



Effect of tillage intensities on predator-prey interactions in vineyards from different landscapes: the case of spiders and springtails

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Ecosystem services provided by vineyards and viticultural landscapes result from interactions between management intensity, soil properties and organisms inhabiting this agroecosystem. Often vineyards are surrounded by more or less heterogeneous landscapes which might alter ecological interactions at the plot level. However, there is actually very little known to what extent management and/or landscape factors influence the abundance and diversity of soil biota or predator-prey interactions in vineyards. In this study we examined (i) to what extent different soil tillage intensities of vineyard inter-rows affect the activity and diversity of spiders and collembolans and their interrelations and (ii) whether and how the surrounding landscape structure/diversity is altering these interactions. We collected data in inter-rows of 16 commercial vineyards in Austria, eight of which were periodically mechanically disturbed, eight had permanent green cover. Vineyards were embedded in landscapes ranging from structurally simple to complex. Both spiders and collembola were collected with pitfall traps; vegetation surveys included plant species diversity, and vegetation cover. Landscape complexity and configuration surrounding the study vineyards within a radius of 750 m was assessed by field mapping using a geographical information system. Data were analysed with generalized linear mixed models. Results showed that soil tillage intensity interacted with the surrounding landscape and affected spiders and collembolans differently. While collembolan diversity was unaffected by tillage, spider diversity was higher under permanent green cover than under periodically mechanically disturbance. Overall, activity densities of both spiders and collembolan were highest under periodically mechanically disturbed inter-rows. Spider activity density was increased in periodically mechanically disturbed inter-rows especially when the proportion of arable fields in the surroundings was high. In contrast, spider activity density under permanent green cover was influenced by semi-natural landscape elements. Our results suggest that potentially detrimental influences of soil management on spiders and collembolans appear to be compensated through interactions with the surrounding landscape. These investigations are part of the transdisciplinary BiodivERsA project VineDivers (www.vinedivers.eu) and will ultimately feed into management recommendations for various stakeholders.