



Home Composting 101

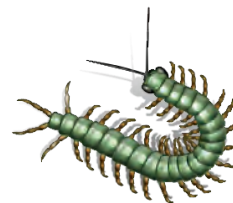
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Skagit County Public Works Solid Waste Division

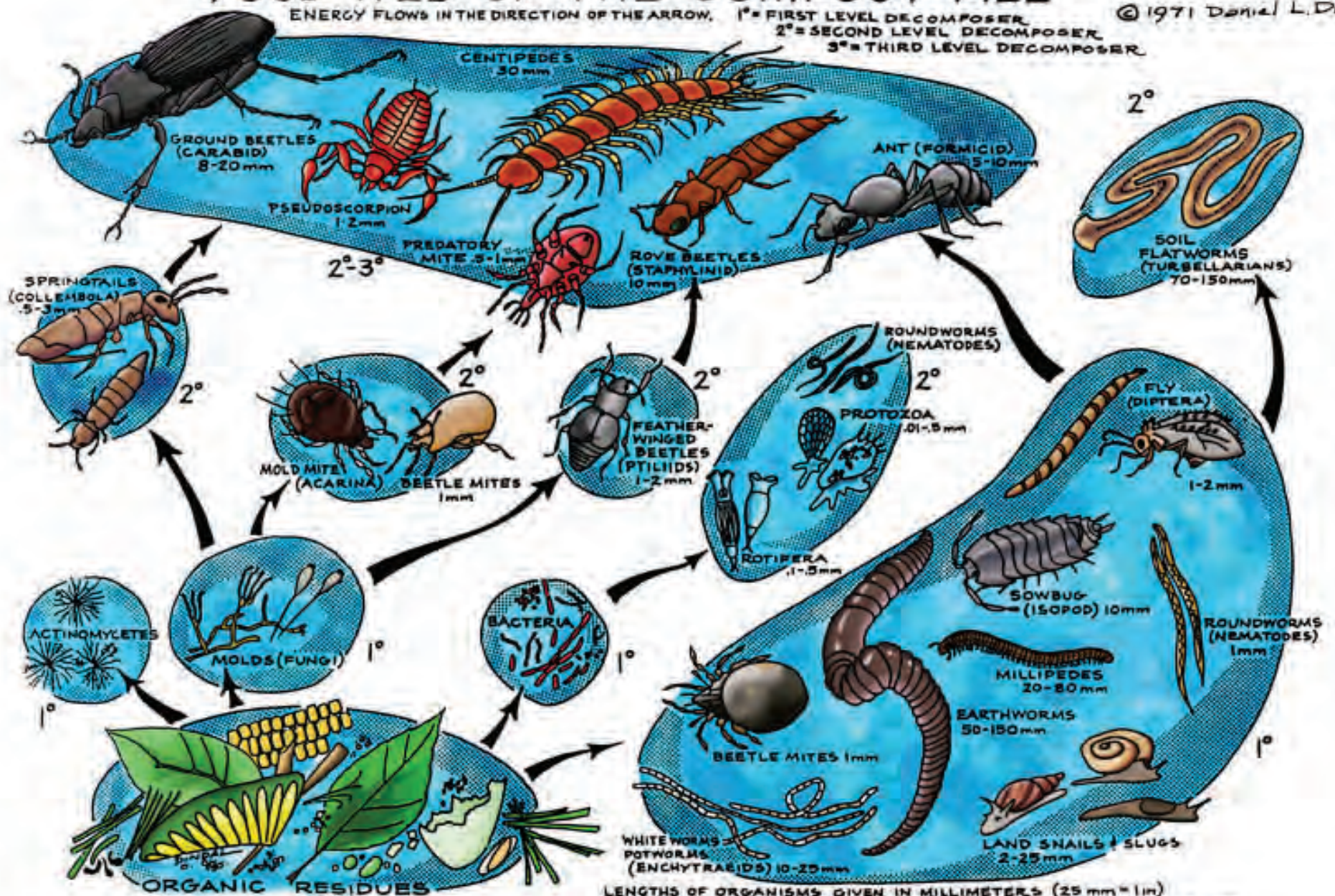
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FOOD WEB OF THE COMPOST PILE

ENERGY FLOWS IN THE DIRECTION OF THE ARROW. 1° = FIRST LEVEL DECOMPOSER, 2° = SECOND LEVEL DECOMPOSER, 3° = THIRD LEVEL DECOMPOSER.

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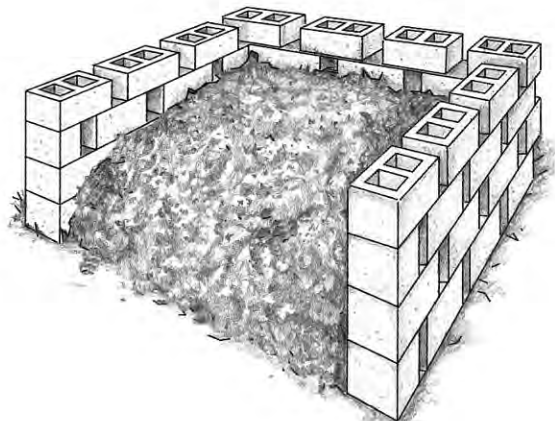
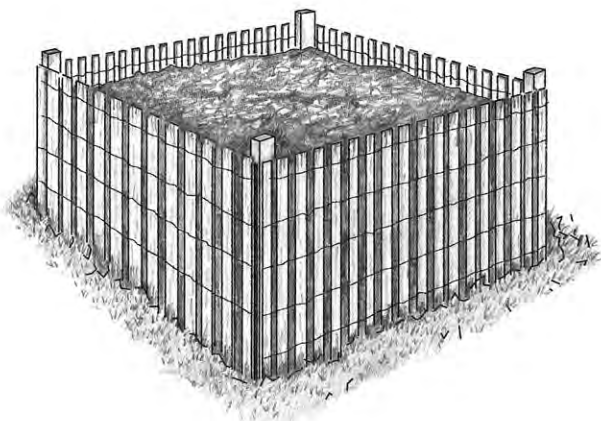
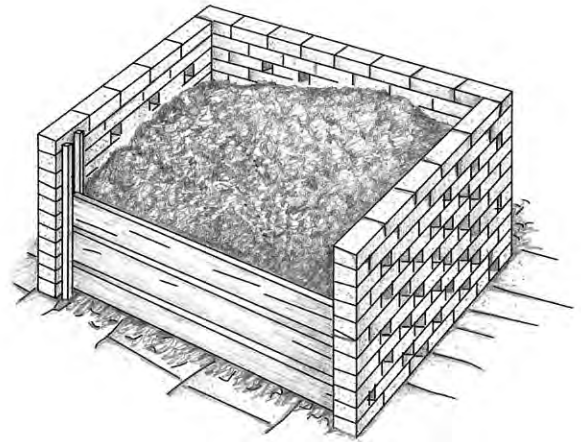
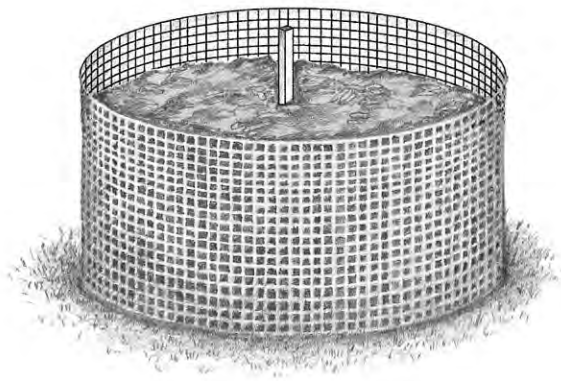
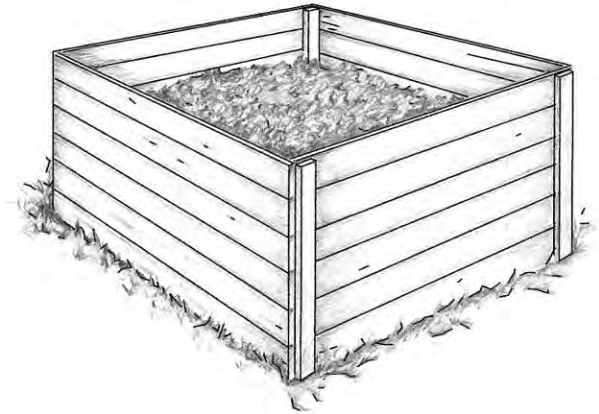


LENGTHS OF ORGANISMS GIVEN IN MILLIMETERS (25 mm = 1 in)
 from... Dindal, D.L. 1971. ECOLOGY OF COMPOST.
 SUNY CESF, SYRACUSE, NY. 12pp.

