



COMPOSTING

A Guide for South Carolina Schools

SIMPLE STEPS

for Successful Composting



Office of
Solid Waste Reduction & Recycling

1-800-768-7348

www.scdhec.gov/recycle

Why compost at school?

Composting offers a variety of benefits from classroom projects to school-wide programs including:

- **Reducing the amount of waste a school creates.** Organics such as yard trimmings, food waste and non-recyclable paper make up a significant portion of a school's waste stream. Schools can divert this material from the landfill and potentially avoid disposal costs;
- **Providing opportunities for hands-on learning** as well as empowering and encouraging students to be aware of and lessen their environmental impact;
- **Enhancing curriculum-based learning.** These projects or programs support lessons in science, chemistry, mathematics, economics and more; and
- **Providing a great way to convert food waste and yard trimmings into a valuable product** that can be added to the school garden or yard and reduce costs by using less water and fertilizer.

Schools can compost!

Different types of composting work for a variety of budgets as well as administrative or educational priorities.

This guide focuses on three options:

1. **On-site bin composting** using outdoor bins as a classroom demonstration;
2. **School-wide composting** centered on food waste collection from the cafeteria using an outside commercial vendor; and
3. **Vermicomposting** in classroom bins.



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What is composting?

Composting is nature's way to recycle.

Composting is the controlled decomposition of organics such as yard trimmings, leaves and food waste. Microorganisms break down this waste into the nutrient-rich material that can be used in gardens and flower beds.

Turning food waste and other organics into compost is just like recycling other materials such as plastic bottles and aluminum cans which make fabric and car parts.

1. On-Site Bin Composting Program

On-site bins provide **outdoor classrooms and show students how to recycle food waste** on a small scale.

Students learn the composting process and how to be responsible consumers by thinking about the waste they create. On-site composting requires planning, dedication and commitment, but students will reap what they sow – compost that can be used at school.

TIP: Start small and be flexible. Research and make changes as needed.



Before you start ...

- **Gather support and develop a plan and budget.** Make sure there is administration approval as well as teacher, staff and student support. Define the scope of the project. Consult with administration about developing a budget – including applying for grants.
- **Decide how and how much food waste will be collected.** Start small, you can always expand.
- **Determine how the material will be taken to the outdoor compost bin.** Food waste is heavy so smaller containers with lids work best for students. **TIP:** Use a wagon or four-wheel garden cart for transporting after collection.
- **Secure equipment.** Tools include: collection containers; a shovel or pitch fork for loading and turning material; a compost thermometer; a scale; work gloves; and bins. Decide whether to buy or build
- compost bins based on your budget and space. Visit www.scdhec.gov/compost for more about buying and building bins.
- **Assign project duties and develop a schedule.** This will ensure that work gets done and everyone helps. Rotate tasks so that experiences can be shared between students, teachers, custodians and parents.
- **Train participants.** Demonstrate proper equipment use – including lifting/hauling techniques. Review appropriate attire such as gloves and remind participants of proper hygiene including hand washing.
- **Promote the project.** Let everyone know the start date, how the project will work and how to participate. Use announcements, posters, newsletters, presentations and the school's website.
- **Keep records.** Measure the amount of material collected (diverted from the landfill) and the compost created.

Schools must follow these composting requirements.

School composting programs are exempt from **ALMOST** all S.C. regulatory requirements **except:**

1. **All material composted at school must be generated and used on site;**
2. **Permitting, financial assurance and compost product testing may be required if the school plans to sell or give away the compost;**
3. **No more than 400 cubic yards of material (i.e., compost or waste) may be on site at any one time;** and
4. **Schools must follow boundary guidelines when setting up the compost site on campus.** The site must be 1) a minimum 50 feet from any property line; 2) a minimum 200 feet from any residence, church, day-care center and park unless waived with documented consent of all property owners; and 3) a minimum 100 feet from any public or private drinking water well.

Composting regulations are available at www.scdhec.gov/compost.

How to Make COMPOST

1



Pick a location. Pick a dry spot within the composting requirements on the previous page and the location recommendations on page 5.

2



Follow the recipe. Making compost is a lot like cooking a meal – you need a recipe. The basic ingredients are alternating layers with 3 parts Browns to 1 part Green.

