



Food Scrap Composting 101

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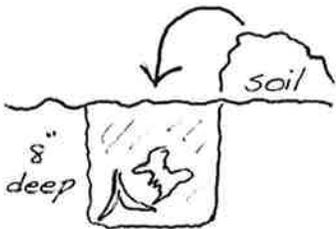
Choices for Food Scrap Recycling

Collect it for curbside pickup where service is available.

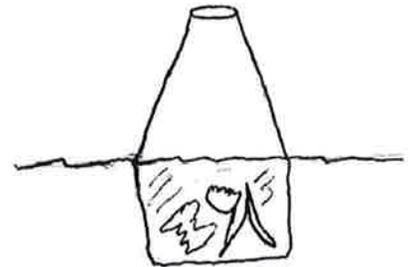
Feed food scraps to your worms.



Bury food scraps in the garden.



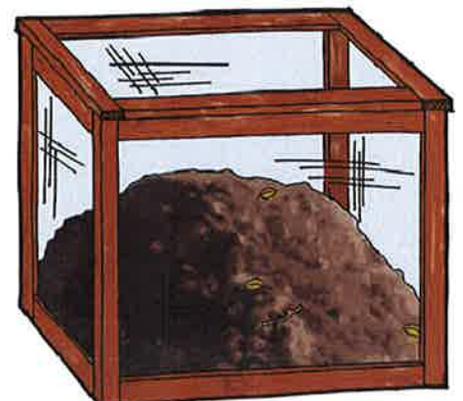
Use a food scrap digester.



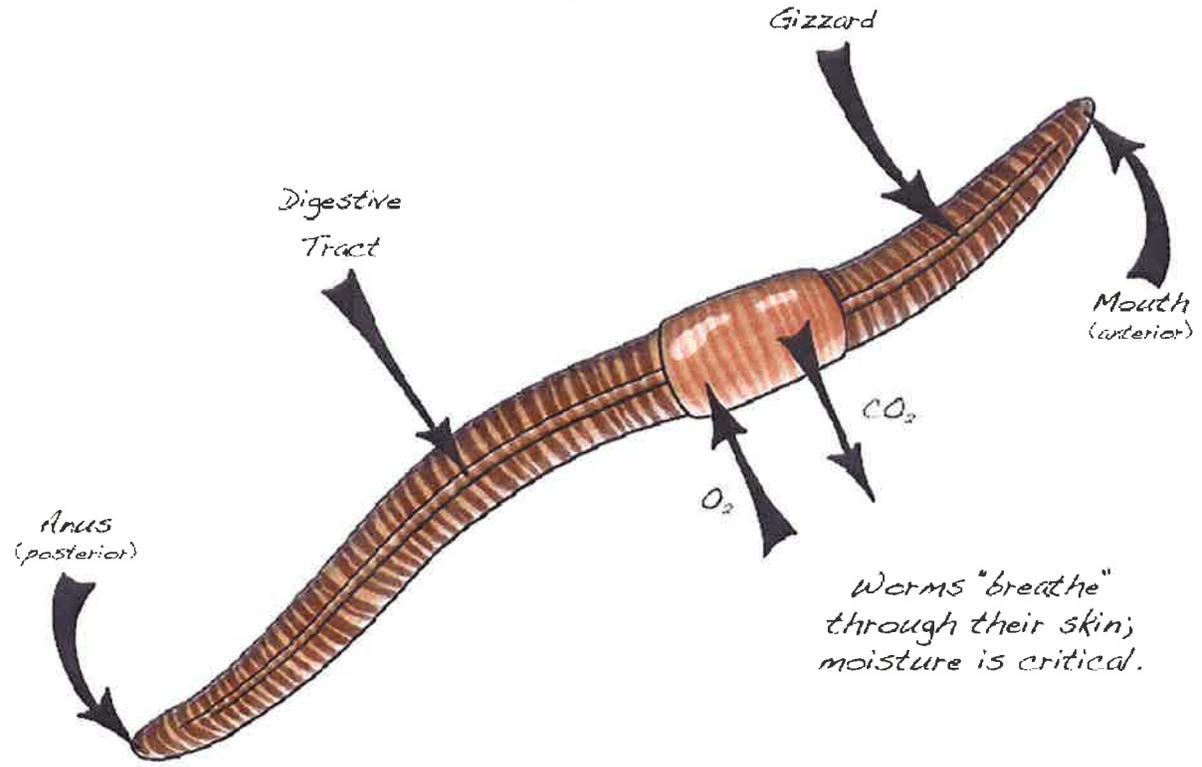
Your food scrap recycling system needs to:

- Keep out pests (rodents, flies, etc).
- Prevent odors.
- Fit your lifestyle.
- Follow local regulations.

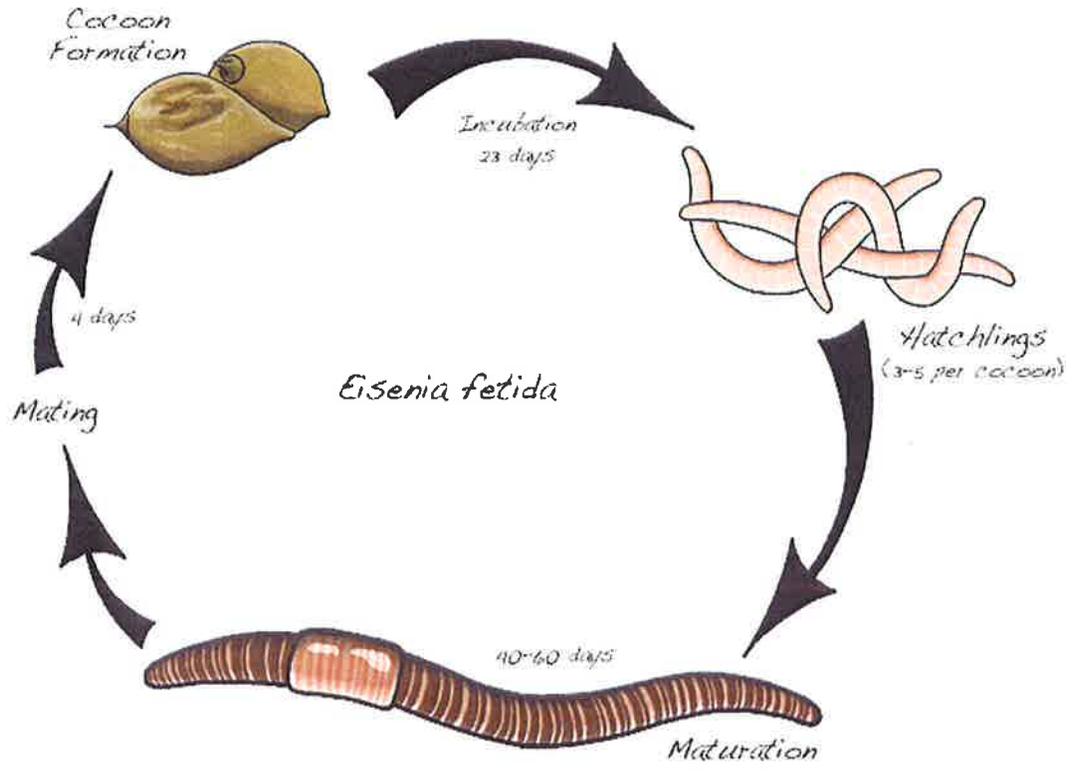
Practice "continuous composting."



Worm Anatomy - Snapshot View



Life Cycle of a Worm



Adapted from Veutter and Reinecke (1988)



The Simple Five Step Guide to Creating a Worm Bin



I hope some of you will be interested in trying a worm bin. If you don't already have one! Here's the process -- from "bedding" the worms to harvesting the vermicompost.

Step One: Tear up a stack of old newspapers. (My 1' x 2' x 4' foot bin holds over 10 grocery bags of shredded newsprint.) You don't need to worry about newspaper ink, even on colored sheets, since toxic heavy metals are no longer used in the ink.

Step Two: Fill a wheelbarrow or big tub with shredded newspapers and wet them down. After they have soaked a few minutes, squeeze out the paper and drop it in a pile next to the bin. Let it drain while you wet down the next batch of paper. When the shredded paper is damp, but not dripping, put it into the worm bin.

Step Three: Invite a friend who has a worm bin to dinner. When he or she asks what they can bring, casually mention that a pound or two of worms would be nice. (Assuring them that the worms are intended for your new bin, not the dinner table, is very important at this point.) If this fails, check out commercial sources of worms.

For vermicompost, you need red worms and not earthworms, so you can't just dig them. Earthworms need a mineral soil; red worms or manure worms like a moist, organic muck. Bait shops do sell red worms, but you need a lot to get your colony going, and that could get pricey.

