



E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2018; 7(2): 1764-1766
Received: 11-01-2018
Accepted: 15-02-2018

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Effect of spacing and pinching on growth and flowering in African Marigold (*Tagetes erecta* L.) cv. Pusa Narangi Gainda

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Abstract

A field experiment was conducted at the Horticulture Research Farm, C.C.S. University, Campus Meerut (U.P.) during the winter season of 2010-11 so as to study the effect of spacing and pinching on growth and flowering in African marigold. It can be concluded that wider spacing showed significantly better effect on flower quality and quantity parameters i.e. flower diameter, flower weight, flowers per plant and flower weight per plant, while significantly maximum flower yield (132.93 q/ha) was obtained at the closer spacing. Although, flowering parameters i.e. flower diameter, flower weight, flowers per plant and flowers weight per plant were not significantly affected by spacing and pinching combinations but flowers yield was significantly maximum (224.10 q/ha) under closer with earlier pinching (130 DAT).

Keywords: Spacing, pinching, African marigold, flowering, Narangi Gainda

Introduction

In India marigold is one of the most important and commonly grown flower. Marigold gained popularity amongst gardeners and flowers growers on account of its easy culture and wide adaptability. It's habit of free flowering, short duration to produce marketable flowers, wide spectrum of attractive color, shape, size and good keeping quality attracted the attention of flower growers and flower auctioners.

Although, flowers are produced throughout the country, their extent of cultivation on commercial scale is significant only in a few states. Bhardwaj, *et al.*, (2001) [1]. Different agro-techniques i.e. planting distance, pinching, weeding and fertilizer applicant etc significantly influenced the growth and flowering behaviours in marigold. Planting regulate plant population per unit area directly. At wide planting the individual plant may get sufficient distance for its growth and development. Due to wide spacing per unit production is less on the other hand, in closer spacing the plants do not get sufficient distance for their development and consequently drastic reduction occurs at close planting. Hence, planting distance should be regarded for massing sufficient production of flowers with good quality in African marigold.

Pinching treatment might be due to the fact that by removal of apical portion move energy might have been to promote the number of side branches. Number of side branches directly positive correlated the yield of flowers in African marigold.

Sehrawat *et al.*, (2003) [4] also obtained maximum number of branches and flowering yield with delayed pinching (40 DAT) in marigold. Thus, it was desirable to investigate the possibilities of finding out an optimum plant spacing to which the plants may have best response. Looking to the above facts, the present study was taken up.

Materials and Methods

The field experiment was carried out with the objective of studying the effect of spacing and pinching on growth and flowering in African marigold (*Tagetes erecta* L.) under Meerut region.

The field experiment was conducted at the Research Farm, Department of Horticulture, Chaudhary Charan Singh University Campus, Meerut during the winter season 2010-11. The experiment was laid out in "Factorial Randomized Block Design" with 9 treatment combinations and each replicated three times.

Results and Discussion**Effect of spacing on growth parameters**

The plant height decreased significantly with increase in spacing level. The closer spacing of (60x30cm) recorded significantly maximum plant height (49.70 and 79.40cm) at 45 DAT and

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at full bloom stage, respectively. The increased plant height in closer spacing might be due to intra-plant competition for light, moisture, space and aeration. This resulted in elongation of main stem; increase in stem length may be due to elongation of cells and number of cells due to cell division. Similar observations was also made by Parminder and Sindhu (2004)^[3] in *Brassica carinata*.

The plant width increased significantly with increase in spacing level. The wider spacing of (60x60cm) recorded significantly maximum plant width (40.33 and 54.13 cm) at 45 DAT and at full bloom stage, respectively. The horizontally increasement in plant growth at wider spacing might be due to less competition between plants for sunlight, aeration and space, which results plant attain a bushy shape. These findings are in close conformity with the findings of Tiwari *et al.*, (2010)^[5] in marigold.

The number of branches per plant i.e. primary and secondary decreased linearly with decreased level of spacing at 45 DAT and full bloom stage. The closer spacing of 60x30 produced less number of branches i.e. primary (11.81 and 26.92) and secondary (20.27 and 25.77) at 45 DAT and full bloom stage, respectively. The minimum number of branches per plant at closer spacing may be due to more competition for light, space and nutrients amongst the plants resulted in vertical growth of plant rather than horizontal growth. These results are in close conformity with the findings of Parminder and Sindhu (2004)^[3] in *Brassica carinata*.

Effect of spacing on flowering parameters

Significantly maximum flower diameter (5.96 cm) and flower weight (6.43 g) were recorded at wider spacing (60x30 cm) compared to closer spacing (60x30 cm), where 5.84 cm flower diameter and 5.90 g weight per flower were recorded. This increased in flower diameter and flower weight at wider spacing may be due to well establishment of the plant, which inturn resulted in big size and weighted flower. These results are in accordance with the findings of Bhat and Shepherd (2007)^[2] in African marigold.

Significantly higher number of flowers per plant (5.17) and flowers weight per plant (322.73g) were observed with wider spacing of 60x60 cm compared to closer spacing (60x30cm). Maximum number of flowers per plant at wider spacing seems to be mainly due to more number of branches per plant and also less competition among the plants for nutrients and light, while flowers weight per plant directly correlated with number of flowers per plants. Similar results were also reported by Tiwari *et al.*, (2010)^[5] in marigold.

Higher flower weight per plant was recorded at wider spacing where as significantly higher flower yield (132.93 q/ha) was recorded at closer spacing (60x30cm). This may be due to numerically more number of plants per unit area. Similar result was also reported by Tiwari *et al.*, (2010)^[5] in marigold.

Table 1: Growth and flowering in African marigold cv. Pusa Narangi Gainda as in flounced by spacing and pinching.

Treatments	Plant height (cm)		Plant width (cm)		Number of primary branches/plant		Number of secondary branches/plant		Flower diameter (cm)	Flower weight (g)	No. of flowers/plant	Flower weight per plant (g)	Flower yield (q/ha)
	45 Dat	At full bloom	45 Dat	At full bloom	45 Dat	At full bloom	45 Dat	At full bloom					
Spacing 60x60cm	41.70	70.53	40.33	54.13	13.04	32.41	21.77	32.64	5.96	6.43	50.17	322.73	89.65
60x45cm	44.47	74.83	38.53	51.47	12.44	30.67	20.43	28.43	5.84	5.90	46.83	276.43	102.39
60x30cm	49.70	79.40	35.30	49.03	11.81	26.92	20.27	25.77	5.60	5.30	45.17	239.27	132.93
SEm±	0.58	0.55	0.51	0.26	0.28	1.49	0.66	0.65	0.06	0.12	0.96	9.39	3.88
CD at 5%	2.35	2.20	2.04	1.05	NS	NS	NS	2.62	0.23	0.48	3.88	37.86	15.65
Pinching													
30 DAT													
45 DAT													
SEm±													
CD at 5%													
Interaction	NS	NS	SIG.	NS	NS	NS	NS	NS	NS	NS	NS	NS	SIG.

Table 2: Combined effect of spacing and pinching on flower yield (q/ha)

Spacing (cm)	Pinching	
	30 Dat	45 Dat
60x60	126.18	109.47
60x45	153.48	137.80
60x30	224.10	177.98

C.D. (5%) 15.16

Only flower yield was influenced significantly due to spacing x pinching interactions. Amongst these interactions (Table 22), significantly maximum flower yield (224.10 q/ha) was recorded at early pinching (30 DAT) with closer spacing (60x30). This was due to that numerically more number of plants per in to area, which increased the flower yield per hectare. Similar result was also recorded by Rajbeer *et al.*, (2009)^[6] in African marigold.

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