3



Check moisture. Too little moisture will inhibit the composting process. Too much will cause the compost to smell.
TIP: The compost should be as moist as a damp sponge.

4



Mix it up. Air is essential. Use a pitchfork, shovel or roll your tumbler to turn your compost – preferably once a week – to heat the pile, kill pathogens and speed the composting process.

5



All done! As material breaks down the compost will get warm. Don't be alarmed if there is steam. Now just wait – you could have finished compost in as little as 12 weeks. When your compost has no pieces of food and is a dark, soil-like material, it's ready!



What about the bin?

Compost bins and tumblers can be purchased online and locally.

See "Composting: Recycling Naturally" for more details about bins to buy and build. Visit www.scdhec.gov/compost.


Picking the Right Location for On-Site Composting

- **A location near the school garden is ideal**, but in a low-traffic area.
- **Bins should be level** – and placed on grass or soil for drainage and aeration.
- **Do not set up on asphalt or concrete.** This inhibits the work of microorganisms and prevents proper aeration.
- **Give bins enough space.** An area 10-foot square works well.
- **Keep the site away from structures and areas** as described in the composting requirements on page 3.
- **If possible, do not locate the bin(s) near dumpsters.** They often attract animals or create odors.

Compost Ingredients for On-Site Bins

Remember to alternate layers: **3 parts Browns** to **1 part Green** from material generated at school.

TIP: Make sure the top layer is Browns.




WHAT CAN NOT BE COMPOSTED ON SITE?

Meat or Bones	Oily Foods	Plastic Bags	Sawdust (from painted or treated wood)
Fish	Grease/Cooking Oil	Plastic Wrap	Wood Shavings (from painted or treated wood)
Poultry	Dairy Products	Coated Paper	Evergreen Leaves

NOTE: Although these items cannot be composted on site, commercial recycling services may accept these items.

Tips for Successful On-Site Bin Composting

- **All food waste should be added to the compost bin daily.** Food should be collected in a covered container to control odors and prevent pests.
- **Weigh and record** to show how much food waste has been diverted from the landfill. The best scale to use is one where the weight is viewed from the side or has a locking feature that allows the weight to be read after the container is removed.
- **Take the temperature.** Compost thermometers will reach the center of the material where it is the hottest. The proper temperature range should be about 130°F to 160°F to destroy pathogens and weed seeds. Do not exceed 170°F.
- **Clean up.** The containers used to carry food waste to the bin should be cleaned daily.



Common Problems & Simple Solutions

SYMPTOM	SITUATION	SOLUTION
The compost has a rotten-egg smell.	There is too much water or not enough air.	Turn the compost and add more browns if it's soggy.
The compost has an ammonia smell.	There is too much nitrogen.	Add browns like leaves and newspaper and turn the compost.
The compost isn't decomposing quickly enough or isn't producing enough heat.	There is not enough material.	Mix new ingredients into the compost.
	The material is too dry.	Moisten and turn the compost.
	The material needs nitrogen.	Add greens like grass clippings or food waste.
	The material needs oxygen.	Turn the compost more frequently.
Flies and/or gnats are around the compost.	The greens are exposed.	Cover the greens with browns, finished compost or soil.



TIP: The nose knows. A simple smell test can be done to see if your compost is ready. Place a small amount in a plastic bag and take a whiff before sealing the bag. After a few days of storing the bag in a dark place, the sample should smell the same as it did before. If it smells worse, your compost needs more time to cure.



2. School-Wide Composting with a Commercial Hauler

Composting food waste from the cafeteria is a growing option for South Carolina schools as commercial vendors offer collection, hauling and processing services. Schools can contract with these vendors where available.

Commercial haulers drastically increase the amount of food and paper material that can be collected for compost in a school lunchroom. Due to the strict standards of operation they must follow as well as the quantity of material they process, commercial facilities differ from small scale and private composting operations. The regulated temperature and process allow more material to be included in commercial composting operations than in backyard or community composting including meat, dairy products, fried foods, certified compostable products, milk cartons and paper products. These facilities receive material from sources as varied as schools, grocery stores, restaurants and even residents.

Schools can take a substantial bite out of their overall waste by diverting their food waste, also known as organic waste. They can reduce their environmental impact and become more sustainable simply by separating their organic waste and composting.

This program also turns the cafeteria into a classroom and helps students learn the scope of the issue, making them wiser consumers.

