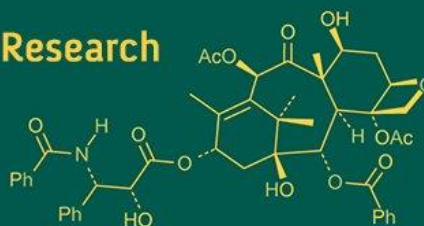


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Influence of paclobutrazol on vegetative growth, flowering and fruiting of guava (*Psidium guajava* L.) cv. L-49

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Abstract

The study "Effect of Paclobutrazol on Guava (*Psidium guajava* L.) cv. L-49" was carried out in 2022-2023 at the Department of Fruit Science, Narendra Deva University of Agriculture and Technology, Narendra Nagar, Kumarganj, Ayodhya (formerly Faizabad), Uttar Pradesh, India. The investigation revealed that paclobutrazol application had a significant effect on the vegetative, flowering, and fruiting parameters of guava grown in the plains of northern India. The treatment T₇ (application of 6 g paclobutrazol per metre canopy diameter through the TSLP) registered the earliest flower bud initiation (15.70 days), the highest fruit set (77.40%), the highest fruit retention (59.00%), the smallest length of new shoots (21.60 cm), the highest number of new shoots per branch (3.00), and thus turned out to be the best treatment.

Keywords: Guava, Paclobutrazol, growth regulator, soil drenching, growth, yield, quality parameters

Introduction

Guava (*Psidium guajava* L.) is truly an important economic fruit plant in the tropical and subtropical regions of the world. The plant belongs to the family Myrtaceae and has a diploid chromosome number of (2n) 22. Its native place in tropical America. It has been naturalized and commercially grown in many temperate and tropical countries because of its shrub habit, profuse bearing, high levels of vitamin C, delicious flavor, and aromatic properties. The genus consists of about 150 species; however, this number is considered to be highly debated. There are several species of wild guava; *Psidium guajava* is the most widely cultivated and used for food, beverages, and pharmaceuticals. It has been found to be the most extensively grown economic fruit plant in the world. The fruit is well-known for its nutritional properties; for instance, it is rich in vitamin C, fibers, and antioxidants. All these qualities make it an attractive fruit for human consumption and industrial processing into jams, juices, jellies, and other products.

Psidium guajava L. (Common Guava): It is the most widespread and commercially important guava species. It is a shrub-like plant bearing fruit profusely with high content of vitamin-C, aroma and good flavour. In northern India guava plants flower two or three times in a year. In this regard, Ambe Bahar refers to the spring flowering of guava plant whereas Mrig Bahar refers to the June or monsoon flowering and Hasth Bahar refers to the October flowering. The fruits of Ambe Bahar are harvested in July-September and the fruits of Mrig Bahar are harvested in November-February. On the contrary, the fruits of Hasth Bahar are harvested in spring season i.e. in summer. A guava tree is comparatively smaller in height with spreading branches. The trees are more or less easy to recognize on account of the fact that their bark is copper coloured, smooth and flakes off to reveal the green underneath layer. Paclobutrazol is a triazole type tree growth retardant which inhibits gibberellin biosynthesis and are involved in reducing abscissic acid, ethylene and indole-3-acetic acid while increasing cytokinin levels (Reddy *et al.* 2008) [14]. It promotes fruit set in the states of inhibited development. Paclobutrazol plays major role in regulation of excessive vegetative growth, enhancement and advancement of flowering, induction of early bearing,

management of alternate bearing, establishment of high density plantation and re-juvenating of old orchards (Saran *et al.*, 2008) [2]. Application of paclobutrazol has been found to promote the vegetative growth, flowering and fruiting of guava, including their number of new shoots per branch and Flowering and fruiting growth.

Materials and Methods

The current study was carried out on ten-year-old guava plants in two consecutive years, 2022 and 2023, at the Department of Fruit Science, Acharya Narendra Deva University of Agriculture and Technology, Narendra Nagar, Kumarganj, Ayodhya (U.P.). The coordinates of the Ayodhya district are 26.47° N latitude, 80.120° E longitude, and 113 m mean sea level. The site is in typical salty, alkaline Indo-Gangetic plains soils.

