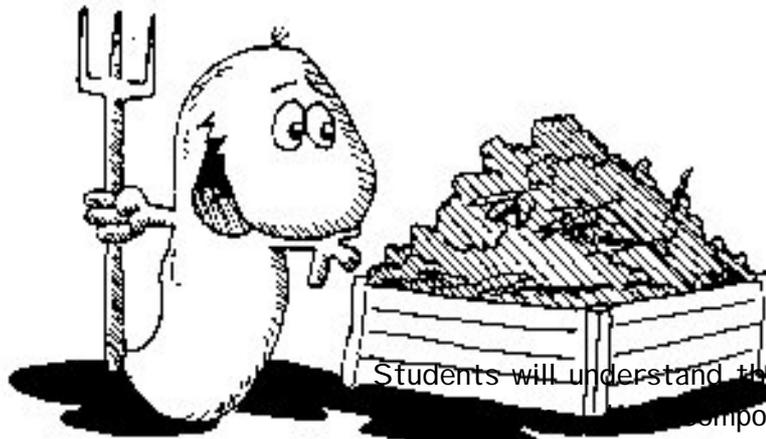


## ORGANIC WASTE - Composting and Wormfarming



### OBJECTIVES:

Students will understand that organic waste, through composting or wormfarming, be made into a natural fertiliser and soil conditioner. They will learn how to make compost and wormfarms.

### BACKGROUND INFORMATION:

From the Gisborne Household Rubbish Survey (1995 - see Waste section), it was shown that half of what we throw away is organic

Compost is nature's way of recycling. Dead plants break down naturally in forests and paddocks and provide the living plants with food.

Composting/Wormfarming sets up the same kind of process in your own garden. It speeds up the natural process and uses organic waste to make up rich fertiliser. This can be returned to the garden and improves the soil by adding nutrients, micro-organisms, worms and improving the soils structure and texture.

For organic waste to change into compost/vermicompost it needs oxygen, moisture, warmth, micro-organisms and worms. Vermicomposting is composting using worms rather than the thermo type of composting. This normally happens in a compost heap once the heat declines.

Very little composting takes place in the landfill mainly because there is no oxygen. Composting can greatly reduce the amount of space occupied in the landfill.

A successful composting system relies on a variety of organic material going in. A mixture of dry (brown) and wet(green) waste. Gisborne has a commercial operations where the public take their trailer load of hedge clippings and garden waste and it is mulched and made into compost that can further be sold as a soil conditioner. Gisborne also has a commercial wormfarm taking food scraps and soft green waste.

Individuals or groups can hire (or purchase) garden mulchers to convert sticks and branches to a fine material suitable for composting.

### **MAKING YOUR OWN WORMBIN**

Be resourceful and use your recycling skills. Suggested recycled bins are:

- ❖ Old fruit bins (you may need to line these with plastic-punch holes in the base for drainage)
- ❖ Old baths
- ❖ Old shower bases with sides made of recycled timber or iron
- ❖ A bed one square metre in size can house up to 5 kilograms of worms

Other materials you will need are :

- ❖ A lid
- ❖ Safe bedding (about 15-30cm of compost in the base of the bin)
- ❖ A layer of black plastic and underfelt to cover the food (- keeps the bin dark and moist).
- ❖ Dolomite or lime may be needed if the bin gets too acidic

### The Worms:

The worms you will need are tiger worms or you can use those from your home compost bin. Tiger worms can be purchased from commercial wormfarmers.

Worms eat their own weight in food daily. They have no teeth so the food must be soft and moist, having been partly broken down by bacteria and fungi, before the worms can ingest the food.

There are about 4000 worms in 1 kilogram of worms. In one week these should eat 5-7 kg of organic waste (a school with 100 pupils normally produces twice this amount each week). The rich vermicast is the waste that is passed out of the worm.

One kilogram of worms can, in good conditions, breed up to 5 -15 kilograms in 2 years.

After a few months creatures other than earthworms often appear. These assist the breakdown process. Try and identify these.