FACT: Commercial compost facilities are required to monitor and record temperatures of their compost piles every 50 feet. To eliminate pathogens, the piles must maintain a minimum temperature of 131°F for three consecutive days.



It's Elementary: Steps for Setting Up a Cafeteria Recycling Program

Most schools set up three-bin stations in the cafeteria to allow students to separate trash, composting and recycling. Students, with teacher guidance, can monitor the program.

- **STEP 1: Assemble a green team.** It should include teachers, custodial and cafeteria staff as well as students. Once this team is established, bring in administrators and the compost vendor.
- **STEP 2: Find out about your waste management contract.** It is essential to understand the school or school district's solid waste operation. Can the current contract be revised to include food waste? Does the contract include zero waste goals or a sustainability budget? If the current vendor does not offer services for organics, are other companies available in your area?
- **STEP 3: Consider a food waste audit.** How much food waste is made? What other waste is created such as single-use plastic items and packaging? Can any of these items be converted to compostable versions? Will you be composting from "back of house" as well? The results will provide an overview and highlight the amount of uneaten food and other compostables as well as disposables and packaging.
- **STEP 4: Determine your budget.** There may be vendor costs as well as equipment expenses for containers and signage. Research grant opportunities or combine grants received to help with costs.
- **STEP 5: Work with your vendor on a plan.** Decide and confirm with the vendor what will be composted as well as how it will be collected, moved from the cafeteria and stored. Also find out if they will provide finished compost for use on school grounds.
- **STEP 6: Promote the program.** Through a school-wide training and education effort, every student is informed about this change of habit, how to properly separate their waste and why it is important to reduce waste and conserve resources.
- **STEP 7: Implement and monitor the program.** Evaluate and adjust as necessary.



What vendors service my area?

There are multiple contact vendors throughout the state that haul food waste and compostables. For information on companies servicing your area contact your local recycling coordinator at www.scdhec.gov/recycleheresc or search the Green Resource Index at www.scdhec.gov/gri.

Currently there are two companies that provide food waste hauling services statewide.

Atlas Organics
www.atlasorganics.net

Smart Recycling US, LLC
www.smartrecyclingus.com

3. Vermicomposting

Vermicomposting is the process of using worms to convert organic waste into a natural fertilizer.

This classroom project is an excellent introduction to environmental science and natural recycling. It is done indoors in a closed bin populated with red wiggler worms. Worms eat the organic waste and expel it as worm castings. The castings along with other decomposed material make up what is known as vermicompost.

Worms

Vermicomposting worms are *Eisenia fetida* - also known as red worms or red wigglers.

Red worms can eat about half their body weight in a day. The worms in your bin, known as a herd, will stabilize at levels that can be supported by the food given to them and the size of the bin. A small bin can house a few hundred worms. A larger bin can house a pound of worms - about 1,000. They can be ordered online, purchased locally or shared by splitting herds from an existing bin.

Vermi-Bins

Vermi-bins can be bought or made. Reusing a plastic storage container is a good place to start.

Bins should allow limited to no light. They should be 3 to 12 gallons in size, but no more than 18 inches high because red worms prefer to live and feed near the surface. Thoroughly wash and rinse before adding the bedding and worms.

Continued on the following page



The Workings of a Worm

Worms do not have teeth, but they do have a gizzard to aid in digestion. A gizzard for a worm is like a garbage disposal in a sink. Inside the gizzard are powerful muscles and small mineral particles like soil or sand. Food enters the gizzard and the muscles and small mineral particles pulverize food making it small enough to pass through the intestines.



Vermicomposting is an aerobic activity – meaning it needs oxygen. For air circulation, use a quarter- to half-inch drill bit to add holes in the top or sides of the container.

Bin Location

Red worms survive best if the temperature is kept between 55°F to 77°F.

Keep your worm bin inside away from vents and window sills as the temperature can fluctuate in these areas. If placed on the floor, lay a rug or a piece of cardboard under the bin to provide insulation.

Worm Bedding

Bedding for the worm bin serves as a food source, provides a medium in which to bury food waste and keeps the worms comfortable and safe. Newspaper is an inexpensive and readily available bedding.

