

Anecic earthworms and associated ecosystem services in a ley-arable crop rotation

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Introduction Earthworms in general and anecic earthworms in particular, play a key role in the ecosystem service of water regulation through enhancing water infiltration and stimulating root growth to deeper soil layers by earthworm burrows. A crop rotation of grass and maize can be sustainable in terms of efficient nutrient use, but there is lack of information on the effect on earthworms.



Materials and methods Earthworms were sampled over three years in a 36 years old experiment on a sandy loam soil with four treatments in a complete randomised block design with four blocks:

- PG: Permanent grassland since 1966;
- TG: Temporary ley-arable crop rotation, with three years of grass ley followed by three years of arable land;
- TA: Temporary arable crop-ley rotation, with three years of arable land followed by three years of grass ley;
- PA: Permanent arable cropping since 1966.

Results In the three-year grass ley, the abundance and biomass of earthworms returned to the level of permanent grassland in the second year and third year respectively (Fig. 1). However, the anecic species did not recover in the three-years grass ley to the dominance they had in the permanent grassland (Fig. 2). In 2004 the water infiltration rate was 2.77 and 1.07 ml water sec⁻¹, for permanent and temporary grassland respectively.

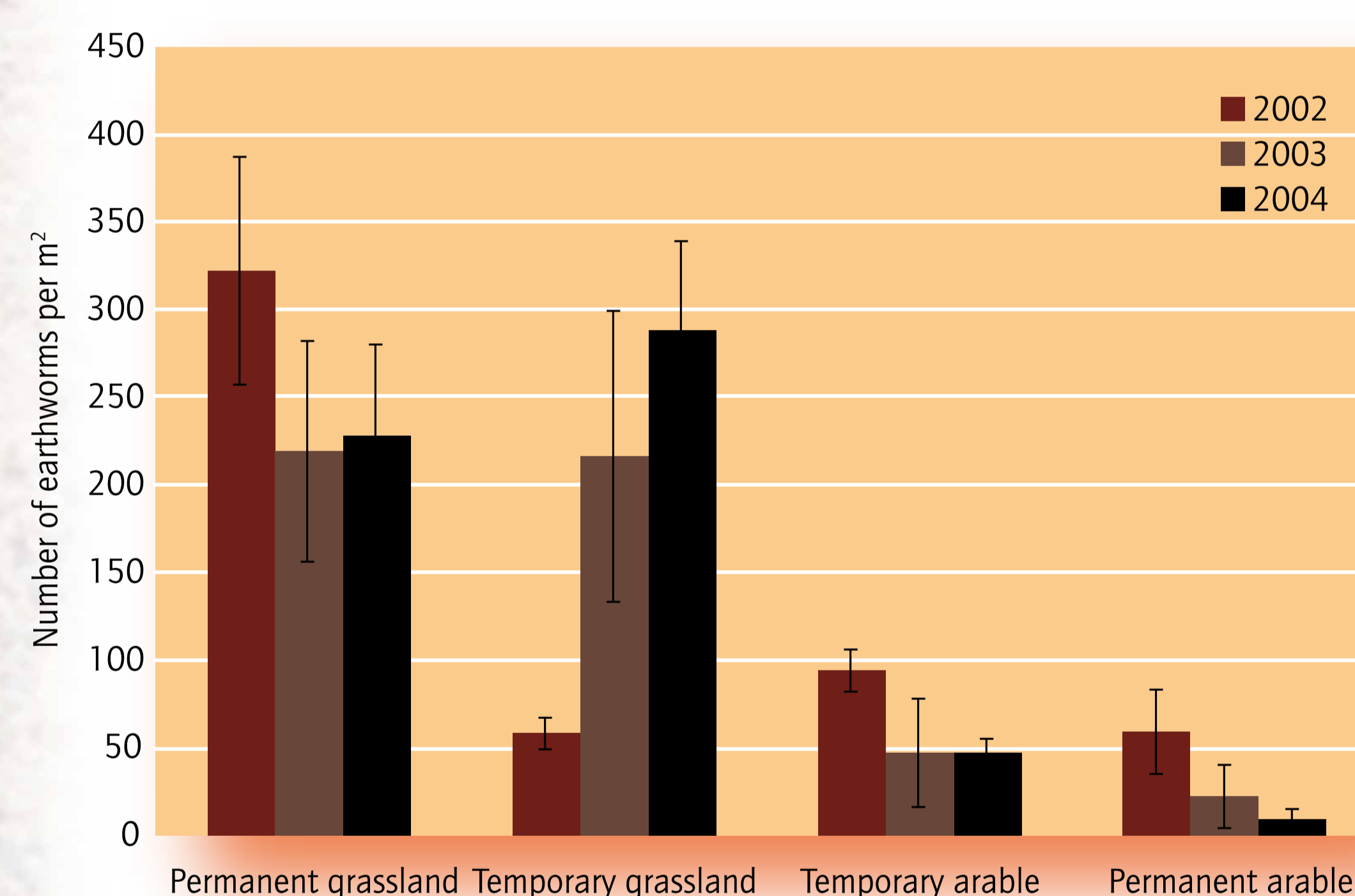


Figure 1. Mean number (\pm SE) of earthworms ($n\ m^{-2}$) in permanent grassland, temporary grassland, temporary arable land and permanent arable land in the 7th rotation of a 36 years old experiment.

