

UNIT 8: COMPOST

VOCABULARY

Acidity
Chemical
Compost bin
Compost heap
Fertilise
Fungi
Herbaceous
Humus
Leaves
Moisture
Organic matter
Soil organisms
Vermin

Biodegradable
Compost
Decay
Decompose
Food scraps
Garden
Horticulture
Inorganic
Lime
Natural
Rot
Soil structure
Woody tissues

Lawn clippings
Microorganisms
Nutrients
Slaters
Temperature
Worms



BACKGROUND

COMPOST is a natural fertiliser and soil conditioner that can be made at home from organic wastes. In a compost heap, these wastes are converted into a rich humus by soil microorganisms, insects and earthworms.

Composting has many benefits; it improves soil by returning nutrients and adding texture, it's low cost and easy to make, and it reduces the amount of rubbish sent to landfills. Compost bins can be easily made from wire, plastic or wood. A good portion of food and garden waste can be placed in a compost bin such as egg shells, grass clippings, soil, fruit peels, tea bags, seaweed, sawdust and shredded newspaper.

COMPOST

Materials students may bring from home

small piece of fence or chicken wire
string
small used piece of plastic sheeting or carpet
food scraps, leaves, grass clippings, wood chips

500g kitchen scraps
square plastic bin or wooden box
small pile of earth from the garden
500g of ready rotted compost or fruit/veg
newspaper strips
eggshells



LET IT ROT!!!

Organic Waste and Composting

KEY CONCEPT

Food scraps and garden waste can easily be made into compost.

Compost fertilises the soil.

LEARNING OBJECTIVES

Students will learn what organic waste is comprised of and how it can be made into compost.

MATERIALS

- Worksheet 23, "How To Build A Mini-Composter"

BACKGROUND INFORMATION

An estimated 25-30% of what we throw away is food scraps and garden waste. This material can easily be made into an organic substance called compost.

Compost or humus results from the natural breakdown of organic matter. Compost is an excellent fertiliser as it is high in carbon and nitrogen, both of which are important foods for plants.

Composting reduces the amount of waste we create. Then the finished compost recycles nutrients back into soil and plant life.

LEARNING STEPS

1. Students discuss the types of food scraps they throw away.
2. Have the students draw pictures of

what their kitchen waste looks like. Ask "What happens to these scraps once they go into the bin? Are there ways to recycle that food waste?"

Here are some ideas:

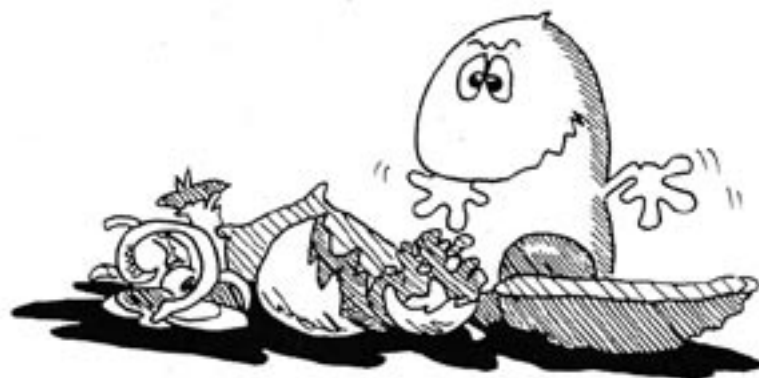
- Home composting bin (see "How to set up a compost bin")
 - Buried directly in trenches in the garden
 - Take to composting companies
3. What does a compost bin look like? Have students draw picture/collages. Discuss how food and garden waste decompose in a compost heap.
 4. Explain that burning food scraps is unacceptable because of the odour, pollution emitted, and atmospheric warming.
 5. Help the students to build a mini-composter.

EXTRA ACTIVITIES

1. Visit a Keen Gardener

Plan a visit to...

- a. A keen gardener nearby who has a well established system of compost bins; composts as much garden and household waste as possible; is able to describe the biological and physical processes involved; uses compost around the garden and can explain the benefits of this; can encourage students



to start their own compost heap at home.

- b. An organic garden or orchard where no use is made of artificial fertilisers or sprays and where organic mulching, composting, “no dig” methods, biological control of pests and diseases, and other techniques can be demonstrated.
- c. A commercial or council composting plant where household and garden waste are sorted, shredded and composted for sale or community distribution.