Compost Holding Units

Left: Movable holding units constructed from wire (top) and snow fencing.

Right: Stationary holding units constructed from wood, mortared bricks, and cinder blocks.



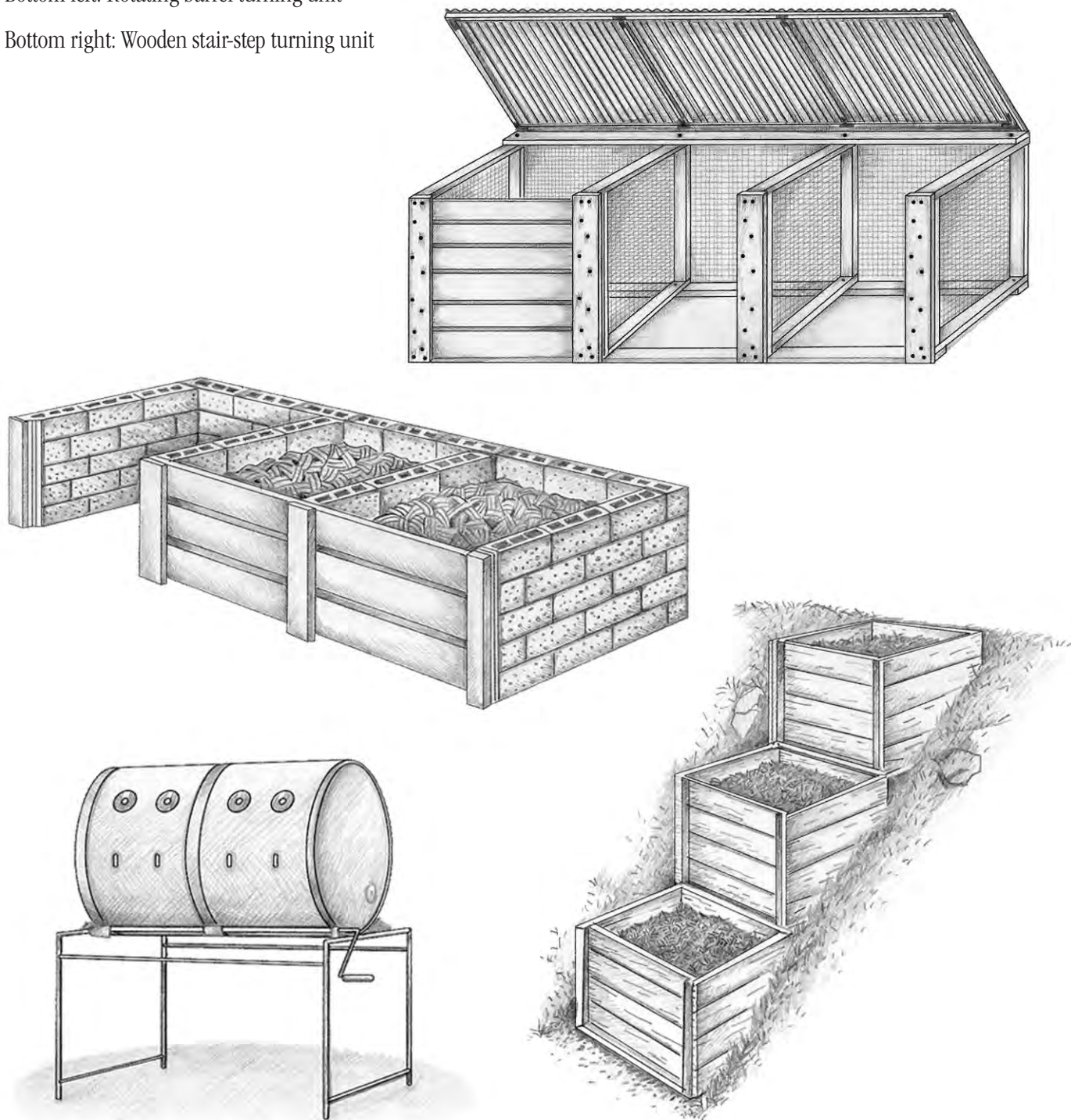
Compost Turning Units

Top: Wood slat 3-bin turning system

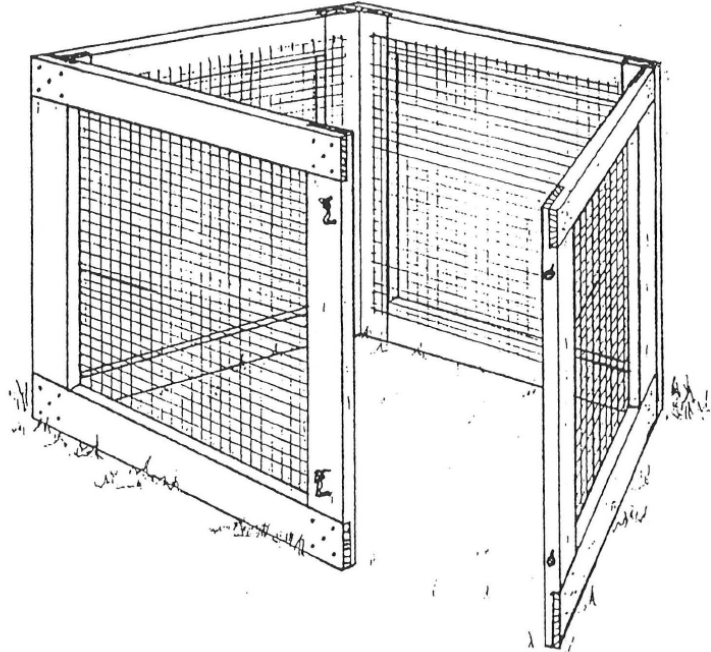
Left: Cinder block and wood turning unit

Bottom left: Rotating barrel turning unit

Bottom right: Wooden stair-step turning unit



Portable Wood & Wire Composting Bin



This portable bin provides a convenient way to compost moderate volumes of yard wastes with minimal labor. Yard wastes are simply added to the bin as they are generated. With no effort besides occasional moistening, compost will be ready in 6 months to 2 years. Chopping or shredding materials, maintaining adequate moisture by watering and covering with plastic or heavy fabric, and occasional turning will produce finished compost in a shorter period of time. Texture of the finished compost depends on the materials composted and how long they are left in the bin. Mixing fresh greens with brown yard wastes will produce the best results.

This bin is very flexible. It fits well in small spaces, and may be used either as a yard waste holding bin or as a portable turning unit. The bin can be easily moved to turn piles or to harvest finished compost and build a new pile: Simply undo the latches, pull the sides apart, and move it. Compost may then be turned into the bin at its new location, and finished compost can be removed from the bottom. It costs around \$50 to build using new materials, less if recycled materials are used.

Materials

- (1) 12 ft 2x4
- (3) 12 ft fir 2x4
- 12 feet of 36" wide ½" hardware cloth
- (100) 1½" galvanized No. 8 wood screws
- (4) 3" galvanized butt door hinges
- (150) poultry wire staples or power stapler
- (1) 10 oz tube exterior wood adhesive
- (6) large hook and eye gate latches

Tools

Hand saw and chisel, or radial arm saw with dado blade, or circular saw, or table saw.
Hammer, screwdriver, tin snip, caulking gun, pencil, and small carpenter's square.

Use eye and ear protection.

