Management and Benefits of Cover Crops in Almond Orchards

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PROJECT SUMMARY

Objectives:

- Compile knowledge on the use, management, and barriers for adoption of cover crops in irrigated almond orchards.
- Quantify the benefits and tradeoffs of winter cover crops and resident vegetation compared to fallow on productivity and soil health, water balance, pollinators and weed pressure in four different geographical regions differing in average annual rainfall
- Determine the host status of various cover crops species and mixes to key plant-parasitic nematodes.

Background and Discussion:

Planted or natural vegetation cover crop during the fall/winter impact various aspects of soil quality regulating N, water, and C dynamics which may be of benefit to the sustainability and resilience of almond industry. Previous projects and farmers experience show that this practice is compatible with large scale almond production and California growers recognize the theoretical benefits that might come from implementing cover cropping. However, we lack concrete information to guide cost-benefit analyses of implementing cover crop and address concerns about potential increase in water usage. Over the course of this project, we will determine benefits and trade-offs associated with winter cover cropping in terms of soil water availability, nitrogen capture, pest suppression, pollinator support, compaction and carbon sequestration across different rainfall zones in both bearing and non–bearing orchards. In addition, we will monitor the impacts of cover crop termination dates on these services to provide strong basis for further optimization of winter cover crop systems for almond orchards.

We will first conduct an extensive review of literature and survey growers, their advisors, and researchers on the current practice and knowledge of growing and managing cover crops (single species, cover crop mixtures or natural vegetation) in Almond orchards across California. Our survey is being reviewed by multiple stakeholders and will be distributed this fall. We will provide both online and paper survey support to identify incentives and barrier for adoption and further define our research agenda.

We also are in the process of setting up four replicated trials across the Sacramento and San Joaquin Valley with either (T1, T2) two winter planted cover crops (pollinator mix and soil mix), (T3) winter resident vegetation, and (T4) bare ground across four rainfall regions. We will monitor shifts in soil hydraulic properties (water retention and release, crusting, compaction, aggregation, total C and infiltration) and water use efficiency (upward and downward water flows, tree water status in the spring and overall water balance). Impact on other ecosystem services such as N and C retention, frost incidences and pest control will also be investigated. Finally, we will conduct field studies building on greenhouse studies performed last year to evaluate parasitic nematode host status of *Croalatia* sp. along with the species and mixtures from the pollinator and soil mixes tested. This will include ability to suppress root-knot, ring and/or lesion nematodes.

We have put together a large team of very talented farm advisors and UC researchers. Their experience combined with the system approach implemented here will help better understand the relationship between benefits and tradeoffs of winter soil cover across rainfall zones. This will help guide the design of locally-adapted and practical floor management strategies that do not interfere with imperatives of intensive almond production while maximizing benefits obtained from cover crops. This project will also assist the development of integrated pest and water/fertility management strategies necessary to meet the future needs of the California almond industry.

Project Cooperators and Personnel: UCCE: D. Doll, D. Lightle, M.Culumber, M.Yaghmour; Project APIS: B.Synk; UCD: A.Hodson, B.Hanson, N.Williams and their respective personnel. PhD students: C.Creze (Gaudin), S.Haring (Hanson); Growers: Wegis Ranch (Backersfield), Valley Pride (Fresno), Castle Farm (Merced), Bosque Verde (Corning)

For More Details, Visit

- Poster location 58, Exhibit Hall A + B during the Almond Conference; or on the web (after January 2018) at Almonds.com/ResearchDatabase
- 2016 - 2017 Annual Reports (16-STEWCROP7-Gaudin-Dahlke) on the web at Almonds.com/ResearchDatabase