



Composting & Soil Amendments

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Today's topic

- 01 **What? Why?** — Define compost and its importance
- 02 **How?** — Basics of composting and maintenance
- 03 **Other Options?** — Alternative amendments and considerations
- 04 **Apply!** — Using amendments and application methods





What is composting?

controlled aerobic, biological decomposition of organic materials into nutrient-rich humus.

- Thermodynamic is HOT Composting
- Mouldering is COLD Composting

Mouldering: To decay or crumble away from neglect


119 billion lbs food wasted

Factors of Composting

- C:N**
Carbon to Nitrogen Ratio
- H₂O**
Moisture Content
- O₂**
Aeration with Oxygen
- Particle Size**
- Temperature**
- Bin or Pile Size**

Factors of Composting: Carbon to Nitrogen Ratio

Ideal **C:N** ratio for mature compost is **30:1**

By volume, this is approximately **3 parts Brown to 1 part Green.**

C:N
Carbon to Nitrogen Ratio

Factors of Composting: Carbon

Provides both an **energy source** and the **basic cell building materials** for the decomposing microbes to reproduce

Think Brown.

C:N
Carbon to Nitrogen Ratio

Materials high in Carbon

- Autumn Leaves
- Straw
- Wood Chips
- Sawdust
- Bark
- Napkins
- Paper Towels
- Mixed Paper
- Newspaper
- Corrugated Cardboard
- Dried Pine Needles

C:N
Carbon to Nitrogen Ratio

Carbon Source	C:N	High Carbon Sources	C:N
Fruit Waste	35:1	Dry Pine Needles	80:1
Peanut Shells	35:1	Newspaper	175:1
Dry Leaves	60:1	Sawdust	325:1
Corn Stalks	75:1	Cardboard	350:1
Straw	75:1	Wood Chips	400:1

Factors of Composting: Nitrogen

Crucial component of **amino acids and enzymes** necessary for **cell growth and function**



Think green.



C:N
Carbon to Nitrogen Ratio

Materials high in Nitrogen

- Vegetable Scraps
- Coffee Grounds
- Grass Clippings
- Plant Debris
- Alfalfa Pellets
- Animal Manures

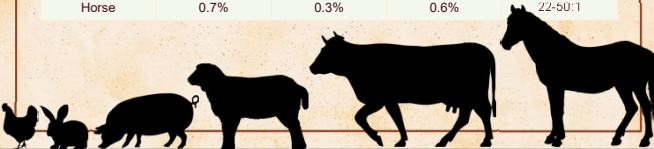



C:N
Carbon to Nitrogen Ratio

Nitrogen Source	C:N
Alfalfa	12:1
Grass Clippings	20:1
Clover	23:1
Hay	25:1
Veggie Scraps	25:1
Garden Waste	30:1
Weeds	30:1

Manures have low C:N and considered "green"

Manure Source	%N	%P	% K	C:N
Chicken	1.1 %	0.8%	0.5%	5-15:1
Rabbit	2.4%	1.4%	0.6%	12:1
Pig	0.5%	0.3%	0.6%	10-20:1
Cattle	0.6%	0.2%	0.5%	10-30:1
Sheep	0.7%	0.3%	0.9%	13-20:1
Horse	0.7%	0.3%	0.6%	22-50:1



What NOT to compost!

Never add:

- Meat
- Fish
- Dairy
- Bones
- Pet Food
- Pet Waste



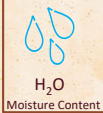
These materials will draw flies, wildlife, and have the potential to introduce Salmonella enterobacteria and other human pathogens. Cat feces can transmit toxoplasmosis, which is especially dangerous for pregnant women.

If you want to learn more about composting animal products, check out the research on Black Soldier Fly Composting on the Purdue Extension – Entomology website: <https://extension.entm.purdue.edu/publications/E-276/E-276.html>

Factors of Composting: Water

Provides habitat for microbial community.

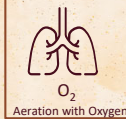
Ideal Moisture Content is **40-60%**.



