International Journal of Chemical Studies

P-ISSN: 2349–8528
E-ISSN: 2321–4902
www.chemijournal.com
IJCS 2020; 8(5): 631-635
© 2020 IJCS
Received: 21-07-2020
Accepted: 29-08-2020

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# Study on effect of pinching and gibberellic acid on growth, flowering and yield of African marigold (*Tagetes erecta* L.) under Prayagraj agro-climatic condition

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**DOI:** https://doi.org/10.22271/chemi.2020.v8.i5i.10372

**Abstract**
The present experiment was conducted to determine the response of Pinching and Gibberellic acid on growth, flowering and yield of African marigold (*Tagetes erecta* L.) in the Department of Horticulture, Sam Higginbottom University of Agriculture Technology and Science, Prayagraj, (U.P.) during the monsoon season 2019. 19 treatments were included in the trial *viz*; T0 Without pinching +spraying, T1 Pinching 30 days, T2 Pinching 35 days, T3 Pinching 40 days, T4 Pinching 45 days, T5 Gibberellic acid 100PPM, T6 Gibberellic acid 200PPM, T7 Gibberellic acid 300PPM, T8 Pinching 30 days + 100 PPM Gibberellic acid, T9 Pinching 30 days + 200 PPM Gibberellic acid, T10 Pinching 30 days + 300 PPM Gibberellic acid, T11 Pinching 35 days + 100 PPM Gibberellic acid, T12 Pinching 35 days + 200 PPM Gibberellic acid, T13 Pinching 35 days + 300 PPM Gibberellic acid, T14 Pinching 40 days + 100 PPM Gibberellic acid, T15 Pinching 40 days + 200 PPM Gibberellic acid, T16 Pinching 40 days + 300 PPM Gibberellic acid, T17 Pinching 45 days + 100 PPM Gibberellic acid, T18 Pinching 45 days + 200 PPM Gibberellic acid, T19 Pinching 45 days + 300 PPM Gibberellic acid were tested in three replication. The experiment of design was randomized block design. The results reveal that Pinching and GA3 treatments had significant response on plant height, number of branches per plant, number of node per plant, stem diameter plant spread per plant, number of flowers per plant, flower diameter, number of bud per plant, fresh weight of flower, dry weight of flower, flower yield per plant, flower yield per plot, and flower yield per hectare. The maximum plant height (56.750cm), Number of branches per plant (86.833), Plant spread (73.990), Number of node per plant (461.383), Stem diameter plant spread per plant (4.090), Number of flowers per plant (101.387), Flower diameter per plant (9.337), Number of bud per plant (101.887), Fresh weight of flower (12.160), Dry weight of flower (1.960), Flower yield per plant (495.333), Flower yield per plot (1.321kg), and Flower yield per hectare (6.604 t/ha.) were produced by the treatment (T13) Pinching 35 days + 300 PPM Gibberellic acid. It was the best treatment for good vegetative as well as yields Production.

**Keywords:** Marigold, gibberellic acid, pinching, flower and yield

## Introduction
Flowers are the symbol of beauty, love and tranquility. They form the soul of garden and convey the message of nature to man. Flower cultivation has a great potential to Spain money, hence grown all over country in approximately 1,66,500 ha area with production of 1021 million tones loose flower and 66,671 crore cut flowers (NHB database, 2009-10). Out of total Floriculture area, 2/3rd area under traditional flower cultivation. The major traditional flowers of commercial significance are marigold, jasmine, China aster, rose, tuberose, crossandra and chrysanthemum. Among them, marigold occupies the top most position as flower.

Marigold (*Tagetes* spp.) is one of the most important flower crop grown commercially in different parts of India especially in the plains. The names Tagetes has been given after ‘‘Tages’’ a demigod known for its beauty. Marigold is short duration, free flowering, and hairy, hardy and evergreen crop belonging to family Compositae. It has gained popularity because of adaptability to various soil and climatic condition and longer blooming period. Marigold is known for its multifarious and diverse germplasm and is associated with festive