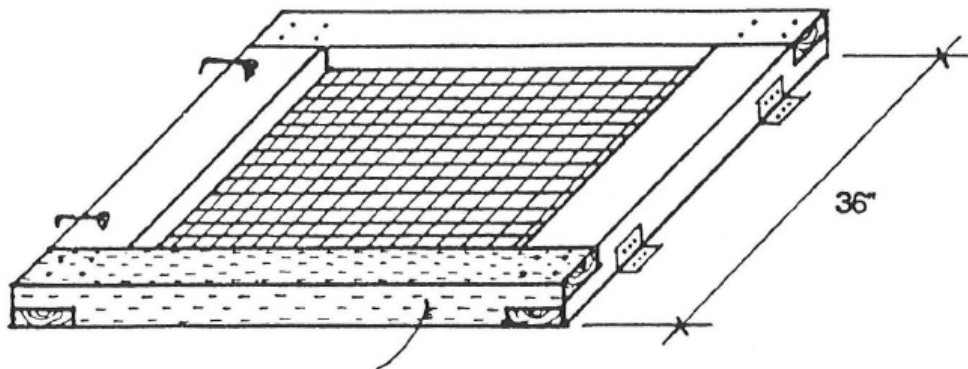
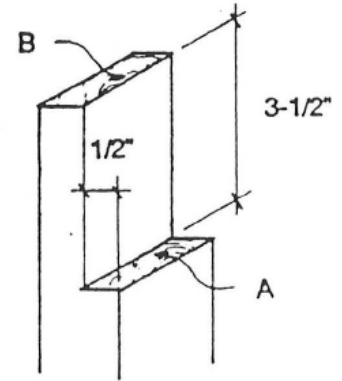
Construction Details:

Cut each 12 foot 2x4 into four 3 foot long pieces. Cut a 3/4" deep and 3-1/2" wide section out of each end, for a total of 32 lap cuts. If using handsaw and chisel, cut 3/4" down at the 3-1/2 inch line, at A in diagram to right. Then cut a 1/2" deep groove into the end of the board, at B in the diagram. Place a thick wood chisel in the end groove and split the wood with a hammer to the 3-1/2" cut. If using a radial arm saw, circular saw or table saw, set blade depth to 3/4" and make multiple passes until the whole section is removed.

Make four 3 foot square frames from the lap jointed 2x4s. Use one pressure treated 2x4 on each frame. Put enough construction adhesive to fill the gaps when the lap joints are screwed together. Fasten each joint with four screws.

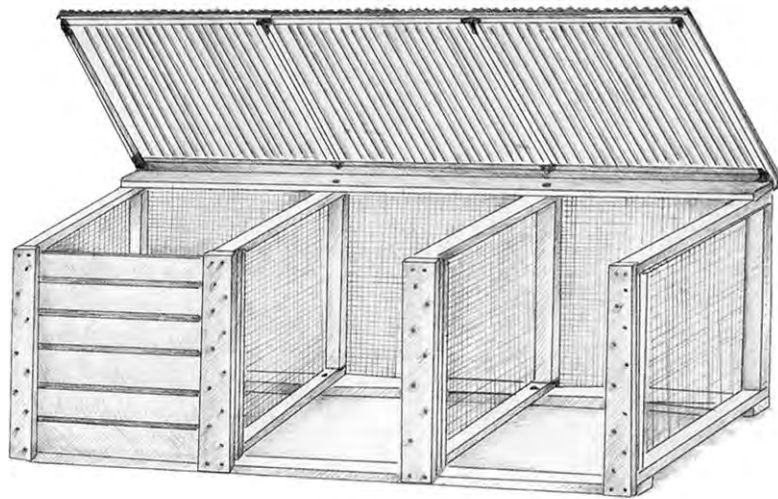
Cut the hardware cloth with tin snips into four 3 foot square sections. Bend the edges of the cloth back over 1" for strength. Lay: one onto each of the four frames. Center and tack each corner with a poultry wire staple. Hammer place a staple every 4" along all four edges of the hardware cloth. Try to tension the doth so it will not sag when filled with compost.

Connect each pair of frames together with two hinges. Then put the hook and eye gate latches on the other ends so that the sections latch together.



PRESSURE TREATED
LUMBER ON BOTTOM

Wood and Wire Stationary 3-bin System



This system is used to compost large amounts of yard materials in a brief period of time.

Yard materials can either be stored until there is enough to fill an entire bin or added as available. Materials should be chopped or bruised, moistened, and mixed to ensure a hot compost.

A pile made with a balance by volume of 50% fresh greens and 50% dried, brown or woody materials and turned every seven to fourteen days can be ready to use in three to six weeks. Aged compost is more beneficial as a soil amendment, but aging will add 3 to 6 weeks to the compost process. The texture of the finished compost depends on the materials composted.

This unit can be built for approximately \$300-375. Construction requires basic carpentry skills and tools. Do not use treated wood or treat the finished 3-bin unit with wood preservatives or paint of any kind. If you can afford the extra expense, using cedar for all bin parts will extend the life of the bin.

For additional composting information consult the *Composting at Home* guide available through the Natural Lawn & Garden Hotline, 206.633.0224, or the web addresses listed on the back of this sheet.

Materials*

- 2 18 foot cedar 2x4s
- 4 12 foot (or 8, 6 foot) cedar 2x4s
- 1 9 foot 2x2
- 2 6 foot 2x2s
- 1 16 foot cedar 2x6
- 9 6 foot cedar 1x6s
- 22 foot of 36" wide ½" hardware cloth
- 12 ½" carriage bolts 4" long
- 12 washers and 12 nuts for bolts
- 3 lbs. of 16d galvanized nails
- ½ lb. of 8d galvanized casement nails
- 250 poultry wire staples or power stapler
- 1 12 foot sheet and
- 1 8 foot sheet, 4 oz. clear corrugated fiberglass
- 3 8 foot lengths of wobble moulding
- 40 gasketed aluminum nails for corrugated fiberglass roofing
- 2 3" zinc plated hinges for lid
- 8 flat 4 corner braces with screws
- 4 flat 3" T-braces with screws

Tools

- hand saw or
- circular power saw
- drill with ½" and ⅛" bits
- screwdriver
- hammer or
- power stapler with 1" long galvanized staples
- tin snips
- tape measure
- pencil
- ¾ socket or
- open-ended wrench
- carpenter's square
- safety glasses
- ear protection



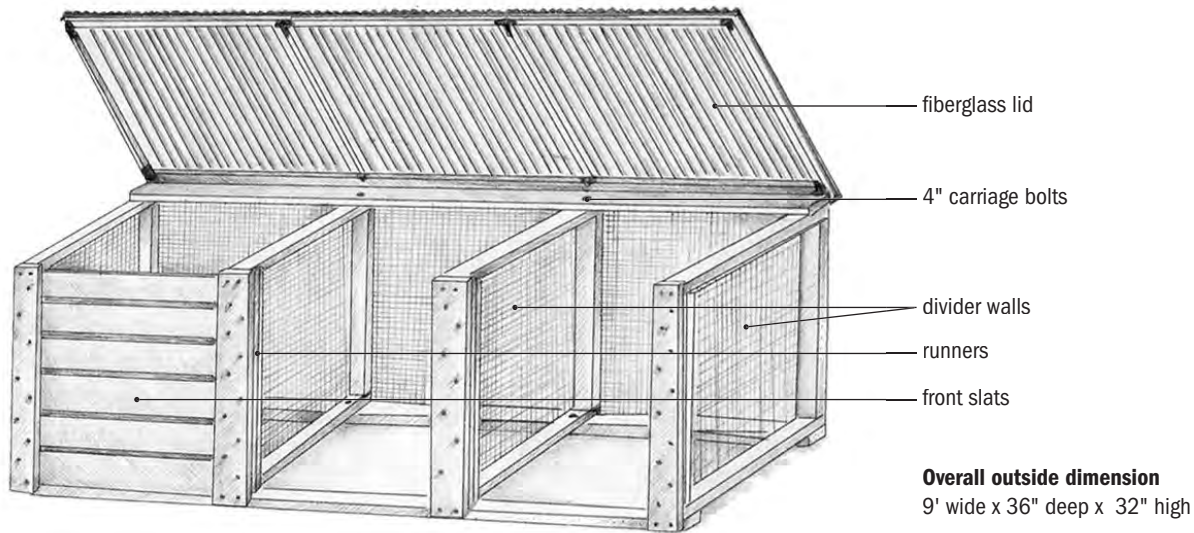
The Natural Soil Building Program is sponsored by Seattle Public Utilities and managed by the Seattle Tilth Association.

