

Soil and earthworm survey – The results so far

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With over 3,000 soil and earthworm surveys submitted online, we decided to take a look at the results and see what all this data was starting to show. Thanks to everyone who has taken part in the survey so far – keep those results coming in!

Survey sites: Most surveys carried out in urban areas



The majority of survey sites (67%) were in urban or suburban locations, and 74% of sites were within 100m of a road. Half of all surveys were in either gardens (24%) or playing fields (26%). While 70% of survey sites showed no signs of pollution, the soils at 5% of sites were reported to have a sour, putrid or chemical smell, suggesting some of these sites were possibly contaminated. Forty-two percent

of the soil pits contained man-made objects such as construction debris or other rubbish, indicating that those soils had been previously disturbed to a greater or lesser extent.

Soil pH: Majority of surveys in slightly acidic soils



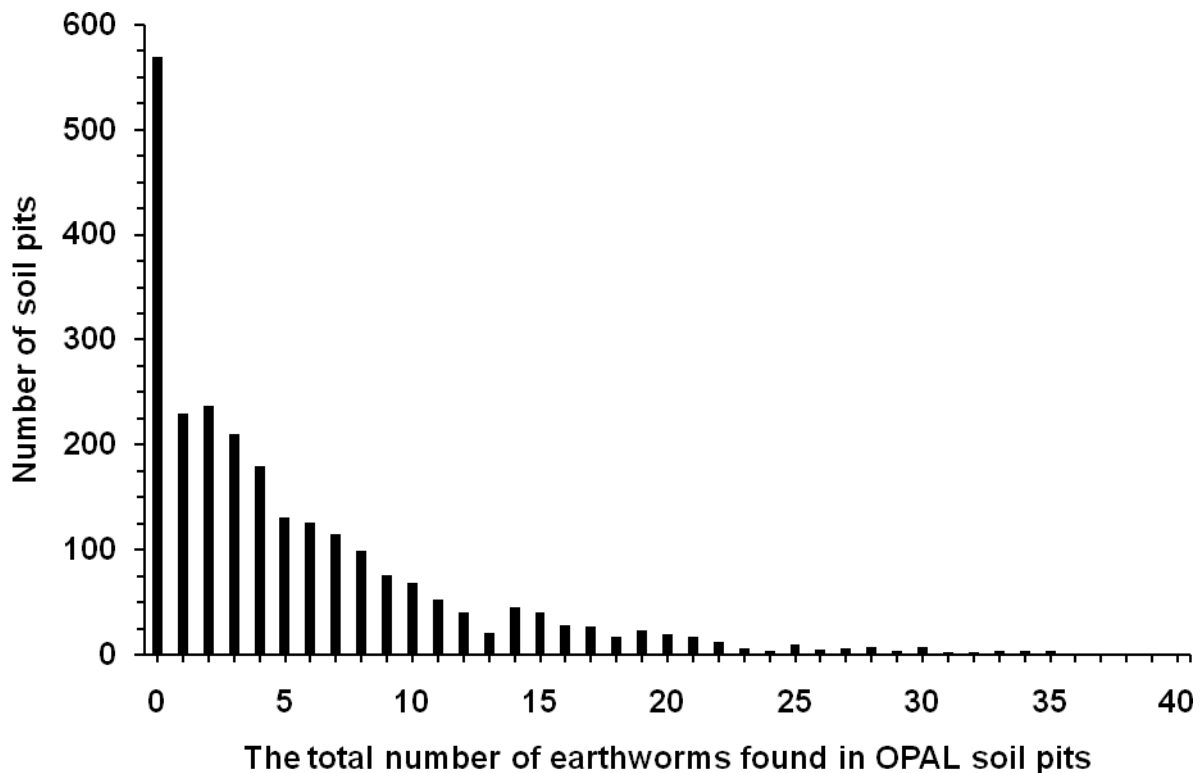
The pH of the topsoil, indicating how acidic (below pH 7) or alkaline (above pH 7) the soil is, varied from 4 to 9. Forty-five percent of pits had a slightly acidic soil pH of either 5.5 or 6.0, which are typical values for many garden and grassland soils in lowland England. The soils in woodlands tend to be more acidic (around pH 4 to 5), while arable soils tend to be less acidic (about 6.5 and above). Soil

pH is important because it can affect the availability of nutrients, and also influences the vegetation at the site as most plant species have a preference for a narrow pH range.