occasion, marriages, religious ceremonies and social function. The flower is endued with a wide spectrum of attractive colour, shape and size along with its good keeping quality. Beside its pristine uses, now marigolds are economically used as cut flower for interior decoration, in hanging basket, rock gardens, for landscaping purposes and for the beautification of mandaps and decoration of cars in marriages. Its leaf and flower are equally important for medicinal value (Tripathy *et al*., 1991). Leaf extract is good remedy for earache. Flower extract is a good blood purifier, a cure for blood piles, ulcer and eye diseases. The leaves of marigold plants are characterized by the presence of distinct odoriferous oil. Thearomatic oil extracted from marigold is called as tagetes oil. Essential oil of marigold has a great use in perfumery industries. The oil has bronchodilatory, anti-inflammatory effect as well as juvenile hormone having insect repellent activities against flies, ants and mosquitoes. The Marigold plant is found beneficial to control nematode population when planted as intercrop and it was found effective as organic manure (Polthance and Yamazaki 1996). Marigold is not only grown as ornamental plant and cut flower but also as a source of nutritional supplement for poultry feed due to presence of an antioxidant, carotenoid pigment known as lutein. Since yellow and orange colour in marigold is due to the presence of this pigment hence lutein is added in poultry diet to intensify the yellow colour of egg yolks and broiler skin (Sreekala *et al*. 2003). Purified extract of marigold petals containing lutein dipalmitate is marked as ophthalmologic agent under the name of 'Adaptinol'.

Marigold is native of Mexico and South America from where it spread to different parts of the world during early part of 16th century. *Tagetes erecta* commonly known as African marigold is grown commercially as loose and cut flower in India and Central America and it has an added advantage that it is not season bound like other annual flower crop. Marigold plant needs plenty of sunshine and is grown in open sunny situation. There are about 33 species of genus *Tagetes*; among them some of the important species are *Tagetes erecta, Tagetes patula, Tagetes tenuifolia, Tagetes lucida, Tagetes lacera, Tagetes lemmonii, Tagetes minuta, Tagetes pysilla and Tagetes corymbosa*. African marigold (*Tagetes erecta*) and French marigold (*Tagetes patula*) are of great horticultural importance and are commercially for their exquisite blooms. Among all the species of marigold, *Tagetes minuta is* valued for its harvest recovery of oil with superior quality. *Tagetes minuta* is commonly grown in Himachal Pradesh, Jammu and Kashmir and Uttarakhand. Sowing of marigold in September-October gave higher average Flower size, number of flowers per plant, flowering period and flower yield than other months (Mishra, 1997). Flower of marigold is capitulum that has an inner disc floret of short and tubular petals and outer ray florets of long and thin petals.

## Material and methods

This study was conducted at experimental of the Department of Horticulture, Sam Higginbottom University of Agriculture Technology and Science, Prayagraj, 211007, (U.P.) India. In RBD during monsoon season of 2019 to optimize the pinching and $GA_3$ in African marigold cv. Local Orange. Present experiment consists of two levels of pinching (no pinching & pinching + $GA_3$ 100,200,300 ppm) and 20 treatment combinations replicated thrice. The soil of the experimental field was sandy loam in texture and had pH (6.87), E.C. (0.15 dSm-1) [1:2 soil water suspension (Jackson, 1967)] [4], organic carbon (0.45 %) [Walkley and Black's rapid titration method (Piper, 1966)] and 212.56 kg/ha available N [Alkaline permanganate method (Subbiah and Asija, 1956)] [15], 37.32 kg/ha available P2O5 [Olsen's method (Bray's method (Jackson, 1934))], 210.05 kg/ha available K2O [Flame photometric method (Jackson, 1973)]. Seeds were sown on 9th July, 2019 on raised nursery beds. 25 days old healthy and uniform seedlings were transplanted at different levels of spacing on 04th august, 2019. A basal dose of well rotten Farm Yard Manure @ 5 kg/$m^2$ was uniformly mixed in the soil 15 days before transplanting. Half dose of nitrogen (10 g/$m^2$), full dose of phosphorus (20 g/$m^2$) and potassium (10 g/$m^2$) was supplied through urea, single super phosphate and muriate of potash, respectively as basal application at transplanting time. Remaining half dose of nitrogen (10 g/$m^2$) was applied at 30 DAT. Different intercultural practices like gap filling, irrigating, staking, weeding etc. were performed as per crop requirement. Observations were recorded for various growth, flowering and yield parameters in African marigold. The data recorded during investigation were subjected to statistical analysis by using RBD for analysis of variance (ANOVA) as suggested by (Snedecor and Cochran, 1987).

