

Why composting is a sustainable decision:

All organic life contains carbon. When an organism decomposes naturally under aerobic (oxygen rich) conditions Carbon Dioxide (CO₂) will be given off. This process occurs naturally in nature. It can also occur in a well managed compost pile.

However, when compostable material gets thrown into the trash and is sent to the landfill the decomposition process is a little different. The landfill decomposition occurs in anaerobic (oxygen limited) conditions. Under these conditions CO₂ is converted and released as Methane (CH₄) and other organic compounds. In wet and anaerobic conditions Nitrous Oxide (N₂O) may even be produced.

What do CO₂, CH₄, and N₂O have in common? All of these compounds are considered Greenhouse Gases. Each gas compound has the potential to trap heat. These gases are naturally occurring in Earth's atmosphere and are a part of the natural Greenhouse effect. This natural process is good because it keeps our planet at a suitable temperature for life as we know and love it. However, human activities since the Industrial Revolution have been increasing the amount Greenhouse Gases in the atmosphere, thus increasing the amount of heat trapped making life on Earth a little warmer every year.

CO₂, CH₄, and N₂O each have their own Global Warming Potential (GWP) and life-time that they will exist in the atmosphere based on their chemical structures. Both Methane and Nitrous Oxide have a higher warming potential when compared to Carbon Dioxide. It is imperative to keep GHG emissions as low as possible, especially for gases like Methane and Nitrous Oxide that have the capacity to trap more heat (Table 1).

Table 1: Three most common Greenhouse Gases (GHGs) and their Global Warming Potential (GWP) and Atmospheric Lifetime (in years)

Gas	GWP	Atmospheric Lifetime (years)
CO ₂ ,	1	50-200*
CH ₄	25	12
N ₂ O	298	114

*Data provided by United States Composting Council
Data provided by the EPA "Overview of Greenhouse Gases"

What does composting have to do with any of this? A well managed compost pile can reduce and even avoid Methane and Nitrous Oxide emissions. Yes, a compost pile will produce Carbon Dioxide; however, CO₂ emissions from compost piles are considered to be a biogenic (produced by living organisms) process rather than an anthropogenic (produced by human beings) process. For this reason the CO₂ emissions from composting are not used in calculations of anthropogenically caused environmental change/global warming. Compostable material that has been sent to the landfill will produce CH₄ or N₂O and can cause significant climate change because of the compounds' heat trapping capacity.

Why should the Arboretum compost? (2 minutes)

There are many reasons to compost:

- Huge movement forward in sustainability and care for environment
 - Reduces & avoids Greenhouse Gas emissions
- Outdoor education experience available to both university and the public
 - Increases capacity of Arboretum to teach
 - Great publicity
 - Could market or commodify
- Use the compost in the garden
 - Enriches the soil: fertilizer, increased soil moisture capacity, reduces some need for herbicides/pesticides
- Use compost at event
 - Hummingbird Days as interactive children/adult activity
- Cut costs
 - Use compost instead of buying dirt + fertilizer
 - Decrease our green waste pick-ups

Basics of Composting

What to Compost:

<u>Yes</u>	<u>No</u>
Kitchen scraps (fruit, veggies, eggshells) Grass clippings Wood chips Newspaper Shredded paper Dry leaves Animal manure	Meat Dairy products Bones Compostable dishware/silverware Pet waste Solid human waste

Carbon:Nitrogen Ratio:

A good compost pile has a healthy ratio of carbon to nitrogen. A good ratio would be two parts carbon to one part nitrogen or a 1:2 ratio. An easy way to think of this would be one bucket of material high in carbon to one bucket of material high in nitrogen. Think of carbon materials as your “Browns” and nitrogen materials as your “Greens” If you want to learn more about the significance of carbon:nitrogen ratio this is a great source: [Carbon/Nitrogen Ratio](#)

<u>Carbons/Browns</u>	<u>Nitrogens/Greens</u>
Wood chips & twigs Cardboard (shredded) Newspaper (shredded) Sawdust Straw Leaves Nut shells Ashes, wood	Vegetable scraps Fruit scraps Eggshells Weeds (no seeds) Coffee grounds Animal Manure Grass clippings

Types of Compost:

[Cold Compost](#) (takes 3-8 months depending on management)

- Adding to the pile as you collect and dump the material
- Most likely will be adding Greens to the pile frequently, should stockpile Browns in order to keep the Carbon:Nitrogen ratio
- Needs to be turned whenever scraps are added or pile does not look “fluffy”

[Hot Compost](#) (takes 4-8 weeks/ 2 months)

- Need to stockpile both Browns & Greens before-hand
- Create the pile in one shot, keeping in mind Carbon:Nitrogen ratio
- Needs to be turned every few days for the first 2 weeks, then once every week

Turning Compost:

Compost needs aerobic (oxygen rich) conditions to break down properly and reduce Methane and Nitrous Oxide emissions. Turning a compost pile adds oxygen and makes for happy decomposers. There are a few methods to turn compost and some are specific to the type of pile you have.

Cold Compost:

Turn it every time you add to it

Turn it if it looks matted (it should look fluffy)

Hot Compost:

Turn it every few days for the first two weeks

Afterwards, turn it once a week (7-10 days)

Remember: Turning compost = happy decomposers = hot pile = compost turns to soil quicker!

[Video on turning a compost pile](#)

Moisture of Pile

The pile should never be too dry or too wet. Your compost pile may need to be watered. Use a hose to spray the pile. If your pile is too moist, add dry material like hay and dead leaves. Add anything that is rich in Carbon instead of Nitrogen. Use this link to help you troubleshoot your compost pile as needed: [Compost Troubleshooting](#)

Links

[Deep Green Permaculture](#): Step by step instructions for hot composting. Methods can also be applied to cold composting.

