



## Nectar Secretion from Dragon Fruit Flower Buds and Its Importance to Bees and Crop Productivity

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Dragon fruit (*Hylocereus* spp.) is an emerging fruit crop in tropical and subtropical regions due to its high market value and adaptability. Beyond its attractive night-blooming flowers, dragon fruit exhibits an important ecological trait nectar secretion from flower buds prior to blooming. This early nectar availability attracts bees and other pollinators even before anthesis, ensuring sustained pollinator presence in plantations. Bees actively collect nectar from the flower buds, gaining an essential energy source, while the crop benefits through enhanced pollination efficiency, improved fruit set, and better fruit quality. Understanding this plant–pollinator interaction highlights the importance of conserving bees in dragon fruit–based agroecosystems and adopting pollinator-friendly farming practices.

**Key words:** Dragon fruit, flower bud nectar, bees, pollination, agro-ecosystem

### Introduction

Dragon fruit cultivation has expanded rapidly in recent years due to its nutritional value, export demand, and suitability for dry and semi-arid regions. While farmers are well aware of its large, fragrant flowers that bloom at night, the nectar secretion at the flower bud stage is a lesser-known but agriculturally significant phenomenon. This trait plays a crucial role in attracting pollinators, particularly bees, which are essential for successful fruit production.

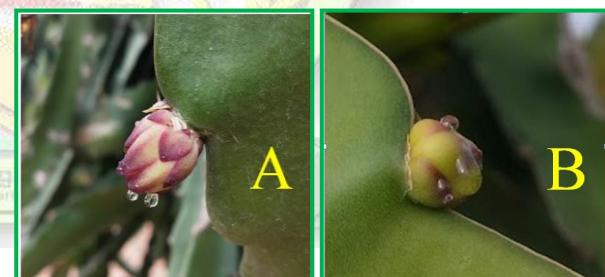
### Nectar Secretion at the Flower Bud Stage

Unlike many fruit crops where nectar is produced only after flower opening, dragon fruit begins secreting nectar during the advanced bud stage. The nectar appears as sticky droplets on the outer parts of the bud and floral bracts. This secretion occurs mainly during early morning and late evening hours, coinciding with peak bee activity. Nectar Secreted on Pink flesh dragon fruit (A) and white flesh dragon fruit (B)

Early nectar secretion serves multiple purposes:

- Attracts pollinators before flowering
- Maintains continuous foraging activity in the field
- Signals a reliable food source to bees

This unique feature makes dragon fruit plantations a consistent nectar resource.



### Bee Visitation and Foraging Behaviour

Bees such as *Apis cerana*, *Apis florea*, *Apis dorsata*, *Apis mellifera*, and other hymenopteran insects are commonly observed visiting dragon fruit buds. Bees collect nectar by licking the

secretions and store it in their honey stomachs. Repeated visits to buds condition bees to return to the same crop even after flowers open. (Plate 1)



**Plate 1: Nectar collection from the flower buds of *Hylocereus undatus* and *H. polyrhizus* by Hymenopteran floral visitors**

#### For bees, dragon fruit nectar:

- Provides quick energy
- Supports colony strength
- Helps during nectar-scarce periods

Thus, dragon fruit acts as an important **support crop for pollinators**.

#### Role in Pollination and Fruit Set

Although dragon fruit flowers open at night and are primarily pollinated by nocturnal insects and bats, bees play a supportive role by:

- Increasing pollen movement during early morning hours
- Enhancing cross-pollination
- Improving fertilization efficiency

Fields with higher bee activity often show:

- Increased fruit set
- Heavier fruits
- Uniform fruit shape
- Reduced flower drop

Early attraction of bees through bud-stage nectar ensures pollinators are already present when flowering begins.

#### Agricultural Importance for Farmers

For dragon fruit growers, understanding bee activity can lead to better farm management:

- Avoid pesticide spraying during bud and flowering stages
- Encourage beekeeping near plantations
- Maintain flowering plants around farms to support pollinators

Integrating **apiculture with dragon fruit cultivation** can provide additional income through honey production while improving crop yield.

## Environmental and Ecological Significance

The nectar-bee interaction in dragon fruit highlights the importance of biodiversity in agriculture. Conserving bees ensures:

- Sustainable crop production
- Healthy agro-ecosystems
- Reduced dependence on artificial pollination

Pollinator-friendly dragon fruit farming supports both **food security and environmental health**.

## Conclusion

Nectar secretion from dragon fruit flower buds is a vital but often overlooked trait that strengthens plant-pollinator interactions. Bees benefit from an early and continuous nectar source, while farmers gain improved pollination, yield, and fruit quality. Recognizing and protecting this natural relationship can help promote sustainable dragon fruit cultivation and pollinator conservation.

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