## Results and discussion

### Growth parameters

**Plant height (cm):** The data pertaining to the influence of pinching and $GA_3$ and their combined treatments on plant height. It is evident from the data presented in Table 1. There was significant variation in plant height of *Tagetes erecta*. The data ranged significantly from 52.200 to 63.100 cm. Treatment $T_{13}$ (Pinching 35 days + $GA_3$ 300 ppm) produced maximum plant height (63.100 cm) and $T_{14}$ (Pinching 40 days + $GA_3$ 100 ppm) produced minimum plant height (52.200cm.). With $T_0$ (43.933cm.)

**Number of branches per plant:** It is evident from the data presented in Table 1. There was significant variation in number of branches per plant among different treatments in *Tagetes erecta*. The data ranged significantly from 65.320 to 86.833. Treatment $T_{13}$ (Pinching 35 days + 300 PPM Gibberellic acid) significantly produced maximum number of secondary branches per plant (86.833) which was significantly higher than rest all treatments whereas the minimum number of branches per plant was recorded with $T_5$ (GA3 100 ppm) treatment followed by $T_2$ (Pinching 35 days) 77.447 and $T_0$ (No pinching) 54.833.

**Plant spread per plant (cm.):** It is evident from the data presented in Table 1. There was significant variation in plant spread per plant among different treatments in *Tagetes erecta*. The data ranged significantly from 68.467 to 73.990. Treatment $T_{13}$ (Pinching 35 days + 300 PPM Gibberellic acid) significantly produced maximum plant spread per plant (73.990) which was significantly higher than rest all treatments followed by $T_2$ (Pinching 35 days) 71.050 whereas the minimum number of branches per plant was recorded with $T_{16}$ (Pinching 40 days + 300 PPM Gibberellic acid) (68.467) treatment and $T_0$ (No pinching + spraying) 64.680.

**Number of node per plant:** It is evident from the data presented in Table 1. There was significant variation in Number of node per plant among different treatments in

*Tagetes erecta*. The data ranged significantly from 407.330 to 461.383. Treatment T13 (Pinching 35 days + 300 PPM Gibberellic acid) significantly produced maximum number of node per plant (461.383) which was significantly higher than rest all treatments followed by T2 (Pinching 35 days) 447.997 whereas the minimum number of branches per plant was recorded with T5 (100 PPM Gibberellic acid) treatment and T0 (No pinching + spraying) 371.220.

**Stem diameter (cm.):** The data pertaining to the influence of pinching and GA3 and their combined treatments on diameter of stem have been presented in Table 1. The data ranged significantly from 3.413 to 4.090. Treatment T13 (Pinching 35 days + 300 PPM Gibberellic acid) significantly produced maximum stem diameter per plant (4.090) which was significantly higher than rest all treatments followed by T2 (Pinching 35 days) 3.857 whereas the minimum number of branches per plant was recorded with T19 (Pinching 45 days + 300 PPM Gibberellic acid) treatment and T0 (No pinching + spraying) 3.857.

**Table 1:** Effect of pinching and GA3 on flower growth parameters of African marigold

| | Treatments | Plant height (cm) | Number of branches/ plants | Plant spread/plant (cm.) | Number of node/ plants | Stem diameter (cm.) |
|---|---|---|---|---|---|---|
| T1 | Pinching 30 days | 55.933 | 68.113 | 70.293 | 429.607 | 3.530 |
| T2 | Pinching 35 days | 60.800 | 77.447 | 71.050 | 447.997 | 3.857 |
| T3 | Pinching 40 days | 55.233 | 68.257 | 70.400 | 410.273 | 3.573 |
| T4 | Pinching 45 days | 55.500 | 69.723 | 70.367 | 409.217 | 3.627 |
| T5 | Gibberellic acid 100PPM | 54.100 | 65.320 | 70.693 | 407.330 | 3.523 |
| T6 | Gibberellic acid 200 PPM | 56.767 | 69.610 | 69.267 | 409.717 | 3.623 |
| T7 | Gibberellic acid 300 PPM | 54.867 | 67.390 | 69.537 | 409.887 | 3.630 |
| T8 | Pinching 30 days + 100 PPM Gibberellic acid | 56.367 | 68.837 | 69.893 | 422.663 | 3.580 |
| T9 | Pinching 30 days + 200 PPM Gibberellic acid | 56.400 | 71.163 | 70.003 | 413.053 | 3.407 |
| T10 | Pinching 30 days + 300 PPM Gibberellic acid | 57.467 | 69.333 | 69.313 | 416.087 | 3.517 |
| T11 | Pinching 35 days + 100 PPM Gibberellic acid | 59.533 | 68.220 | 68.520 | 409.720 | 3.600 |
| T12 | Pinching 35 days + 200 PPM Gibberellic acid | 60.967 | 74.720 | 70.727 | 436.830 | 3.630 |
| T13 | Pinching 35 days + 300 PPM Gibberellic acid | 63.100 | 86.833 | 73.990 | 461.383 | 4.090 |
| T14 | Pinching 40 days + 100 PPM Gibberellic acid | 52.200 | 65.667 | 70.243 | 412.383 | 3.473 |
| T15 | Pinching 40 days + 200 PPM Gibberellic acid | 57.733 | 71.443 | 69.053 | 421.273 | 3.430 |
| T16 | Pinching 40 days + 300 PPM Gibberellic acid | 53.533 | 66.887 | 68.467 | 408.110 | 3.430 |
| T17 | Pinching 45 days + 100 PPM Gibberellic acid | 52.533 | 72.277 | 69.847 | 414.107 | 3.453 |
| T18 | Pinching 45 days + 200 PPM Gibberellic acid | 52.433 | 69.720 | 69.990 | 418.330 | 3.603 |
| T19 | Pinching 45 days + 300 PPM Gibberellic acid | 55.200 | 69.110 | 70.330 | 418.610 | 3.413 |
| T0 | Without pinching +spraying | 43.933 | 54.833 | 64.680 | 371.220 | 2.540 |
| | C.D. | 7.338 | 5.552 | 2.052 | 12.959 | 0.298 |
| | SE(m) | 0.113 | 1.932 | 0.714 | 4.509 | 0.104 |