To use newspaper:

- **Shred or cut** newspaper into 1-inch strips. Do not use glossy paper inserts.
- **Wet and wring out** the newspaper strips.
- **Add a small handful of soil or sand**, then fill the bin two-thirds full of strips.
- **Fluff the paper** so that worms can easily move through the strips.
- **Only add bedding** when setting up the bin and after harvesting.








Feeding the Worms

Give the worms a few days to settle in their new bin before feeding them.

Add a small amount of food waste (keep the choices simple) and check on the worms every few days. You will see how quickly they are eating and then can adjust the food amount. If food begins to rot, add less at a time. Too much food can cause problems with acidity, odors, pests or too much moisture.

FOODS TO ADD

FOOD	TIPS
 Fruit and Vegetable Trimmings	Some foods like carrots and potato peels take longer to break down because they are fibrous.
 Bread	Bread should not have anything on it including mold or condiments.
 Coffee Grounds and Filters	Only paper filters can be composted – NO single-serve cups.
 Egg Shells	Wash and grind shells – they help control acidity.
 Tea Leaves and Tea Bags	Remove staples from bags, but leave the paper and string.

FOODS TO AVOID

✗ Meat	✗ Fish
✗ Dairy	✗ Citrus
✗ Oily foods	✗ Grease

Harvesting Vermicompost

The bin will be ready to harvest in 3 to 6 months.

The vermicompost should be dark and crumbly with no bedding or food waste visible. There are several harvesting options:

- **Migrating Method:** Gently push the compost to one side. In the other half, add bedding and food waste. When the worms migrate to the new bedding, remove the compost (and pick out stragglers). Add bedding to the empty side of the bin.
- **Cone Method:** Place a piece of plastic on a table. Gently remove the compost and place into cone-shaped piles on the table. Each pile should be about 6 inches in diameter. Give the worms 10 minutes to burrow. Next, take a small handful of the compost from the top of each cone and place in a separate container. Wait another 10 minutes for the worms to burrow again and repeat the process until all you have left is worms. Return the worms to the bin where you have added new bedding.
- **Scoop Method:** In a well-lit room, remove the lid and give the worms about 10 minutes to burrow into the compost. Then scoop out the top layer of compost. Repeat the process until all that is left is the worms, then add new bedding.

How to Use It

Vermicompost can function as both a soil amendment and fertilizer. The common ratio is 1 part vermicompost to 4 parts potting soil.

You also can make “worm tea” liquid fertilizer. Mix 2 tablespoons of worm castings with a quart of water – letting it stand for a day and shaking occasionally before sprinkling near the roots of a plant.

TIP: Don't use too much vermicompost. It can make the soil hard and leave plants unable to grow properly.



Helpful Hints: Food Waste = Worm Food

- **Chop the food waste.**
It's easier for the worms to break down.
- **Only add food when the last feeding is almost gone.**
This may vary based on the number of worms and the size of your bin.
- **Keep the bedding as moist as a damp sponge.**
If the bedding is dry, add water using a spray bottle. If the bedding is too wet, add paper or peat moss.
- **Use your hand to pull back the bedding to create a hole big enough for the food.**
Don't use a trowel or shovel that may injure the worms. Fill the hole covering the food with at least two inches of bedding.
- **Red wigglers reproduce quickly.**
You will see reddish-yellow cocoons about the size of a tip of a match. If the bin becomes overcrowded, remove some worms and use them to start another bin.

Resources & Contact Information

DHEC RESOURCES

DHEC's Office of Solid Waste Reduction and Recycling

Telephone 1-800-768-7348

Website www.scdhec.gov/recycle

Don't Waste Food SC

Website www.scdhec.gov/dontwastefoodsc

Take Action SC (DHEC's K-12 curriculum supplement including composting lessons)

Website www.takeactionsc.org

OTHER SOUTH CAROLINA RESOURCES

Farm to Institution

Website www.scfarmtoinstitution.com

S.C. Department of Agriculture (SCDA)

Website www.agriculture.sc.gov

NATIONAL FOOD WASTE REDUCTION RESOURCES

EPA

Website www.epa.gov/sustainable-management-food

U.S. Department of Agriculture (USDA)

Website www.usda.gov/oce/foodwaste

U.S. Composting Council

Website compostingcouncil.org

U.S. Environmental Protection Agency (EPA) Composting Basics

Website www.epa.gov/recycle/composting-home



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