



# NRM Education

climate change biodiversity water food air waste transport purchasing



## Recycling Food Waste and Other Organic Material

### Inspiration

As a natural part of living on this planet we consume food and as an unavoidable consequence of this consumption we produce large amounts of organic waste. It is reassuring to know that this organic material can be recycled and returned to the earth and provide valuable nutrients to successfully grow more food for the future.

This fact sheet will help you source all the resources you will need to help you and your students convert your food waste into reusable material rather than letting the waste go to landfill. This can be achieved through a number of ways; by building a compost heap, establishing a worm farm or setting up a Bokashi system.

### Composting

“Composting is one of the most ancient of agricultural and horticultural skills and is fundamental to successful organic gardening. By definition it is a means of reclaiming plant nutrients in an available form, from any biodegradable material of mostly organic origin.”

Peter Bennet 1981

### Success stories



Compost material can be emptied into a wheel barrow below.

#### Nazareth Primary School

Senior student monitors, collect all food waste daily and fill the compost tumbler. This school site is relatively new and resources are building slowly. In time an additional compost bin will be employed to allow the composting cycle in one bin to complete while the second is being filled.

Oxygen is a vital part of aerobic decomposition and a plentiful supply will speed up the process.

To ensure a good supply of air the composting material needs to be aerated regularly. This can be done by turning the compost heap over with a garden fork however this is a difficult task for some children. The compost tumbler is an excellent ergonomic solution making it an easy task for everyone.

Note if using a tumbler be sure to buy a quality product and that manufacturers can guarantee the quality of the product. One school had a tumbler stand fail.”





Compost bin with painted images act as a reminder for the students.

## Stradbroke Primary School

The students at Stradbroke enjoy painting images of organic material which can be used when building a compost bin. This helps foster ownership of the composting program and the compost bin.

The bins are located near a water supply to make watering in dry weather easier and staff help to maintain the bins by adding grass and other material such as weeds and pruning material.

## Worm farms

Worms can be encouraged to thrive in the vegetable garden so long as there is moisture and plenty of organic material such as pea straw or compost. They eat the surface material and burrow down into the soil leaving behind enriching organic material which will benefit the soil and in turn, the gardens produce. This process of breaking down organic material can be centralised by using a worm farm and feeding the worms all the food scraps generated by your school.

### Success stories



Students are taking records of liquid collected from the worms as part of the maths program. After diluting, bottling and labelling the final product is sold by UNICEF. Castings are used in the vegetable and permaculture garden.

## Stradbroke Primary School

Worm farms are an excellent launching pad for schools to learn the basics of food waste recycling. At Stradbroke each classroom has a worm compost bin and each building has a worm farm.

Monitors from junior primary simply put food scraps in the farm, with the teachers chopping up the scraps every Friday. The senior students have knives and chopping boards to chop the food up on a daily basis.

Each bin has a reminder card to inform the students about what food the worms will and won't eat.

Stradbroke School uses fabulous photos of worms as part of the science program to stimulate discussions about the life cycle of worms.



## Black Forest Primary

Organic waste bins are located next to each general waste bin. Each day monitors from a designated class collect the organic material and either feed the worms or place the material in the compost bin.

A roster system shares the daily responsibility of collection across the school. Both sections of the fridge can be effectively used for worm farms.

An old fridge/freezer with insulated linings, make an ideal temperature controlled home for the worms.

At Black Forest several bins are used to sort rubbish. This bin configuration is repeated throughout the school. The white buckets are used to collect all food scraps.



## Bokashi

The Bokashi food waste system uses beneficial micro-organisms to ferment kitchen scraps, preventing them from decaying and smelling bad. When the bucket is full the organic waste is buried in the garden and is readily incorporated into the soil. The Bokashi system offers many advantages over conventional food waste systems, including: reduced green house emissions, reduced odours and provides a more compact and portable system making it ideal for school use.

## Success stories



### Star of the Sea

The Bokashi bins are part of the environmental program at Star of the Sea. Each day reception and year 5 monitors collect all the food scraps from buckets located in each classroom.

