Growing Groceries
A Program of WSU Extension King County Master Gardeners

Soil, Compost, & Gardening Methods

Composting in the PNW — Kirby Cartwright

Why Compost?

- Improves tilth — adds humus
- Releases nutrients (fertilizer) slowly
- Encourages beneficial microbes
- Conserves water
- Lessens garbage stream

Special Problems in the Northwest

- Rainy season: Fall, Winter, and Spring—nine months of drowning

  Compost goes to sleep
- Hot season: Summer—three months of drought

  Composting dries out

This means attention year-round!

What Are We Going to Learn?

- How to make compost
- Methods of composting
- How to use compost
- The science behind composting

How to Make Compost

There are ingredients

There is an environment

There are containers (or not)

Ingredients: Green and Brown. Air and Water. Carbon and Nitrogen and Oxygen.

Green

- Freshly mown grass clippings are your best friend. C:N = 25:1
- Food (kitchen) waste is your second-best friend (include liquids). C:N = 25:1
- Coffee grounds are another really good friend. C:N = 25:1

Brown

- Leaves: Mow leaves if a there is a large amount (Fall). Male a pile of leaves if you can't put them in a bin. They can become slimy and anaerobic over the

Winter. 75:1

- Pine/fir cones and pine/fir needles: They can take several seasons to decompose, which is both a good and a bad thing. Add more fresh green ingredients such as newly mown grass to speed up decomposition. 80:1
- Dried grasses and garden waste: Don't let them compress when added.
- Sticks and Branches: Smaller is better. If the branches are too large just put them in the municipal recycling bin. 500:1 (?)
- Shredded Paper: Output from your paper shredder is just fine for compost! 175:1

Air and Water

- Air holes in the top and sides of bins and containers allow more air to enter.
- Water holes in the bottom and sides of bins and containers allow too much water to exit.
- Ideally compost ingredients should feel like a damp sponge. Too much water leads to slimy compost—anaerobic.
- Carbon—Bacteria use this for food
- Nitrogen fertilizer—Bacteria use this to build protein.
- Oxygen— Good bacteria use this as an "oxident" to burn carbon—decompose it. It's a poison for anaerobic bacteria. More oxygen keeps the "good" bacteria going and prevents the "bad" bacteria from making smells.

Many Different Proportions to Remember

- Carbon to Nitrogen (C:N) ratio of 25:1 to 40:1 is ideal
  The C:N ratio is a measure of how much carbon there is compared to nitrogen. There are online sources for listing different materials' ratios.
- Brown to Green ratio of 2 to 1
  This ratio is the ideal of green organic matter to brown organic matter when added to the compost mix.
- Why are there differences between C:N and Brown:Green?
- Moisture content of 40-65%—Remember it should feel like a damp sponge. This is hard to measure.
- Free air space of 55-65% by volume—Hard to measure. Just fluff it up. Just turn it over.

Many Different Proportions to Remember!?

- Don't worry!
- Mother Nature has got your back. Throw a bunch of stuff in a bin, add water, and it will turn into compost. Proportions are for type A composters.

Environment

Temperature, air, water, ... , not too much.

Discussions of microbes and bacteria and worms and "bugs." Discuss smell.

Proper conditions for composting – Adequate O2

Many Different Numbers

pH: 6.5 to 8.5
Free air space: 55 to 65% (by volume)
Moisture content: 40 to 65%
Particle size: 1/8 to 2 inches
C:N ratio: 25:1 to 40:1
Temperature: 120°F to 140°F

Many Different Numbers to Remember!?

Again, don't worry! Following the numbers is for type A composters. If you do follow them, you'll get great compost faster. If you don't, you'll still get great compost, only more slowly.

Containers: buckets, bins, and piles

Methods of Composting

- **Hot Composting:** This is the type of composting that most sources write about. It requires more time and more physical effort.

  Put ingredients (in the correct proportions) in a bin or pile. Turn it every week or two. Keep it moist. Keep it warm. After six weeks you'll have compost!

  By turning it, you break up the larger pieces, introduce more air, and distribute the moisture. It's aerobic, fast and not stinky. It quickly smells like newly turned soil.

  Remember that during Winter <u>all</u> composting is cold composting.

  When Spring comes, turn the compost, add some green, distribute the moisture, and it will take off again.

- **Cold Composting:** This is the easiest type of composting and the slowest.

  Put ingredients in a bin or pile and come back in two years. After a year you might want to turn it.

  During a portion of the year—Winter—<u>all</u> composting is cold composting. It's anaerobic, slow and it can be dry, slimy, or stinky (at the bottom of the pile or bin).

  After a year or two, you'll have compost.

- **Alternatives—Do (almost) nothing:** If you can't make it, buy it. Cedar Grove, Pacific Topsoil, or Loop Biosolids (GroCo) all sell compost. Or buy it from Issaquah Grange. Even if you're not making your own compost, remember to put your organic waste in municipal recycling.

  However, homemade compost, like homemade bread, is better. It has better structure with larger particles. Purchased compost is sifted and has small particles. With homemade compost you are absolutely sure what its ingredients are. With purchased compost you are only relatively sure that organic materials went into it.

  Special composting: Human waste is composted

  "The King County Biosolids Program partners with a local composter, GroCo Inc., to make the compost product, which is sold under the brand name "GroCo compost." GroCo compost is both a local and recycled product because it is made up of one part Loop and three parts sawdust from area mills.

  Compost made with Loop undergoes a year-long composting and curing process and is clean, consistent, and weed-free! With a full suite of nutrients and loads of organic matter (just like Loop itself) compost made with Loop builds healthy soil, holds water, and grows lush gardens and landscapes."
  https://www.kingcounty.gov/services/environment/wastewater/resource-recovery/loop-biosolids/compost.aspx

  GroCo controls everything about this process. Everything from the pH to the turning to the moisture content. It is vitally important that human waste is composted. Or else, it goes into Puget Sound.

