

SoildiverAgro project

Adoption of new management practices to increase crop production and quality



THE WHAT AND WHY

Soil community shows resilience against inversion tillage in long-term organically managed boreal cereal field

Deep ploughing as tillage method is thought to have negative impact on many soil organisms, particularly on larger soil organisms such as earthworms. The replacement of ploughing by lighter tillage methods (minimum shallow tillage), accompanied by direct sowing, has become more common. Yet, ploughing is still often applied in organic farming to control weeds. Two separate case study experiments (CS14a and CS14b) were established to explore the impact of sudden deep ploughing on soil biological diversity in the wheat fields under long-term organic farming with minimum tillage. Plots were mouldboard ploughed in spring before sowing (CS14a) or in autumn after the harvest (CS14b). Fields have not been ploughed since 2011 and 2017, and only minimum tillage has been conducted. The main crop during the 3-year monitoring period was spring wheat in CS14a and winter wheat in CS14b

during the first and third years. There was pea as a cover crop in both field sites in the second year. Microbial, fungal, nematode and earthworm communities developed under long-term organic farming with minimum tillage were notably resilient to changes due to ploughing. Beneficial changes in earthworm community achieved by minimum tillage were not lost even after three consecutive years of ploughing. The season affected the results; after autumn ploughing there was a trend towards lowered richness of nematodes and biomass of earthworms, which are important organisms in nutrient release and in pathogen control. In addition, C and N cycling related genes were lower after autumn ploughing. If field must be ploughed for example to control weeds or to facilitate the accumulation of phosphorus load or prevent run offs in the field, springtime ploughing is recommended.



1. Minimum tillage with a sweep-tine cultivator and sowing a cover crop simultaneously in the autumn.

KEYWORDS

Ploughing, minimum tillage, wheat, soil community

AUTHORSHIP

Krista Peltoniemi, Natural Resources Institution Finland (Luke), Finland

Eija Pouta Natural Resources Institution Finland (Luke), Finland,
Sari Iivonen, Finnish Organic Research Institute/Luke, Finland



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