Variable soil health response from an emerging perennial cover crop in almond orchards

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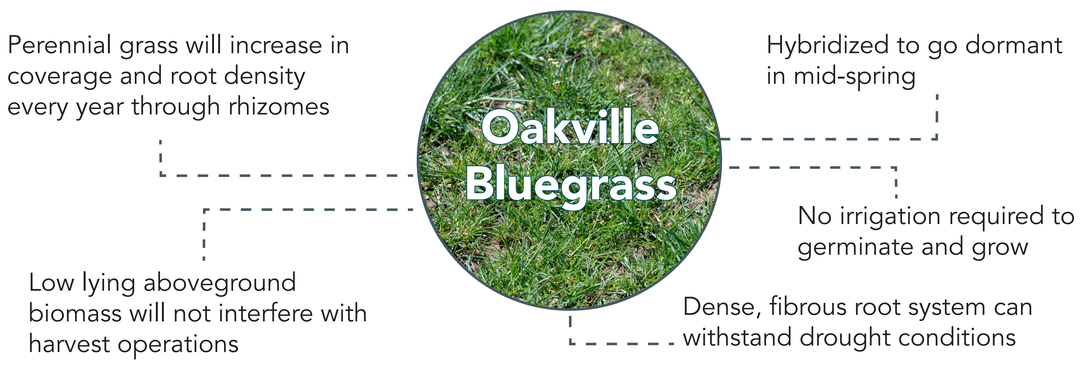
Perennial Cover Cropping

Only 5% of farmland is cover cropped in California[1], a key practice for boosting soil health[2]. Management timing, yearly costs, and resource competition with cash crops continue to act as barriers to adoption, and concern over the consumptive water use is mounting throughout the state[3].

A novel cover crop, Radix *Poa bulbosa*, called **Oakville Bluegrass**, is a hybrid perennial grass that has been optimized for orchard systems[4]. This study examines the cover crop's unknown impact on soil health.



Field Trial Design

We partnered with three working almond orchards in the Central Valley to implement a trial of Oakville Bluegrass on a range of soil textures under a climatic gradient. The cover crop was planted in the fall of 2023 in a block design on each orchard. Physical soil health and soil carbon were assessed at peak cover crop growth in the orchard alleys in spring of 2024.

Reach out to participate in our cover crop trials!

Site Descriptions
Site 1 - Gravelly loam (44.6% Sand, 35.4% Silt, 20% Clay)
Site 2 - Loamy sand (77.5% Sand, 15.7% Silt, 6.8% Clay)
Site 3 - Loam (42.6% Sand, 43.5% Silt, 14% Clay)

How does Oakville Bluegrass confer soil health benefits in the first year of cover crop establishment?

Physical soil health and soil carbon pools were minimally affected after the first growing season. Impacts on soil health indicators showed different trends across sites, indicating field-specific responses.

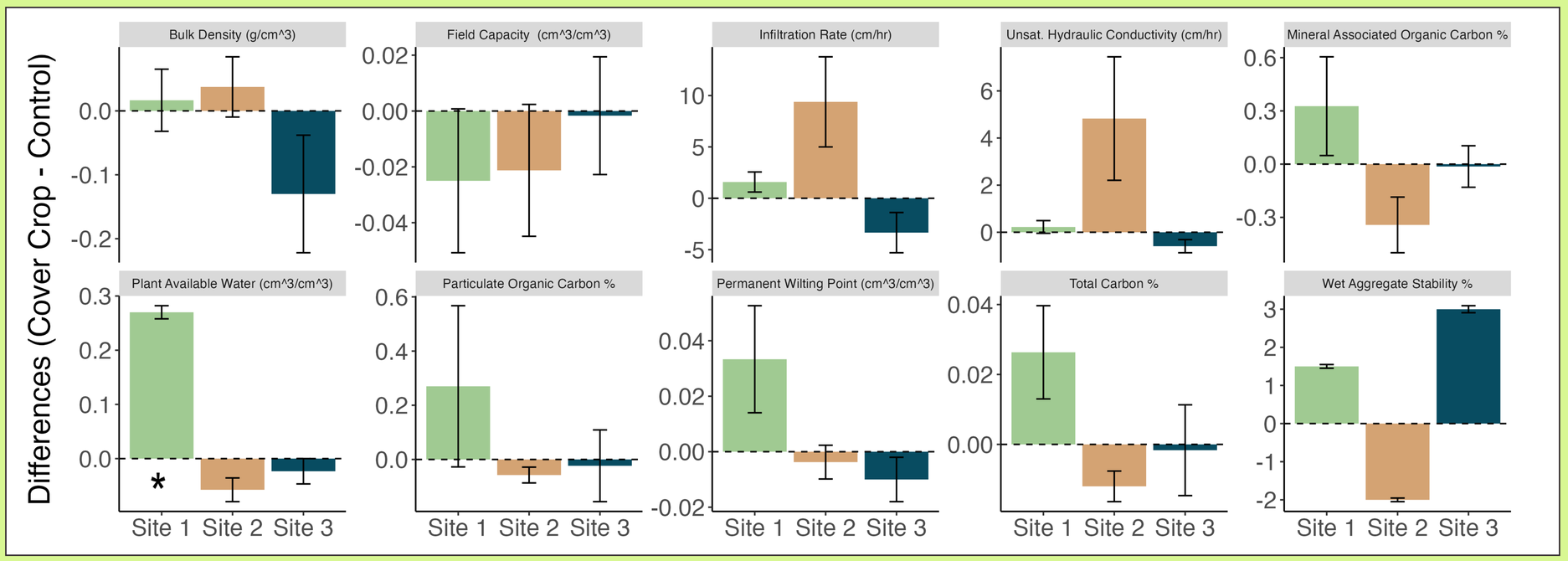


Figure 1. Difference in soil health property means from cover cropping compared to conventional management for each site. Error bars show standard error and significant differences ($P < 0.001$) are denoted with an asterisk.

Cover crop establishment was highly variable across field sites. Growth appeared to depend more on shade cover and soil moisture than latitude and climatic conditions. Resident vegetation was present in most control plots in a patchy distribution.

Figure 2. Photographs of Oakville Bluegrass in cover crop plots at field sites 1, 2, and 3 from left to right taken April 2024.

Field Site	Cover Crop Plots		Control Plots	
	Shoots (kg/ha)	Roots (kg/ha)	Shoots (kg/ha)	Roots (kg/ha)
Site 1	202 ± 47	1670 ± 760 **a**	135 ± 135	213 ± 198 **b**
Site 2	546 ± 156	1277 ± 625	712 ± 496	405 ± 452
Site 3	736 ± 230	442 ± 383	1000 ± 81	344 ± 116

Table 1. Dry biomass (mean ± SD) for cover crop and control plots at each field site. Significant differences in biomass between groundcover practice are denoted by lowercase letters ($P < 0.05$).

Takeaway

Effects of cover cropping with Oakville Bluegrass were weak. In a highly disturbed orchard alley with frequent equipment traffic, soils may take multiple years to see improvements. Despite presence of resident vegetation under conventional management, belowground biomass of the cover crop was greater than resident vegetation in two of the three sites. Establishment of the cover crop root system is the first step in improving soil conditions.

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ACKNOWLEDGEMENTS: This project is supported by the USDA Natural Resources Conservation Service through a Conservation Innovation Grant. Support also comes from the National Institute of Food and Agriculture, U.S. Department of Agriculture, under award number G260-24-WA509 through the Western Sustainable Agriculture Research and Education program under project number GW24-005. Thank you to our collaborators at Vitidore, Inc. for the installation and technical expertise of Oakville Bluegrass.