This recycled paper is recyclable. Revised 12/03



*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."





Overall outside dimension
9' wide x 36" deep x 32" high

Each bin section
35 $\frac{1}{8}$ " wide x 36" deep x 32" high

Construction Details:

Build Dividers Cut two 31 $\frac{1}{2}$ " and two 36" pieces from each 12 foot 2x4. Butt end nail the four pieces into a 35" x 36" section. Check to make sure each divider section is square. Repeat for other three sections. Cut four 37" long sections of hardware cloth, bend back edges 1". Stretch hardware cloth across each frame, check for squareness of the frame and staple screen tightly into place every 4" around edge.



Set Up Dividers Set up dividers parallel to one another 3 feet apart. Measure and mark centers for the two inside dividers. Cut four 9 foot pieces out of the two 18 foot 2x4 boards. Place two 9 foot base boards on top of dividers and measure the positions for the two inside dividers. Mark a centerline for each divider on the 9 foot 2x4. With each divider, line up the centerlines and make the baseboard flush against the outer edge of the divider. Drill a $\frac{1}{2}$ " hole through each junction centered 1" in from the inside edge. Secure baseboards with carriage bolts, but do not tighten yet. Turn the unit right side up and repeat the process for the top 9 foot board. Using the carpenter's square or measuring between opposing corners, make sure the bin is square, and tighten all bolts securely. Fasten a 9 foot long piece of hardware cloth securely to the backside of the bin with staples every 4" around the frame.

Front Slats and Runners Cut four 36" long 2x6s for front slat runners. Cut lengthwise two of these boards to 4 $\frac{3}{4}$ " wide and nail them securely to the front of the outside dividers and baseboard, making them flush on top and outside edges. Save remainder of rip cut boards

for use as back runners. Center the remaining full width boards on the front of the inside dividers flush with the top edge, and nail securely. To create back runners, cut the remaining 2x6 into a 34" long piece and then rip cut into 4 equal pieces, 1 $\frac{1}{4}$ " x 2". Nail back runner parallel to front-runners on side of divider leaving a 1" gap for slats. Cut all the 1x6" cedar boards into slats 31 $\frac{1}{4}$ " long.

Fiberglass Lid Use the last 9 foot 2x4 for the back of the lid. Cut four 32 $\frac{1}{2}$ " 2x2s and one 9 foot 2x2. Lay out into position on ground as illustrated on front page and make sure they are square. Screw in corner braces and T-braces on bottom side of the frame. Center lid frame, brace side down on bin structure and attach with hinges. Cut wobble board to fit the front and back 9 foot sections of the lid frame. Pre-drill wobble board with $\frac{1}{8}$ " drill bit and nail with 8d casement nails. Cut fiberglass to fit flush with front and back edges. Overlay pieces at least one channel wide. Pre-drill fiberglass and wobble board for each nail hole. Nail on top of every third hump with gasketed nails.

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/ResRecsy/composting/composting/shtml

Compost Pile Ingredients: Yes or No

Note: The presence of a C, N, or O in the C:N column indicates whether the C:N values of the material tend to be carbonaceous (C), nitrogenous (N), or other (O).

MATERIAL	USE	C:N	COMMENTS
Algae and seaweed	YES	N	Good nutrient source.
Ash from charcoal or coal	NO		Contains sulfur dioxides, may harm plants in the garden.
Ashes from wood fireplace or stove	YES, but very alkaline material	O	Can cause nutrient imbalance problems. Use no more than a fine sprinkling every 18" or so.
Bird droppings	NO		Droppings from pet birds may contain disease organisms and weed seeds.
Cardboard	YES	C	Use if it cannot be recycled. Best if shredded into small pieces. Glue is usually organic.
Cat feces or litter	NO		May contain disease organisms. Bury 5" deep in non-crop soils away from lake, stream, or well—or put in the trash.
Coffee grounds	YES	N	Worms love it.
Compost activator and starters	YES, but not required	N	Use is optional. Millions of people make compost successfully without them.
Cornstalks, cobs	YES	C	Best if chopped up and mixed with a source of nitrogen.
Dog droppings	NO		May contain disease organisms. Bury 5" deep in non-crop soils away from lake, stream, or well—or put in the trash. May also be flushed down a toilet.
Diseased plants	NO		Piles often do not get hot enough to destroy all diseases.
Dryer lint	YES	N	May need to be moistened.
Eggshells	YES	O	Break down slowly. Recommended that shells be crushed first.
Fish scraps	NO		Attracts rodents and flies.
Hair	YES	N	Add moisture and mix thoroughly in the pile.
Lime	YES, but not necessarily	O	Use sparingly. Lime converts ammonium nitrogen into ammonia gas, creating an odor problem. Overliming can also make a pile too alkaline and kill beneficial microorganisms. It is better to add it to soil or finished compost.
Manure (horse, cow, pig, sheep, goat, chicken)	YES	N	Excellent source of nitrogen. Fresh manure has a high water content; mix with drier materials.

Compost Pile Ingredients: Yes or No (continued)

MATERIAL	USE	C:N	COMMENTS
Meat, milk, meat scraps, grease, cheese, etc.	NO		May attract rodents and other pests to backyard compost systems.
Newspaper	YES	C	Use if it cannot be recycled. Recommend shredding into small pieces. Most inks today are safe for garden use.
Oak leaves	YES	C	Recommend shredding. Very acidic and decompose slowly. The composting process will help counteract the acidity.
Pine cones and needles (redwood, eucalyptus)	YES, but use sparingly	C	Recommended shredding and adding in small quantities. Other compost pile materials will neutralize their acid effect.
Sawdust and wood shavings	YES, but may need to add extra nitrogen	C	Has a high carbon content. DO NOT USE sawdust from pressure treated wood.
Sod	YES	N	Compost separately, grass side down. Cover with black plastic to inhibit growth.
Weeds	YES, but not seeds or spreading roots	N	Annual weeds which have not gone to seed can be composted. Plants that spread through roots or runners such as morning glory, quackgrass, buttercup, or ivy should not be put into fresh compost piles. Spread these plants on pavement to dry thoroughly before adding to compost pile. Home compost piles often do not get uniformly hot enough to kill seeds.

Composting Questions

Prepared by Howard Stenn

Revised by the Garden Hotline, 206-633-0224 or help@gardenhotline.org

Why should I compost?

Organic materials are a valuable resource when composted or used as mulches in the garden. Organic matter improves soil and plant health, prevents erosion, and holds moisture and nutrients in the soil. Home composting is less expensive and more efficient than sending to centralized composting facilities.

How long does it take to get finished compost?

Yard trimmings composted in a holding unit may take from three months to two years to decompose, depending on the materials being composted, how they are prepared, and if the compost is turned or aerated occasionally. If materials are carefully combined to balance nitrogen and carbon, chopped, moistened and turned, compost can be ready in 2-3 months.

How do I know when the compost is "finished"?

Finished compost is dark colored, sweet smelling and crumbly. Compost is ready to use when most of the original plant materials are no longer recognizable (some tough woody materials may still be present - which can be sifted out and returned to the pile).

Do I need a bin to make compost?

No. However, bins make composting convenient, help increase pile temperatures and exclude pests. In the absence of a bin, yard trimmings compost can be made in freestanding piles. Food scraps can be buried under 8 inches of soil or they should be composted separately using a bin system such as a worm bin or food digester or put curbside for Yard and Food Waste collection.

How large an area do you need to compost?

This depends on how large a yard you have, how intensively it is gardened, and how many people contribute scraps to food composting systems. Generally, one or two 3' X 3' X 3' bins are adequate for a city lot. A 2' X 4' by 1.5' deep worm bin is adequate for 2-3 people's kitchen scraps. Additional space near the bins is helpful in order to easily turn piles and sift finished compost.

Where is the best place to put a compost pile?

Compost piles should be built on flat ground, in an area that is easy to reach with a wheelbarrow. The best place for an untended compost pile is on the north (shady) side of a building or under the shade of a tree, where it is easy to keep moist in summer. Do not place a bin too close to fences or buildings in order to discourage animals from nesting.

