

Tools and Activities for School Composting



Help your school reduce waste,
save money, and save the planet!

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Introduction

Composting, the process of turning food and yard waste into a natural soil amendment loaded with nutrients, is a practice that greatly benefits schools. It reduces the school's ecological footprint through waste diversion and also provides an interactive on-site teaching tool enabling students to connect with nature and to get first-hand experience in returning valuable nutrients originating from organic waste into their school gardens.

The guide describes how and when to utilize more than a dozen specialized tools enabling easy composting along with 9 compost-related student activities to reinforce the learning that occurs with a school composting program.

Before reading this guide, it is recommended to review the *Guide for School Composting* manual as it will provide foundational information about the basics of composting and how to implement a successful school-wide composting program.



Tools and Supplies

The following are composting tools and supplies that are recommended for a successful and productive school composting program. Descriptions of the most common types of compost bins, tools needed for collection, promotion and communication, maintenance, tracking and harvesting have been included in this list.

Please refer to the *A Guide for School Composting* for information on the basics of composting, bin locations for school grounds and the rotation method for easy harvest.

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Compost Bins

We recommend a multi-bin compost bin or several single compost bins to manage the high volume of compostable materials and to apply the rotation method described in the manual. You may also consider building your own compost bin as a class project. See the bin plans at the end of this document for an easy-to-build composter.



The triple-bin wooden compost unit, ideal for school composting, is made out of repurposed wood, has a lid, an optional lock and removable front slats for easy access to the compost. It's approximately 1m high, 3 m wide and 1m deep.



This 300L compost bin is easy to install and relocate. It is approximately 0.8 m both in diameter and in height. It has a removable front door and lid.

Collection

Once you have your outdoor compost bin installed, you will have to collect food scraps from students and staff. It's best to locate the collection containers where food waste is thrown out, such as the cafeteria, classrooms and staff rooms. Don't forget to properly rinse the containers after dumping the compostable materials in the outdoor composter.



This 7L plastic container (30cm x 21cm x 21cm) has a lid to keep fruit flies at bay and a handle for easy transportation.



If you have a cafeteria, you may want to consider a larger container such as this cart with wheels and a lid. It's 80 cm high, 44 cm wide and 38 cm deep and holds about 45 litres.



A rake is a handy tool to collect autumn leaves, a great source of "browns". You may want to have multiple rakes if you want to get a whole group of students raking at once.

Promotion and Communication

Promoting and communicating the right messages is key for a successful composting program. It's important to have visual prompts such as container labels and signs placed in strategic areas where the compostable materials are collected and processed. The signs should be simple indicating what can and cannot be composted and where to place compostable materials. These posters include recommendations for school composting. You can order these posters or your school can create its own signage. Refer to the section [page 3 - 4] of the *Step-by-step guide* for materials that can and cannot be included.

Got Compost?

Yes

Fruits & veggies



Also, yes:

