

# The good worm on compost





Home composting and worm farming is an important option we have in minimising and utilising waste. When done properly, home composting and worm farming will deliver valuable organic matter and nutrients for residential gardens, and with it a range of environmental and community benefits. Composting and worm farming can be a winner for everyone.

**Johannes Biala**  
Chair, Compost Queensland

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## Introduction

Waste is a mounting problem around the world – especially in rapidly growing cities like ours.

Each year on the Gold Coast we 'bury' enough waste in landfills to cram more than 1500 Olympic-sized swimming pools.

So, to protect our enviable lifestyle, economy and diverse environment, we must continue to find ways to reduce, reuse and recycle our waste.

The Gold Coast's 2020 Vision on Waste aims to reduce our reliance on landfills.



**Composting and worm farming at home** is fun, simple, economical and healthy for the environment, as well as us – and reduces the need for more tips and landfills.

This booklet is full of great advice on why and how we can set up our own worm farm, in a big back yard or tiny duplex patio and get going with great composting in our garden.

So, let's share the responsibility to better manage our waste and the benefits that come with it, rich black compost. Let's get the good worm on compost!

## Composting

### Why compost

Almost half the rubbish in tips and landfills is kitchen and garden waste and most of it can be composted. This reduces waste, decreases landfill sites and produces humus to make our gardens grow.

We can do this for little or no cost, it's easy!

### How to compost at home

Both, homemade and manufactured bins are great for composting.

If you want to make your own bin, scrap wood and chicken wire are ideal building materials. Or just punch some holes (large enough for aeration and drainage) in the sides of a 200-litre drum and attach a tight fitting lid or piece of old carpet.

Choose a shady garden bed, not too close to houses, and place it on level soil.

To start composting, fill the bottom of the bin with a layer of coarse material, such as sticks or twigs, to aerate and drain the compost. And start adding garden materials such as grass clippings, leaves or prunings, as well as kitchen scraps.



Make sure the right mix of green and brown materials goes into your compost bin. If you ensure that conditions are favourable, within about four months it's ready to use.

### How compost works

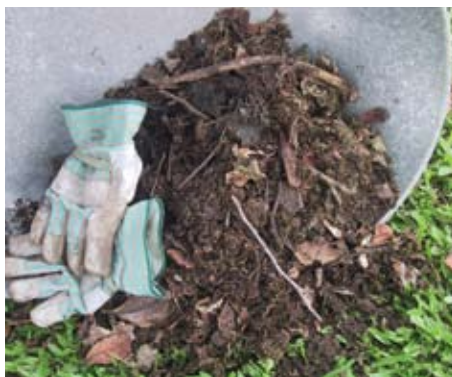
The compost bin simply mimics nature. It creates perfect conditions for good bacteria that do the hard work by breaking down and transforming the waste into rich earth suitable for the garden.

## Food

The trick to making rich, good compost is to provide adequate food, air and water.

A balance of 'green' and 'brown' foods helps create good compost. Green ingredients help the good bacteria reproduce and brown ingredients give the bacteria energy.

So when adding food scraps or fresh grass clippings (green), don't forget to throw in a handful of dry leaves or other dry/woody plant material (brown).



## What not to compost

- Rose cuttings and other garden residues with thorns or nettles, conifer prunings or pine needles.
- Compounds that are hard to handle or can kill micro-organisms in your compost – fat, oil, salt, disinfectants, antibiotics, herbicides, pesticides, waste recently sprayed with pesticides.
- Weeds with seeds, underground stems or bulbs, such as nut grass and oxalis.
- Diseased plant material, put them in the bin.
- Meat and dairy scraps, animal fat, bread or cake. They can attract rats and mice.
- Magazines.
- Treated wood products.
- Animal droppings – cat and dog droppings can spread disease.
- Septic tank sludge or toilet waste.
- Wastes that don't decompose – metals, glass and plastics.



### Green materials

**Kitchen organics** – fruit and vegetable scraps, including cooked table scraps, coffee grounds, egg shells, tea leaves and tea bags, wilted flowers and pot plants

**Garden organics** – grass cuttings, non woody garden prunings, green leaves, flowers, non-toxic weeds without seeds, underground stems or bulbs and vegetable remains

**Animal manure** – horse, chicken or cow

### Brown materials

- straw
- dry brown seedless weeds
- autumn leaves
- small amounts of shredded newspaper and paper tissues
- dry grass clippings
- wood chips, wood shavings and sawdust
- shredded / chipped tree and shrub prunings

## Air

Not enough air in compost may slow breakdown, produce bad smells, and create methane which is a potent greenhouse gas.

