# Effectiveness ranking for insecticides against Asian citrus psyllid

**By Phil Stansly, Jawwad Qureshi and Barry Kostyk**

Asian citrus psyllid (ACP) serves as the vector of greening disease or "huanglongbing" (HLB) and, as such, is the main target of insecticide sprays wherever the disease and commercial citrus production occur together. Optimizing decisions on when, how and what to apply requires weighing numerous factors.

## INSECTICIDAL CONTROL: CONSIDERATIONS

Growers and managers often work with annual budgets based on anticipated needs and profits. Nevertheless, some flexibility is desirable to account for changes in the actual pest or economic situation. Research has shown that at least one, and preferably two, aerial or ground applications of broad-spectrum insecticides during the "dormant" season (winter), when trees are, in principle, not flushing, is a cost-effective practice. However, during the growing season, timing, choice of products and application methods are far from standard. Factors to consider include overall budget, efficacy, pest pressure, optimal timing, equipment availability, conservation of beneficials and resistance management.



## INSECTICIDE TESTING

We have been extensively field-testing insecticides against ACP since 2002. Individual reports can be found on our website at www.imok.ufl.edu/entomology. Most tests were conducted at the Southwest Florida Research and Education Center of the University of Florida-IFAS at Immokalee on Valencia orange trees planted in 1998.

Trees are pruned with a hand-held hedger to induce new growth and encourage ACP infestation. Both bed and swale sides of trees are sprayed using a Durand Wayland 3P-10C-32 air blast speed sprayer at 120 gallons per acre (gpa) or, for certain treatments, a Proptec™ rotary atomizer sprayer at 5 or 10 gpa.

Experimental design is randomized complete block with four replicates. Plots consist of five trees with the three central trees included in post-treatment evaluations. Adult population density is estimated using four "stem taps" per tree. The stem tap employs a white laminated sheet or clipboard onto which insects fall after a branch about 1 foot above is struck sharply three times with a stick or short length of PVC pipe. Nymphs are estimated from 10 randomly selected shoots per plot, collected and examined under a stereomicroscope in the laboratory.

## EFFICACY RANKING

The grower or consultant may have a hard time digging his way through all these reports to help decide what to spray. Therefore, we have endeavored to summarize results by ranking each active ingredient by number of days significantly fewer ACP were counted, compared to the untreated check. Differences in rates or adjuvant use are disregarded. While this results in considerable variability, it reflects the

diverse conditions often encountered in commercial applications.

Figures 1 and 2 illustrate results to date for ACP nymphs and adults, respectively. Note that products primarily targeting nymphs may still result in fewer adults being found on treated trees. The number to the right of each data bar indicates the number of treatments tested, varying from 1 to 21. Naturally, more treatments warrant greater confidence in the result. Standard error bars are also included when a product was tested more than once. Not all the included products are permitted for use on citrus, so always follow the label.

## RESISTANCE MANAGEMENT

Insect populations respond rapidly to selection pressures due to short generation times, so any insecticide application selects for resistance. Some degree of resistance to key insecticides has already been documented in ACP populations in Florida. Therefore, it is prudent to use a particular mode of action (MOA) only once a year. The Insecticide Resistance Action Committee (IRAC) has classified modes of action for all commonly used insecticides (http://www.irac-online.org/wp-content/uploads/2009/09/MoA_Classification.pdf).

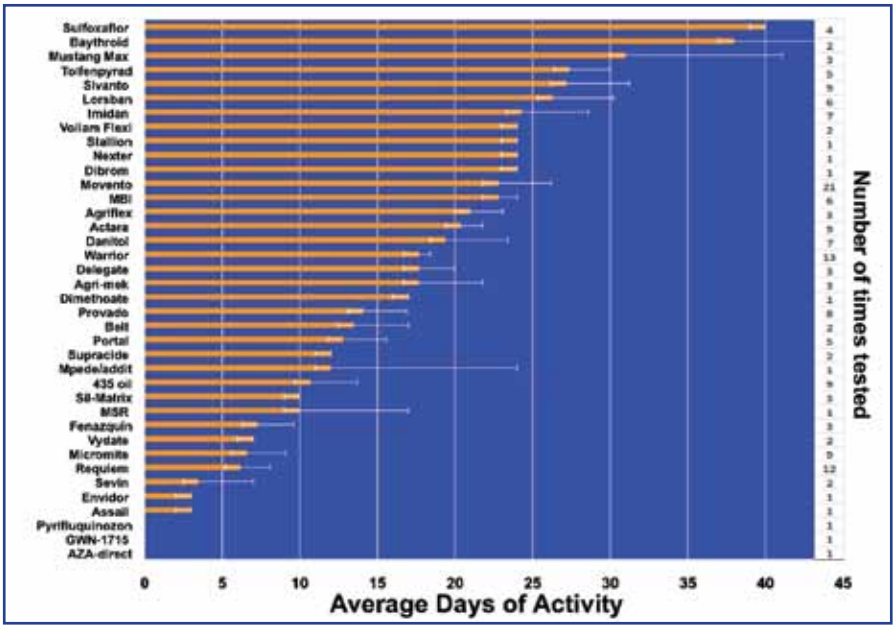


***Figure 1.*** *Reduction of ACP nymphs after application of a foliar spray, ranked by average number of days counts were significantly less than the check*