Tea bags
Coffee grounds

Eggshells
Plant trimming

No

Meat, dairy, oily
or cooked foods

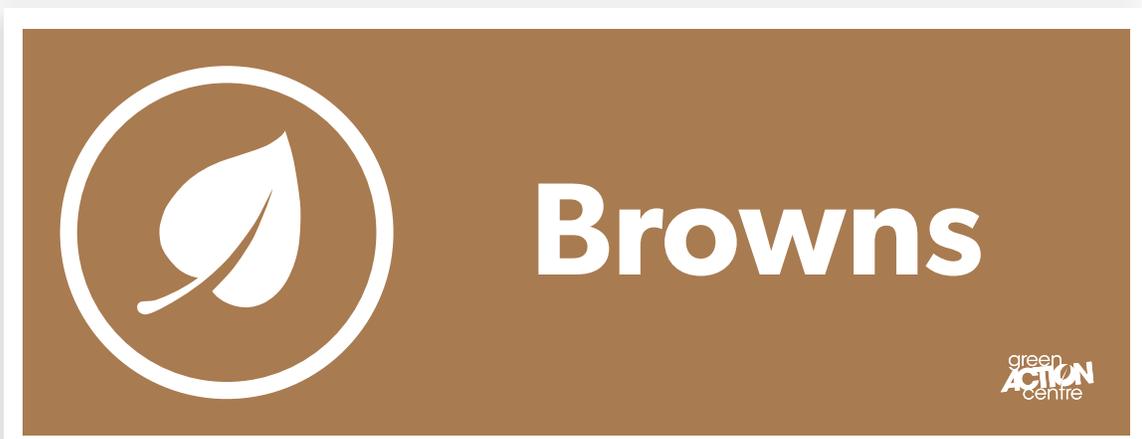
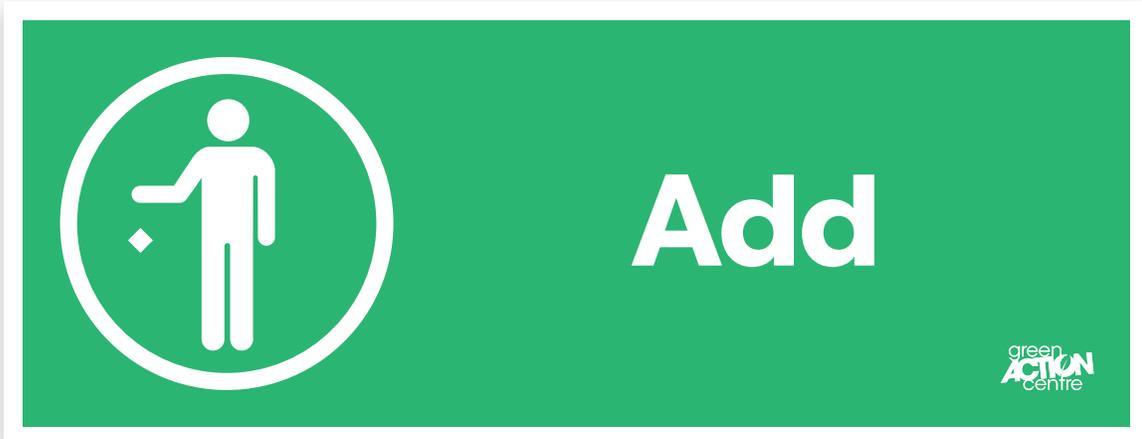


Also, no:

Plastic
Aluminium cans

Glass
Wrappers

The “Add” sign is to be placed on the bin compartment or bin where food scraps and brown materials are currently being added, whereas the “Don’t Add” sign is to be placed on the compartments or bins that have maturing or matured compost. The “Browns” sign is to be placed on the bin that will be storing brown materials such as leaves or sawdust. These materials are ideally placed in the bin near the “Add” pile for easy access. Please refer to the compost rotation method section of the manual for further instructions.



Maintenance

It is important to mix and fluff up the compost pile so that air can circulate to prevent odours caused by anaerobic conditions. Tools such as a compost aerator, a spading fork (see “Harvesting Section”) or a shovel can be used for aeration. Aerate your pile weekly, except during the winter months, for speedy decomposition of your organic material.



A compost aerator is highly recommended because it is easy for children to use as there is no heavy lifting. As you poke this tool in the pile, its wings fold against the shaft for easy insertion and then the wings spread open as the tool is withdrawn, lifting and fluffing up the organic matter.

If your school adds garden waste in the compost bin, you will likely have long stems to compost. It is important to chop up those stems if not it will be very difficult to aerate your pile. Chopping up the garden waste will also help speed up the decomposition process.



These shears are approximately 60 cm long, suitable for cutting most garden stems. To cut small branches and very hard garden stems, a hand pruner is recommended.

Tracking

Tracking equipment is not required for successful composting but is a great teaching tool for students to understand composting processes. A scale can be used to track how much organic materials you are composting which is a good indicator of the success of your program or it can also be used for waste audits, as described in the activity section of this guide. Other tools such as the compost thermometer and Solvita Compost Maturity Test, normally used for large-scale composting, can be fun tools to use in science class.

A compost pile doesn't need to be warm or hot in order for the organic material to decompose, however the hotter the pile, the faster the organic material will breakdown.



This kid-friendly hand-held fish scale can easily weigh organic materials. This scale is used by hooking up the handle of a pail or a bag containing the organic matter. This scale which runs on a 9V battery has a large digital display measuring weight in kg or lbs.



A thermometer can be used to monitor the temperature of the compost pile for science experiments or to use as an indicator of compost efficiency. Temperatures reaching 38 degree Celsius attracts thermophiles, an efficient bacteria that breaks down organic matter rapidly. This thermometer has a 48 cm long stainless steel stem and 6 cm easy-to-read dial and measures the temperature in Celsius and in Fahrenheit. To use, simply insert the thermometer in the centre of the pile (usually the warmest area) and wait for the needle to stop moving.



The Solvita Compost Maturity Test is used to determine the maturity of your compost sample and determine the right application for the finished product (potted plant with seedlings vs topdressing lawn). This simple technology measures the

concentration of carbon dioxide (CO₂) and ammonia (NH₃) emissions, which are indicators of biological activity. The higher the concentrations, the longer the material still needs to compost. The kit consists of 6 tests with jars, gel pads, a colour chart and instructions on proper sampling and test procedures.