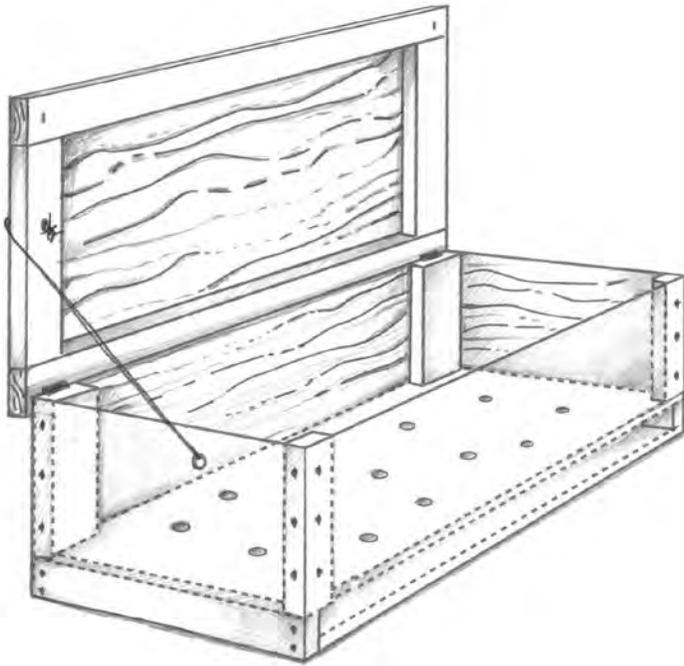
Step Four: Start burying your food wastes in the wormy, bedding-filled bin. Rotate your burying spots to distribute the food evenly. Covering the food with bedding will help control flies and smells. Keep a small bowl or jar next to the kitchen sink to collect "wormfood."

Step Five: When the worms have broken most of the bedding and food into dark crumbly compost, push the compost over to one side of the bin. (It

will have shrunk in volume.) Fill the empty side with new bedding and start burying your food scraps there. As the worms finish decomposing the old stuff, they will migrate over to the new feeding ground. After a month or two most of the worms will be out of the old compost, so you can remove it from the bin for use in the garden.

If many worms still appear in the finished compost, use their love of darkness to help you return them to the bin. Pile the compost on a tarp or plastic sheet in full sun. After about 15 minutes, scrape off the top worm-free inch or two. Keep doing that until you have a very wormy bottom layer that can go back into your bin or may get you a free dinner from a new, would-be worm composter.

Tilth Worm Composting Bin



This system is designed for composting fruit and vegetable food scraps using red worms, a process called *vermicomposting*.

Food scraps and worms are “bedded” in moist brown leaves, shredded newspaper, cardboard, or clean wood shavings. The red worms turn both the food scraps and bedding into high-quality compost suitable for use on houseplants, seedlings or general garden use.

To maintain this system, simply rotate burial of food scraps throughout the fully bedded bin. To bury your food scraps, dig a hole in the bedding, put in food scraps and then cover completely with clean bedding. A properly maintained worm bin should be odorless. Flies may be controlled and moisture maintained by placing a sheet of plastic or cardboard on top of the bedding.

Every 9 to 12 months, the partially finished compost and/or bedding should be moved to one side of the bin, left to age, and new bedding added to the empty half of the bin. Start burying food scraps only in the new bedding. Within four to six weeks, worms will move from the aging compost and populate the new bedding. The finished compost may now be harvested and the open space in the bin can be rebedded. Any large uncomposted food scraps can be added back into the bin.

Worm bins can be kept outside, or in a cool indoor space such as a basement or garage. Outdoor worm bins should be located in a shady protected area. To keep your worms from freezing in winter keep your bin fully bedded. Worm bins can also be insulated with bags of leaves or straw bales laid around and on top of the bin. Another option is solid core blue foam insulation which can be secured to the top and sides of the bin with duct tape and removed in spring or summer.

This bin can be built for about \$30 to \$50, depending on the type of wood* used. (Do not use treated wood of any kind.) The *exterior* of the bin may be painted with a good quality latex primer and latex finish coat. Worm bins can also be made from recycled materials, wooden boxes, or other containers. All worm bins must have drainage holes in the bottom to drain excess liquid and a tight fitting lid to keep moisture in and pests out.

A starter batch of worms can be purchased at a small additional cost, or obtained from a friend’s bin, or found in an old compost pile. Call the Natural Lawn & Garden Hotline at 206.633.0224 for sources of red worms and to request the *Composting at Home* and *Building Healthy Soil* guides. Seattle Tilth sells red worms and the essential book, *Worms Eat My Garbage* by Mary Appelhof.



The Natural Soil Building Program is sponsored by Seattle Public Utilities and managed by the Seattle Tilth Association.

This recycled paper is recyclable. Revised 12/03

Seattle
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Utilities

*Wood products that have the FSC logo give “the consumer a guarantee that the product has come from a forest which has been evaluated and certified as being managed according to agreed social, economic and environmental standards.”



Construction Details

Familiarize yourself with the cutting sequence and expanded view. Make sure to use pencil and straight edge to mark all measurements before cutting.

Careful cutting is essential to get all the pieces to fit properly. Cutting can often be done for an extra charge (25 to 50 cents per cut), at lumber stores with advance notice.

Start by cutting the sheet of plywood in half. When making this first cut (#1), just barely leave the 48" pencil line. Next, take the full 48" x 48" piece and divide it into three equal pieces (cuts #2 and #3). This time, split the pencil line with the cut, otherwise the pieces will end up being too small because the saw blade takes 1/8" every time a cut is made. Splitting the pencil line again, divide one of the three pieces just cut in half (cut #4). These four pieces will become the front side, back side and two ends. Cut the other half of the sheet as per the drawing (cut #5). Split the pencil line on the 23" cut. This will be part of the bottom. The remaining piece will be part of the lid and the dimensions of this piece are not critical.

The bin can be divided into three parts: bottom, sides, and the lid. Start by constructing the bottom.

Bottom Cut one of the 2x2s into two 48" sections. From the other 2x2, cut two pieces 20" long. Attach these pieces to the edges of the bottom. Cut one more piece of 2x2, 20" long for the middle support on the bottom. Use only a few deck screws per side. Next, drill 3/8" drainage holes in the bottom. See expanded view for one pattern for these holes. Need 12 to 16 holes.

Sides Cut from one of the 2x4s two pieces 14 1/4". Cut from one of the 2x2s two pieces 14 1/4". These four pieces are the corner blocks. Next, place the 2x2s under each end of what will become the front. Look for the best plywood surface to be up as that will show on the final bin. Make sure the ends of the 2x2s are flush with the top edge of this front side. Fasten using the deck screws. Follow the spacing pattern shown on the expanded view. Do the same with the other side using the previously cut 2x4s. This side will be the back of the bin. Attach the ends to the just completed front and back sides. Turn the completed unit so the bottom-end is facing up. Slide the bottom—plywood face down—into place so that it rests on the ends of the corner blocks. The bottom 2x2 framing will extend beyond the bottom

edge of the box. This is done to keep the plywood edges from direct contact with the ground. Fasten the sides and ends to the bottom using the screw pattern from the expanded view. Screws are used to assemble the bin because they are easier than nailing and mistakes can be corrected more easily.

Lid Cut two pieces of 2x4 51" long and two 18 1/2" long. Lay the pieces out to form a rectangle. Center the plywood (best surface up) on this rectangle of 2x4s and fasten as per expanded view, the 2x4s will extend beyond the plywood. Next, attach the hinges to the back edge of the bin centered on the 2x4 corner blocks. Once this is done, place the lid on the bin, center it from side to side, and attach the hinges to the back edge of the top. Then, drill a 3/8" hole in one end 4" from the front edge of the bin and down 3" from the top edge of the bin. Mark the lid directly above this hole and drill a 3/8" hole through just the 2x4 edge of the top. Knot one end of the polypropylene rope; thread it through the hole in the bin leaving the knot on the inside of the bin. Then thread the rope up through the hole in the rim of the lid. Open the lid to just past vertical and tie another knot in the rope. This rope prevents the top from falling back and possibly breaking off the hinges. This completes the building of the worm bin.

More on Natural Yard Care:

To receive the Naturals Guides: *Composting at Home*, or *Building Healthy Soil* or for more information on composting please call the Natural Lawn & Garden Hotline at 206.633.0224 or email them at: lawn&gardenhotline@seattleilth.org

More resources can also be viewed at these websites:

