

Vermicomposting (Composting with Worms)

Grade 6 Science: Life Science - Diversity of Living Things (DL)

Grade 7 Science: Life Science - Interactions with Ecosystems (IE)

Outcome: Grade 6: DL6.5 Assess effects of micro-organisms on past and present society and the contributions of science and technology to human understanding of micro-organisms.

Outcome: Grade 7: IE7.3 Evaluate biogeochemical cycles (water, carbon, and nitrogen) as representations of energy flow and the cycling of matter through ecosystems.

Materials:

- Container/Bin - large plastic utility tub - 30cm high.
- Worms - 1.5 to 2 kg (Red wigglers, see notes)
- Nitrogen (green) Sources:
 - Raw or cooked fruit and vegetable wastes, coffee grounds and filters, tea bags, eggshells, bread, pasta.
- Water
- Carbon (brown) Sources:
 - Strips of newsprint, used paper towel, etc.
- Soil

Materials to Avoid:

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| <ul style="list-style-type: none">• Meat, bones and dairy products (create odours)• Fat and oils (hard to break down)• Citrus peels in large amounts (too acidic) |
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Background Information:

What is Vermicomposting?

Vermicomposting is using worms to compost food and organic waste. Compost is ready-to-use organic matter for your soil. Mature compost looks dark, feels crumbly and smells earthy. Adding compost to your soil:

- increases its ability to hold water
- improves soil structure
- provides a low-level, slow-release fertilizer
- boosts the number of “good” soil microbes

How the Vermicomposting Process Works

Worms (red wigglers): Kept in a bin with food scraps and newspaper bedding, they eat the food and bedding and produce (excrete) the compost or worm castings. In Saskatchewan, bins need to be kept inside in the winter so the worms don't freeze. For information on where to get worms go to:

<http://www.saskwastereduction.ca/resources/Composting/vermicomposting.html>
or email info@saskwastereduction.ca

Bacteria and Fungi: These are present along with the worms in a vermicompost bin. Usually these tiny creatures are already on the compost materials when we put them in the pile and they help to begin the decay process, softening food for the worms to eat.

Water: Composting materials need to be kept as moist as a damp sponge.

Food for the worms: Carbon (brown) materials like newsprint, used paper towel. Nitrogen (green) materials like fruit and vegetable food scraps (see “materials” above).

Soil: Small amounts of garden soil or finished compost help absorb odours and add more compost creatures to the worms' bin.

Making a Vermicompost Bin

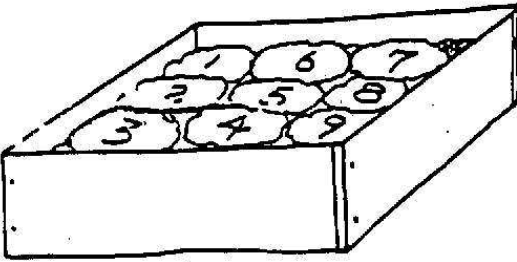
Bin: For a classroom, a large plastic utility bin about 60 x 105 x 30 cm should work well. The bin should be clean and should not have previously stored toxic materials of any kind. The worms need air to breathe. Drill several 5 mm holes in the lid and sides for air circulation.

Bedding: The bedding provides the worms with a balanced diet as well as a damp, aerated home. Good bedding materials are newspaper torn into 3 to 5 cm strips, a small amount of garden soil, small pieces of cardboard or sawdust. Material should be damp but not soaking wet.

Sprinkle some soil in the bottom of the bin. Fill the bin about 1/2 to 2/3 full with the bedding materials, laying paper or cardboard pieces in lightly.

Worms: Place the worms gently in the bin. They will quickly migrate down to a dark part of the bin.

Food: The worms need a steady supply of food to survive. Feed them the foods mentioned earlier - fruit and vegetable scraps, crushed eggshells, etc. about twice per week.



Bury the food in one spot to reduce smells. A nine spot system works well when burying food: i.e. pretend there are nine sections in the bin (3x3) and each time, food is buried in the next spot. Feeding twice a week, this should mean that it will be about a month before food is put in the first spot again, and by then the worms will have eaten most of the food in that spot.

Temperature: Red wigglers like temperatures between 16 to 27 °C.

Harvesting the Compost and the Worms: In 3-6 months the worms will have consumed most of the bedding, and the compost (worm castings) will need to be taken out. Put the contents of the bin onto newspaper or a plastic sheet. Make small piles and let them stand for 10 minutes. The worms don't like light and they will go to the bottom of the piles. Carefully remove compost until you see worms. Gently return the worms to their bin with fresh bedding and some food waste. Compost can be stored, or used right away in gardens or plant pots.

At some point there may be too many worms for one bin. Start another bin or give the extra worms away to another class.

Troubleshooting

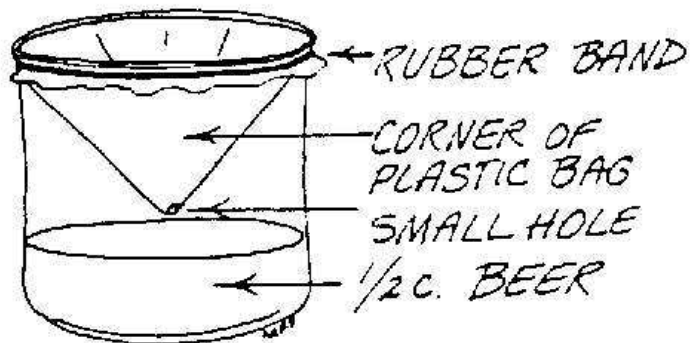
Moulds: Moulds are an active part of the vermicomposting process. The moulds help break down the food and then the worms eat the mould and the softened food. People who are very sensitive to mould should not look after the bin.

Fruit Flies: Fruit flies (small with colourful eyes) can be kept to a minimum by covering fresh food waste with a few inches of bedding. If flies persist, try making a fruit-fly trap to put beside the bin.

Fruit Fly Trap:

Materials: a jar, a plastic bag, a rubber band, and juice, vinegar, or beer.

Pour 125 ml of juice or vinegar into the jar. Place the plastic bag over the mouth of the jar with one corner reaching down into the jar. Poke a small hole in the corner of the bag with a pencil. Secure the bag around the rim with the rubber band. Fruit flies will be attracted to the juice/vinegar and fly in but can't get out.



Fungus Gnats: Fungus gnats are small dark flies that don't like juice: they eat fungi. To control them, place a dry layer of bedding on top of the pile or leave the lid ajar to allow excess moisture to evaporate.

Bad Smells: May be caused by too much food, too much moisture, or dairy or animal products in the bin. Odours can be controlled by:

- Removing some of the food
- Letting bedding dry out a little, or adding fresh bedding
- Adding some crushed egg shells
- Adding some soil

Worms are crawling up the sides of the bin: Conditions may not be ideal. Try:

- checking the temperature, they may be too cold.
- checking that bedding isn't either too dry or too wet.
- fluffing up the bedding to ensure worms have enough air flow.

This lesson is adapted from the Saskatchewan Waste Reduction Council's website:
<http://www.saskwastereduction.ca/resources/Composting/vermicomposting.html>

More information on vermicomposting can be found there or by emailing:
info@saskwastereduction.ca