### Wormfood:

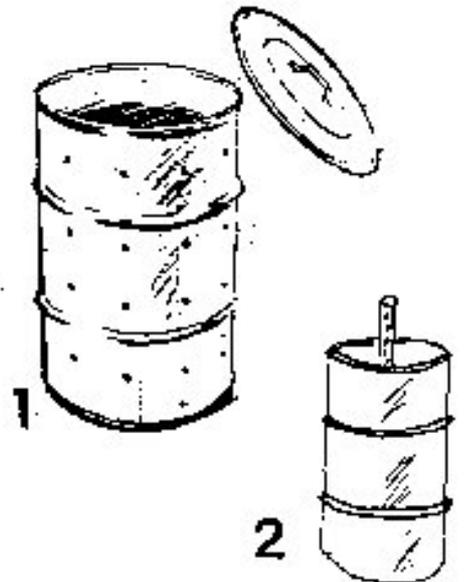
The worms will eat anything that was once alive ie. Organic. They have preferences and will shy away from their less preferred food such as citrus and onions. They especially like food that has air-gaps through it. For this reason it can be a good idea to feed them food parcels. Take the days food from the bin, wrap it in newspaper, and place the newspaper parcel into the wormbin. This keeps it tidy, introduces carbon (a quarter of the food should be carbon based, such as paper), and creates air pockets for the worms.

## MAKING YOUR OWN COMPOST

### Compost Bin

You could use any of the following variations on them (make sure it is aerated):

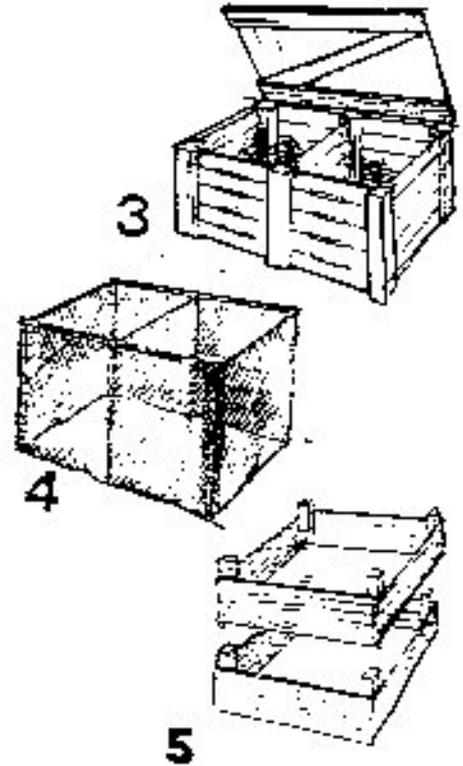
1. 100 litre drum - cut the top and bottom out of the drum and drill holes in the sides to let air flow through. Site the drum on bricks and cover it with a lid or a sack.
2. Drum - cut the top and bottom out of the drum. Insert a piece of piping with holes drilled into it or drainage pipe in the centre for air to flow through. Sit the drum on bricks and cover it with a lid or sack.



3. Bins can be made from wood, bricks and concrete blocks. Be sure to leave holds for air and a way to get in from the front.
4. A bin can be made with a frame of metal or wooden stakes and sides of plastic or wire mesh.

This is best made in two parts - one part can be composting while the other is being filled. The sides can be pulled away to take out the finished compost.

5. Stacking bin - frames can be made from planks nailed to thicker wood at the corners. They are easy to move and can be stacked to make large amounts of compost.



It is better to have two bins so that one can be turned or used while the other is being added to.

Find a **SUNNY SPOT** to put your compost heap. Fork over the soil before you start so that worms can move up into the heap.

#### **ADD:**

- ❖ Start off with a layer of coarse twiggy material - this will assist with drainage.
- ❖ Now alternate layers of **browns** and **greens** (never too thick a pile of greens such as lawn clippings).
  - **Browns:** These are high in carbon and other elements e.g. untreated sawdust, woodshavings or woodash, dry leaves, hay / straw, peat, paper, egg shells, dust (e.g. from vacuum cleaner).
  - **Greens:** These are high in nitrogen e.g. vegetable and fruit scraps, tea leaves and coffee grounds, lawn and fine hedge

clippings, hair and fur, blood and bone, seaweed, animal manure, chopped weeds (care).

- ❖ Every now and again add a shovel or two of soil, blood and bone and in areas like Gisborne where it can be very dry in summer, a sprinkling of water.
- ❖ Cover to control moisture, achieve darkness and retain heat.
- ❖ Turn - the more often this is done, the quicker the composting time.
- ❖ Use it:
  - as a potting mix (mixed with sand or pumice)
  - for mulching
  - dig it in (no dig methods can be used where a few layers of newsprint are placed on the ground and compost placed over this).

happy gardening

**DO NOT ADD:**

- ❖ Thick woody stems (these take too long to rot).
- ❖ Not problem weeds such as oxalis, dock, couch or ripe seed heads.
- ❖ Diseased plant material.
- ❖ Food scraps - encourage pests e.g. meat, fat, dairy products, bones, bread etc.
- ❖ Non biodegradable materials and toxic substances (treated wood, disinfectants etc).

