

ON SITE COMPOSTING AT SCHOOLS

Strategies, Systems and Resources for Lane County Schools

School Garden Project of Lane County

Who is this manual designed for?

This manual is for anyone who is interested in helping schools implement composting programs: students, teachers, community members, food service staff, custodians, volunteers, parents and anyone else with an interest in composting.

The manual was originally designed to accompany a School Composting Workshop in April 2009.

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Why Compost at Schools?

On average, a school of 200 students generates 75 pounds of compostable waste each week, or *over 3,000 pounds per year*. Here in Eugene, over 50% of the waste sent to landfills is compostable.¹

These wasted resources are also a lost opportunity to teach our youth lifelong sustainable practices. By establishing composting programs at schools, we can reduce landfill waste, educate students about the relevance of resource conservation and composting, and generate a useful amendment to boost the health of school vegetable and habitat gardens.

Successful programs are fundamentally student-driven, with support provided by volunteers and school staff. Numerous local schools, such as Edison, Edgewood, Adams, and Cesar Chavez, have implemented low-cost, sustainable cafeteria composting programs that represent a sound educational, economic, and environmental choice.

¹ Oregon DEQ.

Building Support

While the enthusiasm and energy to start a composting program might start with one person, the best way to create a functional, thriving school composting program is to engage a broad group of stakeholders in the effort: students, parents, teachers, administrators, community members, and (most importantly!) cafeteria and maintenance staff. This is an important first step. By energizing students, developing a group of key volunteers, and gathering input from school staff from the beginning of your program, your efforts are much more likely to succeed.

Many schools find it useful to create a “Compost Committee” that might or might not overlap with a Green School or Garden Committee. Responsibilities can be divided among committee members depending on their available time and interest. For example, students and custodial staff might be most involved in the daily transfer of food waste to the compost bin, while a parent or community member would take responsibility for turning the pile every two weeks, or delivering coffee grounds or sawdust to amend the pile.

Ideas for Involving Community and School Staff

1. Present the idea of a composting program at a PTO or school board meeting. Have your facts ready about how much money the school spends on waste disposal, what volume of compostable waste a typical school sends to the landfill in a year, and how you see a composting program fitting with the school’s mission.
2. Solicit parent or community volunteers to help by doing a very straightforward job on the compost team, e.g. ordering leaves from the City in the fall, or helping with bin construction. Consider ways to move volunteers from the “outer circle” of one-time jobs to an “inner circle” of consistent caretaking responsibilities.
3. Talk with cafeteria and maintenance staff about your ideas for the program. Ask them how a program could be set up so that it wouldn’t create extra work for them.
4. Highlight the benefits of implementing a composting program with your school principal, or at a staff meeting. Becoming a certified Oregon Green School gives the school prestige and access to grant funds and conference participation.
5. Ask teachers whether they can think of students who would like to be part of a “Green Team” to train other students to sort compost, and to help with daily tasks.
6. Partner with other groups and organizations for assistance such as Lane County Extension Service Compost Specialists, the Oregon Green Schools Association, your local Neighborhood Association or Grange, the City of Eugene , and School Garden Project.
7. Keep in mind that it’s fine to start small. If cafeteria staff are reluctant to jump into post-consumer composting, consider starting by composting leftovers from the salad bar once a week, and build on your small successes.

Talking points for conversations with school staff, parents, and community members.

- *Give examples of other schools and how they implemented similar compost programs and report on its success. Schools that currently have successful composting programs include Edison, Edgewood, Adams and Cesar Chavez.*
- *Explain how food waste is currently being managed and give examples of how much waste could be diverted through composting. The maintenance staff at your school should be able to give you information on volume and cost of waste disposal. A typical school of 200 generates 75 pounds of compostable cafeteria waste in a week, or ~3,000 lbs/year. Composting this waste instead of paying to have it hauled to a landfill will save the school money.*
- *Provide examples of how the composting project could fit easily with disciplines such as science and math (e.g. making a graph, practicing weight conversion, studying population dynamics). There are existing curricula (e.g. One Rotten Curriculum, The Worm Café) available through the School Garden Project library.*
- *Provide realistic examples of how much time will be necessary to get the project running and then to maintain it. (see “Case Study”)*
- *If possible, have a timeline, workplan and potential site (see “Choosing An Appropriate System and Site”).*

Conducting a Waste Audit

Conducting a waste audit is a fun, hands-on step in implementing a school compost program. It not only helps to identify how much volume of compostable material is generated in a cafeteria, but also gets students, teachers and staff thinking about the waste stream and what comprises it. Not all food material can be composted, and during the waste audit process, participants learn to separate non-compostable items (meat and dairy) from the bread, vegetable and fruit scraps. *Composting meat and dairy is not recommended for school programs.* The audit will identify the weekly volume of compost and thus help determine what size of operation and system will work best.

