# FERTILIZATION AND FIELD CROPS EFFECT ON EARTHWORMS

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## INTRODUCTION

Soil quality can be estimated through soil chemical, physical and biological properties, from which the detection of biological indicators is the most difficult. Usually the earthworms are the easiest detectable species to evaluate sustainability of soil biota on arable land. Naturally the abundance and species diversity of earthworms is connected with soil type, water regime, plant cover and temperature. However, earthworm habitats are largely influenced by agricultural activities such as fertilization, soil tillage, use of pesticides and cultivation practice (organic or conventional farming), crops grown.

**Aim:** to investigate different fertilization schemes under conventional and organic farming practices, including effect on earthworms abundance, biomass and species diversity.

## MATERIAL AND METHODS

**Location:** Estonia, Tartu county: 58° 22' 51.35´´ N  26° 39' 57.2´´ E
**Soil:** sandy loam *Stagnic Luvisol*
**Time:** established 2008, sampling autumn 2012–2016
**Treatments:** Org 0 – without fertilization, organic
Org I – with winter cover crops, organic
Org II – with winter cover crops + 40 t ha$^{-1}$ cattle manure, organic
Conv 0 – control, conventional
Conv 150 – fertilization $N_{150}P_{25}K_{95}$, conventional
**Crop rotation:** spring barley under sown by red clover, red clover, winter wheat, pea, potato
**Cover crops:** after wheat mixture of winter rye and oilseed rape, after pea oilseed rape, after potato winter rye
**Collecting and counting earthworms:** 0.16 m$^2$ area 0.2 m depth, sorted by hand, counted by species, weighted
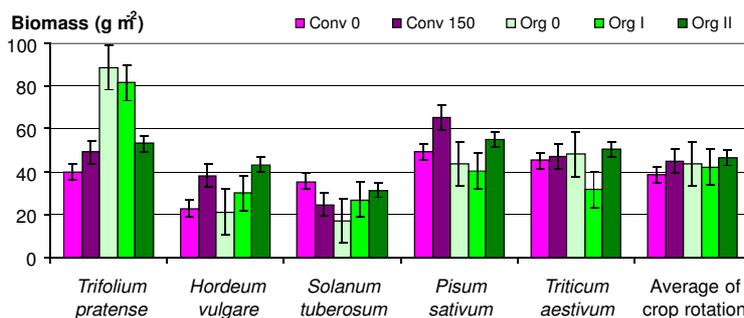
## RESULTS
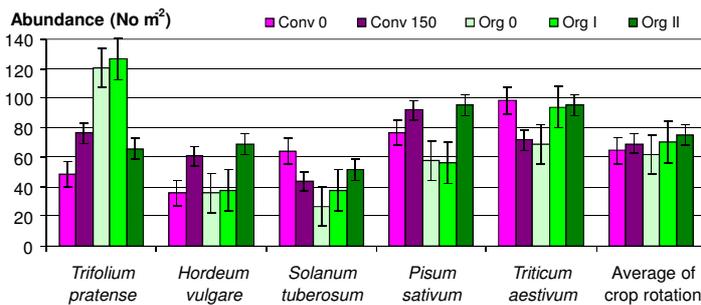


☼ Abundance (number m$^{-2}$) of earthworms depending on management system, fertilization and culture. Vertical bars denote standard error of the mean.
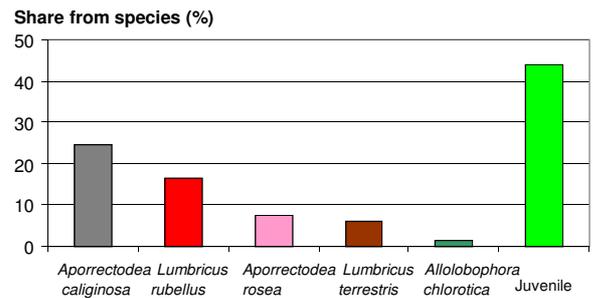


☼ Species composition of earthworm community in average of treatment and crop rotation.



☼ Biomass (g m$^{-2}$) of earthworms depending on management system, fertilization and culture. Vertical bars denote standard error of the mean.


☼*Aporrectodea caliginosa* L.


☼*Lumbricus rubellus* L.


☼Excrements of earthworms


☼ Experimental field in September

## SUMMARY AND CONCLUSION

The dominating species in all treatments were *Aporrectodea caliginosa* L. and *Lumbricus rubellus* L. Only some individuals of *Aporrectodea rosea* L. and *Allolobophora chlorotica* L. were found under conventional farming in both fertilization treatment, but they were found almost on every plot under Organic I and II treatments. The highest number and biomass of earthworms was by using cattle manure and  lowest without any use of fertilizers and cover crops. From the crops the earthworms favoured red clover and pea and less potato.

Even the results revealed slightly improving effect of organic farming on earthworms, the main factor seems to be the availability of suitable food (plant residues, manure) than farming practice itself.