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EFFECT OF FOLIAR APPLICATION OF ORGANIC AND MICRO NUTRIENTS ON CERTAIN GROWTH AND FLOWER YIELD OF AFRICAN MARIGOLD (*Tagetes erecta* L.) CV. BENZ TALL.

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ABSTRACT

Marigold is one of the commercially important flower crops. Which belongs to the genus Tagetes , family Asteraceae. The genus is native of South of Mexico. Marigold requires mild climate for luxuriant growth and flowering. They can be grown in various types of soil and climatic conditions. Micro nutrients are very important for the quality of flower crops and over come the physiological disorder. Organic product, has the potential to play the role of promoting growth and providing immunity in plant system. Quality of flower depends on the cultivation technique of marigold plant. Hence the present study entitled "Effect of foliar application of organic and micro nutrients on certain growth and flower yield of African marigold (*Tagetes erecta* L.) cv. Benz tall) was carried out in the Department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalinagar during 2016-2017. The experiment was laid out in RBD with twelve treatments. The thirteen levels of T_1 (Vermiwash @ 3% + $ZnSO_4$ @ 0.4%); T_2 (Vermiwash @ 3% + $ZnSO_4$ @ 0.6 %) ; T_3 (Vermiwash @ 3% + $FeSO_4$ @ 0.3 %); T_4 (Vermiwash @ 3% + $FeSO_4$ @ 0.6%); T_5 (Panchagavya @ 3% + ZnSO4 @ 0.4%); T_6 (Panchagavya @ 3% + $ZnSO_4$ @ 0.6%); T_7 (Panchagavya @ 3% + $FeSO_4$ @ 0.3 %) ; T_8 (Panchagavya @ 3% + $FeSO_4$ @ 0.6 %); T_9 (FAA @ 3% + $ZnSO_4$ @ 0.4%); T_{10} (FAA@ 3% + $ZnSO_4$ @ 0.6 %); T_{11} (FAA @ 3% + $FeSO_4$ @ 0.3 %);T_{12} (FAA @ 3% + $FeSO_4$ @ 0.6 %); T_{13} (Control). The treatments are evaluated based on their effect on biometric characters viz. plant height, number of leaves, number of branches, number of nodes, days taken to first flowering, number of flowers per plant, single flower weight, flower yield per plant, Out of the thirteen foliar treatments, the highest flower yield per plant (902.87 g plant^{-1}) was observed in plants sprayed with a combination of T_{10} (FAA @ 3% + $ZnSO_4$ @ 0.6 %).

Keywords: Marigold, FAA, Vermiwash, Panchagavya, $FeSO_4$ and $ZnSO_4$.

Introduction

Marigold is native to South of Mexico, but some species have naturalized around the world. It's mostly grown for loose flowers, used for making garlands, veni, decoration of several cultural activities, landscape gardening (potted plant, bedding and edging), tagetes oil (it contains antioxidants), natural carotenoid pigment and xanthophyll, dried flower petals powder are used as a poultry feed to improve the colour of egg yolk and broilers skin (Hasin *et al*., 2006), ray florets used to color and flavor in lettuce salads and other food, its also used for medicinal purposes (caronay artery disease, eye diseases, heart attack, flu, gynecological etc.). Its most effective against the nematode species *Pratylenchus penetrance*. Its used for a trap crop. Marigold dye is a eco friendly (Hemla Naik *et al*., 2004). Foliar application of nutrients quickly observed by the plants than soil application of fertilizers. Organic and micronutrients increasing the great value to both plants and microorganisms in their growth, because it contains abundant amount of nutrients and various types of amino acids and serves as a source of nitrogen (N) for plants Viggnesh (2018). Sujin Raja Singh (2005) reported the effect of vermiwash significantly increasing the plant height, number of flower stalk, number of leaves, flower stalk plant^{-1} and quality of flower and days for flower bud initiation. Panchagavya increase maximum plant height, stem length, number of flower plant^{-1}, flower diameter and vase life which was reported by Sharma *et al.* (2010). $FeSO_4$ increases the maximum plant height, plant spread, number of leaves, leaf area and number of suckers in Gerbera (Soni and Godara, 2015). It is absorbed directly by the crop and it also acts as stimulants. Girwani *et al*., 1990 reported maximum number of branches plant^{-1}, maximum number of lateral plant^{-1} and early flowering in marigold plant observed with the application of 0.5 % $ZnSO_4$. The use of foliar spray of organic and micronutrient has brought about sort of revolution in the floriculture industry. Present research work was planned to investigate the best effect of organic and micronutrients of African marigold under open field condition in the coastal ecosystem.

Materials and Methods

The present investigation was carried out in the Department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalinagar during 2018-19.The experiment was laid out in RBD with three replications which consisting thirteen treatments of various organi and micronutrients as shown in table-1. The experimental area was ploughed thoroughly with a tractor drawn disc plough and cultivator to bring in to the fine tilth. The total area of experimental field 3.7 cents was laid out into 39 treatment plots. The 25 days old seedlings were transplanted in to experimental field. The spray of organic and micronutrients

was given according to the treatment schedule. The treatments were imposed as foliar spray on 25th and 50th days after transplanting at respective concentration during early morning hours. Observations recorded periodically on plant height, number of leaves, number of branches, number of nodes, number of flowers, single flower weight, flower yield per plant and yield per hactare .The data were statistically analysed Panse and Sukhatme (1978).