**Flowering characters**

**Number of Bud per plant:** The data pertaining to the effect of pinching and GA3 and their combined treatments on Number of buds have been presented in Table 2. Significant variation was among the various treatments in *Tagetes erecta*. The treatment T13 (Pinching 35 days + 300 PPM Gibberellic acid) produced maximum Number of bud per plant (101.887 bud / plant) followed by T2 (Pinching 35 days) treatment i.e. (93.830bud / plant), however, it was statistically higher than other treatment. The minimum Number of buds was recorded in T4 (pinching 45 days) (88.273 bud / plant) with T0 Without pinching + spraying (75.550 bud / plant).

**Number of flowers per plant:** The data in respect of the number of flowers per plant as influenced by different treatment of pinching and GA3 and their combinations are presented in Table 2. The data ranged significantly from 81.940 to 101.387. The treatment T13 (Pinching 35 days + 300 PPM Gibberellic acid) resulted in maximum number of flowers per plant (101.387.) followed by T2 (Pinching 35 days) 87.443 and T5 (Gibberellic acid 100 PPM) (81.940), whereas minimum number of flowers per plant was recorded with T0 (Without pinching +spraying) (75.143).

**Diameter of flower (cm):** The data pertaining to the effect of pinching and GA3 and their combined treatments on flower diameter have been presented in Table 2. Significant variation was among the various treatments in *Tagetes erecta*. The treatment T9 (Pinching 30 days + 200 PPM Gibberellic acid) produced maximum diameter of flower (9.337 cm) followed by T1 (Pinching 30 days) treatment i.e. (8.253 cm.), however, it was statistically higher than other treatment. The minimum flower diameter was recorded in T8 (Pinching 30 days + 100 PPM Gibberellic acid) (6.503 cm) with T0 Without pinching + spraying (5.310 cm.).

**Table 2:** Effect of pinching and GA3 on flowering parameters of African marigold

| | Treatments | Number of Bud per plant | Number of flowers per plant | Diameter of flower (cm) |
|---|---|---|---|---|
| T1 | Pinching 30 days | 92.163 | 84.833 | 8.253 |
| T2 | Pinching 35 days | 93.830 | 87.443 | 7.413 |
| T3 | Pinching 40 days | 92.493 | 86.443 | 7.193 |
| T4 | Pinching 45 days | 88.273 | 84.330 | 6.607 |
| T5 | Gibberellic acid 100PPM | 89.773 | 81.940 | 6.903 |
| T6 | Gibberellic acid 200 PPM | 91.497 | 83.330 | 6.877 |
| T7 | Gibberellic acid 300 PPM | 90.443 | 84.667 | 6.570 |