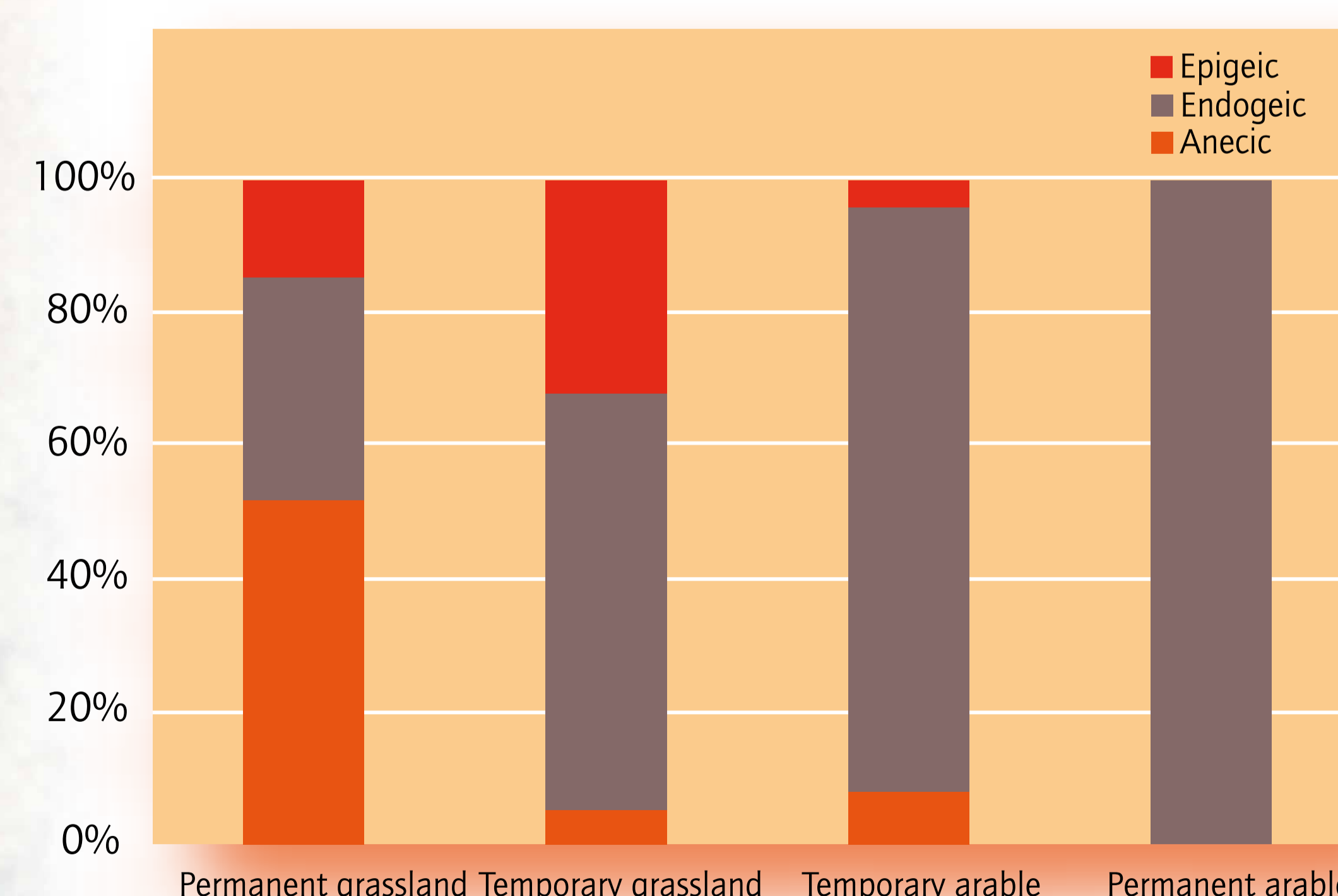


Figure 2. Distribution (%) of the adult earthworms over the ecological groups in permanent grassland, temporary grassland, temporary arable land and permanent arable land in the 7th rotation of a 36 years old experiment.

Epigeic



Endogeic



Anecic



Conclusion The data suggest that especially anecic earthworms are under pressure in a ley-arable crop rotation which may have a negative impact on the ecosystem service of water regulation under future grassland.

References Van Eekeren N, Bommelé L, Bloem J, Rutgers M, De Goede R, Reheul D, Brussaard L (2008) Soil biological quality after 36 years of ley-arable cropping, permanent grassland and permanent arable cropping. *Appl. Soil Ecol.* 40, 432-446.