

CHARACTERIZATION OF SOIL MICROBIAL COMMUNITIES AND THE INFLUENCE OF VINEYARD COVER CROPS

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Abstract

Vineyard cropping levels and associated fruit quality are tied to vineyard soil characteristics such as texture and availability of minerals, water, and nutrients. ‘Healthy’ vineyard soil contains the appropriate nutrients in sufficient quantities, and there is increasing evidence that soil microbial communities play a vital role in maintaining this balance. Of particular importance are the organisms that produce or release nutrients that will become bioavailable for vines. Without adequate populations of these important soil organisms that produce nutrients from the atmosphere or soil organic material, the use of chemical fertilizers becomes necessary. The long-term benefit of understanding the composition of soil microbial communities and their function in a specific soil system can allow viticulturists to reduce the use of chemical fertilizers and adopt more environmentally sustainable practices in the management of vineyards. The implementation of cover crops is a common practice used to improve vineyard soil structure and organic matter. The main objective of this research is to characterize vineyard soil microbial communities throughout the growing season, and to assess the influence of cover crop cultivation on microbial species presence and abundance. This study utilizes DNA-sequencing of a single gene in the soil metagenome, as well as chemical tests, to compare the impact of a clover and of a pea-based cover crop to that of native ground-cover on the soil microbial community and soil characteristics. Determining the role of cover crop selection on soil microbial populations will help to provide viticulturists with recommendations for ongoing sustainable management practices targeted to maintain and improve soil health.

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