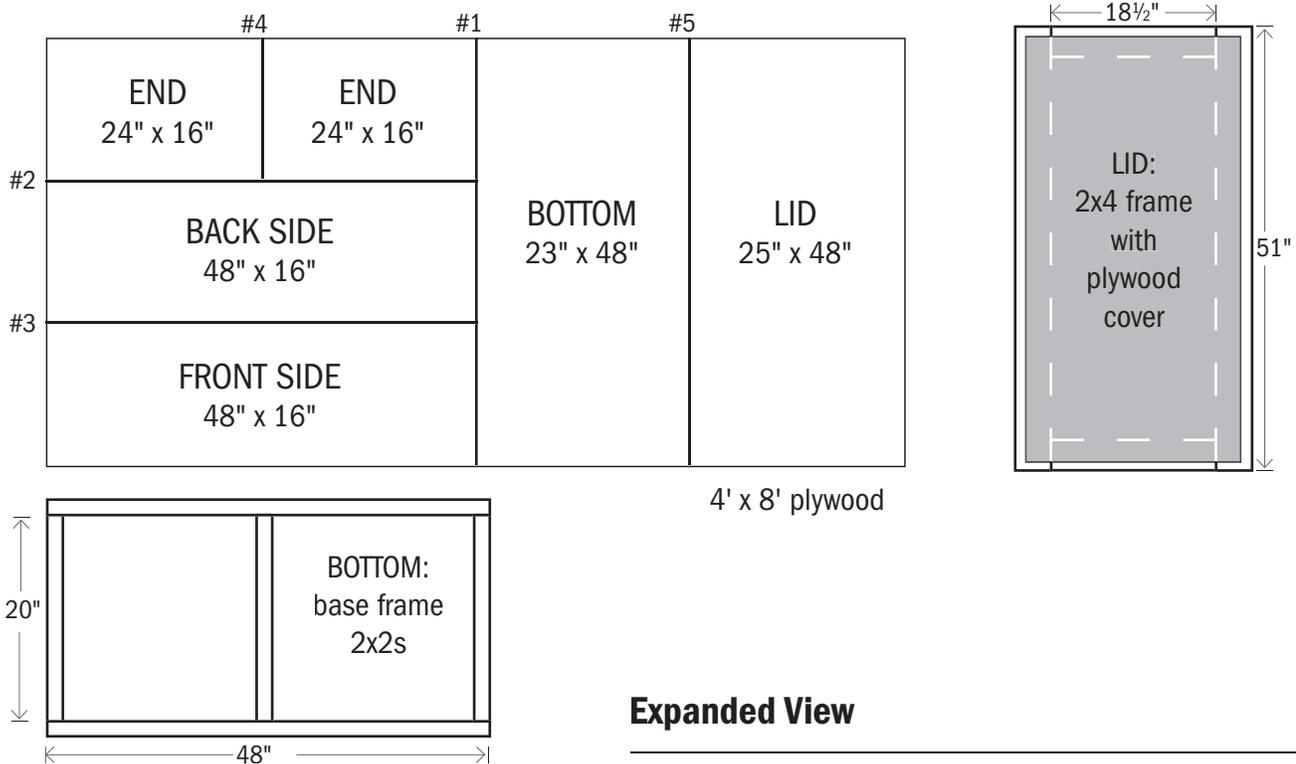
www.ci.seattle.wa.us/util/composting
www.cityofseattle.net/util/rescons/
www.savingwater.org
www.compostwashington.org/

This and other compost bin plans can be found at:

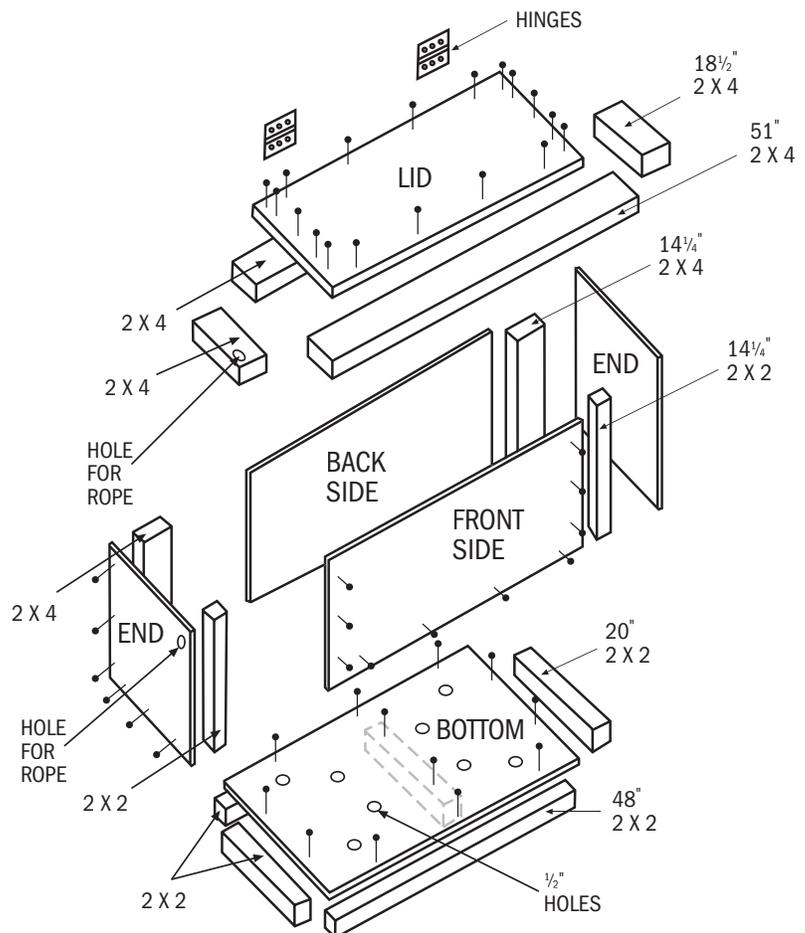
www.seattleilth.org/download/download.html
www.dnr.metrokc.gov.swd/ResRecscy/composting/composting/shtml

Thank you to John Watson, a Master Composter/Soil Builder Volunteer, for revising the worm bin plans.

Cutting Diagram



Expanded View



Materials*

- 1 sheet of ½" exterior plywood (CDX grade least expensive— ACX most expensive. Do not use composite or chip boards. They will not withstand the moisture generated in a worm bin)
- 2 8' 2x4s, (stud grade will probably be the straightest)
- 2 8' 2x2s, (common & better)
- 80 1⅜" x #8 coated deck screws
- 1 pair of zinc plated 3" x 2" butt hinges without screws if possible (use the deck screws)
- 1 48" length of ⅜" polypropylene rope

Tools

Tape measure, portable electric saw or hand crosscut saw, electric drill with variable speed, #2 Philips driver bit, ⅜" drill bit, hammer, pencil, 4' straight edge, pair of saw horses (for cutting plywood and assembling the bin) eye and ear protection.

Drills and saws can be rented if you have no real need to own power tools.

Compost Websites

General Composting

Composting at Home

The City of Seattle Website addresses food and yard waste composting. Suggested reading, links, and sources for raw materials, chippers, bins, and worms.

www.ci.seattle.wa.us/util/composting/default.htm

Seattle Public Utilities

Information on composting, water conservation, natural lawn care and gardening, recycling, waste reduction, green cleaning and watersheds.

www.ci.seattle.wa.us/util/rescons

City Farmer, Canada's Office of Urban Agriculture

A vast array of information and articles on composting and gardening.

www.cityfarmer.org

Washington Organic Recycling Council

Looks at the relationships between organics, recycling, soil, water, and salmon. Helpful links.

www.compostwashington.org/

Organic Gardening Magazine

Site contains rotating articles, soil and compost information, and books for sale.

www.organicgardening.com/

Sources for Buying Worms

Seattle Tilth Association

Local red wiggler seller. Download building instructions for yard waste and food waste compost bins.

www.seattle.tilth.org

BRR Worm Farm, Little Rock, WA

Products and information on vermicomposting.

www.wormswrangler.com/index.htm

Yelm Earthworms & Casting Farm

Good site for buying worms, castings, soil, books, videos, and bins. Articles too.

www.yelmworms.com

Sources for Bins, Bin Plans, & Materials

Composters.com

Great pictures of all types of bins as well as products for lawn and garden care, pet waste management, recycling, and water conservation.

www.composters.com

Digitalseed website

Home composting information and easy-to-read instructions for homemade yard waste and food waste bins.

www.digitalseed.com/composter/index.html

King County Hazardous Waste

Lists resources for Manure, wood shavings, and building materials, for home composting.

www.metrokc.gov/bazwaste/imex/toc.html

Spokane Regional Solid Waste System

Home composting information and yard waste bin plans.

www.solidwaste.org

Urban Garden Center

Composters, worm bins, chippers, rain barrels and other yard and garden products for sale.

www.urbangardencenter.com

Seattle Tilth O.T.S. (Off the Shelf) Worm Bin

Bin Design by Colleen Quinn, Illustrations by Paul Tomita for the Seattle Tilth Association

Materials:

- 10-- 1" screened louvered vents
- 2-- 2" screened louvered vents
(lumber yard)
- 2 solid color Rubbermaid bins at least 14" deep
- O-ring hose washer
- 1 Male hose adapter, $\frac{3}{4}$ " x $1\frac{1}{2}$ "
- 1 Metal hose shut-off valve, spigot
- Teflon plumbers tape
(hardware/garden store)

Tools:

- Drill motor
- $\frac{1}{4}$ " drill bit (regular)
- 1" drill bit (blade type)
- 2" drill bit (cup type)
- Measuring tape

Assembling the Tilth O.T.S. Bins

Bin # 2: Install Screened Louvered Vents and Drainage Holes

- Before drilling holes, make an indentation with the point of the 1" drill bit to help guide the drill.
- Turn the bin upside down and drill twenty $\frac{1}{4}$ " holes in the bottom of the bin for drainage. Be sure to drill in the lowest areas of the bin. Using the drill, remove any plastic residue from the holes so they are clean and free of plastic curls.
- Turn the bin on its side and drill five 1" holes for the louvered vents along the upper edge. Locate the holes $1\frac{3}{4}$ " from the top edge, spacing each hole about 3" apart. Note: When drilling holes for the louvers, drill straight through, once only. Multiple drilling will make the holes too large and the vents will not be secure.
- Repeat the process on the opposite side of the bin.
- Finish by inserting the 1" louvered vents into the holes from the outside of the bin.
- Make sure the vents are flush with the outside wall.

