

Sampling and Management of Asian Citrus Psyllid during the Early Phases of Infestation

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Sampling Methods

Yellow Sticky Cards:

CPDPC/CDFA personnel monitor all citrus orchards in California using a density of 1 trap per 1/2 mile of perimeter (one trap every 40 acres). The traps are hung on the outside of the orchard to take advantage of the ACP tendency to move between edges of orchards. These traps are changed every 2 weeks. CDFA is trapping for regulatory purposes. Because yellow sticky cards are not highly attractive to psyllids, it is important for growers/PCAs to conduct tap and visual sampling, especially during periods of flushing, in all of their orchards.

Tap and Visual Sampling:

Uniform sampling methods are needed to compare infestations in commercial citrus orchards. The current protocol is to sample 10 trees each on the north, east, south, west borders (rows/trees) of the orchard and in the center of the orchard (total of 50 trees). The psyllid prefers borders and so the focus is on the outside edges of orchards. Edges are defined as breaks in citrus plantings, generally the size of a road.

1. Use a white clipboard with a grid, or tape white paper with a grid on it to the bottom of a translucent clipboard. The grid will help you count the psyllids more quickly. Spray the nonpaper side of clipboard with a squirt of Dawn detergent mixed in a ½ liter of water. ACP knocked onto the clipboard will stick in the solution. Hold the clipboard 1 foot below a branch and strike the branch 3 times with a 12" section of pvc pipe (or other device). Then count the number of winged adult psyllids collected on the clipboard. Scrape the psyllids off of the clipboard after each count and re-apply the liquid as needed.
2. Examine 1 young leaf flush per sample tree for all psyllid stages (eggs, nymphs, adults). Split the numbers on the sample sheet by stage. Example; 1/0/3 denotes 1 egg, 0 nymphs and 3 adults were found.
3. Describe the state or stage of the leaf growth on the tree as feather flush, growing flush or fully expanded leaves. This provides information about whether the flush is in a suitable state for immature stages.

Frequency of sampling in find sites after a psyllid treatment

Conventional Orchards: Treatment with two broad spectrum pesticides (preferably the combination of a pyrethroid and a systemic neonicotinoid) is recommended and if the population of ACP is low, this usually suppresses them below detectable levels (based on trap counts and visual inspections) for more than 9 months. It is recommended that visual and tap sampling be conducted 2 months after the double treatment (whether that is a combination of a foliar and systemic or two foliar) and then again at 2 month intervals throughout the year to ensure that psyllids stay below detectable levels.

Organic Orchards: In organic situations, the insecticides are weakly effective and so must be applied every 10-14 days until sticky cards and tap and visual samplings show no psyllids present. It is recommended that tap and visual samples be conducted 2 weeks after a treatment and then at 2 week intervals throughout the year. The treatment program continues as long as psyllids are detected. The sampling program continues until no psyllids have been found for a full year.

Conventional Treatment Approach

Principles for treating commercial citrus orchards with first appearance of ACP:

1. Apply two ACP effective insecticides (see Table below) with different mode of actions as soon as possible after detection of ACP, with at least one from the broad spectrum group. The best treatment combination is a foliar pyrethroid (Baythroid, Danitol, or Mustang) + a systemic neonicotinoid (Admire Pro or generic imidacloprid, Platinum). Apply the foliar first for rapid knockdown and the systemic close to the same time since it takes time for uptake into the tree. Use a systemic only if it will be effective; proper irrigation system, soil type and appropriate timing (June-October).
2. If a soil applied systemic can not be used, then use a broad spectrum foliar insecticide (pyrethroids preferred) in combination with Movento. Movento takes several weeks for uptake. Use a Movento only if it is the appropriate time of year (May-October).
3. If neither a systemic neonicotinoid or Movento can be used, then apply two foliar applications < 1 month apart (within a life cycle of the insect). Use a broad spectrum foliar (pyrethroids, organophosphate, carbamate, neonicotinoid) first and any ACP effective insecticide from a different mode of action grouping second. If weather or other conditions delay applications, treat as soon as possible.
4. Treat the find site and neighbor orchards as close to the same time as possible, preferably within 2 weeks of each other to achieve the 'area treatment effect'. All blocks that intersect an 800 m radius should be treated in their entirety. Blocks that are outside the 800 meters and are in the direction of prevailing winds should also be considered for treatment.
5. You can use normal treatments for other pests as part of the program, if they are ACP effective and applied in a timely fashion.

