Considerations for July/August, 2015
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Harvest has arrived earlier than "normal" this year, albeit not as early as expected. This shortened season is due to the drought, warmer than normal temperatures following bloom, and reduced water applications.

Irrigation Management. With the exception of drying down the orchard for harvest practices, irrigation during the period of hull-split to harvest should be as close to full evapotranspiration (ET_c) as possible. Kernel weight is still accumulating and continues until the abscission layer between the peduncle and hull forms. Adequate,(but not excessive) moisture must be available through hull-split, as hulls must be turgid to properly split. Water stress can change the onset of hull-split and ripening, cause stick-tights, reduce kernel weights, and cause shriveling or "texturing." Excessive moisture, however, can delay harvest and increase the incidence of hull rot.

Harvest Timing.
Timing of harvest is always tricky. Growers must balance between harvesting early and having a longer dry time on the ground, or harvesting later and having a greater chance of navel orangeworm infestation (NOW). In years in which NOW pressure is greater than normal- such as this year - an earlier timed harvest should be considered. Trees should be shaken as soon as a few test trees shake clean. Be careful on shaking too green, as longer shaking time per tree can damage tree trunks. This "barking" of trees often creates wounds that are susceptible to fungal wood pathogens such as *Ceratocystis*. Once the nuts are on the ground, windrowing and pickup should occur in a timely process to reduce ant damage.

Harvest Sample.
Taking a harvest sample is simple, but time consuming. Nevertheless, it should be considered because the amount of insect damage can be masked by the handling that occurs during sweeping, pickup, and processing. Our trial data has found that as much as 4% more damage can be found in harvest samples than what was indicated in the processor report. In other words, when we found an estimated 5% damage/reject level in the harvest sample, the processor indicated a 1% rejection level. The 4% discrepancy is most likely due to damaged nuts lost during the harvesting process (i.e. sweeping, pick-up, and processing). This is still lost crop even though it isn't detected.

Another reason for performing a harvest sample is to account for the damage that does occur in the field. Processors often lump all worm damage together, not separating out NOW, Peach Twig Borer, Oriental Fruit Moth, or other worms. Ant damage often does not show up because the chewed kernels are often blown out the back of the pick-up machine. Gummy nuts due to nutrient deficiencies, feeding damage, or other conditions are also lumped together on processor reports.

Collecting a harvest sample is easy. In each block of concern, collect 500 nuts from the ground after shaking and place them in a paper bag. Two samples of 250, or 4 samples of 125 nuts from differing areas of the block can also be collected, but try to keep the total number of nuts per block at 500. Store the bags in a freezer until they can be cracked out. This may be several weeks after harvest. Check for signs of pests and disease once crackout is possible. Compare damaged nuts to pictures found at the UC IPM website: http:\\www.ucipm.ucdavis.edu. A hand sheller can be helpful in processing many samples. It can take 60-90 minutes for each sample depending on size. Five hundred nuts split into four 125 nut samples should suffice for a 40 acre block.

Understanding the types and intensity of damage to harvested nuts allows the development of the most cost-effective methods to manage orchard pests. If orchard practices are changed for a season, a harvest sample can provide information on whether the changed practices affect marketable yields.

Dust Management.
A major concern when harvesting is dust stirred up by harvesting equipment. To reduce dust, consider oiling or wetting roads, maintaining clean orchard floors, using correct settings on the sweeper head, reducing blower passes, and reducing harvester speed to allow more time for gravity separation. Also, when working near the edges of fields, it is important to blow inward so canopies can naturally filter the dust. These practices are important in all operations, but are of greater concern when near roads, schools, homes, or other residential areas.

Stockpile Management.
While waiting to be processed, almonds can be stockpiled and fumigated. Stockpiling has a number of advantages, including: getting the almonds out of the orchard sooner, the ability to perform post-harvest practices to reduce in-field ant infestations, and allowing greater flexibility in scheduling transport to the processer.

When stockpiling, make sure that the moisture content of hulls and kernels is less than 12% and 6%, respectively, and choose a location which is suitable for drainage in rainy weather and that is not near equipment or fuel storage. Stockpiles should be oriented in a north-south direction to aid in drying and covered with white-on-black tarps. Monitor humidity and open the tarp when appropriate to reduce condensation and mold formation. Also monitor and treat for insect, bird, and rodent pests. If rain threatens, ensure piles are covered . Finally, be aware that stockpiles are a potential fire hazard.

Hull Analysis for Boron.
Boron is an important micronutrient for almonds. Boron is critical for flower fertilization, as it is involved in directing the germinating pollen tube. Deficiencies lead to reduced nut set, and in severe cases, an appearance of a "nonproductive symptom." Within the tree, boron deficiency can lead to a dieback of small twigs and a "weeping branch" look. Boron is also toxic at high concentrations. Boron toxicity is often being observed in areas with high soil boron or in blocks irrigated with water containing boron. Boron toxicity symptoms appear as gummy nuts that may form "stick tights," as well as gum exuding from pruning wounds, bud and leaf scars, and spurs.

Critical threshold levels for boron hull values are as follows:

	Hull Boron Level (PPM)
Deficiency	<80 PPM
Sufficient	100 - 160 PPM
Toxicity	>300 PPM

To determine if an orchard is deficient in or showing toxicity from boron, hull samples must be collected. Since the hulls serve as the primary boron sink, they tend to accumulate the nutrient, and provide a consistent reading. Leaf values are not effective in determining adequate boron levels. Leaf tissues can not reliably detect toxicities and are inconsistent at the lower end of the sufficiency levels.
Boron deficiency can be alleviated through applications of boron to the soil. Caution should be used when determining the rate of material applied, as high rates of application may cause toxicity. There have been some reports that boron applied in the summer may lead to stick-tights at harvest, suggesting that it may be better to apply boron after harvest. A foliar spray of boron should always be considered between postharvest and pinkbud.

Postharvest irrigation and nutrition. The initiation of fruit bud formation occurs for most almond varieties in mid- to late August. Severe stress imposed during this period can reduce floral bud count and fertility in the following years. Trees should be irrigated as soon as possible after harvest to reduce stress.

During this period, the tree is also building nitrogen stores for the following year. Approximately 20% of the nitrogen budget should be applied in the post-harvest period. The rate may be reduced if mid-July leaf samples were above 2.5%. No more than 50 lbs of nitrogen should be applied, however, as research has shown that the shorter days and lower ETc demands limits the amount of nitrogen uptake to about this much. This is especially true with later harvesting varieties.

The final thought. Over the past few years there has been an increase of almond thefts. These include from stockpile yards and missing truckloads. Although it is a busy time, be mindful of the activity and stick to the protocol of verifying drivers and receiving signed pickup sheets. Each almond is worth about a penny, which makes a double trailer worth around $50,000-$60,000! With that in mind, consider assigning only the most trustworthy employees to handling trucking and delivery information.

Figure 1: Severe water stress between hull-split and harvest can cause a reduction in kernel weights and "textured" almonds.

Figure 2: A small navel orangeworm (NOW) larvae crawling on the surface of a nut. NOW will feed on the nut, decreasing crop yield and quality while increasing the risk of aflatoxin.

Figure 3: Ant damage to an almond kernel. Ants often consume the meat of the kernel, leaving only the pellicle. Often times, the pellicle is light enough to be blown out through harvesting and the full extent of ant damage often goes undetected.