When conducting a waste audit, try to involve students, faculty and cafeteria staff. While a two-week time frame is ideal, the audit can be done over a one-week, or even one-day period. In Eugene, Oregon Green School Coordinators and/or Compost Specialists are often available to assist with or lead waste audits.

To conduct a waste audit:

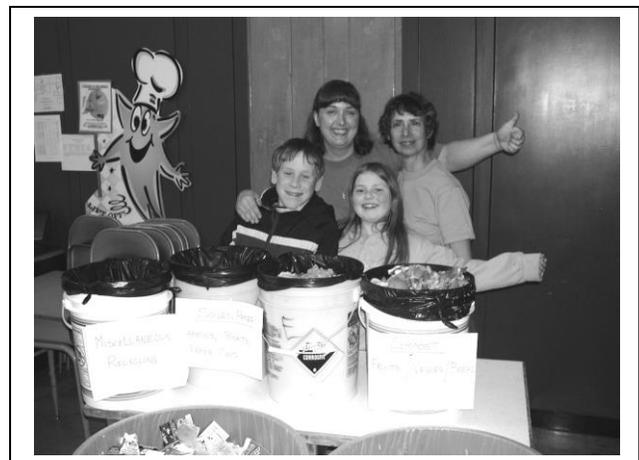
1. Place two clearly labeled bins or trash cans in the cafeteria wherever the trash cans usually stand. Label one bin "Fruits, Vegetables and Napkins" and another "Waste." Have plastic gloves and spatulas available to help sort the food waste.
2. As students approach the sorting station, help them to scrape their food waste and trash into the appropriate bin. This is a good place to involve student helpers as "compost monitors."
3. Record the volume (and weight) of the compostable food at the end of the lunch period. Don't forget about the preparation waste from the kitchen (this is the waste produced before the meal is served including fruit peels, lettuce cores and similar items).

The following chart will help with converting the gallons collected to the cubic feet volume necessary for determining an appropriate composting system.

Gallons Equivalent Volume

7 1/2 gallons	1 cubic foot
45 gallons divided by 7.5	6 cubic feet
202 gallons	27 cubic feet

A container that is 3 ft x 3 ft x 3 ft equals 27 cubic feet



Overview of Composting Systems

Now that you have a good estimate of the volume of compost generated in a week, you may now determine what system will work best. Some of those are:

- Bin Systems
- In-vessel composting (Earth Tubs)
- Vermicomposting (worm composting)

When choosing a composting system, there are many factors to consider other than volume. These include cost, labor, amount/type of food and yard waste, available land or site, and the age of the students.

Bin Systems

Bin Systems range from backyard black plastic domes to a three-bin wooden structure. The bin needs to be at least large enough for a 3x 3x 3 foot pile to sustain the high temperatures necessary for good composting. Food waste is added to the bin along with a carbon source such as leaves or sawdust. The active compost pile should be turned intermittently to incorporate air, then eventually set to rest until it is fully decomposed (a process called “finishing” or “curing”).

It is important to make sure the bin is rodent proof.

This can be accomplished by installing ¼ inch hardware cloth on the ground and around the sides of the bin if rodents are a concern on site. Installing a lid will lessen any possible odor concerns. If plastic domes are used, it is recommended that to have multiple vessels because they tend to fill up quickly and will need 6-12 months to fully decompose.

If space allows, preference should be given to the three-bin structures because they are easier to turn, and can hold more material than the black plastic domes. Thus, composting efforts can be expanded in future as needed. The non-active bins can hold carbon material (leaves, sawdust) or finishing compost. The bin structure also allows students and others to see the compost process and observe it more thoroughly than if it is contained under black plastic domes.



Compost Bins on rotation at Ridgeline Elementary

Costs \$0-1,000 (material can be donated and construction done in school). A functional 3-bin system can be constructed for less than \$400 (cost of materials).

