Adding Almond Hulls to a Producing Almond Orchard: Feasibility and Soil Health Impacts

Project Leader: David Doll
University of California Cooperative Extension – Merced County, 2145 Wardrobe Ave., Merced, CA 95341
(209) 385-7403, dadoll@ucdavis.edu

PROJECT SUMMARY

Objectives for current year:

1. Determine if almond hulls can be re-applied to orchard floors without impacting production practices;
2. Identify the optimal rates of almond hull and shell application without negatively influencing tree performance;
3. And determine if in-season almond hull and shell applications have the same nutrient value as compost applications.

Background and Discussion:

In 2017, the NASS estimate for the California almond industry was 2.25 billion pounds of almond kernels on an estimated 1,000,000 bearing acres of land (USDA-NASS, 2017). Processing by-products include the hull and shell and account for 50% and 25% of the total fruit weight harvested, respectively. Thus, for the estimated kernel yield, an approximate 4.5 billion pounds of hulls and 2.25 billion pounds of almond shells are also harvested.

Common practice for almond hull use is to sell them to the dairy industry for feed. Based on crop production estimates, however, hull supply will outgrow dairy demand unless the dairy industry continues to grow within California. There are alternative uses of almond hulls. These include the use as a source for pyrolysis into biochar, co-generation of energy, source of sugar extract for ethanol production, and human food consumption. Each of these has their respective challenges, but it is unclear if any of them are economically feasible. In the meanwhile, a short-term solution must be identified.

This study aims to explore how hulls interact with soils and determine the feasibility of application to an orchard as a soil amendment. This process of "in-field composting" could reduce nutrient loss that occurs during the composting process as well as increase organic matter.

Two trial locations were established in almond orchards in 2017: one in the northern Sacramento Valley in a three-year-old Nonpareil/Aldrich/Monterey (50%/25%/25%) orchard and the other in a mature Butte/Padre orchard in the central San Joaquin Valley. Treatments included an almond hull:shell mix that was applied to the orchard floor at either one or two tons/acre, almond shells applied at one ton/acre, a locally sourced compost applied at 1 ton/acre, and an untreated control. Treatments were applied in early April, with the exception of the compost or compost tea treatments. Leaf nutrient levels were sampled in mid-July. Yields were measured for tree performance. Soil will be taken in November of 2017.

Almond hulls applied in late April were degraded by harvest at both plots and did not impede operations. By the middle of the summer, there was no evidence of the hull applications at the San Joaquin Valley site, while few hulls remained due to a later application at the northern Sacramento Valley location. Leaf and soil nutrients are in the process of being analyzed.

Project Cooperators and Personnel:
Dani Lightle, UCCE - Glenn County; Rory Crowley Nicolaus Nut, Chico, CA; Burroughs Family Farm, Turlock, CA; Cameron Zuber, UCCE - Merced; Amélie Gaudin, UC Davis; Timothy LaSalle, CSU Chico

For More Details, Visit

- 2016 - 2017 Annual Reports (15-DOLLD-01 (AIM)) on the web at Almonds.com/ResearchDatabase
- Poster location 57, Exhibit Hall A + B during the Almond Conference; or on the web (after January 2017) at Almonds.com/ResearchDatabase
- Related project: 17.PREC7.Brown