The Journal of Rural and Agricultural Research Volume 24 No. 2, 63-66 (2024)
Received September 2024; Acceptance November 2024

Effect of Plant Spacing and Pinching on Vegetative growth of African Marigold (*Tagetes erecta* L.) cv.Pusa Narangi Gainda

ALOK KUMAR* GITAM SINGH, L.K. SHARMA, KAILASH PARIHAR[1], CHAHAK TANDON[2] AND PARTH PANDYA[3]
College of Agriculture, Madhav University, Sirohi-307026, Rajasthan, India
Corresponding Author- csaalokhorticulture@gmail.com

Abstract

The present investigation entitled "Effect of Different Plant Spacing and Pinching on growth, yield and flower quality of Marigold (Tagetes erecta L.) was conducted at Main Experiment Station, Faculty of Agriculture & Science and Technology, Integral University, Lucknow (U.P.) in winter season, during the year 2019-20. The experiment was laid out in Factorial Randomized Block Design with three replications comprising nine treatment combinations of three plant spacing (50x40cm, 50x50cm, 50x60cm) three pinching levels (no pinching, pinching at 20 DAT, pinching at 30DAT). The result concluded that the important growth characters were significantly influenced by different plant spacing and pinching treatments tried under this investigation. Plant height was found to be significantly more under the spacing of 50x50 cm and pinching at 30 DAT. Rest of the growth parameters viz., number of branches, plant spread, fresh and dry weight of plant, number of leaves per plant and stem diameter also showed superior performance under wider spacing (50x60) cm. and pinching at 30 DAT. The combination of wider spacing and pinching at 30 DAT was found to be superior for these traits. The pinching treatments had significant effect on flower diameter, pedicel length, days taken for 50% flowering and vase life of cut flowers.

Keywords: Marigold, spacing & pinching Vegetative growth, yield and flowering quality, FRBD

Introduction

Marigold (*Tagestes erecta* L.) a member of family Asteraceae is a beautiful commercial flower that is gaining status because of its wide range of adaptation and increasing demand in the subcontinent (*Tagetes erecta* L.) popularly known as "African marigold" produces large size flowers with colors ranging from yellow to orange. It is originated of central and South America, especially Mexico; it is very important commercial plant of the Marigold. China, India & Peru are the leading countries producing & exporting marigold flowers. Major Importing Countries are USA and Europe. In India, Madhya Pradesh, Karnataka, Gujarat and Andhra Pradesh are leading states in marigold production. (NHB, 2015-16). In India, marigold production is 603.18 thousand MT with an area of 66.13 thousand hectare (NHB, 2015-16).

Marigold is an important commercial flower of India. The common name marigold, derived from "Mary's Gold" is associated with Virgin Mary of the Christian stories. In India marigold is commonly grown flowers. Because of their easy cultivation in the marigold, wide adaptability to varying soils and climatic condition of the marigold long duration of flowering and attractively color flower in African marigold. Marigold can be grown in all seasons i.e.,

[1]Professor – College of Agriculture, Madhav University, Sirohi-307026, Rajasthan, India
[2]M.Sc. Research Scholar, Integral Univ., Lucknow, UP
[3]M.Sc. Research Scholar, Madhav University, Sirohi, Rajasthan

rainy, winter and summer of which rainy and winter season crops are the main crop. Besides these, marigold is planted to control the soil nematodes. There is 19 a large demand of flowers during the festivals like Dushehra and Diwali as well as marriage seasons.

In India flowers are sold in the market as loose or after making garlands flowers are traditionally used are offering in churches and temples and also used in ceremonies, festivals, beautification and landscaping. It is highly suitable for making flower beds in a herbaceous border and also found ideal in newly planted shrubberies to provide color and fill the space. Both leaves and flowers posses' medicinal valve. Leaf extract is a good remedy for eye disease and ulcers**.** The essential oil can find a use in the perfume industry. Marigold is resistant to nematode infestation. There is a considerable decrease in some nematode spp. population by growing of marigold (*Tagetes erecta L.*). Spacing is an important growth and yield contributing factor which can be manipulated to maximize production from per unit area. With the increase in weeds, the production of the flower tends to decreases due to the competition between the plants and weeds for light, space and nutrition which can be overcome by providing optimum plant spacing. Economic flower yield can be obtained when the plants are planted at optimum planting distance of important crop of the African marigold. Besides, pinching is also an important factor for plant growth and flower production in marigold. Pinching is an important cultural operation, which delays flowering and enhances the flower yield. Farmers felt that grass is more useful to fill the animals' stomachs and would therefore come before crop stover as a feed. Farmers preferred Deda over Kona because it has more biomass (Singh and Sharma, 2015). The farmers face fodder deficiency in winter when they have only dry stalks of cereal fodder or dry summer grasses. Under such conditions adoption of oat production technology can be beneficial for providing fodder for winter seasons (Singh et al 2017). The performance of Toda rai singh village group was better than Akodia and Harnoda village group but poor in comparison all other groups due to feeding, locally available sources of feed and managemental factors (Singh et al 2017).