Labor necessary (Level at which students can help) 5-10 hours/week

K-12 w/ assistance for younger children

Materials Vegetative waste, napkins, grass clippings and yard waste, sawdust

Advantages Easy to maintain, low cost

Disadvantages Slow (3 months- 1+ years for finished product)
Meat and dairy products may be difficult to compost



Finishing bin at Chavez Elementary

In-vessel composting

The most common in-vessel composting unit at Eugene schools is the “Earth Tub,” many of which were paid for by the Sustainable Schools initiative, which has been discontinued. The Earth Tub is capable of composting most all cafeteria food including meat and dairy. Air flow is controlled with a biofilter unit to eliminate odors, and leachate is controlled via PVC tubing and manual discharge. The cover of the Earth Tub spins to allow rotation of an auger. The vertical stainless steel auger, is powered by a 2 hp electric gear motor. The operator, pushing on one of three handles, rotates the auger around the inside of the Tub.

Each Tub has the capacity to handle 100-150 pounds per day, with a total capacity of 4,000 pounds.

The Earth Tub is able to decompose meat and dairy products making it easier to sort compostables while capturing most of the food waste. After the compost is harvested it should be moved to a finishing bin, where it will rest for a month before it is used.



Harvesting compost from Earth Tub

Costs (no labor) \$7,000 - \$25,000 Labor 5-15 hours/week Technical knowledge needed. Most of the Earth Tubs in schools around Eugene were purchased through a grant that has been discontinued.

Levels 5-12 or 9-12 Depending on system

Materials Suitable Food scraps including meat and dairy (most systems), yard waste, paper products (non waxy)

Advantages Fast, capable of composting most organics

Disadvantages Expensive, technical knowledge required, ample space devoted to system, difficult for students to observe compost process

Vermicomposting

Composting using worms can be done utilizing a variety of technologies and is an especially good small-scale way to introduce the idea of composting. Small worm bins can be placed in classrooms and monitored by the students. Regardless of the type of vermicomposting system used, the worms must be kept within a defined temperature range between 50-80 F. In Eugene, this temperature range can be maintained by placing the worm bin under an awning, where it will be shaded during the summer and partially covered during the winter.

In general, the worm to daily food ratio is 2:1 (two pounds of worms can eat about one pound of food waste in a day). There are institutional style bins in which material is added to the top of the bin and finished worm castings are removed through a tray on the bottom of the bin. Bins can also be constructed with wood and work in much the same way with a little more manual labor, but much cheaper. A very inexpensive option for class room worm bins is making them from two plastic Rubbermaid containers with holes drilled in them. Agnes Stewart Middle School in Springfield has a larger scale vermi-compost system.



Two models of worm bins

Costs \$ 10 – 2,000 Depending on size of operation.

Labor K-12 5-10 hours/week

Materials Suitable- Vegetables, Fruits, Breads, Coffee rinds

Avoid large amounts of meat and dairy (if pulped this concern lessens)

Advantages- Easy to maintain, can be done on a smaller scale in classrooms

Disadvantages- Expense of commercial devices, temperature requirements

Other Compost System Options

Compost Tumbler: This system, which consists of a mounted barrel which is spun by a handle on the end, operates on the principle of consistent turning, or ‘tumbling’ of the compost. Many models are advertised as needing no source of carbon.

Advantages and disadvantages: This system is well-contained and rodent-proof. Many of the compost experts we have spoken with report problems with bins breaking or being difficult to turn. Some models are fairly expensive.



A compost tumbler

Metal Barrel Composting: This system is a simplified, low-cost version of the compost tumbler, comprised of metal barrels with holes manually drilled into the underneath and sides of the barrel for aeration. The active barrel should be layered with nitrogen and carbon sources. It should be turned once a week by laying it horizontally on the ground and pushing it back and forth between two people. This is a good activity for two students to push the barrel with their feet. The barrels should be stored above the ground such as on a pallet so air can get under the barrel.

Advantages and disadvantages: This system is inexpensive, rodent-proof, and if properly maintained can produce finished compost in weeks. However, the barrels can become fairly heavy, and might be considered an eyesore.