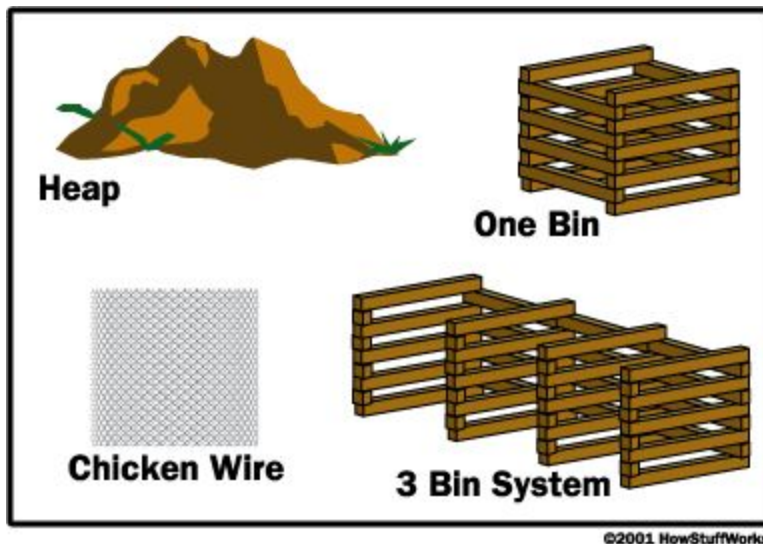
[Home Composting Made Easy](#): Easy to follow instructions on composting setup and troubleshooting. Information about C:N ratio, hot vs. cold, turning, stages of compost, and more. Ultimate quick resource.

What it requires (15 minutes)

Decide if the compost will simply be a pile or if will be located within a structure. Either design works well.

How you build it: (10 minutes)

Options



[Cornell Designs for Composting Systems](#) (resource includes all systems mentioned and more)

[3 Bin Instructions by Instructables](#) / [3 Bin Instructions by University of Wisconsin](#)

[1 Bin Instructions](#)

[Wire Bin](#) / [Wire Bin Video](#)

[Purchase composting bins](#)

Who builds it

Interns/Students

Curators

Volunteers (office & regular volunteers)

Community workday

How do you get these people?

Interns → experience and education opportunity

Students → “composting workshop”

Volunteers → hours, experience

Where to build it

Inside the gates:

Concrete barriers and or beyond concrete barriers

Outside the gates:

By green waste piles

*If it's going to be outside the gates we should be prepared to build a structure in order to keep out animals

Supplies to build a structure for it

Space ✓

Interested people (Interns/ volunteers/ workers ✓)

Tarp (optional) [\\$7 - \\$30](#)

Wood Bins:

Nails/Screws ✓

Hammer/Drill ✓

Circular Saw ✓

Gloves ✓

Tape measure ✓

Wood:

3 Bin [~ \\$120](#)

1 Bin [~ \\$ 50](#)

Wire Bin:

Wire Mesh [\\$7 - \\$72](#)

Wire Cutters [\\$10 - \\$13](#)

Gloves ✓

Tape measure ✓

Supplies to build the pile

Collecting garden waste (or Browns) ✓

Shovels ✓

Pitchfork ✓

Wheel barrels (for the Browns) ✓

Interns/ volunteers/ workers ✓

Garden Hose/ access to water ✓

Buckets for collecting food/kitchen scraps from Office and Hort II [\\$16-\\$36](#)
Compost thermometer (optional but recommended) [\\$19.95](#)

What you need to take care of it (2 minutes)

- Knowledge
- People

How you take care of compost

- Slightly different depending on cold or hot compost
- Manage C:N
- Turn pile
- Check temperature
- Troubleshoot (too dry or too wet)
- Cover it during rain (optional/ recommended on who you talk to)

Who does the dirty work

This depends on who will be in charge/ wants to be involved

→ Ideas:

- Interns
- Volunteers
- Curators
- Office Staff
- Community Composting Day(s)

Common Concerns (15 minutes)

- **Rodents/smell:** Solution putting it away from building and a well managed compost pile never really smells
- **Cost:** Solutions include reusing materials and or grants
- **Time:** Myth it takes a lot of effort to manage a compost pile
Debunked it actually only takes 1-2 hours weekly plus 2-4 hours to build both structure and pile together
- **What do we do with the end product:** Solution it's safe for our gardens and it will be beneficial for the soil. We can also give it to PICA gardens (they are interested in finished compost)
- **Saving food scraps:** Solution lids should prevent smell and rodents.
Empty the buckets as needed (assigned to student/intern)

The floor is open to comments, concerns, and further questions to consider before instituting a medium-scale composting system:

Notes from Green Team: Considerations & Comments

- scale?
- wood too big (chipper) hire or buy (dangerous & too costly)
- turning it can take a lot of labor/ time and therefore money and resources
- what is the value?
 - could be educational: "kids kan kompost too!"
- curators who will be interested = tom & helen
- PSI for next year: Can work 250/ can have interns work under them
- what we do have is space for the pile; the further the better
- who do we get on board? Martin
- diseases/SOD/weed seeds = keep out
- nursery/ helen's greenhouse clippings = good edition!

Notes from meeting with Martin: Considerations & Comments

-location: ast concrete bin area

Need:

- weed concrete area
- acquire used pallets
- purchase chicken wire

Material:

- Signs for what to compost (3 copies)
- Buckets
- 4 Pallets (Helen has connections for used pallets: BayTree Bookstore!)
- Chicken wire
- tom for help building

Green Team email:

- approved!
- Theresa can you purchase wire for us? Smallest amount
- Tom can you help us build a one bin pallet structure / link a picture to the structure/ or instructions

Build Date: Thursday, June 2, 2016