

Considerations for March/April, 2015

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Almond kernel development is ahead of schedule. Kernel fill for Nonpareil was completed in many locations of the northern San Joaquin Valley around mid-May, suggesting that the season is progressing 2-3 weeks ahead of "normal." This means that hull-split and harvest will occur earlier than normal, impacting nutrient, irrigation, and insecticide timings. Every orchard will progress differently depending on location and varieties, so it is important to monitor the progression on an orchard basis.

**Irrigation prior to hull-split.** Research has shown that a mild to moderate water stress applied just prior to and maintained through the first week of hull-split may help with harvesting and reduce hull rot. This practice is known as regulated deficit irrigation (RDI). Irrigation durations should be reduced and plant stress should be monitored using the pressure chamber until a stem water potential of -15 bars is achieved. Depending on soil and irrigation practices, this may take a few days to several weeks and may require a 10-50% reduction in water applied. The stress should be maintained for 2-3 weeks. Once hull-split is progressing, then full irrigation should resume until the pre-harvest programs begin.

Be careful not to over-stress the trees. Too much stress during the hull-split period can decrease kernel weights and cause "textured" kernels. If trees have been deficit irrigated through the season due to drought conditions, RDI is not advised. More information can be found in Publication #8515 "Drought Management for California Almonds" available for free at <http://anrcatalog.ucdavis.edu/>.

**Hull-Rot Management.** Hull rot is a fungal infection of the splitting hull by either *Rhizopus stolonifer* or *Monilinia* spp. Toxins produced by these fungi move into the tree, killing spurs and wood within the canopy, impacting future production. Trees that are over-fertilized and -irrigated tend to have increased hull-rot. Nitrogen applications should be minimized after kernel fill and, if possible, RDI should be applied. Fungicides have been shown to be effective in reducing strikes by *Rhizopus*, but must be timed to the initial splitting of the almond hull. This usually coincides with NOW sprays. Hull split fungicide sprays do not reduce hull rot by *Monilinia* spp. Data indicates that fungicides for *Monilinia* need to be applied in early to mid June to reduce latent infections of the hull.

**Managing navel orangeworm.** If navel orangeworm (NOW) populations are high, hull-split sprays should be made to protect the crop from infestation. Sprays should be made at the onset of hull-split (e.g. 1-5%). Often at this time, blanks begin to split in the interior of the orchard. Most reduced-risk pesticides need to be applied prior to egg laying or hatching, supporting this earlier timing. Pyrethroids (e.g. Brigade, Warrior), organophosphates (e.g. Lorsban), and chlorantraniliprole (e.g. Altacor) have shown adult activity and may be suitable for later timed hull-split sprays. Although lower in cost, pyrethroids have been shown to impact spider mite

predators for at least 6 months after the hull-split application. Second sprays for 'Nonpareils' and coverage for later splitting pollinators may be needed, especially in areas with higher temperatures and NOW populations. Work with your pest control advisor to determine the best strategy for timings and pesticide selection.

**Webspinning Spider Mite Management in Almonds.** As summer approaches almond growers need to be monitoring for webspinning spider mites. The most common species during the summer are Pacific and twospotted spider mite, though on occasion strawberry spider mite can be found. As adults, all three mites look and behave similarly, even though control of Pacific spider mite is more difficult to control.

Webspinning spider mites overwinter in the orchard under rough bark and ground litter. During the spring, usually in March and April, migration will occur from these places into the lower areas of the tree. These early-season populations are typically small, do not reproduce quickly, and often become prey to early-season natural enemies. However, as temperatures warm in late May through September, the populations increase rapidly, particularly if natural enemies are absent. In favorable conditions, a lifecycle can be completed in 7-10 days, with 8-10 generations a year.

Spider mites damage leaves by sucking cell contents and damage initially appears as a light stippling. As populations increase, mites and their eggs become more visible, and eventually "webs" will appear around spurs and leaves. Leaves with high populations will fall from the tree, reducing carbohydrate production. If leaf loss becomes severe there is a potential for crop loss the following year. Spider mites are most problematic in orchards that are dusty or where the trees are stressed. Stressing factors can include insufficient irrigation, nutrient deficiencies, or excessive crop load.

The most important factor in spider mite management is biological control. When natural enemies are abundant, miticides are not needed. When natural enemies are absent, control with even the best miticides can be short-lived. The goal is to find a balance that relies primarily on natural enemies supplemented by miticides as needed.

