BASIC PREREQUISITES OF A SEMI-FIELD TERRESTRIAL MODEL ECOSYSTEM (TME): ECOLOGY, VARIABILITY, TECHNICAL SET-UP & RESULTING TEST STRATEGIES

Scholz-Starke B.1, Theißen B.1, Toschki A.1, Ratte H.T.1, Schäffer A.1, Heimbach F.2, Nikolakis A.2, & Roß-Nickoll M.1

1: Institute for Environmental Research, RWTH Aachen University, Germany (Corresponding author: bern@bios.rwth-aachen.de)  
2: Bayer CropScience AG, Division BCS-D-ETX, Monheim, Germany

Introduction
- Semi-field test systems are more and more discussed to derive structural endpoints
- Terrestrial Model Ecosystems (TME) are currently proposed as a higher-tier testing option to detect side effects of pesticides on the soil community
- We compared data from field & TME samples in order to investigate the stability of the TME test system
- We present evaluation of techniques by statistical considerations & qualitative analyses
- We propose a study design which is capable to detect effects on soil communities

Data base
- Field samplings on the TME coring area (>300 Samples from 2004-2006)
- TME samplings (>300 samples of untreated TME from 2005-2007).
- Endpoint: Community structure of Oribatids, Collembolans, Enchytraeids (determined to species level) & Nematodes (feeding guilds).

Do we have appropriate techniques?

Conclusion
- Techniques have been optimised according to available data
- Humidity as limiting factor of soil animal reproduction has been monitored
- Irrigation has been taken place in case of permanent drought following a general minimal disturbance dogma

How to manage intrinsic variability?

Conclusion
- A priori power analysis of pre-sampling data was identified as essential to further adjustments of sampling design
- Pooling of sub-samples considerably reduces variability
- In order to enhance statistical power dose-response design was applied in 2006

How to handle spatial variability?

Conclusion
- Soil organisms are not randomly distributed over the coring area
- Patchiness occurs on small (< TME) and big scales (>TME)
- Coring strategy has been adjusted to a 5 x 5 m area to avoid big-scale variability

Do TME maintain stable communities over time?

Conclusion
- TME abundance is considered as stable over a period up to 1 year after coring
- Number of >30 species constantly present in the systems

Summary
- All methods have been optimised by internal & external validation
- Intrinsic variability has been lowered and study design is changed to EC3 design
- Spatial variability was quantified by means of screening studies & coring strategy was adapted to avoid additional variability
- TME are considered as stable over time periods up to one year
- Species inventory provides diverse communities