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Wrigglers At Work Worm Composting Lesson Plan

Grade: Preschool – Grade 3

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Background

With landfills reaching capacity, greenhouse gas emissions on the rise, and continual degradation of our soil, it is becoming more important to revisit the age-old practice of composting. It is hypothesized that humans have been composting since the very beginning of food cultivation (Martin & Gershuny, 1992). Nature has always composted. This lesson introduces the idea of composting and gives students a chance to learn about worms, build a worm bin together, and have hands on experience with composting in their classroom. Worm bins are a great opportunity for hands on learning about the process of composting. After 5 months of using the bin, students will be able to plant a garden in the castings.

Objectives

Students will...

- Use observation skills to learn about Red Wiggler Worms.
- Explain the environmental importance of composting.
- Apply knowledge of worms and worm composting to build a worm compost bin.
- Apply knowledge of worms and worm composting to maintain a worm compost bin in their classroom.

Materials

1. Compost Recycling Naturally Poster (Provided. Can also be drawn out.)
2. Worm Anatomy Poster (Provided.)
3. Samples of finished compost (available from any backyard composter or garden store)
4. Samples of greens (food scraps) and browns (newspaper, straw, dead leaves, etc.)
5. Worm bin (see below for sourcing)
6. Lasagne tray or similar shallow container to collect excess moisture under the bin
7. Bin stand (wood or bricks)
8. 1 pound of worms (see below for sourcing)
9. 2 large buckets of leaf mulch or coir (see below for sourcing)
10. 1" stack of newspaper (remove glossy inserts)
11. Water jug
12. Worksheets (Provided)

Optional Materials:

1. Picture of landfill garbage
2. Worm sock puppet (making this could be another class activity!)
3. Tarp or plastic sheet (if building the bin indoors)



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Notes on sourcing materials

Bin Worm bins are available from The Greater Victoria Compost Education Centre in Victoria, BC, City Farmer in Vancouver, BC, or possibly your local compost education centre or garden centre. You can also make your own bin from an opaque plastic container (approximately the size of a recycling bin with a lid) by drilling breathing holes along the sides and drainage holes in the bottom and placing on a stand (two bricks work fine) with a tray underneath to catch the drippings. Plans for this are readily available online.

Worms The worms you use must be Red Wiggler worms (*eisenia foetida*). These worms may also be known as: Red worms, manure worms, red hybrids, fish worms, dung worms, English red worms, striped worms, stink worms, tiger worms, brandlings, or apple pomace worms. Standard earth worms you find in the garden will not work, as they do not eat fresh material and need more space to tunnel around. Red wiggler worms are available from your local compost pile, fresh horse manure from your local farm, or through worm breeders (can be found online or through your local compost education centre).

Leaf Mulch Leaf mulch is partially decomposed leaves. It is generally available from your local municipality or landscape supplier, or from any boulevard or park in the fall. An alternative, if leaves are unavailable, would be coir. Coir, compressed coconut husk, is a renewable alternative to peat moss, and can be purchased at your local garden store.

Key Terms

Composting

Composting is recycling naturally. It is the decomposition of natural material by fungi, bacteria, and organisms (such as worms) into soil-like material.

Compost

Compost is the black crumbly product of composting. This is the nutrient rich soil-like material (humus) produced by the composting process.

Black Gold

Black Gold is what avid composters and gardeners like to call finished compost because of its incredible value for the soil and the plants.

Red Wiggler Worms

Eisenia Foetida. These worms are best for composting because they eat their weight in fresh organic material every day. They are smaller than your average earthworm, and slightly red in colour.

Greens

Greens are nitrogen-rich materials. These are often materials that are fresh and juicy, such as raw fruit and vegetable scraps, fresh grass clippings, fresh weeds, manure, etc.



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Egg shells and coffee grounds are also considered greens due to their high nitrogen content.

Browns

Browns are carbon-rich materials. These are often materials that are dry, fibrous, and crackly, such as newspaper, dead leaves, dried grass clippings, coir, straw, etc. (Newspaper can be used in a compost because the inks on North American newspapers are vegetable-based.)

BC Ministry of Education Curriculum Planned Learning Outcome Matches

Kindergarten

Science:

1. Use the five senses to make observations;
2. Share with others information obtained by observing;
3. Compare common animals.

Social Studies:

1. Identify the purpose of classroom and school expectations;
2. Demonstrate responsible behaviour in caring for their environment.