| | | | | |
|---|---|---|---|---|
| T8 | Pinching 30 days + 100 PPM Gibberellic acid | 91.440 | 84.500 | 6.503 |
| T9 | Pinching 30 days + 200 PPM Gibberellic acid | 90.440 | 85.553 | 9.337 |
| T10 | Pinching 30 days + 300 PPM Gibberellic acid | 92.497 | 82.000 | 7.563 |
| T11 | Pinching 35 days + 100 PPM Gibberellic acid | 89.827 | 84.497 | 7.120 |
| T12 | Pinching 35 days + 200 PPM Gibberellic acid | 92.887 | 87.163 | 6.860 |
| T13 | Pinching 35 days + 300 PPM Gibberellic acid | 101.887 | 101.387 | 6.650 |
| T14 | Pinching 40 days + 100 PPM Gibberellic acid | 88.997 | 81.500 | 6.887 |
| T15 | Pinching 40 days + 200 PPM Gibberellic acid | 88.497 | 84.277 | 7.243 |
| T16 | Pinching 40 days + 300 PPM Gibberellic acid | 91.493 | 83.277 | 7.230 |
| T17 | Pinching 45 days + 100 PPM Gibberellic acid | 89.663 | 84.220 | 7.027 |
| T18 | Pinching 45 days + 200 PPM Gibberellic acid | 90.887 | 82.887 | 7.327 |
| T19 | Pinching 45 days + 300 PPM Gibberellic acid | 90.110 | 84.663 | 7.223 |
| T0 | Without pinching +spraying | 75.550 | 75.143 | 5.310 |
| | C.D. | 5.378 | 3.722 | 0.624 |
| | SE(m) | 1.871 | 1.295 | 0.217 |

**Yield characters**

**Flower yield per plant (gm.):** The data on yield of flower per plant as influenced by pinching and $GA_3$ and their combinations have been presented in Table 3. An appraisal of the data clearly revealed that the yield of flower per plant was significant difference was recorded. The maximum yield of flowers (495.333 g/plant) was recorded in $T_{13}$ (Pinching 35 days + 300 PPM Gibberellic acid), followed by $T_2$ (Pinching 35 days) (418.667 g/plant) however, the minimum flower yield (388.667g/plant) was recorded in $T_{12}$ (Pinching 35 days + 200 PPM Gibberellic acid) with $T_0$ Without pinching +spraying (299.00g/ plant)

**Flower yield per plot (kg.):** The data on yield of flower per plot as influenced by pinching and $GA_3$ and their combinations have been presented in Table 3. An appraisal of the data clearly revealed that the yield of flower per plot was significant difference was recorded. The maximum yield of flowers (1.321 Kg/plant) was recorded in $T_{13}$ (Pinching 35 days + 300 PPM Gibberellic acid), followed by $T_2$ (Pinching 35 days) (1.321 Kg/plant) however, the minimum flower yield (1.066 Kg/plant) was recorded in $T_{15}$ (Pinching 40 days + 200 PPM Gibberellic acid) with $T_0$ Without pinching +spraying (0.776 Kg/ plant)

**Fresh Weight of Flower (g):** The data on Fresh weight of flower per plant as influenced by pinching and $GA_3$ and their combinations have been presented in Table 3. An appraisal of the data clearly revealed that the Fresh weight of flower per plot was significant difference was recorded. The maximum yield of flowers (12.160 g) was recorded in $T_9$ (Pinching 30 days + 200 PPM Gibberellic acid), followed by $T_1$ (Pinching 30 days) (9.987 g) however, the minimum flower yield (9.070 g) was recorded in $T_{19}$ (Pinching 45 days + 300 PPM Gibberellic acid) with $T_0$ Without pinching +spraying (6.613 g)

**Dry weight of flower (G):** Dry weight of flower was recorded as affected by different varieties is furnished in table 3. An appraisal of the data clearly revealed that the Fresh weight of flower per plot was significant difference was recorded. The maximum yield of flowers (1.960 g) was recorded in $T_9$ (Pinching 30 days + 200 PPM Gibberellic acid), followed by $T_1$ (Pinching 30 days) (1.453 g) however, the minimum flower yield (0.980 g) was recorded in $T_3$ (Pinching 40) with $T_0$ Without pinching +spraying (0.317 g)

**Flower yield per hectare / ton. (G):** Flower yield per ha. /t. was recorded as affected by different varieties is furnished in table no 3. An appraisal of the data clearly revealed that the Flower yield per ha was significant difference was recorded. The maximum yield of flowers (13.213 t/ha.) was recorded in $T_{13}$ (Pinching 35 days + 300 PPM Gibberellic acid), followed by $T_2$ (Pinching 35 days) (11.087 t/ha) however, the minimum flower yield (10.657 t/ha.) was recorded in $T_{15}$ (Pinching 40 days + 200 PPM Gibberellic acid), with $T_0$ Without pinching +spraying (7.762 t/ha.)