Factors of Composting: Oxygen

Most of the life in compost is **AEROBIC**

Requiring **Oxygen** to Survive,
Thrive, and Multiply.



Factors of Composting: Particle Size

Smaller Particles =
Increase Surface Area =
Increase Microbial Activity =

Faster Compost!



Factors of Composting: Temperature

In optimum conditions, oxidation generates heat.

Bacteria and **Fungi** thrive, radiating more heat
and the compost becomes **Thermodynamic**.



Neglected piles may **Moulder**,
slowing decomposition.

How HOT?

To kill MOST weed seeds and pathogens a compost pile must:

- Be kept at a minimum of **104 degrees F** for at least **five days**.
- Meet or exceed **131 degrees F** for at least **4 hours** during this period.

Bonus if kept under 140 degrees F
as much as possible since the
beneficial bacteria begin to perish



Factors of Composting: Bin or Pile Size

Minimum 3' x 3' x 3'

Maximum 5' x 5' x 5'



Types of Bins: Tumbler

- Well contained
- Rodent resistant
- May be expensive
- Needs troubleshooting



Types of Bins: Slat Style

- Excessive moisture loss
- NOT Rodent-proof
- Plastic slat style is expensive
- Large & easy to use/expand



Types of Bins: Commercial / Eco-composter

- Large capacity
- Locking lid
- May* need more ventilation
- Relatively easy to use



Types of Bins: Electric

- Easy, indoor bin
- Few pest problems
- Expensive
- Small capacity



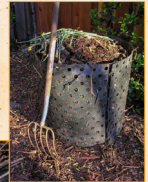
Types of Bins: Vermicompost

- Can be indoor & year-round
- Faster than traditional
- Pest potential
- Provides worm castings



Best Management Practices:

- Turn pile often
- Monitor moisture
- Add materials as needed
- Maintain ideal temperature



Other Options?

- Biochar
- Worm Castings
- Cover Crops
- Biosolids
- Wood ash
- Peat moss
- Beneficial microbes
- Green sand



What is a Soil Amendment?

Any material added to the soil to improve its physical properties.



Don't Guess, Soil Test!




Contact your
Purdue Extension –
County Educator for
more information on
soil testing.

What are they good for?

- NPK guaranteed analysis
- Shelf life (pack or expiry date)
- Price point per application



Biochar




Blacklite Pure
Pricing listed as FOB Oriand, 95963

Loose: \$60 per cubic yard, \$305 per ton.
(80 cubic yards per truck average)
Bulk Tote Bags: (1.5 Cy) \$135 per tote.
(48 totes per truck)

Description
A biochar produced in Northern California purely from subwood forestry residues. It is highly porous, adsorptive, and has great water holding capacity. This is a carbon-negative product certified by CarbonCure. Registered as an organic input material with CDFA. Ingredients: Wood Biochar

Particle Size: 1/16" minus
Bulk Density (bone dry): 215 lbs per cubic yard
Moisture Content: 10%
Bulk Density (as delivered): 390 lbs per cubic yard
Carbon Content: 85% +
Ash: < 5%
pH: 8.13
Liming Potential as CaCO3 equivalent: 5.7%
ECe millimhos/cm: 0.22
N-Corg: 0.20 (carbon is at least 70% stable beyond 100 years)

Disclaimer: specifications listed above are averages, not guaranteed analysis



PACIFIC BIOCHAR

DESCRIPTION
A biochar produced in Northern California purely from subwood forestry residues. It is highly porous, adsorptive, and has great water holding capacity. This is a carbon-negative product certified by CarbonCure. Registered as an organic input material with CDFA. Ingredients: Wood Biochar

Directions for Application
Field Application: Apply at rate to achieve 0.25% to 1% soil OM increase in initial application. i.e. 10 tons (dry basis) per acre cultivated to 6" depth results in 1% OM increase in area cultivated.

Potting Media: Blending to achieve 5% to 10% by volume is common to amend potting media. Product can be used as the primary ingredient in potting media, >50%, if sufficient nutrients are provided.

