

## Review Article

# **Response of foliar application of GA<sub>3</sub> and paclobutrazol on flowering and vase life of Tuberose (*Polianthes tuberosa* L.)**

### **Abstract**

The present investigation “Response of foliar application of GA<sub>3</sub> and paclobutrazol on flowering and vase life of Tuberose (*Polianthes tuberosa* L.)” was carried out was carried out in Horticulture Research Farm at the Department of Floriculture and Landscape Architecture, IGKV, Raipur, Chhattisgarh, India, 2017-18 and 2018-19. The experiment was laid out in Factorial Randomized Block Design with three replication comprising treatment combination of two PGRs (GA<sub>3</sub> and Paclobutrazol) and two tuberose cultivars (Prajwal and Bidhan Ujjwal). Two PGR’s namely Gibberellins (GA<sub>3</sub>) and Paclobutrazol (PBZ) were taken as growth promoter and growth retardant, respectively. In this contest, an experiment was conducted to investigate the effect of different levels of growth promoter and retardant on growth, flowering and vase life of different cultivars of Tuberose. The result indicated that the vegetative growth, flowering and vase life were significantly influenced by different plant growth regulators and cultivars. The maximum plant height was recorded with cv. Prajwal (V<sub>1</sub>) as compared to cv. Bidhan Ujjwal (V<sub>2</sub>). While, minimum number days to first spike emergence (117.33 days), days to first flower opening (131.83 days) was recorded with cv. Bidhan Ujjwal. Among the growth regulators treatments GA<sub>3</sub> 150 ppm (30 and 50 DAP). However, maximum length of spike (94.72 cm), length of rachis (30.35 cm), length of florets (5.8 cm), diameter of florets (4.32 cm), Number of florets spike<sup>-1</sup> (43.41) and Vase life (10.17 days) was recorded with cv. Prajwal. Among the growth regulators treatments GA<sub>3</sub> 150 ppm (30 and 50 DAP).

**Keywords:** Tuberose, PGR, Gibberellic acid (GA<sub>3</sub>), Paclobutrazol (PBZ), Prajwal and Bidhan Ujjwal, Flowering, Vase life.

### **INTRODUCTION**

Among the commercially grown flowers in India. Tuberose (*Polianthes tuberosa* L.) occupies prime position because of its popularity as a cut flower, loose flower as well as its

potential in perfume industry. It is a bulbous geophyte which produces white and waxy florets which are used mainly for making garlands, bouquets, bridal make up and other floral arrangements. The florets borne on long spike stand long distance transport, remain fresh for long and are excellent for table decoration. The plants are also used in landscaping as a component in beds and borders and as potted plants. Plant growth regulators are known to coordinate and control various phases of growth and development, including flowering at optimum concentrations. Gibberellic acid and Paclobutrazol are very important plant growth regulators and are widely used in horticulture. Therefore, the combination of both growth promoter and growth retardant at their right level and their right stage of crop is highly desired. The GA<sub>3</sub> regulation of growth itself is involved with both cell division and cell enlargements without cell division (Habera and Leopold, 1960). The application Paclobutrazol the so called growth retardant is generally used widely in the orchard plants like mango which regulates its alternate bearing habit but it is used very rarely in the flower crops. There is very mere information regarding paclobutrazol effect in the floriculture sector hence we conducted this experiment to assess effect of paclobutrazol in different doses of PGR's. Thus, keeping in view the potentialities of growth regulators like GA<sub>3</sub> and PBZ, the present study was undertaken to find out the suitable concentration of these PGR's for better flowering and vase life of tuberose.

## **MATERIALS AND METHODS**

The experiment was carried out during the years 2017-18 and 2018-19, was carried out in Horticultural Research cum Instruction Farm at the Department of Floriculture and Landscape Architecture, College of Agriculture, Indira Gandhi Krishi Vishwavidyalaya, Raipur, (C.G.). The experiment was laid out in Factorial Randomized Block Design with three replications comprising sixteen treatment combinations of Eight levels of PGR's viz., G<sub>1</sub> GA<sub>3</sub> 150 ppm at 30 DAP, G<sub>2</sub> GA<sub>3</sub> 150 ppm at 50 DAP, G<sub>3</sub> GA<sub>3</sub> 150 ppm at 30 and 50 DAP, G<sub>4</sub> PBZ 10 ppm at 70 DAP, G<sub>5</sub> GA<sub>3</sub> 150 ppm at 30 DAP + PBZ 10 ppm at 70 DAP, G<sub>6</sub> GA<sub>3</sub> 150 ppm at 50 DAP + PBZ 10 ppm at 70 DAP, G<sub>7</sub> GA<sub>3</sub> 150 ppm at 30 and 50 DAP + PBZ 10 ppm at 70 DAP, along with G<sub>8</sub> distill control (water spray) and two varieties viz., Prajwal and Bidhan Ujjwal of tuberose were taken.

Bulbs of tuberose cv. Prajwal were provided by Horticulture Research Farm at the Department of Floriculture and Landscape Architecture, Indira Gandhi Krishi Vishwavidyalaya,

Raipur and the other cv. Bidhan Ujjwal were provided by Horticulture Research Farm, Mandouri, Bidhan Chandra Krishi Vishwavidyalaya, West Bengal.

