

Off-Season Pruning Effectively Reduces Dragon Fruit Canker¹

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This fact sheet, based on a recent publication by Dutra et al. (2025), presents evidence obtained from local commercial dragon fruit plantings, where the effectiveness of off-season pruning proved to greatly reduce dragon fruit canker disease pressure during the flowering and fruiting season. It aims to promote the adoption of this practice as a management strategy for dragon fruit canker in south Florida and beyond. The target audience of this publication includes commercial producers, home gardeners, Extension agents, and the industry.

Introduction

Dragon fruit (*Selenicereus* spp., formerly *Hylocereus* spp.), also known as pitahaya and pitaya, is a tropical fruit crop important for its health and economic benefits. In the United States, dragon fruit cultivation has significantly expanded because of its high profitability and adaptation to different climates. The southern regions of Florida and California, as well as the Hawaiian Islands, are the main dragon fruit production areas in the United States. Florida is the largest US producer with approximately 720 acres in 2018 (Crane 2018). Dragon fruit produced in the United States include two types: red peel with white pulp (*S. undatus*) and red peel with red pulp (*S. costaricensis* and

S. polyrhizus). Dragon fruit production is affected by several limiting factors, including diseases.

Dragon fruit canker (DFC) (Figure 1), caused by the fungus *Neoscytalidium dimidiatum*, is reported to be the most important disease in south Florida (Hong, Gazis, et al. 2020; Hong, Zhang, et al. 2020). DFC management depends on cultural practices and the preventative spray of fungicides during high-risk periods. Off-season pruning in south Florida is typically conducted from November to March, after the last harvest and before the new flowering season. This practice removes diseased stems (cladodes), promotes new stem growth, and enhances the vigor of the remaining stems. It also helps improve air circulation and sunlight penetration in the canopy, thus reducing disease pressure. Off-season pruning is crucial for reducing the amount of *N. dimidiatum* spores, thereby preventing or delaying disease outbreaks in the following production season. Failure to manage the disease during this critical period often leads to severe fruit infections throughout the entire production season. Although off-season pruning is a widely recommended practice, there was no science-based data on its effectiveness in Florida until the research described in this publication.

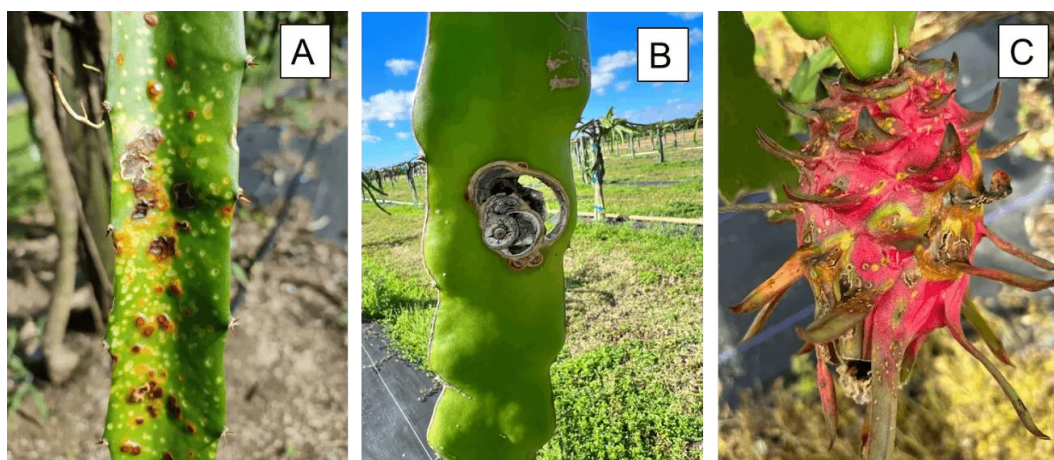


Figure 1. (A) Stem canker symptoms begin as small, sunken yellow spots that enlarge into orange to reddish-brown lesions, often merging into large necrotic areas. (B) Lesions may be surrounded by a yellow halo or water-soaked tissue that dries, forming “shot hole” symptoms. (C) On fruit, symptoms start as tiny whitish-yellow spots on the peel that darken, merge into brown lesions, and may cause peel cracking.