With enough air, bacteria thrive and make better compost more quickly.

Ensure material is turned into the hottest part of the heap to destroy weed seeds and pathogens, disease causing organisms.

### To create enough air

- Put twigs and other coarse materials in the mix.
- Punch holes in the container or insert a slotted pipe in the centre of the heap.
- Break up clumps of food waste.
- Put newspaper or sawdust in the mix to absorb excess moisture. A maximum of 10 per cent newspaper works well.
- Turn the heap with a fork regularly (once a week to once a month).
- Don't let it get too wet.
- Always mix fresh grass clippings with dry materials.

## Water

Keep the compost as moist as a wrung out sponge. To test, grab a handful and squeeze it. A few drops means it has enough moisture, otherwise add water.

If it's too wet, the compost will be heavy and clumpy, air won't get in and composting will be slow, which could create smells – so add dry absorbent materials.

For even water distribution, use a watering can while turning the pile. During dry weather, a cover and regular watering may be needed. A well-constructed compost bin will not become soggy.

Green materials such as food scraps and fresh grass clippings often contain lots of moisture, which can easily be balanced with dry brown materials.

Towards the end of the composting period, moisture can decrease so that it feels like rich soil.



“Compost that is stored uncovered can lose nutrients.”

## Using compost

When your compost is ready to use it will be crumbly, almost black and have an earthy smell. It's perfect for garden beds as a mulch or soil improver, spread on lawns, or as a component in potting mixes. Compost that is stored uncovered can lose nutrients.

Don't forget to wear gloves when working in the garden and with compost and wash your hands afterwards.

The 'how long will it take' question can not be answered easily as it depends on so many different factors including type and size of compost ingredients, moisture levels, frequency of turning, etc.

## Fixing composting snags

### My compost smells

- Rotten eggs (sulphur) – it's too wet, mix in dry leaves, shredded newspaper, sawdust, twigs and cover during rain.
- Ammonia (acidic) – too much 'green' materials and too wet. Add 'brown' materials, wood ash, dolomite, sawdust or newspaper.
- Bad – it needs air. Turn the layers and mix in green twigs and woody plant stems.

### My compost takes too long to break down

- Too dry, moisten it more regularly (but don't overwater).
- Not the right mixture of 'browns' and 'greens', adjust the mix, add more 'greens'.
- Woody material too thick, use shredded or chipped woody material.
- Needs air, turn the layers and mix in green twigs and woody plant stems.

### My compost attracts animals and flies

- Most flies in compost are small, harmless vinegar flies that are a healthy indicator for your pile.
- Unsuitable material such as meat, seafood, dairy products, oily or greasy products or faeces will attract animals.
- The general rules are to cover food additions with a layer of soil or finished compost and turn the pile regularly.

### Maggots/cockroach eggs in my compost

- Remove materials unsuitable for composting (see previous list), cover the maggots with lime and add soil/finished compost to the top – keep it covered and turn regularly.

### Mice and rats in my compost

- Too much bread – put fine wire mesh under the bin and set rodent traps.
- Too dry – moisten more regularly and sprinkle lightly with a watering can.

### Ants in my compost and it's dry to touch

- Add moist ingredients, such as fresh grass clippings or vegetable and fruit scraps and/or moisten gently until as wet as a wrung-out sponge.

## CASE STUDY Composting

### Mudgeeraba State School

A donated rotating compost bin has been central to turning a dry garden bed into a picturesque rainforest garden outside the Special Education Unit.

Mudgeeraba State School Special Education Unit teacher aid Sue McCulloch said the students wanted to start composting as part of their contribution to the environment.

"It also encourages them to eat healthy as some of them would be aware of the final product – that fruit and vegetable scraps can be turned into compost," she said.

"The rotating compost bin was donated by one of the teachers several years ago and it's been great for our garden, which was originally a dry bed. We composted, mulched, planted and included a bird feeder. All the kids were involved.

"The bin is about one metre wide, half a metre deep and spins. The kids love it. We put leaves, lawn clipping, paper and fruit scraps into it. The compost has been used to grow our herbs – spring onions, parsley, basil and oregano. We have lemon grass and we are planting some flowers.

