Influence of soil factors on the microbiome of Rendzic Leptosols chronosequence in the Crimean Peninsula

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Pedogenesis depends on multiple factors, such as climate, vegetation, topography, parent material. Some of these factors are zonal, meaning they are determined by climate zone. But some factors are intrazonal, meaning that it has the same impact on soil formation in different climate zones. One example is parent material. The other peculiar feature of a parent material is that it determines the rates of pedogenesis. In this regard, Rendzic Leptosols – are intrazonal slowly developing soils formed on a limestone bedrock. In this study we approached the dynamics of microbiome formation in a chronosequence of these soils collected in Crimean Peninsula using analysis of 16S rRNA gene libraries and quantitative PCR. The chronosequence included benchmark soil, 700 year-old soil from the ancient city of Eski-Kermen, 70 year-old soil from WWII trenches and 50 year-old soil from the open quarry screenings. Our research demonstrated that soil type on a limestone rock is the driving force behind microbiome shaping, without any apparent influence of its age. Dominant phyla for all soil sites were Actinobacteria, Proteobacteria, Acidobacteria, Bacteroidetes, Thaumarchaeota, Planctomycetes, Verrucomicrobia and Firmicutes. Alpha diversity was similar across sites and tended to be higher in topsoil. Beta diversity showed that microbiomes diverged according to the soil site and the soil horizon. CCA analysis, in combination with PERMANOVA, linked differences in microbiomes to the nutrients associated with the soil horizon, and our analysis showed that the reactive component of the soil microbiome shifted simultaneously in both soil horizons between different soil sites.