



PERFORMANCE OF DIFFERENT MARIGOLD VARIETIES UNDER AGRO CLIMATIC CONDITION OF PESHAWAR (*TAGETES ERECTA*)

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ABSTRACT

An experiment "Performance of different Marigold varieties" was carried out at Ornamental Nursery Department of Horticulture, the University of Agriculture Peshawar during 2013. Seedlings of Marigold cultivars "Inca 1 gold, White vanilla African, Bunanza French, Inca 2 double orange" were selected and transplanted in pots on 4th September 2013 having 6 plants in one treatment and they were replicated three times. The experiment was laid out in completely randomized design (CRD) and data were collected on days to flowering, number of branches plant⁻¹, number of flowers plant⁻¹, flower weight (gm), flower volume (cm³), plant height (cm), root weight (gm), and number of leaves plant⁻¹. Different varieties had showed significant results, however minimum days to flowering (22), maximum plant height (39.6), maximum number of leaves (108), maximum number of flowers (21.5), maximum flower weight (10.22), maximum flower volume (27.80), maximum root weight (7.33), and maximum number of branches were recorded in variety (Inca-1 gold) and variety (Inca-2 double orange). Statistical analysis showed different varieties of Marigold had significantly affected the plant height (cm), number of leaves plant⁻¹, flower weight (gm), flower volume (cm³), root weight (gm), number of branches plant⁻¹. On the basis of conclusion it is stated that variety (Inca 1 gold) and variety (Inca-2 double orange) showed best performance, so it is recommended for the flower growers of Peshawar area.

KEYWORDS: Marigold, Varieties, Cultivars

INTRODUCTION

Marigold (*Tagetes erecta* L) belongs to family Asteraceae or Compositae and order Asterales are grown as landscape plant use for aesthetic gratification. Marigolds come in different colors; yellow and orange being the most common. Marigold plant have a stout, branching and common species are grown up to 60cm. Marigold is an extremely effective herb for the treatment of skin problems and can be used wherever there is inflammation of the skin, whether due to infection or physical damage. As an ointment, Marigold is an excellent cosmetic remedy for repairing minor damage to the skin such as sub dermal broken capillaries or sunburn [1].

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.

Most of the marigolds have some odor and has great value in cosmetic treatment. There are many varieties of Marigolds available today. Some of the major Marigold varieties are African or American Marigolds, French Marigolds, Signet Marigolds.

Loose flowers are sold in the markets which are mainly used in making garlands. The flowers are also used as cut flower arrangement. Furthermore, Marigold is grown for beautification as a landscape plant due to its variable height and various colors. French Marigold is ideal for rockeries, ending, hanging basket and window boxes.

Marigold is adaptable to different types of soils. However, sandy, loamy, clay, well drained and fertile soil of pH 7.9-8.5 is most desirable.

Marigolds can be propagated by seeds. The plants need about 45 days to flower after seeding. Proper spacing between plants is required for better development of plants and higher flowers production. Marigold seeds should be sown 2cm apart. When true leaves have formed, transplant into individual containers or outdoors.

Proper fertilizer application is must but it is in the form of fertigation. With the application of nitrogen (N), the number of flowers per plant and flower production increases. Similarly with the application of potash can prolong the flowering period. Likewise for better performance of plant, incorporation of farm yard manure with soil is must before sowing of seeds.

As we know that we give fertilizer in a ratio of 1:2:1 to flowering plant, but Marigold requires a very little amount of fertilizer and a soil having much amount of organic matter.

Varietal screening for growing Marigold in area is important because as we know that Marigold is an important loose flower commercially used in landscape as cut flower and other casual activities.

So I design my experiment with an objective to evaluate the performance of different varieties of Marigold and to choose the best variety for Peshawar area.

MATERIALS AND METHODS

An experiment on "performance of different Marigold varieties" was conducted at the Ornamental nursery Horticulture Department, the University of Agriculture Peshawar during 2013. 4-week-old seedlings at 2-3 leaves stage of Marigold were brought from registered nursery NAZ garden and transplanted to the pots on 4th September.

The experiment was laid out in Complete Randomized Design (CRD) with four treatments and replicated thrice and there were six plants in each treatment.

Marigold different varieties (Inca-1 Gold, White vanilla African, Bunanza French , Inca-2 Double orange) were transplanted randomizely into 12 different plots, each plot contain six

plants every treatment was repeated three time. Each plot was managed with respect to pest control, irrigation, and weeding.

2.1 DIFFERENT VARIETIES

- V1 Inca-1 gold
- V2 White vanilla African
- V3 Bunanza French
- V4 Inca-2 double orange

2.2 PARAMETERS

The following parameters were studied in experiment during the flowering season.