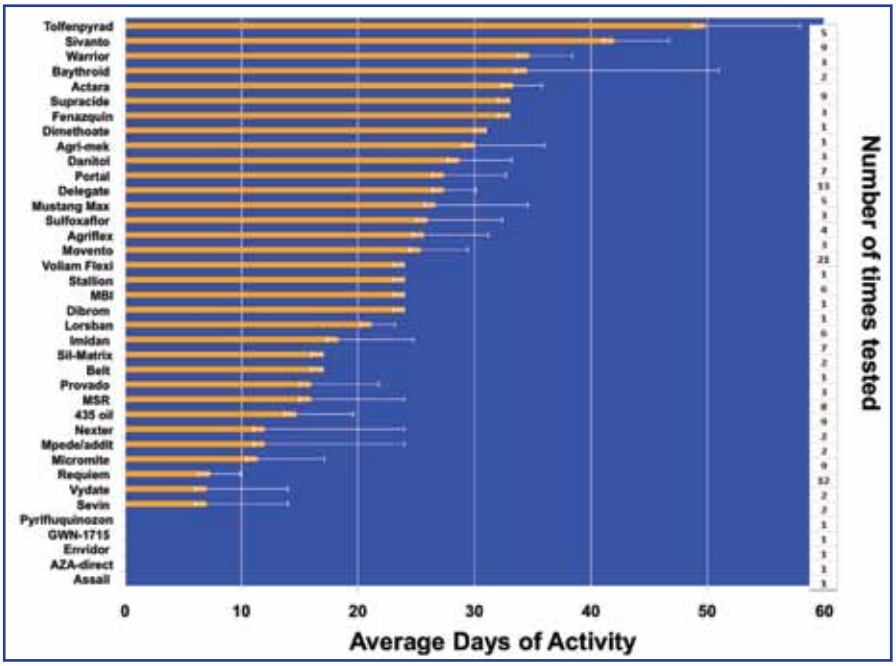


***Figure 2.*** *Reduction of ACP adults after application of a foliar spray, ranked by average number of days counts were significantly less than the check. Does not imply that adults were controlled directly.*

**Table 1.** Example ACP control programs by number of foliar sprays per year with the objective of using the most effective product, rotating modes of action, controlling secondary pests, and conserving beneficial insects and mites

| | Number of Sprays per Year not Counting Post-Bloom or Summer Oil | | | | | Other pests controlled | MOA** |
|---|---|---|---|---|---|---|---|
| | One | Two | Four | Five | Seven | | |
| Jan | Pyrethroid | Pyrethroid | Pyrethroid | Pyrethroid | Pyrethroid | | 3 |
| Feb | | | Movento*^ | Movento*^ | Movento*^ | rustmite, scales | 23 |
| Mar | | | | | Delegate* | leafminer | 5 |
| Apr | | | | | Oil | weevils | 3<br>1A |
| May | Oil | Oil | Oil | Oil | Portal^ | spidermite, rustmite | 15 |
| Jun | | | Agriflex*^ or Delegate* | Agriflex*^ or Delegate* | Agriflex*^ | leafminer (rustmite w/Agriflex) | (6,4)<br>5 |
| Jul | Oil | Oil | Oil | Oil | Oil | leafminer, rustmite | 6 |
| Aug | | | | | | | 1B |
| Sep | | | | Micromite*^ | Micromite*^ | leafminer, rustmite, weevils | 21 |
| Oct | | | | | | weevils | 3 |
| Nov-Dec | | Organo-phosphate | Organo-phosphate | Organo-phosphate | Organo-phosphate | | 1B |

** Generally applied with oil or another surfactant. ^ Primarily for control of nymphs*
***http://www.irac-online.org/wp-content/uploads/2009/09/MoA_Classification.pdf.*

## CONSERVING BENEFICIALS

Citrus production would be difficult without the assistance afforded by many beneficial organisms in controlling myriad pests including scales, mites, leafminers and others, in addition to ACP. Escalating insecticide use for ACP control has already augmented incidence and intensity of many of these pests in Florida citrus. Therefore, selective insecticides are recommended to limit collateral damage during the growing season.

## SPRAY PROGRAMS

There is no "fits all" spray program that will satisfy every grower's needs in regard to cost, efficacy against ACP and other pests, conservation of beneficials and resistance management. Examples in Table 1 are merely intended to illustrate how these criteria could be combined into a spray program based on number of sprays and contingent, of course, on actual pest populations.

## SOIL DRENCHES

Young trees flush often and are best protected with soil drenches or possibly injections of systemic insecticides. The good news is that drenches of imidacloprid, thiamethoxam (Platinum) and clothianidan (Belay) can suppress ACP on young trees for up to 80 days. The bad news is that all three products are neonicotinoids with the same (IRAC-4) mode of action. A new product, Verimark (cyantraniliprole) with IRAC-MOA 28 should be available in 2013. Meanwhile, soil applications of MOA-4 products should be alternated with sprays of non-neonicotinoid insecticides. It is also a good idea to avoid foliar applications of neonicotinoids to preserve these products for soil application to young trees.

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