CITRUS ADVANCED TECHNOLOGY PROGRAM

QUARTERLY & FINAL PROGRESS REPORT FORM: Control of Citrus Greening, Canker & Emerging Diseases of Citrus

▶PROJECT QUARTER END March 2026 ◉ *Quarterly Report* ○ *Final*

Proposal Title

Getting to the root of the problem: Managing Diaprepes root weevil on trees with HLB

Today's Date 04/16/2026

Sponsoring Organization (drop-down) Citrus Research and Development Foundation

Category (drop down) Other

ABSTRACT (Executive Summary-public report-do not disclose proprietary information or intellectual property)

1. Please state project objectives and what work was done this quarter to address them:

Field-level efficacy of Btt and *Steinernema riobrave* combinations against root weevil larvae

During the current reporting quarter, field experiments continued to evaluate biological control options for managing Diaprepes root weevil larvae under citrus trees under both summer and winter conditions. This work focused on determining whether Bacillus thuringiensis (Bt) could improve control when used alone or in combination with the beneficial nematode Steinernema riobrave (Sr), which is already recognized as an effective biological control agent against root weevil larvae.

Results from both seasonal field trials showed that S. riobrave remained the most reliable treatment for reducing larval survival. Under summer conditions, nematode applications provided very high levels of control, with larval mortality exceeding 85%, and these treatments performed significantly better than the untreated control. Bt applied alone provided moderate suppression during summer, reducing larval survival more than the untreated control, but it did not perform as well as the nematode treatments. When Bt was combined with S. riobrave, control remained high, but the combination did not improve larval mortality beyond what was achieved with nematodes alone.

Under winter conditions, the pattern was even clearer. Nematode treatments again provided the strongest suppression of larvae and were significantly better than both the untreated control and Bt alone. The combination of Bt and S. riobrave also improved control compared with the untreated control, but again did not outperform nematodes alone. In contrast, Bt by itself did not significantly reduce larval populations during winter, indicating that its effectiveness is limited under cooler conditions.

An additional finding from this quarter was that Bt consistently increased nematode abundance in the soil, including during winter, suggesting that it may alter the soil environment in ways that favor nematode persistence or activity. However, this increase in nematode abundance did not translate into greater larval mortality beyond what was already achieved with direct nematode application. Therefore, although Bt may provide some supporting benefit, especially in warmer conditions, it did not function as a stand-alone or synergistic replacement for nematode-based control.

Overall, the results from this quarter reinforce that S. riobrave is highly effective against Diaprepes larvae in citrus. Bt may have some supplemental value during summer and may promote greater nematode presence in soil, but it did not consistently improve pest suppression when added to nematode treatments and was not effective on its own during winter. These findings help clarify the practical role of these tools in seasonal citrus

PI First Name Lauren

PI Last Name Diepenbrock

Email ldiepenbrock@ufl.edu

Phone 863-956-8801

Organization UF IFAS CREC

Sponsor Project Number 22-013

Project Duration (years) 3 *Year of Project* 3

% Completion of Objectives (FDACS requirement) 96.00%

CITRUS RESEARCH AND DEVELOPMENT FOUNDATION, INC.