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## **Can non-inversion tillage and field margins improve water storage in arable landscapes through stimulation of earthworm diversity?**

The project uses agrobiodiversity as a functional tool for achieving the provision of multiple ecosystem services in agricultural landscapes in the Netherlands. We hypothesize that the management of productive landscape elements (reduced tillage in arable land) and non-productive landscape elements (field margins, principally aimed at biological disease control, biodiversity conservation and landscape aesthetics) can be mutually supportive in enhancing soil physical functions (e.g. water storage and transmission), through the stimulation of earthworm diversity in arable land. The capacity of the landscape to absorb water in wet periods and supply water during dry spells is a key ecosystem service, especially in the context of climate change. Non-inversion tillage in combination with controlled traffic is proposed as a management strategy that can reduce soil compaction, increase earthworm diversity and enhance water infiltration and soil moisture supply capacities of arable fields. Earthworm diversity is typically low in conventionally tilled arable fields. However different functional groups of earthworms, that are considered to play crucial roles in soil structure formation and soil physical properties, can potentially be restored when soil disturbance is decreased. The colonization process may be enhanced when diverse populations are present in nearby landscape elements (e.g field margins) that provide niches and refuges for earthworm populations. The objective of our research project was to obtain a quantitative understanding of the relationship between (i) soil tillage, (ii) field margins (iii) earthworm-mediated processes and (iv) soil physical quality. To study these relationships we established multi-year, replicated field experiments that included land use intensity gradients (plough, non-inversion, field margin). Earthworm density and diversity was monitored over 4 years and soil physical quality was assessed.