Before planting the bulbs were stored in well ventilated semi shady place for two months. Older leaves emerging from the neck of the bulbs were trimmed off. Before planting, the bulbs were treated with fungicide copper oxychloride (0.1%) and the individual bulbs. weighing 15-30 g with 1.5- 2.5 cm in diameter were selected for planting. Five plants were selected randomly from each plot for recording data on various flowering attributes. In this article the data on flowering parameters like days to first spike emergence, days to first flower opening, spike length, rachis length, spike diameter and vase life were also recorded during the investigation.

## **RESULTS AND DISCUSSION**

The flowering parameters discussed in this article are, days to first spike emergence, days to first flower opening, length of spike, length of rachis, length of florets, diameter of florets, number of florets spike<sup>-1</sup> and vase life.

### **Influence of Varieties**

Data presented in (Table 1, 2 & 3) revealed that the cultivars of Tuberose had significantly influenced on flowering and vase life parameters characters. The pooled mean data revealed that the minimum period for days taken to first spike emergence (120.13 and 119.38 days) and less number of days from days after planting to first flower opening (133.75 and 132.96 days) were recorded under cv. Bidhan Ujjwal (V<sub>2</sub>) as compared to Prajwal (V<sub>1</sub>) during in the year 2017-18 and 2018-19, respectively. While, maximum length of spike (105.25 cm), length of rachis (30.29 cm), length of florets (5.71cm), diameter of florets (4.56 cm), number of florets spike<sup>-1</sup> (42.20) and vase life of cut spike (11.75 days) were recorded under cv. Prajwal (V<sub>1</sub>) as compared to Bidhan Ujjwal (V<sub>2</sub>). The two years results indicated that there was highly significant difference in early and late flowering behavior, length of spike, length of rachis, length of florets, diameter of florets and vase life within the varieties. It could be stated that variation within the varieties might be due to genotypic and environmental differences. Similar results were reported by Devadanam *et al.* (2007), Sateesha *et al.* (2011), Vanlalruati *et al.* (2013), Krishan moorthy (2014), Dimri *et al.* (2017), Madhumati *et al.* (2018) in tuberose.

### **Effect of plant growth regulators:**

During the first year of the investigation, the application of growth regulators, GA<sub>3</sub> 150 ppm (30 and 50 DAP) recorded early days to spike emergence (117.33 days), earliest flower opening (131.83 days). The maximum length of spike (94.72 cm), length of rachis (30.35 cm), length of florets (5.86 cm), diameter of florets (4.32 cm) , number of florets spike<sup>-1</sup> (43.41) and vase life of cut spike (10.17 days) as compared to control. Similar trend was observed in second year of trial as well as in pooled mean data. The early days to spike emergence and earliest flower opening in GA<sub>3</sub> treatments may be due to increase in the endogenous level of gibberellins which by virtue of its flower inducing characteristics might have also promoted the early days to spike emergence and earliest flower opening. The results obtained in this study are in close agreement with the findings of Bhosale *et al.* (2014), Shanker and Sharma (2016) in tuberose, Rana *et al.* (2005) in gladiolus, Sunitha *et al.* (2007) in marigold. Increase in length of spike, length of rachis and length of florets might be due to increase in the cell division and cell elongation of intercalary meristem resulting in rapid internode and floret elongation. These findings were corroborated with the finding of Singh and Srinivastava (2009), Padaganur *et al.* (2010), Rani and Singh (2013) in tuberose. The role of GA<sub>3</sub> in improving the florets size may be ascribed to the translocation of metabolites at the site of florets development. Increase in diameter of florets might be due to cell elongation in the floret. Gibberellins are also known to increase the sink strength of actively growing parts. The similar findings were also noted by Bhosale *et al.* (2014) in tuberose, Rana *et al.* (2005) in gladiolus and by Salem *et al.* (2016) in gerbera. The significantly maximum number of florets spike<sup>-1</sup> with foliar spray of GA<sub>3</sub> at 150 ppm concentration was mainly due to an increase in the cell division and cell elongation in the intercalary tissue. whereas, application of PBZ 70 ppm in mid growth stage suppress the growth resulting in length of spike. These results are in consonance with finding of Asgarian *et al.* (2013), Nishith *et al.* (2015) in tuberose. The longer vase life of cut spike with higher concentration of GA<sub>3</sub> might be attributed to higher auxin activity which has been reported to delay senescence and enhance the translocation of metabolites. An increased better quality of spike might be caused by drawing of photosynthesis to flower as a consequence of intensification of the sink which also increased cell division and cell elongation due to the foliar application of GA<sub>3</sub> which might have been utilized for the production of the better quality spike in tuberose. The results obtained in this study are in close agreement with the findings of Dani *et al.* (2010), Nellipali and Pal (2018) in tuberose.

The interaction effect of growth regulator and variety treatments was found to non-significant for all the characters. This may be due to the similar effect of plant growth regulator on both the varieties of tuberose.

UNDER PEER REVIEW







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