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DEVELOPING COVER CROP SYSTEMS FOR ALMOND ORCHARDS

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WINTER COVER CROPS ARE NOT FREQUENTLY PLANTED IN CALIFORNIA ORCHARDS



- Risk of frost
- Increase in water usage
- Issues at harvest
- Additional difficulties in management
 - Weed control
 - Winter sanitation
 - Vertebrate pest management
- Cost and uncertainties of economic return
- Lack of information on cover crop management (species, planting dates, termination...)



Resident vegetation is common
Clean berms, unmanaged middles
Mowed during bloom
Allowed to die or terminated prior to harvest

.....DESPITE POTENTIAL BENEFITS

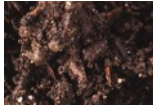
- Build up of organic matter and healthier soils
 - Decrease compaction
 - Improve aggregation/infiltration
 - Conservation of precip water -iWUE
 - Earlier field access
 - Dust reduction
- Pollinator health
- Management of problematic weeds
- Management of soil born pests

BENEFITS



OUR OBJECTIVES AND MAIN RESEARCH QUESTIONS

#1 : develop feasible and practice winter cover crop systems for almond growers which maximize agronomic benefits and reduce operational concerns



What levels of C and N capture and increased in **soil health** may be provided by common cover crop mixtures or natural vegetation during the winter?



Do cover crop **use or help conserve** water in our climate?



How does it impact soil and surface temperature and **frost risk** at blooming?



Can cover crops be used to deter soil born-pests such as **nematodes**?



Do cover crop impact weed pressure and help **control noxious weeds**?



What is the impact on **pollination** of almond orchards?

How to best manage cover crops to maximize benefits?

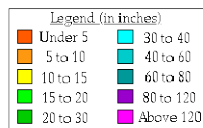
STUDY SITES ACROSS RAINFALL GRADIENT

Temp/FROST
MONITORING
Soil, surface and tree

Glenn Country

Average Annual Precipitation
California

Copyright 2000 by Spatial Climate Analysis Service,
Oregon State University



Castle Farm
Merced County

TERMINATION
DATES
*Before bloom or
summer*

Valley Pride Farming
Fresno County

Wegis & Young
Kern County

Kearney experimental station,
Fresno County

NEMATODE
SUPPRESSION
Infected orchard

COMPACTION
*Compare to
ripping*

4 treatments, replicated designs

PAM "Pollinator mix"

*Bracco White Mustard, Diakon Radish, Nemfix Yellow
Mustard, Common Yellow Mustard, Canola*

"Soil mix"

*Bracco White Mustard, Diakon Radish, Merced
ryegrass, Berseem clover, Common vetch*

Perennial resident vegetation

Bare soil

Conventional herbicide control

WHERE ARE WE AT?

- 1st field season – 3-year study
- All sites recently planted

Measurements

- Cover crop establishment and biomass (C/N inputs)
- Soil health parameters (including aggregation, compaction, OM, salinity...)
- Soil food web and macro fauna
- Winter water dynamics and storage (neutron probes), tree water status in the spring (SWP)
- Weed pressure and species
- Flower visitation by pollinators
- Yields



GROWER SURVEY – WE WANT TO HEAR FROM YOU

Online



2017 California-wide
Almond Orchard - Cover Crop Survey

English

Welcome!

This survey is part of a UC Davis research project in collaboration with the University of California Cooperative Extension and the Almond Board of California. The objectives are to obtain baseline data on cover-crop use in almond orchards and to identify the most important benefits and concerns of growers about this practice. Data will be used to guide research and extension activities. This survey is anonymous and voluntary. There is no incentive nor compensation for taking this survey.

Who can take this survey?

1. Individuals involved in almond farming
2. Farmers with 1 acre or more of almond trees
3. Both users and non-users of cover crops

Time needed: 10 minutes

Will my information remain confidential?
Yes. To ensure this, please do not include personal information (names, addresses...) in the comments sections.

Do I have to answer all questions?
No. However, surveys with more than 10% incomplete responses will not be used in our study.

Completion and submission of the survey indicates your consent to participate in this project.

For further information or if you have questions or concerns, please contact the project director:
Amélie Gaudin, Ph.D.
University of California, Davis
agaudin@ucdavis.edu

https://ucdavis.co1.qualtrics.com/jfe/form/SV_3UepPhXFE82Qv55

Paper – mail / available here

Zoom level. Click to open the Zoom dialog box.

2017 California-wide Almond Orchard - Cover Crop Survey

Is almond farming your primary activity? ☐ Yes ☐ No
Do you have 1 acre or more of almond trees? ☐ Yes ☐ No
Are you involved in agronomic decisions? ☐ Yes ☐ No
If you answered "Yes" each time, you're invited to complete this survey!

PART I: Cover cropping opportunities

How knowledgeable are you of cover cropping in almond orchards?
☐ Not at all ☐ Somewhat knowledgeable ☐ Very knowledgeable
Have you previously considered using cover crops in your orchard?
☐ Yes ☐ No

In your opinion, are cover crop benefits mostly:

- ☐ Agronomic: organic matter, reduces dust...
- ☐ Operational: earlier field access...
- ☐ Economic: reduces input expenses, positive economic returns...

In your opinion, which of the issues are most improved by cover cropping?

	Not improved	Somewhat improved	Most improved
Tree nutrition	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Allows earlier field access	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Pollinator habitat	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Weed control	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Water retention	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Soil health (organic matter, less dust)	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Soil biodiversity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Post nematode control	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

About this survey:
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The survey is also available online at the following link or QR code:
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PROJECTED PROJECT OUTCOMES



- Regionalized and updated data relevant to a large number of grower
- Systems approach to help you evaluate benefits and potential tradeoffs in your system/region
- Strong basis to start optimizing cover crop mixes and management according to your objectives



THANK YOU

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