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The Flicker: A Vehicle-Driven, Mechanical Device for Detecting and Monitoring Adult Asian Citrus Psyllid and Other Arthropods in Citrus

Hall, D.G.¹ and Chamberlain, H.²

¹United States Department of Agriculture, Fort Pierce, FL USA

²Pest & Disease Management, LLC, Avon Park, FL USA

A number of different methods have been used to detect and monitor Asian citrus psyllid (ACP) in citrus including: stem tap samples, yellow sticky traps, vacuum samples, suction traps, sweep net samples, visual searches per unit of time, and samples of flush shoots or pairs of mature leaves (Hall et al. 2012). Each of these methods has some value in determining the presence and abundance of ACP in citrus, but there are advantages and disadvantages associated with each method and a number of factors may ultimately influence which of these sampling methods to use including cost, the objective of sampling, and the particular circumstances under which sampling is conducted. However, none of these sampling methods can be used to quickly survey a large block of trees unless relatively few trees are actually examined and/or a large number of scouts is available to do the survey. Pest & Disease Management, LLC (PDM) recently designed and built a mechanical device for detecting and monitoring ACP populations in citrus (Figure 1). The device (patent pending) is attached to a truck, tractor or all-terrain-vehicle and pulled through a grove. Vertical baffles attached to metal arms extending from the device are kept in contact with the outer edge of tree canopies while driving along a row. Adult psyllids are flicked (hence the name ‘flicker’) by these baffles onto large sticky traps positioned horizontally below the baffles. Depending on the size of trees, from 1 to 4 baffles with traps 2 to 6 feet above ground can be used; there are two horizontal traps associated with each baffle, one ahead of the baffle (front traps) and one behind the baffle (rear traps). Moving at speeds of 2.5 to 5.0 mph, the Flicker can be used to sample a large number of trees at a fast pace. We constructed a dataset of numbers of psyllids captured using the Flicker in Florida citrus orchards [n = 235 runs, 0.6 to 2.2 miles of trees per run, average 1.2 miles per run, an average of 3.6 baffles (6.7 sticky traps) per run]. The Flicker caught an average of 4.9 ACP per 1000 ft of trees (=0.8 ACP per trap per 1000 ft of trees); the maximum number of ACP observed among these 235 runs was 177 ACP per 1,000 ft (30 ACP per trap per 1000 ft). Among 154 runs in which at least one ACP was detected, the flicker caught an average of 1.3 ± 0.2 ACP per trap per 1,000 ft of trees (Figure 2). The number of ACP captured per trap per 1000 ft of trees was statistically the same for front traps (4.7 ± 1.1) and rear traps (4.4 ± 1.1). Among runs that included all four trap levels, the lowest traps caught significantly fewer ACP than the highest traps ($F = 5.1, P = 0.006, 3$ df).

Preliminary data indicate that, when populations are moderately high, the Flicker is similar to other sampling methods with respect to detecting psyllids. Of interest is the efficiency of detection methods when ACP populations are small. Intuitively, the chances of detecting psyllids when population levels are low should be increased by increasing the number of trees sampled across an area, which the Flicker facilitates. When psyllid densities are very low,

limited comparisons between visual searches, tap samples and Flicker runs indicated that the Flicker and visual searches provided 100% detection while tap samples provided 92% detection. In addition to surveying for ACP, the flicker catches many other arthropods including citrus weevils; Asian cockroach; sharpshooters; lacewings; lady beetles; Caribbean fruit fly; spittlebugs; grasshoppers; and katydids.

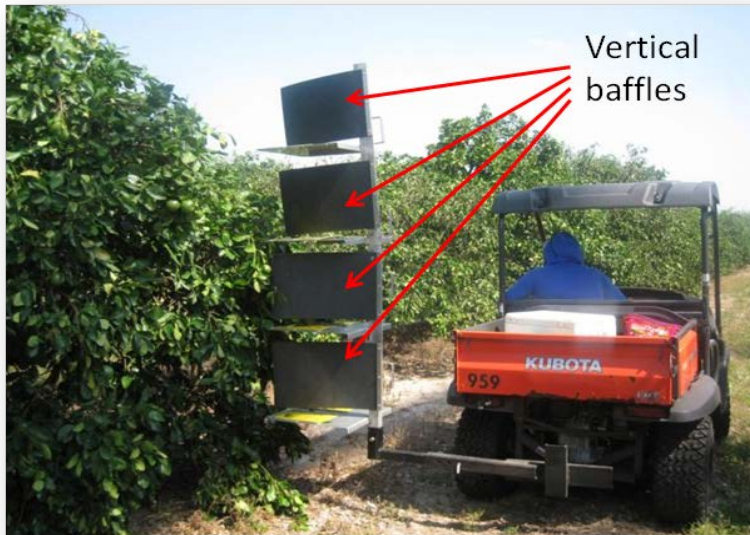


Figure 1. The Flicker attached to an all terrain vehicle.

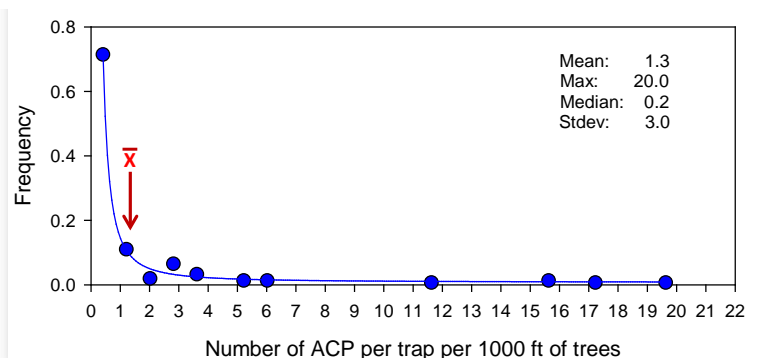


Figure 2. Frequency distribution of numbers of Asian citrus psyllids captured by the Flicker (blocks in which at least one psyllid was captured).

References

Hall, D. G., M. L. Richardson, E. D. Ammar, and S. E. Halbert. 2012. Asian citrus psyllid, *Diaphorina citri* (Hemiptera: Psyllidae), vector of citrus huanglongbing disease. *Entomologia Experimentalis et Applicata*. 146: 207-223.