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EFFICIENCY OF ORGANIC AND BIODYNAMIC MANURES ON GROWTH AND FLOWERING IN MARIGOLD (*TAGETES PATULA* L.)

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ABSTRACT

Investigation on the efficiency of organic and biodynamic manures on growth and flowering in marigold (*Tagetes patula* L.) were carried out at Research Farm of Department of Applied Plant Science (Horticulture), School of Bio- Sciences and Bio- Technology, Babashaheb Bhimrao Ambedkar University, Lucknow (U.P.) 226025. The experiment was laid out in naturally ventilated green house condition with factorial completely randomized alongwith consisted 12 treatments and replicated thrice. Results showed that marigold when grown in sand + soil + vermicompost (1:1:2) + 5% biodynamic amendment significantly gave maximum plant height (27.750 cm), plant spread (23.175 cm), number of branches per plant (25.454), stem diameter (1.549 cm), number of leaves per plant (140.714), leaf length (9.308 cm) and leaf width (4.896 cm). The same treatment was also found superior in terms of days to first flower bud initiation (24.22), flower bud diameter (1.94 cm), bud length (3.49 cm), number of flower per plant (16.27), and flower diameter (7.98 cm) over control.

Key words: Biodynamic manure, Jjeevamrit, Amritpani ,Vermicompost, Marigold.

INTRODUCTION

French marigold (*Tagetes patula* L.) is one of the most important flower, ideal for rockery, edging, hanging baskets and window boxes. Flower remains fresh for 4-5 days at room temperature and used for religious offering and social functions for making garlands, beautification, pooja and other purposes like pigment, oil extraction and therapeutic uses. Marigold is a heavy feeder of nutrients. At present study these nutrients are supplied through biodynamic manures. The indiscriminate and continuous use of chemical fertilizers in intensive cropping system has led to an imbalance of nutrients in the soil, which has an adverse effect on soil health and affecting the growth and flower production in marigold. Therefore, the use of organic manure like Farm Yard Manure and vermicompost along with balanced use of biodynamic manures improve the physico-chemical properties of the soil besides increasing the efficiency of applied manures.

MATERIALS AND METHODS

The study was conducted at the Research Farm of Department of Applied Plant Science (Horticulture),

Babashaheb Bhimrao Ambedkar University Lucknow during the year 2012. The experiment was laid out in a factorial completely randomized design on marigold with 12 treatments . All the treatments were replicated thrice The treatment of biodynamic amendments (Jeevamrit and Amritpani) individually at the rate of five per cent each were applied with water at the time of transplanting of seedlings and again each concentrations were applied after 15 days regular intervals. The details of different treatments are given below :

T₁ Sand + Soil + FYM (1:1:1) control

T₂ Sand + Soil + Vermicompost (1:1:1)

T₃ Sand + Soil + Vermicompost (1:1:2)

T₄ Sand + Soil + FYM (1:1:1) + 5%Jeevamrit

T₅ Sand + Soil + Vermicompost (1:1:1) + 5%Jeevamrit

T₆ Sand + Soil + Vermicompost (1:1:2) + 5%Jeevamrit

T₇ Sand + Soil + FYM (1:1:1) + 5%Amritpani

T₈ Sand + Soil + Vermicompost (1:1:1) + 5%Amritpani

T₉ Sand + Soil + Vermicompost (1:1:2) + 5%Amritpani

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T₁₀ Sand + Soil + FYM (1:1:1) + 5% (Jeevamrit + Amritpani)

T₁₁ Sand + Soil + Vermicompost (1:1:1) + 5% (Jeevamrit+ Amritpani)

T₁₂ Sand + Soil + Vermicompost (1:1:2) + 5% (Jeevamrit + Amritpani)

The observation for different vegetative growth and floral parameters were recorded.

RESULTS AND DISCUSSION

There were significant differences with respect to growth parameters like plant height, plant spread, stem diameter, number of branches, number of leaves, leaf length and leaf width in all the treatment combinations (Table 1) showed the vegetative parameters. Treatment receiving sand + soil + vermicompost (1:1:2) + 5% jeevamrit significantly gave maximum plant height (27.75 cm) and it was at par with treatment T₅, whereas, minimum plant height (8.736 cm) was observed in treatment T₁ i.e. sand + soil + FYM(1:1:2) - control. The maximum plant spread (23.175 cm) was observed in treatment T₆ and it was at par with treatment T₅, where as minimum plant spread (12.738 cm) was observed in treatment T₁. The maximum stem diameter (1.549 cm) was observed in treatment T₆ and it was statistically at par with treatment T₅, whereas, minimum stem diameter (0.803 cm) was observed in treatment T₁. Significant increase in number of branches were also observed among the treatments. The maximum number of branches per plant (25.454) were observed in treatment T₆ and it was found at par with treatment T₅. However, minimum number of branches per plant (14.499 cm) was observed in treatment T₁. The numbers of leaves were also influenced by different treatments. Treatment T₆ significantly increased the number of leaves per plant (140.714) and which was significantly at par with treatment T₅, whereas, minimum number of leaves per plant (86.745) was observed in treatment T₁. The plant also showed significant variations in leaf length due to various treatments. Treatment T₆ (9.30 cm) recorded maximum leaf length which was significantly at par with treatment T₅, whereas, minimum leaf length (6.931 cm) was observed in treatment T₁. Further, significant influence of different combinations of organic and biodynamic manures on growth characters of marigold was observed. T₆ resulted maximum leaf width (4.896 cm) and it was at par with treatment T₅,