Harvesting

After about a year of composting successfully, there should be beautiful finished compost ready for harvest. A spading fork, manure fork, spade or shovel can be used to remove finished compost. A wheelbarrow or pail is also handy to move compost from one area to another.



The spading fork can also be used to aerate compost, especially heavy wet compost.



A round shovel is the perfect type of shovel for removing finished compost from the outdoor bin.



A wheelbarrow is a handy tool to move large amounts of finished compost from the compost bins to the gardens and lawns for compost incorporation in the soil.



A compost screen can be used to filter out any remaining large organic materials such as fruit pits and twigs. Screened compost can easily be applied on lawns. The compost screen shown fits nicely on a wheelbarrow.

Student Activities

This section offers suggestions for student activities that can be done before, during and after implementing your school composting program. These activities can touch upon various subject areas such as science, math, social studies, and arts education.

Pre-Composting Activities

The following activities help introduce the concept of waste reduction and composting enabling students to have a better understanding of the issues and processes involved.

1. Conduct a waste audit

Track how much and what type of waste is generated at the school by conducting a school waste audit. Based on predetermined categories (e.g. compostable, recyclable, landfill waste), assign students to collect, sort and weigh the trash generated in their classroom or school. The activity is followed by a group discussion of observations and brainstorming of possible waste reduction methods.



2. Visit compost bins in a community garden

A great way to understand composting is to see a compost bin in action. Take your class to a community garden that has active compost piles, and invite gardeners to address the students. During your visit, encourage students to aerate the pile, to use a compost thermometer and to identify finished compost.



3. Teach the basics of composting through drama or art

Divide students into groups and ask them to develop a skit, puppet show, posters or a display to demonstrate various composting topics such as the biological composting processes and the benefits and impacts of composting. The students could perform or display their work at school assemblies as an educational component of the school composting program.



4. Observe decomposition in a jar

For this experiment, ask students to simply place 5 cm of moist soil in a transparent jar or reuse a beverage container, then add a few food scraps or garden waste, and repeat the layers, with soil as the top layer. Instruct your students to leave the jar open without disturbing and to record observations daily. Make sure to keep the contents slightly moist by adding some water and stirring it weekly. After a few weeks, have a group discussion about recorded observations.



Composting Activities

Many fun activities can be done while collecting the school's organic matter and managing the compost pile. The following activities involve tracking various composting components and using math skills when graphing or analyzing the results.

1. Track your results

For a full week, have the students weigh each container of food scraps being collected. Calculate the average weight so that it can be applied to subsequent containers. The number of pails transferred in the compost pile can be easily recorded on a tracking sheet to estimate the amount of waste diverted from the landfill. Display the results on a poster in the hallway and post on your school website for everyone to see.



2. Measure compost temperatures

Once you have a well-established compost pile, ask students to compare the temperature to aeration frequency while maintaining consistent moisture levels. Graph and interpret your results.



Post-Composting Activities

Once your pile produces some finished compost explore the different stages of compost to better understand the decomposition process and see first-hand the benefits for plant growth and soil fertility.

1. Play “Compost Detective”

Once your school’s bin is well-functioning with some finished compost, collect compost samples from different stages of decomposition and have your students guess the maturity level. Common clues to determine maturity is odour, texture, colour and types of organisms present. Instruct them to analyze, record and discuss what they see, smell and feel with the goal of identifying immature versus mature compost.

Compost is normally mature when it is dark brown, smells like earth, and crumbles in your hands with no large lumps or recognizable food content.

2. Compare plant growth with compost and without compost

When it is time to sow the school garden, dedicate a portion of the garden to compare the health and growth of plants with and without compost application. Divide the chosen area into two sections. Have your students till in 6 cm of mature compost in only one section and keep the remaining section as soil. Then sow the entire area with the same amount and types of seeds. After a few weeks, ask your students to note and compare the height of the plants and any other differences.

When sowing seeds in a pot, it’s best to place the pots in a mini greenhouse or on a window sill. Also water the pot every 1-2 days to keep seeds moist.