**Table 3:** Effect of pinching and GA3 on flower yield parameters of African marigold

| | Treatments | Flower yield/plant (gm.) | Flower yield/plot (kg.) | Fresh weight of flower (g) | Dry weight of flower (g) | Flower yield/hect are / ton. (g) |
|---|---|---|---|---|---|---|
| T1 | Pinching 30 days | 392.333 | 1.081 | 9.987 | 1.453 | 10.807 |
| T2 | Pinching 35 days | 418.667 | 1.109 | 9.503 | 1.007 | 11.087 |
| T3 | Pinching 40 days | 389.000 | 1.087 | 9.080 | 0.980 | 10.867 |
| T4 | Pinching 45 days | 398.000 | 1.087 | 9.380 | 1.053 | 10.867 |
| T5 | Gibberellic acid 100PPM | 403.000 | 1.075 | 9.477 | 1.030 | 10.753 |
| T6 | Gibberellic acid 200 PPM | 400.333 | 1.089 | 9.320 | 1.143 | 10.887 |
| T7 | Gibberellic acid 300 PPM | 405.333 | 1.081 | 9.403 | 1.170 | 10.810 |
| T8 | Pinching 30 days + 100 PPM Gibberellic acid | 402.667 | 1.105 | 9.283 | 1.030 | 11.050 |
| T9 | Pinching 30 days + 200 PPM Gibberellic acid | 393.667 | 1.085 | 12.160 | 1.960 | 10.853 |
| T10 | Pinching 30 days + 300 PPM Gibberellic acid | 409.667 | 1.085 | 9.910 | 1.247 | 10.850 |
| T11 | Pinching 35 days + 100 PPM Gibberellic acid | 393.000 | 1.079 | 9.363 | 1.097 | 10.787 |
| T12 | Pinching 35 days + 200 PPM Gibberellic acid | 388.667 | 1.074 | 9.387 | 1.063 | 10.743 |
| T13 | Pinching 35 days + 300 PPM Gibberellic acid | 495.333 | 1.321 | 9.413 | 1.100 | 13.213 |
| T14 | Pinching 40 days + 100 PPM Gibberellic acid | 403.667 | 1.093 | 9.463 | 1.063 | 10.927 |
| T15 | Pinching 40 days + 200 PPM Gibberellic acid | 409.000 | 1.066 | 9.413 | 1.090 | 10.657 |
| T16 | Pinching 40 days + 300 PPM Gibberellic acid | 395.667 | 1.104 | 9.400 | 1.010 | 11.043 |

| | | | | | | |
|---|---|---|---|---|---|---|
| T17 | Pinching 45 days + 100 PPM Gibberellic acid | 392.333 | 1.073 | 9.543 | 1.060 | 10.727 |
| T18 | Pinching 45 days + 200 PPM Gibberellic acid | 393.333 | 1.076 | 9.230 | 1.060 | 10.760 |
| T19 | Pinching 45 days + 300 PPM Gibberellic acid | 397.333 | 1.098 | 9.070 | 1.113 | 10.977 |
| T0 | Without pinching +spraying | 299.000 | 0.776 | 6.613 | 0.317 | 7.763 |
| | C.D. | 18.637 | 0.033 | 0.837 | 0.175 | 0.331 |
| | SE(m) | 6.485 | 0.011 | 0.291 | 0.061 | 0.115 |

## Conclusion

On the basis of present investigation, it is concluded that treatment ($T_{13}$), I, e., in terms of Growth parameter (number of branches, Plant spread, Number of node, Stem dia meter), Floral parameter (Bud per plant, Number of flower per plant) and yield parameter (Flower yield per plant, Flower yield per plot) and in Plant height without pinching $T_{10}$ followed by Plant height with pinching $T_{17}$ and Flower parameter Diameter of flower in $T_9$ and followed by in Yield fresh weight of flower, Dry weight of flower. Thus, it may be recommended that the African marigold cv. Local orange plants should be treated with $T_{13}$ treatment (Pinching 35 days + gibberellic acid 300 ppm) as application) to improve the ultimate objective i.e. the yield of flower which may ensure us to get maximum net return.

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