Technical Program Update:
Selecting and Managing Vineyard Cover Crops to Reduce Water Use

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A decline in the Paso Robles Groundwater Basin since 1997 has increased awareness in water conservation practices by agricultural producers relying on ground water for irrigated crops. Almost all of the annual rainfall in the Paso Robles AVA falls during the winter, and is essential for recharging basin reserves, contributing to plant available water, and leaching salts in soil. There is a strong desire for grape growers in the basin area and beyond to improve rainwater retention and reduce water consumption. Cover crops are commonly planted in vineyards as a means to improve water infiltration from winter rain events, while preventing erosion and building organic matter in soil. However, the cost of those cover crops in terms of water use us not well understood in the Central Coast.

A cover crop of barley seeded between vine rows reduces erosion from winter rain.

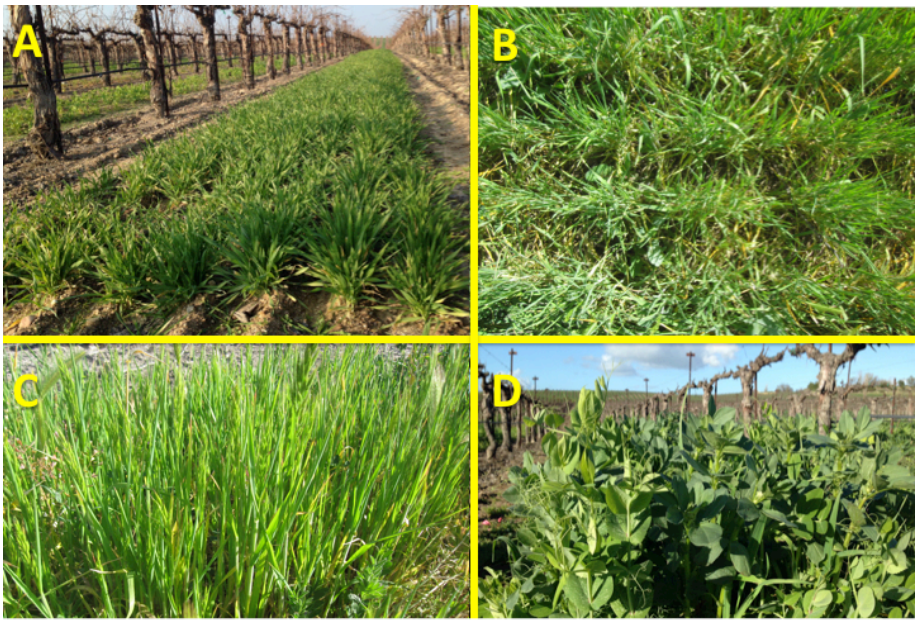
Water loss through evapotranspiration by cover crops has been investigated in other winegrowing regions. For example, mowing of inter-row fescue cover crop reduced evapotranspiration by 35-49% immediately after mowing, with a 20% reduction still in effect 19 days after mowing (1). In another study, vineyard cover crops allowed to complete their growth cycle (vetch & ryegrass) consumed more water (75mm in 36 days) than those stunted with herbicide just before bud break (3). The residue remaining from a dormant cover crop has also been shown to reduce evaporative losses of soil water in the spring. Cultivated soil between vine rows lost 21.6% more water than those with cover crop mulch residues and water conservation was observed in the surface soil, as well as in the subsoil (3).

Data driven protocols for cover crop management with the goal of water conservation have not been developed in the Paso Robles AVA. Grant funding from Western Sustainable Agriculture Research and Education (WSARE) was awarded to the Vineyard Team for a 2-year study to evaluate cover crop species and management of grass cover crops to reduce net water consumption.

This project is maintained in collaboration with five producers to determine how to best implement cover cropping practices in vineyards while minimizing consumption of stored winter rainwater and improving moisture available to vines, ultimately conserving water in the Paso Robles Groundwater Basin.