Sheet Mulching: This is an option if the school has an area they would like convert into a garden bed. First lay down newspaper and cardboard over the area. Then layer food scraps, leaves, manure and straw into a garden bed shape. Let the pile rest and overtime it will break down into a rich garden bed. Be sure to keep the pile moist as you would a compost pile. There is ample information available on-line about sheet mulching, also called “lasagna gardening” or sheet composting.

Advantages and disadvantages: This is a fantastic way to create garden space without scalping sod. The principle can be adapted to single garden beds (“in-situ” composting) as well. The system is probably not practical for large scale composting efforts.

Choosing an Appropriate System and Site

Before deciding on a system for your school, evaluate the strength of your compost committee or volunteer team. Is there a teacher that would be willing to have his/her classroom take on the composting maintenance? Are there parents or community members who will be willing to volunteer with turning the compost? Is there a custodian or food service employee that will help to oversee the cafeteria sorting and organization?

If you do have an active group, a helpful step in choosing which compost system will work at your school is to visit other schools of a comparable size that have composting facilities and discuss the utility of the system they have.

Considerations for sighting a compost system

- Is there a site that is located close to the cafeteria where students can easily take the daily food scraps?
- Is water available nearby?
- Is there existing infrastructure that could be of use? A shed or building to hold dry sawdust, leaves or coffee grounds?
- How will the construction of compost bins affect the aesthetic of the school grounds?
- Does the compost area present an “attractive nuisance” to students or community members?

Implementing Your Compost Program

Once you have your system in place and your compost team is ready to get going, it will be time to train the student body to sort their waste. In the cafeteria it is important to have clear signs and waste collection station(s). Place the compost collection bucket next to the garbage/tray collection area. Signs should be posted for both compost and garbage and making the distinction between the two. These signs should have clear pictures as well as words so young students can follow along too.

- During the first two weeks of the compost program it is important to have a compost monitor helping students sort out their compost but the monitor is not needed after the students have become used to the new sorting system.
- Have someone, preferably a student or two, scheduled to empty compost at the end of the lunch period. They will record the volume/weight of the compost and empty into the active compost bin. There they will also record the temperature of the pile and make any observations such as site and smell. Then they will add a layer of carbon material to the pile (leaves or sawdust).
- It is very important to have clear signage and directions at the compost bins. The signage should include a step by step list on how to empty the food scraps and layer the carbon material as well recording information. It is also important to have signage for the adult volunteer who comes to turn the pile and add coffee grounds/water if needed. Also having a troubleshooting sheet on hand for how to deal with any problem situations (e.g. odor, low heat, flies) can be very helpful for novices.
- When the compost system is going to start, let the whole school know. Have an act in the upcoming school assembly. One local school had an act at an assembly in which the principle hid in a garbage can as Oscar the Grouch and when another teacher tried to put compostable waste in the garbage he jumped out. Let all the teachers and students know through posters, announcements, newsletters, ect. Encourage parents, community, and students to visit the compost, use it in their classrooms as a learning tool, and sign up to help out with it.

- When setting up the compost bin area make sure that there is a place to store carbon material such as leaves or sawdust. Most often the carbon is stored in a large covered bin such as 55 gallon container (see Resource Guide) or it can be stored under an existing covered shed. Having a bucket of coffee grounds (nitrogen source) on hand will be helpful for heating up the pile as needed.

Involving the Classroom

Composting at school teaches students practical skills while diverting waste from landfills. School composting can be integrated into the curriculum and provide a real-world and hands-on approach to classroom learning. Composting efforts can effectively be combined with school disciplines of science, math, economics/marketing, and English to enhance curriculums.

A local resource for classroom use is “One Rotten Curriculum,” which can be checked out from the School Garden Project Lending Library.

Some curriculum tie-ins:

Biology: *Fungi, bacteria, actinomycetes and other organisms are found in the compost pile and digest a variety of materials.*

Water, Air and Soil Quality: *Discuss methane and leachate released from landfills which negatively impacts environmental quality.*

Math: *Volume, Weight, Temperatures and other calculations can be made from the pile and recordings.*

Economics/Marketing: *Compare costs of buying bags of compost with making compost. Discuss upfront investment and return costs.*

Science: *Decomposition of organic matter and role of decomposers. Discuss the cycle of life and importance of decay.*

Case Study: Edison Elementary

By Susan Daniell, Edison parent

The Edison composting program began as an extension of the school’s gardening activities and to recycle cafeteria waste. In March of 2008, members of Edison Elementary staff, the Edison Garden Committee, the City of Eugene Solid Waste and Recycling Program, OSU Lane County Extension Service and the School Garden Project gathered to conduct an audit of cafeteria waste to determine the volume of compost that could be diverted from the garbage. After assessing the site, the group purchased three stacking compost bins and later added a wood-and-wire three-bin compost system. The compost area is located just outside the cafeteria. Three 55 gallon barrels next to the bins hold sawdust and coffee grounds to amend the piles.



