



Managing soil health in vineyards: knowns and unknowns

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Abstract:

Context and purpose- The use of soil conservation practices in wine grape production is becoming common throughout the world in response to an increased awareness of the value of soil health to maintain crop productivity and environmental quality. However, little information is available on the meaning of soil health within a viticultural context, and what soil properties should be targeted to achieve both the agronomic and environmental goals of wine grape producers. Conservation practices lead to increases in soil organic matter which may improve soil water retention, and increase soil C content therefore constituting a potential avenue to adapt to droughts and sequester C. Well-known management practices such as the use of cover crops, compost or no-till, although effective, seem to result in highly variable outcomes in soil organic matter and other soil health indicators. This variability is likely associated to the application of the practices in different soils and climates. Thus, integration of soil health building practices needs a thorough understanding of their efficacy under different conditions. Furthermore, additions of soil organic matter could trigger emissions of CO₂ and N₂O, a potent greenhouse gas that could represent a potential tradeoff of soil conservation practices. Finally, nutrient and water availability may be affected by the increase in soil organic matter having consequences for vine balance and grape quality.

Material and Methods- Over the course of six years we performed a survey to winegrape growers in different regions in California to understand their perception and definitions of soil health. Furthermore, we carried out a series of field trials at commercial vineyards in California where we tested the effects of different soil conservation practices on soil health, greenhouse gas emissions, vine yield and grape quality.

Results- This presentation will provide an overview of recent research carried out in close collaboration with the wine grape industry to provide a better definition of soil health that is specific to this crop. Furthermore, the efficacy of conservation practices to build soil health relative to potential tradeoffs, such as the emissions of greenhouse gasses or reductions in grape quality, will be evaluated. Finally, the stacking of practices will be discussed as an avenue to maximize benefits to soil health and reduce environmental tradeoffs, as proposed in the framework of regenerative farming.

Keywords: Grapevine, cover crops, compost, no-till, C sequestration, greenhouse gas emissions, sustainability.

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