Materials and Method

The present investigation was carried out on the"Effect of different plant spacing and pinching on growth, flowering and yield of marigold (*Tagetes erecta* L.) cv. Pusa Narangi Gainda during the year 2019-20at Main Experiment Station, Faculty of Agriculture Science and Technology, Integral University, Lucknow (U.P.) in winter season. The experimental details are given in Table 1.

Table 1: Details of field Experiment

Experimental Design	FRBD
Number of Replications	3
Number of Treatments	9
Plot size	2.0 m×2.0 m
Number of plants per plot	16
Total number of plants	162
Total number of plots	27
Cultivar	African Marigold (Pusa Narangi Gainda)
Place of Experiment	Horticulture Research Field
Total area of experimental plot	108 m^2
Treatment Details	**Symbol used**
Spacing	
1. 50 x 40 cm	S_1
2. 50 x 50 cm	S_2
3. 50 x 60 cm	S_3
Pinching Levels	
No pinching	P_0
Pinching @20 DAT (Single Pinching)	P_1
Pinching @30 DAT (Double Pinching)	P_2

Result and Discussion

1. Plant height (cm)

The observations of plant height as influenced by different plant spacing and pinching were recorded periodically and the data given in table 2. The plant height was significantly influenced by the spacing treatments. It was observed that the wider spacing i.e., S_3 (50x60 cm) recorded significantly maximum plant height (71.06 cm) followed by 69.98 cm with S_2 (50x50 cm). But it was found minimum (63.05 cm) with narrow spacing i.e., S_1 (50x40 cm). The increased plant height with wider spacing may be due to fact that the plants with the sufficient spacing had no competition with other plants for nutrient availability which ultimately resulted in better growth of plants. The wider spacing is also favorable

Table 2: Effect of different treatments on Plant height (cm), No. of leaves/plant, stem diameter (cm), No. of primary branches/plant, No. of secondary branches/plant and plant spread (cm) of African Marigold

Treatment	Plant height (cm)	No. of leaves/ plant	Stem diameter (cm)	No. of primary branches/plant	No. of secondary branches/plant	Plant spread (cm)
Spacing						
S_1	63.44	130.25	1.23	9.05	23.38	32.40
S_2	65.27	135.86	1.56	10.15	36.70	38.70
S_3	69.36	143.76	1.62	14.02	40.15	41.50
SE(m)	5.32	7.34	0.41	0.35	1.51	2.30
C.D	15.49	21.12	1.18	1.42	6.11	10.61
Pinching						
P_0	74.46	116.54	1.51	8.65	26.43	30.45
P_1	65.82	142.15	1.61	10.95	32.53	40.10
P_2	65.74	158.78	1.36	12.25	42.11	45.46
SE(m)	3.86	5.57	0.21	0.62	3.93	1.76
C.D	11.09	22.46	0.61	2.53	11.32	7.12
Interaction Effect						
(S_1P_0)	64.44	123.39	1.37	8.85	24.90	31.42
(S_1P_1)	65.29	136.20	1.42	10.00	27.95	36.25
(S_1P_2)	66.92	144.51	1.29	10.65	32.74	38.93
(S_2P_0)	67.90	126.20	1.53	9.40	31.56	34.57
(S_2P_1)	68.76	139.00	1.58	10.55	34.61	39.40
(S_2P_2)	70.39	147.32	1.46	11.20	39.40	42.08
(S_3P_0)	68.44	130.15	1.56	11.33	33.29	35.97
(S_3P_1)	69.30	142.95	1.61	12.48	36.34	40.80
(S_3P_2)	70.93	151.27	1.49	13.13	41.13	43.48
SE(m)	1.17	3.99	0.20	0.31	1.82	1.25
C.D	3.55	5.016	0.44	0.94	5.52	3.79

for lateral growth of plants. Similar results of increased plant height due to wider spacing have also been reported by Pratibha *et al.* (2018).

2. Number of leaves/plants

Effect of various spacing and pinching on number of leaves per plant recorded at different intervals are presented in Table 2. The data on number of leaves per plant showed remarkable effect due to plant spacing. It was observed that the wider spacing i.e., S_3 (50x60 cm) yielded significantly higher number of leaves (143.76) followed by 135.86 with S_2 (50x50 cm). Number of leaves per plant was found minimum (130.25) in closer spacing treatment i.e., S_1(50x40 cm). The wider spacing favored for production of a greater number of leaves per plant. This might be due to greater availability of plant nutrients, water and better sunlight exposure under wider spacing, which favors more lateral growth of plants. Similarly, the data on the effect of pinching indicated that pinching at 30 days after transplanting gave significantly a greater number of leaves (158.78) followed by 142.15 with treatments P_2. The least number of leaves per plant (116.54) was observed under the treatment P_0 (no pinching). The present findings are in conformity with the report of Chauhan *et al.* (2016).

