Evaluation of summer marigold hybrids for agro economic traits under prayagraj agro- climatic condition

ABSTRACT

Evaluation of ten marigold varieties/ hybrids of African marigold, has been taken up at Vegetable farm, Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology & Sciences, Prayagraj (UP) during 2022-23 The experiment was laid out in Randomized Block Design (RBD) with three replications. The analysis of variance revealed significant variation for most of the parameters. The result revealed that highest plant height (T10) (92.93cm), number of branches(T7) (27), was noted in recorded maximum leaf area index (T7) (3.25cm) and flower bud initiation (T10) (45). Earliest 50% flowering (T10) (57days). No. of flower per plant highest in (T7) (78), highest yield per plot (873.34g) and yield hactare-1 (4.37 t.) in (T7) PusaBasanti.

Key words: - summer, marigold varieties/ hybrids, climate.

1.INTRODUCTION

African Marigold (*Tagetes erecta L.*) belonging to family Asteraceae is the most commonly grown loose flower and is extensively used in religious and social functions. It is gaining popularity on account of its easy culture, wide adaptability, and increasing demand in the Asian subcontinent. Marigold plants originate from Central America, probably in Mexico. Today, they are naturalised in the tropics and sub-tropics of the Old and New worlds. They are cultivated in India and Pakistan as a medicinal, flavouring, dye and ornamental plant. Marigold flowers are available year round with a peak season in the summer and fall months. Marigold is an annual flower and requires full sun to bloom. The blooms may be single or double colored and can be varying hues of yellow, orange, red, and maroon. in Sometimes, the whole plant is used for decorations. It can be planted in beds for mass display, in mixed borders and can also be grown in pots. Different varieties of African marigold vary in plant height and spread, flower size, quality and yield. The flowers are large and globular in shape. Colour shades vary from

light yellow to creamy yellow, bright yellow, cadmium orange, deep orange, sulphur yellow and white. “The total area under marigold cultivation was 68.33 thousand hectares with the production of 607.97 thousand MT (NHB 2017) in India and estimated production was 755.10 thousand MT according to NHB 2021-22 (1st advanced estimate). Seed production is a critical component in any crop improvement program, and finding good seed is a major challenge in marigold. The success of marigold production is determined by a number of management elements, one of which is nutrition. Nutrition plays a vital role in marigold development, flowering, and seed generation” (Swaroop*et al*., 2007).

“Among the various reasons behind low productivity of marigold, poor soil and nutrient management is a major cause. Therefore, nutrient management has prime importance for successful cultivation. But, the indiscriminate application of chemical fertilizers alters the soil fertility, leading to the pollution of soil and water bodies. These are an important part of contemporary agriculture for maintaining production sustainability, yet they can be harmful to soil health over time. As a result, chemical fertilizers use must be restricted to a certain extent” (Gotmare*et al*., 2007). “On the other hand total organic farming may be a desirable proposition for improving the quality of agricultural produce. It may not be possible to maintain the quality of the produce in commercial agriculture, where mostly the stress will be given mainly on yield. It is impossible to meet the nutrient requirement of the crops, exclusively through the organic farming” (Upadhyay*et al*. 2022).

“After all the sustainability in agriculture system is a global issue. Under these circumstances, practice of INM is the better option for the improvement of physical (structure and water retention capacity), chemical (nutrients and cation exchange capacity) and biological (microflora and microfauna) properties. As a result, a promising cultivar and performing well in one region, may fail to perform well in another region of varying climatic conditions. The quest for selecting suitable high yielding variety/hybrid for the region leads to the requirement of collection and evaluation of available genotypes”. (Borah et al.,2019). INM is

based on the idea of maintaining and maybe improving soil fertility in order to achieve long-term productivity (Panda, 2006).

