



Biodiversity & Compost Cake Facilitator Notes

Objective: Students will understand the importance of biodiversity when composting and also experience, first-hand, the way that different organisms work together to break down our food scraps.



Recipe Category: Soil & Composting



Cooking Time: 30mins



Level of Difficulty: Grade 6



Recipe Ingredients:

- Compost ingredient cards
- Shovel or trowel
- Long rope (long enough to contain the whole group in a "U" shape)
- Spray bottle with water
- Compost sample in a jar



Curriculum Links:

Grade	Subject Area	Ontario Curriculum Links
6	Science & Technology	<p><i>Understanding Life Systems - Biodiversity</i></p> <p>1. Assess human impacts on biodiversity, and identify ways of preserving biodiversity. (O) 1.2 Assess the benefits that human societies derive from biodiversity. (S)</p> <p>2. Investigate the characteristics of living things, and classify diverse organisms according to specific characteristics. (O) 2.2 Investigate the organisms found in a specific habitat and classify</p>

		<p>them according to a classification system. (S)</p> <p>3. Demonstrate an understanding of biodiversity, its contributions to the stability of natural systems, and its benefits to humans. (O)</p> <p>3.5 Describe interrelationships within species and between species and their environment and explain how these interrelationships sustain biodiversity. (S)</p> <p>3.6 Identify everyday products that come from a diversity of organisms. (S)</p>
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Introduction: (5 mins)

- Give a brief outline of the subject matter for this workshop (Example: the many different creatures, critters and organic materials needed to make compost).
- Lead some discussion and questions around the topic, for example:
 - Defining key terms: Decomposition, Compost, Biodiversity, Microorganism...
 - *Has anyone ever composted before? What do you know about compost?*
 - *What role do us humans play in composting? What else is involved in composting?*
 - We put food scraps in, we mix it up, add water if needed, protect it from the weather... The microorganisms, fungi and worms do the rest!
 - *What can we put into the compost?*
 - Food scraps, leaves, grass, twigs and sticks, paper bags, shredded newspaper...
 - *Why is composting important?*
 - Compost is a great way to recycle scraps into nutrient-rich soil for our plants.
 - It reduces waste going to land fill
 - It's better than using chemicals on our garden and it's free!
 - It improves the biodiversity of organisms in the soil
- Overview of the workshop/ what to expect from the next 25mins
 - You're each going to become a component of compost and recreate what actually happens inside a compost bin. Do your best to *become* that creature or thing!

Setting the Scene: (5 mins)

- Spread the **rope** out into the biggest “U” shape it can make. The bottom of the U can be rounded or squared, this will form your compost bin.
- Ask students to stand *around* the compost bin.
- Let’s imagine this is our compost pile... *How does it look? What does it smell like? What does it sound like? How do you think it would taste?*
 - A good, healthy compost pile should be a deep, rich brown colour, nice and moist and NOT smelly! There probably is some noise happening; if we were microscopic we might hear it! (I have no idea how it would taste...)

Compost Contents: (5 mins)

- Now imagine if our compost pile was a cake... made up of different layers until it’s around three feet high (show 3ft high with your hands). *What do you think the layers are made of?*
 - Actually, the compost cake is made up of layers of *carbon* material, *nitrogen* material, and finally a layer of *soil microbe* “frosting”. This pattern is repeated over and over again until it’s the right size.
- Hand out the **compost layer cards** to the students. Asking them to keep them to themselves for now, and think about how they would act if they were that creature or thing.
 - There should be 3-5 carbon, 3-5 nitrogen and 6 microorganisms and 4 macroorganisms (you can photocopy the cards to make sure you have enough for your group).

