

PERFORMANCE OF AFRICAN MARIGOLD VARIETIES FOR GROWTH, FLOWERING AND YIELD UNDER VIDARBHA CONDITIONS

Manoj J. Patokar¹, R. P. Gajbhiye², Siddhi Patil³, S. R. Bayaskar⁴ and S. S. Moon⁵

ABSTRACT

An experiment was conducted to study the performance of African marigold varieties for growth, flowering and yield under Vidarbha conditions during *kharif* season of the year 2016-17 at research farm of Horticulture Section, College of Agriculture, Nagpur. The experiment was laid out in Randomized Block Design with eight treatments replicated thrice. The treatments comprised of varieties African Double Orange, Pusa Basanti Yellow, African Giant Double, PusaNarangiGaiinda, NAM-2, Crackerjack Mix, African Giant and African Marigold. The results revealed that, growth parameters *viz.*, plant height (135.39 cm), number of branches plant⁻¹ (19.73), leaf area at 50% flowering (28.67 cm²), plant spread at 50% flowering E-W (44.63 cm) and N-S(45.69 cm) were recorded significantly maximum in NAM-2. However, maximum stem diameter (1.58 cm) was recorded in African Giant Double. As regards flowering parameters, minimum days to first flower bud initiation (32.60 days) were recorded in Crackerjack Mix. Whereas, days to opening of flower from bud emergence (14.60 days), days to 50% flowering (50.67 days) were recorded minimum in African Double Orange. However, maximum blooming period (69.00 days) was recorded in African Giant Double. Whereas, significantly maximum yield of flowers plant⁻¹ (642.15 g) was recorded in NAM-2.

(Key words: African marigold, varieties, growth, flowering)

INTRODUCTION

Marigold is one of the commercially exploited flower crop belongs to family Asteraceae and genus *Tagetes*. In India marigold (*Tagetes* spp.) ranks first among the loose flowers. There are about 33 species of marigold. Apart from its significance in ornamental horticulture, it has been valued for other purposes too. The aromatic oil extracted from marigold, is called as "*Tagetes* oil". It is used in preparation of high grade perfumes and also as an insect fly repellent. Recently dried flower petals of marigold are used as poultry feed in order to improve the colour of egg yolk as well as broiler's skin.

There is plenty of area under local varieties on account of lack of availability of seeds and awareness of farmers about the knowledge of improved varieties. Farmers are growing the local varieties without knowing the yield potential and quality. There are several varieties released in different states having many desirable characters, high yield potential and better quality parameters. Moreover, the information on the suitability of varieties in the region is very scanty. There was also a feedback on this aspect from state agricultural extension agency and farmers. Keeping these points in view the present investigation was planned at Horticulture Section, College of Agriculture, Nagpur during the year 2016-17.

MATERIALS AND METHODS

A field experiment was carried out at research farm of Horticulture Section, College of Agriculture, Nagpur during *kharif* season of the year 2016-2017. The experiment was laid out in Randomized Block Design with eight treatments replicated thrice. The experiment comprised with eight treatments *viz.*, T₁– African Double Orange, T₂– Pusa Basanti Yellow, T₃–African Giant Double, T₄–Pusa Narangi Gaiinda, T₅– NAM-2, T₆–Crackerjack Mix, T₇– African Giant, T₈–African Marigold.

The seeds of varieties of African marigold were collected from different seed suppliers of India. The seedlings were prepared in crates in Hi-tech polyhouse of Maharajbag. The crates were prepared thoroughly by mixing soil with farm yard manure and linden powder. Seeds were treated with fungicide for healthy growth of seedlings and sown in lines at 10 cm spacing and 2-3 cm deep in the soil. Seeds were then gently covered with the soil. Crates were watered lightly with the help of rose can. After about 3 to 4 days the seeds started germinating and potential germination was completed within eight days. The crates were watered regularly and weeding operation was carried out in order to keep the crates free of weeds. Seedlings were transplanted on raised bed with planting of one seedling hill⁻¹ in the experimental field on 31st July, 2016 at the distance of 45 cm x 30 cm.

1, 3 and 4. P.G. Students, Horticulture Section, College of Agriculture, Nagpur (M.S.)

