Attractants and traps for ACP management

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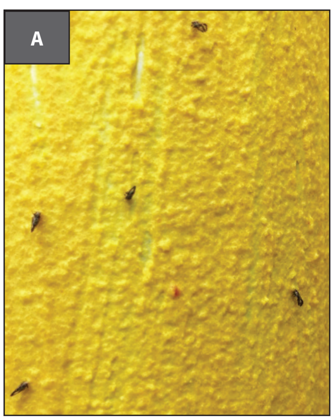
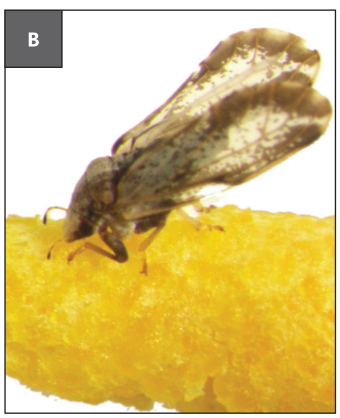
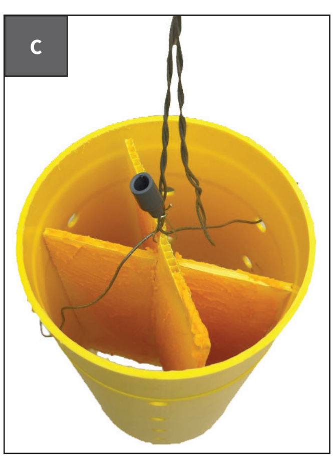
What is the technique?

Attractants for insect pests of agricultural crops play an increasingly important role in management programs. Chemical, visual, and auditory cues that attract insects are identified during laboratory investigations and then verified for their attractiveness in the field. These cues are then exploited to serve as lures deployed with traps to attract pests coming from potentially long distances. This allows detection and monitoring of target pests and/or attracting and killing them to reduce their numbers in the orchard. Traps may be coated with a sticky substance to ensnare individuals (Fig. 1A) or the insect may be trapped within an enclosure containing a killing agent (Fig. 1 B). Such traps are optimized for pests of economic significance by taking advantage of the chemical and visual cues associated with the resources insects search for, such as host plants for egg laying or mates for reproduction.

Asian citrus psyllids (ACP) use multiple sensory modalities [vision, olfaction, contact chemoreception, gustation (taste), perception of auditory or vibrational stimuli] to locate host plants to feed on and reproduce. ACP are attracted to wavelengths perceived as yellow or lime-green in the human visual spectrum. UV wavelengths further increase ACP attraction to visual cues. An effective scent attractant blend can contribute to the attraction of ACP to visually attractive traps (Patt and Setamou 2010). After landing, ACP taste their potential food source and determine if the plant is suitable when they first insert their mouthparts into the plant. A specific blend of chemicals was identified that elicits a feeding response from ACP upon contact with a attractive substance (Lapointe et al. 2016). Currently available traps for monitoring ACP consist of flat, yellow-color panels (approx. 20 x 15 cm) coated with adhesive to ensnare encountering insects (Fig. 1A). In some cases, panels are also sold with proprietary blends of volatiles that purport to increase catch of ACP.







A. *Dead psyllids in feeding position on imidacloprid trap.*
B. *Dead psyllid in feeding position on Specialized Pheromone and Lure Application Technology (SPLAT®) card; stylets not inserted but tarsal claws firmly attached.*
C. *Trap with holes; SPLAT® card with all ingredients; rubber septum with odorant mix. Photo credits: Ian Jackson (Panel A) Justin George and Stephen Lapointe (Panel B).*

How does a better trap improve HLB management?

Trap devices for ACP are intended for: 1) detecting infestations in new areas; 2) triggering insecticide treatments to maintain psyllids below a threshold; and 3) timing insecticide sprays to have maximum impact on populations. Attractants for ACP can also be combined with a low-dosage killing agent into a single device that can be deployed for direct population reductions. Psyllids spread huanglongbing bacteria, and so reducing their numbers is a critical component of reducing impact of the disease.

Who is working on the Project?

Drs. Mamoudou Setamou (Texas A&M University), Steven Lapointe, David Hall, Joseph Patt (USDA-ARS-Fort Pierce, FL), Justin George, Xavier Martini, and Lukasz Stelinski (University of Florida), have collaborated extensively and also lead individual research efforts on identification of ACP attractants and development of practical ACP traps and lures.

What are the challenges?

The search for effective chemical attractants has yielded only weakly effective lures that enhance ACP adult orientation to visually attractive traps by only 2-2.5 fold. Currently available traps attract ACP from relatively short distances of only 6-30 feet, after ACP have already infested host plant foliage. The visual and olfactory cues of natural citrus foliage, particularly in a crop monoculture, far outcompete traps; they are simply much more attractive than foliage-mimicking traps. Thus, they are not very useful for drawing psyllids away from citrus.

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In addition, such traps are not always reliable predictors of population outbreaks.

Efforts continue to refine chemical lures to improve their effectiveness under varying seasonal conditions and within diverse citrus genotypes grown in different regions. Furthermore, improvements continue on integrating several attractive cues (color, smell, and taste) with a toxicant to develop attract-&-kill stations that may alleviate the need for repeated insecticide spray applications for ACP management.

Citations:

Lapointe, S.L., George, J., and D. G. Hall. 2016. A phagostimulant blend for the Asian citrus psyllid. J. Chem. Ecol. 42: 941-951.

Patt, J.M., Sétamou, M. 2010. Responses of the Asian citrus psyllid to volatiles emitted by the flushing shoots of its rutaceous host plants. Environ Entomol 39: 618–624.

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