Multiple types of compost bins in use at Edison Elementary

Daily composting efforts began on Earth Day last year. Each day students sort their leftovers into three separate containers: garbage, milk and compost (vegetable, fruit, and bread scraps). Edison Head Custodian Stacey Jones coordinates student volunteers who help with composting on a rotating schedule. At the end of the lunch period, students record the weight of the compost collected, then carry the compost buckets to the bins outside. Next, they record the temperature of the bin labeled “OPEN.” After dumping the day’s lunch scraps into the “OPEN” bin, they cover the addition with a scoop of sawdust and close the lid. Every other week, a parent or community volunteer turns the

compost, checks its temperature, and adds coffee grounds or other amendments as needed. Volunteers also coordinate the bin rotation and move the “OPEN” and “CLOSED” labels as bins are filled and others are emptied. One year after the program started, Edison is using compost from the cafeteria to enrich the soil in their school garden beds.

Edison’s compost project reflects the enthusiasm for composting in our community. The program’s success is the result of the effort and support of individuals and organizations in the school and the community who believe in the importance of recycling and education. Initial funding for the project was provided by a K-12 Waste Reduction Grant from the City of Eugene Planning and Development Department and Lane County Public Works, Waste Management Division. Rexius donated bark mulch to help prepare the site and The Oregon Country Fair provided funding for tools. Anne Donahue of the City of Eugene and Jared Pruch of the School Garden Project provided advice and assistance with setting up the project and auditing cafeteria waste. Lane County/OSU Extension Service’s Compost Specialists Ginny Ducale and Joan Ojero have provided technical advice and education to students. Within Edison, Head Custodian Stacey Jones has been managing the daily activities of composting by the “Green Team” students of 4th/5th Grade teacher Debra Gelzer. The students gather data and educate their peers about composting. Parent volunteers Susan Daniell and Caryn Jacobs help with overall coordination of the project and regularly turn compost. Neighbors have offered help as well – the South University Neighborhood Association and Edison teamed up to win a City of Eugene neighborhood matching grant to purchase a storage shed for composting and garden supplies, and neighbors have offered amendments such as wood chips and chicken manure. Local coffee houses have generously donated coffee grounds and 4J Facilities provides free sawdust.

As the program moves into its second year, it will become part of a school-wide plan to recycle and conserve resources. As students learn the importance of composting to recycle food waste and to improve garden soil, they will also learn about other ways they can reduce waste and contribute to a healthy environment.

Appendix: Resource Guide

Local Resource Guide

Bins:

There are 55 gallon plastic containers available for \$10 at Emerald Valley Kitchen. There are also 55 gallon metal drums available at Glory Bee for \$10.

Buckets:

There are buckets available for free at Emerald Valley Kitchen, and occasionally at Dairy Girl. Check other local food processors.

Leaves:

Often the district grounds crew can provide access to leaves collected on school grounds. If there are no leaves available, free leaves are available from the City of Eugene. For most compost systems, one will not need the 7 yard delivery they offer so it is best to get a load from one of the community garden sites: Amazon, Matthews, and Alton Baker. (See City of Eugene Website: www.eugene-or.gov for directions to gardens)

Coffee Grounds

Coffee Grounds are great source of nitrogen. It may be easiest to go to a local coffee shop and ask for coffee grounds when you need them but there are some sites in Eugene with existing grounds distribution programs. Sweetlife Patisserie has coffee grounds accessible at all times in the parking lot under the cover of a plastic cabinet, be sure to return the buckets back to the cabinet after emptying the coffee grounds. Other locations include, but are not limited to: Starbucks, Market of

Choice, Supreme Bean, One Cup, Full City Coffee, Dutch Bros and Allan Bros. Be sure to bring containers and wear gloves.

