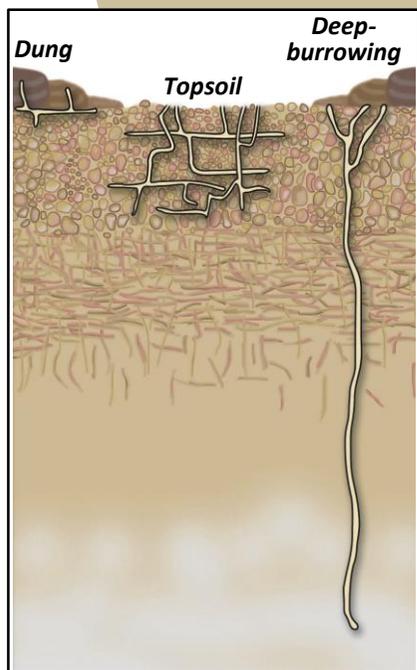


Do you have healthy earthworm populations?

New Zealand's pasture earthworms arrived accidentally with the first European settlers and because of this they can still have a patchy distribution.

There are three types of earthworms with different roles in the soil that should be present in your soil.



Dung earthworms feed on dung and do not form permanent burrows.

Topsoil earthworms burrow through the topsoil, feeding on the organic matter here.

Deep-burrowing earthworms feed on dung on the soil surface and take this into their deep burrows.

Ideally you will have ...

Number (per spade spit)	Earthworm type
more than 1	Dung
more than 14	Topsoil
more than 1	Deep-burrowing

... otherwise the ecosystem services earthworms contribute to may be compromised.

If a type of earthworm is absent, it can be introduced.

Earthworm populations may be increased by avoiding pugging events and increasing available organic matter (their food).

The optimum soil pH for earthworms is 6-7.

Benefits of earthworms

Earthworms improve pasture production throughout the year. Earthworms feed on organic matter and move this into the soil, increasing soil fertility. At the same time earthworms assist the formation of soil structure, improving both the drainage and water holding capacity of soils.

Many soils just have the topsoil earthworms. Results from a controlled study show that adding the deep burrowing earthworm can

- increase pasture production by more than 10%;
- more than double the rate of dung decomposition in winter;
- improve water infiltration to reduce soil moisture content by more than 5% in the winter.

If you have no earthworms, adding all three types of earthworms will have even greater benefits.



The weight of earthworms in the soil is similar to the weight of stock above ground! No wonder they improve plant growth.

For more information about earthworms and their introduction, contact:

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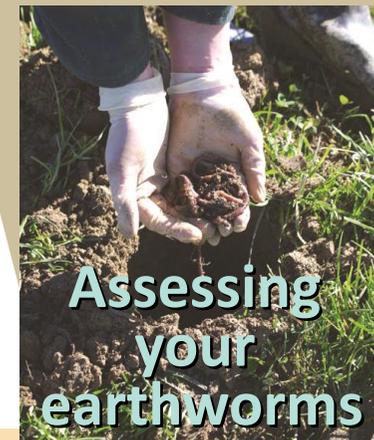
Christchurch 8140

New Zealand



<http://www.agresearch.co.nz/news/earthworms-in-new-zealand-pastures/>

The great kiwi earthworm survey



How to sample:

1. During June to September choose a paddock.
2. Collect three spade spits (20x20 cm, 30 cm deep) per paddock.
3. Hand-sort earthworms by crumbling the soil onto a sheet of plastic and looking through the roots. Put the earthworms in water.
4. Take the earthworms out of water and place onto a paper towel. Look at the colour and size of the adult earthworms. Using the key (<http://agpest.co.nz/wp-content/uploads/2013/06/Earthworm-Identification-Guide.pdf>), can you see different types? Place earthworms on white paper next to a ruler and take a close-up photo out of direct sunlight.
5. Record the abundance/m² of each type of earthworm (multiply by 8.3).
6. Go to (<http://naturewatch.org.nz/projects/the-great-kiwi-earthworm-survey>) and enter your observation.
7. Repeat in as many paddocks as you would like to get a representative sample over your farm.



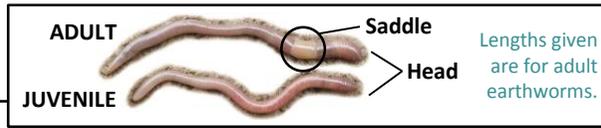
Identifying common pasture earthworms

Start here

Is the earthworm dark or pale? (Check this at the head end.)

Dark earthworms have a paler underside.

In pale earthworms the upper and undersides are the same colour.



Dark earthworms

Is the earthworm a red-brown colour with a purple sheen and iridescent in bright light?

No Yes

Is the earthworm very large, forming large casts?



Deep: *Lumbricus terrestris* 'nightcrawler' (90-300 mm).

OR ... Is it smaller with a reddish saddle and very active when disturbed?



Very common

Dung: *Lumbricus rubellus* 'dung worm' (25-150 mm).

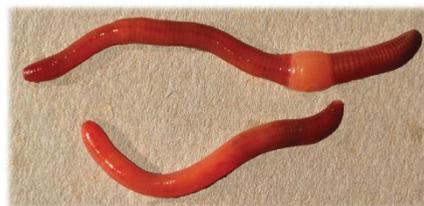
Is the earthworm bright red with yellow?

Yes No

Is it found in a rich organic matter and with yellow bands (when it stretches)?



Dung: *Eisenia fetida* 'tiger worm' (30-130 mm).



OR ... Is it short with faint yellow colouring concentrated at the tail end?
Dung: *Dendrodrilus rubidus* 'bark worm' (20-100 mm).

Is the earthworm a dark grey-brown colour?

No Yes

Is the earthworm large?



Deep: *Aporectodea longa* 'blackhead worm' (90-120 mm).

OR ... Is it smaller, and darker along the length of its body?



Topsoil: *Aporectodea trapezoides* 'southern worm' (40-90 mm).

Is the earthworm a green-brown colour?

No Yes

Is it a long slender earthworm which writhes like a snake when disturbed?



Dung: *Amyntas corticis* 'snake worm' (70-180 mm).



OR ... Is it greenish brown, coiling stiffly when disturbed?

Topsoil: *Allolobophora chlorotica* 'green worm' (40-70 mm).

You have probably found a rare earthworm which is not in this key. Record it as unidentified.

Pale earthworms

Is the earthworm pale all along its body with a small yellow tip at the tail?

No Yes



Topsoil: *Octolasion cyaneum* 'yellow tail' (65-180 mm).

Is the earthworm pink or grey with a pink head?

No Yes



Very common

Topsoil: *Aporectodea caliginosa* 'grey worm' (40-100 mm).

OR ... Does it have a pale pink head and tail with a dark pink-orange saddle?



Topsoil: *Aporectodea rosea* 'pink worm' (25-85 mm).

Is the earthworm pink or grey with the saddle quite close to the head end? (Saddle starting before segment 22, compared with after segment 22 in many non-natives.)

No Yes



There are about 200 native species (e.g. *Octochaetus multiporus*) which vary considerably in size and colour. They tend to be found in forests but some are found in low fertility hill country.