OPTIMIZING RESIDENTIAL INSECTICIDE APPLICATIONS FOR COMMERCIAL GROVE PROTECTION

Holly Deniston-Sheets[1]
Monique Rivera[2]
Neil McRoberts[3]

[1]*Citrus Research Board*
[2]*Department of Entomology, UC Riverside*
[3]*Quantitative Biology & Epidemiology Lab, Plant Pathology Dept., UC Davis*

SUMMARY

DATOC was asked to explore how the procedure for applying insecticides in residential areas (“buffer zones”) surrounding commercial groves under area-wide ACP control programs might be improved. We recommend that if the size of buffer zones must be reduced to optimize application timing and decrease spending, the zone be reduced to 250 m from 400 m; the area within 100 m from a grove should be treated first, followed by the remaining area out to the zone’s outer edge at 250 m.

Background

Both the Science and Operations Subcommittees have dedicated an appreciable amount of time and effort to optimize the cost-effectiveness of recurring HLB and ACP management activities in Southern California. In this case, the Operations Subcommittee wanted to know how many houses would be included in buffer zones of varying sizes, how far into residential neighborhoods treatments would extend with a range of potential sizes, and what distance was considered large enough to offer protection to nearby commercial groves.

Evidence

To answer these questions, we examined buffer zones recently treated by CDFA, and compiled prior research on treatment efficacy and ACP flight patterns.

Buffer Zones

Maps of treated buffer zones demonstrate the broad range of neighborhood types, density, and grove sizes which are treated by CDFA. Newer home lots can be as small as 15 m x 15 m, but a typical suburban property is around 15 m x 30 m. Older homes are closer to 15 m x 46 m, and lots in affluent areas trend closer to 30 m x 56 m, or larger. Example Area 1 (Figure 1, left) shows a small grove surrounded by a relatively high-density neighborhood, with possible buffer zones of 100 m, 250 m, or 400 m indicated. In contrast, Example Area 2 (Figure 1, right) has far fewer residential properties around commercial groves and changing the size of the buffer zone here will likely make less significant differences in cost. Lastly, the residential area in Example Area 3 (Figure 2) has a similar housing density as Example Area 1, but as the grove is much larger, buffers in this area will contain many more properties (Table 1).

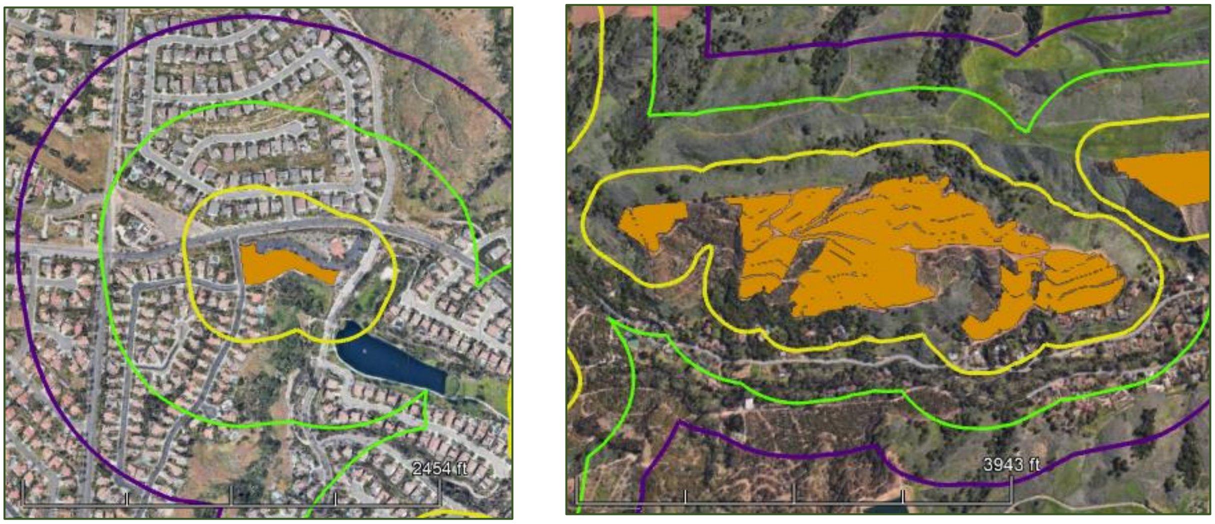

Figure 1. Example area 1 (left) and 2 (right): potential buffer zones of 100 m (yellow), 250 m (green) or 400 m (purple) around commercial groves (orange). Imagery from Google Earth Pro. 2020.

Figure 2. Example area 3: Potential buffer zones of 100 m (yellow), 250 m (green) or 400 m (purple) around commercial groves (orange). Inset shows the full expanse of the indicated buffers with the zoomed-in area outlined in white. Imagery from Google Earth Pro. 2020.

Table 1. The number of residential properties present in buffer zones of various sizes in each example area.

	Residential Properties present in buffer zone size:			
	100 m	**200 m**	**300 m**	**400 m**
Example Area 1	23	97	190	290
Example Area 2	20	44	76	82
Example Area 3	101	236	369	472

Treatment efficacy

We are aware of two projects that have directly or indirectly measured the efficacy of buffer zone treatments in Southern California. The first was conducted in 2017 and 2018 by Dr. Beth Grafton-Cardwell (UC Riverside) in Ventura and Riverside. This project found that Tempo and Merit applied together were fully effective within four weeks (data not shown). The second project is currently underway by Dr. Greg Simmons (USDA APHIS) and Dr. Richard Stouthamer (UC Riverside). This is a large demonstration project in Hemet and has shown significant reductions in ACP caught on traps per day in buffer zones compared with untreated areas (data not shown). Both of these projects justify continued use of buffer treatments around commercial groves.

ACP Flight

Work underway by Dr. Monique Rivera (UC Riverside) and Dr. Xavier Martini (University of FL) has evaluated the flight performance of ACP in relation to temperature and humidity using a custom-made flight mill. Although their work has shown that "long-distance" flyers can travel 500 m on average, this occurs under ideal temperature conditions and shorter flights were observed more frequently. The spatial clustering of HLB+ trees in Southern California also supports the predominance of shorter-distance flights, as 95% of infected trees are within 215 m of another HLB+ tree, and this number has remained under 250 m for nearly two years.

Conclusions and Implementation

The goal of buffer treatments is to limit ACP incursion from residential areas into commercial groves, so it should be optimized for that purpose. Specifically, location and timing should be optimized to minimize ACP dispersal, triggered by buffer treatments, into groves. We recommend the program be structured to accomplish this by applying treatments first to the properties nearest to groves (within the first 100 m) and moving outward upon completion. Although there is not strong evidence to support reducing the total size of the buffer zone, a reduction could tighten application windows, thereby increasing insecticide efficacy, as well as cut costs. If the program decides both these goals are priorities, we recommend the zone be reduced to 250 m from 400 m, with the timing caveat outlined above.