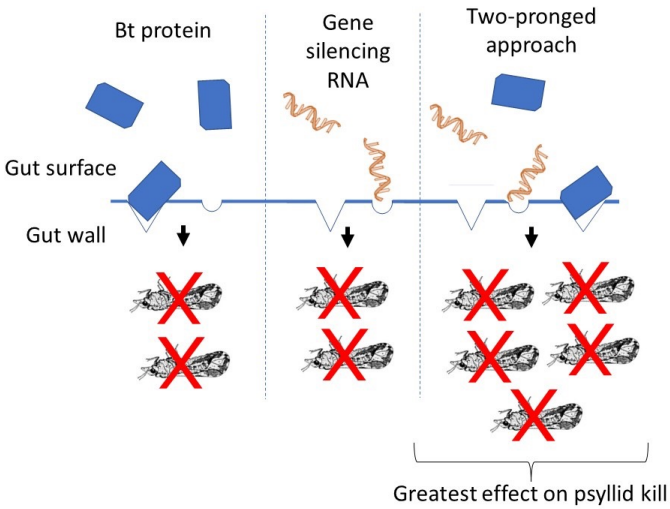
Optimal *Bt* Toxins and Gene Silencing RNAs for Management of Asian Citrus Psyllid to Mitigate the Impact of Huanglongbing

Researchers: Bryony C. Bonning, Nabil Killiny, Choaa El-Mohtar, Manjul Dutt, Lukasz L. Stelinski

Contact: Bryony C. Bonning, bbonning@ufl.edu

UF/IFAS Gainesville



Take Home Message:

- Four of 18 *Bt*-derived pesticidal proteins screened to date are toxic to ACP. ACP nymphs are more susceptible to *Bt* pesticidal proteins than adults.
- Few progeny survive on transgenic plants expressing *Bt* pesticidal proteins demonstrating rapid suppression of ACP populations.
- 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.

Effort Statement: The impacts of additional *Bt* pesticidal proteins and gene silencing RNAs on ACP have been determined and the best candidates for testing in combination identified. The impacts of pesticidal proteins on ACP nymph survival has been characterized and preliminary data on the optimal plant promoter to use for pesticidal protein expression generated.

Summary: The Asian citrus psyllid (ACP) transmits the pathogenic bacterium that causes citrus greening or 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.

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