Do I need to add fertilizer to my garden if I use compost?

Yes. Compost is a soil conditioner, but because it releases major nutrients (nitrogen, phosphorous, potassium) very slowly, it is not a reliable substitute for fertilizers. Compost improves nutrient

availability, stores fertilizers in the soil for gradual use by plants, neutralizes acid soils, and adds minerals needed for plant growth.

Can I compost all my yard trimmings? Can I make too much compost?

It is difficult to make too much compost. Compost can be used on new and established plantings and added on a yearly basis. Most gardeners import compost into their gardens in addition to their own homemade compost. However, not all yard trimmings are best managed by home composting. Diseased plant material, weed seeds and weeds with spreading roots or runners (morning glory, blackberry, quack grass, etc.) should be sent to a commercial composting facility through the Yard and Food Waste Collection program. Also, most gardeners do not have the tools needed to compost woody or evergreen trimmings.

What can I do with composted grass if I don't have a garden?

First, consider “grasscycling” - leaving clippings on the lawn to recycle nutrients and improve the soil. Composted grass clippings can be placed around shrubs or put in potted plants. Alternately, find a neighbor who can use some mulch or has a compost pile. You can also sign up for Yard and Food Waste Collection and send your clippings to a centralized compost facility.

How does compost affect the acidity (pH) of soils?

Finished yard waste composts are neutral, and help to sweeten our naturally acid soils.

Is it OK to garden in pure compost? In compost mixed with fill soil?

For gardening, it is best to mix compost with mineral soils (clay, sand or loam), to produce ideal texture that provides anchorage for plant roots. Pure compost does not drain well, and may encourage pest or disease problems. Clean sandy fill soil (not heavy clay) and compost mixed in roughly equal amounts should provide a good growing medium.

What can be done about a smelly compost pile?

Too much water, an overabundance of green material, poor aeration, or the addition of meat or other animal products causes smelly piles. The bacteria that live in anaerobic piles produce a sulfuric, "rotten egg" smell. (Do not put food scraps or pet waste in yard trimmings compost piles.) Smelly piles should be turned to introduce air and encourage aerobic bacteria. Wet, compacted materials should be broken up with a pitchfork and mixed with coarse materials such as dry straw or corn stalks to absorb excess moisture and create air spaces. Don't compost grass clippings without mixing with coarse, woody materials. Grass will quickly compact and become anaerobic.

Are rats attracted to compost? How can I get rid of them?

Rats can be attracted to two aspects of compost:

1) Rats are most often attracted to food scraps of all types - especially meat and dairy products. Food scraps should not be put into home yard trimming composting systems! Food scraps, (excluding meat, fish and dairy products) should be composted in worm bins with tight fitting lids to exclude rodents, placed in a digester (such as a Green Cone), buried under at least 8" of soil or put curbside for Yard

and Food Waste collection. Meat, fish and dairy products should not be placed in any home compost bin.

2) Sometimes rats will nest in yard trimming compost piles- even when there is no food waste in the pile. Turning and rebuilding the pile, with special attention paid to shredding and moistening dry woody materials, can discourage them. Rats don't like wet, soggy conditions for nesting. Also positioning the bin so it is not directly adjacent to any structure, such as a fence or shed, and allowing enough room to easily walk around the bin will also discourage nesting.

Are rats really a problem if I have cats around to catch them?

Rats can pose severe public health problems. They carry and transmit diseases to domestic pets and humans. Rats should be discouraged through proper composting techniques, regardless of whether they are obviously present, or if cats are hunting them. Because rats are nocturnal (active at night) they may be around without your noticing them, even if you have cats around.

Do compost piles attract slugs and snails?

Slugs and snails live happily in compost piles where they help to break down organic material. They are nocturnal and home compost piles can provide daytime hiding places for them away from the sun and heat. They lay their eggs in the piles which may be spread with finished compost. If possible, place compost piles in areas away from vegetable gardens. Metal flashing can be attached to pieces of the bins or placed near your compost pile to repel slugs and snails. Traps can be placed nearby to divert them from the pile.

How can I stop flies and other insects from becoming pests around the compost pile?

Do not put any food scraps into a yard trimming compost pile. Compost piles made entirely from yard trimmings do not usually attract flies or other insect pests in large numbers. Flies are attracted to food scraps and animal manures - including fallen apples or other garden fruit. Compost food scraps in a worm bin or in a Green Cone or other food digester, bury them under 8" of soil or put them curbside for Yard and Food Waste collection. If you must put fruit from your garden into a yard trimmings compost pile, be sure to cover it with several inches of compost or soil - not just with loose yard trimmings!

Can yard trimmings treated with pesticides and herbicides be put in the compost? What happens to them in the compost pile?

There are no simple answers to this question. Individual chemicals react in different ways and break down under unique conditions. Decomposition of most pesticides and their byproducts has not been studied thoroughly. The by-products of decomposition may be more toxic than the original chemicals. Avoid use of synthetic pesticides and herbicides, and keep treated materials out of compost piles if possible. If in doubt, place materials curbside for Yard and Food Waste collection for commercial composting.

Never purposely dump any chemical into a compost pile. At a minimum, thoroughly compost yard trimmings that have been treated with pesticides (or those of uncertain origin) in a hot pile and leave to cure for a full year. Refer questions about specific pesticides to Washington Toxics Coalition 632-

1545, the Washington Department of Ecology Hazardous Wastes Hotline (800) 633-7585, or call The Garden Hotline (206) 633-0224.

Is it safe to grow food in composted sewage sludge?

Washington Department of Ecology Compost Quality Guidelines allows use of composted sludge if the compost meets the state's "Class AA" Guidelines. The Guidelines allow the compost to include some heavy metals, at levels that the US EPA has determined to be safe. These metals don't decompose, so repeat applications will lead them to build up in the soil. To be safe, don't use these materials in food growing areas.

Can vacuum dust be composted?

Small amounts can be composted, as most vacuum dust is soil or organic material. The fibers from synthetic carpeting will not decompose, but they will probably not be noticeable in the finished compost. However, be aware that carpeting is a trap for lead and other toxic dust, which is tracked into the house from urban streets. For this reason, it is best not to add vacuum dust to the compost pile.

Should I wear gloves and a dust mask when handling compost?

Gloves are not necessary for handling composted yard trimmings or kitchen scraps, though you may want to wear them to keep your hands clean. If you have allergies to molds, plant materials or dust, it is advisable to wear a dust mask when adding to or turning compost or harvesting finished compost.

Can grass clippings treated with "Weed and Feed" be composted or mulched safely?

Lawn clippings with herbicides on them may kill garden plants if used as mulch or "young" compost. If herbicide use is suspected, materials should be thoroughly composted and allowed to cure for one year before use in the garden. The hotter your pile the more likely any pesticide residue will be burned off. The best option is to not use herbicides in your garden. Do not use compost made from sources of unknown origin on food crops.

Can glossy magazine and colored newspaper pages be composted?

Some glossy papers contain toxic pigments, so these materials should not be composted. Regular newsprint from local newspaper sources is safe to use in compost as it is printed with soy based ink. Not all local colored newsprint is printed with soy based inks so use these in moderation. When bedding a worm bin, strands of shredded newspaper have a tendency to clump up. To avoid this, rip up newspaper into squares, crumple, dunk into water and shake off excess moisture, then place into the bin.

Can office paper be composted?

Computer paper is not recommended for worm bins because of heavy metals in the colorants. It is best to recycle shredded paper.

Can wood shavings be composted?

Untreated wood shavings can be composted. If using wood shavings for worm bin bedding, soak them overnight in water before adding to the bin, to be sure that they hold the moisture. Cedar contains naturally occurring anti-microbial oils, which will greatly slow the decomposition process and can be irritating to delicate worm skin. They should be added in very small amounts or used as mulch.

Can fireplace and barbecue ash be used in the compost?

Wood ash is an excellent source of potassium, a major nutrient required for healthy plant growth. However it is very alkaline, and should be used in the garden or compost pile in small amounts, as large clumps of ash can damage plants. Use in moderation to avoid high pH levels that inhibit microorganisms. If you do add ash to a compost bin, do so in small amounts at a time and mix as you go. Do not burn or use ashes from wood treated with paints or wood preservatives, or ashes derived from burning lots of paper- they may contain heavy metals or chlorinated compounds.

