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## EFFECT OF ORGANIC MANURES AND FOLIAR APPLICATION OF FISH AMINO ACID ON VEGETATIVE GROWTH AND DRY MATTER PRODUCTION OF AFRICAN MARIGOLD (*TAGETES ERECTA* L.)

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### ABSTRACT

African marigold (*Tagetes erecta* L.) is one of the important commercial flower crop grown exclusively for their vibrant blooms. An experiment entitled “Effect of organic manures with foliar application of fish amino acid on growth and yield of African marigold (*Tagetes erecta* L.)” was carried out in the department of Horticulture, Faculty of Agriculture, Annamalai University, Annamalai nagar during (2018–2020). The twelve treatments includes organic inputs such as farmyard manure (25 t ha<sup>-1</sup>), vermicompost (5t ha<sup>-1</sup>), oilcake (2 t ha<sup>-1</sup>) along with foliar application of two levels of fish amino acid @ 2% and 4% . The treatments were studied under randomized block design (RBD) with three replications. Among the twelve treatments, the performance of plants treated with (FYM @ 25t ha<sup>-1</sup>+ Vermicompost @ 5 t ha<sup>-1</sup> + FAA @ 4%) resulted in superior plant height (63.42 cm), plant spread (54.31cm), number of primary branches (13.68), secondary branches (24.17) , number of leaves (154.86) , dry matter production (118.23 g plant<sup>-1</sup>). Hence it is concluded that combined application of organic manures and fish amino acid had a good synergetic effect on vegetative growth of African marigold.

**Keywords** : Oilcake, FAA, DMP, Marigold

### Introduction

African marigold (*Tagetes erecta* L.) is one of the most important flower crop having a great industrial and commercial value. It is native to Mexico and belongs to the family Asteraceae. Marigold is an herbaceous annual and is exclusively known for their attractive blooms, cheerful colours and wider adaptability. Among the different species of African marigold *Tagetes erecta* L. is majorly cultivated all over India due to its vibrant blooms and good quality flowers. With an increasing demand for organic floriculture among the people, efforts have been put up to maintain their sustainability in agriculture. Organic manures are environmental friendly and helps in improving the soil microbial population and C:N ratio.

Farmyard manure is one of the traditional manure and holds a good amount of essential nutrients. On an average well decomposed farmyard manure contains 0.5 %N, 0.2% P<sub>2</sub>O<sub>5</sub> and .0.5% K<sub>2</sub>O Idan *et al.* (2014). Vermicompost is formed by fragmentation of the earth worm excreta and serves as an excellent plant growth media. Oilcake are concentrated bulky manures , when applied in the soil on mineralization supplies the nutrients to the plants. They contain a good composition of both macro and micro nutrient and supply them to the plants without any losses and neutralizes the detrimental effects of fertilizers. Fish amino contains a rich quantity of amino acids which induces the protein synthesis of plant. In this study, an attempt was made to visualize the effect of organic manures with foliar

application of fish amino acid on growth and yield of African marigold.

### Materials and Methods

The present experiment entitled “Effect of organic manures and foliar application of fish amino acid on growth and yield of African marigold (*Tagetes erecta* L.)” was carried out in the Floriculture yard, Department of Horticulture, Annamalai University, Annamalai nagar, Tamil Nadu during the year 2018 to 2020. The experiment was laid out in Randomized block design with the plant spacing of 30 x 45 cm. The treatments imposed in this study was (T<sub>1</sub>) Farmyard manure @ 25t ha<sup>-1</sup>, (T<sub>2</sub>) Vermicompost @ 5t ha<sup>-1</sup>, (T<sub>3</sub>) Oilcake @ 2 t ha<sup>-1</sup> (Coconut oilcake ), (T<sub>4</sub>) Fish amino acid (2%), (T<sub>5</sub>) Fish amino acid (4%), (T<sub>6</sub>) FYM @ 25t ha<sup>-1</sup>+ Vermicompost @ 5t ha<sup>-1</sup> + FAA 2%, (T<sub>7</sub>) FYM@ 25t ha<sup>-1</sup> + Oilcake @ 2t ha<sup>-1</sup>+FAA 2%, (T<sub>8</sub>) Vermicompost @ 5t ha<sup>-1</sup>+ Oilcake@ 2t ha<sup>-1</sup> + FAA 2%, (T<sub>9</sub>) FYM @ 25t ha<sup>-1</sup> + Vermicompost@ 5t ha<sup>-1</sup> + FAA 4% , (T<sub>10</sub>) FYM@ 25t ha<sup>-1</sup> + Oilcake @ 2t ha<sup>-1</sup>+FAA 4%, (T<sub>11</sub>) Vermicompost@ 5t ha<sup>-1</sup> + Oilcake @ 2t ha<sup>-1</sup> + FAA 4% , (T<sub>12</sub>) Control (RDF). Three replications were maintained for each treatment.