Earthworm distribution: Gardens tend to have the most earthworms



While no earthworms were found in 23% of pits, for those pits with earthworms the most frequently recorded number was two earthworms (in 10% of pits). The ten pits with the highest abundance ranged from 41 to 88 earthworms (not shown on chart). However, some of these pits were dug in compost heaps, which would explain their unusually high abundance.



This variation in numbers is to be expected because earthworms, like most animals, are not evenly spread within a habitat. If you dig several pits in the same habitat, the number of earthworms you find will vary from pit to pit, and it is not unusual for some pits to have no earthworms in them. If you dig more than one pit you should calculate the average (including any zeros) to get a more accurate idea of the abundance of earthworms in that habitat.

The number of earthworms in soil pits will also vary naturally among different types of habitats. From the submitted survey results, the average number in gardens was 7.4 earthworms per pit, while it was 6.1 in playing fields, 4.0 in woodlands and 2.3 in heathlands. Habitats with infertile or acidic soils (such as heathland, moorland and many woodlands) tend to have a lower abundance of earthworms. In contrast soils with less acid soils or more fertile soils, including some grasslands, gardens and arable soils, tend to have relatively higher numbers of earthworms. High levels of some kinds of pollution can reduce the number of earthworms at a site, or eliminate them altogether. However, if you find very low numbers of in your survey it is more likely to be due to the natural variation in earthworm populations rather than pollution.

Earthworms and their ecology: Redhead worms are the most frequently found



The most frequently recorded species in the survey was the redhead worm, *Lumbricus rubellus* (11% of adult specimens). The redhead worm is the species found in the widest range of habitat types because it is very tolerant of variations in environmental conditions such as the amount of tree cover, soil pH and soil moisture.

The black-headed worm, *Aporrectodea longa* was the second most frequently recorded species (10% of adult specimens). This species has been frequently found because it is relatively common in amenity grasslands and gardens. The grey worm, *Aporrectodea caliginosa*, (9% of recorded adults) is also common in grasslands and gardens as well as arable fields. The brandling worm, *Eisenia fetida* (9% of recorded adults) was found in 16% of surveyed gardens, although they are probably common in compost heaps.

The burrowing and feeding activities of earthworms are good for the soil because they help to mix and aerate the soil, and speed-up decomposition and nutrient recycling.

Earthworm species can be divided into four ecological groups.

(1) Epigeic or litter-layer earthworms are dark red in colour. They usually live in the leaf-litter and humus at the surface of the soil, and feed on decaying leaf-litter and humus. Examples of epigeic species are the redhead worm (*Lumbricus rubellus*) and the octagonal-tailed worm (*Dendrobaena octaedra*).

(2) Endogic or shallow-soil earthworms are pale pink or grey or greenish in colour. They make horizontal tunnels in the top 10 cm of the soil (below the litter and humus layer), and they eat soil. Examples of endogeic species are the grey worm (*Aporrectodea caliginosa*) and the green worm (*Allolobophora chlorotica*).

(3) Anecic or deep-burrowing earthworms are large, dark red or purplish-black in colour. They build and maintain vertical burrows that can go down 2m in the soil. The two anecic species in Britain are the lob worm (*Lumbricus terrestris*) and the black-headed worm (*Aporrectodea longa*). The lob worm comes to the surface at night to collect fallen leaves which it pulls down into its burrow to feed on.

(4) Compost worms live in decaying organic matter, such as garden compost heaps. They are red in colour but often appear stripy when they elongate their body. There are two species in Britain: the brandling worm (*Eisenia fetida*) is probably found in most garden compost heaps, while the compost worm (*Eisenia veneta*) also occurs in compost heaps but is far less common than the brandling worm. Both species feed on decaying vegetable matter.

Keep the results coming in!

Thank you to everyone who has taken part in the survey so far. Your contribution is helping us understand more about our soils and how to protect them and the life they support.

Survey results will be accepted for the next two years, so please keep the submissions coming in. It is best to avoid doing the survey in the summer months because when the soil is too dry the number of earthworms declines and they become less active and more difficult to find.

If you have any questions, or if you would like to take part in the survey, please contact our fabulous team of OPAL community scientists (click on the regional map on the front page for your local contact details).