

# Using Citrus Tristeza Virus-Based Vector as a Platform for the Management of Huanglongbing

**Researchers:** Choa El-Mohtar,  
William Dawson

**Contact:** Choa El-Mohtar,  
mohtarc@ufl.edu

UF/IFAS CREC



## Take Home Message:

- CTV vectors are tools to screen potential therapeutics that would mitigate HLB.
- CTV vectors are a tool to induce early flowering in citrus enabling the transition from the juvenile to the mature stage. It would fast forward the release of citrus germplasm that is tolerant of HLB.
- We are using alternate temperature therapy to generate CTV- and HLB-free growth from field tested citrus germplasm that is tolerant to HLB for large scale field experiments.

**Effort Statement:** We continue in our effort to use CTV vector to identify new potential therapeutics that would mitigate HLB. Further, we are working on CTV vectors as a tool to transition citrus to maturity via inducing early flowering efficiently.

**Summary:** Citrus is commercially propagated from elite scion lines lacking tolerance to huanglongbing (HLB) on selected rootstocks. *Candidatus Liberibacter asiaticus* (CLAs), the causative agent of HLB, is transmitted between trees by the Asian citrus psyllid (ACP) insect vector. CLAs and CTV colocalize in the phloem tissue of citrus where ACP feeds. To induce resistance/tolerance to HLB, systemic but nonvirulent CTV-T36 based vectors are being used to deliver potential therapeutics to the citrus phloem tissue. First, a major therapeutic to manage HLB is antimicrobial peptides (AMPs). CTV delivered AMPs are screened in both the greenhouse and in the Florida orchards after acquiring the required permits. A second use of the CTV vector is to identify CRISPR

targets by inducing RNA interference (RNAi) against negative regulators of citrus defense and susceptibility genes. A third use of the CTV vector is to modify psyllid citrus phloem diet by RNAi and bacterial pesticidal proteins. Efficacious CTV-delivered therapeutics will be used in budwood sources as a remedy until a permanent solution for HLB is available. Furthermore, CTV vectors have other uses that include promoting early flowering by overexpressing genes promoting flowering and silencing negative regulators of flowering. In addition, we are using alternate temperature therapy to generate HLB — and CTV-free growth from citrus germplasm that is showing tolerance to HLB in the field. This will enable large scale field experiments to confirm the phenotype.

## Funding:

 National Institute of Food and Agriculture  
U.S. DEPARTMENT OF AGRICULTURE

 Citrus Research and  
Development Foundation, Inc

 SOUTHERN  
GARDENS  
CITRUS  
Orange juice is our business™