

Cover Crops to Reduce Water Use

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Declines in the Paso Robles Groundwater Basin and several years with very little rain have increased awareness of water conservation practices in vineyards. Cover crops can improve water infiltration from precipitation while also preventing erosion and building organic matter in soil. However, the cost of those cover crops in terms of water use is not well understood on the Central Coast. In 2014 grant funding from Western Sustainable Agriculture Research and Education (Western SARE) 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.

The Experiments

This project consists of two experiments:

1. Measure the effect of five species of cover crop (plus clean cultivation as a control) on soil moisture.
2. Measure the effect of six different techniques and timings of cover crop termination on soil moisture.

Each experiment was replicated at three sites on the east side of Paso Robles, with randomized complete block design.

EXPERIMENT 1	EXPERIMENT 2
Cover Crop Comparison	Cover Crop Termination
Clean cultivation	Clean cultivation
Barley (UC 937)	No till, mow after seed set
Medic (Paraggio)	Mow at bud break
Triticale (Trios 888)	Mow and disk at bud break
Brome (Blando)	Mow 30 days after bud break
Peas (Dundale)	Chemical mow at bud break

Methods and Materials

Cover crop seed for both Experiment 1 and Experiment 2 were planted in November of 2014 and 2015. Helena Chemical Company generously donated the seed, the labor, and the expertise for planting the cover crops in both 2014 and 2015. In late April of 2015 and May of 2016 soil samples were collected from 18" and 36" below the soil surface in the experimental plots. Plant material was also collected to see if there were differences in the amount of biomass produced by either the species of the cover crop or the termination method of the grass only plots. Both years the soil and plant samples were



Experimental treatments being executed in mid-March 2016. Early mow treatment on right; Early mow and disk treatment on left.

processed at Cal Poly SLO. The gravimetric soil moisture content and the dry matter biomass of the samples were determined and datasets for analysis was created. Pruning weights were taken in January 2016 in each experimental plot to determine if the different treatments had any effect on vine growth during the 2015 season. Each site (vineyard) was a complete experimental design in and of itself which allowed comparisons to be made between sites.

Results

1. In both 2015 and 2016, the different timings and manners of terminating the cover crop (mowing, disking, etc.) did not produce differences in soil moisture depletion. There were no statistically significant differences between the treatments. This was true at all three sites where Experiment 2 was performed.

2. In both 2015 and 2016, the different species of cover crops planted did not produce differences in soil moisture depletion. There were no statistically significant differences between the treatments. This was true at both sites with data from 2015 and 2016.

3. Pruning weights showed that the different experimental treatments did not produce differences in vine growth during the 2015 season. This was true for both experiments and at all sites.

Discussion

The timing and manner of terminating a cover crop in a vineyard does not appear to affect soil moisture. This is



especially interesting given that one of the treatments was clean cultivation. One would expect less soil moisture in plots where a cover crop was grown compared to plots with no surface vegetation in the vineyard middles. This was not the case, suggesting that the presence of a cover crop in a vineyard middle during the winter and spring months does not increase the quantity of water that must be supplied to vines through irrigation.

The species or type of cover crop in a vineyard does not appear to affect soil moisture. This is also interesting given the variety of species include in the experiment. Grasses and legumes are very different types of plants with different rooting patterns, etc. One would expect some difference soil moisture depletion between types. This was not the case, suggesting that the species of cover crop in a vineyard middle during the winter and spring months does not have an impact on soil moisture depletion.

It is hard to ignore these findings when this was the case for both years at all sites.

One factor which could have affected this experiment is the lack of rainfall during the winter of 2014- 2015 and again during the winter of 2015-2016. If more water had been available during the growth of these cover crops, differences between the treatments might have been observed. Additional data must be collected in seasons with higher rainfall to

Left: Pruning weights being taken December 2015.

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