**Windbreaks can help reduce Asian citrus psyllid populations.**

# Planting strategies to reduce psyllids

**By Xavier Martini and Lukasz Stelinski**

Prevention is one of the pillars of integrated pest management. The core idea is to take actions that will prevent the arrival and establishment of pests in the grove.

The Asian citrus psyllid (ACP) has been present in Florida since 1998, and so far the major tool to control its spread has been intensive insecticide use. Insecticides are indeed an extremely effective method of managing this pest and disease. However, implementation of other strategies that lead to decreased insecticide use should be considered. For example, the establishment of natural preventive actions may reduce ACP arrival and establishment within groves and, combined with appropriate insecticide use, could help growers to better control populations of this pest. Prevention measures against ACP could start as soon as a new citrus grove is planted. We recently conducted extensive studies to determine if planting strategies (such as presence of windbreaks, row orientation and tree density) could influence psyllid populations.

## RESETS INSTEAD OF SOLID-SET REPLANTING

Replanting has been a major focus since huanglongbing (HLB) was first detected in Florida in 2005. However, its implementation has been variable, as HLB has taken such an economic toll on citrus production within the past two to three years. Replanting is essential to maintain citrus production in the state at a high level. However, it is costly and without tolerant rootstocks yet available, it is important to maintain disease pressure as low as possible. Growers can either reset citrus trees within mature groves in order to replace pathogen-infected trees one by one, or they may plant new solid sets of seedlings across large areas following large acreage removals.

To assess the effect of planting young trees as single resets versus solid-set replantings on ACP population densities, we conducted experiments in three commercial citrus groves in Lake Alfred. Four different groves were

sampled in 2013 and 2014. Each grove was divided into two parts: One was a solid-set replanting, and the other was comprised of a mixture of mature trees and non-bearing reset trees. We observed a threefold greater population of ACP on non-bearing citrus when planted as a solid-set replanting as compared to resets planted within mature groves (Figure 1, page 28).

A solid-set replanting is composed of only young trees; therefore, this environment may contribute to a more open space favoring wind circulation and sun exposure. This leads to changes in the microclimate within a grove. For instance, we observed an increase up to +7.2° F in ambient temperature during the day within solid-set replantings as compared with resets intermittently replanted within mature groves. ACPs appear to favor these open microclimatic conditions, and our research suggests that resetting into mixed plantings should be promoted if at all possible. When planting solid sets, young, non-bearing trees should be under particular scrutiny for protection from ACP and HLB as they are likely more susceptible to new infection as compared with resets in mixed plantings.

## KEEP WINDBREAKS

Windbreaks have been used as a very important tool to reduce citrus canker infection and protect citrus groves from prevailing winds and storms. Windbreaks can be single or multiple rows of trees (for instance cadaghi trees, a fast growing variety of eucalyptus). Artificial structures are also possible. Living windbreaks offer an advantage over artificial windbreaks because they are less expensive to establish, but they require a longer time to become functional given that trees need time to establish an effective height.

During the 2014 growing season in Florida, we selected five groves under organic management to assess the possible effects of windbreaks on ACP populations. Each grove had one edge associated with a windbreak and the opposite edge without a windbreak. We observed that ACP populations were reduced by about 56 percent on the edge of citrus groves in the presence of windbreaks (Figure 2, page 28). Our results suggest that the conservation of windbreaks and hedgerows may support HLB management in addition to the other benefits. Also, implementing new windbreaks when planting solid sets may help reduce ACP populations.

We acknowledge that there are some constraints to implement windbreaks, including cost, shading, competition for water and nutrients, obstruction for agricultural equipment and loss of surface. However, windbreak protection against citrus canker and ACP, in addition to other ecological benefits such as a possible increase of habitats for

