

Tagungsbeitrag zu: Workshop Kommission III „Bodenökologie und Bodenbiologie“ der Deutschen Bodenkundlichen Gesellschaft  
Titel der Tagung: Experimenting with Earthworms  
Veranstalter: Kom. III der DBG  
20.-21. März 2009 in Trier  
Berichte der DBG (nicht begutachtete online Publikation; <http://www.dbges.de>)

## Comparing lifeforms of earthworms in microcosms

Martin Potthoff<sup>1</sup>

### The two perspectives of earthworm investigations

#### The usual environment

This perspective is on the soil of arable, grassland or forest sites. It represents natural conditions in field scale which are more or less uncontrolled and investigators have to handle tons of hidden unknown factors. In this perspective mostly earthworms are quantified depending on side conditions like farming practise (eg. Metzke et al. 2007; Ernst and Emmerling, 2009).

#### The usual cage

This perspective is on microcosms, containers or jars with soil and earthworms. It represents highly artificial conditions in small scales which are very controlled and unknown factors are reduced to minimum. In this perspective mostly earthworms are taken as experimental treatments and earthworm related processes and/or effects are quantified (eg. Potthoff et al. 2001). Between the two perspectives there is a big gap. It is quiet hard to relate lab results to field conditions and to mimic natural conditions in the lab. Moreover, in the context of caging earthworms for experiments it is to ask if cages like microcosms are adequate to all lifeforms and if comparisons are reliable.

---

<sup>1</sup>Research Centre Agriculture and Environment, University of Göttingen, E-mail: [mpottho@uni-goettingen.de](mailto:mpottho@uni-goettingen.de)

## Example:

### Anecic and endogeic earthworms compared in a microcosm setup simulating inversal and chisel ploughing

#### Outcome:

- N-transfer from litter to soil is reduced for anecics by inversal ploughing
- Endogeics induce higher N-transfer compared to anecics under inversal ploughing
- Microbial use of litter-N is increased by endogeics but not by anecics in the case of inversal ploughing
- Endogeic “geophageous” earthworms and anecic “saprophageous” assimilate litter derived N in equal rates

#### Conclusions:

- Despite its „geophageous“ classification *A. caliginosa* assimilates litter derived N in saprophageous rates.
- The contribution of *L. terrestris* to nutrient turnover is reduced due to the removal of litter from the surface by tillage.
- Tillage as well as earthworm activity increases nutrient transfer to active soil pools like SMB. Endogeic effects persist with tillage, anecis effects not.

#### References

- Ernst, G., Emmerling, C. (2009) Impact of five different tillage systems on soil organic carbon content and the density, biomass, and community composition of earthworms after a ten year period. European Journal of Soil Biology, in press (doi:10.1016/j.ejsobi.2009.02.002)
- Metzke M., Potthoff M., Quintern M., Heß J., Joergensen R.G. (2007) Effect of reduced tillage systems on earthworm communities in a 6-year organic rotation. European Journal of Soil Biology 43, S209-S215.
- Potthoff M., Joergensen R.G., Wolters V. (2001) Short-term effects of earthworm activity and straw amendment on the microbial C and N turnover in a remoistened arable soil after summer drought. Soil Biology & Biochemistry 33, 583-591.