Bin # 1: Install Shut-Off Valve/Spigot

- Drill a 1" hole at the center, end sidewall, one half inch from the bottom. Be sure that the hole is on the flat surface of the sidewall, not on the curved area.
- Stretch and push the O-ring onto the threaded end of the male hose adapter.
- Make sure the O-ring is in the groove all the way to the end of the male hose adapter.
- Wrap the threaded end of the male hose adapter with teflon plumber's tape.
- From the inside of the bin, place male hose adapter through the 1" center hole.
- From the outside of the bin, screw the shut off valve/spigot onto the male hose adapter tightly.
- The spigot control knob should be on the top side of the spigot for easy use. Always keep the spigot in the closed position to prevent leakage.

Lid # 2: Install Screened Louvered Vents

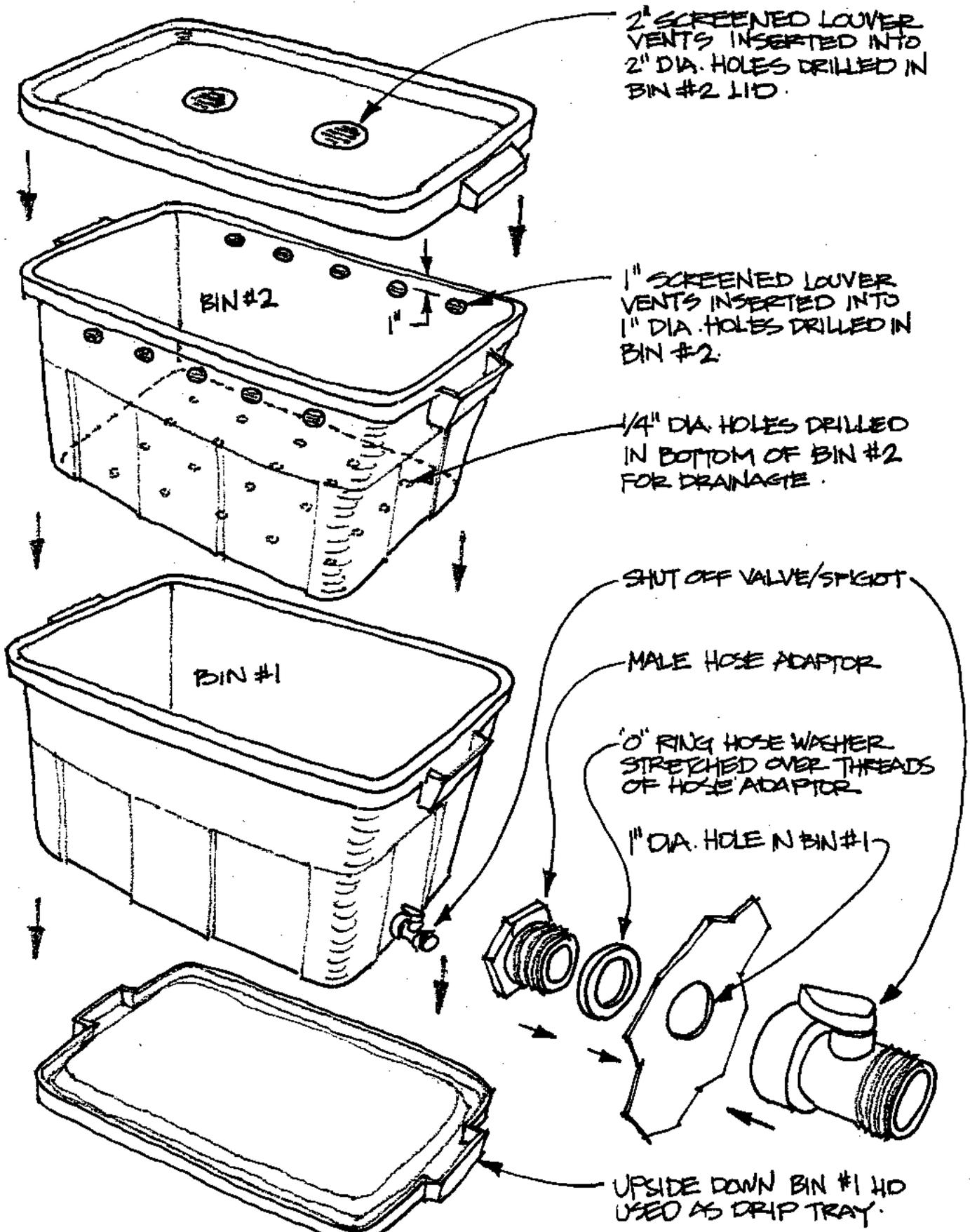
- Take the lid of bin #2 and place on top of the bin #2.
- Mark two locations on the lid for the 2" louvered vents.
- Carefully drill the 2" hole using a cup drill bit.
- Clean off any plastic residue or curls.
- Insert the 2" louvers from the outside of the lid through the holes.
- Assemble the bin according to the illustration, stacking Bin # 2 inside Bin # 1.
- Put lid #2 with the vents, on top of the bins.
- Do not snap the lid shut, just lay it loosely on top of the bin.

Lid # 1: Drip Tray

- Use lid #1 upside down, positioning lid under valve/spigot as the drip tray under the bins.

Seattle Tilth O.T.S. (Off the Shelf) Worm Bin

Bin Design by Colleen Quinn, Illustrations by Paul Tomita for the Seattle Tilth Association



O.T.S. Worm Bin Tips

Prepare bedding in another container and transfer to the bin.

This can be done in a 5-gallon bucket in small batches.

Your bathtub or shower is a good place to mix the bedding, as mixing bedding with water can be messy.

Set Bin #2 in the tub or shower while you transfer bedding, allowing excess liquid to drain before putting the bins together.

To moisten paper, rip into squares, crumple, dunk into water and shake out excess water before placing in the bin. Wood shavings should be soaked first to insure that they take up the water.

Using paper and wood shavings will mean less crawling critters in your bin.

Using leaves will introduce more crawling critters into your bin.

Fill your bin almost full with bedding, leaving 1" louvered vents exposed.

Do not block the louvered vents with bedding. The bin needs air for the worms.

Add food scraps by burying your food in holes or pockets in the bedding.

Do not overload your bin. Use the formula below to figure pounds of food per week your bin can handle:

Width' X length' (square feet) = # lbs food per week.

For example, the O.T.S. bin that measures 1' width by 1¹/₂' length can handle about 1¹/₂ lbs food per week.

Create a pattern when burying food. Bury in a new place every 4-6 times you bury food.

Avoid disturbing all the bedding when burying food. The bedding may heat up and the worms will have nowhere to go to avoid the heat.

Take care that the spigot is in a protected area- so that it is not kicked, etc...

Drain compost tea liquid often.

Check daily after newly bedding bin, less often later. Pick up both bins and move side to side. A sloshing sound means you need to drain the compost tea liquid.

Lift and tip bins toward the spigot, open spigot and drain liquid into another container or bucket.

Use the compost tea liquid for your houseplants. (Note: If the liquid is foul smelling like very rotten food, it is not healthy for your plants, so flush the liquid down the toilet.)

Keep adding fresh bedding to your bin, as materials break down into compost.

You need to be able to bury food scraps under the bedding, so add more fresh bedding on top as the existing bedding decomposes.

Harvest compost when bin material looks brown and crumbly (like coffee grounds) and smells like the forest floor.

To harvest compost, your Tilt O.T.S. Worm Bin will need to be emptied and re-bedded.

First drain the compost tea.

Lift the interior bin (Bin #2) out of the exterior bin (Bin #1).

Rinse out Bin #1, flush spigot with water and set Bin #1 aside.

Remove visible food scraps from Bin #2 and set food aside.

Lay down plastic sheeting and dump out the contents of Bin #2 in a pile on the plastic.

Separate the worms from the bedding:

The worms will avoid light and burrow down into the compost.

You can remove the 3" top layer of compost without getting worms.

Repeat the process, removing a 3" compost layer every 5 to 10 minutes.

Finally, you will have a little compost and a pile of worms.

Re-bed Bin #2. Add worm/compost pile to Bin #2 and reassemble bins.

Bury the food scraps you put aside.

You may want to put the finished compost into another container to age.

In case of problems with little flies...

Fruit flies can be prevented by laying a piece of plastic bag or cardboard over the top of the bedding, inside the bin. (This breaks their life cycle, as they don't like to lay their eggs on the smooth surface.) Be sure that food scraps are buried beneath the bedding. Existing fruit flies can be sucked up with the vacuum cleaner. Also be sure to wash the food scrap bucket on your kitchen counter often, with soap and water.

Fungus gnats can be attracted to moist organic matter, such as found in a worm bin. They don't respond to the same fruit fly techniques listed above, but they can be trapped with a sticky trap made for gnats. Attach sticky trap tape to a piece of cardboard and place on top of the bedding, inside the bin. If fungus gnats get into houseplants, you can let the soil dry out before watering and scratch the soil surface to disturb the life cycle.