Credit: Pamela Dutra, UF/IFAS

Experimental Site

Two field trials were conducted from October 2022 to July 2023 in two commercial dragon fruit plantings in Homestead, Florida. In both locations, the plants were trained using a single-pole system, with two plants per pole. Orchard 1 consisted of 15 acres of three-year-old red-pulp dragon fruit plants (*S. polyrhizus*) arranged in 45 rows, with 63 poles per row and spacings of 6.5 ft between plants and 11.5 ft between rows. Orchard 2 comprised 45 acres of three-and-a-half-year-old white-pulp dragon fruit plants (*S. undatus*) arranged into 17 rows, with 400 poles per row and spacings of 6.5 ft between plants and 13 ft between rows. In both orchards, registered fungicides, including Abound®, Switch® 62.5WG, and OxiDate® 5.0, were applied every 7–14 days throughout the production season based on weather conditions. Irrigation was provided three to five times through a drip system during the dry season (November–April). The average temperature during November through April was 71.6°F ± 5.4°F with a total rainfall of 19.5 inches (495 mm), and the temperature during May through July increased to 79.2°F ± 2.9°F with a total rainfall of 20.1 inches (513 mm).

Field Experimental Design and Treatment Setup

Field trials were conducted to compare the development of DFC in pruned versus non-pruned dragon fruit plants. At each site, 100 dragon fruit plants were selected and divided into two groups: 50 for the pruned treatment and 50 for the non-pruned control. Each group was organized into 5 rows (replicates), with 10 consecutive plants (5 poles) per row (Figure 2). Plants were chosen sequentially within each row to simplify pruning. Selected plants for pruning in one row did not overlap with those in neighboring rows, and unselected rows were left between treatment blocks to maintain spatial separation. Two stems from opposite sides of each plant were labeled for disease assessment.

In pruned groups, major pruning was manually performed after the final harvest in 2022. Due to the extensive workload covering the entire area, pruning was carried out in stages, starting on October 16 and concluding on November 2. Pruning involved the removal of diseased, rotten, and damaged stems, including those affected by insects, sunburn, or other physical or environmental stress. The intensity of pruning was determined by each collaborating grower, ranging from 30% to 50% of the canopy removed (Figure 3). In the non-pruned groups, diseased stems were not removed from the plants and were maintained until the following season. To protect the high-value crop, any newly developed stems exhibiting disease symptoms during flowering in both orchards were promptly removed (Table 1).

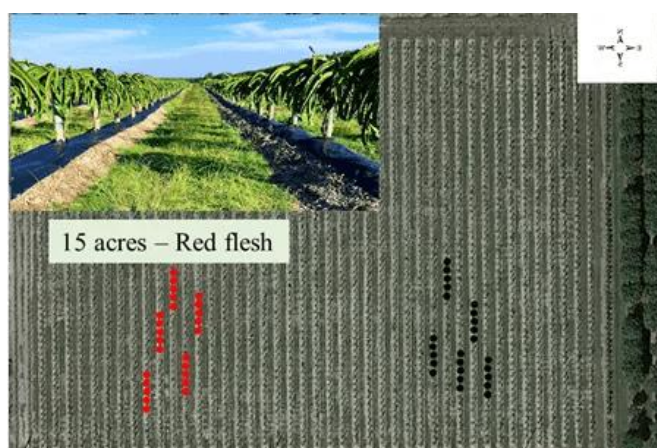


Figure 2. Distribution of dragon fruit plants selected in field trials. Dots represent poles supporting dragon fruit production with two plants for each pole. The left-most dot selection in the first image and the upper-most dot selection in the second image (red dots) represent pruned plants. The right-most dot selection in the first image and lower dot selection in the second image (black dots) are non-pruned plants.

Credit: Pamela Dutra, UF/IFAS



Figure 3. Dragon fruit plants pruned (left) and non-pruned (right) in field trials.

Credit: Pamela Dutra, UF/IFAS

Disease Assessment

DFC symptoms developed in both field trials as a result of natural infection. Disease severity varied among fruit on the trees, with an overall rating from 0.1% to 8%. After pruning, canker disease severity (%) on stems was assessed monthly by estimating the area of the stem surface affected by visible canker lesions, using a diagrammatic scale developed by Dutra et al. (2024). From June through July 2023, four fruit randomly selected from each plant (200 fruit per treatment group) were evaluated

every two weeks to determine canker severity (%) on fruit by estimating the percentage of fruit surface with disease symptoms. Fruit canker severity was assessed according to the following classes: 1 = <1%, 2 = 1%–15%, 3 = 15%–25%, 4 = 25%–45%, and 5 = 45%–100% (Figure 4). The area under the disease progress curve (AUDPC) for stem disease severity and fruit disease severity was calculated for each treatment group according to Madden et al. (2007). AUDPC summarizes the amount and the progression of disease symptoms over time into a single value, enabling straightforward comparison of overall disease development across treatments, that is, pruning versus non-pruning control. The control of DFC on stems and fruit was calculated as follows:

$$\text{Disease Control (\%)} = \frac{NP - P}{NP} \times 100$$

Equation 1.

