

Springing into action? Collembola in agroecosystems

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Summary

Collembola (springtails) are detritivores, beneficial for soil fertility. In agroecosystems, different species are positively or negatively affected by varying management intensities. This project will investigate further the effect of management intensity on Collembola communities.

Key words: Collembola, soil mesofauna, agroecosystem, management.

Introduction

Collembola are soil arthropod mesofauna found in all the world's ecosystems (Petersen & Luxton, 1982). Predominantly generalist detritivores, they feed on soil organic matter and fungal mycelia, increasing decomposition and nutrient cycling (Filser, 2002), contributing to ecosystem services such as providing soil fertility (Zhang *et al.*, 2007). Intensive agricultural management, while producing higher crop yields, negatively affects Collembola communities, decreasing species abundance and diversity (Bedano *et al.*, 2006), compared with lower intensity systems (House, 1985; Brennan *et al.*, 2006). As organisms of varying sizes are affected differently by changing environmental conditions (Kladivko, 2001), species in different soil layers can be positively (Alvarez *et al.*, 2001) and negatively (Sabatini *et al.*, 1997) affected by decreasing cultivation intensity. This study will look at effects of different cultivation intensities on Collembola communities in agroecosystems. We hypothesise that higher intensities will reduce species diversity and abundance and that under both high and low intensity management, communities will have dominant species.

Materials & Methods

Collembola communities will be sampled at Harper Adams University, Shropshire, UK (OS Grid ref: SJ7120) in summer 2013. Fields under permanent pasture, short-term ley, long term arable (wheat in 2013) and agri-environment scheme field margins will be sampled using fortnightly suction sampling, pitfall trapping and soil cores with Tullgren funnel extraction. Specimens will be identified where possible to species level using Hopkin (2007). Temperature, humidity, organic matter volume, soil moisture, pore structure and pH will be measured, to explore effects on the Collembola community and interactions with cultivation. Species richness indices (Magurran & McGill, 2011) and multivariate analyses will be used to compare communities.

Results and Discussion

At the time of writing sampling has not commenced, so results cannot yet be reported. Depending on the results of this study, the project will be developed to include more sampling sites. Dominant Collembola species will be investigated further with microcosm studies. Results from the project will inform the development of future management practices that will conserve farmland biodiversity.

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