

# Response of earthworms and microannelids to slurry application at soil-monitoring sites on grassland

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## Background

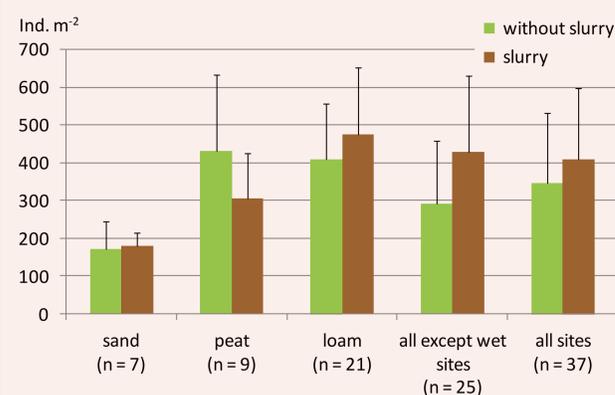
Soil decomposer communities of grassland are influenced by nutrient input. The effect of organic fertilisers on soil fauna depends on frequency and season of application, but also on soil properties. At soil-monitoring sites, in addition to the assessment of soil physical, chemical and biological parameters, detailed data on management measures are collected.

## Scope

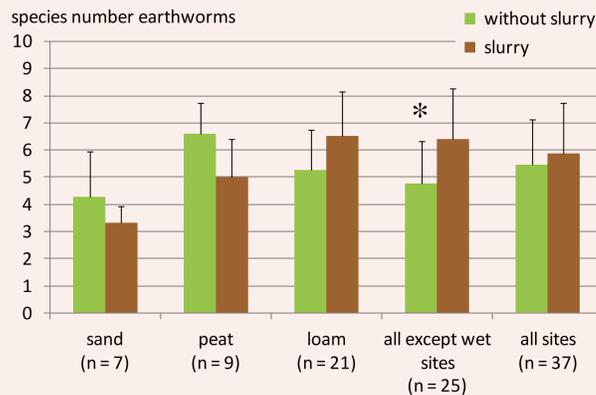
We analysed earthworm and microannelid data from grassland soil-monitoring sites in Schleswig-Holstein with respect to slurry application. The focus was on total abundance, species number, dominance of r-strategists (microannelids) and life-form types (earthworms). For analysis, sites were grouped according to texture and influence of groundwater (wet grassland = groundwater level seasonally reaching the topsoil).



## Results – Earthworms (Figures 1 + 2)



**Figure 1:** Earthworm abundance with and without slurry application in the year of sampling. n = number of samplings. Error bars: SD. Differences not statistically significant



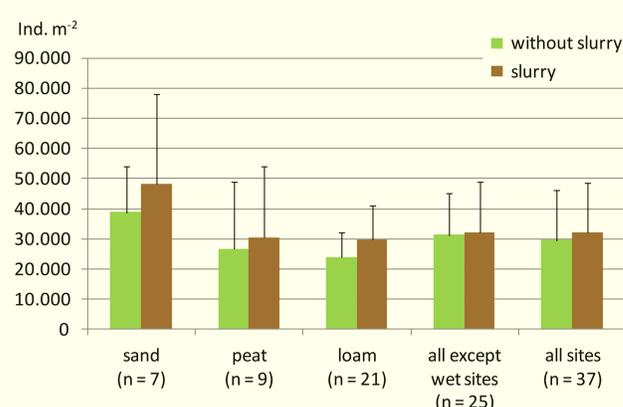
**Figure 2:** Species number of earthworms with and without slurry application in the year of sampling. n = number of samplings. Error bars: SD. \*: difference statistically significant

## Sampling

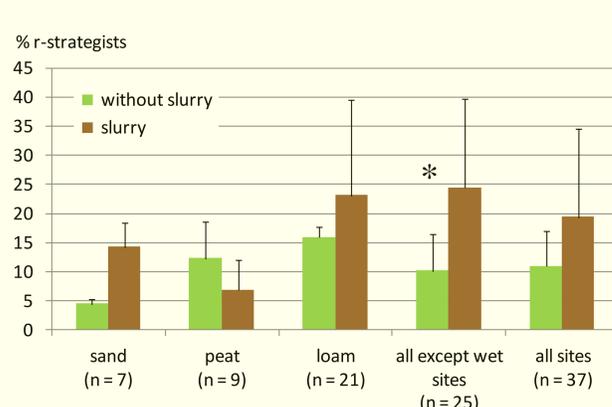
- 10 samples per site
- Sampling season: autumn
- Microannelids (enchytraeids and other small annelids): soil corer samples (Ø 5 cm, sample depth 0-10 cm)
- Wet extraction without heating for 48 h
- Earthworms: Hand sorting plus Kempson extraction (250 cm<sup>2</sup>) and formalin extraction (0.25 m<sup>2</sup>)
- Last slurry application between 8 and 39 weeks prior to sampling

- Total abundance of earthworms does not show a significant response to slurry application in the year of sampling, nor does the dominance of epigeic, fast breeding species (not shown here)
- At the sites not influenced by groundwater, the species number is higher with slurry application in the year of sampling

## Results – Microannelids (Enchytraeids) (Figures 3 + 4)



**Figure 3:** Microannelid abundance with and without slurry application in the year of sampling. n = number of samplings. Error bars: SD. Differences not statistically significant

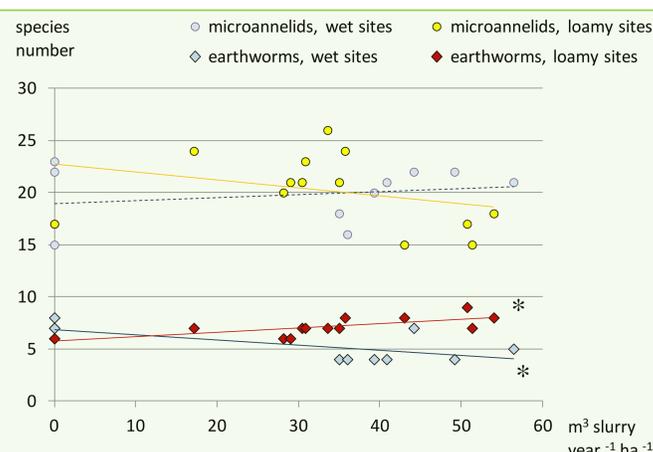


**Figure 4:** Dominance of r-strategist species with and without slurry application in the year of sampling. n = number of samplings. Error bars: SD. \*: difference statistically significant

- Total abundance of microannelids does not show a significant response to slurry application in the year of sampling, nor does the species number (not shown)
- At the sites not influenced by groundwater, the number of fast breeding r-strategist species is higher with slurry application in the year of sampling

## Results – long-term (Figure 5)

- Species number of earthworms on **wet** grassland **declines** with increasing amount of slurry applied over the preceding 5-7 years
- Species number of earthworms on **fresh** grassland **rises** with increasing amount of slurry applied over the preceding 5-7 years
- Species numbers of microannelids show opposite behaviour, but trends are not statistically significant



**Figure 5:** Species number in relation to slurry application. Amount of slurry: Mean value of the preceding 5-7 years, including the year of sampling. \*: significant relation (p < 0.05)

## Conclusions

- Effects of slurry application differ between wet grassland and other permanent grassland sites
- Soil texture apparently influences the impact of slurry, although effects are not significant due to small number of cases
- Earthworms and microannelids respond partly differently to slurry application
- As sites differ also concerning other management measures apart from slurry application, further data analysis is desirable

## Acknowledgements

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