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**BP Shirsat**
College of Horticulture, Dapoli, Ratnagiri, Maharashtra, India

**KV Malshe**
College of Horticulture, Dapoli, Ratnagiri, Maharashtra, India

**SG Mahadik**
College of Horticulture, Dapoli, Ratnagiri, Maharashtra, India

**Corresponding Author:**
**BP Shirsat**
College of Horticulture, Dapoli, Ratnagiri, Maharashtra, India

# Effect of plant growth regulators and pinching on vase life and economics of Gaillardia under Konkan agroclimatic condition

**BP Shirsat, KV Malshe and SG Mahadik**

**Abstract**
The field experiment was conducted at College of Horticulture, Dapoli in Rabi season of the year 2020-21 to assess the response of Gaillardia (*Gaillardia pulchella*) to the application of plant growth regulators and pinching practice in relation to flower vase life and economics under Konkan agroclimatic condition. The experiment was designed in Factorial Randomized Block Design consisting of three replication with seven plant growth regulator treatments (Factor A) *viz*; $T_1$- Control, $T_2$- Ethephon @500ppm, $T_3$- Ethephon @ 1000 ppm, $T_4$- $GA_3$ @ 100 ppm, $T_5$- $GA_3$ @ 200 ppm, $T_6$- CCC @ 1000 ppm, $T_7$- CCC @ 2000 ppm and pinching practices (Factor B) as $P_1$ - Pinching at 30 days after transplanting and $P_2$ – No Pinching. The significantly highest vase life (6.50 days) was observed in the treatment $T_7$ (CCC @ 2000 ppm). The lowest vase life was recorded in the treatment $T_2$ (Ethephon @ 500ppm) i.e. 3.17days. Whereas, the vase life in control ($T_1$) was 5.50 days. Pinching treatments and their interaction with plant growth regulators did not significantly altered on vase life of flower. The highest B:C ratio (2.68) was obtained in $T_4P_1$ treatment followed by $T_4P_2$ and $T_1P_2$ treatments (2.57 and 2.57, respectively) The rest of the treatment combinations had low B:C ratio than the Control. While $T_2P_2$ combination was not cost effective as B:C ratio is (0.82). It is inferred that $GA_3$ @ 100 ppm with pinching at 30 DAT was cost effective treatment.

**Keywords:** Gaillardia, Plant growth regulators, pinching, vase life

## Introduction
Gaillardia belongs to Asteraceae family and it is prevalently recognized as "Blanket Flower''. Its common name is referred to the resemblance of inflorescence to the brightly patterned blankets. The gaillardia is mainly grown for its cut flowers and the loose flowers are used for making garlands in religious occasion and for decoration during social functions. It's gorgeously colored flowers are best arranged in copper bowls or simple plain-coloured vases.
In gaillardia, the flowering is a complex process which occurs in response to environmental factors like photoperiod and prevailing climatic conditions. Plant growth regulators (PGRs) are generally used in flower crops for controlling flowering attributes. Several PGRs interrupt physiological pathways of hormones and enzymes, which disrupts normal growth (Danielson, 2005) [1], which ultimately affect the plant growth, yield and quality of flowers and yield. Pinching is a characteristic horticultural practices adopted in flower crops which reduces the height that promote axillary branches, delays flowering and helps in breaking resting period.
There is a scope for area expansion under gaillardia in Konkan region. Therefore, an attempt has been made to assess the response of Gaillardia (*Gaillardia pulchella*) to the application of plant growth regulators and pinching practice in relation to flower vase life and economics under Konkan agroclimatic condition.

## Material and Methods
An experiment was carried at Floriculture Farm of College of Horticulture, Dapoli, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli, Dist. Ratnagiri during *Rabi* season of the year 2020-21. The experiment was designed in Factorial Randomized Block Design consisting of three replication with seven plant growth regulator treatments (Factor A) *viz*; $T_1$- Control, $T_2$- Ethephon @500ppm, $T_3$- Ethephon @ 1000 ppm, $T_4$- $GA_3$ @ 100 ppm, $T_5$- $GA_3$ @ 200 ppm, $T_6$- CCC @ 1000 ppm, $T_7$- CCC @ 2000 ppm and pinching practices (Factor B) as $P_1$ - Pinching at 30 days after transplanting and $P_2$ – No Pinching.