Result and Discussion

Among the growth characters, the plant height (98.04 cm), number of leaves (220.69), number of branches (26.64) and number of nodes were found to be markedly influenced by the foliar application of (FAA @ 3% + $ZnSO_4$ @ 0.6 %) at 25th and 50th days after transplanting (T_{10}) On growth characters, the effect of Zinc is necessary for proper vegetative and reproductive growth of the plant. Synthesis of plant nutrients and balancing intake of P and K inside the plant cell is done by the zinc. Stunted growth and little leaf are the deficiency symptoms of the zinc, which are reason to bizarre IAA metabolism (Marschner, 1995).Similar finding are reported by Choudhary *et* al., (2016)in marigold. Regarding flowering and yield, it shows that the treatment FAA @ 3% + $ZnSO_4$ @ 0.6 % (T_{10}) recorded maximum number of flowers per plant, flower yield per plant and flower yield per hectare (52.05, 902.87 g $plant^{-1}$ and 64.89 t ha^{-1}) respectively which was on par with T_6 and followed by the treatment T_2. The increment in the number of flowers per plant obtained in the above said treatment might be due to production of more number of laterals at early stage, which had sufficient time to accumulate carbohydrates for proper flower differentiation. The plant with more number of branches and favourable physiological activity could have the better results in more production and translocation of photosynthates in plants, which might have accelerated the formation of more number of big sized flowers. The FAA synthesis Several enzymes, viz. catalase, peroxidase, alcohol, dehydrogenase, carbonic dehydrogenize, tryptophan synthates etc. responsible for chlorophyll synthesis and various physiological activities were activated and also increased the cell division and metabolic activity which encourage plant growth and development. Similar results were registered by Prasanth *et al.,* 2017 in African marigold, Viggnesh (2018) in Tuberose, Dianarose Garcia, (2016) in egg plant.

Table 1 : Effect of foliar application of organic and micronutrients on growth characters of African marigold (*Tagetes erecta* L.) scv. Benz tall – F1 Hybrid

Treatments	Plant height (cm)	Number of leaves $plant^{-1}$	No. of branches
T_1-Vermiwash @ 3% + $ZnSO_4$ @ 0.4%	78.79	173.39	20.43
T_2-Vermiwash @ 3% + $ZnSO_4$ @ 0.6 %	93.38	210.58	25.53
T_3-Vermiwash @ 3% + $FeSO_4$ @ 0.3 %	86.99	191.73	22.99
T_4-Vermiwash @ 3% + $FeSO_4$ @ 0.6 %	71.49	154.16	17.87
T_5-Panchagavya @ 3% + $ZnSO_4$ @ 0.4%	81.93	181.29	21.58
T_6-Panchagavya @ 3% + $ZnSO_4$ @ 0.6%	96.63	218.57	26.64
T_7-Panchagavya @ 3% + $FeSO_4$ @ 0.3 %	89.24	199.71	24.13
T_8-Panchagavya @ 3% + $FeSO_4$ @ 0.6 %	74.62	162.14	18.99
T_9-Fish Amino Acid @ 3% + $ZnSO_4$ @ 0.4%	82.96	183.81	21.87
T_{10}-Fish Amino Acid @ 3% + $ZnSO_4$ @ 0.6 %	98.04	220.69	26.90
T_{11}-Fish Amino Acid @ 3% + $FeSO_4$ @ 0.3 %	90.26	202.60	24.41
T_{12}-Fish Amino Acid @ 3% + $FeSO_4$ @ 0.6 %	75.64	165.26	19.29
T_{13}-Control	67.84	145.81	16.46
S.Ed	**1.18**	**3.71**	**0.53**
CD (p = 0.05)	**2.36**	**7.43**	**1.07**

Table 2 : Effect of foliar application of organic and micronutrients on flowering and yield attributes in African marigold (*Tagetes erecta* L.)cv. Benz tall – F1 Hybrid

Treatments	No.of nodes $plant^{-1}$	No.of flowers $plant^{-1}$	Flower yield $plant^{-1}$	Flower yield ha^{-1}
T_1-Vermiwash @ 3% + $ZnSO_4$ @ 0.4%	24.91	43.17	523.38	38.57
T_2-Vermiwash @ 3% + $ZnSO_4$ @ 0.6 %	29.27	50.05	821.17	58.77
T_3-Vermiwash @ 3% + $FeSO_4$ @ 0.3 %	27.14	46.57	671.11	48.50
T_4-Vermiwash @ 3% + $FeSO_4$ @ 0.6 %	22.73	31.75	410.67	28.43
T_5-Panchagavya @ 3% + $ZnSO_4$ @ 0.4%	25.83	44.73	588.06	48.92
T_6-Panchagavya @ 3% + $ZnSO_4$ @ 0.6%	29.12	51.70	887.40	63.18
T_7-Panchagavya @ 3% + $FeSO_4$ @ 0.3 %	28.03	48.16	738.35	52.86
T_8-Panchagavya @ 3% + $FeSO_4$ @ 0.6 %	23.63	41.27	479.87	32.78
T_9-Fish Amino Acid @ 3% + $ZnSO_4$ @ 0.4%	26.24	45.02	604.59	44.18
T_{10}-Fish Amino Acid @ 3% + $ZnSO_4$ @ 0.6 %	29.53	52.05	902.87	64.89
T_{11}-Fish Amino Acid @ 3% + $FeSO_4$ @ 0.3 %	28.44	48.05	754.58	54.42
T_{12}-Fish Amino Acid @ 3% + $FeSO_4$ @ 0.6 %	24.02	41.65	499.10	34.21
T_{13}-Control	20.74	37.49	339.62	22.67
S.Ed	**0.39**	**0.72**	**30.94**	**2.14**
CD (p = 0.05)	**0.78**	**1.44**	**61.89**	**4.28**

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