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*Short Communication*

# Effect of Plant Growth Regulators and Humic Acid on Growth and Flower Yield of Gerbera (*Gerbera jamesonii*) Var. Ankur

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***Key words*:** *Gerbera jamesonii*, Growth regulators, Growth, Flower yield, Humic acid

Gerbera (*Gerbera jamesonii*) belonging to the Asteraceae family that ranks among the top ten cut flowers of the world. The use of plant growth regulators has brought a revolution in the floriculture industry and has been found to be of great significance in the commercial cultivation of flower crops. Plant growth regulators are not nutrients, but chemical substances that are used in small amount to promote and influence the growth, development and differentiation of cells and tissues. Plant growth regulators play important role in commercial cut flowers are growth control, prevention of bud dormancy, promotes flowering, prolonging the vase life of the flower and retarding the senescence [1]. Foliar application of growth regulators can stimulate flowering to get maximum yield. Foliar fertilization improves the growth and development by providing essential nutrients readily translocated by crop plants. Plant growth regulators also influence the vegetative growth and flowering in gerbera and stimulates cellular elongation and plants grow faster and initiate flowering. Growth promoters like Auxin, Gibberellin and Cytokinin modify physiological process by accelerating plant growth while growth retardant like cycocel and Abscisic acid inhibit plant growth. Maximum vegetative growth, flower yield and quality was observed in gerbera by application of GA3 @ 150 ppm [2]. Foliar application of Triacontanol (0.5%) was found to improve the vegetative growth and flowering of gerbera. Similarly, application of growth retardant like paclobutrazole (P 333), Maleic hydrazide (MH), chromequot (CCC) etc., in gerbera reduce plant spread, increase leaf number/plant, increase chlorophyll content, decrease in stalk length, increase in stalk thickness, number of flowers and flower quality parameters [3]. Campesterol + Stigmasterol are the 8$^{th}$ generation nano technology-based compounds stimulates the flower production. Nitrobenzene based flower booster, used in floriculture industry for yielding excellent quality flower. The use of amino acids spray on plant shoot is one of the modern methods used to improve plant growth and productivity because of their direct role in increasing the tissue content of proteins and essential enzymes for organizing the metabolic events or activation of antioxidants. Hence, more plant resistance toward stressful conditions is achieved.

The application of seaweed extract for different crops was a great importance due to contain high levels of organic matter, micro elements, vitamins and fatty acids and also rich in growth regulators such as auxins, cytokinin and gibberellins [4]. Hence, an experiment was formulated to study the effect of plant growth regulators and humic acid on growth and flower yield of gerbera (*Gerbera jamesonii*) var. Ankur.

The experiment was carried out in Avalapalli, Hosur, Tamil Nadu in the farmers field during the period 2017-2020. Planting materials were procured from KF Bio plants, Pune, which was in healthy condition with two leaf stage in pro-trays with cocopeat medium. The experiment consisting of nine treatments with two growth promoters ($GA_3$, Triacontanol), two retardants (Alar and Maleic hydrazide), two new generation stimulants (Campesterol + Stigmasterol and Nitrobenzene) and two amino acid and Sea weed extract combinations. All the treatments were added with humic acid @ 2000 ppm were imposed as foliar application at 30 days interval. Observations on plant spread, number of leaves, leaf length, leaf width, leaf area, Number of flowers, days to first flower, flower diameter and stalk length were taken at 180 days after planting.

The plant spread was found to be significant at all the days of observations. Maximum plant spread was (35.6 cm) was recorded in $T_3$ ($GA_3$ @ 300 ppm + HA @ 2000 ppm). This is followed by the treatment $T_5$ (Campesterol + Stigmasterol + HA @ 2000 ppm) with 35.2 cm. However, the lowest plant spread was recorded under the treatment $T_1$ (Alar @ 1000 ppm + Humic Acid @ 2000 ppm) with 32.4 cm.

Maximum number of leaves were observed under the treatment $T_3$ ($GA_3$ @ 300 ppm + HA @ 2000 ppm) with 30.18 leaves at 180 days. This is followed by $T_5$ (Campesterol +Stigmasterol + HA @ 2000 ppm) which recorded 29.76 leaves. The lowest number of leaves was recorded in the treatment $T_1$ (Alar @ 1000 ppm + Humic Acid @ 2000 ppm) which recorded 27.04 leaves at 180 days.

From the data, the results revealed that, maximum leaf area (212.3 cm$^2$) was observed under the treatment $T_3$ ($GA_3$ @ 300 ppm + HA @ 2000 ppm). This is followed by the treatment

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$T_5$ (Campesterol + Stigmasterol + HA @ 2000 ppm) which recorded a leaf area of 208.73 $cm^2$. However, the lowest leaf area was observed under the treatment $T_1$ (Alar @ 1000 ppm + Humic Acid @ 2000 ppm) with 185.42 $cm^2$.