True charcoal is a partially burned form of wood. Very often, chemicals have been added to barbecue briquettes (such as binders used to hold briquettes together), so it is best to keep barbecue ash out of compost or gardens.

Can pet wastes be added to home compost?

Pet wastes (dog, cat, birds, and any carnivores) can carry diseases that infect people. They should be handled as little as possible, so don't compost them. They can be buried in an ornamental garden area or flushed down the toilet. Pet wastes should not be buried in a vegetable garden. Herbivore manure (cows, horses, chickens, goats) is fine.

Can weeds be composted? How do you stop them from spreading in compost?

The leaves of most weeds may be composted. Do not compost weed seed heads, since many seeds will survive temperatures up to 140 F. Even a well-made "hot" compost pile may not achieve this heat uniformly throughout the pile. Roots or runners of weeds that spread vegetatively, (such as morning glory, quack grass, and buttercup) and invasive ornamentals (such as ivy) should not be put into compost piles even if they are shredded! Recycle them in the Yard and Food Waste Collection program where they will be composted in hot piles.

Can limbs from trees with tent caterpillars be composted?

Do not compost limbs or other parts of trees with tent caterpillars on them. The eggs will hatch the following spring unless they are burned or destroyed in a very hot compost pile. It is best to burn the infected limbs and add the ash to the pile.

Can any diseased plant be composted safely?

No diseased plants should be added to a home composting system. Pathogens may live through the composting process and spread through the garden as compost is used. Large-scale commercial composting systems attain sufficient temperatures over 140 F to kill pathogens. Home composting systems do not reliably reach these temperatures throughout the entire pile.

How do you know if you have the proper carbon to nitrogen ratio for fast composting?

Mixing roughly equal volumes of fresh "greens" (such as grass clippings, fresh weeds and flowers, etc) and dried "browns" (such as straw, corn stalks, fall leaves, etc) provides a good carbon to nitrogen (C: N) balance. Experimentation is the best way to get a good sense of carbon to nitrogen ratios in different materials. Composting books (and the MC/SB Manual) have tables listing ratios of common wastes. Remember, 30:1 is an ideal ratio, which yields quick, hot compost. Significantly higher carbon to nitrogen ratios (i.e.- 80:1) will yield fine compost in a longer period of time.

Can wood chips be used in compost?

Wood chips may be added to compost piles in limited quantities. They are very rich in carbon, and have limited surface area that prevents bacteria from decomposing them quickly. They may not break down completely for a long time, but will become "stable" and improve drainage and aeration in heavy clay soils without lowering fertility.

Can sawdust and wood shavings be used in compost?

Sawdust and wood shavings are very rich in carbon, plus they have more surface area for bacteria to work on than larger chips do, so they tend to rob more nitrogen from the compost pile or soil initially and take a long time to stabilize. Sawdust run through a compost pile can look dark and smell good after several months, but will still deplete nitrogen when added to the garden. To balance the nitrogen demands of one cubic yard of fresh sawdust, add 3-1/2 pounds of actual nitrogen. (For example, 25 lbs. blood meal, or 8 lbs. urea).

Will mulching with wood chips or sawdust rob nitrogen from plants?

Coarse woody materials such as wood chips will not compete with plants for nitrogen if they remain on the soil surface. Smaller particles such as sawdust have more surface area for bacteria to work on, so they demand more nitrogen than larger particles. Fine materials may deplete soil nitrogen even when used as mulch on shallow rooted plants. If you use sawdust as mulch, add nitrogen fertilizer when turning it under. (See previous answer for the recommended amount). As a general rule, woody materials should only be used to mulch plants with a woody base (such as shrubs and trees) and should not be used on plants that have herbaceous bases (such as vegetables, annuals, and perennials).

How can wood/bark chips be made to compost faster?

Re-chipping to create more surface area or adding nitrogen will speed up decomposition.

How do you gauge the proper moisture content for composting?

Materials should feel like a wrung out sponge: moist to touch, but no more than a drop or two of water should come out when compost is squeezed in your hand. Some very dry materials (such as straw, cardboard, sawdust and wood shavings) may need prolonged soaking and mixing to moisten.

Do I need to water my compost pile?

Providing adequate moisture is essential for quick composting, so you should check your compost pile for moisture and add water if needed (see question above). Occasional watering during dry seasons, along with covering piles with black plastic, burlap or old rug scraps to decrease evaporation, will greatly speed up decomposition.

Should compost piles be covered?

A compost pile that has good moisture content to start with will benefit from covering with plastic or burlap sacks to keep the pile moist in summer and prevent it from getting too soggy in winter. However if a pile is too dry or soggy to start with, covering may make the problem worse.

Do compost "tumblers" work?

Compost tumblers or "barrel turning units" work very efficiently if materials are chopped, moistened, contain adequate nitrogen, and are turned regularly. Designs vary and some tumblers are easier to turn than others. Most tumblers make small batches of finished compost because they require space for compost materials to rotate.

Do I need to use a shredder to make good compost?

Shredders are not needed to make compost out of leaves, twigs, grass clippings and fresh stems. Shredders are needed for composting or making mulch out of branches over 1/2" diameter, waxy evergreen leaves and large volumes of shrub prunings. Shredders are also useful to prepare corn stalks and other woody trimmings for hot composting.

What tools can be used to chip woody materials?

- Machete - Green or woody vegetable stalks, prunings up to 3/4" diameter
- Hand Pruners- green or woody materials up to 3/4" diameter
- Lawn mower - Leaves, stalks and twigs up to 1/4" diameter
- Electric chipper - Leaves, stalks and twigs up to 1" diameter
- 3-8 H.P. Gas Shredder - Small amounts of twigs and branches up to 2" diameter
- Commercial shredder (8+ H.P.) - Branches over 2" diameter

Note: With all of these methods, be sure to use eye protection and wear long sleeves and pants

Does compost need to be turned?

No. Turning speeds up the composting process but it is not necessary to turn piles of under 5 cubic yards. Small piles will compost on their own, given enough time.

How can unfinished compost be reheated?

Relatively fresh materials will heat up if turned (which adds air), bruised or shredded, and adequate moisture is provided. Older "brown" materials can be reheated by mixing in a high nitrogen fertilizer, green grass clippings or fresh manure.

Should limestone be added to compost?

Limestone is not needed for good compost. It may contribute to the smelly loss of nitrogen through ammonia gases. Most finished compost has a neutral to slightly alkaline pH.

Should compost "starters" or soil be added to compost piles?

"Starters" and soil are not essential for composting. "Starters" can speed up the process and make it hotter so weeds and diseases are destroyed more thoroughly. Most "starters" are nitrogen fertilizers or dehydrated bacteria. These same bacteria are already present on dead plant material. If a nitrogen source is needed, fertilizers are cheaper than "starters". Soil is not needed in a compost pile. Small soil particles will be found in a compost pile, clinging to roots and on fallen leaves. Topping a hot compost pile with a layer of soil can help to retain moisture and nitrogen, which might otherwise be lost as a gas during composting.

Do you need to add fertilizer to the compost pile?

The need for fertilizer depends on the material being composted. A mix of leaves, grass clippings and weeds contains sufficient nitrogen for decomposition. Nitrogen fertilizers may be added to speed decomposition of twigs, brown grass, evergreen leaves or wood chips.

Can grass clippings be composted without becoming matted and smelly?

Grass clippings mat and smell bad because of their fine textures, high moisture and nitrogen content leads to rapid decomposition, which requires lots of fresh air. As the clippings decompose and settle, air passages are closed and an anaerobic environment is created, which promotes bacteria that emit a rotten egg smell. Mixing grass with materials, which are coarser and contain more carbon, such as brown leaves or straw, will eliminate odors. Alternatively, grass clippings may be left on the lawn, or spread as a thin (1/2") garden mulch.

Can evergreen leaves from laurel, holly and rhododendron be composted? Rose prunings? Pine needles? Cedar cones?

