Diversity and abundance of soil Mesofauna population in vineyards related to different soil cover management

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Introduction

Soil Mesofauna plays an important role through their effects on soil organic matter decomposition, nutrient mineralization, and amelioration of the soil's physical properties. Many of them are predators feeding on nematodes and other microorganisms and in turn they are prey for Macroarthropods, thus building a bridge to the Macrofauna and define food webs in soils.

The distribution of soil mesofauna can be influenced by both abiotic and biotic factors above- and belowground. Soil management and vegetation cover influences temperature and moisture of soil, thereby having big influence on the density and diversity of nearly all groups in this particular fauna. The presented work investigates the influence of different cover crop management between as well as below vine rows on the abundance and diversity of soil Mesofauna in vineyards.

Materials and Methods

Within the project "PromESSinG", nine vineyards distributed across Burgenland (Großhöflein, Eisenstadt) and Lower Austria (Krems, Langenlois) were investigated. On each vineyard three different practices for inter-row management were established in 2015 (open ground (BG), alternating ground cover (AC), permanent ground cover (CC) **(Fig. 1)**. Pooled soils core samples (10 times 0-10cm and 2.5cm diameter) were used for Mesofauna extraction with the Berlese-Tullgren method **(Fig. 2)**. Soil samples were collected 2016 and 2017 in three sampling periods (May, June and September)

Figure 1: Inter-row management; BG bare ground, AC alternating ground cover, CC permanent ground cover.
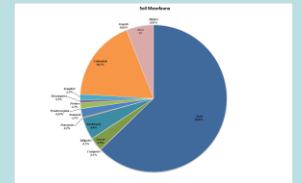

Figure 2: Berlese-Tullgren method.

Figure 3: distribution of Mesofauna species during 2016-2017

Results

- Twenty different taxa were determined. The communities are dominated by Acari and Collembolla respectively accounting for 62 % and 18% of the total number of individuals (Fig. 3). These groups contribute to litter decomposition.
- The abundances of mesofauna communities' differed among the nine vineyards showing the highest values in Dürr (2891) individuals while the lowest value was in Faiglloiser (1126) individuals (Fig. 4). Differences are probably due to eco-climatic zone conditions and to complexity levels of landscape.
- Soil management had significant effects on Mesofauna abundance in all vineyards (Fig. 5). CC inter-rows had higher total abundance of Mesofauna (9070) as BG inter-rows (6287) individuals.
- Highest numbers of Mesofauna individuals were obtained from samples collected in September.
- Influencing factors were determined with RDA analyses (Fig.6): Coleoptera, Nematods and Collembola (Sminthurinae) abundance showed a relation to AC and BG management but the strongest influences seems to be the sand content in the soil. Protura, Diptera larvae, Pauropoda, Diplura, Hymenoptera, and Collembolla (Entomobryidae; Neelidae; Poduromorpha) were associated with CC treatment and amount of clay and silt in soil. While Acari and most of others taxa were most closely associated with N_tot.
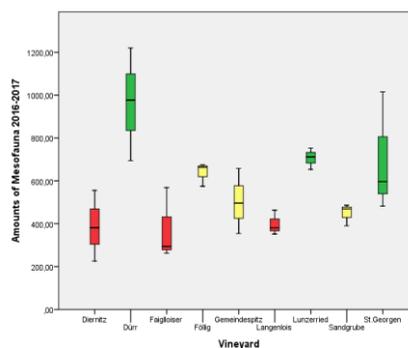

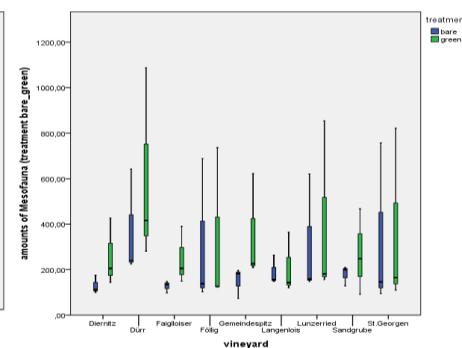**Figure 4:** Total mesofauna abundance in studied vineyards.

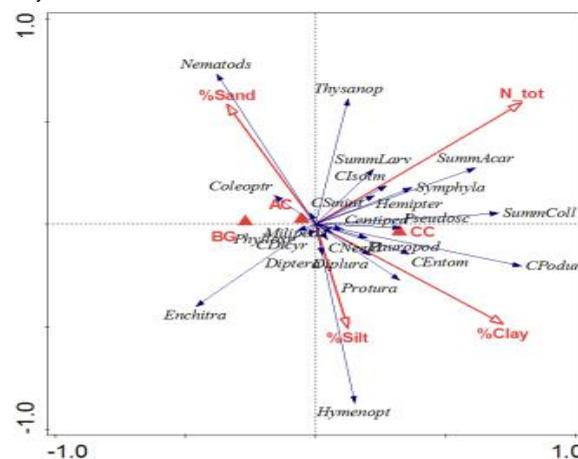**Figure 5 :** Mesofauna abundance in vineyards and treatments

Figure 6: RDA analyses. Relationships between the soil Mesofauna species and the environmental variables