3. Stem diameter (cm)

The data with respect to effect of different plant spacing and pinching treatments on stem diameter recorded periodically are presented in Table 2. The wider spacing of 50x60 cm (S_4) showed significantly maximum stem diameter (1.62 cm) followed by 1.56 with treatment 50x60 cm (S_2). A closer spacing of 50x40 cm under the treatment S_1 produced minimum diameter (1.23 cm). The increased thickness of stem could be ascribed to a

better availability of nutrients per unit area due to sufficient space resulting in less competition among the plants. The results are in accordance with the report of Yadav *et al*., (2004) and Singh *et al*., (2018).

4. Number of primary branches/plant

The data on number of primary branches per plant are presented in Table 2. The results revealed that the number of primary branches significantly increased due to spacing, pinching and their interaction effects. Significantly higher number of primary branches per plant (14.02) was recorded under S_3 (50x60 cm) followed by 10.15 with S_3 (50x50 cm). Whereas, the minimum number of primary branches per plant (8.65) was recorded with closer spacing of 50x40 cm (S_1). The results are in accordance with the report of Subedi *et al*., (2020).

5. Number of secondary branches/plant

The plant spread recorded at the time of final flower picking pinching in Table 2. In case of plant spacing, the maximum number of secondary branches per plant (40.15) was recorded under wider spacing of 50 x 60 cm (S_4) followed by S_2. Minimum number of secondary branches (23.38) was recorded under closer spacing S_1 (50x40 cm).More number of secondary branches per plant recorded under wider spacing may be due to fact that wider spacing provides a congenial growing condition like more space available for growth of root and shoot and less competition for nutrients among the plants. Another reason could be mentioned that higher number of primary branches also yields a greater number of secondary branches. Similar findings have also been reported by Ullah *et al*., (2019).

6. Plant spread (cm)

The maximum spread was recorded at the spacing Table 2 of 50x60 cm under S_3 (41.50 cm) followed by S_2 (38.70 cm), whereas, the minimum spread was noted at the spacing of 40x30 cm with S_1 (32.40 cm). The present study revealed that the plant spread was more under wider spacing that may be due to favorable growing conditions like more space available for growth of roots and shoots, which ultimately helps in higher uptake of nutrients and water from the soil. Similarly, views have also been expressed by Pratibha et al. (2018) and Nain et al. (2017).

References

Chauhan, S.; Rao., V.K.; Kumar, A. and Ghosh, S. (2016). Response of pinching on African marigold cv. Pusa Basanti Gainda under hill condition of Uttarakhand. *J. Hill Agri*., 7(1): 46-51.

Pratibha, C.; Gupta, Y.C.; Dhiman, S.R. and Gupta, R.K. (2018). Effect of planting dates and spacing on growth and flowering of French marigold Sel. 'FM-786'. *African J. Agric. Rese.,* **13**(37): 1938-1941.

Singh, H.; Singh, J. and Ahirwar, G.K. (2018). Effect of spacing and pinching on growth and flowering in African Marigold (*Tagetes erecta* L.) cv. Pusa Narangi Gainda. *J. Pharma. And Phytochem*., **7**(2): 1764-1766.

Singh, G.; Sharma, R.B. and Singh, M. (2017). Green fodder production potential of Oat cv. Kent under semi-arid climatic conditions of Tonk-Rajasthan in Frontline Demonstration, *International Journal of Current Microbiology and Applied Science,* **6**(3): 2228-2232

Singh, G. and Sharma, S.K. (2015). On Farm Trial (OFT) of pearl millet green fodder at Tonk district, *The Journal of Rural and Agricultural Research,* **15**(2): 28-29

Singh, G.; Sharma, R.B.; Singh, M. and Sharma, S.K. (2017). Utilization of agricultural wastes in participatory poultry farming with women under climatic conditions of Tonk district of Rajasthan, *Agriculture Science Digest*, **37**(1): 60-63

Subedi, S.; Pandey, M.; Sharma, T.P.; Adhikari, A.; Khanal, P. and Chaudhary, P. (2020). Effect of Pinching and Nitrogen on yield and yield attributing characters of African marigolds (*Tagetes erecta*) in Deukhuri, Dang. *Acta Scientific Agri.*, **4**(2): 1-3.

Ullah, L.; Amin, N.U.; Wali, A.; Ali, A.; Khan, S.S.'; Ali, M.S. and Kabir, R. (2019). Improvement of Zinnia flower (*Zinnia elegans*) through evaluating of various pinching and the different methods. *Global Advanced Res. J. Agric. Sci*. **8**(4): 179-184.

Yadav, R.M.; Dubey, P. and Asati, B.S. (2004). Effect of spacing and nitrogen levels on growth, flowering and flower yield of marigold (*Tagetes erecta* L.). *Orissa J. Hort*., **32** (1): 41-45.