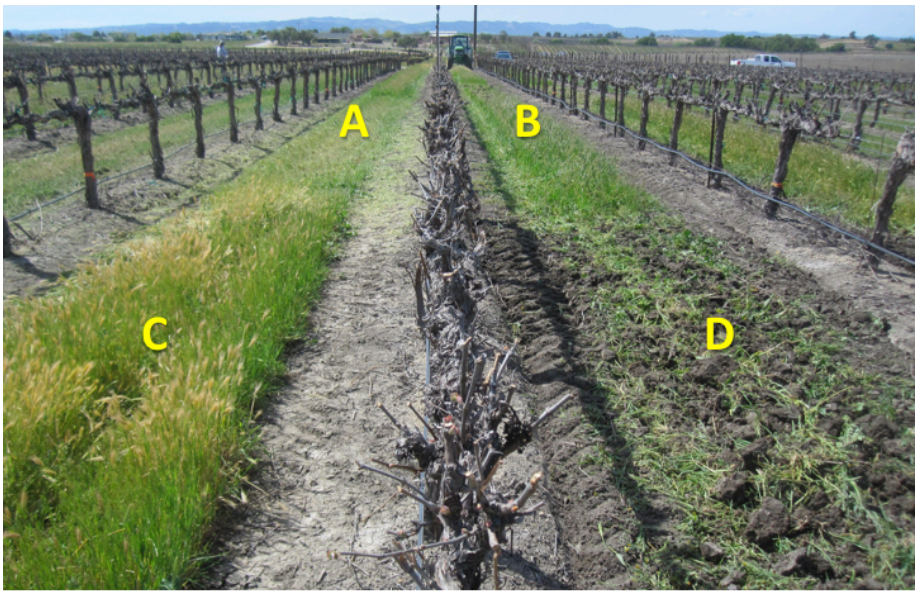
Project Objectives

1) Evaluate cover crop species for their impact on water infiltration, soil moisture retention, and use of plant available water in the vineyard (2015-2016). Cover crop species will be compared to a non-cover cropped control in 3 grower sites using a randomized complete block design with three replicate treatments per block, on a 0.5 acre experimental block per site.



Cover crop varieties evaluated at 3 vineyard sites in Paso Robles area: A) Triticale "Trios" B) Brome "Blando" C) Barley "UC937" C) Field Pea. Clean cultivation not shown.

2) Evaluate treatments to suppress and terminate grass cover crops and their impact on water infiltration, soil moisture retention (2015-2016). Treatments to suppress or terminate a cover crop include mowing (2 timings), disking, and chemical mowing. A clean cultivation soil treatment and a no-till mow treatment will serve as grower controls (common practices of producer cooperators) at 3 vineyard sites.



Experimental plot showing 4 of 6 treatments at bud break including A) Mow seeded grass at bud break, B) Mow seeded grass 30 days after bud break, C) No-till, resident reseeding - mow at seed maturity/bud break, and D) Disk seeded grass at bud break.

3) Perform Economic evaluation of vineyard floor management practices and document financial return on investment in terms of potential water savings. Volumetric soil moisture will be measured at two depths in three replicate treatments per site. Shoot biomass will be measured for each cover crop.

Cover cropping is considered to be an environmentally beneficial practice resulting in improved water infiltration, reduced rainwater runoff and soil erosion, reduced nonpoint source pollution, and increased soil organic matter, fertility, and carbon sequestration. Growers have already responded to recent drought by reducing or eliminating planting of cover crops, with unknown consequences to future soil stability and fertility. Others have terminated the cover crop by mowing or applying herbicides, but with no information regarding the effectiveness of these treatments on water use. Treatments to terminate or suppress cover crops in this study will include a balance of methods adoptable by both conventional and organic or sustainably certified vineyards. Vineyard floor management practices evaluated in this study will also have the potential to transfer over to other crops in terms of soil moisture conservation from winter rains.

Disking in Blando Brome cover crop before bud break on the east side of Paso Robles.

Literature Cited

1. Centinari, M., Filippetti, I., Bauerle, T., Allegro, G., Valentini, G., and Poni, S. 2013. Research Note. Cover Crop Water Use in Relation to Vineyard Floor Management Practices. Am. J. Enol. Vitic. (in press).

2. Ruud, N. and Sorensen, P. 2010. Paso Robles Groundwater Basin Water Balance Review and Update. Prepared for: County of San Luis Obispo, Department of Public Works. Fugro West Inc. Proj. No. 3014.036

3. Van Huyssteen, L, Van Zyl, J. L., and Koen, A. P. 1984. The effect of Cover Crop Management on Soil Conditions and Weed Control in a Colombar Vineyard in Oudtshoorn. S. Afr. J. Enol. Vitic., Vol. 5. No. 1.