

# Diversity and density of springtails (Collembola) in a grass-clover ley in North-west Norway

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The diversity and density of springtails (Collembola) were studied in an organically managed grass-clover ley at Tingvoll experimental farm in NW Norway during 2011–2012. In total after one sampling in 2011 and 3 samplings in 2012, 42 species were identified. Our results included a new species for the Norwegian fauna, *Onychiurus edinensis* (Bagnall, 1935) and one species very unusual to agricultural soils, *Oligaphorura ursi* (Fjellberg, 1984). The most abundant species was *Parisotoma notabilis* (Schäffer, 1896), followed by three species of *Mesaphorura* Börner, 1901, two species of *Protaphorura* Absolon, 1901 and *Isotomurus graminis* Fjellberg, 2007. A high number of *P. notabilis* has also been found in pastures in Iceland (Gudleifsson & Bjarnadottir 2008), in forest habitats in Norway (Hågvar 1982, Fjellberg *et al.* 2005) and in agricultural soil in Denmark (Axelsen & Kristensen 2000) and Sweden (Lagerlöf & Andrén 1991). The average density of springtails was 7 917 individuals m<sup>-2</sup> in 2011. In 2012, the density was generally higher and varied between 16 182 and 41 515. We have proposed a grouping of the species into “epigeic” and “endogeic”, dependent on the presence or absence of eye organs and colour. Such classification is relatively easy and may give useful information in cases when identification to species is not possible.

Key words: Collembola, springtails, Norway, agricultural soil, soil fauna, springtails, *Onychiurus edinensis*, *Oligaphorura ursi*.

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## Introduction

Springtails (Collembola) are a highly diverse group of micro arthropods living in vegetation, litter and in soil, commonly found to a depth of 10–15 cm (Hopkin 2007, Lagerlöf & Andrén 1991, Ponge 2000). Many factors including food availability, soil type, microclimate and species composition in adjacent habitats influence the total distribution of springtails within a specific site. The group comprises a high diversity of species, and springtails may be found in almost any habitat all over the world, except in water (Fjellberg 1998, Hopkin 2007). The vertical distribution in

soil varies with season and between species, and springtails have been reported down to 3 m soil depth in (irrigated) agricultural land in California (Price & Benham 1977). Most individuals are found above ground and in the upper 5 cm of the soil/litter layer (Fjellberg *et al.* 2005, Bardgett & Cook 1998).

On a global level, the current number of species described is approximately 8000 (Bellinger *et al.*, 2014). In Norway, springtails have been extensively studied in natural habitats and in forests (e.g. Lie-Pettersen 1896, Hågvar 1982, 1983, Fjellberg 1998, 2007), and 334 species from 19 families have been identified (Fjellberg 2010).