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EVALUATION OF MARIGOLD GENOTYPES FOR GROWTH AND FLOWERING PARAMETERS UNDER VIDHARBHA CONDITION

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ABSTRACT

An experiment was conducted for the Evaluation of marigold genotypes for growth and flowering parameters under Vidarbha condition during July, 2015 to Dec, 2015 at the farm of Horticulture Section, College of Agriculture, Nagpur. The experiment was laid out in Randomized Block Design with thirteen treatments replicated thrice. The treatment comprised of genotypes NAM-1, NAM-2, NAM-3, NAM-4, NAM-5, NAM-6, NAM-7, NAM-8, NAM-9, NAM-10, NAM-11, NAM-12 and African Double Orange. The results revealed that, growth parameters *viz.*, plant height (122.94 cm), stem diameter (1.59), branches plant^{-1} (20.81), leaf area at 50% flowering (28.89 cm^2), plant spread at 50% flowering E-W (40.14) and N-S (41.18) were recorded significantly maximum in genotype NAM-2. As regards flowering parameters *viz.*, minimum days to first flower bud initiation (38.16 days), days to opening of flower from bud emergence (14.35), minimum days to 50% flowering (50.50 days), blooming period (48.47 days) after planting were recorded in genotype African Double Orange days to opening of flower from bud emergence (14.35).

(Key words: Marigold, genotypes, growth, flowering, bulb)

INTRODUCTION

Marigold is one of the most popular loose flowers grown almost all over the world, that belong to the 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.

The total area under marigold crop in India during the year 2013-2014 was estimated to be 55.89 thousand hectares with the production of 511.31 thousand metric tones of loose flowers and 4.25 lakh numbers of cut flowers (Anonymous, 2014). The total area under marigold crop in India during the year 2013-2014 was estimated to be 55.89 thousand hectares with the production of 511.31 thousand metric tones of loose flowers and 4.25 lakh numbers of cut flowers. (Anonymous, 2014).

In Vidarbha region variability of marigold is considerably high. Number of local genotypes which differs in size and shape of flowers, are under cultivation in different districts and their productivity varies from district to district and season to season. The importance of assembling and maintaining collection of genetic diverse materials is to select suitable genotypes for the particular region to achieve the maximum benefit in a unit area. There is a need for selection and maintenance of good germplasm which serve as the basis for selection in crop breeding programme.

MATERIALS AND METHODS

A field experiment was carried out at farm of Horticulture Section, College of Agriculture, Nagpur during *karif* season of the year 2015-2016. The experiment was laid out in a Randomized Block Design with three replications. The experiment comprised with thirteen treatments *viz.*, T_1 – NAM-1, T_2 – NAM-2, T_3 – NAM-3, T_4 – NAM-4, T_5 – NAM-5, T_6 – NAM-6, T_7 – NAM-7, T_8 – NAM-8, T_9 – NAM-9, T_{10} – NAM-10, T_{11} – NAM-11, T_{12} – NAM-12 and T_{13} – African Double Orange.

The seeds of local genotypes of African marigold were collected from different villages of Nagpur and Bhandara district. 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

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planting of one seedling hill^{-1} in the experimented field on 22th July, 2015 at the distance of 45 cm x 30 cm.

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 P_2O_5 and K_2O and 1/2 dose of nitrogen was applied at the time of planting. 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 planting.

Observations were recorded on plant height (cm), stem diameter (cm), branches plant^{-1} at 15 days interval, leaf area (cm^2) and plant spread (cm) at 50% flowering stage, flowering parameters *viz*., days to first flower bud initiation (days) at first flower bud initiation, diameter of fully opened flower from bud emergence (days) at opening of flower bud emergence, days to 50% flowering (days) at 50% flowering, blooming period (days) at flower first harvest to last harvest collected data were statistically analyzed as per method suggested by Panse and Sukhatme, (1967).

RESULTS AND DISCUSSION

Growth parameters

Data from table 1 revealed that, significantly maximum plant height (122.94 cm) was recorded in genotype NAM-2 which was at par with the genotype NAM-4 (115.90 cm) followed by genotypes NAM-8 (112.78 cm), NAM-6 (100.92 cm), NAM-5 (100.48 cm). However, significantly minimum plant height (75.00 cm) was recorded in genotype NAM-1.

As regards genotype NAM-2 noticed significantly maximum branches plant^{-1} (20.81) which was significantly superior over all other genotypes followed by genotype NAM-4 (18.60). However, minimum branches plant^{-1} (11.11) were recorded in the genotype NAM-1.

In respect of genotype NAM-2 recorded significantly maximum stem diameter (1.59 cm) which was found statistically at par with the genotypes NAM-4 (1.56 cm) and NAM-8 (1.47 cm). However, minimum stem diameter (1.19 cm) was recorded in the genotype NAM-1.

The data presented in table 1 genotype NAM-2 recorded significantly maximum leaf area (28.89 cm^2) at 50 per cent flowering compared to other genotypes, which was found statistically at par with the genotype NAM-9 (28.85 cm^2) followed by genotypes NAM-5 (26.59 cm^2), NAM-4 (26.15 cm^2). However, significantly minimum leaf area (15.45 cm^2) at 50 per cent flowering stage was recorded in genotype NAM-1.

Significant difference among the genotypes 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 genotype NAM-2 (40.14 and 41.18 cm, respectively), which were statistically at par with the genotypes NAM-9 (40.01 and 41.12 cm, respectively), NAM-5 (38.90 and 39.97 cm, respectively), NAM-4 (38.72 and 39.74 cm, respectively), NAM-7 (37.14 and 38.19 cm, respectively) and NAM-6 (37.08 and 38.10 cm, respectively). While, minimum plant spread was noticed with the genotype NAM-1 (32.56 and 33.00 cm, respectively).