Sawdust

4J District schools can place a work order to the district and receive sawdust for free. Sawdust is generally available from local arborists, school wood shops, wood workers or craftsmen. Try to avoid sawdust that has been made from wood with glue; the glue can be toxic.

Other odds and ends

For other odds and ends such as nails and screws, hardware cloth, wood, and posts there are a number of good places to check out. **Bring Recycling** is always a good first place to go before heading to other hardware stores.

Business Contacts

BRING Recycling:	4446 Franklin Blvd. Eugene	541-746-3023
True Value:	2825 Willamette St. Eugene	541-726-0950
	3041 Main St. Springfield	541-367-2221
Jerry's Home Improvement:	2600 Hwy. 99 North Eugene	541-689-1911
	2525 Olympic St. Springfield	541-736-7000
Coastal Farm and Home Supply:	2200 W. 6 th St. Eugene	541-349-0556
Glory Bee, Inc.:	120 N. Seneca, Eugene	541-689-0913
Sweetlife Patisserie:	755 Monroe, Eugene	541-683-5676
Emerald Valley Kitchen	90472 Woodruff, Eugene	800.588.7782

Useful School Composting Contacts

City of Eugene, Love Food not Waste 541-682-6842

City of Eugene Green Schools 541-682-5542

- Information on Oregon Green School certification and OGSA grant opportunities
- General support for implementing school compost programs

Lane County Waste Reduction 541-682-4339

OSU Compost Specialists 541-747-5289

- Resource for expert volunteers
- Technical expertise on compost systems

School Garden Project 541-284-1001

- Educational resources and presentations
- Support for establishing school gardens

BRING Education Coordinator 541-746-3023

- Presentations and resources on vermicomposting

Partners for Sustainable Schools 541-607-9576

- Support in Green School certification, including waste audits

City of Eugene Leaf Program 541-682-5383

- If you mention that you are requesting the leaves for a school, your order will be given priority

Helpful Websites

Mansfield Compost Program: <http://www.mansfieldct.org/schools/mms/compost/index.htm>

- Comprehensive guide to school composting

Oregon State Extension Service Compost Specialists:

<http://extension.oregonstate.edu/lane/gardens/compost>

- In-depth technical information on composting

City of Eugene Compost Program: [http://www.eugene-](http://www.eugene-or.gov/portal/server.pt?open=512&objID=792&PageID=0&cached=true&mode=2&userID=2)

[or.gov/portal/server.pt?open=512&objID=792&PageID=0&cached=true&mode=2&userID=2](http://www.eugene-or.gov/portal/server.pt?open=512&objID=792&PageID=0&cached=true&mode=2&userID=2)

- Links to resources, guides, information

City of Eugene Leaf Program: http://www.eugene-or.gov/portal/server.pt?open=514&objID=1722&qid=68645474&rank=2&parentname=SearchResult&parentid=5&mode=2&in_hi_userid=2&cached=true

- Downloadable PDF of Leaf Delivery Form (fill out and mail in)
- Information on how to use leaves as mulch or compost material

Carbon to Nitrogen Ratio Guide

HIGH CARBON	C:N
Straw	75:1
Leaves	60:1
Newspaper	175:1
Sawdust	325:1
Wood Chips (not recommended, slow to break down)	400:1
Cardboard, Shredded	350:1
HIGH NITROGEN	
Fruit Scraps	35:1
Vegetable Scraps	25:1
Grass Clippings	20:1
Manure	15:1
Coffee Grounds	20:1
Weeds	30:1

Troubleshooting

Getting your compost pile “cooking” properly will take some fine tuning: this guide will give you some tips on how to address common issues. Refer to monitoring records when problems arise, as they may be helpful in determining the cause.

Problem	Solution
Smells like rotten eggs (sulfur)	Aerate Pile. Add more air to mixture by turning it and adding more bulking material like leaves.
Smells sour (like ammonia)	Add more carbon (leaves or sawdust) to the mix.
Mixture is dry	Add water and turn
Mixture is too wet	Aerate pile daily until pile returns to proper moisture level.
Mixture is cold (not heating up)	Add more nitrogen (food waste, coffee grounds, manure, or green grass.)
Mixture attracts animals	Enclose the compost. Install ¼ inch hardware cloth on the ground under compost bin.
Mixture attracts flies	Keep compost covered, spread a layer of leaves or sawdust on top of pile.