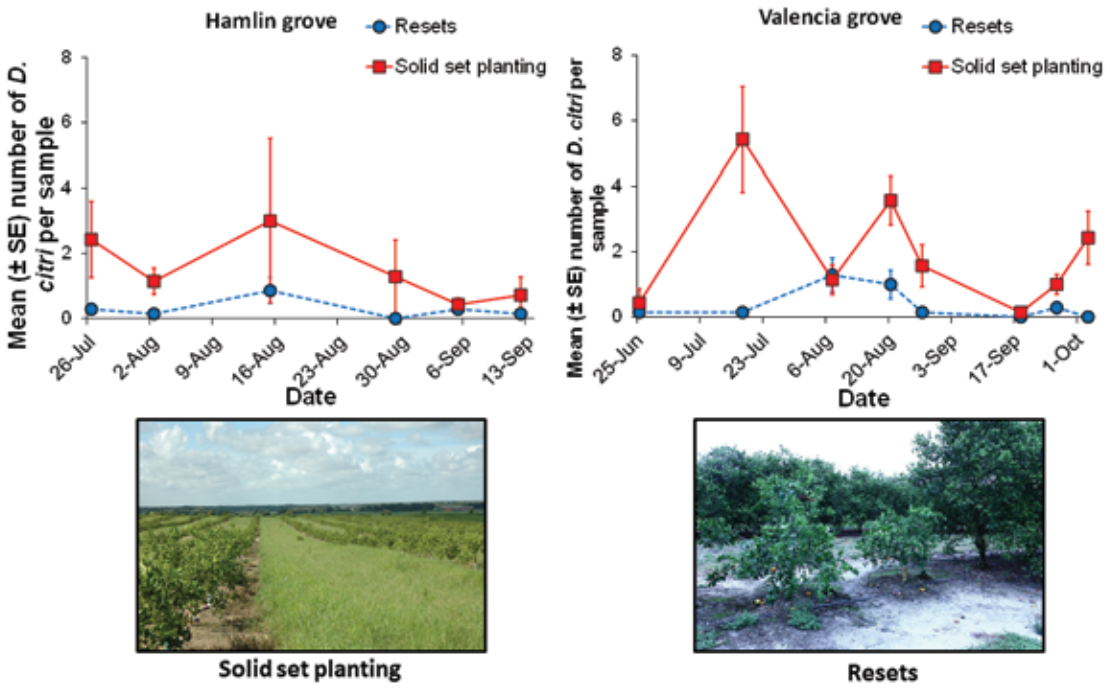


**Figure 1.** Representative examples of ACP populations in young, non-bearing citrus trees, either within a mature grove or within solid-set replantings. Notice that ACP populations were consistently lower on resets than on young trees planted as solid-set replantings.

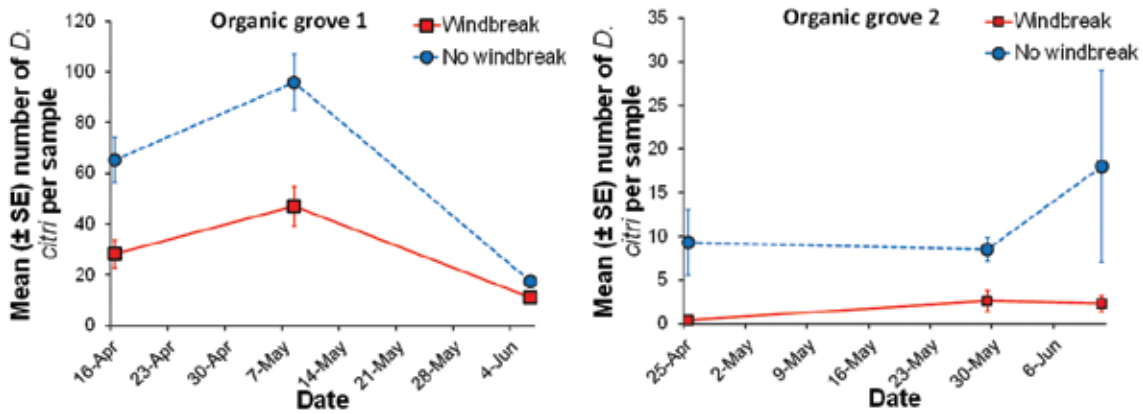


**Figure 2.** Representative examples of ACP populations on the edges of organic groves, depending on the presence or absence of windbreaks. Notice that ACP populations were significantly reduced in the presence of windbreaks.

natural enemies and protection from wind and soil erosion, may outweigh the disadvantages.

## ROW ORIENTATION AFFECTS ACP DENSITY

The choice of a location to plant a new block of citrus depends on many competing factors, including soil type and accessibility to water. Another factor to take into consideration at the time of planting a new citrus grove is row orientation as it relates to ACP. When we compared ACP abundance within 39 groves throughout Florida, we found that the orientation of rows did affect population densities of ACP. Groves planted in rows oriented along the north-south axis, and therefore exposed east and west, typically harbor fewer ACP than groves with rows oriented along the east-west axis. In organic groves, this difference was on average about fivefold — something to consider when planting a new grove.

This finding has been confirmed by follow-up investigations in conventionally managed groves according to CHMA (citrus health management area) recommendations in Central Florida and has been consistent over the different canopy heights investigated. Sun exposure and wind penetration vary depending on row orientation,

and consequently create different microclimates for ACP settling behavior within the citrus tree canopy. Indeed, north-south orientation of citrus rows is a horticultural recommendation as it gives a more even distribution of light between the two sides of the hedgerow than rows planted in an east-west direction. These different microclimates appear to affect psyllid population densities. Therefore, one possible action to reduce ACP abundance along borders at the time of planting is to orient citrus rows along the north-south axis.

## CONCLUSION

Planting new citrus will be paramount in maintaining this crop in Florida despite HLB. Based on our research, possible strategies include the implementation of large blocks of solid-set replantings, but with the knowledge that they must be intensely managed for ACP infestation with insecticides to prevent pathogen transmission. Therefore, particular attention should be placed on intensive management of ACP in solid-set replantings given that these blocks will be particularly susceptible to ACP infestation. Our results suggest that these replanting initiatives should also favor reset plantings, as well as the establishment of windbreaks on the edges of the new solid-set replantings, and orientation of newly planted citrus rows along the north-south axis. None of these measures will totally prevent psyllid arrival to a new grove; however, we believe that these tactics could result in an important reduction of ACP populations.

More information about windbreaks can be found at www.crec.ifas.ufl.edu/extension/windbreaks/design.shtml on the Citrus Research and Education Center website.

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