

The "earthworm basket" method appears promising for measuring mulch burial in on-farm research

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Earthworms contribute to the dynamics of organic matter by collecting, burying, and ingesting plant litter. The "earthworm basket" protocol of EcoBioSoil (Rennes) allows observing part of these phenomena by placing baskets of chopped straw against the ground for several months. This participatory method is intended for the lay public. However, it seems interesting for identifying agricultural practices that enhance earthworm ecosystem services. Yet, no published data validates the appropriateness of this protocol for on-farm research purposes.

To obtain such data, we conducted the "earthworm basket" protocol in 20 Walloon winter wheat fields, each on a different farm. The fields had similar environments - slope, soil type, climate - but were cultivated with various practices that we documented over 10 years. From wheat sowing to April 2021, we counted castings and middens in the baskets. We then quantified the total buried straw by measuring its surface and weight loss. Here, we discuss the methodological and agronomic outcomes of the experiment.

The protocol was workable as it is, but some simplifications could make it less burdensome. The results variability was greater between than within fields. Multivariate analyses (PCA) showed links between earthworm burial activity and agricultural practices that are coherent with the literature. In particular, the amount of straw buried was positively correlated with the frequency of organic fertilization and with the time since the last plowing. It was negatively correlated with cumulative tillage depth and plowing frequency.

Considering these results, using EcoBioSoil's "earthworm basket" protocol in the context of on-field agronomic research seems promising. However, we found that late installation of some baskets, due to late sowing of wheat in some fields, led to lower earthworm activity. In 2022, we will try mitigating this effect by installing baskets from February to June in 20 other wheat fields from the same region.

Keywords

Earthworm ; Mulch burial ; Basket protocol ; Straw ; Agricultural practices