2. Professor, Horticulture Section, College of Agriculture, Nagpur (M.S.)

5. Asstt. Professor, Horticulture Section, College of Agriculture, Nagpur (M.S.)

The recommended dose of fertilizer (100: 50: 25 kg NPK ha⁻¹) was applied to all the plots in the form of urea, single super phosphate and muriate of potash. Out of this, full dose of P₂O₅ and K₂O and ½ dose of nitrogen was applied at the time of transplanting. The remaining dose of nitrogen was applied in two split doses, first dose was given at 15 days and second dose was given at 30 days after transplanting.

Observations were recorded on plant height (cm), stem diameter (cm), branches plant⁻¹ at 90 DAT, leaf area (cm²) and plant spread (cm) at 50% flowering stage, flowering parameters *viz.*, days to first flower bud initiation (days), days to opening of flower from bud emergence (days), days to 50% flowering (days), blooming period (days) and yield of flowers plant⁻¹. The data collected were statistically analyzed as per method suggested by Panse and Sukhatme, (1967).

RESULTS AND DISCUSSION

Significant differences were observed in all growth, flowering and yield parameters among the African marigold varieties.

Growth parameters

Data from table 1 revealed that, significantly maximum plant height (135.39 cm) was recorded in NAM-2 compared to other varieties, followed by African Giant Double (123.99 cm), Crackerjack Mix (117.50 cm). However, significantly minimum plant height (68.34 cm) was recorded in Pusa Narangi Gainda. Variation in plant height is attributed to genetic characters. The results obtained are in close conformity with the findings of Bharathi and Jawaharlal (2014) in marigold. They found highest plant height (113.27 cm) in cultivar Dharmapuri Local.

Among different varieties studied, significantly maximum stem diameter (1.58 cm) was recorded in African Giant Double, which was found statistically at par with NAM-2 (1.51 cm). However, minimum stem diameter (1.17 cm) was recorded in Pusa Basanti Yellow. The variation in stem diameter by different varieties of marigold might be due to varied growth rate and their genetic makeup. Similar results were also reported by Choudhary *et al.* (2014) in marigold. They noticed that, maximum stem diameter (2.14 cm) was recorded in MGH-148-3-3 at Haryana conditions.

NAM-2 recorded significantly maximum branches plant⁻¹ (19.73) which was statistically at par with African Giant Double (18.73) and African Marigold (18.47). However, minimum branches plant⁻¹ (14.20) were recorded in African Giant. Maximum number of branches might be due to the congenial environment to express the dominant genes in the genotypes and different genetic makeup of varieties. The results are in line with the findings of Narsude *et al.* (2010) in African marigold. They reported that, maximum number of branches plant⁻¹ (21.46) was recorded in Tuljapur Local-1.

NAM-2 recorded significantly maximum leaf area (28.67 cm²) at 50 per cent flowering stage followed by African Giant Double (25.67 cm²). However, significantly minimum leaf area (15.33 cm²) was recorded in Pusa Basanti Yellow. Similar results were also reported by Singh and Singh (2005) in French marigold. They revealed that, maximum leaf area (24.76 cm²) was recorded in germplasm of *T. minuta* TM2.

Significant difference among the varieties in respect of plant spread (East-West and North-South) was observed in African marigold at 50 per cent flowering stage. Significantly maximum plant spread (E-W and N-S) was recorded in NAM-2 (44.63 and 45.69 cm, respectively), which was statistically at par with African Giant Double (41.96 and 42.87 cm, respectively). Whereas, minimum plant spread (E-W and N-S) was noticed in Pusa Basanti Yellow (36.81 and 37.86 cm, respectively). Maximum plant spread might be due to the congenial environment to express the dominant genes in the genotypes and genetic makeup of the varieties. Similar results were also reported by Deepa *et al.* (2016) in marigold. They reported that, maximum plant spread (55.90 cm) in the E-W direction was observed in hybrid Sarpan-11 and N-S plant spread was highest in hybrids Sarpan-11 and Sarpan-33 (56.17 cm) at 90 DAT.

Flowering parameters

Data from table 1 revealed that, Crackerjack Mix took significantly minimum period for first flower bud initiation (32.60 days) compared to other varieties. Whereas, maximum days were required for first flower bud initiation in African Giant Double (63.53 days). Variation in flower bud initiation might be due to varied growth rate and different genetic makeup of varieties. Similar variations were also observed by Bharathi and Jawaharlal (2014) in marigold. They noticed that, minimum days taken for flower bud appearance (29.47 days) were found in Bangalore Local Tall.

