DIVERSITY OF ARBUSCULAR MYCORRHIZAL FUNGI ON GRAPEVINE ROOTS ACROSS AN EDAPHOCLIMATIC GRADIENT

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Abstract:

Challenges associated with climate change, such as soil erosion and drought, have impacted viticulture across wine regions globally in recent decades. As winegrowers struggle to maintain yield and quality standards under these conditions, methods to adapt to and mitigate the impacts of climate change have become more prevalent. One potential mitigation strategy is to enhance symbiotic interaction of grapevine roots with arbuscular mycorrhizal fungi (AMF). The symbiotic association between AMF and grapevine roots can increase nutrient availability, soil health, and water use efficiency by improving soil aggregation, aeration, and permeability, while limiting soil organic matter degradation. However, little is known whether the benefits of AMF colonization and diversity may be altered by soil type, rootstalk, and scion. The goal of this research is to survey 12 vineyards across an edaphoclimatic gradient extending from the Willamette Valley (Oregon) to Santa Maria (Central California) to identify AMF colonizing communities. This study aims to gain an understanding of how the AMF abundance and diversity are influenced by different soil types, rootstocks, and scions. The AMF communities and diversity were evaluated by amplifying mycorrhizal DNA in grapevine roots. Fungal community abundance was determined by clearing and staining grapevine roots with trypan blue. We hypothesized that AMF diversity and abundance vary across the edaphoclimatic gradient with greater AMF abundance and diversity occurring in California, which whose soil properties (i.e., texture, pH, and plant-available nutrient concentrations) promote grapevine root symbiosis. This research provides valuable insight into AMF communities across diverse wine-growing regions to improve regenerative agriculture management in vineyards. Future research will focus on assessing the influence of regenerative agriculture management practice on AMF colonization and diversity in grapevines.

Keywords: Climate change, AMF, Vineyards, Rootstock, Sustainable viticulture, Soil health, Microbial terroir