



Health & Safety Guidance for Composting in the School Setting

A composting project in a school, either in the classroom or on the school property, can be a terrific opportunity for students to gain direct knowledge and experience with natural processes and a method of reducing and recycling biodegradable wastes. Although composting utilizes natural decay processes, these processes are occurring in a relatively small, concentrated area of a pile or bin. There is a potential for human exposure to the organisms involved and the products they produce.

To make this educational experience a successful one, we should consider how we might reduce any potential risks. Providing an experience with the decomposers is basically similar to bringing into a school other living things — bracket fungi, birds' nests, wasps' nests, growing plants from seeds, providing butterfly or moth chrysalises, birds, rabbits, guinea pigs, turtles, frogs, snakes, and lizards — so that students can observe and interact with the living environment.

Direct interaction with living organisms is not free of risk. We know that some people can experience health problems: for example, allergic skin reactions or asthma to bird or other animal dander, asthma to fungi, or infections from bacteria and fungi (such as *Salmonella* from turtles).

Composting is a controlled decay process which fosters the growth of bacteria and fungi, as well as other organisms. It can thus be a source of exposure to microorganisms, their spores, or their by-products. Exposure to these items could occur by:

- Inhalation
- Skin contact or absorption
- Injection (exposure through the skin, such as through cuts, abrasions, or puncture wounds)
- Ingestion (usually hand-to-mouth transfer)

In the U.S., both children and adults are experiencing an increase in the incidence of asthma (including adult-onset). Both children and adults may be immunocompromised from inherited or acquired conditions, or due to medication. While most people do not experience any reaction to compost bins

or compost, we need to minimize the risks so that we can protect susceptible people and provide a rich educational experience.

Here are some thoughts and suggestions.

1. Protect those likely to be most sensitive. Involve the teachers, school nurse or physician, parents, and faculty/staff to discover any potentially susceptible occupants of the classroom or school building. Protect privacy of medical information, but determine who may have allergies, be immunocompromised or be prone to infections that could make them sensitive to potential risks. Control exposure of these individuals by restricting who actually comes in contact with the compost. Other students or the teacher could feed the compost bin or take samples. Do not stir or otherwise disturb the pile or bin when people susceptible to inhalation of allergens are nearby.

2. Consider the type of compost bin. Most school compost bins are too small to undergo a thermophilic (hot) phase making the risk from the fungus *Aspergillus* minimal, but also failing to get hot enough to kill pathogens that might be contained in post-consumer food scraps. (See fact sheet on Health & Safety Guidance for Small Scale Composting at: <http://cwmi.css.cornell.edu/smallscaleguidance.pdf>. For information on worm composting, see *Worm Composting Basics*: <http://compost.css.cornell.edu/worms/basic.html>).

3. Turning the compost. Turning of compost piles is what releases most of the airborne particles and gases that can cause symptoms in some people. So if a pile is turned, be aware of the wind direction and of the susceptibility of those nearby and those doing the turning. Susceptible children should not turn the compost. A NIOSH approved N-95 (or higher) respirator should protect a susceptible adult.

4. Where to put the composting activity? If outside, keep it away from air intakes and downwind (for the prevailing winds) of the building. Often, compost piles are placed in school courtyards with surrounding classrooms having unit ventilators; this may not be a good location as it places the air intakes for these units too close to the pile. If inside the building (such as a worm bin), consider hallways, areas near loading docks, or other areas which are drafty. If a classroom's air supply already cannot meet the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE) recommendations for occupant needs, it will certainly be unable to sufficiently dilute and flush away air contaminants from compost. There are other potential sources

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of molds such as carpets that should also be considered if air circulation is inadequate.

5. Manage the compost well. Making compost requires a mix of feedstocks, some high in nitrogen (like food scraps) and others high in carbon (like leaves and newspaper). Keeping food scraps covered with high-carbon materials will keep down flies and dispersal of fungal spores. Make sure you have a handy source of high-carbon materials. A list of materials and their carbon to nitrogen ratios can be found at: <http://cwmi.css.cornell.edu/compostbrochure.pdf>. It is advisable for people to handle only their own food scraps or only to use pre-consumer food scraps to avoid sharing of germs.

6. Practice good hygiene. Anyone coming in contact with the compost bin or compost should practice good hygiene by either washing hands well or wearing disposable gloves. Effective hand washing requires use of soap and sufficient time (sing “Happy Birthday” twice while lathering up). Gloves should be available (use of non-latex gloves such as polyethylene is advisable due to latex allergies) and users should know proper technique for removing gloves (see sidebar). Hands should be washed after gloves are removed. Anyone with cuts and abrasions should cover them with bandages and wear gloves.

7. Recognize potential symptoms. If a student comes into contact with the compost and gets short of breath, wheezes, has irritation of the eye/nose/throat, experiences nausea, or

TAKING OFF GLOVES

To remove used gloves: using the right hand, pinch a bit of the palm of the left glove and pull off the left glove. Using the index finger of the left hand, insert that finger down into the right glove and pull off the right glove. (This procedure enables the gloves to be removed without touching the outside contaminated surface of the glove with the skin.) Discard disposable gloves; do not reuse.

FOR IDEAS ON HOW TO CONSTRUCT A COMPOST BIN SEE:

Composting: Waste to Resources - The packet includes eleven designs for compost systems. (see below)

Welded Wire Cylinder fact sheet - Instructions on how to build a simple and inexpensive compost bin: <http://cctetompkins.org/compost/downloads/weldedwirebin.pdf>

Composting to Reduce the Waste Stream - A guide to small scale food and yard waste composting. Order from NRAES, 607-255-57654; <http://www.nraes.org/publications/nraes43.html>

headache, these symptoms might be associated with exposure to the compost. Consider modifying procedures as needed to protect everyone.

FOR SOME IDEAS ON HOW TO USE COMPOST AS AN EDUCATIONAL TOOL SEE:

Composting in Schools: Web Site - This web site explains how to make compost either indoors or outside, and gives detailed information on the science of the composting process. It also includes articles about weird and unusual composting, frequently asked questions, and a composting quiz. View at: <http://compost.css.cornell.edu/schools.html>

Composting: Wastes to Resources - A guide for those who want to educate youth about composting. The packet includes a 36p instructional guide < <http://cwmi.css.cornell.edu/compostingwastestoresources.pdf>>, two posters, and eleven designs for compost systems < <http://cwmi.css.cornell.edu/designscompostingsystems.pdf>>. 1996.

Composting in the Classroom: Scientific Inquiry for High School Students - A manual for teachers interested in using composting as a topic for scientific inquiry by high school students. Includes example research topics, guidelines for directing student research, and instructions for a wide variety of techniques related to compost science, 116 p, 1998. View at: <http://compost.css.cornell.edu/CIC.html>

Do You Know Where Your Garbage Is? - A 12-min video for youth which presents options for what we can do with the garbage that we can't reduce, reuse, or compost. Two animated characters and documentary footage help us explore the more controversial issues of composting, incinerating, and landfilling and how these can be part of a community's waste management plan. Informative for all ages. 1992. Download at: <http://hdl.handle.net/1813/11409>

It's Gotten Rotten - This video is designed to introduce high school students to the science of composting. It focuses primarily on the biology of the invertebrates and microorganisms that decompose organic matter. Students are shown designing and using both indoor and outdoor composting systems, observing living organisms, and using finished compost to grow plants. 1996. 20 min Video and 15 p. Teacher's Guide: <http://hdl.handle.net/1813/11656>

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