Organic manure such as well decomposed farm yard manure, vermicompost and oil cakes were taken in appropriate quantities as per the treatment and applied to individual plots at the time of land preparation. Thirty days old healthy uniform seedlings were selected and transplanted in the main field. Two seedlings were planted per hill later on

thinning operation was done to maintain single seedling per hill. 2% FAA solution was prepared by dissolving 2 ml in 100 ml of water. In the same way 4% solution was also prepared. The prepared solution of fish amino acid @ 2 % and 4% concentration were sprayed immediately after pinching operation and subsequent spray was given at 15 days interval. Totally 6 sprays was given at subsequent intervals. The application was individually given to the respective plots as per the treatment schedule.

The observation on vegetative characters such as plant height, number of primary branches, number of secondary branches, number of leaves, leaf area and dry matter production were recorded at 30<sup>th</sup>, 60<sup>th</sup> and 90<sup>th</sup> days after transplanting. Flower yield were calculated at weekly intervals. The data on various parameters were analyzed statistically as per the procedure suggested by Panse and Sukhatme (1978).

### Results and Discussion

The results of the present study revealed that the application of organic manure along with foliar application of fish amino acid has contributed significantly in promoting the growth of the plants. The application of organic manures have exerted gradual increase in different growth character among the replication at different levels. Among the twelve treatments T<sub>9</sub> (FYM @ 25t ha<sup>-1</sup> + Vermicompost @ 5 t ha<sup>-1</sup> + FAA 4%) recorded the highest plant height of (32.71cm, 47.71 cm, 63.42 cm at 30, 60,90 DAT respectively). It was followed the T<sub>11</sub> (Vermicompost @ 5t ha<sup>-1</sup> + Oilcake @ 2t ha<sup>-1</sup> + FAA 4%). Application of vermicompost accelerates the plant growth directly by supplying the required amount of nutrients. Similar results was observed in earlier reports of Kumar *et al.* (2006), Idan *et al.* (2014) on their work in marigold.

The data on the plant spread revealed that the among the twelve treatments T<sub>9</sub> plants (FYM @ 25t ha<sup>-1</sup> + vermicompost @ 5t ha<sup>-1</sup> + FAA 4%) exhibited the maximum

plant spread with the values (31.26 cm, 48.24 cm, 54.31 cm at 30 ,60 and 90 DAT). It was followed by T<sub>11</sub> (Vermicompost @ 5t ha<sup>-1</sup> + Oilcake @ 2 t ha<sup>-1</sup> + FAA 4%) whose values were on par with T<sub>12</sub> ( control- RDF) . Organic manures in addition improves the nitrogen and phosphorous uptake thereby increasing the vegetative growth of the plant Shadanpour *et al.* (2011). The maximum number of primary branches (13.68) and secondary branches (24.17) was recorded in plants treated with T<sub>9</sub> (FYM @ 25t ha<sup>-1</sup> + Vermicompost @ 5 t ha<sup>-1</sup> + FAA 4% ). Plants receiving Vermicompost @ 5 t ha<sup>-1</sup> + Oilcake @ 2 t ha<sup>-1</sup> + FAA 4% (T<sub>11</sub>) was considered to the next best which was on par with values of T<sub>5</sub> ( Fish amino acid 4 %). The amino acids present in FAA are well known biostimulants and acts as a precursors of growth hormones in promoting growth via photosynthesis ( Amin *et al.*,2011) .

