Optimal *Bt* Toxins and Gene Silencing RNAs for Management of Asian Citrus Psyllid to Mitigate the Impact of Huanglongbing

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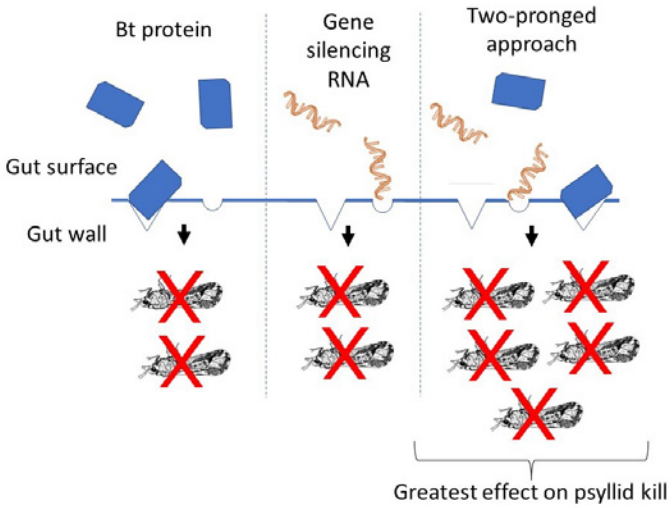

Summary: The Asian citrus psyllid (ACP) transmits the pathogenic bacterium that causes huanglongbing (HLB) disease. The intensive application of chemical insecticides is costly for growers, harmful to beneficial insects, and has resulted in the development of resistance in ACP. This project focuses on a novel, sustainable approach for management of ACP that is compatible with biocontrol programs. We aim to combine two distinct pest control strategies, RNA interference and bioinsecticidal proteins produced by the bacterium, *Bacillus thuringiensis* (*Bt*), for use in combination in transgenic ACP resistant citrus and/or transgenic trap plants. RNA interference is the application of exogenous double-stranded RNAs to block the expression of genes that are essential for ACP survival, or will disrupt ACP physiology. Similar to the case in corn, use of both RNAi and *Bt* pesticidal proteins in combination is expected to be more effective in reducing ACP survival, than use of either technology alone. Both *Bt* proteins and gene silencing RNAs have a strong track record as safe and highly effective insecticides. Identification of the best combinations of gene silencing RNAs and *Bt* proteins for deployment against ACP, will provide growers with an eco-friendly alternative to chemical insecticide use for psyllid management.

Take Home Message:

- Six out of 21 gene silencing RNAs assessed result in high psyllid mortality, and the use of two gene silencing RNAs in combination can further increase mortality.
- Nenonate ACP are 15-fold more susceptible to bacterial pesticidal proteins than adults, which accounts for the very low survival of ACP progeny on transgenic plants that express bacterial pesticidal proteins.
- ACP infected with the HLB bacterium are more susceptible to the impacts of some pesticidal proteins (Mpp51Aa1 and Cry1Ba1), but not others.

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