The preparatory tillage was done and flat beds of 1.2 m X 1.8 m were prepared and one month old seedlings of gaillardia were transplanted at spacing of 30 X 30 cm. The recommended intercultural operations were followed uniformly to experimental plots. The Sprays with different growth regulators was given three times in growth period of crop i.e. 30, 45 and 60 days after transplanting. The observations on yield was recorded on randomly selected five plants. The vase life of the flowers in different treatments was also studied. Statistical analysis of the data was carried out by standard method of analysis of variance as given by Panse and Sukhatme (1985) [4]. The economics was estimated based on the cost of cultivation and returns.

**Table 1:** Effect of plant growth regulators and pinching on vase life of Gaillardia flowers

| Treatment combination | Vase life (Days) | | |
|---|---|---|---|
| | $P_1$ | $P_2$ | Mean |
| $T_1$ | 5.33 | 5.67 | 5.50 |
| $T_2$ | 3.00 | 3.33 | 3.17 |
| $T_3$ | 3.67 | 3.33 | 3.50 |
| $T_4$ | 4.67 | 4.00 | 4.33 |
| $T_5$ | 4.33 | 3.67 | 4.00 |
| $T_6$ | 6.67 | 6.00 | 6.33 |
| $T_7$ | 6.67 | 6.33 | 6.50 |
| Mean | 4.90 | 4.62 | 4.76 |
| | S.Em ± | C.D at 5% | Result |
| T | 0.24 | 0.70 | SIG |
| P | 0.13 | - | NS |
| TxP | 0.34 | - | NS |

**PGRs Treatments**
1) $T_1$–Control
2) $T_2$ – Ethephon @ 500 ppm
3) $T_3$ – Ethephon @ 1000 ppm
4) $T_4$ – $GA_3$ @100 ppm
5) $T_5$ – $GA_3$ @ 200 ppm
6) $T_6$ – CCC @ 1000 ppm
7) $T_7$ – CCC @ 2000 ppm

**Pinching Treatments**
1) $P_1$ - Pinching at 30 DAT
2) $P_2$ – No pinching

**Table 2:** Effect of plant growth regulators on production economics in Gaillardia

| Treatment combination | Yield (q/ha) | Expenditure Rs./ha | Gross Return Rs./ha | Net Profit Rs./ha | B:C ratio |
|---|---|---|---|---|---|
| $T_1P_1$ | 126.6 | 177500 | 633000 | 455500 | 2.57 |
| $T_1P_2$ | 121.5 | 174500 | 607500 | 433000 | 2.48 |
| $T_2P_1$ | 88.4 | 199800 | 442000 | 242200 | 1.21 |
| $T_2P_2$ | 71.5 | 196800 | 357500 | 160700 | 0.82 |
| $T_3P_1$ | 96.3 | 218500 | 481500 | 263000 | 1.20 |
| $T_3P_2$ | 88.2 | 215500 | 4310000 | 215500 | 1.00 |
| $T_4P_1$ | 148.7 | 201360 | 742000 | 540640 | 2.68 |
| $T_4P_2$ | 141.7 | 198360 | 708500 | 510140 | 2.57 |
| $T_5P_1$ | 134.4 | 221620 | 6782000 | 450380 | 2.03 |
| $T_5P_2$ | 123.6 | 218620 | 618000 | 399380 | 1.83 |
| $T_6P_1$ | 92.5 | 197020 | 462500 | 265480 | 1.35 |
| $T_6P_2$ | 81.3 | 194020 | 406500 | 212480 | 1.10 |
| $T_7P_1$ | 104.9 | 212940 | 524500 | 311560 | 1.46 |
| $T_7P_2$ | 96.3 | 209940 | 481500 | 271560 | 1.29 |

**PGRs Treatments**
1) $T_1$–Control
2) $T_2$ – Ethephon @ 500 ppm
3) $T_3$ – Ethephon @ 1000 ppm
4) $T_4$ – $GA_3$ @100 ppm
5) $T_5$ – $GA_3$ @ 200 ppm
6) $T_6$ – CCC @ 1000 ppm
7) $T_7$ – CCC @ 2000 ppm