"Under given agro-climatic conditions, it is important to study the performance of existing varieties available in market and also to identify the best genotype with desirable characteristics and yield which will fetch remunerative profit to farmers of the state. The ultimate yield and production of quality flowers, pigment contents in flower and resistance to biotic factors depend upon the selection of suitable cultivars for a particular locality". (Borah et al.,2019)

2. MATERIALS AND METHODS

The experiment was conducted at Department of Horticulture, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology & Sciences, Prayagraj (U.P.) during 2022-2023. Prayagraj is situated at an elevation of 78 meters above sea level at 25.87^0 North latitude and 81.150 E longitudes. This region has a sub-tropical climate prevailing in the South-East part of U.P. with both the extremes in temperature, *i.e.*, the winter and the summer. In cold winters, the temperature sometimes is as low as 32^0F in December – January and very hot summer with temperature reaching up to 115^0F in the months of May and June. During winter, frosts and during summer, hot scorching winds are also not uncommon. The average rainfall is around 1013.4 (cm) with maximum concentration during July to September months with occasional showers in winter.
The present investigation was carried out on summer, marigold varieties/ hybrids was used as a there were 10 treatments marigold varieties/ hybrids the treatment was common manures and fertilizer application replicated thrice in randomized block design. Cocopeat and vermicompost was used in nursery tray for preparation of marigold seedlings.

Chart 1. List of treatments and treatment variety used for the study

TREATMENTS	TREATMENT VARIETY	VARIETY
T_1V_1	Indus Orange Bunch	Hybrid

T_2V_2	Marigold Gulzafri Orange	Variety
T_3V_3	Indus Sweet Orange	Hybrid
T_4V_4	PusaNarangi	Hybrid
T_5V_5	Double Orange African Marigold	Hybrid
T_6V_6	Marigold Yellow F2	Variety
T_7V_7	PusaBasanti	Hybrid
T_8V_8	African Marigold Yellow Supreme	Hybrid
T_9V_9	Orange African Marigold	Hybrid
$T_{10}V_{10}$	Marigold Yellow F1	Hybrid

3. RESULTS AND DISCUSSION

3.1 Plant height (cm)

At 30 DAT, the plant height was reported highest (52.57cm) in the Double orange African marigold (T5) which was found *at par* with the Indus orange bunch (T1) (49.01 cm) (43.58). the plant height was reported minimum (27.98) in Pusanarangi (T4). Similarly, at 60 DAT, the plant height was recorded maximum (82.84cm) in Indus sweet orange (T3) which was *at par* with (T10) Marigold yellow F1 (81.55) and (T1) Indus orange bunch (77.55) the plant height was reported minimum (47.44) in Pusanarangi (T4) marigold yellow F1 (T10) observed maximum height (92.93cm) At 90DAT which was *at par* with (T8) African marigold yellow supreme (88.48), followed by (T7) Pusabasanti (60.26cm).Variation noted among the treatment might be due to the varietal characters responsible by a gene. As a genetically controlled factor, plant height varied among treatments of marigold. Similar results were also observed in different genotypes by kumar et al. (2017), in a Chrysanthemum, Hedge et al (2022), in Dahlia, Kumari et al (2017), Singh and Singh (2006), Khanvilkar et al (2003) in Marigold .

3.2 Number of branches per Plant

At 30 DAT, the Number of branches was reported highest (11.47cm) in the Pusabasanti (T7) which was found *at par* with the Pusanarangi (T4) (9.26cm) (9.11cm). the Number of branches was reported minimum (27.98) in Marigold yellow F2 (T6). At 60 DAT, the Number of branches was reported highest (17.47cm) in the Pusabasanti (T7) which was found *at par* with the Pusanarangi (T4) (15.27cm) (15.11cm). the Number of branches was reported minimum (7.89) in African marigold yellow supreme (T8). At 90 DAT, the Number of branches was reported highest (22.47cm) in the Pusabasanti (T7) which was found *at par* with the Pusanarangi (T4) (18.27cm) (17.11cm). the Number of branches was reported minimum (11.89) in Marigold yellow F1 (T6).The variation observed in different treatments for number of primary branch may be due to its genetic inheritance character (Narsude et al. 2010) environmental condition also affected the genetic composition. These finding also followed with Singh and Singh (2010), Rao et al. (2003), in marigold ,Munikrishnappa et al. (2013)

3.3 Leaf area index and Days to flower bud initiation.

The records made known that the Leaf Area Index (3.25) was recorded in (T7) Pusabasanti which found to be *at par* with (T8) African marigold yellow supreme (2.83) whereas the lowest Leaf Area Index was reported in (T6) marigold yellow F2 (1.89).Illustrated the data relevant to Days to flower bud Initiation (T8) African marigold yellow supreme (37.25 Days) earliest days of flower bud Initiation were noticed in Late bud Initiation was (T10marigold yellow F2 (45.18).The performance of genotype may vary with climatic condition and their genetic make up. These findings are common with Kumar (2013);in gerbera,vikas et al .(2015)

