

Influence of different guava varieties on reproductive traits of *Bactrocera dorsalis* (Hendel)

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Abstract

The present investigation was conducted under laboratory conditions to evaluate the suitability of different guava varieties for the growth and multiplication of the *Bactrocera dorsalis*. Three commonly cultivated guava varieties, namely Lucknow-49 (Sardar), Allahabad Safeda and Taiwan Pink, were selected for the study.

The results on reproductive traits revealed that guava varieties had a significant influence on the oviposition behaviour and reproductive potential of *Bactrocera dorsalis*. The pre-oviposition period was longest on Lucknow-49 (13.70 days), followed by Allahabad Safeda (12.92 days), and shortest on Taiwan Pink (11.90 days), indicating earlier initiation of egg laying on Taiwan Pink. The oviposition period was also comparatively longer on Lucknow-49 (11.98 days) and Allahabad Safeda (11.59 days), while it was shorter on Taiwan Pink (10.96 days). Similarly, the post-oviposition period was highest on Lucknow-49 (5.46 days) and lowest on Taiwan Pink (4.16 days). Fecundity varied significantly among the varieties, with the highest number of eggs laid on Taiwan Pink (111.8 eggs per female), followed by Allahabad Safeda (96.2 eggs), while the lowest was observed on Lucknow-49 (84.4 eggs). Egg hatching percentage was also highest on Taiwan Pink (88%), followed by Allahabad Safeda (80%) and Lucknow-49 (76%). These findings clearly indicate that Taiwan Pink provides more favourable conditions for reproduction of the pest.

Keywords: *Bactrocera dorsalis*, oviposition, fecundity, egg hatching, reproductive potential

Introduction

Guava (*Psidium guajava* L.) is an important fruit crop cultivated widely in tropical and subtropical regions owing to its high nutritional and economic value. However, its production is severely affected by the oriental fruit fly, *Bactrocera dorsalis* (Hendel), one of the most destructive pests of guava. The pest causes substantial losses by ovipositing in fruits, where the developing larvae feed on the pulp, resulting in fruit deterioration, premature fruit drop, and reduced marketability (Clarke *et al.*, 2005)^[3]. The reproductive potential of *B. dorsalis* is a major factor contributing to its rapid population build-up and widespread occurrence. Reproductive traits such as pre-oviposition period, oviposition period, fecundity, and adult longevity largely determine the fitness and population growth of the pest (Carey, 1993)^[2]. Host plant quality significantly influences these reproductive parameters, as female fruit flies preferentially select hosts that provide favourable conditions for offspring survival and development (Schoonhoven *et al.*, 2005)^[8].

Guava varieties differ considerably in their physical and biochemical characteristics, including fruit firmness, rind thickness, sugar content, acidity, and phenolic compounds. These variations influence host suitability and susceptibility to fruit fly infestation. Recent studies have reported significant differences in infestation levels among guava varieties, with fruit biochemical attributes playing an important role in host preference and pest development (Anilkumar *et al.*, 2024; Mohitha Reddy *et al.*, 2025)^[1, 6].

Furthermore, host fruit quality has been shown to affect fecundity, oviposition behaviour, and population growth of *B. dorsalis* (Su *et al.*, 2025).

Despite the economic importance of this pest, information on the influence of commonly cultivated guava varieties on the reproductive traits of *B. dorsalis* remains limited. Therefore, the present study was undertaken to evaluate the influence of different guava varieties on the reproductive traits of *Bactrocera dorsalis*.

Material and Methods

Location of Experiment and Climatic Conditions

The present study was conducted in the Entomology laboratory of College of Agriculture, Loni, Rahata, Maharashtra, India, during Nov.-2025 to Feb. - 2026. The experimental site falls under a semi-arid to sub-humid agro-climatic zone of Maharashtra, characterized by mean maximum temperatures of 30–38°C, minimum temperatures of 15–22°C, and relative humidity ranging from 45–85%.

Experimental Design and Treatments

The experiment was laid out in a Completely Randomized Design (CRD) with three treatments (guava cultivars) and five replications per treatment.

Selected Guava Cultivars

- T₁: Lucknow-49 (Sardar)
- T₂: Allahabad Safeda
- T₃: Taiwan Pink

Rearing of *Bactrocera dorsalis*

Initial culture of fruit fly, *Bactrocera dorsalis* was raised following the standard procedures described by James R. Carey (1993) [2] and B. S. Fletcher (1987) [4]. Collected the infested fruits of guava from the Horticultural farm of College of Agriculture, Loni, Rahata, and Maharashtra. The infested fruits of guava were kept in the insect rearing cages (Length 45 cm x width 20 cm x Height 15 cm) on a layer of 5 cm sieved moist soil at bottom to facilitate the pupation. The top of the cages was covered with a lid fitted with a mesh cover to prevent the escape of maggots. Such cages were used for maintaining culture of *B. dorsalis*. When, all the full grown maggots entered the soil for pupation, the rotted fruits from the cages were removed. After 4 to 5 days, the soil in the cages was sieved to collect the pupae. The pupae were transferred in clean glass tubes (1.5 cm diameter; 7.5 cm height), individually. The tubes were plugged with cotton lint so as to prevent the escaping of adult fruit flies when emerged.

