

An introduction to earthworms

Importance

Earthworms can be used as an indicator of soil quality because worms are uncommon in soils that are compacted, waterlogged, have extremes in soil pH or are very sandy.

Many arable management practices have an impact on the number of earthworms present in soil, particularly tillage intensity, food supply (soil cover, residue management) and agrochemical applications.

Earthworms provide free labour (nature's ploughs) and fertiliser by breaking down organic matter, allowing bacteria and fungi to release the nutrients into the soil. Increasing earthworm populations in arable fields can be beneficial to crop production.

Types of earthworm

Epigeic earthworms

Epigeic earthworms are litter feeders found on and in the soil surface (< 3 cm). They are the smallest earthworms and have short life cycles.

Anecic earthworms

Anecic earthworms make deep vertical tunnels (up to 2 metres) and inhabit their tunnel throughout their lives. They are the largest earthworms – often the size of a pencil – and can live for up to five years.

They feed at night, foraging the soil surface around their burrow for litter. Anecic earthworms improve soil porosity and aeration, as well as aiding water infiltration by building permanent vertical tunnels through the soil.

They are often absent in fields managed with intensive cultivations and no surface litter (for example, root cropping, ploughed soils).

Endogeic earthworms

Endogeic earthworms are found in the topsoil (>2 cm to 40 cm deep). They are bigger than epigeic earthworms, typically the size of a matchstick.

They make a network of temporary burrows throughout the soil profile. They mix the soil, redistributing soil bacteria and producing faeces (casts) rich in nutrients (N, P, K, S).

Endogeic earthworms are the most common earthworm group found in arable fields.

Assessing earthworm populations

When to assess earthworm populations

Spring and autumn are the best times to do earthworm assessments. Timing the sampling after warm, wet conditions often provides the best earthworm estimates.

How to assess earthworm populations

Hand sorting

One way to assess earthworm populations is to dig a 20 cm x 20 cm x 20 cm hole and hand sort through the soil.

As earthworm populations are patchy, 20 measurements per field are recommended.

To estimate the number of earthworms per m², multiply the number counted in each measurement by 25.

Most conventionally managed arable fields will have around 150 earthworms (matchstick size) per m².



20 cm x 20 cm is a typical tool width and depth

Mustard extraction

The mustard method can be used to get a snapshot of earthworm populations without damaging crops. Mustard is irritating to earthworms, so burrowing earthworms will come to the surface within about 10 minutes.

Pour a mustard solution (1.5 litres of water to 2 tablespoons of mustard powder) over a 50 cm x 50 cm patch of soil and count the number of worms that emerge.

Midden counting (anecic earthworms)



Middens are the distinctive piles of organic residues (twigs, leaves, straw, stones) gathered by each anecic earthworm from its nightly foraging activities

A fast way of assessing anecic earthworm populations is to count the numbers of middens on the soil surface (per m² area).

Field edges that receive tree litter often have higher anecic earthworm populations than in the centre of the field.

| | Typical number of middens per m ² (in spring) |
|---------------------|--|
| Ploughed soil | 0–3 |
| Minimum tilled soil | 3–15 |
| Zero tilled soil | >15–60 |



Moving the midden will reveal the entrance to the earthworm's permanent tunnel (up to 1 cm in diameter)

Images and videos of earthworms, midden building and sampling techniques are available on Instagram [#wormhunters2015](https://www.instagram.com/wormhunters2015)

Further information

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