3. Test your compost’s maturity using germination rates

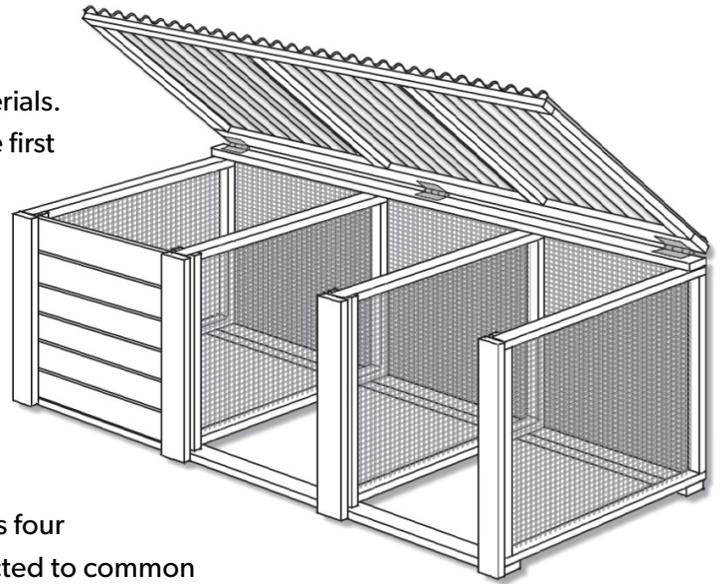
Ask your students to sow 10 radish seeds in pots with 100% compost and in some pots with 100% soil, as controls. After 7 days, instruct them to calculate the germination rate. If, on average, $\frac{3}{4}$ or more of the seeds sprout in the pots with compost, the compost is ready to use in any application. If the control group does significantly better than the pots with compost, the compost may still be immature.

To calculate the germination rate divide the number that germinate by the total number of seeds used, then multiply by 100.

Triple Bin Composter Plan

Multi-Bin Systems

Multi-compartment compost bins allow for continuous processing of large amounts of materials. In a three-bin system, materials are added to the first compartment only. Once full, start adding to the second while the first one is left to cure and mature. The third compartment is used for storage of brown materials. A three-bin system can simply be considered as two additional sections attached to a single compartment bin. A simple three-section unit can be constructed with seven discarded pallets lashed together. This particular design employs four identically constructed wooden frames connected to common top and bottom.



Tools

- Tin snips
- Drill with 1/8" bit and 1/2" spade bit
- 3/4 inch socket wrench or adjustable wrench
- Carpenter's square
- Staple gun or power stapler with staples
- Handsaw or circular saw
- Screwdriver
- Hammer

Parts for Optional Lid:

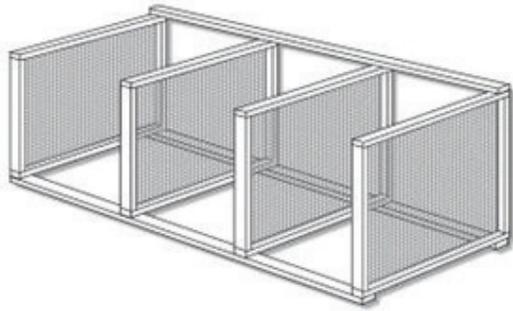
- 4 — flat 4" corner braces & screws
- 2 — flat 3" T braces & screws
- 1 — 9' 2 x 4
- 1 — 9' 2 x 2
- 2 — 6' 2 x 2
- 1 — 12' sheet and one 8' sheet 4 oz. clear corrugated fiberglass
- 3 — 8' lengths of wobble molding
- 40 — gasketed aluminum nails
- 2 — 3" zinc-plated hinges

List of Materials

- 2 — 18 foot treated 2x4
- 4 — 12 foot 2 x 4
- 1 — 9 foot 2 x 2
- 2 — 6 foot 2 x 2
- 1 — 16 foot 2 x 6
- 9 — 6 foot 1 x 6
- 22 — feet of 36" wide 1/2" mesh hardware cloth
- 12 — 1/2" carriage bolts 4" long with nuts
- 12 — 1/2" flat washers for the bolts
- 3 — pounds of 16d galvanized nails
- 250 — poultry wire staples
 - 1 — 12 foot sheet of 4oz. clear corrugated fiberglass
 - 1 — 8 foot sheet of 4oz. clear corrugated fiberglass
 - 3 — 8 foot lengths of wiggle molding
- 40 — gasketed aluminum nails for corrugated fiberglass roofing
- 2 — 3" zinc-plated hinges for lid
- 8 — flat 4" corner braces with screws
- 8 — 3" T-braces with screws
- 1 — bottle of carpenter's glue

Construction Instructions

1. Sides and Dividers



Cut two – 31 ½ inch and two 36 inch pieces from each 12' 2 x 4. End nail the 36 inch pieces to the 31 ½ inch (2 – 3½ inch galvanized spiral nails in each) to form four pieces into a 34 ½" x 36" square. Repeat for all four sections. You now have to cut and attach the wire mesh or chicken wire to each frame. Using your tinsnips, cut pieces your mesh to fit each frame. It is a good idea to cut the mesh 1 inch wider in each direction than you need so that you can fold it over and form a 1 inch overlap along each edge. Make sure to turn the overlap so that the bent over portion is against the

frame so that it cannot catch on anything later on. Attach the mesh using your staple gun or hammer driven staples. Make sure to stretch the mesh in all directions as you secure it to the frame.