Make that Compost! (10-15mins)



1. Begin by pretending to loosen the bottom layer of soil with your shovel or trowel to help with drainage of the compost.
2. With your shovel or trowel, pretend to scoop up the *carbon* material students. Have them shout out what they are and show their best impression of that thing (carbon and nitrogen are more difficult to impersonate, but see what they come up with!) Line them up along the bottom of your pile. Carbon materials include:
 - Dried leaves, straw, dried grass, small dead branches, dead pine needles, other dried up organic materials
3. Repeat this process with the *Nitrogen* materials. Lining them up above the Carbons to form two layers. Nitrogen materials include:
 - Food scraps, manure, green grass, newly fallen leaves, weeds, other fresh organic materials
4. Okay, so now we just have our *soil microorganisms and macroorganisms* left. Ask them to spread themselves evenly around the outside of the compost pile.
 - *Are they all the same type of microbe? Can they all go into the compost at once? Why or why not? Why do you think it's important to have many different types of creatures in our compost pile?*
 - Different soil microbes are "active" at different times because they prefer different temperatures.
 - Even though they're different, they are all still very important to the process, because they're responsible for different stages of the composting and can contribute different functions as needed.
 - If we didn't have **biodiversity** in the compost bin, we wouldn't have compost! *Why?* Let's investigate our biodiversity further...

5. From the microbes, scoop up the *Psychrophiles* and layer them on top of the Nitrogens. They won't stay there long! Have them move through the compost bin, mixing it up as they go!
 - *Psychrophiles* ("sike-ro-file") – are present in lower temperatures, like a cool spring day (less than 20°C). They're the first bacteria to arrive!
 - *The Psychophilic* phase is where these bacteria invade the compost pile and begin to burn carbon, releasing heat and nutrients. As the temperature begins to rise, the next gang of bacteria arrives...

6. Now scoop up the *Mesophiles*. Once they enter the compost bin, the *Psychrophiles* need to move to the edges of the pile because it's getting too hot! Remember, *Mesophiles* are busily moving around the compost bin.
 - *Mesophiles* ("miso-file") - like mid temperatures, like a hot summers day (20-30°C), most decomposition in the compost bin is 'mesophilic', they work hard!
 - *The Mesophilic* phase lasts for a couple of days. Mesophiles love food scraps, especially inside your compost bin. Mesophiles work really hard to consume just about everything in site, generating enough heat to raise the temperature even higher...

7. Bring in the *Thermophiles*! As the name suggests, they like it hot. It's now getting way too hot for even the *Mesophiles*, they need to move to the edges as well. Now it's the *Thermophile's* turn to move around the bin.
 - *Thermophiles* ("therm-o-file") – are present at temperatures of 40-70°C – strong enough to boil an egg, destroy weed seeds and diseases too.
 - *The Thermophilic* phase, can last from a few days to several months.
 - You won't see *worms* and *Thermophiles* side by side – because the worms will cook in such hot temperatures! If a worm moves inside the bin at this time, they're fried!

8. Last but not least, scoop up our macroorganisms, the *worms, mites, grubs and fungi* – they work along side *Mesophiles* when things cool back down a little. So bring the *Mesophiles* back into the pile, and send the *Thermophiles* out to the edges. *Mesophiles, worms and fungi* all move through the compost together.
 - The cooling phase may take several months.

So, if we didn't have biodiversity in the compost bin, we wouldn't have compost! Why?

- The temperature might not increase enough to break down the scraps
- The carbon and nitrogen may not break down properly
- There may not be enough food for everyone (e.g. worms actually eat the bacteria feeding on the food, not the food directly).

Human Involvement: (1-2 mins)

Our compost pile is looking great! We've moved through all of the phases, the microorganisms, worms and fungi have done their job. Now the humans need to help a little bit, to make sure it's the right moisture level and to aerate it to reduce smells.

- With your shovel or trowel, go through and mix up the compost pile!
- With your spray bottle, give the compost pile a bit of water!

Take Me Out To The Compost Song: (any time)

Sung to the tune of "Take me out to the ball game" (call and repeat)

Take me out to the com-post,

Take me out to the pile!

Add some soil and a few good worms,

I don't care if I'm turned or I'm churned.

'Cause it's root, root, root for the mic-robos,

If they don't win it's a shame.

For in two, four, six weeks, I'm out in the old gar-den!

From Pam Ahern, Teacher at Waits River School, East Corinth, Vermont USA.



Serving Suggestions:

Compost Cake Cards look like this:



Field to Table Schools Program
www.foodshare.net
Biodiversity and Compost Cake
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Compost Cake, *Project Seasons* (page 87) by
Shelburne Farms