2. Survey...

Check with the class and then get each student to survey five other families (ask neighbours, relatives, friends) to determine:

Who has a compost bin or heap at home?

Who uses a compost pile just for:

- a) kitchen scraps
- b) lawn clippings
- c) garden wastes
- d) autumn leaves, or a combination of all these?

How do people get rid of organic matter: using the weekly rubbish collection or a garden bag system?

Who has a garden at home? Do they add their own compost? Buy compost? Never use compost?

3. Long term experiments

- a. Design experiments to determine the rate of decomposition under natural conditions, e.g. beneath different forest species, garden shrubs, in different areas (damp/dry/sheltered/exposed) of a reserve or park; at different times of the year.
- b. Shred a variety of materials – household scraps, fallen leaves, lawn clippings, prunings, paper, plastics, cotton, wool, timber, aluminium cans, glass, steel wool, etc and place weighed quantities outside under similar conditions of light, temperature, moisture, etc. What

happens over a period of hours, days, weeks, months?

- c. Take a mixture of organic matter – lawn clippings, kitchen scraps, garden weeds, leaves, etc. Shred (using garden mulches, lawn-mower, or chop finely) and place samples under varying conditions of sun/shade, warm/cool, moist/dry, soil organisms added/not added, to discuss experimental design and the factors affecting the rate of decomposition.
- d. Make a pile of grass clippings and take the internal temperature of the heap over a period of hours, days and weeks. Graph the results. How many readings? Where? How often? What time of day? What is causing this rise in temperature?
- e. Examine a mature compost heap. What organisms do you find? What is the nature of the compost, i.e. colour, texture, smell, composition? Stir some into a jar of water. What layers settle out?
- f. Set up some garden trials. Plant a variety of flowers and vegetables in plots with added compost and without compost. What were the benefits of adding compost to the soil?

4. Start a school compost scheme

Talk with your syndicate, senior staff, Board of Trustees, caretaker, etc. to establish the scope of the scheme. Involve your class in planning then site, construction of bins, costings, permission from the Principal, Board of Trustees, and maintenance. Decide what will go into the bin (food 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? Ring the Auckland Regional Council Enviroline (09) 366 2070 for composting information and assistance.

HOW TO BUILD A MINI-COMPOSTER

Materials:

Small piece of fence or chicken wire (approx 32cm x 58cm) from your local hardware or building supply store
String
Small used piece of plastic sheeting or carpet to cover the bin
Food scraps, leaves, grass clippings, wood chips, (see Compost Recipe below for a detailed list)

Instructions:

Tie the ends of the wire together to form a square. (See Figure 2)

Use the recipe below to make compost

Compost recipe

What to compost:

“Greens” – nitrogen-rich wastes: kitchen food scraps, fruit and vegetable peels, coffee grounds, tea bags, grass and plant clippings, hair, fur, animal manure, blood and bone, seaweed, fish bones, chopped weeds (less noxious varieties).

“Browns” – high in carbon and other elements: dried leaves, sawdust, wood shavings, hay, peat, vacuum cleaner dust, shredded paper and newspaper, egg shells and crushed sea shells, wood ash.

What to keep out of compost:

Meat, grease, fat, dairy products, large bones, food packaging, plastics, treated wood products, noxious weeds, diseased plant material, underground stems, coal ash.

Layer: “Greens and Browns” (see Figure 1)

Add: soil or finished compost, water

Continue: to layer the above ingredients

Cover: with a sheet of dark plastic

Cook: for a few days under the plastic

Check: that the pile is moist, add water if it is brittle or dry

Turn: the heap as often as you feel like it (once/

week, once/month) to allow for air to mix with the compost. Check moisture

Repeat: the process of cooking and turning until the pile achieves the consistency of brown, crumbly soil

Common Compost Concerns and Solutions:

Concern: rotten odour

Solution: turn pile, add dry materials such as leaves, wood chips or straw

Concern: ammonia odour

Solution: add brown (carbon) materials such as leaves or straw

Concern: pests (rats, insects)

Solution: remove any meat or fatty foods from pile, or cover with a layer of soil, leaves or sawdust

WORKSHEET 23

How to Build a Mini-Composter



FIG 1.

