



## Study of microarthropod communities to assess soil quality in different managed vineyards

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Land use type influences the abundance and diversity of soil arthropods. The evaluation of the effects of different crop managements on soil quality is commonly requested; it can be pursued by means of the determination of communities' structure of edaphic fauna. The development and application of biological indices may represent an efficient mean to assess soil quality.

We evaluated the effect of crop managements (organic and Integrated Pest Management-IPM) in some vineyards in Piedmont (Italy) on soil biota in relation to some physical and chemical characteristics of the soil.

The study was performed in eleven sites, including seven organic and four IPM managed vineyards located in the Costigliole d'Asti area. Samplings were carried out during the winter 2011 and the spring 2012. Soil samples were collected using a cylindrical soil core sampler (3cm diameter x 30cm height): each sample was a cylindrical soil core which was equally subdivided to study arthropod communities at different depth ranges.

Additional samples were collected and analyzed for the following soil physical and chemical properties: texture (sedigraph method), pH (1:2.5 soil/water), total organic carbon (TOC), total nitrogen (NT) and calcium carbonate (dry combustion by CN analyzer). The extraction of microarthropods was performed using the selector Berlese-Tullgren. All specimens were counted and determined up to the order level. The influence of soil properties and of agronomic practices on the abundance of mesofauna was evaluated by multivariate analysis (MANOVA). The biological soil quality was also defined through the determination of biotic indices such as the qualitative and quantitative QBSar (Quality Biological Soil – arthropods), and biodiversity indices such as species richness and indices of Shannon-Wiener ( $H'$ ) and Simpson ( $D$ ).

Overall, more than four thousands arthropods were collected and the highest abundance was in biological management with about 2:1 ratio (biological vs conventional/IPM management). The mites represented about 50% of the arthropodofauna recorded, collembolans 30%, and 20% other microarthropods (Blattaria, Chilopoda, Coleoptera, Diplopoda, Diplura, Diptera, Hemiptera, Hymenoptera, Isopoda, Homoptera, Pauropoda, Protura, Pseudoscorpionida, Psocoptera, Symphyla, Thysanoptera). The mesofauna abundance was affected by the type of management ( $P=0.015$ ) and soil texture ( $P=0.029$ ). At the identification level considered, the biological indices calculated showed no substantial differences between different crop managements ( $H'=1.26$ ,  $D=0.97$  in organic vineyard,  $H'=1.30$ ,  $D=0.89$  in IPM vineyard). The analysis of microarthropod communities by QBSar, however, showed higher values in organic compared to IPM managed vineyards (QBSar 199 vs 98 in 2011 and 205 vs 188 in 2012, respectively) which are close to figures characteristic of preserved soils.