FARMING SYSTEM AFFECTS SOIL MICROBIAL COMMUNITIES IN VINEYARD

Corneo P.E.[1], Gamba U.[2], Giovannini O.[1], Longa C.M.O.[1], Pertot I.[1]

[1]Department of Sustainable Agro-ecosystems and Bioresources, Research and Innovation Centre, Fondazione Edmund Mach (FEM), S. Michele all'Adige 38010, Italy; [2]Centro di Riferimento per l'Agricoltura Biologica (C.R.A.B.), Via San Vincenzo, 48, Bibiana (TO) 10060, Italy

The use of conventional farming system has negative effects on the environment, often leading to a loss of biodiversity. The use of mixture of pesticides for the protection of crops can represent a source of contamination and degradation of the environment. Such a behaviour has been investigated at different biological levels, ranging from the aboveground level (plants, birds, spiders, grasshoppers, predatory insects) passing to the belowground level (ants, soil microorganisms) and under different land use types. On the other hand organic farming relies on the use of a limited range of organically approved pesticides, thus causing less disturbances and favouring higher biodiversity compared to the conventional farming system. However the beneficial impact of organic farming has been mostly observed in the case of annual crops, which usually undergo higher levels of disturbances due to management practices, compared to perennial crops. The effect of the farming system in the vineyard environment has been poorly investigated and the understanding of its impact is fundamental for the maintenance of this economically important agroecosystem.

We selected four couples of vineyards cultivated respectively through conventional and organic farming systems in Piemonte (Italy), a region where viticulture is widespread. Four areas were selected, three in the province of Turin and one in the province of Cuneo. Soil samples were collected during 2011 in April and October, corresponding to spring and autumn season when soil temperature was approximately 12-16 °C. Inside each of the eight vineyards an area of 500 m^2 was selected and soil samples were collected according to a W shaped design. Composite samples from each vineyard were then analyzed by automated ribosomal intergenic spacer analysis (ARISA) an ITS based method to characterize the soil bacterial and fungal community structure inside each vineyard. Multivariate analysis and non-parametric MANOVA (NP-MANOVA) were used to assess the effect of area (A1-A2-A3-A4), soil management (C/O), sampling time and site and the interactions among these factors.

Soil bacterial community was mainly affected by the effect of the area considered and this was due to differences in the physicochemical characteristic of the study area. In particular the area of Cuneo was geographically distant and characterized by differences in the granulometry, pH macro and micro elements that caused differences in the bacterial community, thus overwhelming the effect of the farming system. When considering only the three areas in the province of Turin, the effect of area was absent and an effect of the farming (C/O) was visible (P=0.0386) and not dependent on the sampling time (P=0.3607). In the case of the fungal microbial community an effect of area was present (P=0.0005), while an effect of the farming system was not found (P=0.19) and it was not time dependent (P=0.83). The fungal and bacterial diversity were mainly unaffected by the farming system, while an effect of the area was found.