The emerged population of adult fruit flies (both sexes) were maintained in iron wire cage (Height 30 cm; Breadth 30 cm) covered with black cloth. To provide food to the adult flies, 5 percent honey solution was given through cottony sponge tightened with thread and hung inside the cage. Another cottony sponge dipped in guava juice fluid (Guava juice sieved with the help of muslin cloth) and hung inside the cage as suggested by R. I. Vargas *et al.* (1984) [10]. Every day morning and evening, food was supplied to the adult fruit flies until the death of adults. Three commonly cultivated guava varieties, namely Lucknow-49, Allahabad Safeda, and Taiwan Pink, were selected for the study based on their commercial importance. Healthy and uniform fruits free from infestation were collected, washed, and air dried before use.

To study the influence of different guava varieties on reproductive traits of *Bactrocera dorsalis*.

To study the influence of guava varieties on reproductive traits, the newly emerged adults were sexed based on presence of ovipositor in female and paired. Five pairs of male and female flies were released into the oviposition cage containing fruit slices of each variety separately for egg laying. Fruit juice of respective cultivar and 5 percent of honey solution soaked in cotton sponge was provided to the adults as food source separately. This method was in accordance with procedures described by N. Roy (2021). [7]. The data on duration of pre oviposition, oviposition, post-oviposition, fecundity/female and hatching percentage were recorded. Pre-oviposition period was calculated from the date of emergence to the date of starting of egg laying. Oviposition period was calculated from date of starting egg laying to the date of stopping egg laying. Post-oviposition period was calculated from the date of stopping egg laying to the date of death of the female adult. Fecundity was calculated by taking average of number of eggs laid per female. Hatching percentage was calculated from the data on number of eggs hatched out of total number of eggs under observation.

Statistical analysis

The experiment was laid out in a Completely Randomized Design (CRD) with three treatments (guava varieties) and five replications. The collected data were statistically analyzed using analysis of variance (ANOVA), and treatment means were compared using critical difference (CD) at 5 per cent level of significance. Percentage data were subjected to arcsine transformation before analysis.

Results and Discussion

Table 1: Influence of different guava varieties on *B. dorsalis* reproductive traits

Different guava varieties	Pre-oviposition period*	Oviposition period*	Post-oviposition period*	Fecundity/female	Hatching (%) #
Lucknow-49	13.70 (3.83) ^a	11.98 (3.60) ^a	5.46 (2.54) ^a	84.4 (9.20) ^b	76 (60.75) ^b
Allahabad safeda	12.92 (3.73) ^{ab}	11.59 (3.55) ^a	4.91 (2.43) ^a	96.2 (9.84) ^{ab}	80 (63.70) ^b
Taiwan pink	11.90 (3.59) ^b	10.96 (3.46) ^b	4.16 (2.27) ^b	111.8 (10.61) ^a	88 (69.91) ^a
S.Em±	0.051	0.02	0.04	0.33	0.2
CD at 5%	0.072	0.07	0.12	1.03	0.60

The means followed by the same letters in each column are non-significant (P<0.05, DMRT)

*= Figures in parentheses are square root transformed values

= Figures in parentheses are arcsin transformed values

The data presented in Table 1 revealed significant difference in reproductive parameters of *Bactrocera dorsalis* on different guava varieties. The pre-oviposition period was found to be highest on Lucknow-49 (13.70 days), which was statistically at par with Allahabad Safeda (12.92 days), whereas the lowest pre-oviposition period was recorded on Taiwan Pink (11.90 days). The shorter pre-oviposition period on Taiwan Pink indicates early initiation of egg laying, suggesting its higher suitability for the pest. Similar findings were reported by Fletcher B. S. (1987) [4], who observed that host suitability affects reproductive maturity in fruit flies.

The oviposition period also showed significant variation among varieties. The longest oviposition period was observed on Lucknow-49 (11.98 days) followed by Allahabad Safeda (11.59 days), while the shortest duration was recorded on Taiwan Pink (10.96 days). Similarly, the post-oviposition period was significantly higher on

Lucknow-49 (5.46 days) and Allahabad Safeda (4.91 days), whereas Taiwan Pink recorded the lowest value (4.16 days). Fecundity differed significantly among the varieties, with Taiwan Pink recording the highest fecundity (111.8 eggs per female), followed by Allahabad Safeda (96.2 eggs), while the lowest fecundity was observed on Lucknow-49 (84.4 eggs). A similar trend was observed in egg hatching percentage, where Taiwan Pink showed the highest hatching (88%), followed by Allahabad Safeda (80%), and Lucknow-49 (76%).

The present findings are in close agreement with James R. Carey (1993) [2], who reported that fecundity and egg viability in fruit flies depend largely on host quality and nutritional composition. Similar observations were also made by Waqar Jaleel *et al.* (2018) [5], who reported higher fecundity of *Bactrocera dorsalis* on nutritionally rich host fruits. Further, Nayan Roy (2021) [7] also observed that guava supports higher reproductive potential compared to other fruits.

Conclusion

The present study clearly demonstrated that host plant variety plays a crucial role in influencing the reproductive potential, developmental duration, and population growth of *Bactrocera dorsalis*. Among the tested guava varieties, Taiwan Pink was highly susceptible and most suitable for the pest, whereas Lucknow-49 showed relatively lower suitability. These findings can be effectively utilized in developing varietal selection and integrated pest management strategies to minimize fruit fly infestation in guava cultivation.

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