Synthetic Insecticides for ACP control

ACP Effective Insecticides			
Chemical group	Pesticides	Mode of Action	Selectivity
Organophosphate	Lorsban, Supracide, Dimethoate, Imidan	1a	Broad spectrum
Carbamate	Sevin, Lannate, Carzol	1b	Broad spectrum
Pyrethroids	Baythroid, Danitol, Mustang	3	Broad spectrum
Neonicotinoids foliar	Provado and generics, Actara	4	Broad spectrum
Neonicotinoids systemic	Admire and generics, Platinum		Broad spectrum
Spinosyns	Delegate	5	Soft
Avermectins	Agri-Mek and generics	6	Soft
*Benzylureas	*Micromite	15	Soft
*Meti insecticide	*Fujimite, *Nexter	21	Soft
Tetronic acid	*Movento (foliar systemic)	23	Soft
Ryanodine	Altacor	28	Soft

*Primarily affects eggs and nymphs

See the pesticide labels and the UC IPM guidelines for citrus

<http://ucipm.ucdavis.edu/EXOTIC/diaphorinacitri.html> for rate recommendations.

Organic Treatment Approach

Very few commercial citrus orchards have had detections of ACP (Imperial, San Diego, Ventura, San Bernadino), none were organic, and conventional insecticides have been very effective in suppressing ACP to undetectable levels. We will not know if the proposed strategies to suppress ACP with organic products are effective until organic orchards become infested and growers practice the proposed strategies. Strategies will change as we learn more about the psyllid and how best to manage it.

There are a number of insecticides with organic registration that have Asian citrus psyllid listed as a target pest on the label. However, the efficacy, both in terms of the number of insects killed and the persistence of the insecticides is much lower for organic insecticides compared to synthetic insecticides such as pyrethroids, neonicotinoids and organophosphates. Thus, for purposes of ACP suppression, organic insecticides are not the preferred treatment regime. Because of the recent detection of HLB in Los Angeles County, the importance of suppressing ACP below detectible levels has escalated. Organic pesticides are not likely to lower the ACP population sufficiently to limit disease spread (this is the experience of Florida) and organic certification will need to be abandoned when HLB spreads to areas near commercial orchards.

Organic insecticides require contact with the insect body and so it is difficult to control the hard-to-reach nymphal stages of ACP tucked inside new flush with these products. The persistence of organic products is only hours-days (not weeks like the synthetics) and so they need to be applied frequently. In Florida efficacy trials, petroleum oils worked as well as any of the other products and oils are generally cheaper than the other products. Since the efficacy is similar between the various products, choice of product is not as important as frequency of use for controlling ACP. See pesticide labels for specific instructions and rate recommendations.

Organic ACP Treatment Protocol when ACP is detected

Insecticide choices (There are additional formulations available)

Petroleum Oils: 0.25% oil (low rates of oil act as an oviposition deterrent and kill ACP when they make direct contact).

Ecotrol (rosemary+peppermint oil)

Triology (neem oil)

Pyganic EC 5.0 (pyrethrins)

Aza-Direct (azadirachtin)

Sampling frequency: Conduct tap and visual surveys every two weeks throughout the season.

Treatment frequency: Treatments are applied every 10-14 days until ACP are not detectible by tap sample, visual inspection of leaf flush, and yellow sticky cards for 3 sampling periods. Sampling continues year round and if psyllids are found the treatments resume.