Lenni Thompson with the rotating compost bin



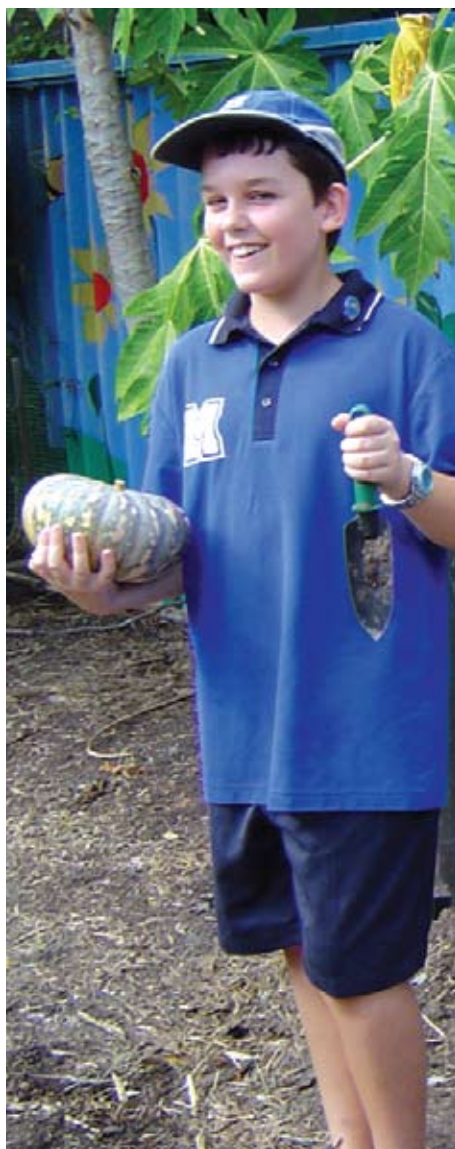
“The bin is about one metre wide, half a metre deep and spins. The kids love it. We put leaves, lawn clipping, paper and fruit scraps into it. The compost has been used to grow our herbs – spring onions, parsley, basil and oregano. We have lemon grass and we are planting some flowers.

“The kids go out there and do everything. Collect the scraps, water it and we’ve used some of what we’ve grown in our cooking.

“We’ve grown big pumpkins for soup. There is a passionfruit vine grown from somebody’s lunchbox, it fell out and seeded itself, and we are actually propagating our own seeds.”

The garden is 10 metres long and five metres wide – looked after by children aged 6 to 13 years.

“It takes time, but they know what it’s all about now and they are trying to get everyone in the school involved,” said Ms McCulloch.



Ben Heaven in the garden

## Worm farming

Another cheap way of using organic residues, grow compost worms!

There are 350 species of earthworms in Australia, although only a few are ‘special’ compost worms (such as Tiger and Red Worm). Only these special compost worms are able to thrive in the moist and nutrient rich conditions of a worm farm. They are generally more active and 20,000 of them will consume up to five kilos of organic residues a day.

### Growing worms

Worms love fruit and vegie scraps. And in return they will produce a rich natural fertiliser.

Best of all a worm farm can be set up in any backyard, unit or townhouse patio!

It’s a cheap and simple way to recycle food and garden waste, reduce rubbish in landfills and lower community costs in garbage collection and disposal.



“It’s a cheap and simple way to recycle food and garden waste”



### Worm farms

Old wooden drawers, plastic crates, bathtubs, large piping, polystyrene or wooden fruit boxes make good farms. Drill a 50-millimetre hole every 7.5 centimetres in the bottom of the box then turn the box over and drill from the other side. This will remove any shavings and ensure good drainage.

For a commercial worm farm, visit the local hardware store, check under 'worms' in the Yellow Pages or search the Internet.

Choose a shady spot with good drainage or a place under cover such as a garage or verandah. Put the container on bricks to



ensure drainage holes are clear and use a piece of cardboard or a wet Hessian bag on a wooden frame as a lid to allow air flow.

### Best beds

Before adding worms to your new worm farm, you have to prepare their bed. The right bedding is important – it should be light, fluffy and moist. A block of coir soaked in water or a mixture of mature compost, shredded wet paper or chopped straw make excellent bedding materials.

Soak the bedding mix and wring out till only a few drops of moisture remain before adding the worms, as their skins are sensitive and can be damaged by rough or dry beds.

Worms 'breathe' through their skin, so air and moisture are essential. Ensure beds don't compact and restrict ventilation. Mix in some straw or wood shavings with the worm food and gently move the surface about every two weeks.



### Moisture

The bedding must stay wet, yet it also has to be well drained and aerated. Sixty per cent moisture is best. This will circulate enough air to keep the worms healthy.

A spray bottle is also a good way to keep the bed moist. Use a pot plant moisture meter to help check levels especially on hot, windy days.

Fresh food scraps provide lots of moisture. If the worm farm is drying out regularly it may be getting too hot, try another position.