Where NP is the final disease severity (%) in stems or fruit in non-pruned plants, and P is the final disease severity (%) in stems or fruit in the pruned plants.



Figure 4. Classification of dragon fruit into disease severity categories. Disease severity classes are determined by the percentage of the fruit covered with disease damage.

Credit: Romina Gazis, UF/IFAS

Off-Season Pruning to Effectively Lower Dragon Fruit Canker

Off-season pruning, conducted during October to November 2022, effectively reduced stem and fruit canker during the following growing season (May–July 2023) in both commercial orchards. This reduction was evident by a

decrease in disease progress (as measured by AUDPC) and lower final disease severity in stems and fruit of pruned plants compared to the non-pruned trees (Figure 5). The effectiveness of pruning in controlling stem and fruit canker varied between the two locations. Off-season pruning of dragon fruit plants helped reduce stem canker by 61%–67% and fruit canker by 42%–51%.

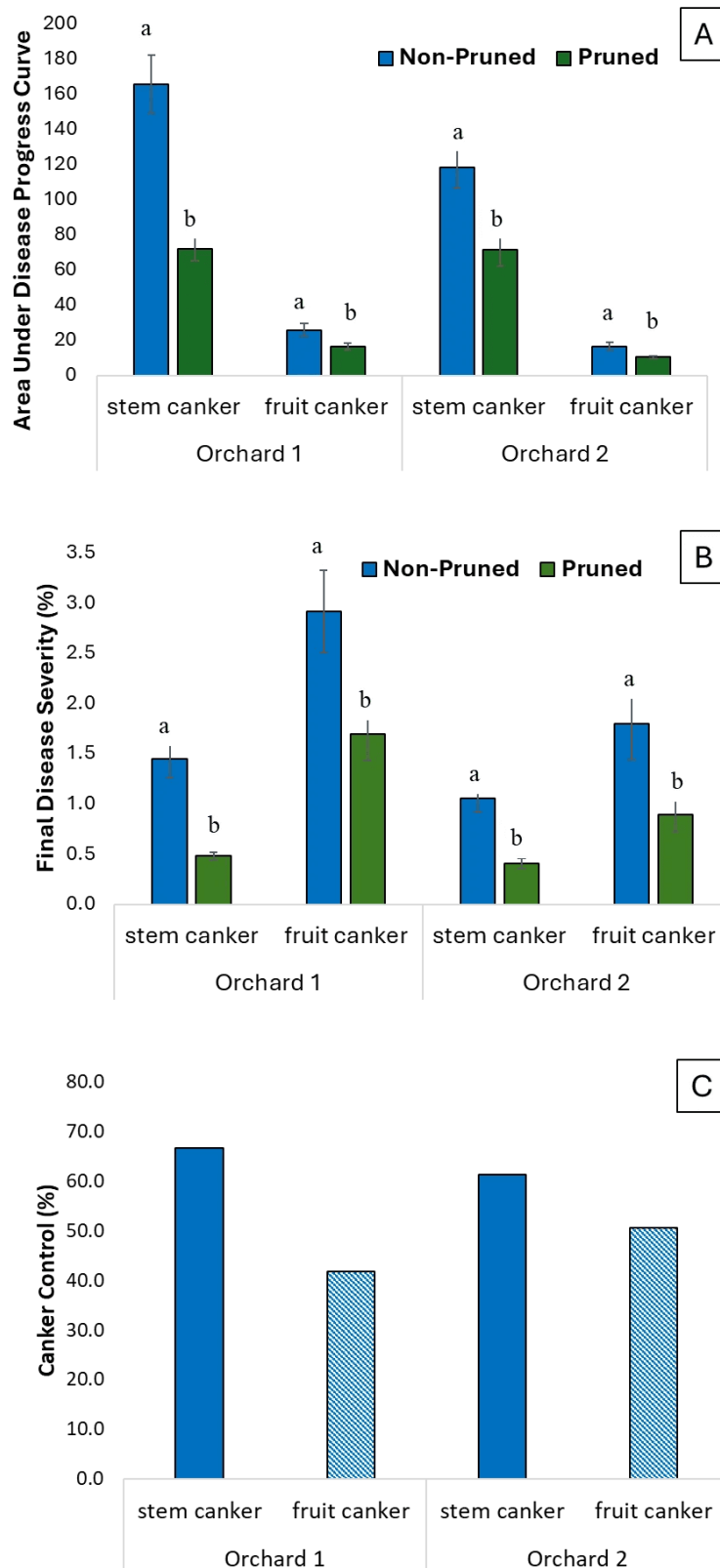


Figure 5. (A) Area under the disease progress curve (AUDPC) for stem severity and fruit severity, (B) final disease severity on stems and fruits, and (C) canker disease control by off-season pruning from two commercial orchards in Homestead, Florida. Final stem severity was assessed using a diagrammatic scale by Dutra et al. (2024). Final fruit severity was categorized into classes: 1 (<1%), 2 (1%–15%), 3 (15%–25%), 4 (25%–45%), and 5 (45%–100%). Canker disease control was calculated as the percentage reduction in final disease severity in pruned plants relative to the non-pruned controls. Bars represent each standard error of the mean. Means followed by the same letter within each treatment group (pruned vs. non-pruned) are not significantly different at $p = 0.05$.

Credit: P. Dutra, R. Gazis, J. Crane, and S. Zhang, UF/IFAS

Maintaining Clean Orchards to Reduce *N. dimidiatum* Inoculum (Infecting Spores)

Favorable weather conditions in south Florida during the spring and summer seasons, along with high disease pressure, have historically necessitated DFC control. Effective DFC management requires not only pruning but also the removal and proper disposal of infected plant parts (debris) (Figure 6) (Fullerton et al. 2018). In areas where plant debris is used as a source of organic matter or in larger orchards where manual stem removal is labor-intensive and time-consuming, accelerating the decomposition of plant debris to prevent spore formation may be an alternative strategy for reducing pathogen inoculum in the debris. Applications of quaternary ammonia mixed with copper or copper sulfate to pruned stems on the