What causes worm death?

Bedding too dry— no moisture for the worms. It should be moist like a wrung out sponge.

Too much water— they drown. Use the spigot to drain the liquid often. A layer of coco peat fiber or peat moss at the bottom of the bin can help absorb excess moisture.

Too little air— they suffocate. Keep bedding fluffy and vents clear.

Too much acid is toxic and burns worms delicate skin. Avoid adding too many citrus foods.

Digging around in the bin too much will cause the food and bedding to heat up, killing the worms.

Harvest the compost when it is ready, as the worm's castings are toxic to the worms. Remember to continue to add fresh bedding to the top in your bin, as the existing bedding begins to decompose

Vermicompost Troubleshooting

SYMPTOM	POSSIBLE CAUSE	SOLUTION/ALTERNATIVE
Standing water in the corners of the worm bin	Not enough bedding	Build a “peat snake”, add more bedding
	Leak in bin lid	Evaluate bin, locate leak, fix leak. Consider moving bin to area sheltered from weather.
Worm bin smells like rotten eggs, vinegar, or garbage	Worm bin has become anaerobic (oxygen pores in worm bin material are filled)	Aerate bin by stirring contents, add bedding to soak up extra water. If bin is too full, remove some contents and repeat directions listed above.
	Meat or dairy, fats or oils have been placed in the worm bin	Remove any large scraps of meat or dairy add vegetarian food scraps in their place. Aerate bin with a trowel, depending on how wet the bin is, add bedding
Worms are engaged in mass exodus from the bin	Citrus	Pick out all citrus; add bedding and vegetable scraps to dilute acidity.
	Lack of nutritious food	Is there uneaten food in the bin? If no-FEED. Is yes- is it ‘fresh’ or has it been precomposted? You may need to add fresh vegetable wastes. Try some of their favorites like melon, rotting squash or wilted lettuce.
	Temperature is too hot/too cold	Thermophilic composting can occur if you are adding too much fresh food and bedding. This can raise the temperature in the work bin above that which worms like.
	Too many castings in worm bin	Worms like moist, fresh bedding with a layer of food at the top. Their excrements (castings) are toxic to them. Harvest your castings and re-bed your worm bin.
Worms are dying	Worms are too dry	Add enough water to make all bedding “as moist as a wrung out sponge”
	Worms are too wet	Build a “peat snake” to soak up standing water, add bedding. Check drainage.
	Worms are too cold	Make sure the worm bin is sheltered from wind, rain or snow. If worms under shelter remain cold insulate the bin by placing straw bales, large Styrofoam blocks, or a loose dark colored tarp around it. Bring the worm bin indoors (the garage works) during times of

		extreme cold.
	Worms are too hot	Place worm bin in a shady area. Add moisture if the bin is dry.
	Worms do not have enough air	Check bin for clogged air circulation holes, lift the bin off the ground several inches using bricks or cinder blocks to enhance air circulation. Stir bedding and food scraps to oxygenate the bin environment.
	Bin may be contaminated with animal manure containing a de-worming medicine	Never place cat, dog or pig manure in a vermicompost bin. Any livestock animal could be subject to de-wormer that could harm a vermicomposting system. Be aware of any manure source that is placed in your bin.
	“Weed and Feed” or other lawn/ garden pesticide may be in food or bedding materials.	Remove all contents from bin and start over.
Worm bin contains centipedes	Centipedes are friends of nature, but not friends of worms.	Centipedes are known to kill and eat worms from time to time, its best to capture and eliminate them for a happy worm environment. Millipedes are vegetarians and are not dangerous to worms.
Worms are not eating food fast enough	Not enough worms for the amount of food	One pound of worms will eat half a pound per food a day. Add worms.
	Wrong type of worms	Vermicompost worms are a specific type of worm known as “red wigglers” or “tiger worms,” scientific name <i>Eisenia fetida</i> . They are litter feeders and specifically used for composting food waste.
Worms have disappeared	Any of the above possible imbalances of you system can cause your worms to die out or simply leave. You may not see them leave or be able to see the dead bodies.	Check all of the above management practices. Re-bed your worm bin. Get more worms and start again. Try placing the bin in a more protected area and check on them at least once daily. Worms escape primarily at night because they don’t like light. If you suspect them ‘running off’ turn a light on around the bin to keep them inside.

Moles have eaten your worms

Moles and voles love worms! If your bin is flush on the ground and you don't have small enough mesh to keep small creatures out, this may be what happened. Either raise your bin 4+ inches off the ground, or attach a fine mesh screen to the base of the worm bin that a mole could not crawl through.



- Worms do not have lungs, but breathe through their skin. The oxygen goes directly into their bloodstream. A worm's skin must stay moist in order for them to breathe like this.
- If you look at a worm's body under a magnifying glass, you will see a lot of little rings across their entire body. It looks kind of like corduroy or a lot of rings connected together. These rings are called segments. When a worm grows up, it will have 120-170 segments. On the first segment is their mouth and on the last segment is their anus—sort of like the beginning and the end.

If you had a microscope and looked really, really closely at each segment, you will see something that looks like a bunch of small hairs or bristles. (Nope, worms aren't bald!) These bristles are called setae (pronounced see-tee) and they help worms move. A worm has four pairs of these bristly hairs on each ring or segment.

- A worm has five hearts
- When worms are a few weeks old you will notice a light colored band forming near their front end. This is their clitellum. Their clitellum will someday help to form cocoons. New baby worms will hatch from the cocoons and they will have a family.
- A worm can tell the difference between light and dark, pretty good for a critter that doesn't have eyes. They have cells in the front part of their bodies that are sensitive to light. This is called light sensitivity.

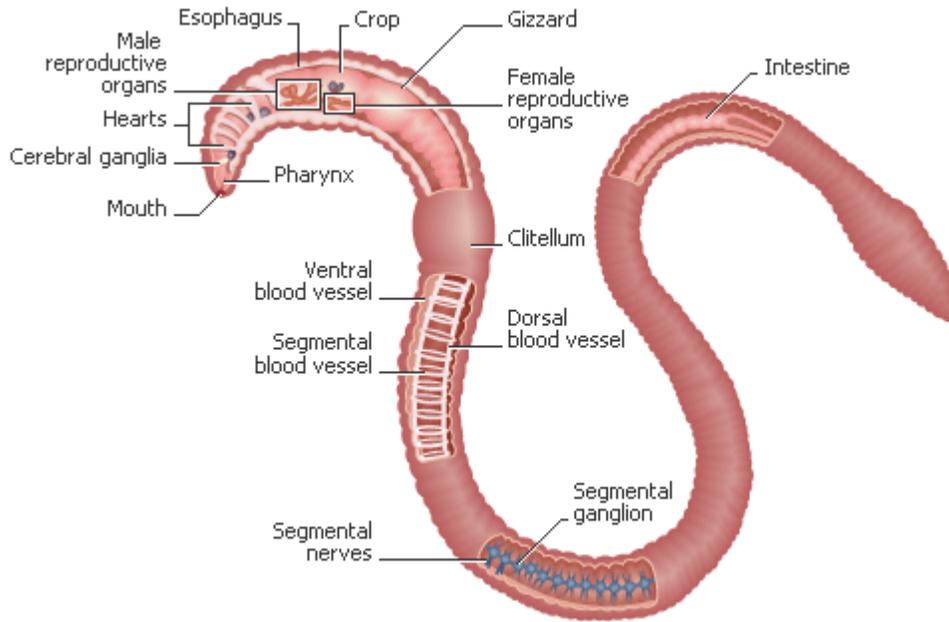
Worm Cocoon (Egg)



Setae (Bristles that act as “brakes”)



Anatomy of a Worm



Worms Eat My Garbage!

One pound of worms can eat $\frac{1}{2}$ pound of food in one day! You can save money on garbage costs and reduce the amount of waste that goes to the landfill by feeding your table scraps to the worms in a worm bin. Most worms are vegetarian, and here are some of the things they like to eat:

YES	NO
<ul style="list-style-type: none"> ○ Carrot peelings ○ Apple cores ○ Coffee grounds ○ Soggy cereal ○ Corn scrapings ○ Watermelon rinds ○ Shredded newspapers ○ Banana Peels ○ Lettuce Leaves 	<ul style="list-style-type: none"> ○ Meats ○ Cheeses or dairy ○ Fats and Oils (like butter) ○ Citrus: Lemons, Limes and Oranges burn their skin ○ Dog, cat, and pig manure (or any carnivorous animal, herbivorous animal manure is fine i.e. cow, horse or goat)

Homemade Food Scrap Digester



Properly composted food scraps can be turned into an excellent fertilizer for gardens. However, composting food scraps in an open pile or mixed with yard waste can attract some unwanted urban pests—rats, mice, raccoons and opossums! Here's how to easily make your own pest-proof food waste digester that will avoid pest problems.