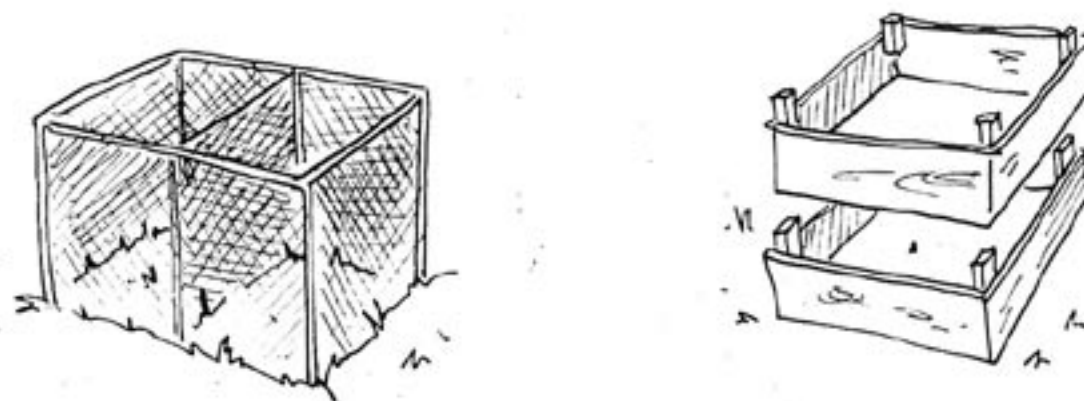


FIG 2

WORMS EAT YOUR RUBBISH

How to Make Worm Compost



KEY CONCEPT

Earthworms are very useful in aerating and fertilising the soil.

Their castings (faeces) are a rich fertiliser for gardens and houseplants.

The worm composting system is designed for composting food scraps using earthworms. Food scraps and worms are “bedded” in shredded and moistened newspaper. The worms turn both food scraps and bedding into a high quality compost for houseplant and garden use.

LEARNING OBJECTIVES

Students will understand how worms can help to reduce waste and produce an excellent compost.

Earthworms belong to a large and important group of worms called annelids. They are also referred to as segmented worms as their bodies are divided into many rings or segments called somites. Earthworms are hermaphrodites, meaning that each animal is both male and female and can produce both eggs and sperm. Two worms mate to produce eggs. The eggs will hatch in 14 – 21 days.

The earthworm has a pinkish-brown body, which is covered with a thin, slimy skin that is sensitive to light and touch. It lives in burrows underground. Earthworms are very beneficial to the soil. They mix the soil and break it down into small pieces.

MATERIALS

- Worksheet 20 “Survey of Containers”
- 500g kitchen scraps
- Square plastic bin or wooden box
- Worksheet 24 “How To Make A Worm Bin”
- Small pile of earth from the garden
- 500g of ready-rotted compost or fruit and vegetables
- Newspapers torn into strips
- Eggshells

LEARNING STEPS

1. Follow the instructions from Worksheet 24 “How To Make A Worm Bin”

Note: Keep the worm bin covered with a piece of plastic – this keeps the moisture in and the bugs out. Leave the bin in a

BACKGROUND INFORMATION

Food scraps can easily be turned into useful compost with the help of earthworms. Earthworms feed on organic materials.

shady spot. (Worms do not like direct sunlight.) A properly maintained worm bin will be odourless.

2. (Optional) Keep a record of:
 - 1) temperature of the worm compost
 - 2) amount and types of food fed to the worms
 - 3) the total volume/weight of the compost

EXTRA ACTIVITIES

1. Study Natural Cycles

Find an area of trees and shrubs within the school grounds or in a nearby park or reserve. Investigate leaf fall, soil and leaf litter, any signs of fungi or microorganisms, leaf skeletons, decomposition, rotting branches and logs or humus layers.

2. Have a class compost making competition

Who can bring in photos, a diary, samples of compost, etc. of their own home compost system?



WORKSHEET 24

How to Make a Worm Bin

1. Build or obtain a rectangular or square shaped wood or plastic bin. Drill holes in two sides and on the bottom. Use a piece of flat wood or plastic sheet to cover the bin.



2. Moisten the newspaper with water.

3. Sprinkle in 1 or 2 eggshells.



4. Place worms in the box.



5. Bury about 250 – 500 grams of food scraps once a week. Make sure to rotate the placement of food.



6. The worm bedding should be changed every 3-6 months. Remove newly made compost and replace with newspaper strips.



7. When you've finished worm composting, tip the compost, worms and any newspaper scraps onto a garden.