3.4 Days to 50% Flowering, No. of flowers per plant and Flower duration.

The number of days required for the investigated variety to reach 50% flowering showed significant variances. According to data on the number of days needed for 50% flowering (T4) Pusanarangi (48.16 Days) experienced 50% flowering at the earliest possible time.(T10) Marigold yellow F1 (57.41 Days) was flowering late.Varied genotypes may require different flowering times depending on their genetic make-up (Singh and Singh, 2006). The results were consistent with those

of Singh and Mishra (2008) for marigold and those of Nair et al. (2003) for gerbera.

The records made known that the highest number of flowers plant**.**the records made known that the highest number of flowers per plant (78.34) was recorded in (T7) Pusabasanti which found to be *at par* with (T4) Pusanarangi (65.44) whereas the lowest number of flower was reported in (T5) Double orange African marigold (35.33).Similar finding have been reported by Singh and Sangama (2000) in China Aster, Singh et al. (2004), Singh and Mishra (2009), Sunitha et al. (2007), Narsude et al.(2010), Beniwal and Dahiya (2012) in marigold.The result related to flower duration was found to be significant.the data relevant to days to first flowering earliest days of first flowering were noticed in (T1) Indus orange bunch (39.31Days).

4. CONCLUSION

These findings concluded thatsummer marigold variety/hybrid experiment considering the important vegetative, floral and yield characteristics, (T7) Pusabasanti is found suitable for commercial cultivation. To obtain the higher benefits in prayagraj (U.P.) under Allahabad agro climatic conditions.with better quality along with maximum yield of flower (T7) Pusabasanti followed by (T4) Pusanarangi may be recommended for commercial cultivation.

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Table 1 Plant height, Number of branches per Plant and Leaf Area Index of marigold variety/hybrid at different time intervals.

Treatments	Treatments	Plant Height (cm)			Number of branches/ Plant			
		30 DAS	60 DAS	90 DAS	30 DAS	60 DAS	90 DAS	Leaf Area Index
T_1	Indus orange bunch	49.01	77.55	81.36	9	15	17	2.19
T_2	Marigold gulzafri orange	35.85	61.7	79.33	5	9	13	2.33
T_3	Indus sweet orange	48.53	82.84	86.72	8	13	16	2.1
T_4	Pusanarangi	27.98	47.44	76.31	9	15	18	2.33
T_5	Double orange African marigold	52.57	72.25	85.43	5	9	12	2.03
T_6	Marigold yellow F2	34.99	70.5	86.36	3	9	13	1.89
T_7	Pusabasanti	43.58	53.31	60.26	11	17	22	3.25
T_8	African marigold yellow suprem	37.65	76.63	88.48	4	8	12	2.83
T_9	Orange african marigold	35.64	61.59	68.82	8	12	14	2.15
T_{10}	Marigold yellow F1	38.24	81.55	92.93	5	10	12	2.41
	S.Ed(±)	**2.24**	**2.41**	**2.47**	**0.16**	**0.29**	**0.37**	**0.12**
	C.D. at 5%	**6.66**	**7.15**	**7.34**	**0.49**	**0.86**	**1.1**	**0.36**

Table 2 Days to flower bud initiation, Days to 50% Flowering, No. of flowers per plantand Flower duration (Days)of marigold variety/hybrid at different time intervals.

Treatments	Treatments	Days to flower bud initiation	Days to 50% Flowering	No. of flowers per plant	Flower duration (Days)
T_1	Indus orange bunch	42	57	59	39
T_2	Marigold gulzafri orange	37	48	44	26
T_3	Indus sweet orange	40	52	50	28
T_4	Pusanarangi	37	48	65	26
T_5	Double orange African marigold	44	49	35	20
T_6	Marigold yellow F2	39	48	35	24
T_7	Pusabasanti	41	50	78	22
T_8	African marigold yellow suprem	37	47	36	26
T_9	Orange african marigold	42	49	47	21
T_{10}	Marigold yellow F1	45	57	38	36
	S.Ed(±)	**1.08**	**1.35**	**1.22**	**0.75**
	C.D. at 5%	**3.21**	**4.01**	**3.61**	**2.24**