The increase in morphological characters viz., plant spread, number of leaves, leaf area might be due to application of GA which help in cell expansion and cell elongation resulting increase in leaf area [5-8]. Earliness in flowering was recorded under the treatment $T_1$ (Alar @ 1000 ppm + Humic Acid @ 2000 ppm) with 86.77 days. This is followed by the treatment $T_2$ (M H @ 500 ppm + HA @ 2000 ppm) with 88.31 days. However, maximum number of days was recorded under tye treatment $T_9$ (Control) with 98.34 days. Similar finding have been obtained by Kumar *et al*. [9] who reported that application of growth retardant in gerbera advanced the flower production earlier than other treatments. Among the treatments, maximum number of flowers (22.19) were recorded under the treatment $T_3$ ($GA_3$ @ 300 ppm + HA @ 2000 ppm). This is followed by the treatment $T_5$ (Campesterol + Stigmasterol + HA @ 2000 ppm) with 21.79 flowers. The lowest number of flowers (19.28) was recorded under control ($T_9$). Maximum flower diameter (11.78 cm) was recorded under the treatment $T_2$ (M H @ 500 ppm + HA @ 2000 ppm). This is followed by the treatment $T_1$ (Alar @ 1000 ppm + Humic Acid @ 2000 ppm) which recorded a flower diameter of 11.46 cm. However, the least flower diameter (9.55 cm) was recorded under the control ($T_9$).

Among the treatments, the maximum flower stalk length (46.88 cm) was recorded under the treatment $T_3$ ($GA_3$ @ 300 ppm + HA @ 2000 ppm). This is followed by the treatment $T_5$ (Campesterol + Stigmasterol + HA @ 2000 ppm) which recorded a stalk length of 46.14 cm. However, the lowest stalk length (41.85 cm) was observed under control ($T_9$).

Table 1 Effect of growth stimulants and humic acid on growth and flower yield of gerbera (*Gerbera jamesonii*) var.Ankur

| Treatment details | Plant spread (cm) | No. of leaves | Leaf area ($cm^2$) | Days to first flower | No. of flowers per plant | Flower diameter | Stalk length |
|---|---|---|---|---|---|---|---|
| $T_1$: Alar @ 1000 ppm + Humic Acid @ 2000 ppm | 32.4 | 27.04 | 185.42 | 86.77 | 20.56 | 11.46 | 43.59 |
| $T_2$: M H @ 500 ppm + Humic Acid @ 2000 ppm | 32.7 | 27.40 | 189.07 | 88.31 | 20.76 | 11.78 | 44.54 |
| $T_3$: GA3 @ 300 ppm + Humic Acid @ 2000 ppm | 35.6 | 30.18 | 212.3 | 89.89 | 22.19 | 11.29 | 46.88 |
| $T_4$: Triacontanol @ 1000 ppm + HA@ 2000 ppm | 34.4 | 28.92 | 201.91 | 94.68 | 20.94 | 10.33 | 44.89 |
| $T_5$: Campesterol +Stigmasterol + HA @ 2000 ppm | 35.2 | 29.76 | 208.73 | 91.44 | 21.79 | 10.95 | 46.14 |
| $T_6$: Nitrobenzene @ 2000 ppm + HA @ 2000 ppm | 34.8 | 29.31 | 205.18 | 94.14 | 21.37 | 10.67 | 45.41 |
| $T_7$: Amino Acid @ 500 ppm + HA @ 2000 ppm | 34.0 | 28.51 | 199.83 | 94.80 | 20.39 | 10.01 | 43.81 |
| $T_8$: Sea weed @2000 ppm + HA @ 2000 ppm | 33.6 | 28.08 | 196.27 | 96.68 | 20.13 | 9.67 | 42.83 |
| $T_9$: Control | 33.2 | 27.62 | 192.67 | 98.34 | 19.28 | 9.55 | 41.85 |
| SEd | 0.17 | 0.20 | 1.69 | 0.81 | 0.20 | 0.15 | 0.36 |
| CD | 0.36 | 0.40 | 3.4 | 1.64 | 0.40 | 0.31 | 0.72 |


## SUMMARY

Gerbera (*Gerbera jamesonii*) belonging to the Asteraceae family that ranks among the top ten cut flowers of the world. The use of plant growth regulators has brought a revolution in the floriculture industry and has been found to be of great significance in the commercial cultivation of flower crops. Hence, an experiment was formulated to study the effect of plant growth regulators and humic acid on growth and flower yield of gerbera (*Gerbera jamesonii*) var. Ankur. The experiment was carried out in Avalapalli, Hosur, Tamil Nadu in the farmers field during the period 2017-2020. Planting materials were procured from KF Bio plants, Pune, which was in healthy condition with two leaf stage in pro-trays with cocopeat medium. The experiment consisting of nine treatments with two growth promoters ($GA_3$, Triacontanol), two retardants (Alar and Maleic hydrazide), two new generation stimulants (Campesterol + Stigmasterol and Nitrobenzene) and two amino acid and sea weed extract combinations. All the treatments were added with humic acid @ 2000 ppm were imposed as foliar application at 30 days interval. Observations on plant spread, number of leaves, leaf length, leaf width, leaf area, Number of flowers, days to first flower, flower diameter and stalk length were taken at 180 days after planting. From the experiment, it was concluded that, foliar application of $GA_3$ @ 300 ppm along with Humic acid @ 2000 ppm was found to increase the growth and flower yield of gerbera under poly house conditions.


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