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INFLUENCE OF ORGANIC INPUTS AND GROWTH REGULATORS ON GROWTH, OF FRENCH MARIGOLD

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ABSTRACT

Field experiment was undertaken to find out the influence of different orgaftfc inputs and growth regulators on growth, yield and quality of French marigold (Tagetes patula L.) cv. Sindhamani, in a farmer's field at Sivapuri near Annamalainagar, Tamil Nadu. The experiment was laid out in randomized block design with three replications. Various organic inputs and growth regulators including panchagavya 3%, vermiwash 1:5 dilution, humic acid 0.02%, gibberellic acid 300ppm, triacontanol at 250 ppm were applied. The growth, yield and quality characters were studied at different stages of crop growth. The study revealed that the growth characters expressed as plant height, number of laterals, number of leaves and leaf area were siginificantly higher by the application of Gibberellic acid @ 300 ppm + Panchagavya @ 3%. The hlorophyll content was also enhanced in this treatment.

INTRODUCTION

Marigold, a member of the genus Tagetes of the family Asteraceae, is one of the most important flowering annuals, cultivated commercially in India as bedding plant, loose flower for making garlands, wreath, religious offering, colour pigments, insect and nematode repellants, nutrient supplement for poultry feed and cut flower purposes. Marigold gained popularity among gardeners and flower dealers on account of its easy culture and wide spectrum of attractive colours, shape, size, and good keeping quality. Thus the demand for marigold as loose flower is increasing constantly. There are four species of marigold that are typically used in horticulture namely Tagetes erecta L. (African marigold), Tagetes patula L. (French marigold), Tagetes tenufolia and Tagetes lucida (Sweet scented marigold). Among the species, French marigold is smaller and more graceful. A native of Mexico and South America, French marigold was first discovered by Portuguese in central America in 16th century and was introduced to Europe and India. Marigold is one of the most important species grown commercially for loose flower in different parts of India especially in the tropical and subtropical regions.

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It is grown in India in an area of 0.56 m ha with a production of 0.511 t loose flowers and 4.25 m number of cut flowers (Anon.2014). Boxes. In recent times the flowers are also used for extraction of natural colouring materials used for cosmetic and food colouring (Ashraf et al., 2005).Carotenoids m marigold (Tagetes spp.) Have emerged as poultry feed mix for improving egg yolk pigmentation and its production. Lutein, a major component of carotenoid, is having therapeutic values (Gau et al., 1983). The essential oil present in Tagetes species is used in perfume industry. The average yield of French marigold can be mcreased by improving the production technologies. French marigold is used in landscape gardening due to its variable height icd colour of flower. It is ideal for rockery, edging, hanging baskets and window boxes. In recent times the flowers are also used for extraction of natural colouring materials used for cosmetic and food colouring (Ashraf et al., 2005). Carotenoids m marigold (Tagetes spp.) Have emerged as poultry feed mix for improving egg yolk pigmentation and its production. Lutein, a major component of carotenoid, is having therapeutic values (Gau et al., 1983). The essential oil present in Targets species is used in perfume industry. The average yield of French marigold can be increased by improving the production technologies.

MATERIALS AND METHODS

The present investigation entitled, "Influence of organic inputs and growth regulators on growth, yield and quality of Fench marigold (*Tagetes patula* L.)," was carried out in a farmer's

field at Sivapuri which is located 3km from Annamalainagar, Annamalai University, Tamil Nadu during 2014-2015. The experimental materials consisted of seedlings of French marigold (*Tagetes patula* L.) cv. Sindfhamani obtained from Hosur, Tamil Nadu. The experiment was laid out in Randomized Block Design (RBD) with three replications. Three different growth regulators with two concentrations an three organic inputs with control were adopted as treatment. The main field was prepared by thorough ploughing with tractor drawn disc plough. Well decomposed farm yard manure was applied at the rate of 25 tonnes per hectare. Watering was done to the plants immediately after transplanting. Subsequent watering was done to keep the optimum moisture as and when required. Weeds were removed periodically by hand weeding and stalking was given to all plants in order to prevent lodging.

factors and group B vitamins produced by ceolamoebocytes of earthworms present in the vermiwash. Similar result of increased plant height due to the application of vermiwash was also reported in Jasminum grandiflorum by Tomati et al.(1983) and Grappelli et cr/.(1985). Maximum number of laterals were recorded in the treatments of gibberellic acid along with panchagavya and was followed by application of gibberellic acid along with vermiwash. The role of gibberellic acid on branch induction has well documented in many horticultural crops. Gibberellic acid when applied at optimum concentration, stage and time increased the number of branches by increasing the cell division and cell elongation. Increased number of primary and secondary branches might be due to the application of panchagavya which have contributed to the buildup of protoplasm in the cells for the formation of enzymes needed for rigid growth.