“Worms 'breathe' through their skin, so air and moisture are essential.”

## Temperature

A shady spot, adequate moisture and good ventilation will keep worms happy, healthy and breeding.

The bedding temperature inside should be 10 to 24 degrees celsius.

## Acid level

Every fortnight include a regular sprinkling of dolomite, garden lime or crushed egg shell to control acidic conditions. Wood ash is good too.

However, if unsure about acidity, testing kits are available from most garden shops.

Note: Excess coffee grounds, orange, lemon and other citrus peels are acidic and contribute to acidity in worm farms.

## Ventilation

Air is important for your worms to breath and for food scraps to decompose.

If there's not enough air, toxic gases could build up and kill the worms.

For better circulation, loosen the top layer of the bedding every two weeks.



## Feeding worms

Worms must have food to thrive! Because they have no teeth, they require food to soften or decompose at least partly before they can swallow it.

Take it slowly, particularly when first starting a worm farm. Begin with 2000 worms, add food every couple of days in small amounts and increase the volume as the worm population grows.

In the first seven days the worms will have to adapt to their environment and food source, so only feed them lightly.

Worms can consume up to half their body weight a day - the more soft food you give them, the quicker they will eat it.

About 2000 worms, weighing half a kilogram, can eat half to one kilogram of food every three to five days.

As worm numbers grow, so does their appetite. To judge the feeding rate, supply food for a few days. When it's almost gone, add more.

However, don't overfeed them because uneaten food will simply rot, create a smelly worm farm and result in acidic conditions the worms don't like. Excess food can be frozen, and then thawed when needed.



## What to feed

- Fruit and vegie scraps and peelings.
- Moist cardboard and paper.
- Crushed eggshells.
- Cooked rice and pasta scraps.
- Ground wheat, corn or flours.
- Leaves and dead grass clippings.
- Tea and coffee grounds.



## Feed only in moderation

- Fresh manure - pig, sheep, horse.
- Fresh grass clippings (gets too hot if too much is added).
- Acidic foods like citrus fruits, pineapple, kiwifruit or tomatoes.
- Bread and pizza.

## What not to feed

- Salty food and vinegar, like salted peanuts and chips.
- Spicy food like curry.
- Onion, garlic and shallots.
- Cat and dog manure.
- Manure from recently wormed animals.
- Contaminated materials like sawdust from treated wood.
- Meat, bones and poultry.
- Dairy food and cereal.
- Chicken manure.
- Animal feed.

### Worm feeding tips

- Divide the bin into three or four imaginary segments, and add food, rotating through segments.
- Spray dry ingredients with water before adding.
- Break food into small pieces or cut it in strips before it 'ages'.
- 'Age' scraps for a few days, and stir from time to time to generate air, before adding to worm farm.
- Regularly add crushed eggshell, dolomite or garden lime to the bin to balance pH and to avoid calcium deficiency in worms.
- To prevent insects, fruit flies or mould cover fresh food with hessian, cardboard or old carpet.



"Break food into small pieces or cut it in strips before it 'ages'."

"Moisture drained from the worm farm is a good liquid fertiliser when diluted."

### Using worm castings

Castings are worm manure, a nutrient-rich earth-like substance, similar to compost and what is left behind after the worms have eaten their food. It's perfect for many garden applications, such as planting out seedlings, boosting garden plants (vegetables, flowers, fruit trees), amending poor soils, top-dressing lawns, or enriching potting mixes.

If used to top dress garden beds or pot plants, castings should be covered with a layer of mulch to prevent them from drying out.

Moisture drained from the worm farm is a good liquid fertiliser when diluted.

**Remember:** As with all gardening, wear gloves when handling castings, and wash them afterwards

## Removing worm casts

The castings are ready to be removed when the material is 'earthy' in consistency.

Take a few inches off the top to be used as new bedding material, move the remainder to one side, add the new bedding and top up with more food. Gradually the worms will migrate to the new side.

Leave the old bedding for about a month to allow worm eggs to hatch. Remove the castings, leaving some castings behind as fresh bedding to start the process over again.

**'A well maintained worm farm will double every two or three months!'**

## Worm breeding

A well maintained worm farm will double every two or three months!

As hermaphrodites, all mature worms with a prominent band can have babies.

Babies hatch from the capsules in 30 days and are ready to breed 55 to 70 days later.

Capsules, the size of a grape seed, produce about 12 babies per week. Initially they are soft and milky white, but quickly harden, turn a light lemon colour, then various tones of yellow and finally a rusty brown.

When capsules are transparent, the babies have hatched. The worms are also transparent with a red tinge and may not be visible in the first few weeks.