The randomised block design with three replications was used to assess ten different treatment combinations. These are: T₁-Control (untreated plant); T₂-2 gm Paclobutrazol per m canopy diameter (ring basin method); T₃-4 gm Paclobutrazol per m canopy diameter (ring basin method); T₄-6 gm Paclobutrazol per m canopy diameter (ring basin method); T₅-2 gm Paclobutrazol per m canopy diameter (Trunk Soil Line Pore method); T₆-4 gm Paclobutrazol per m canopy diameter (Trunk Soil Line Pore method); and T₇-6 gm Paclobutrazol per m canopy diameter (Trunk Soil Line Pore

Note: Drenching time: First week of August 2022

Observation to be recorded

- 1. Number of new shoots per branch:** During the second two weeks of November, the number of shoots on each experimental tree was counted on four chosen branches, one in each direction.
- 2. Length of new shoots (cm):** Four tagged branches, one in each direction, were used to measure the shoot length on each experimental tree in December (for the winter season). For the winter months, the average shoot length per branch was computed and reported in centimetres (cm).
- 3. Flower bud initiation**
- 4. Fruit set (%):** Four tagged branches were used to estimate the percentage of fruits set for each season one month after anthesis. The formula provided was used to get the average percentage of fruit set.

Fruit set (%): $\text{set fruit of Number} \div \text{counted flowers Total}$

- 5. Fruit retention (%):** For each tree, the number of fruits on four tagged branches was recorded during the second fortnight of July (for the rainy season) and the second fortnight of November (for the winter season). The average number of fruits per branch was calculated for each season.
- 6. Fruit yield (kg/tree):** At the time of fruit harvesting, the yield per tree was noted and given in kilograms per tree.

Statistical analysis

The data obtained were statistically analyzed in Randomised Block Design (RBD). The significance of treatment effects was tested using F-test and critical differences (CD) at a 5% probability level were calculated for comparison among

treatment means. The experimental data were analysed statistically with the analysis of variance method given by Panse and Sukhatme (1985) [1].

Result and Discussion

The effects of paclobutrazol significantly influenced the Number of new shoots per branch, Length of new shoots (cm), Flower bud initiation, Fruit set (%), Fruit retention (%) and yield (kg/ha). The application of 6gm Paclobutrazol per m canopy diameter (TSLPM) (T₇) consistently outperformed others across all traits.

Number of new shoots per branch, Length of new shoots

(cm): The application of Paclobutrazol had a substantial impact on the number of new shoots per branch in guava cv. L-49 during the years 2022-2023 of the experiment, according to a review of data on the number of new shoots per branch and length of new shoots (Table 1, Fig. 1). Treatment T₇ (6 gm Paclobutrazol TSLP) had the fewest new shoots per branch (3.00) and the longest new shoots (21.60 cm), Treatment T₄ (6gm Paclobutrazol RB) with 4.00 new shoots per branch and 23.40 cm in length came next. Conversely, the control treatment (T₁) had the highest number of new shoots per branch (7.00) and the longest new shoots (24.60 cm). These results also imply that the length of new shoots in guava cv. L-49 is greatly influenced by the administration of paclobutrazol. In comparison to the control, different treatments resulted in differences in shoot length; higher paclobutrazol concentrations caused a noticeable decrease in shoot growth. Similar observations in accordance with the present finding have been reported by Ahmand *et al.* (2000) [3], Brarr (2010) [5], Arora (1983) [11], Pandey *et al.* (2017) [7] and Singh *et al.* (2018) [8] in guava.

Flower bud initiation, Fruit set (%), Fruit retention (%):

The application of T₇ (6gm Paclobutrazol TSLP) had the lowest flower bud initiation (15.70 days) and the highest fruit set (77.40%) and fruit retention (59.00%), respectively. This was followed by the application of T₄ (6gm Paclobutrazol RB), which had the lowest flower bud initiation (16.20 days) and the highest fruit set (75.60%) and fruit retention (56.70%) in guava plants. However, the highest flower bud initiation (21.00 days) while minimum fruit set (69.00%) and fruit retention (48.20%) was recorded in the T₁-control (Untreated plant). Additionally, the findings support the notion that the application of paclobutrazol influences the timing of flower bud initiation in guava cv. L-49, with certain treatments promoting earlier or delayed flower bud initiation compared to the control. Furthermore, specific treatments resulted in significantly higher or lower fruit set and fruit retention than the control group. These results are consistent with studies by Brarr *et al.* (2010) [5], Jain and Dashora (2007) [9] in guava, Pandey *et al.* (2017) [7] in litchi, and Gaur *et al.* (2005) [13] in guava.

Fruit yield (kg/ha): It is clear from looking at data on fruit yield kg per plant in Table 4.1 and Fig. 1 that Paclobutrazol had a considerable impact on fruit yield per plant in guava cv. L-49 during the experiment's 2022-2023 years. In a particular year, treatment T₇ (6 gm Paclobutrazol TSLP) produced the highest fruit yield per plant, measuring 42.90. In 2022, therapy T₄ (42.06 RB) likewise showed equally positive outcomes. However, throughout the year, the control treatment (T₁) had the lowest fruit yield per plant, measuring 25.01.

These results are in line with studies on mangos by Bagchi *et al.* (2008) ^[10] and Bal, J. S. and G. S. Dhaliwal (2003). They discovered that applying 5.00 g/ha of cultar to the soil along with 20 ppm NAA produced the maximum yield per tree (68.12 kg) and yield per hectare (106.25 q/ha). In the 10-year-old mango variety Langra, the control group had the

lowest yield (29.85%).

