INFLUENCE OF SOIL PHYSICAL AND CHEMICAL PROPERTIES ON FUNGAL AND BACTERIAL COMMUNITIES IN 12 VINEYARD SOILS FROM NORTHERN ITALY

M. Zanardo[1], F. Stellin[1], F. Gavinelli[2], S. Fusaro[2], D. Sommaggio[2], R. Rosselli[2], M. Pindo[3], N. La Porta[4], G. Concheri[1], M.G. Paoletti[2], A. Squartini[1]
[1]DAFNAE Department of Agronomy Food Natural Resources Animals and Environment, University of Padova, Legnaro (PD), Italy
[2]Department of Biology, University of Padova, Padova, Italy
[3]Department of Genomics and Biology of Fruit Crop,
IASMA Research and Innovation Centre Fondazione Edmund Mach,
San Michele all'Adige (TN), Italy
[4]Sustainable Agro-Ecosystems and Bioresources Department,
IASMA Research and Innovation Centre Fondazione Edmund Mach,
San Michele all'Adige (TN), Italy

Background

Soil chemical and physical properties, which are determined both by pedo-climatic factors and by management, can significantly influence microbial communities.

Objectives

Scope of this work was to assess whether given features can specifically influence defined microbial taxa in a man-managed environment such as the vineyard.

Methods

Soil samples were collected in 12 vineyards located in two neighbouring groups of hills, both renowned in Italy for their wines: the Euganean Hills, whose soils are of prevalent volcanic origin, mainly from trachyte and riolite rocks, and the Berici Hills, with a marine sedimentary genesis, mainly from clay-limestone. Soil bacterial and fungal communities were determined through 16S and ITS 454 pyrosequencing analysis, their relative taxa abundances were calculated and their levels of correlation with soil characteristics were tested.

Conclusions

In order of abundance, the dominant bacterial taxonomic groups across all samples were Actinobacteria, Alphaproteobacteria, Acidobacteria, Bacteroidetes, Betaproteobacteria, Chloroflexi, Gemmatimonadetes, Planctomycetes,

Deltaproteobacteria, Gammaproteobacteria. Among fungal phyla, Ascomycota largely dominated followed by Basidiomycota. Prevailing fungal classes were Dothideomycetes, Sordariomycetes, Agaromycetes, Leotiomycetes, Eurotiomycetes and Tremellomycetes. Some of these taxa and less abundant microbial groups were found to be significantly influenced by soil pH and texture. Moreover, a considerable number of significant correlations were found between the relative abundance of microbial taxa and the amount of several different chemical parameters such as total carbon, nitrogen, phosphorus, exchangeable bases and microelements.

This study provides novel insights into how soil structure and management can affect soil microbial community composition.