2.2.1 Days to flowering

Number of days from the data of transplantation to first flowering was counted for each treatment in each replication and average was calculated.

2.2.2 Plant Height (cm)

From each treatment in each replication three plants were randomly selected, stem were measured with measuring tape and average was calculated.

2.2.3 Number of leaves plant⁻¹

From each treatment in each replication three plants were selected, leaves were counted and average was counted.

2.2.4 Number of flowers plant⁻¹

From each treatment in each replication three plants were randomly selected, flowers were counted and average was calculated.

2.2.5 Flower weight (gm)

From each treatment three plants were randomly selected, weigh and average was calculated.

2.2.6 Flower volume (cm³)

From each treatment in each replication three plants were randomly selected, volumes were determined and average was calculated.

2.2.7 Root weight (gm)

From each treatment in each replication three plants were selected, roots were weight and average was calculated.

2.2.8 Number of branches plant⁻¹

From each treatment in each replication three plants were randomly selected branches were counted and average was calculated.

RESULTS AND DISCUSSION

3.1 Days To Flowering

Data regarding days to flowering has been shown in table 1, analysis of variance in table 1-a, while original replicated data is in appendix-1. P-value (0.00) in table-1a shows that days to flowering were significantly different among varieties. Minimum days to flowering (22) were taken by variety (Bunanza French Marigold), while more days to flowering (41) were taken by variety (White vanilla African marigold). Who concluded that early or late flowering could be due to genetic makeup of a variety [2].

3.2 Plant Height (cm)

Data regarding plant height has been shown in table 1, analysis of variance in table 1-b, while original replicated data is in appendix-2. P-value (0.0001) in table 1-b shows that plant height were significantly different among varieties. Maximum plant height (39.6) was taken by variety (Inca-2 double orange), while minimum plant height (27.4) was taken by variety (Bunanza French Marigold). Who concluded that maximum and minimum plant height could be due to the genetically controlled factors [3].

Table 1. Performance of different Marigold varieties on days to flowering and plant height

Treatment	Days to flowering	Plant height(cm)
Inca-1 gold	40.6 a	34.8 b
White vanilla African	41 a	38.3 a
Bunanza French	22 b	27.4 c
Inca-2 double orange	40.6 a	39.6 a

LSD value at 5% level of significance=6.60 LSD value at 5% level of significance=5.05

Means followed by same letters are statistically not different from each other.

Table 1a. Analysis of variance for days to flowering.

Source	D.F	S.S	M.S	F	P
Treatments	3	793.58	264.52	46.7	0.00
Error	8	45.33	5.66		
Total	11	838.91			

Coefficient of variation = 6.60%

Table 1b. Analysis of variance for plant height (cm).

Source	D.F	S.S	M.S	F	P
Treatments	3	269.78	89.92	28.7	0.0001
Error	8	25.06	3.13		
Total	11	294.84			

Coefficient of variation = 5.05%

3.3 Number of Leaves Plant⁻¹

Data regarding number of leaves has been shown in table 2, analysis of variance in table 2-a, while original replicated data is in appendix-3. P-value (0.851) in table 2-shows that numbers of leaves were not significantly different among varieties. Maximum number of leaves (108) were counted in variety (Inca-2 double orange), while minimum number of leaves (100.50) were counted in variety (Inca-1 gold). Who concluded that the number of leaves plant⁻¹ may vary from variety to variety and hence it is a varital trait and is governed by the genetical makeup [4].

3.4 Number of Flowers Plant⁻¹

Data regarding number of flowers has been shown in table 2, analysis of variance in table 2-b, while original replicated data is in appendix-4. P-value (0.154) in table 2-b shows that number of flowers was significantly different among varieties. Maximum numbers of flowers (21.5) were taken by variety (Bunanza French Marigold), while minimum numbers of flowers (16.3) were taken by variety (Inca-1 gold). Who concluded that less or more number of flowers could be due to the prominent central disc florets and also due to the presence of fairly more number of developed ray florets [5].

Table 2. Performance of different Marigold varieties on number of leaves plant⁻¹ and number of flowers plant⁻¹.

Treatment	No. of leaves plant ⁻¹	No. of flowers plant ⁻¹
Inca-1 gold	100.50 a	16.3 b
White vanilla African	105.33 a	19.6 ab
Bunanza French	106.17 a	21.5 a
Inca-2 double orange	108 a	18.4 ab

LSD value at 5% level of significance=10.33 LSD value at 5% level of significance=13.19
Means followed by same letters are statistically not different from each other.

Table 2a. Analysis of variance for number of leaves plant⁻¹.

Source	D.F	S.S	M.S	F	P
Treatments	3	92.17	30.72	0.26	0.851
Error	8	941.33	117.66		
Total	11	1033.50			

Coefficient of variation = 10.33%

Table 2b. Analysis of variance for number of flowers plant⁻¹.