Composting can achieve a bad reputation because of smell and vermin.

This will not happen if you use quality wastes and ensure aeration by timing plus moisture / temperature control.

## Diagram of a Compost Heap



### Class Plan (Levels

1. Ask class i mple  
of the finished compost to school or visit a home gardener and collect some.

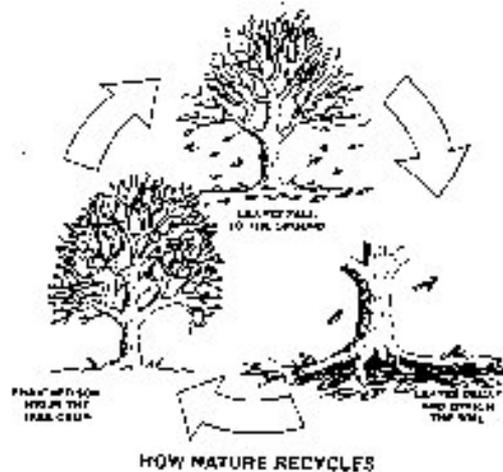
Bring a small sample of commercial potting mix.

2. Use your senses - feel, smell, look.  
Discuss the difference with the class (seedlings often grow better in commercial potting mix as it has been sterilised. Sand or pumice is added to assist drainage).
3. Plant some seeds in the compost and commercial potting mix (you could also include some garden soil).

4. Watch them grow.
  
5. Discuss what is needed to make compost. Discuss how the children could make compost.
  
6. Dig a trench outside and fill it with layers of organic material as described in background notes.
  
7. Make a small wormery  
Each student will need 2 soft drink bottles (2 litre, with top cut off, and 300 ml – the 300ml bottle is filled with water and sits inside the larger bottle. This forces the worms to the outside so they can be readily observed).  
Make 3cm layers within the outer bottle of compost, sand, fresh food.  
Add 10 worms. Cover with a paper sleeve to keep dark. Observe the layers mix and move and the level of the layers.
  
8. Study Natural Cycles.  
Find an area of trees and shrubs within the school grounds or in a nearby park or reserve.

Make the connection that leaves become soil by letting the children see and feel the layers of leaf and soil that you have collected. Have children dig a small hole through the leaf layer into the soil. Have children make sketches and take notes on what they observe.

Help children understand that a tree's leaves fall, decay into the soil, nourish the tree by making the soil richer, and thus help the tree to grow and produce more leaves. Explain further to the children that the leaves produce oxygen for us to breathe. Tell them that a series of events in nature that repeat over and over is called a NATURAL CYCLE. Explain also the role that bacteria, worms and slugs have to play in this process. Not only is it a natural cycle, but a living cycle.



#### Materials:

- »» Samples of compost and potting mix
- »» Yoghurt or milk containers to grow seeds in
- »» Seeds
- »» Spade (for trench)

#### Class Plan (Levels 3 and 4)

1. Ask class if anyone has compost at home. Get students to bring a sample of the finished compost to school.

Bring a small sample of commercial potting mix.

2. Discuss the difference with the class (seedlings often grow better in commercial potting mix as it has been sterilised. Sand or pumice is added to assist drainage).
3. Discuss what is needed to make compost. Discuss how the children could make compost.
4. Have students draw pictures / poster.
5. Help the students build a **mini-compost bin** e.g. perforated drum as outlined in "Background Notes" OR start a **School Compost Bin** or **Wormfarm** (refer to notes).

Talk with your syndicate, senior staff, Board of Trustees, caretaker etc to establish the scope of the scheme. Involve your class in planning the site, construction of bins, costings, permission from the Principal and Board of Trustees and maintenance. Decide what will go into the bin (fruit scraps, garden weeds, lawn clippings, prunings etc). How will these be collected, will they need shredding? What about flies, rats, safety, smells? Should the bin be covered? Do we need to turn it over occasionally? Where are we going to use our compost? Will two bins be enough? Phone Gisborne District Council Environmental Health Section (06) 867 2049 for composting information and assistance.

**Materials:**

- »» Samples of compost and potting mix
- »» Container for compost or wormfarm
- »» Organic material to add
- »» Worms if making a wormfarm
- »» Fork / spade for turning