The most important predators of spider mites are sixspotted thrips, western predatory mite, and the spider mite destroyer. Sixspotted thrips are highly migratory and can quickly control spider mite populations. Over the past few years it has become the predominant mite predator in California almonds. The western predatory mite- although similar in size as spider mites- is whitish in color and often moves quickly across leaves. The spider mite destroyer is a small black ladybug that feeds exclusively on spider mites. It is found primarily during the second half of the season. These predators are very effective in controlling mite populations, and in orchards with high predator-to-prey ratios, treatment may not be required. Growers who want to conserve and promote predators should avoid broad spectrum insecticides, particularly early in the season,

and avoid prophylactic and preventative miticide applications that do not provide enough food for mite predators to become established in the spring.

In determining when to time the first mite spray application, a presence/absence monitoring protocol has been developed. Monitoring should occur weekly, and prior to mid-June should focus on hot-spots within the orchards. After mid-June, the whole orchard should be randomly sampled.

When sampling trees, 15 leaves from a minimum of five trees should be selected. Leaves should be randomly chosen from the inside and outside of the canopy. Examine both sides of the leaves looking for pest mites and predators. Note the number of leaves on each tree with pest mites and their eggs, and the number of leaves with predators. There is no need to count the mites. Once completed, compare the numbers with the guidelines provided in the "Don't Treat" and "Treat" columns on the sampling form provided at the webspinning spider mite link of the UC Almond Pest Management Guidelines (<http://ucipm.ucanr.edu/PMG/selectnewpest.almonds.html>)

Many miticide options exist for cases where a treatment is required. Each miticide has its strengths and weaknesses, and for that reason options should be discussed with a pest control advisor. For almond growers in the San Joaquin Valley that plan on using miticides containing abamectin, keep in mind that new regulations require that only low-VOC formulations be used between May 1 and 31 October 2015 and 2016. More details on this new regulation and all miticide options can be found in the UC Almond Pest Management Guidelines (<http://ucipm.ucanr.edu/PMG/selectnewpest.almonds.html>).

**Spray rig speed.** Spray coverage for almond trees is based on the height and density of the tree. If the height of the tree is under 10 feet, adequate spray coverage can be attained at almost any reasonable speed. For taller orchards, however, slower speeds have been shown to increase coverage. Research trials have shown that a difference of a 1/2 mph (2.0 mph v/s 2.5 mph) can reduce the coverage by 30% for trees 18' or higher. Traveling at 3.25 MPH, less than 2% coverage was achieved at a height of 20 feet. This reduction makes reduces the concentration of the pesticide deposited, increasing the chance of resistance formation, loss of crop due to disease/insect damage, and tractor/rig damage. For maximum coverage and pesticide efficacy, spray rig speeds should be operated no faster than 2 MPH.

**Ants.** Ants are a serious problem where they are present. If in high populations, they can consume between 1-2% of the crop within four days. Fields should be scouted and, if needed, baits should be applied. Baits - since they are growth regulators- must be applied 1 month prior to harvest for maximum effectiveness. If bait wasn't applied, and fire or pavement ants are present, a broadcast spray of organophosphate should be applied as close to harvest as allowed to reduce foragers. Nuts should also be picked up as soon as possible after shaking. Be mindful that not all ants present within the orchard feed on almonds. A quick trick to distinguish "good ants" from "bad ants" is to throw potato chips or a hot dog near the mound. If consumed, it can be

assumed that the colony will also feed on almond kernels. Another trick is to stomp near the mound to bring ants to the surface. If they swarm out of the mound, are red in color with a black butt and bite, they are mostly likely fire ants. Monitoring and treatment information can be found at (<http://ucipm.ucanr.edu/PMG/selectnewpest.almonds.html>).

**Final thought.** As we prepare for an earlier than normal harvest, remind your work crews to be careful with the heat and around machinery. Long, hot days - especially when short on sleep - slow our reflexes and reduce the ability to make decisions. Work with the crews and contractors to ensure that there is adequate shade and water, and rules regarding pesticide usage are being followed. If personally spraying or harvesting late, have somebody check in every few hours to make sure you are safe.



Figure 1: Almond kernel development nearing completion within a 'Nonpareil' almond. Photo Credit: David Doll.



Figure 2: Six-spotted thrips provide excellent biocontrol for web-spinning spider mites. They are the predominant predator within the San Joaquin Valley. Photo credit: UC ANR.



Figure 3: Fire ant mounds in an almond orchard. Mounds tend to be at the edge of the wetting profile and are found in groups of three or more. Photo credit: David Doll.