented in Table 1 reveal that pinching and application of different growth retardants at various levels influenced growth, flowering and yield significantly in marigold. The treatments were effective in suppressing plant height compared to Control. CCC at 2000ppm recorded minimum plant height (46.0cm), maximum plant-spread (56.0cm) and maximum number of branches (19.0), whereas, maximum plant height (67.0cm), minimum plant-spread (29.66cm) and minimum number of branches (5.33) were recorded in the Control (non-pinching). These findings are in accordance with Jay *et al* (1991), Girwani *et al* (1990), Narayana Gowda and Jayanthi (1991), and Dutta and Ramadas (1997) in chrysanthemum. This response may be due to inhibition of GA synthesis and breakdown of apical dominance, thereby resulting in auxin balance and enhanced

differentiation of branching caused by CCC, as proposed by Ninnemann *et al* (1964). Early flowering (50.33 days) was recorded in non-pinching (Control). Late flowering was recorded with CCC 2000ppm and MH 1000ppm (66.66 days). These results are in congruence with Narayana Gowda and Jayanthi (1991) and Parmar and Singh (1989) in chrysanthemum. Delay in flowering may have been due to inhibition of GA synthesis.

As for flowering and yield parameters, application of CCC at 2000ppm recorded maximum flowering-duration (25.33 days), number of flowers per plant (40), single-flower weight (119.46g), flower yield per plant (408.10g), flower yield per unit area (17.83t/ha) and seed yield per plant (17.80g), whereas, minimum flowering-duration (21 days), flower number per plant (17.0), flower weight (19.55g), flower yield per plant (243.23g), flower yield per unit area (10.03 t/ha) and seed yield (7.33g) were recorded in Control (non-pinching). Maximum flower diameter (7.93cm) was recorded with CCC at 2000ppm. Results of the present study are in agreement with Leena *et al* (1992) in gladiolus, Dutta and Ramadas (1997) and Takuldar and Paswan (1994) in chrysanthemum, and, Syamal *et al* (1990) in marigold and China aster. This may probably be due to suppression of apical dominance, resulting in increased number of flowers

per plant and, ultimately, increased flower yield per hectare. Our results clearly showed that spray of growth retardants enhanced flower yield compared to that in Control (non-pinching). Maximum shelf life of flower was recorded in CCC 2000 ppm (3.66 days). Similar results were obtained by Raju Dantuluri, (2000) who reported improved shelf life of flowers in Asiatic hybrid Lily cv. Corrida with CCC treatment. The minimum shelf life of flowers was recorded in pinching and non pinching (2.33 days).

Thus, the present investigation revealed that application of CCC at 2000ppm was superior among the treatments tested for increasing flower yield in marigold.

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(MS Received 08 July 2014, Revised 25 May 2015, Accepted 29 May 2015)