Green Teacher

Composting Experiment

Observing how different organic materials and plastic react to the composting process

By **Green Teacher staff, with assistance from Friends of the Earth Canada**

Overarching inquiry question: *How do different organic and plastic materials react in the same composting conditions over a one-month period?*

Background information:

Composting is a remarkable natural process that is continuously taking place in soils around the world through the magic of decomposition, during which microorganisms (i.e., organisms which are too small to see with the naked eye) such as bacteria, protists, and some fungi break down organic matter (i.e., part(s) or all of a living thing) and produce water, heat, carbon dioxide (CO_2), and eventually humus (not to be confused with that delicious chickpea-based hummus!). Humus is a dark, nutrient-rich material often found in topsoil. Fully formed humus is quite spongy; it typically takes many months to form.

Without the process of composting, organic waste would accumulate rather quickly. Imagine if things like dead leaves, apple skins, animal poop, and even bones never broke down and instead littered the ground everywhere! *(Note: This is what happens when plastic breaks down into micro-plastics but never fully degrades.)*

The rate of composting depends on factors like moisture level, temperature, oxygen level, and the biological profile of soil (i.e., which and how many microorganisms occupy soil). Different things also break down at different rates. For example, leaves decompose much more quickly than wood does.

Materials:

*terrarium or alternative transparent container with an air-tight lid *(Note: A 2-litre drink bottle could work, too, but be sure that the bottle is reused or recycled.)*
*potting soil (enough to fill the terrarium/container almost to the top)
*1 cup of vegetable/fruit skins/peels (i.e., organic kitchen scraps)
*1 cup of shredded newspaper
*collection of Price Look-up (PLU) stickers (see 'Preliminary work' below for further details)

*1–2 cups of water
*ruler (or alternative measuring device)
*1 measuring cup
*recording sheet

Preliminary work:
*About two weeks prior to the beginning of the experiment, invite your learners to bring to class PLU stickers. Ideally, each learner will contribute four or five PLU stickers to the experiment. Additional stickers can be collected on a piece of paper and sent to your Member of Parliament (MP) as part of *Maya's Plastic Pollution Campaign*.

Core activity:
*Prepare your study container by layering soil and the three materials that will be observed: vegetable/fruit skins/peels, shredded paper, and PLU stickers. Layering will adhere to the following pattern:

*soil (bottom)
*vegetable/fruit skins/peels
*soil
*shredded paper
*soil
*PLU stickers
*soil (top)

Note: The produce and paper layer should be approximately of equal thickness. The thickness of the layer of PLU stickers is not important as it will not be measured during the experiment.
*Pour one or two cups of water into the soil. Doing so mimics the natural addition of water to soil through precipitation and runoff.
*Seal the container so that it is airtight. *(Note: If you are using a two-litre drink bottle, the top will need to be reattached tightly.)*
*Leave the container in a well-lit (ideally with natural sunlight) area. Over the course of four weeks, document the thickness and appearance of the three materials according to this chart (or a reasonable facsimile):

	Start of experiment	After 1 week	After 2 weeks	After 3 weeks	After 4 weeks
Vegetable/fruit skins/peels	Thickness (mm): Appearance:	Thickness (mm): Appearance:	Thickness (mm): Appearance:	Thickness (mm): Appearance:	Thickness (mm): Appearance:
Shredded paper	Thickness (mm): Appearance:	Thickness (mm): Appearance:	Thickness (mm): Appearance:	Thickness (mm): Appearance:	Thickness (mm): Appearance:
PLU stickers	Appearance:	Appearance:	Appearance:	Appearance:	Appearance:

Follow-up:

*After four weeks, dump out all the contents of the container and examine the three materials more closely. Discuss the following questions:

Why are there differences in the decomposition rates of the three materials?

If the compost from your backyard composter or from your municipal compost facility contains plastic PLUs, where do you think that those pieces of plastic show up next? What living things might be affected?

How could the presence of PLU stickers in municipal compost (i.e., compost collected in bins and processed by municipal workers) impact time and cost at processing sites? (See the optional extension below.)

What are alternatives to using plastic PLU stickers to mark and track fruits and vegetables?

Optional extension:

*Record the amount of time it takes to remove plastic PLU stickers from 10 pieces of fruit or vegetables. Now multiply by 1000 to estimate how long it would take to remove plastic PLUs from an industrial-size waste bin going to the compost facility.

*Continue the experiment for several months and be sure to regularly mix the soil and thus aerate it (add oxygen to it), mimicking natural conditions. Needless to say, measuring the layers of the organic materials would no longer be possible, but you could still observe the composition of the soil and the state of the materials.

Additional Resources:

*Learn about *Maya's Plastic Pollution Campaign* — conducted in partnership with Friends of the Earth Canada — here.

Possible adaptations:

*Conduct an outdoor version of this experiment where each material is buried in its own marked study plot at the same depth.

*Conduct this experiment with different materials (e.g., leaves, twigs, bark, etc.). You could go one step further and measure the decomposition rates of leaves/twigs of different plant species or natural textiles (cotton or wool samples) compared to synthetic textiles (polyester or acrylic samples).

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