Source	D.F	S.S	M.S	F	P
Treatments	3	43.19	14.39	2.30	0.154
Error	8	50.18	6.27		
Total	11	93.38			

Coefficient of variation = 13.193%

3.5 Flower Weight (gm)

Data regarding flower weight has been shown in table 3, analysis of variance in table 3-a, while original replicated data is in appendix-5. P-value (0.00) in table 3-a shows that flower weight was significantly different among varieties. Maximum flower weight (10.2) was recorded of variety (Inca-1 gold), while minimum flower weight (2.7) was recorded of variety (Bunanza French). Who concluded that maximum or minimum flower weight could be due to increased flower size with high dry matter accumulation [6].

3.6 Flower Volume (cm³)

Data regarding flower volume has been shown in table 3, analysis of variance in table 3-b, while original replicated data is in appendix-6. P-value (0.049) in table 3-b shows that flower

volume was significantly different among varieties. Maximum flower volume (27.8) was taken by variety (Inca-1 gold), while minimum flower volume (9.2) was taken by variety (Bunanza French). Who concluded that maximum or minimum flower volume could be due to genetic makeup of a variety [7].

Table 3. Performance of different Marigold varieties on flower weight and flower volume.

Treatment	Flower weight(gm)	Flower volume(cm ³)
Inca-1 gold	10.22 a	27.80 a
White vanilla African	6.75 b	22.83 a
Bunanza French	2.77 c	9.20 b
Inca-2 double orange	9.77 a	20.53 ab

LSD value at 5% level of significance=10.13 LSD value at 5% level of significance=33.56
Means followed by same letters are statistically not different from each other.

Table 3a. Analysis of variance for flower weight (gm)

Source	D.F	S.S	M.S	F	P
Treatments	3	106.32	35.44	63.4	0.00
Error	8	4.47	0.55		
Total	11	110.79			

Coefficient of variation = 10.13%

Table 3b. Analysis of variance for flower volume (cm³).

Source	D.F	S.S	M.S	F	P
Treatments	3	556.99	185.66	4.08	0.049
Error	8	363.81	45.47		
Total	11	920.80			

Coefficient of variation = 33.56%

3.7 Root Weight (gm)

Data regarding root weight has been shown in table 4, analysis of variance in table 4-a, while original replicated data is in appendix-7. P-value (0.62) in table 4-shows that root weight was not significantly different among varieties. Maximum root weight (7.3) was recorded of variety (Inca-2 double orange), while minimum root weight (5.2) was recorded of variety (Bunanza French). Who concluded that maximum or minimum root weight could be due to physiology of a plant [8].

3.8 Number of Branches Plant⁻¹

Data regarding number of branches has been shown in table 4, analysis of variance in table 4-b, while original replicated data is in appendix-8. P-value (0.304) in table 4-b shows that the numbers of branches were not significantly different among varieties. Maximum number of branches (26.3) were counted in variety (Inca-1 gold), while minimum number of branches (16.8) were counted in variety (Bunanza French). Who concluded that less or more number of branches could be due to the influence of genetical make up of a variety [9].

Table 4. Performance of different Marigold varieties on root weight and number of branches plant⁻¹.

Treatment	Root weight(gm)	No. of branches plant ⁻¹
Inca-1 gold	5.83 a	26.33 a
White vanilla African	7.20 a	26.16 a
Bunanza French	5.20 a	16.83 a
Inca-2 double orange	7.33 a	24.33 a

LSD value at 5% level of significance=36.11 LSD value at 5% level of significance=27.72
Means followed by same letters are statistically not different from each other.

Table 4a. Analysis of variance for root weight (gm).

Source	D.F	S.S	M.S	F	P
Treatments	3	9.81	3.27	0.61	0.62
Error	8	42.61	5.32		
Total	11	52.42			

Coefficient of variation = 36.11%

Table 4b. Analysis of variance for number of branches plant⁻¹.

Source	D.F	S.S	M.S	F	P
Treatments	3	180.75	60.25	1.43	0.304
Error	8	337.16	42.14		
Total	11	517.91			

Coefficient of variation = 27.72%

CONCLUSION AND RECOMMENDATIONS

Based on the results it is concluded that:

Statistical analysis showed different varieties of Marigold had significant differences in the maximum plant height (cm), maximum number of leaves plant⁻¹, maximum flower weight (gm), maximum flower volume (cm³), maximum root weight (gm), maximum number of branches plant⁻¹.

On the basis of conclusion it is stated that variety (Inca 1 gold) and variety (Inca-2 double orange) showed best performance, so it is recommended for the flowers growers of Peshawar area.

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