COVER CROP AND TILLAGE EFFECTS ON A MATURE SAN JOAQUIN VALLEY VINEYARD

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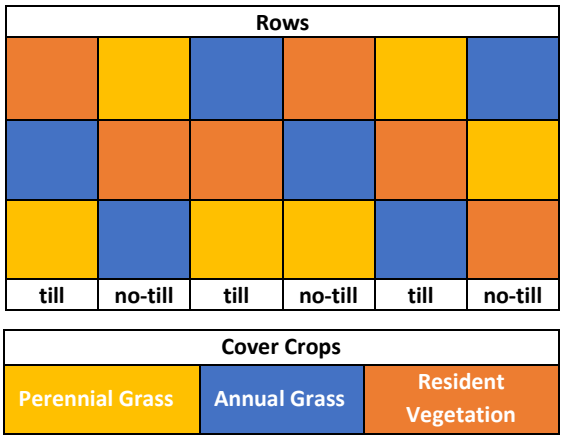
Results from a 2-year study suggest that implementation of cover crops and no-till systems have negligible effects on grapevine physiology, soil characteristics, and do not affect yields in mature vineyards in the San Joaquin Valley. It may not be economically feasible to implement permanent cover crops in vineyards

The experiment included two levels of tillage (till and no-till) combined with 3 different cover crops: an annual grass (barley), perennial grass (Poa bulbosa hybrid) and resident vegetation (weeds) for a total of 6 treatments.



Results

Grapevine Physiology

No changes to vine nutrition status at bloom were observed in either year. There was also no effect on vine gas exchange. In early spring 2020, the perennial grass cover crop improved plant water status (-0.88 bars) compared to resident vegetation (-12.0 bars) and annual grass (-11.8 bars). However, this effect did not hold throughout the season, nor was it repeatable again in 2021. There was no effect of tillage on plant water status.

Yield and Yield Components

No changes were observed among yield, yield components (cluster weight and leaf area to fruit ratio), nor berry chemistry (Brix, pH, and titratable acidity (TA)) in 2020. Differences between years were observed among Brix, TA, and total anthocyanin content. However, this is likely a function of harvest time as the 2021 crop was harvested 3.5 weeks earlier than in 2020.

Non-structural carbohydrates (Fructose, glucose, and raffinose) from dormant wood was analyzed. In 2020, raffinose content was significantly lower under no till treatments. Decreased raffinose may indicate lower degree of stress pre-dormancy in no till treatments. 2021 results are pending.

Soil Total Organic Carbon and Soil Microbiome

Tillage decreased total organic carbon in the upper 0-15 cm of the soil (1.5% under no-till, 1.4% under till). There was no effect of cover crop or tillage on the number of species of soil microorganisms nor changes to the network structure. However, network transitivity, the measure of the degree to which nodes in the network cluster together, increased more under till treatments compared to no-till. This could be a result of drastic reconnection responses after the physical disruption to the soil as opposed to no-till settings where connections remain stable. Likewise, no-till treatments displayed a decrease in carbon and nitrogen cycling pathways in the soil as well as phosphorus and potassium concentrations.