

Almond Orchard Recycling

Project Leader: Brent Holtz

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PROJECT SUMMARY

Objectives for current year:

- The overall goal of this project is to comprehensively assess management implications of two forms of whole orchard recycling (WOR), chipping (C) vs. orchard grinding (G), compared to orchard removal for energy co-generation.
- Refine life cycle assessment (LCA) model for evaluation of carbon dynamics and balance.
- Quantify effects of the treatments on the physical and chemical soil properties and tree nutrients.
- Quantify effects of the treatments on biological soil properties.
- Assess impacts of the treatments on replanted orchard growth, health, nutrition, production, and water relations.

Background:

The first orchard grinding trial established in 2008 compared WOR to burning and incorporating the ash. The second orchard was replanted to almond. Ultimately, greater yields, significantly more soil nutrients, organic matter, and total carbon were observed in the grind treatment when compared to the burn. Leaf petiole analysis revealed higher nutrients levels in trees growing in the grind treatment, providing evidence that 30 tons per acre of organic matter was beneficial to the next generation of trees.

Discussion:

WOR could reduce net orchard greenhouse gas emissions by sequestering temporary carbon stored in tree biomass into soils. The woody residue generated by WOR, estimated to be 40-80 tons per acre depending on tree size, spacing, and varieties, could increase soil organic matter, soil fertility, soil water infiltration rates and soil water retention. Impacts of the orchard debris on incidence and severity of soil-borne diseases of almond are largely unexplored, but increases in soil organic matter content have resulted in favorable soil microbial community shifts, resulting in suppression of some soil-borne diseases and improved plant nutrient dynamics. Preliminary data from the 2008 trial has shown less water stress from trees growing where the previous orchard was ground, suggesting increased water holding capacity. The 2008 trial also indicated better ion ratios in the soils with ground trees. Four additional WOR trials with almond were established and fumigated in 2016 and will be re-planted to second-generation almond trees in early 2017.

Project Cooperators and Personnel:

Amélie CM Gaudin and Elias Marvinney, UC Davis, Greg Browne, USDA-ARS, UC Davis, Andreas Westphal, UC Riverside, David Doll, UCCE - Merced County, Mohammad Yaghmour, UCCE – Kern County

For More Details, Visit

- Poster location 66, Exhibit Hall A + B during the Almond Conference; or on the web (after January 2017) at Almonds.com/ResearchDatabase
- 2015 - 2016 Annual Reports CD (15-PREC3-Holtz (AIM)); or on the web (after January 2017) at Almonds.com/ResearchDatabase
- Related projects: 12-PREC3-Holtz, 16-STEW7-Gaudin, 15-DOLLD-01-AIM, 16-PREC-Brown