Denton County Master Gardener Association

The Denton County Master Gardener Association is a volunteer organization under the guidance of Texas A&M AgriLife Extension Service. Our mission is to provide information that encourages safe, effective and sustainable horticultural practices.





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COMPOSITING



How to create black gold

A copy of the presentation is available at: http://dcmga.com/events/handouts/

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Composting

- Composting is the transformation of organic material (plant matter) through decomposition into a biologically humusrich substance suitable for growing plants.
- Invertebrates (insects and earthworms), and microorganisms (bacteria and fungi) help in this transformation.



Photo: Macalester.edu

Why do it?

Environmentally responsible

- Keeps biodegradable waste out of landfills and sewage plants
- Reduces methane emissions from landfills and lowers your carbon footprint
- Alternative to burning
- Gives you a vibrant garden without chemical fertilizers
- Enriches soil, helping retain moisture and suppress plant diseases and pests

Environmental Protection Agency, "Home Composting" http://www2.epa.gov/recycle/composting-home

What's happening?

Many home composting systems are based on providing the optimal conditions for thermophilic (high temperature--decomposition occurs most rapidly between 110° to 160°F.) composting because it promotes rapid decomposition and kills weed seeds and disease-causing organisms. These high temperatures are a by-product of the intense microbial activity.

Thermophilic composting can be divided into three phases: (1) a mesophilic, or moderate-temperature phase, which typically lasts for a couple of days;

(2) a thermophilic, or high temperature phase, which can last from a few days to several months depending on the size of the system and the composition of the ingredients; and(3) a several-month mesophilic curing or maturation phase.

"THESCIENCE OF COMPOSTING" Cornell University



Composting tasks

- Adding ingredients
- Maintain proper temperature
- **T**urn
- Maintain moisture
- Harvest



Steps in composting process

Original ingredients

Early stage decomposition—most ingredients still recognizable

Middle stage decomposition—bacterial microorganisms at work. Ingredients less recognizable

Late stage decomposition—ingredients no longer recognizable, some fungi and actinomycetes begin working

Later stage decomposition—all ingredients transformed, woody substances may still be recognizable

Curing—pile begins cooling, compost becomes ready to use

Choosing a site for the pile

- Place pile on bare ground, not concrete or asphalt.
- Organisms that decompose organic materials need free contact with both soil and atmosphere.
- The pile should not be directly exposed to sun, wind, rain, or standing water (direct sun is hostile to micro-organisms and standing water or too much rain may sour pile).
- Choose a convenient location to allow turning and moving pile.
- Leave space between piles

Information extracted from: http://aggie-horticulture.tamu.edu/earthkind/landscape/dont-bagit/chapter-4-building-and-maintaining-a-compost-pile/

Building your pile

- 1. You will need to collect enough material to create a 1-cubic-yard pile. The mixture should ideally approximate a 30:1 carbon-to-nitrogen ratio.
- 2. Chop, cut, or shred any coarse materials to increase their surface area for microbes to work.
- **3.** Layer materials. Start the foundation of the pile by placing a 6inch layer of bulky materials on the ground. Materials such as brush trimmings or wood chips can be used.
- 4. Next add to the pile a 6-inch layer of high-carbon material (high C:N ratio) such as leaves, straw, hay or a mixture of these.
- 5. Water the pile Conduct a squeeze test to gauge the moisture content of the compost materials. Add water until squeezing a handful will yield one or two drops of water. Adding too much water may leach out nutrients. Conduct this test each time you add composting materials and water.

What materials to compost?

Green / wet materials (nitrogen)

Fruit and veggie scraps Egg shells Tea bags, tea leaves Fresh green grass clippings and plant trimmings (grown without pesticides or weed killers) Garden refuse Green grass clippings

Brown / dry materials (carbon) Chopped dry leaves, dried grass clippings Wood shavings or sawdust Nuts and shells Coffee grounds and filters Pinecones, pine needles—chopped Shredded newspaper and other paper products Twigs Peanut shells Dryer lint

<u>Do NOT</u> put fats, meat, bones, dairy products, pet poop, diseased plants or any materials containing pesticides or herbicides in your compost pile.

Goal Carbon:Nitrogen ratio

- Should be 30 parts carbon to 1 part nitrogen by weight
 - Grass Clippings 19:1
 - Leaves 40:1
- Equal weight of each would give you approximately 30:1 ratio for pile



Care of compost

Passive

- Let sit
- Takes several months
- Active
 - Turn often
 - Keep moist (H₂O 40-60% of weight)
 - Have proper ratio of C:N (30:1)
 - 2-6 weeks (depending on ingredients)

When is the pile done?

Unfinished compost may harm plants if worked into soil, but may be used as mulch. Or, wait until:

- The pile cools off and decreases to about onethird of its original volume (depending on the original ingredients).
- The pile is dark, crumbly, and has an earthy odor.
- The temperature is within 10°F of the air temperature.