Making the Digester and Getting Started

One of the simplest ways to compost food scraps is in a sunken garbage can. The can should have a tight fitting lid and holes punched on the sides and in the bottom. A galvanized metal can (about \$20 to \$30 new) works well (plastic should be avoided). Drill or punch about 20 drain holes, $\frac{1}{4}$ or $\frac{3}{8}$ -inch diameter, in the bottom of the can. Drill 20 more holes in the sides of the can, but only in the lower third, which will be covered by soil. If the lid is not tight, make a lid out of a piece of plywood, with a handle on top and some wood blocks underneath to fit the lip of the can and help hold the lid on. A bungee cord can be knotted to the lid handle and the bungee hooks fastened to the can handles, securing the lid.

In a well-drained spot, dig a hole about 15 inches deep (about half as deep as your container) and set the can into the hole. Then, push the soil back in around the sides and tamp it down with your foot or a shovel.

Your new digester is ready to use!

Collect food scraps, storing them in a container in your kitchen, and once or twice a week, throw the food scraps into the Food Scrap Digester. If odor or fruit flies are a problem, you can stockpile bags of brown leaves, coarse sawdust, straw, or shredded paper near the digester and use the material to place a thin layer on top of each new food scrap addition to the digester. No worms need to be added to this digester. Worms will find their way into the digester through the holes and will help break down the food scraps.

Harvesting the Compost

Depending on your household's food habits, a digester will fill in 6-12 months. Harvest the compost by shoveling the upper foot or so of undecomposed food off to one side and shoveling the dark, soil-like compost out of the bottom of the digester. If the unfinished compost is wet and smelly, mix it with some soil and wait a week for it to turn drier and sweet smelling. Return the top layer (which was set aside) back into the digester to finish composting and continue to add food scraps. You can also bury the top layer of undecomposed food in a trench at least one foot deep in the garden, making more room for food scraps in the digester. While harvesting compost from your digester, watch out for the jagged metal around drainage and air holes.

If you want completely finished, non-smelly compost, we recommend installing *two* digesters. When one digester gets full, just start using the second digester. After 6-12 months, all the compost in the first digester will be finished and ready to harvest and use.



The Natural Soil Building Program
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Seattle
Public
Utilities

Using Compost

The most common uses of compost are as mulch on established plants, as a soil amendment at planting time, and in potting mixes. Food scrap compost contains more nutrients than yard waste compost, and should be used more sparingly. It can be applied as a one-inch mulch around plants or up to two inches can be dug into garden soil. For a potting mix, add up to 20% food scrap compost to a commercial or homemade potting mix.

Trouble Shooting

Here are some common problems and how to fix them:

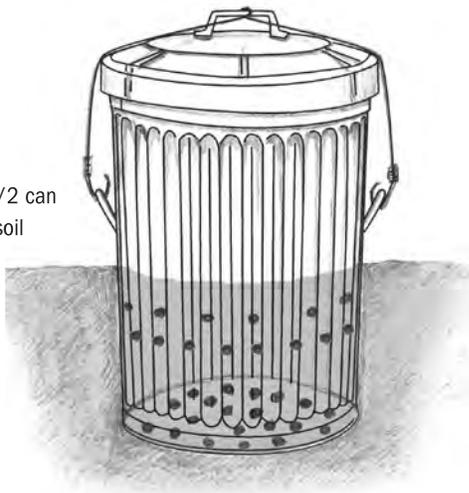
Odors and fruit flies

Stir in leaves or coarse sawdust to keep the food scraps aerobic. Cover fresh food scraps with leaves, coarse sawdust, straw or shredded newspaper to exclude fruit flies. If you prefer to use grass clippings as a covering material, first leave them in the sun to dry out and turn brown. Once a healthy worm population is established in the digester, they will help reduce odors by aerating the food scraps. Always keep the lid closed and on tight.

Raccoons, opossums or dogs knock the lid off

It's important to keep the lid on your digester closed to keep rodents out. Place a rock on the lid or tie a bungee cord to the lid handle and attach the bungee hooks to the handles on the sides of the garbage can to hold the lid on. And be sure to keep meat scraps out! They smell bad and attract animals, so it is better to put the meat, fish, poultry, dairy and oily food scraps in the garbage.

Bury 1/2 can
in the soil



DO Compost

- Vegetable scraps
- Grains and pasta
- Fruit rinds and peels
- Breads
- Coffee grounds, filters
- Tea bags
- Paper napkins, towels
- Eggshells

DON'T Compost

- Meat
- Fish and poultry
- Cheese
- Oily foods
- Butter
- Dairy products
- Other animal products
- Pet waste

More on Natural Yard Care:

To receive the Naturals Guides: *Composting at Home*, or *Building Healthy Soil* or for more information on composting please call the Natural Lawn & Garden Hotline at 206.633.0224 or email them at: lawn&gardenhotline@seattletilth.org

More resources can also be viewed at these websites:

www.ci.seattle.wa.us/util/composting
www.cityofseattle.net/util/rescons/
www.savingwater.org
www.compostwashington.org/

This and other compost bin plans can be found at:

www.seattletilth.org/download/download.html
www.dnr.metrokc.gov.swd/ResRecy/composting/composting/shtml

Pit or Trench Composting

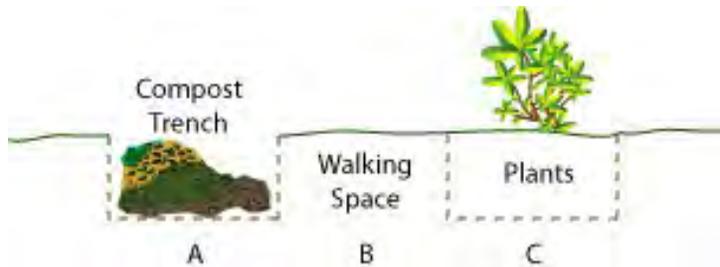
This is the simplest way for composting kitchen scraps. Dig a one-foot-deep hole. Chop and mix the food wastes into the soil then cover with at least 8 inches of additional soil. Depending on soil temperature, the supply of microorganisms in the soil and the content of the materials, decomposition will occur in one month to one year.

Food waste burial can be done randomly in unused areas of the garden or in an organized system. One system is to bury scraps in holes dug around the drip line of trees or shrubs. An English system, known as pit or trench composting, maintains a three season rotation or soil incorporation and growing. Sometimes this is also called Vertical composting.

For Trench Composting, divide garden space into 3' wide rows.

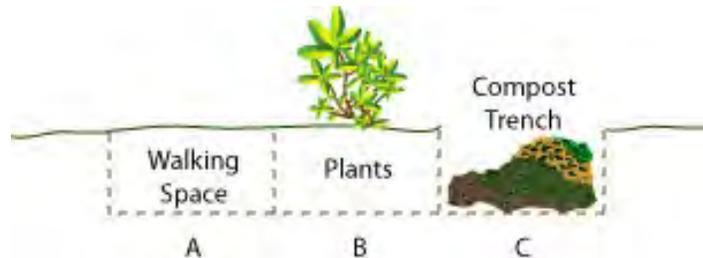
Year 1

Dig a 1' foot wide trench on the left hand 1/3 of the 3' area (A). Add compostable materials in this trench and cover with soil when half an inch full. Leave the center 1' section open for a path (B), and plant your crop in the remaining 1' strip along the right side (C).



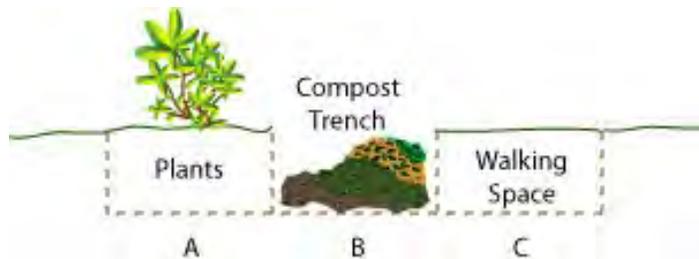
Year 2

Section A is a path for year 2 allowing time for the Materials to break down. Plant your crop in section B. Section C, where you planted last year, becomes the compost trench.



Year 3

Section A is now ready for planting. Section B is your trench for composting. Section C is in the second year of composting so it will be the path.



Adapted from University of Illinois Extension
<http://www.extension.uiuc.edu/>

Pest Control

How to get rid of rats



Rats are dangerous! They can ruin your food, destroy things in your home and start electrical fires. Rats and their fleas can carry disease. If you have any questions, feel free to call the Public Health Environmental Health Office at (206) 205-4394.

Where do rats live outside?

- Under wood piles or lumber that is not being used often
- Under bushes, vines and in tall grasses that are not trimmed or cut back
- Under rocks in the garden
- In cars, appliances and furniture that has been put outside and is no longer being used
- In and around trash and garbage that has been left on the ground
- In holes under buildings

Where do rats live inside the home?

- In the insulation of walls or ceilings
- Inside the crawl spaces
- Behind or under cupboards, counters, bathtubs and shower stalls
- Near hot water heaters and furnaces
- In basements, attics and wherever things are stored in boxes, paper or cloth

What foods brings rats into my yard and neighborhood?