There's no chance of breeding too many worms because they adapt their breeding to their available space and food. When they reach capacity, they stop breeding.



## Most asked questions

### How do I keep ants out of my worm farm?

Add water and some garden lime or dolomite. If they persist smear some petroleum jelly around the bedding legs.

### What if my worm farm attracts flies?

Maybe there's too much food. Vinegar flies cause no harm, but to eradicate too many fill a jar lid with vinegar and place it in one corner to drown most of the flies or add dolomite or eggshells. To prevent insects or fruit flies, bury the food under the surface. Also keep the surface covered with a damp newspaper or Hessian bag.

### What if the bedding smells bad?

Maybe there's too much food. Stop feeding to allow the worms to catch up.

### Can I go on holidays?

Yes, take a break – established worm farms can be left for six to eight weeks (some schools will leave them for the entire summer holidays). Just make sure they get a big feed before heading off and the farm is in a shaded, cool spot and covered with soaked newspaper or Hessian.

### What if the bedding is sopping wet?

Mix in some dry bedding to absorb excess moisture and leave the cover/lid off until it returns to normal moisture level.

### What if the bedding is too dry?

Add cool water and keep the cover/lid on the worm farm.

### What if the worms try to crawl out?

Check the moisture, pH and temperature and correct whichever is inappropriate.

## CASE STUDY **Worm farming**

### **Coolangatta Special School**

What started with the donation of one old bathtub and 1000 compost worms grew to nine tubs and almost 30,000 worms in just three years!

Coolangatta Special School farm in the Currumbin Valley, is a gardening, Wipe out Waste and Keep Australia Beautiful fresh on the menu award winner. It is also a frontrunner in growing composting worms, which it sells to other budding worm farmers.

Environment Coordinator, Colleen Duncalfe, said a volunteer worked with the students twice weekly to water, feed and extract the juices from the worms. The juices are diluted and used on the gardens in the 12-acre property.

"It was something we've always wanted to do. We thought it was a great idea and it just got bigger and bigger," said Ms Duncalfe.

"It's all part of our sustainable living here."

The school is fortunate to have access to horse manure from a local riding school, and includes their fruit and vegetable scraps as food for the worms.

From left: Ms Duncalfe, Sam Cleaver and Tiarne Wilson



"Everything is recycled here, even the rubber bands that bundle the vegies together are reused," said Ms Duncalfe.

"Starting the worm farm was a great opportunity for us because we have the space, the gardens and the students can take part. The students come and get the lettuce, feed the worms and water them because you can't let it get too dry.

"They collect the liquid juice, and it's their job with a staff member to place it on the garden. And they are responsible for collecting the animal manure for the compost heap."

The school also sells worm farms, ready to go. Sizes can be made to order. For further information contact 5533 0312



"Starting the worm farm was a great opportunity for us because we have the space, the gardens and the students can take part."

## Acknowledgements

### Thanks to the following information sources:

- [ecorecycle.vic.gov.au](http://ecorecycle.vic.gov.au)
- [epa.qld.gov.au](http://epa.qld.gov.au)
- [squirmy-worms.com](http://squirmy-worms.com)
- [brisbane.qld.gov.au](http://brisbane.qld.gov.au)

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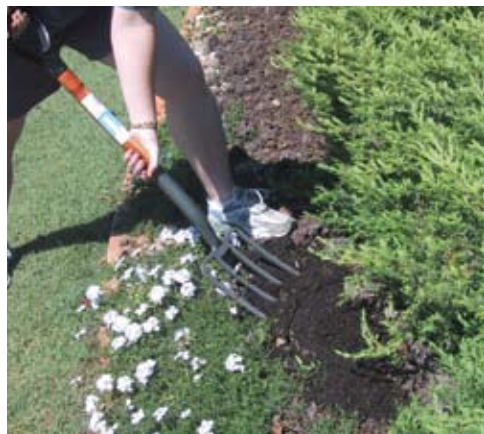
### Other publications of interest:

- Better gardening – Gold Coast City Council free publication about conserving water in our gardens



This guide is a result of a survey of residents during December 2004. The survey included 420 randomly selected Gold Coast residents and showed that:

- A third of residents use organic household waste to create compost
- 69.5 per cent of residents believe composting is an important issue in waste management
- 82.3 per cent believe educational programs on composting procedures should be provided by Council to show how to compost or worm farm.
- Residents composting were more likely to be a member of a garden club and, on average, spent more time in the garden each week than those who did not use composting.
- Residents who used composting were also more likely to live in a home they owned.



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