LANDSCAPE SOUTH AUSTRALIA MURRAYLANDS AND RIVERLAND



# Farm-scale Vermicomposting

## With the ever-fluctuating cost and availability of fertiliser and declining rates of soil microbiology, home-grown fertilisers are increasingly appealing to landholders as a low cost and sustainable alternative.

Vermicast – the end-product of the composting of organic matter by worms – is one such alternative fertiliser source which is rich in microbes, nitrogen, phosphorous and potassium, and also has the potential to improve soil aeration, texture and water holding capacity. In this webpage, we look at the use of farm-scale vermicompost systems as a way to generate valuable fertiliser on-site.

## The essential services of earthworms

Worms play a vital role in soil function as they help to recycle decaying plant material and make nutrients more available to plants. By feeding on the bacteria and fungi that destroy pathogenic micro-organisms, worms play an integral role in regulating the balance of beneficial microbes in the soil profile. When worms burrow, they allow water and air to penetrate the soil surface, helping to improve soil health, texture and aeration. Vermicast also increases the amount of humus in the soil profile, helping to boost water holding capacity and improve soil pH levels.

Worms can help to incorporate humus into the soil profile by up to 2 metres. Anecdotal evidence suggested that the presence of earthworms may help with seed germination and disease prevention.

## Which worms for vermicomposting?

Australia is home to more than 4,000 species of native earthworms, with an additional 40 introduced species often found in modern farming systems. While there are many different types of

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worms that can be used in vermicompost systems, the most commonly used types in Australia are the red wriggler or tiger worm (*Eisenia fetida)* and the European night crawler (*Eisenia hortensis).*



## Making your own worm farm

Worm farms are easy to set up on any scale with smaller entry-level worm farms available from many hardware stores. Farm-scale vermicompost systems are relatively easy to construct on-farm either as a compost heap, windrow or as a modular system of IBC totes.

## To set up a modular IBC tote vermicompost system:

- Cut the metal frame at the first ring level from the top, all the way around the tote, then cut the lid off the plastic to the same level, ensuring that the plastic remains in one piece. Drill a series of 3mm holes in this piece of plastic. Place around 5 bricks in the bottom of the tote, then place the piece of plastic on top of the bricks. This should create a space for liquid to drain at the bottom of the IBC.
- Cover the new internal base of the IBC with a piece of shade cloth, then add a 5cm layer of soil or compost. Add in the worms and cover them with a layer of hay or shredded cardboard, corrugated cardboard, if possible, for protection. Keep the contents of the tote moist so the worms don’t dry out and position the tote in the shade.
- Make a cover for the top of the tote with the left-over steel frame either and plywood or plastic. Paint the outside of the tote to block the worms from daylight. Set up a sprinkler system above the tote to irrigate the vermicompost for 1 minute, once a day. You may need to increase the frequency of irrigation shifts in summer.

The number of worms added will dictate how quickly organic material is converted into a useful product, and the worms will also multiply over time in the right conditions. A handful or 2 of worms would be a good starting point.

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## Harvesting vermicast and worm juice

While vermicast (solid) production will take up to 6 months to complete, worm juice can be harvested much earlier and the addition of irrigation applications will speed up this process.

To harvest vermicast, spread the contents of the tote onto a sheet and wait for the worms to move away from the solids. The solids can then be spread onto paddocks, worked in, or combined with seeds and sown into the ground, and the worms can be saved for future use.

IBC taps make harvesting worm juice easy, and once the worms start generating sufficient quantities of juice, it can easily be siphoned into a bucket. The liquid can then be diluted at a rate of 1 part worm juice to 10 parts water and used to fertilise plants or as a soil drench or returned to irrigate the worms and concentrate the liquid.

As the volume of organic matter in the tote begins to reduce, add fresh vegetable scraps and organic matter at a rate of around 2-3 litres per week. Be careful not to overfeed the worms as the vermicompost will become smelly and start to attract unwanted pests and animals. If white flies appear around the tote, add some lime to reduce the acidity.

It may take a while for the numbers to breed up, but you will soon see cocoons (like red eggs if tiger worms as used) throughout the vermicast. To upscale the production, simply join together multiple totes. Another option is to set up vermicast totes around the farm to make in-paddock applications easier.



## Vermicompost windrows

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Vermicompost can be established with a base of manure or composted green waste in windrows at a height of 30 cm and approximately 100 cm wide. Once the worms have been evenly distributed down the length of the windrow, cover with another 5 to 8 cm of compost. Cover each windrow with shade cloth, hessian or straw to stop birds from eating worms and cover with a tarp in the event of heavy rain. Make sure the compost is moist but not overly wet and feed the worms weekly depending on amount eaten. Use sprinklers to keep the heap moist and humid.

Vermicast should be ready to harvest and apply after a year when it appears to be an odorless, brown crumby soil. The vermicast can be used applied directly onto the soil surface but incorporating it into the topsoil will produce quicker results.

To make a liquid extract, put some of the vermicast into a mesh bag and drunk it into non-chlorinated water a few times to wash off the microbes and nutrients before suspending it in a bucket of water for a few hours. This can be scaled up by using a larger bag or more bags or using a larger water holding tank equipped with water circulating pump to wash off the microbes. Left over vermicast can be returned to the windrow.

In cropping systems, worm liquid can be applied as a seed coating before seeding to give the crop a great start for the upcoming growing season.

### More information

- Meat and Livestock Association, increasing earth worms in pastures (https://www.mla.com.au/globalassets/mla-corporate/extensions-training-and-tools/creative-commons/increasing-earthworms-in-pastures---cc.pdf)
- Making an IBC tote worm farm (https://www.youtube.com/watch?v=ZJUQZ16xWu0)
- Options for worm farm construction (https://www.ecofarmingdaily.com/build-soil/soil-inputs/compost/vermiculture-systems/)
- Case Study: broadacre cropper Col Harper (https://nutrisoil.com.au/wp-content/uploads/2021/11/NutriSoil-Case-Study-Col-Harper.pdf)
- The Benefits of Worms & Vermicast – Integrity Soils (https://integritysoils.com/blogs/articles/the-benefits-of-worms-and-vermicast)

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## More information

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