Laurel leaves, rose prunings, pine needles, holly, rhododendron and other waxy leaves break down slower than many other trimmings, but they do not pose any problem in the compost or in the garden (except rose thorns, which may attack you). Shredding these materials will help them to break down quicker and be less visible in the finished compost. Their texture and resistance to decomposition makes them excellent for mulching. Generally, it is best to leave cedar products out of the compost bin as cedar contains naturally occurring anti-microbial oils, which will slow down the composting process. Cedar cones and boughs are best used as mulch, left in place under the cedar tree.

Are there any types of leaves that should not be composted?

Keep leaves that are diseased with rust, powdery mildew or seriously infested with pests out of the home compost pile. Eucalyptus, California bay laurel, juniper, acacia, walnut, camphor, pittsporum and cypress have acids that are toxic to other plants, but small amounts in the compost pile are OK. Use compost made from oak and beech leaves on acid loving plants.

Can sod be composted without continually resprouting?

Yes. Sod should be composted in piles covered tightly with black plastic to exclude light and stop all growth. The sod should be thoroughly moistened and stacked with green sides together in a compact pile. If the sod is already brown, or contains a thick layer of thatch, sprinkle each layer with an organic high nitrogen fertilizer. Other materials may be included in the pile, including vegetatively spreading weeds such as buttercup and quack grass, which will also die without light. (Morning Glory will not be killed this way.) Sod piles may take six months to 2 years to completely decompose and kill spreading roots.

Can I compost bracken ferns?

Bracken ferns are difficult to compost. Shred them before adding to compost, or put ferns curbside for Yard and Food Waste collection.

Can you compost if you just have kitchen scraps?

Yes! Vegetative kitchen scraps without meat or fish, dairy products or oily foods can be composted in worm bins, placed in a digester (such as a Green Cone) or buried at least 8" deep in the garden.

Why can't dairy products, meat or fish be composted?

Animal products attract flies, rodents and other pests, which create nuisances and carry diseases. These protein rich materials break down slowly and are more likely to create odor problems and other complications.

Can coffee filters and teabags be composted in a worm bin?

Yes. Any uncoated paper product may be composted. Worms love coffee grounds and filters, as well as tea bags.

How can kitchen scraps be kept from smelling bad while storing them for composting?

Store food scraps in buckets with tight fitting lids until ready to add to worm bin. Keep a large (5 gallon) bucket outside, and a small (1/2 gallon to 1 gallon) container inside which can be emptied into the larger outdoor container daily. Wash the inside kitchen container often with soap and water to prevent fruit flies. Adding layers of sawdust between food scrap additions can help absorb moisture, control odors and help prevent fruit flies. When disposing of food scraps through the Yard and Food Waste Collection program it is helpful to use BioBags (bio-degradable corn based plastic) as liners for your kitchen food waste collection container. These are approved for commercial composting.

How can I prevent fungus gnats in an indoor worm bin?

Fungus gnats are small insects that are similar looking to fruit flies, but do not respond to the techniques described above. They are attracted to moist organic conditions, and can become a nuisance in houseplants and indoor worm bins. They can be trapped with sticky trap tape, hung above the worm bin or attached to a piece of cardboard and placed inside the bin. If fungus gnats infest houseplants, let the plants dry out and scratch the soil surface to disturb the larvae. Beneficial nematodes may also be helpful; add them to the indoor worm bin or houseplant to eat the larvae.

Can I compost apples that are infested with apple maggot?

The best way to handle apples that are infested with apple maggot is to drop them in water or cook them, then compost in a food waste compost bin. Since we live in an Apple Maggot Quarantine Area, only put infested apples in the Yard and Food Waste collection bins if tightly sealed in corn based BioBags. These bags have been approved for commercial composting and the heat generated in a commercial composting system will kill the apple maggot larvae in the apples.

Can I compost apples that are infested with apple scab?

Cook apples that are diseased with apple scab before putting them into a food waste compost bin. To keep the fungus from overwintering, put fallen leaves from the apple tree in the Yard and Food Waste Collection bin for pickup.

Are bugs in my worm bin OK? How can I get rid of fruit flies?

Many bugs may be at work in the worm bin helping the worms to decompose organic materials. Sow bugs, spiders, centipedes, slugs and springtails (tiny white bugs) are all common. Most of them are not a problem. If fruit flies become a problem, make sure that food scraps are completely buried beneath bedding. Try covering the top of the bedding with plastic, newspaper or cardboard (such as pizza boxes) overlapped to create a barrier. Make sure you have a tight fitting lid on the worm bin to exclude flies. You can also purchase the beneficial nematode, *Steinernema feltiae*, which can be added to worm bins to eat fly maggots, but will not disturb the worms. Check the IPM Resource Guide or call The Garden Hotline (206.633.0224) for a list of places to purchase nematodes.

Do galvanized metal trashcans leak toxins if they are used as food digesters?

Galvanized metal trash cans may leach zinc into the finished compost, but not enough that plants will take up zinc at toxic levels. However, be careful that children do not eat the finished compost.

What type of materials should I use to build my worm bin?

Worm bins can be made out of recycled materials, wooden boxes and other containers. Worm bins must have drainage holes in the bottom and a tight fitting lid. Red cedar, northern white cedar, Douglas fir and black locust woods naturally resist pests and rotting. Exterior grade plywood can also be used in building a bin. Do not use “treated wood” to build a worm bin. Do not paint the inside of the worm bin. If using a plastic bin, be careful to keep the bin in a shady area to prevent the bin from overheating in the summer.

Compost Troubleshooting

SYMPTOM	POSSIBLE CAUSE	SOLUTION / ALTERNATIVE
Pile is damp and warm in the middle, but nowhere else	Pile may be too small	Gather enough material to make a pile 3' high, 3' wide, and 3' long.
Pile does not get hot	If pile is moist and sweet smelling, in may not have enough nitrogen	Mix in fresh grass clippings, manure, blood meal, or other high nitrogen fertilizer.
	If pile is very wet—perhaps smells sour, it may not be getting enough air inside	Turn the pile. Mix in dry sawdust, straw, or stalks to improve drainage and air flow.
	Pile may be too small	Gather enough material to make a pile 3' high, 3' wide, and 3' long.
	Pile was built gradually over a few weeks or longer	Let it compost slowly. If materials are still fresh, turn and mix in fresh grass clippings, manure, blood meal, or other high nitrogen fertilizer.
Pile is dry throughout	Lack of water	Turn the pile and spray all materials with water.
Pile smells like rotten eggs, vinegar or garbage	Too wet, not enough oxygen	Turn the pile and mix in coarse dry materials such as leaves, straw, or corn stalks. Cover with plastic during rainy weather.
	Inappropriate materials such as food or pet waste in pile	Remove and dispose of inappropriate materials.
Pile smells like ammonia	Too much nitrogen	Turn the pile and mix in dry materials such as leaves, sawdust, shredded paper, straw, or corn stalks.
Pile is attracting dogs, raccoons, rates, flies, or other pests	Inappropriate materials such as food or pet waste in pile	Remove and dispose of inappropriate materials.
Pile contains earwigs, slugs and other insects	No problem	Slugs should be removed and destroyed so that their eggs are not spread in the garden.

Sample Recipes

Composting is like cooking in many ways. Some people will enjoy having a recipe to follow - at least until they get more experience. Here are a few sample recipes to share at a workshop:

For "one-liner" recommendation to home composters, advise them to "Start with equal parts greens and browns for your compost pile."

"Overgrown grass and leaves"

Mix equal parts fresh grass clippings with dry leaves to make one cubic yard.

"Garden party gatherings"

Mix 1 part chopped garden weeds; 1 part fresh grass clippings; 3 parts dry leaves; 1 part food scraps.

"'Big party' compost"

4 parts food scraps, (mixed with enough sawdust to coat the pieces); 3 parts fresh grass clippings; 6 parts dry leaves.