These results might due to the differences among the genotypes for plant height is attributed to their variation in their genetic makeup. Similar results were recorded by Bharati and Jawaharlal (2014). They revealed that, highest plant height was recorded in cv. Dharmapuri Local in marigold. Narsude *et al.* (2010) reported that, maximum plant height, plant spread and stem girth was recorded in cv. Pakharsangavi Local however, maximum number of branches plant^{-1} was recorded in genotype Tuljapur Local-1 in marigold. Raghuvanshi and Sharma (2011) reported that, maximum plant height recorded in cv. Safari Queen however, maximum plant spread was noticed in cv. Harmony Boy in marigold. Wankhede *et al.* (2004) noticed that, maximum plant height was recorded in gerbera cv. Charmander whereas, maximum leaf area was recorded in gerbera cv. Savannah under shade net conditions.

Flowering parameters

Data from table 2 revealed that, genotype African Double Orange took significantly minimum period for first flower bud initiation (38.16 days) compared to other genotypes, which was found statistically at par with the genotypes NAM-4 (40.04 days) and NAM-7 (40.06 days). However, maximum days were required for first flower bud initiation in the genotype NAM-3 (52.26 days). The different period required for the first flower bud initiation in African marigold genotypes might be due to varied growth rate and their different genetic makeup.

As regards genotype African Double Orange took significantly minimum days (15.07 days) for opening of flower from bud emergence compared to other genotypes, under investigation which was found statistically at par with the genotype NAM-2 (16.40 days). However, maximum days were required for days to opening of flower from bud emergence with the genotype NAM-3 (19.92 days).

Significantly minimum days required for 50 per cent flowering (50.50 days) were recorded in the genotype African Double Orange which was found statistically at par with genotypes NAM-10 (55.04 days), NAM-6 (54.07 days), NAM-4 (52.14 days), NAM-7 (52.11). However, significantly maximum days (64.84 days) for 50 per cent flowering were taken by the genotype NAM-3 which was found statistically at par with the genotypes NAM-1 (62.52 days) and NAM-8 (61.22 days).

Significantly longer blooming period (64.49 days) was recorded in the genotype NAM-3 which was at par with the genotypes NAM-1 (63.14 days), NAM-8 (62.13 days), NAM-2 (60.52) and NAM-9 (60.15 days). The shorter flowering period (48.47 days) was observed in the genotype African Double Orange followed by genotype NAM-4 (48.68 days).

Table 1. Growth and flowering as influenced by marigold genotypes

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 (cm)
					E-W	N-S				
T1- NAM-1	75.00	1.19	11.11	15.45	32.56	33.00	50.08	17.80	62.52	63.14
T2- NAM-2	122.94	1.59	20.81	28.89	40.14	41.18	45.79	16.40	58.16	60.52
T3- NAM-3	84.17	1.21	13.20	17.86	36.14	37.18	52.26	19.92	64.84	64.49
T4- NAM-4	115.90	1.56	18.60	26.15	38.72	39.74	40.04	15.07	52.14	48.68
T5- NAM-5	100.48	1.34	15.60	26.59	38.90	39.97	45.91	17.54	57.37	52.38
T6- NAM-6	100.92	1.36	15.92	22.85	37.08	38.10	42.92	17.50	54.07	56.13
T7- NAM-7	99.05	1.28	16.80	23.37	37.14	38.19	40.06	19.83	52.11	49.16
T8- NAM-8	112.78	1.47	16.90	21.18	36.57	37.62	49.92	17.82	61.22	62.13
T9- NAM-9	95.84	1.24	18.08	28.85	40.01	41.12	45.12	19.85	58.91	60.15
T10-NAM-10	94.64	1.23	13.92	19.59	36.42	37.45	43.55	17.62	55.04	56.90
T11-NAM-11	99.12	1.31	15.62	17.12	36.03	37.07	48.16	19.15	67.78	58.14
T12-NAM-12	82.38	1.16	15.23	18.95	36.92	37.96	46.15	19.62	58.58	50.37
T13-African Double Orange	95.15	1.37	15.38	18.95	36.33	37.35	38.16	17.48	50.50	48.47
SE(m)±	3.19	0.04	0.46	0.70	32.56	1.09	1.55	0.65	1.72	1.71
CD at 5%	9.32	0.12	1.35	2.03	40.14	3.19	4.52	1.91	5.02	4.99

***DAT- Days after transplanting**

From above results, it is showed that the different period required for the first flower bud initiation in African marigold genotypes might be due to varied growth rate and their different genetic makeup *viz*., minimum days to first flower bud initiation, days to opening of flower from bud emergence, 50 per cent flowering and blooming period in marigold.

That this might be due variation in their genetic factors. The results are obtained during this investigation are in close agreement with the results of Singh *et al.* (2003). They observed that, maximum flowering duration was recorded in marigold cv. 'Orange Gate'. Rao *et al.* (2005) reported that, maximum duration of flowering was recorded in marigold cv. Orange Double. Arulmani *et al.* (2015) reported that, minimum days taken for first flower appearance and days taken for 50 per cent flowering were observed in gaillardia cv. DGC-2. Bhuyar *et al.* (2004) reported that gerbera cultivar Ruby Red showed best results in terms of bud initiation of flower under fan and pad cooling system polyhouse conditions.

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