Yearly Cycle of Composting

Summer — Cover with a lid or tarp to keep it moist. It's most active this time of the year — if kept moist. Water daily if possible or weekly if not. It's aerobic.

Fall — The compost is cooler with not much activity. There's lots of brown being added to it. Water should only come from kitchen waste. It's still aerobic.

Winter — Cover it with a lid or tarp to keep it drier. Add kitchen and yard waste—space permitting. Put in municipal composting if there is too much to absorb. Don't water it. It's anaerobic.

Spring — The compost's microbe activity starts back up. It's aerobic again. There's lots of green with lots of water being added to it. Make an effort to add brown to it. Water lightly and infrequently.

Dos and Don'ts of Composting

- Do add soil or compost to introduce microbes
- Do turn it over (if the mood strikes you)

- Don't add purchased cultures to introduce microbes
- Don't let it get wet and slimy
- Don't let dry out
- Don't let it compact and lose air
- Don't add too much to your soil! You can have too much compost or organic matter in your soil. Sources suggest a range of 5% to 20%.

Problems with Composting

It's smelly! Throw some soil on it, or leaves, or brown; turn it over.

It's cold. Put some freshly mown grass or other high nitrogen ingredients in it.

It's too wet (Winter). Put a lid or a tarp on it to keep moisture out.

It's too dry (Summer). Put a lid or a tarp on it to keep moisture in.

There's too much green or too much brown being added to it. Just wait. Later in the cycle, there will be more brown or green. The mix will balance out.

The yard waste is too big. Cut it up, put it in a pile, or deposit it in municipal recycling.

Animals get into it. Cover it with a lid, or a tarp.

How to Use Compost

This is the easiest and most rewarding part. You are now done with 90% of the work:

- Work compost into the top six inches of a freshly dug bed. This increases tilth and adds a slow-release fertilizer.
- Top dress garden beds with compost to avoid disturbing the soil structure. Worms, rain and temperature cycles will work it in.
- Use chunky, not completely decomposed compost as a mulch.

The Science behind Composting

Definition: Compost is the "Resultant material from aerobic breakdown by microorganisms of organic plant and animal materials." To this I would insert "and anaerobic breakdown." But remember, aerobic is fast. Anaerobic is slow. It's all going to get there in the end.

Why is the C:N Ratio Important? This ratio indicates how easily bacteria decompose organic matter. The bacteria in compost use carbon for energy and nitrogen for protein building, just as we use carbohydrates for energy and protein to build our bodies. The best ratio of these two ingredients for aerobic bacteria is 30:1. When bacteria have a steady diet

of organic matter at this ratio they decompose organic material very quickly.

C:N Ratios of Common Organic Materials

Sandy loam (fine) 7:1

Sandy loam (coarse) 25:1

Peat moss 58:1

Coffee Grounds New: 25:1 Aged: 10:1

Fresh Manure 90:1

https://www.uaex.edu/yard-garden/vegetables/compost.aspx — Compost and Composting Resources

http://cru.cahe.wsu.edu/CEPublications/FS207E/FS207E.pdf — Using Coffee Grounds in Gardens and Home Landscapes

http://whatcom.wsu.edu/ag/compost/fundamentals/needs_carbon_nitrogen.htm — Compost Fundamentals

Aeration: The microorganisms responsible for fast decomposition need oxygen. If oxygen is not sufficient, a compost pile will become anaerobic and smelly. Compost also needs to be porous to allow outside air and water into it. There should be enough "bulking agents" (branches, leaves, and grass) to create pores.

As the compost in the decomposes, it settles, compresses, and reduces aeration. If it's too wet, that also reduces aeration. Turning the pile or adding bulking agents restores porosity and allows oxygen to enter.

Citations

- Soil and Compost (KCMGF) http://www.mgfkc.org/resources/growinggroceries/soil
- Backyard Composting Home Garden Series (WSU) http://cru.cahe.wsu.edu/CEPublications/eb1784e/eb1784e.pdf
- Master Composting Program by Sam Agima https://extension.oregonstate.edu/sites/default/files/documents/1/ntosoils-compostingandthectonratio.pdf
- Master Gardener Manual (WSU 2011)
- Cornell Waste Management Institute http://cwmi.css.cornell.edu/smallscale.htm

Resources

- Local compost sources: Cedar Grove, Pacific Topsoils, GoCro Compost
- Research your local government and/or waste disposal and recycling company to find out what you can and cannot recycle. Here is Republic Services' and Bellevue's information: Yard Debris and Food Scraps Recycling

https://utilities.bellevuewa.gov/UserFiles/Servers/Server_4779004/File/pdf/Utilities/Food_Waste_Brochure_2012_INTERIOR.pdf

- Seattle Public Utilities Backyard Composting: https://www.seattle.gov/util/EnvironmentConservation/MyLawnGarden/CompostSoil/Composting/index.htm
- A really good (more scientific) presentation on composting by Sam Angima: Master Composting Program (OSU Extension, Lincoln County, Oregon: https://extension.oregonstate.edu/sites/default/files/documents/1/ntosoils-compostingandthectonratio.pdf

Free Stuff!

Bellevue residents can get started food scrap recycling with a free kitchen food waste container by Republic Services, at 425-452-4762 for a Free Kitchen Compost Bucket

Free Compost for Organizations: Cedar Grove Donations

King Conservation District (GroCo Compost): Free Compost Available to Qualifying King County Community Gardens

McDonald's Coffee Grounds

Five Gallon Buckets: from the trash everywhere!

Master Gardener Education Supported by

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