Winter 2017

Dispatches from the Orchard

University of California Agriculture and Natural Resources
Cooperative Extension
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Navel Orangeworm – what can we do to prepare for next year?

This year was a bad year for NOW. Populations were high, and many growers suffered significant damage even after doing everything right, because high populations in neighboring fields moved into their fields. I've outlined basic control procedures for almonds and pistachios below. For other crops affected by NOW such as figs, sanitation can still be extremely helpful. For more pest management information on any crop, you can consult the statewide IPM website, www.ipm.ucanr.edu.

Your first step is to remove mummies from trees and destroy them by February 1st, as these provide overwintering sites and food for the next generation. In Madera County, you should only be leaving a maximum of one mummy per tree in almond orchards. We don't have sanitation standards for pistachio, but mummies in trees are more attractive to NOW than on the ground, so it's important to remove them as soon as possible. Almond mummies can be destroyed by flailing, however pistachio nuts are not destroyed using this method and need to be tilled into the soil, which makes the mummies inaccessible to the moths. You can also encourage resident vegetation or grow cover crops, as this increases moisture levels around mummies and accelerates their breakdown. Sanitation has proven to be one of the most effective procedures to reduce harvest damage, since you are destroying overwintering larvae.

Monitoring NOW in pistachios and almonds is done through pheromone traps, which should be placed by mid-March, and egg traps, which should be placed at the beginning of April. You can use pheromone traps to monitor population sizes and the timing of flights. Egg traps can be used to establish spring biofix (when 75% of the egg traps show increases in egg laying over two consecutive monitoring passes), fine-tuning hullsplit sprays in almonds, and as feedback in mating disruption.

Navel orangeworm infesting fig mummies. Photo: P. Gordon

Mating disruption is an underused resource. It has been shown to be effective in almonds, and has a more limited, but still positive, effect in pistachios. It is important to remember that dispensers must be placed at the density recommended by manufacturers, and that this management method cannot take the place of other NOW control measures, particularly sanitation. Dispensers should be hung halfway up the canopy in a grid system. There are many options available, which you can discuss with your PCA or farm advisor.

In many cases you will need to spray for NOW. Treat if you have almond varieties that will be harvested after the third flight. The best time to treat is when 1% of the nuts are at hullsplit and egg laying is occurring, or approximately 1200 days after the spring biofix, which may be necessary due to reduced egg laying in traps once hullsplit occurs as the new crop is more attractive to the moths than the traps. In pistachios, the NOW spray occurs about a month before harvest, or approximately 2100 degree days after spring biofix and/or four to seven days after pheromone traps begin catching the third flight. If you must delay harvest until after the fourth flight, consider a second spray three weeks later if NOW populations are high.

Prompt removal of nuts is the best way to prevent NOW damage. If you do not remove mummies, or your orchard is neighboring other orchards with high mummy counts, this may be your best option for reducing damage. In all cases, damage increases as harvest is delayed.

Remember Fumigation and Rootstocks when Prepping for New Orchards

Orchard planning and planting are two of the most important tasks in your orchard's life – poor planning can mean wasted space, inappropriate rootstock or scions, and bad irrigation design, to name a few issues. Failing to take soilborne diseases and pests into account is often a significant oversight when planning orchards. It's estimated that nematodes alone affect one-third of the orchard acreage in California. Prunus Replant Disease (PRD) affects even more land. This year I saw this oversight manifest itself in two ways: orchards hammered by bacterial canker and PRD.

We had an unusual spring in 2017 – the bountiful rains and cooler temperatures created an unusual microclimate that was favorable to bacterial canker and blast, caused by *Pseudomonas syringae*. This pathogen affects almonds, apricots, cherries, nectarines, peaches, plums, and prunes. The bacteria can invade above-ground portions of trees through any natural (leaf scars, for instance) or unnatural (pruning cuts or other physical damage) openings. Most years we see only blasted flowers, however this year many young trees were taken down by the canker phase. Cankers caused by *P. syringae* can be identified by brown flecks on the periphery of cankers, and a faint alcohol smell. What does this have to do with orchard preparation? Well, stressed trees, particularly trees stressed by ring nematode, are more susceptible to bacterial canker. Every site I visited that had significant bacterial canker infections was a young orchard that either did not select rootstocks appropriate for the nematode populations in the soil, or did not do pre-plant fumigation. In some orchards, losses from bacterial canker were appreciable. Hindsight is of course 20-20, however some additional testing, conversations with a nursery representative or farm advisor, and the extra expense of fumigation could have saved a lot of frustration.

I also saw some orchards that were hit by the more typical Prunus Replant Disease. These orchards tend to have uneven growth due to trees with varying vigor.

While the pest and disease causing organisms making up PRD are not fully understood, currently we believe that it is a mixture of fungal pathogens, sometimes associated with nematodes, that stunt and occasionally kill newly replanted *Prunus* trees.

We do not have rootstocks that are completely tolerant to PRD or all species of nematodes. Nemagard, for instance, is only tolerant to root knot nematode. Therefore, fumigation is still your best bet. While our current fumigants cannot penetrate as deeply as methyl bromide, trees grown in soil fumigated with what we currently have on the market still fare better than trees grown in non-fumigated soil. If you are intending to grow organic, or do not chose to fumigate, a study led by Greg Browne, published in 2013, showed that growing a green manure crop of 'Piper' sudangrass for two months in nematode infested soils improved the growth of replanted peaches.