Grade 1

Science:

1. Communicate their observations, experiences, and thinking in a variety of ways (e.g., verbally)
2. Classify objects, and organisms
3. Classify living and non-living things
4. Describe the basic needs of local plants and animals (e.g., food, water, light)
5. Describe how the basic needs of plants and animals are met in their environment

Social Studies:

1. Identify strategies to address relevant school-based problems
2. Demonstrate responsible behaviour in caring for their immediate and school environments

Grade 2

Science:

1. Use their senses to interpret observations
2. Infer the probable outcome of an event or behaviour
3. Based on observations classify familiar animals according to similarities and differences in appearance, behaviour, and lifecycles
4. Describe ways in which animals are important to other living things and the environment



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Social Studies:

1. Select a solution for a school based problem
2. Describe their responsibility to environment

Grade 3

Science:

1. Ask questions that foster investigations and explorations relevant to the content

Social Studies

1. Apply critical thinking skills including questioning, predicting, imagining, comparing, classifying, and identifying patterns to select problems or issues.
2. Demonstrate a sense of responsibility for local environment

Outline

1. Agenda
2. Worm Code
3. What is compost?
4. Why is compost important?
5. How do you make compost?
6. Meet the worms!
7. Worm anatomy
8. Build worm home
9. Worm care
10. Song
11. Reflection/Wrap up/Questions

Procedure

1. Agenda

Introduce the lesson

What do you think we're going to be doing today?
[Quickly go through agenda.]

2. Worm Code

Set down guidelines

[This is a fun way to remind kids about listening skills and paying attention, but might not be necessary for all classes.]

Have you ever heard a worm yelling in your garden? No? What about singing? No? Wow, worms are really quiet, aren't they? So today, we are going to practice being quiet like worms.

What if we forget and turn into humans again and get really, really noisy? How can we remind ourselves to pay attention and use our eyes and ears again? What if we had



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a secret code? Something we could say and do with our bodies...that makes us think of worms or composting... [If kids can't come up with anything suggest some version of "Wriggling Worm" or "Wormy, wormy, wormy" with arm motion.]

Let's practice that. So we'll all be really noisy. And then when I do "Wriggling Worm", we'll all switch on our ears (click), and be....hold finger to lips for cue for younger kids] quiet...Ready? Pretend to talk really loudly ...laaalalala....Wormy, wormy, wormy! [Make sure kids get it before moving on.]

And if you have something to say, what do you do? That's right, raise your hand.

3. What is Compost?

Think silently

Have students close their eyes and think about the question of "What is compost?" silently in our heads for a minute. Get them to think about how they would finish a sentence that begins, "Compost/Composting is...".

Share definitions

Have children share their definitions. Use children's answers to begin to build a definition of compost. Use the Compost Cycle poster as an aid. Sum up the cycle, and continue around until the kids grasp that it goes around and around and around.

"So composting is recycling naturally. Just like we recycle a juice bottle so we can turn it into something else and use it again and again, we are turning our apple cores and banana peels in to soil to grow more food."

Touch Black Gold

Pass around sample of finished compost. Have children make predictions about what it will smell like, feel like, etc.

4. Why do we Compost?

Interview partner

Treat the question as a news story investigation. Have children pretend to be reporters interviewing each other. [As children are interviewing, move among them to listen, prompt and ask what they are coming up with. Report back what you heard, adding material where needed. Use the aid of the posters.



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1. So there is less garbage and pollution (Because worms can't live in the landfill to turn the banana peel into soil, it makes bad gasses – pollution – instead.)
2. So worms have food to eat.
3. So we have more soil, to grow more food for us to eat.

5. How Do We Compost?

Greens and Browns

Brainstorm things that you would add to a compost and which category they fit into (greens or browns).

Younger Kids:

Pass around a bucket of greens (with fresh soft, juicy plants) and a bucket of browns (dry and crackly) for them to touch and compare.

Worms

“Whoa, hold on, we are still missing something...what animal do we need to turn this pile of greens and browns into Black Gold??

WORMS!! Are you ready to meet them???”

6. Experience Worms

How worms hear

“Worms don't have ears like we do. They hear through their *whole* body. If you put your hand to your throat and go “aaah” we can hear like a worm. Let's all try this. Did you feel that? What you felt is called vibrations, and that is how worms hear. So many years ago the First Nations people knew that an earthquake was coming before they felt it themselves. How did they know? Because suddenly all the worms would start to come out of the ground. Why do you think the worms came out of the ground when an earthquake was coming? Because the vibrations in the ground sounded really loud to the worms.

Set the tone

So this means that when we hold the worms, we are going to be...[quiet, gentle, etc.]

So we can show the worms that we are ready to meet them when we are sitting quietly with our hands out like this.

Hand out worms

Worm anatomy/debrief

[Discuss/Debrief: What was one thing you noticed about your worm? Use the poster and their observations to facilitate a basic discussion about worm anatomy.]

Samples:

Worms have no eyes.

Worms have no teeth. Instead they pull their food in through their prostomium (a big flap of skin), through their crop, and into their gizzard. The gizzard grinds up their



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food with the help of gritty material such as sand or coffee grounds (so be sure to feed your worm coffee grounds from the teachers' lunch room!). Dinosaurs and birds also have gizzards.

