

Effect of Bio fertilizers with NPK Level on Vegetative Growth, Flowering and Flower Yield of F1 Hybrid (*Pusa Basanti*) of african marigold (*Tagetes erecta* L.)

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Abstract

An investigation was carried out to study effect of Biofertilizers with NPK levels on vegetative growth, flowering and flower yield of F1 hybrid (Pusa Basanti) of African marigold (*Tagetes erecta*) during the winter season 2008-2009 .The Experiment laid out in Randomized Block design (RBD) with 14 treatment combination and replicated thrice, the treatments were made by making the combination of NPK, Azoto, PSB, VAM, the results revealed maximum plant height (27.67cm), maximum plant spread (33.67), Number of primary branches (13.33), Number of flower per plant (19.00), flower size (9.00cm), weight of flower (15.67), Days to appearance of first Flower bud Initiation (33.33 days), Flower yield (165.55q/ha), maximum net profit (Rs.72192.42),and benefit cost ratio (2.12) Based on the above discussion, it is concluded that treatment T₆ 75% NPK + PSB + Azoto + VAM was found to be the best treatment as compared to others which significantly increased the plant growth, flowering, and flower yield of African marigold F1Hybrid (Pusa Basanti) *Tagetes erecta*.

Keywords: Bio fertilizers, NPK, F1hybrid, vegetative growth, yield *etc.*

Introduction

The marigold belongs to family Asteraceae and genus *Tagetes*. There are about 33 species under the genus but two species namely *Tagetes erecta* L. the African type and *Tagetes patula* L. the French types are very common in Indian gardens and are native to Mexico and South America. The African marigold as a vigorous tall growing plant and having flowers of lemon yellow, orange, white colors etc. while the French marigold is mostly dwarf and compact in growth habit.it is ideal for rockery, edging, hanging basket, and window boxes. Marigold can be grown in three seasons. *i.e.* rainy, winter, and summer but the quality flowers are produced during the winter. Marigold spread quickly among the growers because of the ease in cultivation, longer blooming period and beautiful flowers with an excellent shelf life.it has wide adaptability to different soils and climatic condition. They are extensively used for garlands, religious offerings and exhibitions. The plants of *Tagetes* species yield a strong aromatic and essential oil which is used in making high grade perfumes. The leaf paste is used

for ear-ache. The flower extract is used as blood purifier and good remedy for eye diseases, ulcers. Marigold is highly effective in keeping the nematode population control. One of the major concerns in today's world is the pollution and contamination of soil. The use of chemical fertilizers and pesticides has caused tremendous harm to the environment. A solution for this is the use of biofertilizers, environmentally friendly fertilizers now used in most countries. Biofertilizers are the products containing living cells of different types of microorganism which have an ability to fix atmospheric nitrogen and to convert non -usable from the nutrients to usable form through biological process. The Biofertilizers are cheap so a normal farmer can take the benefits from its. *Azospirillum* colonizes the root mass and fixes N is loose Association with plants.it fixes nitrogen in an environment of low oxygen tension. They can fix 25-30 kg N/ha. The VAM fungi are beneficial microorganism, which form symbiotic association with fine roots of plants. They colonize root cortical tissues and extend their hyphae into the surrounding; farming

an important linkage between plants and its underground environment. It reduces the phosphorous requirement. The reports indicated that the vegetative growth, flowering and yield of African marigold (*Tagetes erecta*) F1 hybrid were enhanced by application of PSB, VAM, Azotobacter and NPK levels. From the findings of present investigation was to find out the effect of biofertilizers with NPK levels on vegetative growth, flowering, and flower yield of F1 hybrid (Pusa Basanti) of African marigold (*Tagetes erecta*).

Materials and Methods

This experiment was conducted in Floriculture Unit, Department of Horticulture, College of Agriculture, Allahabad Agricultural Institute Deemed University Allahabad (Prayagraj) UP, India during 2009-2010. Soil of the experimental plot was sandy loamy, uniform in texture and well drained. NPK was applied @ 80 kg N, 100 kg P₂O₅, 60 kg K₂O/ha half dose N and total dose of P₂O₅ and K₂O were applied as basal dose one week prior to planting. The second dose of N was applied as top dressing at 30 DAT fertilizers was given in the form of UREA SSP and mop. The fertilizers were weighed separately and broadcasted. 20 tons of FYM/ha were applied at the time of field preparation.

The experiment was laid out in Randomized Block design (RBD) with three replications. Treatments comprised of three Biofertilizers PSB, VAM and AZOTO each applied @ .25 gm/planting case of Azotobacter the 25 gm/plant of Azotobacter culture was weighed and thoroughly mixed with 1000 ml of water for making .25% Azotobacter culture, the roots of the seedling were dipped into the slurry for 5-10 minutes. After that they were transplanted. VAM biofertilizer Nutria Link was mixed with soil before transplanting @ .25 gm/plant. VAM was applied in the soil @ .25 gm/plant. Seeding dip in slurry method was done for Azospirillum. Seed of Pusa Hybrid (*Tagetes erecta*) African marigold for the experiment were procured from the Arena Landscape Architect and consultant, Tagore town, Allahabad (Prayagraj). The intercultural operations were followed as and when required. The growth and yield parameters of F1 hybrid African marigold for each treatment were observed in four plants selected by random sampling method. The data were statistically analyzed and critical differences were worked out at five per cent level to draw statistical conclusions as suggested by Panse and Sankhatne (1978).