whereas, minimum leaf width (3.433 cm) was observed in treatment T₁. It might be due to that after application of Amritpani and Jeevamrita significantly increased root geometry, nutrient access and supply, resulting in the development of sound and healthy rhizosphere. Another cause might be increased nutrient uptake, photosynthesis, source sink relationship, besides excellent biochemical activities (1). Similar results of increased vegetative growth were also reported in papaya (3). Similar results were also reported in heliconia by (9 and 8) was also reported jeevamrita a strong promoter of natural farming. It is a rich bio-formulation contains consortia of beneficial microbes. (7) also reported that seed materials treated by bioenhancers significantly enhanced decomposition of organic materials there by enrich soil and induce better plant vigour. These could be a potent tool to utilize these in fertigation in various crops.

A perusal of data (Tables 2) revealed that all the flowering characteristics of marigold were significantly affected by different treatments. Treatment T₆, consisting Sand + Soil + Vermicompost (1:1:2) + 5% Jeevamrit significantly earlier emerged first flower bud (24.22 days) whereas, delayed in flower bud initiated in T₁ (40.12) i.e. control. The treatment T₆ (1.94 cm) showed maximum flower bud diameter while, smallest flower bud diameter was observed in T₁ (1.34 cm). Treatment T₆ (3.49 cm) resulted maximum flower bud length while, smallest flower bud length was observed in control T₁ (2.15 cm). A significant increase in flower diameter of marigold by organic and biodynamic manures was observed. The treatment T₆ when plants were treated with Sand + Soil + Vermicompost (1:1:2) + 5% Jeevamrit significantly produced maximum flower diameter (7.98 cm) followed by T₅ (7.54 cm) and minimum flower bud diameter was in control T₁ (5.56 cm). The maximum number of flowers per plant was also influenced by different treatments. Treatment T₆ exhibited maximum number of florets (16.27) followed by T₅ (15.92) and minimum number of flowers per plant was registered in the treatment T₁ (7.77). Among the various treatments, the treatment combination consisting of plants grown in media containing sand + soil + vermicompost (1:1:2) + biodynamic amendment (Jeevamrit) proved to better for all vegetative and reproductive growth. Similarly (5) also reported increasing in plant height, number of

Table 1 : Effect of organic (Vermicompost) and biodynamic (Jeevamrit) manures on vegetative growth in marigold.

Treatment	Plant ht (cm)	Plant spread (cm)	Stem dia. (cm)	No. of branches/plant	No. of leaves/plant	Leaf length (cm)	Leaf width (cm)
T ₁	15.124	12.738	0.803	14.499	86.745	6.931	3.433
T ₂	16.336	12.964	0.815	14.982	86.760	7.382	3.467
T ₃	16.869	13.797	0.897	15.387	93.543	7.392	3.507
T ₄	21.898	20.147	1.328	20.678	124.740	8.988	4.144
T ₅	22.167	20.152	1.332	22.177	125.473	9.033	4.259
T ₆	25.750	23.175	1.549	25.454	140.714	9.308	4.896
T ₇	19.750	18.475	1.223	18.244	112.249	8.396	3.708
T ₈	20.056	18.535	1.231	18.387	113.037	8.488	3.849
T ₉	20.341	18.646	1.254	18.547	114.564	8.561	3.856
T ₁₀	18.061	17.494	1.060	17.617	95.444	7.467	3.540
T ₁₁	19.486	18.295	1.167	17.840	96.921	7.566	3.627
T ₁₂	19.489	18.356	1.189	17.909	99.624	7.613	3.656
Mean	24.823	29.259	0.158	29.006	873.146	1.879	0.541
C.D. at 5%	0.484	0.092	0.028	0.136	0.978	0.351	0.136

Table 2 : Effect of organic (vermicompost) and biodynamic (jeevamrit) manures on reproductive growth in marigold.

Treatment	first bud initiation (Days)	bud dia. (cm)	bud length (cm)	flower diameter (cm)	No. of flowers/plant
T ₁	40.120	1.340	2.150	5.560	7.770
T ₂	38.200	1.350	2.200	5.610	7.960
T ₃	37.460	1.360	2.230	5.670	8.420
T ₄	27.540	1.690	3.180	7.360	15.210
T ₅	26.340	1.830	3.270	7.540	15.920
T ₆	24.220	1.940	3.490	7.980	16.270
T ₇	30.120	1.560	2.730	6.460	13.120
T ₈	29.440	1.620	2.840	6.670	13.200
T ₉	27.920	1.650	2.900	6.790	13.280
T ₁₀	33.460	1.400	2.600	6.230	12.170
T ₁₁	32.200	1.450	2.680	6.410	12.210
T ₁₂	31.400	1.553	2.700	6.450	12.480
Mean	74.538	0.114	0.545	1.788	25.692
C.D. at 5%	0.992	0.011	0.021	0.092	0.215

leaves and flower yield in China aster by different sources of nutrients. These results are close conformity with (2). (4) Suggested that vermicompost renders its beneficial effects by providing nutrients in the available form and also enhances their uptake in plants.

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