The scraps are added to the Bokashi bins and sprinkled with a dry mixture which starts the fermenting process.

After 3 weeks when the bucket is full the remaining contents are added to the worms or buried in the vegetable garden.

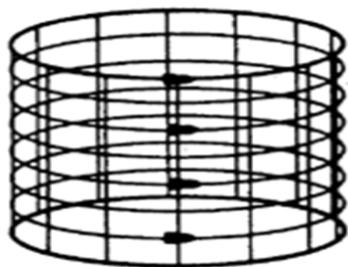
Bokashi liquid can be bottled and sold as liquid fertiliser to raise funds. This is a great activity which can be incorporated with other school programs.

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## Getting Started

### Composting



Source Watkins products

#### Option A - Wire frames

Wire frames are a great way of keeping a compost heap contained. Plastic coated fencing wire will have a long life but galvanised is also good. Simply multiply the diameter that you require by 3.2 to calculate the required length of material.

The two ends can be fastened together with wire or chain snaps to form a circle.

#### Option B - Plastic bins

A large range of plastic bins are available from hardware stores and garden centres. Some councils, such as Burnside, sell bins to local residents at cost price.

This split bin used at Plympton Primary provides good access for aerating and emptying when composting is complete.



At Black Forest Primary a series of bins provides enough storage, as well as allowing the full bins to decompose while the third bin is being filled.



#### Option C - Timber construction

For the real enthusiast a series of bays can be made. This is useful for turning material from one bay to the next. A third bay can be used to store material that will be used for the next compost heap.

The scale of this operation suits a school with plenty of organic material, including lawn clippings, pruning material and leaves.



#### Option D - Compost tumbler

Compost tumblers are a more expensive option however they offer several benefits. Their ergonomic design makes it possible to aerate the compost by turning the tumbler. This requires no additional tools and is a cleaner and easier process.



Source Picsearch

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When the compost material has broken down the tumbler can be turned so the opening is at the bottom and the contents spill out below.

## Compost Recipe



**Black Forest use this as a guide for staff and students to help build a successful compost**

Ingredients  $\frac{1}{2}$  **Brown stuff** (carbon rich)

- paper
- cardboard
- dry straw
- dry twigs
- dead leaves

$\frac{1}{4}$  **Green Stuff** (nitrogen rich)

- Green leaves
- Grass clippings
- Weeds
- Manure

$\frac{1}{4}$  **Food scraps**

- fruit and vegetable scraps
- coffee grounds
- bread

At Black Forest an A3 laminated sheet hangs next to the compost bins

## Using the ADAM Principles

**A**liveness  
**D**iversity  
**A**eration and  
**M**oisture

These principles outline the basics of what compost needs. Many schools have reported that the information contained within these links to be very useful. Below are links to some fact sheets which explain these principles in a variety of ways.

[http://www.manningham.vic.gov.au/maccwr/\\_assets/main/lib90021/02%20-%20pdf%20files/compostingbrochure.pdf](http://www.manningham.vic.gov.au/maccwr/_assets/main/lib90021/02%20-%20pdf%20files/compostingbrochure.pdf) or google Manningham council and search for composting

<http://www.manly.nsw.gov.au/ignitionSuite/uploads/docs/Manly%20Council's%20Compost%20Guide.pdf> or or google Manly council and search for composting.

<http://www.sustainableillawarra.com.au/pdf/Composting-fact-sheet.pdf> or Google the ADAM principles of composting.

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## Worm Farming

### Layered worm farm

**Lid**  
With air holes

**Moist Mat**  
A moist cloth mat provides moisture and darkness for the worms

**3<sup>rd</sup> Working Tray**  
The most recent layer to be added is now the most active feeding layer

**2<sup>nd</sup> Working Tray**  
Second most recent layer to be added and is now a less active feeding layer.

**1<sup>st</sup> Working Tray**  
The farm starts with this single layer and the 2<sup>nd</sup> layer is only added when bottom layer is completely full. This provides contact with layer above and the worms are then able to move up to new food supplies. When all layers have been added and the top layer is full, the castings in the bottom layer are used in the garden and this layer now moves to the top.