"All around materials party"

2 parts grass clippings to 1 part shredded card board, just tear into strips by hand and 2 parts chipped woody yard trimmings (tree

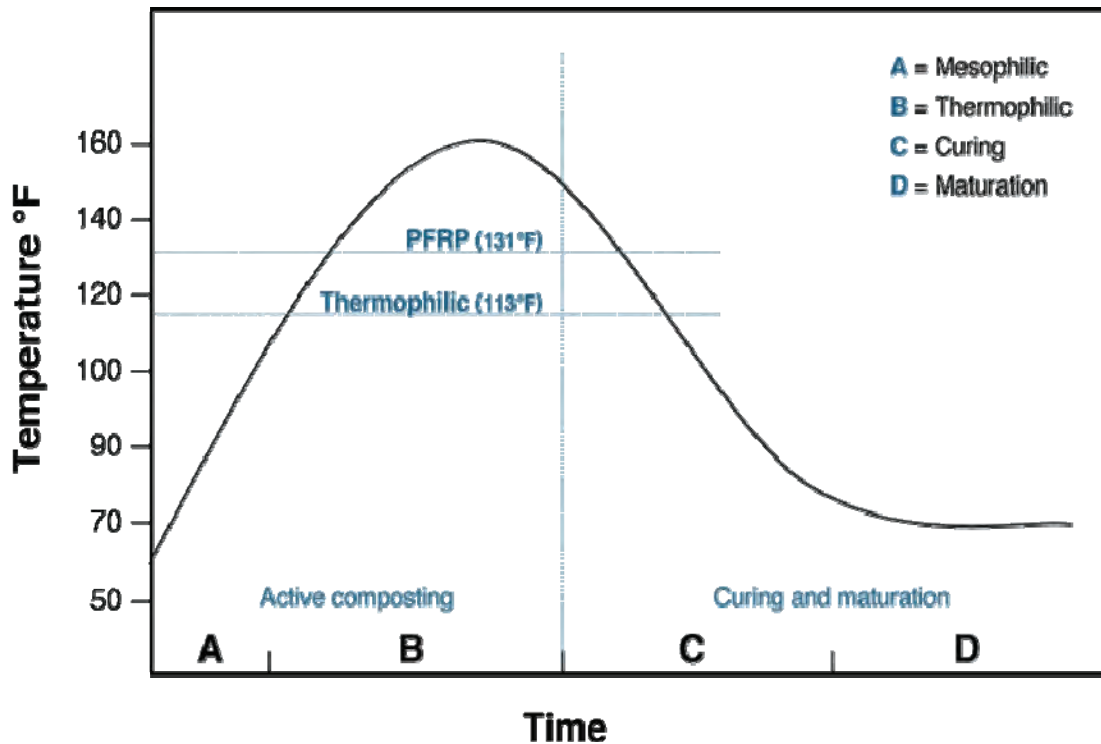
Figure 3.xx "Table of C/N Ratios"

Selected Raw Material	Typical C/N Ratio	Selected Raw Material	Typical C/N Ratio
Apple pomace	48	Broiler litter	12-15
Apple processing sludge	7	Horse manure	20-50 (average 30)
Cocoa shells	22	Laying hen manure	3-10
Coffee grounds	20	Food scraps	14-16
Corn cobs	56-123	Corn silage	38-43
Corn stalks	60-73	Wheat straw	100-150
Cotton seed meal	7	Legume hay	15-19
Cranberry filter cake	31	Corrugated cardboard	563
Fruit wastes	20-49	Bark - Hardwood	116-436
Potatoes - cull	18	Bark - Softwood	131-1285
Potato processing sludge	28	Newsprint	398-852
Soybean meal	4-6	Sawdust	200-750
Vegetable wastes	11-13	Grass clippings	9-25
Blood meal	3	Leaves - Deciduous	40-80
Crab and lobster waste	4-5	Sheep manure	13-20
Fish waste (gurry, racks)	2.6-5	Paunch manure	20-30

Figure 1 Carbon compounds arranged with easily decomposed materials at the top.

Carbon compound	Generally found in:	Specific examples	Comments
Carbohydrates	Sugars and starches	Fruits and vegetables	Easiest to decompose
Hemicellulose	Plant cell walls		
Proteins	Plant and animal; made of amino acids; contain nitrogen and sulfur	Meat; fish; nuts; legumes; dairy products	
Fats/oils	Plants and animals	Beef tallow; soybean oil	
Cellulose;	Wood	Paper	
Chitin	Animal and insect structural components;	Crab shells; insect exoskeleton	
Lignin	Complex compound in wood;	Tree trunks	Hardest to decompose broken down by fungi

Temperature Changes in a Typical Compost Pile



Mesophilic = The middle temperature stage, between 68°F and 113°F, at which certain organisms thrive.

Thermophilic = The highest temperature stage, between 113°F and 150°F, at which certain other organisms thrive. PFRP during at this stage at 131°F.

PFRP = Process to Further Reduce Pathogens

Curing = The cooling stage, not below 104°F, during which compost completes its decomposition process.

Maturation = The final stage, in which the most-resistant plant materials (e.g. wood, lignin) decay.

◆◆◆ OH RATS! ◆◆◆

NOT IN OUR COMPOST BINS!!!

Rodents (rats and mice) prefer to travel and forage for food at night under protective cover. They travel along fence lines, avoid running across open ground, and **prefer nesting areas in close proximity to their food source**. They are able to squeeze through openings only ½ inch in diameter.

- ⇒ Rodents see dry compost materials as an opportunity to move right in! No one likes to sleep in a wet bed, so keep the compost piles wet! Keep your garden and compost areas as tidy as possible. Store wood and plant stakes above ground. Mulch materials should be spread no more than 2” to 3” deep.
- ⇒ Harden area under yard waste and worm bins using bricks or concrete pavers or install on concrete patio or driveway.
- ⇒ Keep an open area around the compost units. (At least 2 feet of open space.) Locate compost units away from fences. Keep the grass and weeds pulled or closely cut in this open area to prevent rodents from moving in undetected. Remove blackberry brambles and ivy if possible, as rodents use this for cover and nesting.
- ⇒ Put all unwanted fruits or vegetables into the Worm Bin or Green Cones.. Don’t leave rotting food on the ground.
- ⇒ Existing compost units can be modified and made rodent resistant by lining them with ¼ inch, 16 to 20 gauge, galvanized wire mesh called hardware cloth. It is available at hardware stores and lumberyards.

ELIMINATE THE FOOD SOURCE!

THE MOST IMPORTANT ASPECT OF RODENT PREVENTION

- ◆ Compost food scraps separately from yard waste
- ◆ Compost correctly
- ◆ Do not leave bowls of pet food outside.
- ◆ Pick up fruit and vegetables up off the ground.
- ◆ Make sure birdseed is placed on raised platforms and keep the premises clean of seed. (Consider installing a large garbage can lid a few inches below the bird feeder to catch falling seed.)
- ◆ Clean up dog droppings. (Rats will eat dog feces as a last resort.)
- ◆ Keep garbage as well as any bulk foods in galvanized metal or high-density plastic containers with lids tightly secured.
- ◆ Secure garbage can lids with bungie cords; replace warped or ill fitting lids.

ELIMINATE HARBORAGE!

- ◆ Clean up debris in the yard, keep things tidy.
- ◆ Woodpiles should be at least one and a half feet off the ground.
- ◆ Junk cars should be towed away.
- ◆ Trim tree branches to keep the climbing rat, or Roof Rat out of the attic. Plug up any holes near eaves or vents. Line inside of vents with hardware cloth.
- ◆ Keep the Norway, or brown rat, out of the basement by blocking openings in the foundation. (Use sheet metal or ¼ inch hardware cloth, cut to size, to cover openings. Steel wool can be used to plug up tiny holes.)

To eliminate existing rodents, old fashioned snap traps work best. There are also effective live capture traps on the market. Whichever you decide to use, be sure to anchor it down so the rodent doesn't drag it off. Bait the traps with raw bacon, peanut butter or cheese, which will command the attention of the rodent's keen sense of smell. Poison is ***not recommended*** as other animals may be poisoned inadvertently. Also, a dying rodent may leave a bad odor when they die in the wall of your house. ***Neither trap nor poisons will work unless food sources and nesting possibilities are first removed.***

Food waste makes up 25% of the total waste stream. Over 20,000 tons per year go to the land fill. (Plus the 43% of households who put food waste down the garbage disposal!) That's a lot of great compost for your garden! Now that you know how to do it right!

HAPPY RODENT-FREE COMPOSTING!!!

~ Notes ~