The clitellum indicates an adult worm. This is also used for reproduction.

Babies hatch from small yellow cocoons the size of a grain of rice. Show the kids if you can find one. As many as 5 baby worms can come out of one of these cocoons.

Boys vs. Girls: Each worm is both a boy and a girl (hermaphroditic).

Breathing: Worms don't have lungs like we do. They breathe through the skin over their entire bodies (cutaneous respiration).

Light sensitivity: Worms hate bright light. This is why they try to wriggle under your hand.

("Photosensitive...doesn't mean they're afraid of having their photo taken!")

7. Build worm home

Introduce bin

What do you notice about this compost bin/worm home that would be good for worms?

Black with lid = because they don't like light

Drainage holes = so they don't get too wet

Vents = so they can breathe

Bedding

Discuss the materials for bedding (Browns), and the fact that worms eat their beds.

[Have children shred newspaper and add it to the worm bin, while mixing it with leaf mulch or coir.]

Water

Add water to bedding and stir thoroughly until it is about as damp as a wrung out sponge. Because worms breathe through their skin, it is important that they stay moist. If the bin is too wet, however, it will start to smell and be unpleasant for the worms and the classroom. Try to maintain this "wrung out sponge" moisture level.

8. Worm care

Feeding

What do worms eat? Do a sorting activity with pictures of foods or with plastic foods from play kitchen to discuss what the worms will eat. Having a worm sock puppet character to interact with through this process can be fun. Worms eat fresh fruit and vegetables (as well as egg shells and coffee grounds). They do not eat: meats, dairy, greasy foods, breads or grains.



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Discuss the following feeding instructions:

One 1 litre yogurt container of food scraps this week, 2 next week, 3 the following week, 4 the week after, and then 5 ever week thereafter (never more than 4 or 5, never less, worms will go hungry).

When you put it in, bury it deep under the bedding, so the fruit flies don't know it's there. Bury it in a new spot every week. This can be tracked by a treasure map above the bin, or a marker above the spot.

Air

Remember how worms breathe through their skin? So it is really important that every few weeks you gently flip the worms bedding so that they can breathe.

Harvesting

In about 5 months [use the specific time, i.e. summer vacation], the worms will have made this into beautiful Black Gold. Then they will need new bedding and food for their home. This is just like how you change your sheets on your bed. If you don't change their beds in 5 months, they can get really sick. [Instructions for harvesting can be found in the Worm Composting Fact sheet on the Greater Victoria Compost Education Centre website: www.compost.bc.ca.]

Using compost

Brainstorm what the class will do with the Black Gold when it is ready. Use it in the garden, use it on plants in the classroom, sell it, etc. [Connect to compost cycle.]

9. Add worms/Sing Song

Add worms

So now we have browns, water, greens (which you will add soon)... will this turn into Black Gold by itself?? No! What are we missing? Worms! Add the worms to the bin.

Song

Should we sing them a song to help them settle in?

(To the tune of "Twinkle, Twinkle, Little Star")

Wiggle, Wiggle little worm [wiggle arm]
How I love to see you squirm [squirm body]
Down inside your bin so dark [deep voice, crouch down with hands over head]
Like a Really Shady Park [shrill voice, arms up like a tree]
Wiggle, Wiggle, little worm [wiggle arm]
How I love to see you squirm [squirm body]



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10. Reflection/Wrap Up/Questions

<i>Reflect</i>	What is one thing you would like to tell your family tonight about what you learned today?
<i>Questions</i>	Discuss any remaining questions.
<i>Worksheets</i>	Hand out worksheets.
<i>Wrap up</i>	I want to thank you for being such great listeners and scientists today. You are going to have an amazing compost in your classroom, and keep lots of fruits and vegetables out of the landfill. AND make beautiful Black Gold for your garden.

Resources

- Composting Goes to School* (n.d.). Provided by The Composting Council of Canada.
- Diary of a Worm*. (2003). By Doreen Cronin, illustrations by Harry Bliss. Published by Scholastic Inc.
- The Life Cycle of an Earthworm*. (2003). By Bobbie Kalman. Published by Crabtree Publishing Company.
- Squirmy Wormy Composters*. (1992). By Bobbie Kalman and Janine Schaub. Published by: Crabtree Publishing Company.
- Worms Eat My Garbage: How to Set Up and Maintain a Worm Composting System*. (1997). By Mary Appelhof. Published by Flower Press.
- Worms Eat Our Garbage: Classroom Activities for a Better Environment*. (1993). By Mary Appelhof, Mary Frances Fenton, and Barbara Loss Harris. Published by Flower Press.

References:

- Martin, D.L. and Gershuny, G. (1992). *The Rodale book of composting*. Emmaus, PA: Rodale Press.