**Collection Tray**  
Harvests the liquid

**Tap**  
For gathering 'worm juice' liquid

Source Property 24 .com



Worm farm in fridge

An old small fridge makes an ideal container to protect the worms from extreme temperatures.

Drain holes need to be made and the fridge needs to be set on a gentle slope to aid with drainage. A hole has been created, in both the freezer and fridge section, at the back of the fridge (now the bottom of the fridge) to create drainage. The holes should be located in corresponding corners of each section to facilitate drainage.

The fridge has also been raised off the ground to allow access underneath to gather the worm liquid as it drains out. Here the system works in a horizontal manner rather than vertically.

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## *Worm Menu*

As a guide worms will eat anything that was once living. This includes:

- Left over vegetable scraps, fruit and vegetable peelings
- Manures (well aged)
- Tea leaves/bags and coffee grounds
- Vacuum cleaner dust or hair clippings (also animal)
- Torn up newspapers, egg and milk or pizza cartons (soaked first)
- Crushed egg shells (This will help with the pH balance).

## *Bokashi Systems*



Bokashi Bucket

This compact and mobile system can be used in doors as there is little odour and the unit is sealed.

The system is essentially a bucket with a rack at the base to allow the liquid to drain through. Periodically the liquid can be drained via the tap.

Star of the Sea students make their own active ingredient in bulk and the measuring and mixing offers an ideal opportunity for the students to become more involved. However the activating mixture can be readily purchased from suppliers.

## *Integrating the compost or worm farm with other school activities*

- broken down organic matter can be recycled to the benefit of the food garden
- the process of fund raising, through the sale of the worm liquid, can be applied to programs such as maths
- school culture and sustainability can be reinforced
- on site recycling of organic material can help to minimise transport and carbon footprints
- compost bins and Bokashi systems can become an integral part of the food garden.

## *Site selection*

- organic waste buckets with lids can be located at each class room
- worm farms can be located outside each main building or with the veggie patch
- composting activities are often integrated with vegetable gardens or
- a more central location in conjunction with a water supply may be more practical.

## *Benefits for Students*

- seeing how living organisms such as bacteria or worms breakdown organic material into reusable nutrients that can be reused by a new generation of plants.
- pride in preventing waste going to landfill
- volunteering for watering and maintaining the compost
- taking responsibility
- increasing respect and understanding for the food chain.

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## Web links

**Burnside City Council:** Down loadable PDF A guide to better composting  
[www.burnside.sa.gov.au/site/page.cfm?u=1144](http://www.burnside.sa.gov.au/site/page.cfm?u=1144)

**Yates** How to make compost, a useful guide which lists what to include and exclude.  
<http://www.yates.com.au/garden-guide/projects/how-to-make-compost/>

**Go organic.** An Australian organisation with many organic gardening tips, including composting.  
<http://www.goorganic.com.au/compost.htm>

**Media Launch.** This site has a very comprehensive fact sheet on composting and includes many useful references.  
<http://www.medialaunch.com.au/39/GENERIC2.html>

**Burke's Back Yard.** Fact sheet on building a compost heap and how to use the final product  
<http://www.burkesbackyard.com.au/factsheets/Gardening-Tips-Books-Techniques-and-Tools/Making-compost/6077>

**Gardening Australia.** Building a worm farm.  
<http://www.abc.net.au/gardening/stories/s1620935.htm>

**Campbelltown City Council.** Great site on sustainable living including worm farms and making compost  
<http://www.campbelltown.nsw.gov.au/default.asp?iNavCatID=2962&iSubCatID=1884>

**ReIn: Can-O-worms**  
[http://www.reln.com.au/pdfs/Can-O-Worms\\_Booklet.pdf](http://www.reln.com.au/pdfs/Can-O-Worms_Booklet.pdf)