Results and Discussion

The results summarized in Table 1 it was observed that the maximum plant height (27.67) was observed with the treatment T₆ (75%NPK + PSB + Azoto + VAM) followed by treatment T₅ (75%NPK + PSB + Azoto) which was (26.00 cm). The minimum height (23.67 cm) was observed in the control. The maximum plant spread was observed in treatment number T₆ (75%NPK + PSB + Azoto + VAM) followed by treatment number T₅ (75%NPK + PSB + Azoto) which was (33.33) the minimum plant spread (25.67 cm) was observed in the control. Similar trend was observed that is the maximum number of primary branches (13.33) with in the treatment number T₆ (75%NPK + PSB + Azoto + VAM) followed by treatment T₅ (75%NPK + PSB + Azoto) which was (13.00). The minimum number of primary branches (8.67) observed in the control. The maximum number of flowers/plant (19.00) were recorded with the treatment T₆ (75%NPK + PSB + Azoto + VAM) followed by treatment T₅ (75%NPK + PSB + Azoto) (18.00). The minimum number of flowers/plant (11.33) was found in treatment number T₀ (control). The data in the Table 1 shown with different treatments reveals that there was significant difference on the size of individual flower. The maximum size of flower (9.00 cm) was seen in the treatment T₆ (75%NPK + PSB + Azoto + VAM). While followed by treatment number T₅ (8.67) the minimum flower size (6.00) was recorded with treatment T₀. The critical analysis of the data presented in Table 1 and shown that the effect of different treatments significantly differs on the weight of single flower. The maximum weight (15.67 gm) was achieved by the treatment T₆ (75%NPK + PSB + Azoto + VAM) followed by treatment T₅ (75%NPK + PSB + Azoto). While the minimum (10.67 gm) weight of flowers was seen in the treatment number T₀ (control). Number of days taken to appearance of first flower bud. The minimum number of days (33.33) taken under treatment T₆ (75%NPK + PSB + Azotobacter + VAM) for appearance of first flower bud. While as maximum days (39.00) was taken under control for appearance first flower bud. Flower yield was influenced by the different treatment significantly, the maximum flower yield (165.55 q/ha). Was recorded in the treatment T₆ (75%NPK + PSB + Azoto + VAM) Followed by treatment T₅ (75%NPK + PSB + Azoto) which was (151.16 q/ha). The minimum (67.70 q/ha) flower yield was recorded in the treatment T₀ (control). Table 1 clearly shows that the maximum net profit (Rs.72192.42) and benefit cost ratio (2.12) was recorded in treatment T₆ (75%NPK + PSB + Azoto +

Table1: Effect of Biofertilizers with NPK levels on growth, and flower yield parameters of F1 hybrid (Pusa Basanti) of African marigold (*Tagetes erecta*) at 90 days after transplanting

Treatment Combinations	Plant height (cm) at 90 days	Plant spread (cm) of marigold is informed by different treatment at 90 DAT	Number of primary branches/ plant at 90 DAT	No. of flowers/ plant At 90 DAT	Flower Size in (cm). at 90 DAT	Flower weight in (g) at 90DAT	Days to appearance of first flower in (DAYS)	Flower yield in Q/ha
Control (T0)	23.67	25.67	8.67	11.33	6.00	10.67	39.00	67.70
100% NPK (T1)	24.00	29.33	10.00	17.67	7.00	14.67	34.67	144.55
75% NPK+PSB (T2)	24.33	32.00	10.00	13.67	7.67	15.00	36.33	114.18
75%NPK+Azoto (T3)	22.67	31.33	11.67	16.33	7.00	14.33	34.00	130.26
75%NPK+VAM (T4)	23.00	30.00	11.00	16.67	8.67	15.00	37.00	127.34
75%NPK+PSB+Azoto (T5)	26.00	33.33	13.00	18.00	8.67	15.67	33.67	151.16
75%NPK+PSB+Azoto+VAM (T6)	27.67	33.67	13.33	19.00	9.00	15.67	33.33	165.55
75%NPK+Azoto+VAM (T7)	23.67	31.67	11.67	14.67	8.33	14.00	34.33	140.94
50%NPK+PSB (T8)	24.33	29.33	10.67	17.33	7.33	14.67	34.33	125.08
50%NPK+Azoto (T9)	23.67	31.00	11.33	15.33	8.00	14.67	36.33	90.32
50%NPK+VAM (T10)	23.00	31.33	11.33	12.33	8.00	13.00	36.67	119.72
50%NPK+PSB+Azoto (T11)	24.00	29.00	10.33	14.67	7.67	14.67	37.33	103.78
50%NPK+PSB+VAM (T12)	24.00	30.00	11.33	14.33	8.00	13.00	34.33	129.79
50%NPK+Azoto+VAM (T13)	22.33	29.33	10.67	14.00	7.33	14.33	34.33	111.38
S. Ed. ($\pm$)	0.712	0.846	0.536	0.841	0.454	0.443	0.778	0.648
CD (5%)	1.461	1.736	1.099	1.725	0.932	0.910	1.597	1.330

VAM), followed by treatment T₅ (75%NPK + PSB + Azoto) having net profit (Rs.62569.42) and benefit cost ratio (2.45). The minimum net profit (Rs.9968.34) and benefit cost ratio (1.27) was found in treatment T₀ (control)

Conclusion

Therefore, based on these findings, it can be concluded that the application of T₆ (75% NPK + PSB + Azoto + VAM) is highly beneficial for enhancing the growth, flowering, and flower yield of African marigold F1 hybrid (Pusa Basanti). This treatment not only improved the quantitative aspects of flower yield but also provided economic benefits to the growers. Further research could explore optimal application rates and timings of these biofertilizers to refine their effects on marigold production under different environmental conditions.

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