

## Sampling and Management of Asian Citrus Psyllid

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### Sampling Methods

#### Yellow Sticky Cards:

The CPDPC/CDFA is monitoring 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. Once a psyllid is found in an orchard, the trapping density is increased to 100 traps per square mile (one per 5 acres) in the core square mile and 50 traps per square mile in the surrounding 8 square miles (one per 10 acres).

#### Tap and Visual Sampling:

Uniform sampling methods are needed to compare infestations in commercial citrus orchards. 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. Hold a clipboard with 8x11" white paper on it 1 foot below a branch and strike the branch 3 times with a 12" section of pvc pipe (or other device), counting the number of winged adult psyllids collected on the clipboard. They will be stunned for a very short period of time.
2. Examine 1 young flush per sample tree for all psyllid stages (eggs, nymphs, adults). Note if eggs or nymphs are seen by splitting the number on the sample sheet.
3. Describe the state of the leaf growth as feather flush, growing flush or fully expanded leaves.

### Frequency of sampling after a psyllid treatment

**Conventional Orchards:** Treatment with two broad spectrum pesticides (preferably the combination of a pyrethroid and a 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 weeks after a treatment 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.

### Conventional Treatment Approach

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

1. Apply two ACP effective insecticides 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 + a systemic neonicotinoid.

2. Use a foliar + soil applied systemic (imidacloprid, Platinum) if possible. 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 and appropriate timing).
3. If a soil applied systemic cannot be used, use a broad spectrum insecticide in combination with foliar applied systemic Movento (if it is the right time of year).
4. If neither Movento or a systemic neonicotinoid can be used, then use two foliar applications. Use a broad spectrum foliar (pyrethroids, organophosphate, carbamate, neonicotinoid) first and either a broad or soft insecticide second. Apply the foliar insecticides within a life cycle of the insect (< 1 month apart). If weather or other conditions delay applications, treat as soon as possible.
6. Treat the find site and neighbors 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 a 400 m radius should be treated in their entirety. Blocks that are between 400 and 1000 meters and which are in the direction of prevailing winds or contiguous with the 400 meter area should also be considered for treatment.
7. 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	21	Soft
Tetronic acid	*Movento (foliar systemic)	23	Soft
Ryanodine	Altacor	28	Soft

\*Primarily affects eggs and nymphs

#### 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 it 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. In all likelihood, the 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 be effective enough to limit disease spread (this is the experience of Florida) and organic certification will need to be lost when HLB spreads to areas near commercial orchards.

Organic insecticides include Neem oil (AZA-Direct), Ecotrol, Pyganic (EC 1.4 or EC 5.0), and numerous petroleum oils. These 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. The persistence of organic products is only hours (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.

#### Organic ACP Treatment Protocol

Water volume: 100-250 gpa

Insecticide choices (There are additional formulations available and these rates need to be verified)

Petroleum Oils: 0.25% oil

Ecotrol (rosemary+peppermint oil): 16 oz/50 gallons of water

Triology (neem oil): 1%, (maximum 2.5 gallons per acre)

Pyganic EC 5.0 (pyrethrins): 4.5-18 oz per acre

Treatment frequency: Every 10-14 days until ACP are not detectible by tap sample, visual inspection of leaf flush, or yellow sticky cards.