With Compost: Blend with compost at a rate of 10% - 20% by weight for annual maintenance type applications. Blend with compost at a rate of 20% - 50% by weight for rare events such as deep tillage and permanent crop field prep.

RANGE OF ANALYSIS BY PRODUCT					
Moisture	Feedback Ash	Feedback N	Feedback P	Feedback K	Feedback Ca
0.10	0.08	0.18	0.390	0.475	0.030
0.100	0.100	0.100	0.100	0.600	0.040

Worm Castings

NCD&CS Diagnostic Analysis (June 2021)

pH..... 5.94
C:N..... 12.1:1
Total Nitrogen..... 1.32%
Soluble Nitrogen (NH₄ + NO₃)..... <0.59%
Available Phosphite (P₂O₅)..... 0.52%
Soluble Potash (K₂O)..... 0.25%
Calcium (Ca)..... 0.73%
Iron (Fe)..... 0.61%
Magnesium (Mg)..... 0.25%
Sulfur (S)..... 0.09%
Manganese (Mn)..... 0.03%
Zinc (Zn)..... 0.01%
Aluminum (Al)..... 0.59%
Sodium (Na)..... 0.03%

Conditions of Sale

Seller warrants that the product consists of the ingredients specified and is reasonably fit for the purpose stated on the label when used in accordance with the directions under normal conditions and use. The seller's liability from handling, storage, and use of this product is limited to replacement of the product or a refund of the purchase price.

This package contains Grade A worm castings which:

- Significantly increase root and foliage growth
- Contain an abundance of nutrients and beneficial soil microorganisms
- Improve soil porosity & water retention
- Have no chemicals or additives
- Work great both indoors & outdoors
- Comply with all EPA and NCD&CS regulations

Cover Crops

 **PURDUE UNIVERSITY** Extension Department of Horticulture & Landscape Architecture <https://ag.purdue.edu/ifa>



Buckwheat in bloom.

Cover Crops in the Home Garden

Apply!


Read the Label



FIRST

Apply Compost!

- Establish a New Lawn
 - Add **4-6"** tilled to 5-8" depth
- Existing Lawn
 - Add **1/8-1/4"** to lawn
 - Water in well



Finely Sifted Compost

Apply Compost!

Potting Soil Recipe

- 1 part Compost
- 2-3 parts Sterile Soil



Apply Compost!



Plant Starter Mix Recipe

- 1 part mature sifted compost
- 2 parts soil
- 1 part sand, perlite, or vermiculite
- Mix well



Apply Compost!



Planting Trees and Shrubs

- Mix compost with soil from planting hole
- 1/3 compost and 2/3 soil

Use as mulch

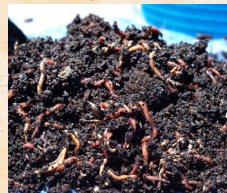
- 2-6" layer



Apply Compost!

Worm Castings/ Vermicompost


- Good moisture-holding capacity
- Microbially active
- Use the same as compost!
 - Keep your worms in your bin



Key Points of Composting

The infographic is divided into two rows. The top row features three icons: a pie chart for C:N, water droplets for H₂O, and a lung for O₂. The bottom row features three images: a pile of small particles, a thermometer, and a compost bin. Arrows at the bottom point to the left and right.

<p>C:N Ideal 30:1</p>	<p>H₂O 40-60%</p>	<p>O₂ Turn every 3-7 days</p>
<p>Smaller Particles = Faster</p>	<p>Temperature Avg. 104°F for 5 days</p>	<p>Bin or Pile Size 3'x3'x3' min/ 5'x5'x5' max</p>



Thank you!

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Resources

- <https://www.uvm.edu/extension/mastergardener/master-composter-program>
- <https://www.extension.purdue.edu/extmedia/ID/ID-182.pdf>
- <https://extension.entm.purdue.edu/publications/E-276/E-276.pdf>
- <https://content.ces.ncsu.edu/worms-can-recycle-your-garbage>

