Orchard Removal Carbon Recycling and Replant Disease

Project Leader: Brent Holtz
University of California Cooperative Extension, San Joaquin County, 2101 East Earhart Ave, Suite 200, Stockton, CA 95206
(209) 953-6124 baholtz@ucdavis.edu;

PROJECT SUMMARY

Objectives:

- Compare effects of grinding of whole trees and soil incorporation as a pre-plant soil treatment with burning and incorporation on young tree growth
- Compare the two treatments with and without soil fumigation (Inline) on young tree growth.
- Assess the effects of the soil treatments on tree growth, plant pathogen presence, disease incidence, and soil characteristics.

Background and Discussion:

We are examining second generation orchard growth and replant disease when planted into ground where whole trees were ground and incorporated versus where whole trees were burned and the ash incorporated. More growers are grinding up orchards upon removal. Can this organic matter be incorporated or should it be removed from the orchard? Burning is no longer an option in the San Joaquin Valley for air quality reasons.

Almond orchard soil is traditionally very low in organic matter, though higher organic matter is generally associated with better water holding capacity, better mix of soil microbial communities, etc. This project is assessing whether incorporating the biomass of the removed trees into the soil prior to replanting is a net benefit/ detriment to establishing a new orchard, as well as whether carbon can be sequestered in the soil. Soil biomass treatments were completed in early 2008; soil fumigations in fall 2008, and Nonpareil, Butte, and Carmel on a Nemaguard rootstock were planted in replicated blocks early 2009.

Results from the first 2 years indicate that young tree growth was not different whether ground trees were incorporated or burned, but that soil fumigation helped increase tree size.

Despite incorporating high levels of organic matter, no reduced growth due to a nutrient (N:C ratio) imbalance was observed. The whole tree grinding (30 tons / acre) did not stunt replanted tree growth. Two years after incorporation and burning, the carbon-nitrogen ratio remained higher in the burn treatments when compared to the grind treatments. Carbon found in the ash from the burn treatment has been more readily detected in the soil analysis when compared to the carbon still captured in the large chunks of woody debris from the grind treatment not yet decomposed. Wood aggregates, consisting of large pieces of wood debris and soil, were only found in the grind treatment plots. Fungal mycelium was readily observed colonizing woody aggregates and more basidiomycetes (mushrooms) were observed in the grind plots.

Tree growth, disease incidence, and soil characteristics will continue to be monitored for 2 more years to assess whether soil incorporation of chipped tree removal can sequester carbon without detrimental effects on young tree growth.

Project Cooperators and Personnel Greg Browne, USDA/ARS, Davis; David Doll, UCCE Merced County; Amanda Hodson, UC Davis; Kevin Brooks, CSU-Fresno

For More Details, Visit

- Poster location 24, Exhibit Hall, Session 2; or on the web (after January 2012) at AlmondBoard.com/AICposters
- 2010 - 2011 Annual Report CD (10-PREC3-Holtz); or on the web (after January 2012) at AlmondBoard.com/ResearchReports
- Related Projects: 11-PATH1-Browne; 11-STEWCROP4-Kimmelshue;