- Garbage that rats can get into, like garbage cans with loose lids, plastic or paper bags, and litter.
- Food for pets and birds that has not been eaten. Birdseed on the ground, pet food in pet dishes, bread crumbs, etc.
- Fruits and berries that have fallen to the ground.
- Compost pile or worm bin that isn't taken care of the right way (do not put meat, fish, poultry, or dairy in the compost)
- Dog droppings

What do rats eat when they get inside the house?

- THE SAME FOODS WE DO!
- Foods, fats, oils that have been spilled and left on counters, floors, appliances and tables
- Grains, like cereal, oats, rice and vegetables like potatoes and carrots that are in cardboard boxes and plastic bags
- Pet food in boxes or bags
- Any garbage that is not in a can with a tight lid

Keep rats away from your home!

Do not give food and shelter to these most unwanted guests!

- The time to act is before the signs (droppings) of a rat or mouse.
- Stack fire wood 18 inches off the ground and away from all buildings.
- Birdhouses and seed should be on poles and in trays rats can't get.
- Keep garbage can lids closed tightly.
- Plant bushes so they will stay at least 3 feet from your house.
- Keep yards and alleys clean. Take junk to the dump!
- If you feed them, they will stay. Pick up fruit and vegetables in your yard.
- Do not compost any animal products (fish, meat, chicken, cheese, butter). Keep lids tight.
- Use only rodent resistant composters.
- In basements keep any food in closed containers that rats can't chew through.
- Cover all openings to your house. Rats can get into very small places.
- Do not leave your pet food outside. If your pet doesn't eat it, the rats will.
- Roof rats get into your house from tree branches that hang over the roof. Keep trees cut back and cover any openings in the eaves.

Keep rats out of your sewer pipes!

Rats live in sewers and can follow the food in pipes up to your toilet.

- Keep your kitchen sink rinsed clean and use garbage disposals as little as possible.
 - Rinse out your kitchen sink once or twice a month.
 - Use 1 cup of bleach (an alternative to using bleach, 1 cup of baking soda followed by 1 cup of vinegar) and rinse with boiling water.
- Never throw grease down the drain.
- Keep your toilet lid down when not in use.
- If you find a rat in your toilet, flush it! (hint: squirt a little dishwashing liquid under the lid into the bowl, wait a couple of minutes then flush)

To kill a rat, use a rat trap!

The best trap is the large, simple, cheap wooden "**snap trap**." They are sold in hardware stores.

To use the trap:

- **BAIT IT** with pieces of apple, potato, raw bacon or with peanut butter spread on a cotton ball.
- **ATTACH IT** firmly to the ground or solid place to keep the rat from dragging the trap away.
- **PLACE THE TRAP** near where you have found the droppings. Make sure the trap is safe from people, children, pets or animals who could get hurt from it.

POISONS ARE NOT RECOMMENDED for rat control, because children or other animals may eat it by mistake. Also, poisoned rats can die in hard to reach places causing a very bad smell.

DEAD RATS must first be wrapped in newspaper, or placed in a plastic bag before putting it in a tightly covered garbage can. Injured or sick rats *must be killed*, then wrapped and put in the garbage can. Try not to touch the dead rat. Use gloves if possible.

WASH YOUR HANDS WITH HOT WATER AND SOAP AFTER GETTING RID OF DEAD RATS! (even if you used gloves)

I Smell a Rat: Solving Rodent Problems

By Philip Dickey

To say that rats and mice make unwelcome house guests is probably the understatement of the month. Aside from the "eek" factor, there is the legitimate concern about disease. (It turns out that fear of vectors need not be confined to those who failed physics.) Rats can carry a dozen diseases including plague, and they contaminate about ten times as much food as they eat. Although mice seem to be considerably more acceptable to humans than rats, an effect that has been dubbed the "Disney influence," mice can have many of the same pathogens that rats do. From a public health standpoint alone, it is important to have zero tolerance for rodents inside the home. In addition, both rats and mice sometimes start house fires by gnawing through electrical wires.



Rat and mouse poison can be purchased at almost any grocery store, yet, surprisingly, the pros do not recommend using poison. Why not? Well, of course, there is the toxicity of the poison, which poses a hazard to children and pets and means that the leftovers will have to be disposed of as a hazardous waste. In addition, mice and rats have already developed resistance to Warfarin and several other types of poisons. But the main reason is that the poisoned animals have an annoying habit of going away to die inside the walls of your house. At best this may mean buying a truckload of Glade; at worst, it means tearing part of the wall out to find and remove the dead animal.

Public Health/Seattle & King County agrees with pest control experts that trapping is the way to go. At the same time, it is essential to block entrances, eliminate food sources, and reduce habitat. Very logical, but it is harder than you might think. This article will reveal the tricks of the trade: how and where to set traps, where to look for signs of entry, and how to block entry, and of course, what to do with the dead bodies. Sound like fun? Stay tuned.

Mice Are Not Just Small Rats

Although quite similar to each other in appearance, rats and mice actually belong to different biological classifications. Rats belong to the genus *Rattus*, while mice are members of no, not *Mouseus*, it's actually *Mus*. The reason you should care is because of their differences in behavior. A mouse problem is usually confined to a single house and can be treated individually. A rat problem may be a neighborhood or community problem involving a variety of habitat and food sources. If so, a permanent solution requires cooperation and simultaneous treatment at many sites. Besides, setting out mouse traps won't help if you have rats—a rat can probably run a long way with a mouse trap attached to its foot.

Proper identification is important, but fortunately it's easy. Basically, mice are small, and rats are large. A typical adult house mouse is six to seven inches long (tail included), is gray in color, and has prominent ears. The common rat species, the Norway (or sewer) rat and the roof rat, are both about 12-18" long, though they may differ slightly in coloration and body shape. The only possible confusion could be between a baby rat and an adult mouse. The main difference between the two is that the young rat would have proportionally much larger feet and head for the size of its body. This sounds simple, but unless you see the two side by side, you may not be able to tell the difference. Fortunately (or not), if you have rats, you'll probably get to see the adults, too. Rats also give off a characteristic musty odor not associated with mice.

Even if you never see the animals themselves, you can identify them by their calling cards, a euphemism for droppings or feces. Feces of the Norway rat are 3/4" long and have blunt ends; those of the roof rat are 1/2" long and have pointed

ends. Mouse pellets are only about 1/4" long and have pointed tips. (You could make a fortune on Jeopardy if this category ever came up!) If you have rodents, you will find lots of fecal pellets everywhere they run. This can be helpful in deciding where to place traps.

Other signs include tracks in the dust in the basement or attic, rub marks along beams or boards, and even their urine, which glows when exposed to ultraviolet light. It also smells, even when not illuminated. Finally, you can often hear them inside the walls, squeaking and thumping around.

As you search, take notes indicating all of the signs you find, as well as the presence of any nests and the sightings of any rodents. Indicating this information on a simple map of the house and property may help you to understand the dynamics of the situation and arrive at the best trap placement, as well as plan needed repairs.

"Here I Come to Save the Day ..."

It should come as no surprise that Walt Disney chose a rodent to represent a character capable of amazing feats of strength and dexterity. In a sense, every mouse is mighty (and rats proportionately more so). Just look at this list of physical capabilities of rats (and mice). They can: pass through any opening larger than 1/2 inch square (1/4 inch for mice); walk along horizontal wires and climb vertical wires; climb the inside of vertical pipes 1-1/2" to 4" diameter; climb the outside of vertical pipes of any size if within 3 inches of a wall; crawl horizontally on any type of pipe or conduit; jump vertically at least 3 feet above a flat surface (12 inches mice); dive and swim underwater for up to 30 seconds; swim up through the water seal or trap of toilets; and swim up to 1/2 mile in open water.! Mice can walk or run along ledges too narrow for rats and can jump from a height of eight feet to the floor without injury. They are also capable swimmers, but they do not tend to dive below the surface.²

Mice particularly reproduce with frightening speed. At the age of 51 days, a female mouse can give birth. With an average litter size of 6.7, one pair of mice can produce up to 87 children in a year, which could mean almost 8000 mice all told (counting children of the children).³ Since house mice can live happily in your house on a permanent basis, this means you need to get moving once you find them.

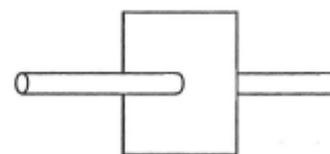
Trapping

Choosing a Trap

There are many kinds of traps available. The old-fashioned snap trap has been around for years, and it still works well. It should do the job just fine for most "mouse in the house" problems. The brand name Victor is common. A much larger version of the same trap is available for rats. If you have shopped for mouse traps lately, you know that the search for the "better mouse trap" continues. In fact, there is one trap called The Better Mouse Trap, TM It features several advantages over the conventional trap. One is that it is easier to set without getting your fingers caught. Secondly, you can release the mouse without touching it. Thirdly, the trap is made of plastic, so it is easy to clean. Finally and perhaps most important, it comes in two decorator colors: high-tech black to match your stereo and a very trendy gray.