**Bokashi Composting Australia**  
<http://www.bokashi.com.au/>

**Hunter Gatherer Designs-** Bokashi Composting  
<http://www.hgd.com.au/bokashi/index.html>

**Waste Wise WA** Information on worm composting  
<http://www.wastewise.wa.gov.au/for-students/build-a-worm-farm-game.html>

**Every Day Sustainable Living** workshops on composting and worm farming  
<http://www.everydaysustainableliving.com/EDSL.php>

**Curriculum in School Gardens** This page suggests ways in which you can link recycling of food waste into your school curriculum.  
<http://nrmeducation.net.au/index.php?page=professional-development-2>

**Food Gardens Video** - This informative video can be found on our NRM Education web site. It discusses how to establish a food garden. Just scroll down the page on the following link to locate the video.  
<http://nrmeducation.net.au/index.php?page=resources-2>

**Black Forest Primary School Garden Movie Clip** – This video offers a great insight into how this well know food garden was established and is currently used as an integral part of the schools curriculum.  
<http://nrmeducation.net.au/index.php?page=resources-2>

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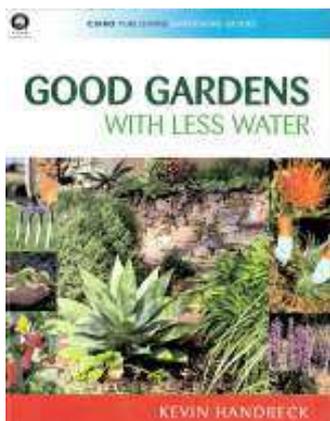
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## Books

The following books all have useful sections on composting and are available for loan through the NRM Education Library (see link below). Those individually noted also have information on worm farms.

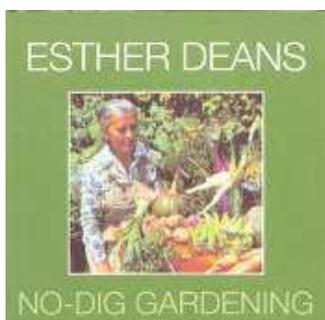
[http://www.waterwatchadelaide.net.au/uploads/file/new\\_waterwatch\\_files/equipment/library\\_list\\_gardens.pdf](http://www.waterwatchadelaide.net.au/uploads/file/new_waterwatch_files/equipment/library_list_gardens.pdf)



### GB3 - Good Gardens with less water (book)

2008, CSIRO Publishing

“This beautifully illustrated, full-colour book contains a wealth of information on such key topics as: how to improve soil structure to maximise the retention of water for use by plants; selecting drought-tolerant native and exotic plants; working out how much water to apply to different types of plants; choosing the best lawn grass for your climate; rainwater harvesting and use; and how to avoid problems when grey water is used in the garden. With specific chapters devoted to watering systems and equipment, mulches, planting techniques and potted plants, this book offers practical solutions for anyone who wishes to garden sustainably.”



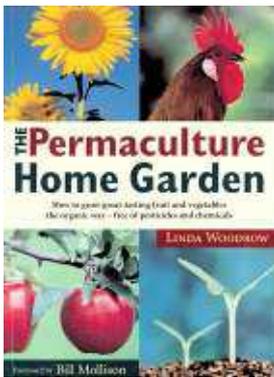
### GB10 - Esther Deans no-dig gardening & leaves of life (book)

2002, Harper Collins “Esther Deans’

“Growing Without Digging” and “Leaves of Life” inspired thousands of people to try their hand at growing their own vegetables and flowers at home. Now these two garden classics are available in a combined mini-paperback format with all the wonderful tips and advice from the first two editions. Esther Deans’ method of growing vegetables and flowers without digging produces results - as those who have been to see her own garden will testify. Flowers and vegetables grow side by side, as if nature had scattered the seeds on the ground and plants had simply sprung up from where they fell.”