The data on the number of leaves revealed that the maximum number of leaves was observed in T<sub>9</sub> (FYM @ 25 t ha<sup>-1</sup> + vermicompost @ 5 t ha<sup>-1</sup> + FAA 4%) having the value of 15.86 at 90 DAT. Studies have revealed the beneficial effect of fish amino acid on tuberose exhibiting maximum growth characters (Sivasankar *et al.*, 2018). The highest dry matter production (118.23 g/plant) was recorded in plant treated with FYM @ 25t ha<sup>-1</sup> + Vermicompost @ 5 t ha<sup>-1</sup> + FAA 4% (T<sub>9</sub>). The lowest dry matter production was noted in T<sub>3</sub> (Oilcake @ 2 t ha<sup>-1</sup>). The increased dry matter accumulation was due to the availability of nitrogen which enhanced more vegetative growth resulting in higher photo assimilates there by increasing the dry matter production. Similar findings was observed in Mohanaty *et al.* (2018), work on African marigold.

By considering the above facts it could be concluded that the application of FYM @ 25t ha<sup>-1</sup> + vermicompost @ 5t ha<sup>-1</sup> + Fish amino acid 4% was found to have a good beneficial effect on growth and yield of African marigold leaving less harm to the soil flora.

**Table 1:** Effect of organic manures and foliar application of fish amino acid on growth and Dry matter production of African marigold (*Tagetes erecta* L.)

TREATMENT	Plant height (cm)	Plant spread (cm)	Number of primary branches	Number of secondary branches	Number of leaves	DMP (g/plot)
T <sub>1</sub> - Farmyard manure @25 t ha <sup>-1</sup>	47.08	46.37	8.09	17.99	134.70	99.83
T <sub>2</sub> - Vermicompost @5 t ha <sup>-1</sup>	51.09	48.32	9.46	19.51	139.65	102.51
T <sub>3</sub> - Oilcake @2 t ha <sup>-1</sup>	41.37	43.59	6.14	15.83	127.65	95.76
T <sub>4</sub> - Fish amino acid (2%)	49.05	47.32	8.77	18.73	137.12	97.24
T <sub>5</sub> - Fish amino acid (4%)	53.04	49.26	12.91	23.32	142.05	105.72
T <sub>6</sub> - FYM @25t ha <sup>-1</sup> + Vermicompost @ 5t ha <sup>-1</sup> +FAA 2%	57.25	51.31	10.13	20.24	147.24	111.04
T <sub>7</sub> - FYM@ 25t ha <sup>-1</sup> + Oilcake @ 2t ha <sup>-1</sup> +FAA 2%	54.96	50.32	10.72	20.91	144.42	108.95
T <sub>8</sub> - Vermicompost @ 5t ha <sup>-1</sup> + Oilcake@ 2t ha <sup>-1</sup> + FAA 2%	55.22	50.32	10.88	21.07	144.74	107.86
T <sub>9</sub> - FYM @ 25t ha <sup>-1</sup> + Vermicompost@ 5t ha <sup>-1</sup> + FAA 4%	63.42	54.31	13.68	24.17	154.86	118.23
T <sub>10</sub> - FYM@ 25t ha <sup>-1</sup> + Oilcake @ 2t ha <sup>-1</sup> +FAA 4%	59.17	52.24	11.57	21.83	149.62	113.02
T <sub>11</sub> - Vermicompost@ 5t ha <sup>-1</sup> + Oilcake@ 2t ha <sup>-1</sup> + FAA 4%	61.46	53.35	13.01	23.43	152.44	115.36
CONTROL (RDF)	61.17	53.22	12.23	23.32	152.09	114.98
S.Ed.	0.6	0.46	<b>0.20</b>	<b>0.22</b>	<b>0.71</b>	<b>1.81</b>
CD (p = 0.05)	1.52	0.93	<b>0.51</b>	<b>0.57</b>	<b>1.86</b>	<b>3.76</b>

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