ground not only promote stem decomposition but also inhibit germination of *N. dimidiatum* spores on pruned debris (Freitas et al. 2024). However, the feasibility of implementing these treatments depends on several factors, including the size of the planting, available resources, cost considerations, and potential toxicity to the soil. For smaller-scale operations, manual removal may still be the most practical approach.



Figure 6. Infected plant debris on the ground after pruning. Pruning and destroying diseased stems is highly recommended to avoid the *N. dimidiatum* infection on young cladodes, flower buds, and fruits. Credit: Pamela Dutra, UF/IFAS

Protecting Pruning Wounds in DFC Management

As *N. dimidiatum* spores can easily enter plant tissue through wounds caused by pruning, it is important to disinfect pruning tools and protect the plants by applying fungicides to the wounds. Biological control agents could also provide protection; however, their efficacy under field conditions, particularly in Florida, needs to be investigated and confirmed.

Conclusions

The findings from our field trials indicate that off-season pruning is crucial for reducing stem and fruit canker in the commercial production of dragon fruit in Florida. Producers should prioritize the continuous removal of newly infected growth throughout the year, especially in early spring, to reduce the risk of fruit infections. Pruning, along with the removal of infected plant debris and preventive fungicide treatments, is an essential component of an integrated management strategy for DFC. This approach can minimize losses due to DFC, ensuring the sustainability and profitability of dragon fruit production in Florida and beyond.

Recommendations

- Remove and destroy disease-affected cladodes (stems) during the fall and winter period after harvest (off-season).
- If the disease pressure is high during any part of the year, remove and destroy disease-affected cladodes.
- Apply registered fungicides in rotation from flowering to harvest.

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Table 1. Timing of new cladode sprouting, flowering, harvest, and recommended schedules for sanitation practices (pruning and plant debris removal) and fungicide application for dragon fruit cultivation in south Florida.

Stages and Maintenance Practices	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
New cladode growth	X	X	X	X	X						X	X
Flowering wave			X	X	X	X	X	X	X	X		
Fruit harvest wave					X	X	X	X	X	X	X	
Increased risk of DFC infection					X	X	X	X	X	X		
Sanitation practices	X	X	X							X	X	X
Potential fungicide applications				X	X	X	X	X	X	X		

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