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## **GB12 - The Permaculture Home Garden: how to grow great-tasting fruit and vegetables the organic way - free of pesticides and**

1996, Penguin

This book has information on both composting and worm farms

“Inspired by her own training in permaculture, Linda Woodrow has devised a totally integrated organic system of gardening that combines science with common sense. In *The Permaculture Home Garden* she draws us into a warmly welcoming household where everyone shares the planting, helps to tend the hens, and relaxes after a satisfying day's work. Step-by-step instructions and helpful diagrams make it easy to plan and plant a garden to suit your taste and space – a garden that not only looks wonderful but also yields bountiful fruit, herbs and vegetables.”

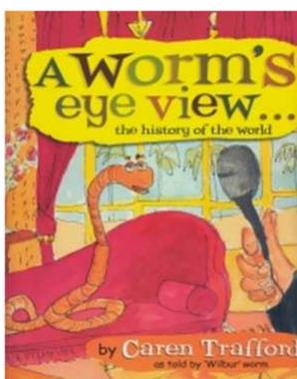


## **GB5 - One Magic Square: grow your own food on one square metre (book)**

2008, Wakefield Press

This book has information on both composting and worm farms.

“One Magic Square shows how, with a ten-minute effort, you can start your own productive food garden on a single square metre. By following these plot designs you can keep your labour pleasurable as your self-sufficiency increases. Take control of your own fresh food supply! Food gardening is the most intelligent adult endeavour on earth – Lolo Houbein shows you how to do it, and why you should.”



## **A worm's eye view; the history of the world**

“This book charts the worm's progress, from the earliest days to today when, believe it or not, worms are dining and holidaying in 5 star restaurants and resorts. They love it. We are helping them and they are helping us and the planet.”

"This book results in the best kind of learning ... the sneaky sort that happens when you are having fun. It's a delight."  
Sandra Mc Ewan, Curator Biotechnology, Powerhouse Museum

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## Material Suppliers



**Gedye compost bin** is one of the better brands, which has a well fitting lid and fluted sides to absorb any radiant heat from the sun.

Local councils often encourage the use of compost bins by making them available to local residents via council chambers.

This style of bin is readily available from hardware and garden centres or contact Tumbleweed Sales Pty. Ltd on 1800 809 088 for their nearest stockist.



**Compost Mate Aerator** Can be purchased from Very Edible Gardens <http://www.veryediblegardens.com/>

The turning action of this tool makes it easy to penetrate the heap but then requires some strength to lift its load.

There are variations of this concept and such tools are available from hardware stores online garden supplies and local councils such as Burnside City Council.



### Can o Worms

These are readily available from all large hardware stores.

Variations can be found through the internet.



### Bokashi systems

Ecolateral

451 Magill Road

Hunter Gatherers Designs

<http://www.hgd.com.au/bokashi/index.html>

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## *Funding Sources*

Typically grants come up four times a year. The application forms are about two pages in length. If you're unsuccessful the first time, make enquires about how to improve your application and simply try again in three months time. It is more practical to start with the simple grants rather than the big ones.

Coles Community grants Program or Google - Coles and Landcare

[http://svc018.wic008tv.server-web.com/funding\\_opportunity\\_details.asp?fo\\_id=6](http://svc018.wic008tv.server-web.com/funding_opportunity_details.asp?fo_id=6)

Yates Landcare Australia Junior Landcare Grants Program

<http://www.yates.com.au/feature/landcare-australia---junior-landcare-grants-program/>

Australia Post Grants

[http://www.auspost.com.au/GAC\\_File\\_Metafile/0,,3196\\_juniorlandcaregrantsapplicationform.00.doc](http://www.auspost.com.au/GAC_File_Metafile/0,,3196_juniorlandcaregrantsapplicationform.00.doc)

Woolworths Fresh Food Kids

<http://www.freshfoodkids.com.au/community/community-grants/apply/>

Stephanie Alexander Scheme

<http://www.healthyactive.gov.au/internet/healthyactive/publishing.nsf/Content/grants>

Australian Open Garden Scheme

<http://www.opengarden.org.au/grants.html>

Local Council Grants

Contact your local council to see if a grant is available

Google 'Environmental Grants' for more extensive options

## *Acknowledgements*

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Michael De Boo

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