**Pinching Treatments**
1) $P_1$ - Pinching at 30 DAT
2) $P_2$ – No pinching

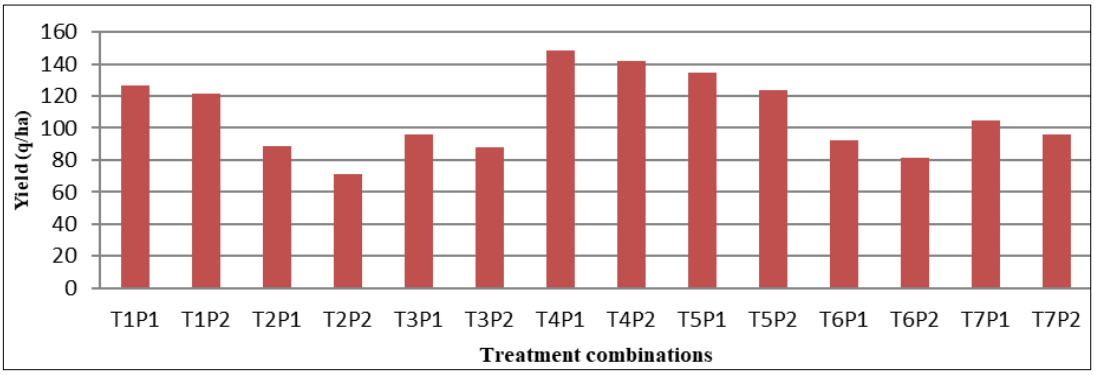


**Fig 1:** Yield of gaillardia as influenced by plant growth regulators and pinching

**Results and Discussion**

The data pertaining to the effect of plant growth regulators on vase life in gaillardia flowers are presented in the Table 1.

The data pertaining to the effect of plant growth regulators on vase life of gaillardia flowers are showed that the significantly highest vase life (6.50 days) was observed in the treatment $T_7$ (CCC @ 2000 ppm) and which was at par with the treatment $T_6$ (CCC @ 1000ppm) i.e.6.33 days. However, the lowest vase life was recorded in the treatment $T_2$ (Ethephon @ 500ppm) i.e. 3.17days. As against the vase life in control ($T_1$) was 5.50 days.

The result clearly revealed that there was highest vase life in the flowers are treated by the treatment CCC. Increased vase life might be due to reduced physiological weight loss and lesser water uptake by flowers. Restricted respiration due to inhibitory action of retardant might have increased the vase life. Similar findings were also obtained by Saiyad (2009) [5], Moon *et al.* (2018) [3], and Kadam *et al.* (2020) [2] in gaillardia.

Pinching treatment did not significantly altered on vase life of flower. The interaction effect between plant growth regulator and pinching on vase life of flower was found to be non-significant (Table 1).

Economics of the experiment was worked out on hector basis and presented in Table 2. The maximum flower yield (148.7 q/ha) was recorded in treatment combination $T_4P_1$ and minimum (71.5 q/ha) was in $T_2P_2$ treatment combination. Further, it is revealed that the highest cost of production (Rs. 221620/-) incurred in $T_5P_1$treatment ($GA_3$ @ 200 ppm + pinching at 30 DAT) and the maximum gross return (Rs. 742000/-) was received in $T_4P_1$ as it has highest yield. The lower cost of production in $T_2P_1$(Control) treatment is mainly due to less expenditure on plant growth regulators and manpower required for spraying and pinching.

The highest B:C ratio (2.68) was achieved in $T_4P_1$ treatment followed by $T_4P_2$ and $T_1P_2$ treatments (2.57 and 2.57, respectively) however, rest of the treatments have low B:C ratio than the Control. While $T_2P_2$ combination was not cost effective as B: C ratio is (0.82). Thus, it is cleared that $GA_3$ @ 100 ppm with pinching at 30 DAT was cost effective treatment. In gaillardia, the higher B:C ratio due to $GA_3$ @ application was earlier reported by Kadam *et al.* (2020) [2].

From the present investigation, it is cleared that the pinching did not altered the vase life while spraying with spraying with CCC improved the vase life of gaillardia flowers. The spraying with $GA_3$ @ 100 ppm and pinching at 30 days after planting exhibited highest cost benefit ratio.

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