Artificial border fencing and live windbreaks for ACP management

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What is the technique?

To date, heavy use of insecticides for management of Asian citrus psyllid (ACP), *Diaphorina citri*, has not prevented citrus greening or Huanglongbing (HLB) spread. Exclusion of ACP is the best approach to prevent ACP infestation of citrus groves as it effectively prevents the pest from coming into contact with citrus trees and establishing its populations. ACP prefers to live on the edges of groves and so the border trees are the first to be colonized. In addition, ACP adults move between habitats on a daily basis. These innate behaviors can be exploited to protect citrus by placing barriers around grove borders to prevent invasion and establishment of its populations.

ACP-resistant barriers can be either living windbreaks or artificial screen barriers, established around grove borders. Screen barriers should be built with a fence at least 12 ft high, 30-40 ft away from the border trees with psyllid resistant screens (Fig. 1). It is well established that most psyllids are trapped when fences are between 2 and 10 ft. high; hence, a 12 ft. high fence will effectively exclude most psyllids from entering groves. In a field study conducted in Texas, border fences established along the southern and eastern borders of a grapefruit grove resulted in 55-98% reduction of ACP numbers relative to a control grove without border fences. The windbreak must be made of mesh and open to wind flow to avoid turbulence, which reduces efficacy.

Fig. 1. Border mesh fencing deployed along grove border to prevent ACP infestation into groves. A. Outside of the grove; B. Inside of the grove showing a 30-40 ft. distance between the grove and the mesh fencing for easy access of farm equipment.

Living windbreaks also reduce wind and ACP movement into the grove They also reduce soil erosion, increase water retention and filter pollutants. They can also be used as refuges by beneficial insect species, such as pollinators and natural enemies. The ideal windbreak tree is an evergreen, long-lived and fast-growing tree that can grow at least 12 feet in height. It should be inexpensive, easy to establish and require only minimal maintenance. Finally, it is important not to select a tree that could function as an alternative host for citrus pests or diseases (citrus and other plants in the Rutaceae family).

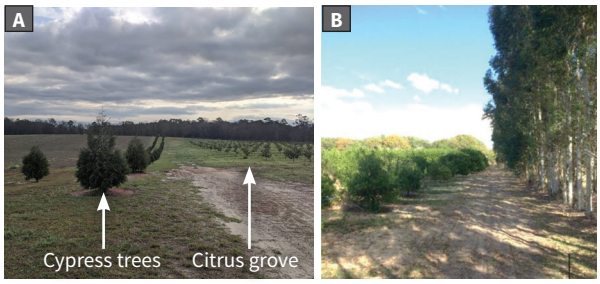

Fig. 2: (A) Example of newly planted windbreak made of cypress on the border of a citrus grove. Two rows of trees planted in rectangle, at each corner and in the middle, offer better protection than a single row. (B) Live windbreak that reached its full size.

Ideally, windbreaks should surround each side of the citrus grove. If, for economical or logistical reasons this is not feasible, it is wise to position the borders perpendicular to the main wind current during the year. Wind direction in a given area can be found on www.windhistory.com.

How do border fences improve ACP and HLB management?

Non-chemical control approaches play an increasingly important role in ACP management programs. Border mesh fences reduce the number of HLB-infected ACP flying into groves, and thus reduce the risk of HLB spread. Windbreaks can be implemented either as a standalone approach or coupled with other management strategies such as pesticide sprays.

Research on living windbreaks significantly decrease the density of ACP on the border of citrus groves (Martini et al. 2015). They act mostly as physical barriers; however, they may also provide refuge for natural enemies of ACP if appropriate flora attractive to these species is present (Patt and Rohrig 2017, Patt 2018).

Who is working on this project?

Drs. Mamoudou Sétamou (Texas A&M University-Kingsville), Xavier Martini, Lauren Diepenbrock, and Lukasz Stelinski (University of Florida), Beth Grafton-Cardwell and Monique Rivera (University of California Riverside) are collaboratively exploring both ways to develop border management strategies.

What are the challenges and opportunities?

The deployment of border fencing and living windbreaks generally requires dedication of space (30-40 ft.) to establish the border wall and to allow for access of farm equipment

between the border and crop edge. This may reduce the cropping area and competition between the crop and living windbreak trees should be considered. In some areas, grove borders are immediately adjacent to other crops, e.g., avocadoes, thus requiring the removal of producing trees before these border management approaches can be deployed.

Other challenges are the initial cost of and the time required for establishment of border mesh fencing. Although living windbreaks can be the cheapest and longest-lasting option, these trees take time to grow of sufficient height to prevent grove infestation by ACP, depending on the species of live windbreak chosen and the environment. In this case it is estimated to be at least five years.

Citations:

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