Hints for Better Trapping

- ❖ Check traps to be sure they are working properly.
- ❖ Don't use traps that have warped bases. The rocking motion will frighten the rodents away before they are caught.
- ❖ Remove potential food and water sources (see page 66).
- ❖ It may help to set out the traps baited but unset for several days so that the mice or rats become accustomed to them and get bolder and more careless.
- ❖ Be sure that your bait is firmly secured to the trigger.
- ❖ If you are trapping mice, try moving the traps around to different locations. Mice are curious and these changes will attract them. Rats, however, will be cautious of moving traps and may be frightened off.
- ❖ Try changing to another type of bait. Be sure bait is fresh.
- ❖ Never handle traps after petting a cat or dog. These odors will be transferred to the traps and may frighten away the rodents.



A piece of sheet metal can be placed over a pipe or conduit to act as a barrier to rats or mice using it as a highway (see page 66).

Dan Stein, an IPM expert in Eugene, Oregon, recommends the Snap-E traps for both rats and mice. He says they are easy to set and, like the Better Mouse Trap, don't involve touching dead mice or rats.

For those who prefer to catch but not kill, there are live traps. However, be aware that releasing live-trapped rodents may be illegal, especially if you live in a populated area.

For bigger problems, there are multiple-catch traps like the aptly-named Victor Tin Cat.™ This live trap device can scoop up as many as ten mice before it needs to be emptied. It is well-suited for a garage or barn situation. Unlike a real cat, the Tin Cat does not bring half-dead mice into the living room to show you.

Placing Traps So That They Catch Something

Remember how in the cartoons the mice always manage to elude the traps? The same thing can happen in real life if you don't know what you are doing.

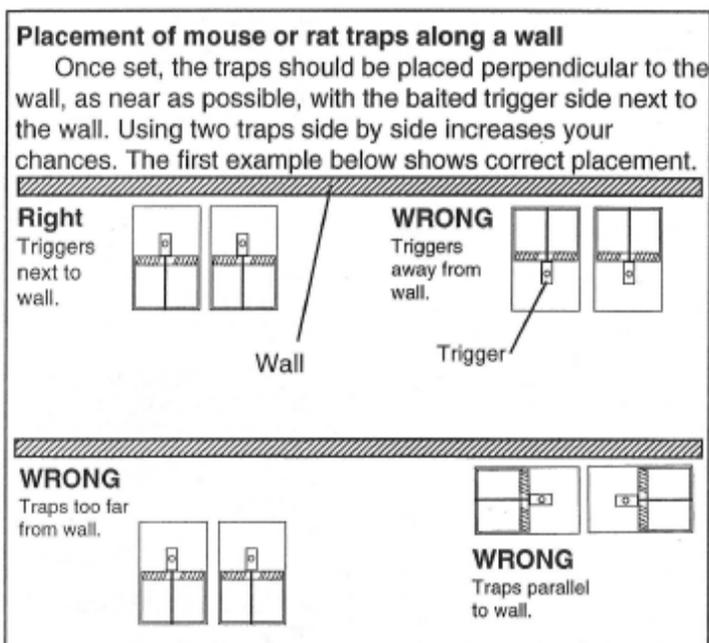
First, where should you place the traps? Traps can be placed anywhere that you know rats or mice are frequently passing. Ideal spots are along walls, especially just outside a known entry hole. Traps can also be nailed or taped to pipes, boards, rafters, or other common pathways. Be sure that the trigger is placed where you think they will hit it. Note: if you have small children or pets, be sure to protect them from the traps by shielding the trap with a board or box

When setting traps along a wall, position them with the triggers toward the wall (as shown in the illustration) because the animals tend to run along close to the wall. Placing two traps side by side increases your odds of catching something, as does placing traps on both sides of an entry opening.

Never handle traps with your bare hands. Your scent may scare the wily critters away. Use gloves from the moment you open the package. Another trick that may

help is to set out the traps baited but unset for several days so that the mice or rats become accustomed to them and get bolder and more careless. What to use for bait? They always used cheese in the cartoons, but experts say that peanut butter is more effective for catching both mice and rats because it is sticky, so the animal is more likely to disturb and set off the trap. Smear the mixture on a piece of gauze and wrap it around or attach it to the bait tray.

OK, now what do you do if you actually succeed in catching something? Public Health/Seattle & King County says that dead mice and rats should be wrapped in newspaper and placed in the trash. Laws may vary in other places, so it never hurts to call your local health department for instructions. You should definitely wash up carefully with soap and hot water afterwards. See the box at the left for special precautions cleaning up after deer mice.



Hantavirus and Deer Mice

Hantavirus causes a rare, serious respiratory disease. The virus is spread by deer mice and some other wild rodents. Deer mice are about 6 inches long, yellowish brown to grayish white on top, with a white belly and feet, large ears, and a furry tail.

Prevention strategies are similar to those for other mice, but infested areas must be carefully disinfected, and you should not dust, sweep, or vacuum them because this will spread the virus. See www.metrokc.gov/health/prevcont/hanta.htm for more information.

Making the Home Rodent-Proof

Trapping by itself will not solve the problem permanently. You need to find out how the animals got in and block the entrance if possible. The droppings can help lead you to possible openings. Some places to check include around the baseboards in every room, at all water and electrical entrances to the home, anywhere there may have been water or other damage, especially under sinks and behind bathtubs and toilets. In the basement, check along the foundation line and around doors and windows. Remember, even fairly small holes can be sufficient. Crawl spaces are prime locations for rodent entry and evidence. Look in the attic, too. Roof rats can live in trees and can make their way into the attic or areas under the roof.

Repair any damaged material and plug or block all holes. Mortar or adhesive is OK for very small gaps around pipes and conduits, but for larger holes you may need to insert a piece of sheet metal. Heavy-duty screening can be placed over vent pipes that need to have an air flow. A large piece of sheet metal can be attached perpendicularly on a pipe or conduit to serve as a guard.

At the same time, remove any sources of food and water. This is critical for trapping rats because they are creatures of habit and will not visit your traps at all if other food is available. Mice are browsers and may try food in a trap while other food is present. However, a long-term solution requires addressing food sources in either case. Repair all leaking faucets and drains- this also helps prevent roach and ant problems. Food should be kept in glass jars or tins rather than in plastic or cellophane bags.

For a rat problem, you also have to look at potential problems outdoors. Make sure that all garbage cans have tight fitting lids that are well secured. If you have a problem with dogs or other raccoons tipping the cans over, build a rack to support them. If you are composting yard waste, be sure not to put kitchen waste into the compost pile. There are other ways to compost food waste that will not attract rodents-a Green Cone is one way, or you can bury vegetable waste, but it needs to be at least a foot deep. Other food sources for rats include unburied cat and dog feces, pet food, and bird-feeder spill. Bird food is a very common problem that may make it impossible to get rid of a rat infestation. Finally, blackberry bushes and fallen debris provide prime rat habitat. If you have solved these problems but the neighbors have not, you will need to talk to them. Do it individually or call a neighborhood meeting to share your knowledge and form a plan. If you don't feel confident enough to do this yourself, try contacting your health department for assistance or advice. In the Seattle area, phone 206-205-4394 or visit www.metrokc.gov/health on the Internet.

Getting Professional Help

If you try the suggestions made above and fail to solve the problem, or just prefer to have someone else do it for you, there are competent professionals who can set traps and advise on needed repairs. Don't hire someone who proposes poison as a first step. You want them to really put effort into physical and mechanical methods. If limited use of baits is called for, it's best not to do it yourself, but instead have your pest control operator use them so that they are integrated with the other methods and not over-used.

Tips for Rat and Mouse Control¹

- ❖ Store garbage in tightly closed cans.
- ❖ Keep pet food inside.
- ❖ Compost grass, brush, and yard cuttings but not garbage or food scraps.
- ❖ Remove fruits, vegetables, and bird seeds from the ground.
- ❖ Start your wood or lumber pile at least 1-1/2 feet off the ground.
- ❖ Do not pile wood next to your home.
- ❖ Remove animal droppings, trash, and/or garbage from your property.
- ❖ Have junked cars towed away.
- ❖ Prune tree limbs so that they do not touch the home.
- ❖ Close every possible entry to your home, including windows, doors, vents, pet doors, and small gaps under the eaves.
- ❖ Keep your home free of litter.
- ❖ Any food stored in basements should be in rat-proof containers.

Rodent Poison is *Poison*

Rat or mouse poison baits aren't just toxic to rodents. They are hazardous to small children and to pets. They may also pose a serious threat to eagles or other birds that eat a poisoned rodent. Do not leave baits where children or pets have access, and dispose of used bait as a household hazardous waste. See page 129 the Resources chapter for information on locating local disposal sites.

References

- 1 *Common Sense Pest Control*. William and Helga Olkowski and Sheila Daar. The Taunton Press. Newtown, CT. 1991.
- 2 *The House Mouse: Its Biology and Control*. WSU Cooperative Extension Bulletin EB1401.
- 3 *Dan's Practical Guide to Least-Toxic Home Pest Control*. Dan Stein. Hulogosi, Eugene, OR. 1992.
- 4 *Seattle-King County's Most Wanted*. Seattle-King County Department of Public Health.
- 5 "Managing the House Mouse." Helga and William Olkowski. *Common Sense Pest Control Quarterly*, Volume VI, Number 4, Fall 1980.

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* Please note that these locations may or may not have worms available at the time you call

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~ Notes ~