Table 1. Effect of organic inputs and growth regulators on growth parameters

Treatments	Plant Height (cm) 90 days	Number of lateral per plant 90 days	Number of leaves per plant 90 days	Leaf area (cm2) 90 days	Total chlorophyll content (mg g-1)	Days of first flowering	Number of flowers per plant
T1 - Gibberellie acid @300 ppm	126.97	29.43	159.14	112.38	1.25	129.86	22.55
T2 - Panchagavya @3%	117.07	24.63	140.96	99.13	0.56	139.61	15.31
T3 - Vermiwash 1:5 Dilution	116.52	23.55	139.24	98.21	0.47	140.53	14.38
T4 - Triacontanol @ 250 ppm	119.02	25.44	142.62	100.42	0.64	138.49	16.03
T5 - Humic acid @ 0.02%	111.72	23.31	135.47	96.25	0.21	142.34	13.42
T6 - Gibberellic acid @ 300ppm + Panchagavya @ 3%	134.38	35.19	172.36	123.60	1.75	118.21	29.29
T7 - Gibberellic acid @ 300ppm + Vermiwash 1:5 Dilution	130.88	32.68	169.21	119.55	1.45	122.59	27.16
T8 - Gibberellic acid @ 300ppm + Humic acid @ 0.02%	128.68	30.75	165.41	115.16	1.32	126.31	24.77
T9 - Triacontanol @ 250 ppm + Panchagavya @ 3% 1	125.31	28.36	155.04	108.79	0.96	133.71	19.65
T10 - Triacontanol @ 250 ppm + Vermiwash 1:5 Dilution	123.25	26.24	148.48	106.41	0.81	136.40	17.32
T11- Triacontanol @ 250 ppm + Humic acid @ 0.02%	121.22	25.34	146.92	105.24	0.73	138.13	17.02
T12 - Absolute control	109.08	22.81	133.82	89.42	0.03	143.37	13.82
SE.d	0.72	0.57	1.15	0.69	0.02	1.31	0.54
C.D (p=0.05)	1.50	1.18	2.24	1.48	0.05	2.71	1.13

RESEARCH FINDING AND DISCUSSION

Growth is one of the essential parameter that determines the yield attributes of any crop. Treatment of different organic inputs and growth regulators significantly influenced the plant height, number of laterals, number of leaves and leaf area of French marigold. Among the growth attributes observed, the plant height (Fig. 1) was found to be markedly influenced by various treatments that tested. Application of Gibberellic acid @300 ppm along with Panchagavya @ 3 % recorded the highest plant height at 30, 60 and 90 DAT. It was followed by treatment with Gibberellic acid @300 ppm along with vermiwash 1:5 dilution. The increase in plant height due to gibberellic acid might have resulted from enhanced cell division in apical meristem and cell elongation as suggested by Sunitha et al., (2007) and Sorubarani (2009). The reason for the highest plant height due to panchagavya could be due to the nutrients and better nitrogen uptake by plants which is being a constituent of protein and protoplasm may be vigorously activated the vegetative developments of plants as reported by Sharma and Shaffai Mohamad (2004) in tuberose and Anil Singh and Yesphal Singh (2003) in Rose. Combination of gibberellic acid and panchagavya showed increased effect over their per se performance. This could be attributed to the complimentary effect. Combined application of gibberellic acid and vermiwash boosted the plant height when compared to control. This might be due to the presence of growth promoting substances present in the vermiwash. Further, the plant growth stimulants could be attributed to the presence of plant growth

The results were further supported by the findings of Waheeduzzama (2004) in anthurium, Ramachandra Reddy and Bhaskara Reddy (1996) in tomato and Ramya (2005) in annual moringa. Combination of gibberellic acid and panchagavya showed increased effect over their per se performance. This could be attributed to the complimentary effect. Combination of gibberellic acid and vermiwash recorded the second highest number of laterals when compared to control. This could be due to the synthesis of enhanced nitrogen from the growth promoter substances produced by the microbes present in vermiwash, which induced increased shoots production. The present observation indicates that vermiwash would be an efficient essential source of nutrients present in an easily available form to the plants (Yawalkar et al. 1981). Similar results were obtained in the findings of Sivasubramanian and Ganeshkumar (2004) in marigold Highest number of leaves were recorded in the treatment of gibberellic acid along with panchagavya.

The beneficial effects of gibberellic acid on higher leaf production was reported by Sharma et al., (2006). This might have been contributed by extensive root system and vigorous vegetative growth of plants supplying more plant food system and promoting photosynthetic activity. Application of gibberellic acid in combination with vermiwash to plants produced second largest number of leaves than control from the above results, it is clear that the wormcast provides essential nutrients in available forms to plants and the worm exudates had stimulatory effect of producing plan growth promoter i.e., auxin which improves the plant growth (Ross

and Cairns, 1982 ;Vidhapriyadharshini, 2006). Combination of organic inputs and growth regulators showed increased effect over their per se performance. This could be attributed to the complimentary effect. Leaf area was the highest in the treatment of gibberellic acid along with panchagavya. The increasing leaf area might be due to increasing plant height and number of branches. Similar result were recorded by earlier workers Taygi and Vijay kumar (2006), Swaroop et al. (2007) and Ramesh Kumar et al.(2010) in marigold. They found that GA3 @ 200 ppm had recorded maximum vegetative growth parameters in African marigold.

Conclusion

Based on the Present inverting among the various treatments T6 C Gibberellic acid @ 300pp, t panchagauga @ 3% recorded the wight growth parameters.

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