

HLB control: capitalizing on resistance in *Poncirus trifoliata* to Asian citrus psyllid

Research by Dr. David Hall, USDA-ARS, Fort Pierce, FL

Article written by David Hall, Elizabeth Grafton-Cardwell, Peggy G. Lemaux, & Lukasz Stelinski. Revised December 12, 2017
<http://ucanr.edu/sites/scienceforcitrushealth/>

What is the technique?

All *Citrus* species are susceptible to colonization by large numbers of the Asian citrus psyllid (ACP). In contrast, *Poncirus trifoliata* is a genotype with strong resistance to ACP infestations. *Poncirus* and *Citrus* are closely related and readily hybridized. Research is therefore being conducted to identify traits responsible for ACP resistance in *Poncirus* and to determine if these traits can be passed to hybrids with *Citrus* species or utilized in other ways to reduce ACP infestation and HLB in citrus.



Poncirus trifoliata

Photo credit: David Hall (left); UC-Riverside Citrus Variety Collection (right)

How does it improve HLB management?

Current recommendations to growers confronted with HLB are to plant disease-free nursery stock, routinely identify and remove infected trees to reduce inoculum loads, and aggressively manage populations of the psyllid. Insecticidal control is the key tactic used to manage the psyllid, but host plant resistance holds some promises or clues in the search for alternative tactics. Field, laboratory and greenhouse investigations have confirmed that ACP infestations are greatly reduced on *Poncirus*. One trait involved has already been identified: *Poncirus* leaves emit volatiles that discourage oviposition. The specific volatiles involved are being investigated. There may be other chemical traits that work in concert with these volatiles to reduce ACP colonization of *Poncirus*. If the chemicals that deter ACP infestations can be identified, they might be applied directly to reduce infestations in citrus. Further, the genes responsible for producing these chemicals in *Poncirus* might be transferred to citrus through conventional breeding.

Who is working on the project?

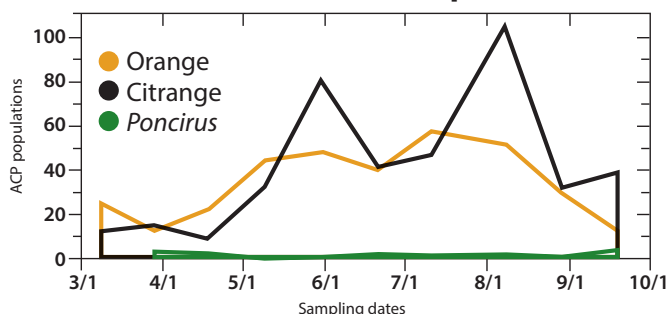
David Hall, Steve Lapointe and Ed Stover have led research efforts to develop management tactics for ACP based on

resistant traits associated with *Poncirus*. They are with USDA's Agricultural Research Service, U.S. Horticultural Research Laboratory located in Fort Pierce, FL.

What are the challenges and opportunities?

This research is being pursued in search of new tactics for managing ACP in citrus, to reduce insecticide use and assist in HLB control. Although closely related to *Citrus*, *Poncirus* differs in that it is deciduous during the winter and produces inedible fruit. The resistance in *Poncirus* to ACP infestations is striking. For example, in a recent field study averages of 2 and 40 immature ACP (eggs and nymphs combined) per flush shoot were observed during the summer in 5-year-old *Poncirus* and sweet orange trees, respectively (see chart below). A similar level of plant resistance to ACP in citrus would be expected to reduce area-wide populations of the

Mean number immature ACP per flush shoot



Asian citrus psyllid populations did not grow well on *Poncirus trifoliata* but grew quite easily on orange and citrange trees in a grove in east-central Florida in 2016.

psyllid and consequently the incidence of HLB in citrus. A very limited number of citrange cultivars (hybrids between *Poncirus* and sweet orange) have thus far been evaluated for ACP resistance, and these did not exhibit resistance. The search needs to be expanded to a larger number of hybrids. In the meantime, we may be successful in identifying volatiles and other chemicals associated with *Poncirus* that suppress oviposition. These may have value as foliar sprays for reducing ACP infestations.

Source: Hall, D. G., M. G. Hentz, and E. Stover. 2017. Field survey of Asian citrus psyllid (Hemiptera: Liviidae) infestations associated with six cultivars of *Poncirus trifoliata*. *Florida Entomologist*. 100: 667-668.

Funding source: This project is funded by the Citrus Research & Development Foundation.