

Earthworms

In this factsheet, we discuss what earthworms do and why they are vital to maintaining soil health in farm soils.

Ecology

Earthworms are soil dwelling invertebrates that act as **keystone species** (a species with a disproportionately large effect on its natural environment) in soil ecosystems.

They do not eat living plants or their roots, so are not considered pests. Instead, they eat detritus and soil organic matter as well as the microorganisms found on these materials. They tend to prefer cool, moist but well aerated soils and are most active in Spring and Autumn. In Summer, they often curl into a tight ball (aestivating) to ride out hot, dry periods.

Earthworms usually prefer a pH between 5.5 -8.5.



Plant and Soil Health Benefits

Earthworms have a large influence on promoting beneficial soil health in agricultural systems. The following are some major ways that earthworms influence soil health:

Enhancing Plant Resilience – Numerous studies have found that earthworms help plants to defend themselves against fungal and invertebrate pests. This is done by the stimulating effect of the worms on beneficial microbes and on nutrient availability.

Burrowing – Earthworms help to create extensive channel systems in the soil which become important pathways for aeration, water, and plant roots, which in turn benefit plant productivity and soil development.

Casts – Worms ingest about 2–30 times their own weight of soil in a single day. This ingested soil passes through the worm’s gut, is acted on by the microorganisms there and then expelled to form casts. These casts are usually high in polysaccharides which can aid aggregate stability and increase nutrient availability to plants.

Nutrients – Alongside providing nutrient rich casts, when earthworms die and decay, the nutrients in their body are released into plant available forms which plants can easily take up. They also incorporate animal and plant litter into the soil which reduces the loss of nutrients, particularly nitrogen.

Soil Biodiversity – Earthworms promote biodiversity through the above activities and translocating nutrients and microbes through the soil. They help to create more habitat and food resources for other organisms in the soil.

Types

There are 26 species of earthworm in the UK but can be placed into 3 groups based on their burrowing habitats and behaviour:

- **Epigeic** – Small worms that tend to live in the litter layer or in organic-rich soil close to the surface
- **Endogeic** – Small-medium sized, live mainly in the top 10–30cm of mineral soil where they make shallow, largely horizontal burrows
- **Anecic** – The largest and longest-lived type found in the UK. They make vertical, relatively permanent burrows up to several metres deep and emerge in wet weather or at night to forage

Earthworm Economics

It should be clear that earthworms have a key influence on promoting the health of a farm’s key asset, its soil. In numerous ways,

earthworms can help farmers to save money and improve productivity:

- Reduce fungicide and pesticide use
- Improve nutrient efficiency
- Alleviate compaction
- Improve crop and pasture health
- Incorporate manure more efficiently in the soil
- Improve drainage and aeration

Managing for Earthworms

The following steps are ways to protect and encourage earthworms in your soils.

- **Sources of organic matter** – Earthworms need organic matter as their food source, so either inputs from living plants or animal/plant residues are important.
- **Consider fertilizer and insecticide use** – Direct contact with ammonia fertiliser and certain insecticides can be fatal to earthworms.
- **Tillage reduction** – Tillage ultimately reduces earthworm numbers and particularly adult earthworms which may have a big impact on soil properties. Limiting tillage frequencies will help to ensure a healthy mix of juvenile and adult worms

Ultimately, a field with minimum tillage, good aeration, a plant litter mulch layer and year-round vegetative cover makes an ideal environment for earthworms. It should be noted, however, that earthworm population will probably be limited in very sandy soils due to the sharpness of sandy grains.

Assessing Earthworms

Lastly, monitoring the earthworms in your soils is simple and straightforward and is one key test for identifying your soil's health. It is important to remember that earthworm counts should be carried out in Spring or Autumn or in conditions that are damp and warm.

Remember to note the time since soil was last

tilled. Sandy soils generally tend to be lower in earthworms so this should also be considered.

Equipment: Spade, pen and paper, sheet or mat, jar or tray

Steps to conduct Earthworm count test

1. Use a spade to dig out a soil pit (30x30x30cm)
2. Remove soil onto a mat or plastic sheet
3. Hand sort the soil and remove worms into a pot to make them easier to count
4. Count earthworms and make a note
5. Return worms and soil to the pit
6. Repeat across the field to get a representative sample

Ideally, digging 10 pits per field would give a strong representation (ADHB recommendation) of worm populations but this may not be practical for everyone. 3-4 soil pits per field will give a dependable indication of earthworm numbers.