Composting bins

- Expensive
- Limited capacity
- Can be challenging to turn
- Good if available space is small





Homemade

- Three bins are best
 - One to fill
 - One that's "cooking"
 - One to draw from







Bin-less pile

- Just a pile with no partitions
- Should be several feet
 deep—Recommended
 dimensions for a heap are 5
 feet wide by 3 feet high
 (University of Illinois
 Extension Service)
- Hard to maintain sufficient depth to achieve high enough temperatures
- Takes several months to achieve useable compost
- Easy and nothing to build
- Moveable





Tumblers

A compost tumbler is a fully sealed container that can be rotated to mix the composting materials. The sealed container helps contain the heat generated by the composting process, thereby speeding the process of converting kitchen and yard waste into compost.

- Expensive
- Limited capacity
- Weight may make it difficult to turn
- Keeps out rodents and other pests



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Sheet Composting

- Spread a thin layer of organic materials over a garden area and till.
 - Leaves, garden debris, weeds, grass clippings, and vegetative food scraps are examples of materials that can be easily tilled into the soil.
 - To aid decomposition, materials should be shredded or chopped prior to layering.
- Benefits: Little effort or cost
- Challenges: The danger of sheet composting is that carbon containing residues will call upon the nitrogen reserves of the soil for their decomposition. On the other hand, high-nitrogen materials may release their nitrogen too quickly in the wrong form. What may take a matter of weeks in a compost pile may take a full season in the soil.

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. Rotate.



Vermicomposting*

What is worm composting?

Worm composting is using worms to recycle food scraps and other organic material into a valuable soil amendment called vermicompost or worm compost.
 Worms eat food scraps, which become compost as they pass through the worm's body. Compost exits the worm through its' tail end. This compost can then be used to grow plants.

Setting up a worm bin

 Setting up a worm bin is easy. All you need is a box, moist newspaper strips, and worms. Worms need moisture, air, food, darkness, and warm (but not hot) temperatures. Bedding, made of newspaper strips or leaves, will hold moisture and contain air spaces essential to worms.

***"Worm Composting Basics**"; Cornell University: (http://compost.css.cornell.edu/worms/basics.html)

More on vermicomposting

- Containers: A good size bin is a 5- to 10- gallon box or approximately 24" X 18" X 8". The box should be shallow rather than deep, as red wigglers are surface-dwellers and prefer to live in the top 6" of the soil. Line the bottom with plastic (e.g. from a plastic bag or old shower curtain). Cover the bin with a loose fitting lid. This lid should allow air into the bin.
- Worms: Choose red worms or red wigglers, which can be ordered from a worm farm. The scientific name for the two commonly used red worms are Eisenia foetida and Lumbricus rubellus.
- **Conditions**: Worms need moisture, air, food, darkness, and warm (but not hot) temperatures. Bedding, made of newspaper strips or leaves, will hold moisture and contain air spaces essential to worms.

Harvesting worm compost

After 3-5 months, when your bin is filled with compost (and very little bedding), it is time to harvest the bin.

- To prepare for harvesting, do not add new food to the bin for two weeks.
- Push all of the worm bin contents to one half of the bin, removing any large pieces of undecomposed food or newspaper.
 Put fresh bedding and food scraps in empty side of bin. Continue burying food scraps only in freshly bedded half.
- Over the next 2-3 weeks, the worms will move over to the new side (where the food is), conveniently leaving their compost behind in one section. When this has happened, remove the compost and replace it with fresh bedding. To facilitate worm migration, cover only the new side of the bin, causing the old side to dry out and encouraging the worms to leave the old side.
 Mixed worm compost with your potting or garden soil to make nutrients available to plants. Or, the compost can be used as a top dressing for your indoor or outdoor plants.

Illustrated worm composting



What method is right for me???

- How much space do I have?
 - Is it indoor or outdoor or both?
- What do I want to compost?
 - How much waste do I have a week?
- How and where do I want to use the compost?
- How much time can I spend on it a week?
- What's my *ewww!* factor?
- How committed am I to composting?



Let's get real

Concerns	Solutions
I don't have room	Use commercial bin
It takes too long	 Maintain proper conditions
	Cut up large pieces
It smells	Not if you maintain C:N ratio
Temps too low to kill diseases, fungi, weed seeds	Use local community composting facility for problem pieces, compost the rest
Attracts animals	Bury food waste in center

Resources

- Denton County Master Gardener Help Desk: 940-349-2892 or email: master.gardener@dentoncounty.com
- "Composting Fundamentals:" https://aggiehorticulture.tamu.edu/earthkind/landscape/dont-bag-it/chapter-2composting-fundamentals/
- "Composting for the Homeowner" : http://web.extension.illinois.edu/homecompost/methods.cfm
- "COMPOSTING AND MULCHING: A Guide to Managing Organic Landscape Refuse": http://www.caes.uga.edu/publications/pubDetail.cfm?pk_id=6406
- "Worm Composting Basics" : http://compost.css.cornell.edu/worms/basics.html
- "Vermicomposting Composting With Worms": http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-1494/