Among different varieties, African Double Orange took significantly minimum days (14.60 days) for opening of flower from bud emergence which was found statistically at par with African Marigold (15.60 days). However, maximum days to opening of flower from bud emergence (17.80 days) was recorded in African Giant. Similar results were also observed previously by Bharathi and Jawaharlal (2014) in African marigold. They noticed that, earliest flower bud opening was observed in Double Orange (46.00 days).

Significantly minimum days (50.67 days) required for 50 per cent flowering were recorded in African Double Orange which was found statistically at par with Crackerjack Mix (52.67 days), Pusa Basanti Yellow (53.00 days) and African Giant (55.33 days). However, significantly maximum days (82.33 days) for 50 per cent flowering was recorded in African Giant Double. Among the different varieties studied, the variety African Double Orange found earliest in respect of 50 per cent flowering. This may be due to earlier opening of flower from bud emergence. Similar results were also obtained by Poornachandragowda *et al.* (2016) in African

Table 1. Performance of African marigold varieties for growth and flowering under Vidarbha conditions

Treatments	Plant height (cm) (90 DAT)	Stem diameter (cm) (90 DAT)	Branches plant ¹ (90 DAT)	Leaf area at 50% flowering (cm ²)	Plant spread at 50% flowering (cm)		Days to first flower bud initiation (days)	Days to opening of flower from bud emergence (days)	Days to 50% flowering (days)	Blooming period (days)	Yield of flowers plant ⁻¹ (g)
					E-W	N-S					
T1- African Double Orange	100.76	1.34	17.73	18.00	38.04	38.89	39.20	14.60	50.67	54.00	339.24
T2- Pusa Basanti Yellow	97.06	1.17	14.67	15.33	36.81	37.86	39.87	17.20	53.00	48.67	138.25
T3- African Giant Double	123.99	1.58	18.73	25.67	41.96	42.87	63.53	16.33	82.33	69.00	325.81
T4- Pusa Narangi Ga-inda	68.34	1.30	16.40	16.00	38.87	39.82	41.27	17.00	60.00	51.33	203.10
T5- NAM-2	135.39	1.51	19.73	28.67	44.63	45.69	46.80	16.53	61.00	64.67	642.15
T6- Crackerjack Mix	117.50	1.42	17.87	17.33	39.07	40.06	32.60	15.80	52.67	60.67	233.28
T7- African Giant	102.72	1.37	14.20	16.33	39.76	40.95	38.40	17.80	55.33	59.33	218.99
T8- African Marigold	113.37	1.22	18.47	17.67	39.65	40.66	40.47	15.60	56.33	63.33	126.31
SE(m)±	3.12	0.05	0.49	0.77	1.17	1.33	1.42	0.51	1.81	1.61	7.94
CD at 5%	9.45	0.15	1.48	2.33	3.55	4.04	4.29	1.54	5.49	4.88	24.08

***DAT - Days After Transplanting**

marigold. They revealed that, minimum number of days taken for 50 per cent flowering (57 days) was recorded in the genotype Indam Yellow.

Significantly maximum blooming period (69.00 days) was recorded in African Giant Double which was at par with NAM-2 (64.67 days). The minimum blooming period (48.67 days) was observed in Pusa Basanti Yellow. From the above results, significant differences were recorded in respect of blooming period among different marigold varieties. This might be due to more dry matter accumulation because of absorption of more nitrogen and other nutrients and nutrient uptake in addition to prevailing favourable environment. Similar results were documented by Choudhary *et al.* (2014) in marigold at Haryana conditions. They reported that, maximum duration of flowering (76.53 days) was recorded in genotype Hisar Jaffri-2.

The data presented in table 1 indicated that, there were significant differences found among varieties of African marigold in respect of yield of flowers plant⁻¹. NAM-2 noted significantly maximum yield of flowers plant⁻¹ (642.15 g) which was found statistically superior over all other varieties under study. However, significantly minimum yield of flowers plant⁻¹ (126.31 g) was recorded in African Marigold. Similar results were also observed previously by Choudhary *et al.* (2014) in marigold. They noticed that, flower yield plant⁻¹ (874.37 g) was recorded maximum in 'Hisar Jaffri-2'.

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