Therefore, the current study's results and those of Bagchi *et al.* (2008) ^[10] indicate that Paclobutrazol spraying significantly affects fruit output per plant in guava cv. L-49. In comparison to the control group, some treatments—such as T₇ and T₄—produced more fruit.

Influence of paclobutrazol on vegetative growth, flowering and fruiting of guava (*Psidium guajava* L.) cv. L-49

Symbols used	Treatments	Number of new shoots/branch	Length of new shoots (cm)	Flower bud initiation	Fruit set (%)	Fruit retention (%)	Fruit yield (kg/tree)
T ₁	Control (Untreated plant)	7.00	24.60	21.00	69.00	48.20	25.01
T ₂	2 gm Paclobutrazol per m canopy diameter (RBM)	5.66	25.70	18.20	72.00	54.30	30.64
T ₃	4 gm Paclobutrazol per m canopy diameter (RBM)	4.66	24.50	17.40	74.20	55.00	35.50
T ₄	6 gm Paclobutrazol per m canopy diameter (RBM)	4.00	23.40	16.20	75.60	56.70	42.06
T ₅	2 gm Paclobutrazol per m canopy diameter (TSLPM)	5.30	24.40	17.60	73.80	55.30	31.35
T ₆	4 gm Paclobutrazol per m canopy diameter (TSLPM)	4.30	23.90	16.00	76.00	57.80	36.03
T ₇	6 gm Paclobutrazol per m canopy diameter (TSLPM)	3.00	21.60	15.70	77.40	59.00	42.90
Sem(±)		0.15	1.08	0.70	1.40	1.23	1.30
C.D.(P = 0.05)		0.45	3.31	2.15	4.32	3.78	4.01

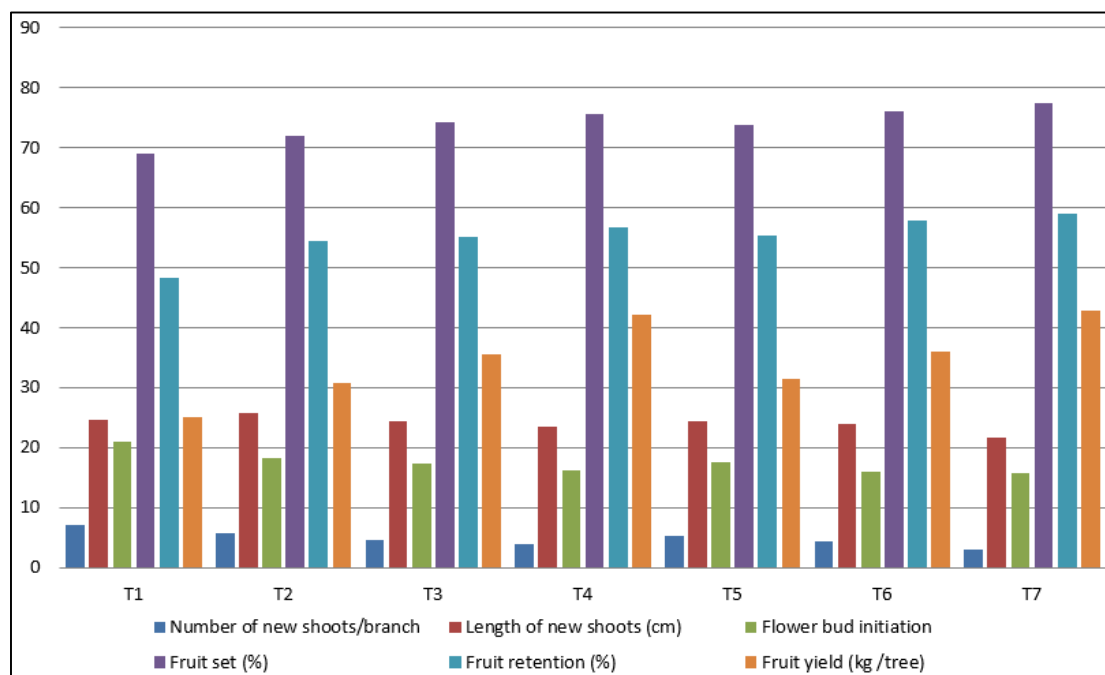


Fig 1: Effect of paclobutrazol on vegetative growth, flowering and fruiting of guava

Conclusion

Paclobutrazol treatment significantly affected guava's vegetative growth, flowering, and fruiting.

The most profitable and lucrative guava fruit output (42.90 kg/tree), fruit set (77.40%), and fruit retention (59%) were produced by plants treated with 6 gm Paclobutrazol per m canopy diameter (Trunk Soil Line Pore technique).

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