



THE EFFECTS OF PERENNIAL COVER CROP MANAGEMENT ON SOIL TEMPERATURE AND VINE WATER STATUS

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Abstract:

Context and purpose of the study- The implications of perennial cover crop management on vine vigor and yield have been well documented. However, whereas multiple studies show that cover crop management affects grapevine dry matter production, water, and nutrient status, the specific effects of a new hybrid perennial cover crop on soil temperature and its relationship to vine water status in vineyards has not been explored. This study will compare 3 different perennial cover crop combinations and tillage practices with a no-till seeding of a new hybrid perennial, *Poa bulbosa* (Pb).

Materials and methods- Different perennial cover crop combinations and soil management (disked vs not disked) practices were evaluated in 3 different vineyards. Cover crops included *Poa bulbosa*, (Pb), a blend of Blando brome, Zorro fescue and clover, and native grasses that were seeded in vineyards of Cabernet Sauvignon (Site 1, disked 50%), Zinfandel (Site 2, no-till), and Chardonnay (Site 3, no -till) growing on a Bale clay loam soil. Vine spacing included 4 x 12 (Site 1) ft, 4 x 5 ft (Site 2) and 4 x 6 ft (Site 3), with vines trained to a quadrilateral (Q), single high wire (SHW) or cordon and spur (CS) pruning respectively. Soil temperature (T) probes were installed at the 5 cm and 12.5 cm depths in the control and Pb treatments. Max, min, and average soil T and air temperatures were recorded every 15 minutes from June until September. Vine stem water potential measurements were taken every two weeks from June until September.

Results- From June until September soil avg temperatures (T) were lower at the 5 cm and 12.5 cm depths under the Pb cover than the control native covers at Sites 2 and 3 and higher at Site 1 (50% disked). The minimum T and maximum T varied across sites and depths with all cover crop combinations from June until September. Vine stem water potentials were similar in control vines at Site 1 (50% disked) and in the Pb treatment from June until September, and higher in vines in the Pb treatment in Site 2 (no-till) and Site 3 (no-till) compared to the native control covers. The implications for manipulating soil temperature using cover crops in response to climate change and their effect on vine production will be discussed.

Keywords: Cover Crops, *Poa bulbosa*, Vineyards, Grapevines, Water Status, Nitrogen, Soil temperature, Carbon Sequestration.