2. Compost Frame

Set up your two ends approximately 9 feet apart making sure that the 36" width is parallel to the ground. Place two 9 foot 2 x 4 base boards on top of the ends dividers and nail into place using 1 – 3½ inch galvanized spiral nail. This is only to hold the pieces together while you make the bolted connection. Drill a ½" hole through each junction centred 1inch from the inside edge so that you can bolt through from the base board to the end panel. Secure the base boards with carriage bolts, washer, and nuts, but do not tighten fully yet.

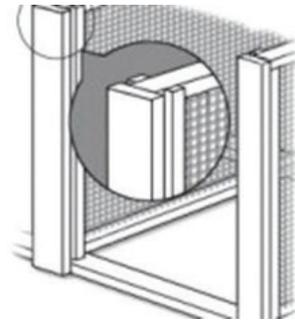
Measure and position the two inside dividers so the distance remaining between the 2 end panels is split evenly into 3 sections. Again nail the dividers into place using one 3½ inch galvanized spiral nail so that they do not move while you are drilling and bolting the unit together. Drill the ½" holes 1 inch from the inside edge and secure the panels with the carriage bolts, washer, and nuts. Turn the whole unit right side up and repeat the process for the top 9 foot 2 x 4.

Using your carpenter's square, make sure that each section is square to the base and top 9 foot 2 x 4's and tighten all bolts securely.

Using your tinsnips, cut pieces mesh to fit along the back of the unit, once again leaving an extra inch in each direction to form a 1 inch overlap. Attach the mesh using your staple gun or hammer driven staples. Make sure to stretch the mesh in all directions as you secure it to the frame.

3. Runners and Front Slats

Cut four pieces 36" long from the 12 foot 2 x 6. Nail these securely to the front of the outside ends, dividers, and baseboard. On the ends make sure that they are flush with the outside edge and for the dividers, center them on the 2 X 4 frame so that they extend equally to both sides.



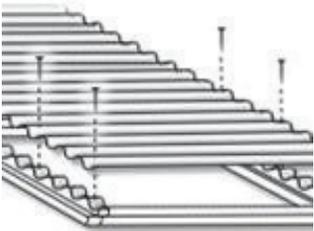
Cut six pieces 34 ½ inches long from three 6 foot 2 X2s to create back runners for the front slats. Pre-drill the 2 X2s at each end and attach to the top and bottom of the end and divider panels using the two ½ in. galvanized wood screws (1 screw each top and bottom) You can optionally nail these in place using 3½ inch galvanized spiral nail, however you will need to hold the panel solidly while you nail on the 2 X 2 or you will twist your new compost bin out of square. Place the 2 X2s parallel to the front runners, leaving a 1" gap to allow the insertion of slats.

Use the 9 foot 1 X6s to make six slats for each front opening. Measure the width of each opening before cutting your slats. Make sure to cut the slats ½" less than the opening to allow the slat to slip down through the opening in the slats easily. As the actual width may vary from section to section, you may want to mark the slats for each section indicating which section they belong to. (i.e. R – right, C – center, L – left)

4. Fibreglass Lid (optional)

Use the two 9 foot 2 x 4s for the back and front of the lid. Cut the 6 foot 2 x 4s into four 30 inch pieces, to run between the two 9' pieces (one at each end, flush with the 9' piece ends, and two in the middle, equally spaced to sit atop bin dividers).

Lay out the back, front and braces on the ground and check for squareness. Connect the four corners using the flat 4 inch corner braces. Make sure to check each corner again for squareness before securing the brace with the screws. Once all the corners are secured, locate and two other braces equally spaced between the ends and secure in place using the flat 3 inch T braces and screws. Attach 2 of the 3 hinges approximately 1 foot from each end, and the 3rd hinge equally spaced between the other two.



Tools and Activities for School Composting

Contact Us

If you have questions about composting, Green Action Centre is here to help. Visit our website at greenactioncentre.ca for detailed information on home, school, and workplace composting, vermicomposting, compost bin plans, and many other subjects.

You can call us on our toll-free compost InfoLine at 1-866-394-8880 or in Winnipeg at 204-925-3777.

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About Us

Green Action Centre is a non-profit hub that promotes greener and better living by sharing practical solutions and advocating for change.

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Happy Composting!



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