

Current Research Objectives

PI Name: Nian Wang

Research topic: Genome editing of citrus

Primary Research Objective(s):

1. Identifying the susceptibility genes of citrus to HLB
2. Generating non-transgenic HLB resistant citrus varieties by modifying the HLB susceptibility gene(s) using the CRISPR technology

Research Goal: Generating non-transgenic HLB resistant citrus varieties using the CRISPR technology

Outcomes thus far to advance the science: We have identified multiple HLB susceptibility genes. We have developed non-transgenic genome editing technology for citrus based on CRISPR. Efforts are underway to prepare for large scale citrus nursery tree production once the susceptibility gene modified trees have been tested and proven to be HLB resistant and with other suitable horticultural traits.

Funding source for this objective(s): USDA-SCRI-CDRE, State Legislative funding for the UF/IFAS Citrus Initiative

PI Name: Nian Wang

Research topic: HLB management

Primary Research Objective(s):

Optimization the application of bactericides to control HLB via trunk injection

Research Goal: Developing a more efficient approach to apply bactericides to reduce Liberibacter population in the phloem.

Outcomes thus far to advance the science: We have determined the dose, trunk injection ports, and timing needed to control HLB via trunk injection. This method showed significantly improved efficacy compared to spraying. The residue of bactericides in fruit juice is undetectable after optimization of dose and application timing.

******Outcomes thus far that have been used by Florida growers:** Citrus growers have formed a task group to register trunk injection of bactericides to control HLB using the data we generated.

Funding source for this objective(s): Citrus Initiative and CRDF

PI Name: Nian Wang

Research topic: HLB management

Primary Research Objective(s):

Optimization the application of insecticides and bactericides to control HLB in Florida
Using modeling to guidance the designing of HLB control approach in US

Research Goal:

Developing a viable approach to control HLB in different citrus-producing states of US.

Outcomes thus far to advance the science: We have developed an efficient approach to extend the production life of HLB diseased mature trees. We have developed an efficient approach to prevent HLB infection of young plantings in Florida. We have provided suggestions on HLB control in different citrus producing states based on their infection status.

******Outcomes thus far that have been used by Florida growers:** Yield increase of 20-30% has been observed for HLB diseased trees using optimized control approach including optimized using insecticides and bactericides (e.g., timing, and adjuvants). Replanting trees are free of HLB until production.

Funding source for this objective(s): Citrus Initiative, USDA-Multi-Agency Coordination (MAC)

PI Name: Nian Wang

Research topic: HLB management

Primary Research Objective(s):

Improve HLB management by conducting more targeted HLB control approaches based on the infection stage.

Research Goal:

Developing citrus Huanglongbing management strategy based on the infection stage of trees in HLB-endemic citrus producing regions

Outcomes thus far to advance the science: A targeted HLB approach based on infection stage can make citrus production profitable in HLB endemic regions.

******Outcomes thus far that have been used by Florida growers:** Combination of macronutrients (P.K.N.), compost, and plant defense elicitors β -aminobutyric acid (BABA) and salicylic acid (SA) is effective on controlling HLB on diseased trees with disease index of 0-28. The combination slowed down the progression of HLB and reduced disease severity by approximately 18% compared to the untreated control. Our data also showed no decline of fruit yield and conferred a higher yield than the untreated control in several two-year trials.

Funding source for this objective(s): Citrus Initiative, USDA-Multi-Agency Coordination (MAC)