Prokaryotic communities in Patterned Grounds in North-western italian Alps: Influence of lithology on small-scale distribution.

Roberta Gorra*, Michele d'Amico, Ilaria Mania, Michele Freppaz

DISAFA, University of Turin, via Leonardo da Vinci 44, 10095 Grugliasco (TO), Italy

Patterned Grounds (PG) are formed on permafrost soils as a result of cryoturbation. The mixing, heaving, and churning of soil that occurs during freeze-thaw cycles form stripes, circles, polygons and nets with and without visible surface textural sorting. They occupy small flat surfaces and show quite different morphologies in relation with the lithology of the parent material. The parent material lithology is important in the formation and development of different PG features, thanks to different resistance to physical weathering leading to sorted or non-sorted patterns (the latter often associated with easily weatherable materials). Although many studies have described PG features and their formative processes, the important role that they play in controlling soil properties has only recently been recognised and abundance and distribution of microorganisms has not yet been considered. Prokaryotic communities that develop in these ecosystems may play important roles in nutrient availability and stabilization of organic matter and therefore in plant colonization and ecosystem evolution.

In this study, we assessed small scale distribution of prokaryotes in PGs, in terms of abundance and diversity, from four areas in the Graian Alps (North-western Piedmont and Valle d'Aosta Region). Multiple sites were chosen in order to evaluate influence of different lithotypes on spatial distribution of microbial communities. Denaturing gradient gel electrophoresis (DGGE) and quantitative real-time PCR (qPCR) approaches were used to assess respectively molecular diversity and abundance of *Bacteria* and *Archaea*.

Results indicate that PGs are habitats composed by different ecological niches that allow the growth of phylogenetically and metabolically diverse prokaryotic groups. Abundance of microbial population shows a clear spatial distribution that is correlated to organic matter and influenced by lithology of parent material. These first results seems to confirm the important role of prokaryotes in nutrient cycling but, above all, in evolution of PG soil ecosystems.