Composting and Soil Health

NM STATE
BE BOLD. Shape the Future.
College of Agricultural, Consumer and Environmental Sciences

Charlene Carr, Southern Pueblo Extension

Pueblo Extension

Decomposition

The transformation of organic material by bacteria, fungi and molds which occurs in the presence of air and water.

HUMUS **> >**

The end result is compost which is composed of humus, organic matter, soluble nutrients and microbes.

Pueblo Extension

Why would we want to compost?

- To make garden plants healthier
- To make good growing medium to start plants
- To make good soil for transplanting trees
- To handle excess organic waste

Pueblo Extension

How does compost do these good things?

- Compost contains nutrients plants need
- It can loosen clay soil so air can get in
- It can help soil hold more water (especially sandy soils)
- Compost acts as soil “glue” holding soil particles together.

Pueblo Extension

Making Compost is Like Cooking

You need the proper mix of ingredients, a place to put them, and some time.

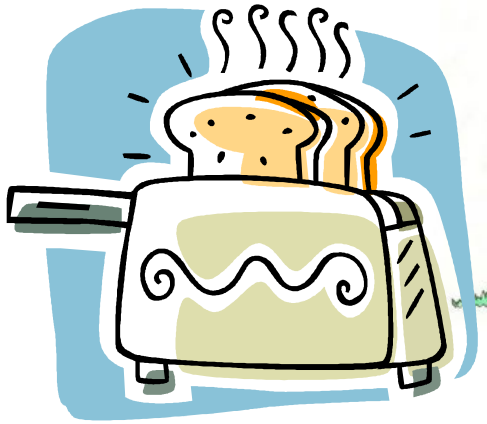
The compost ingredients are:

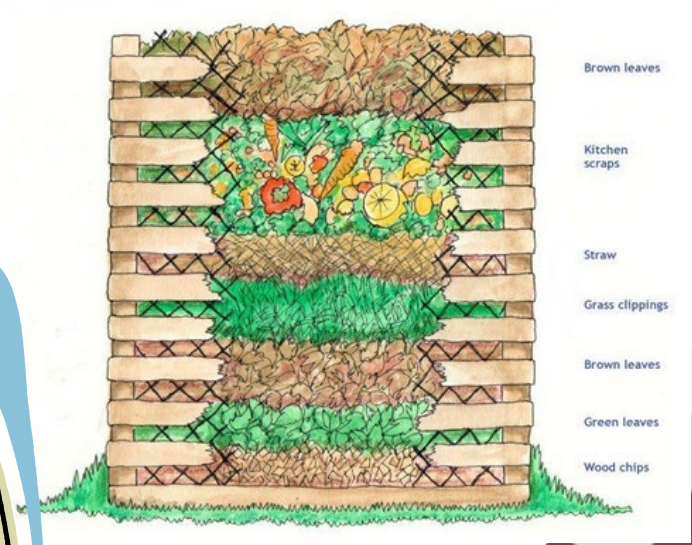
I. Brown Organic Material

II. Green Organic Material

III. Water

IV. Good Microbes

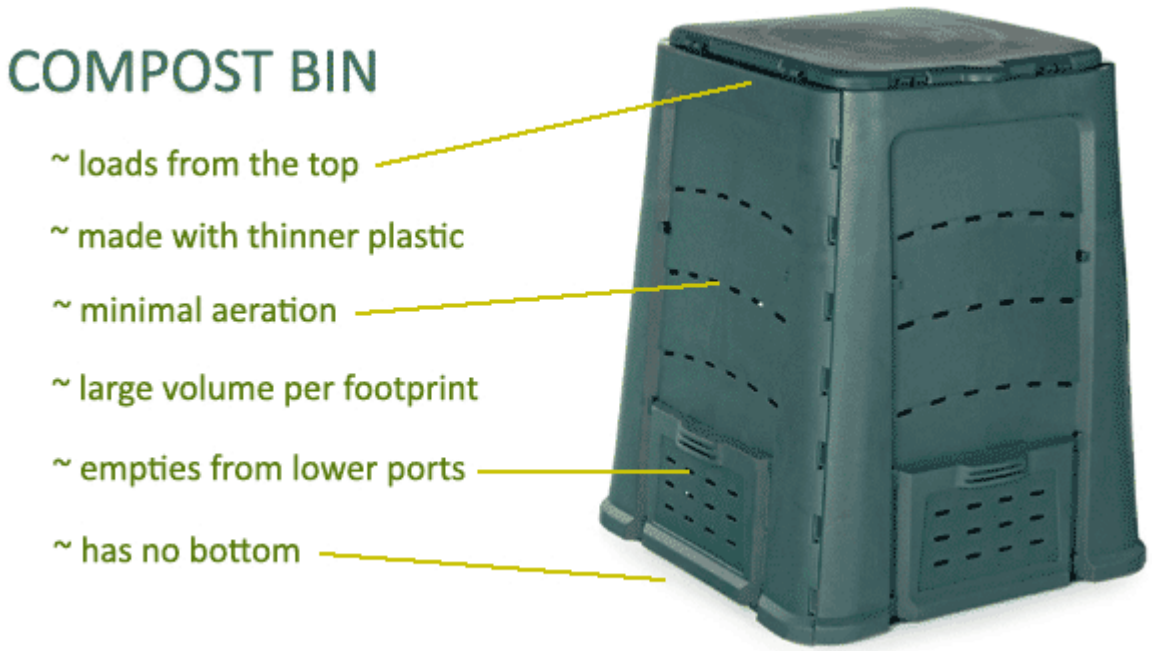




- *The brown material provides the carbon*
- *The green material provides the nitrogen*
- *The ratio of Carbon to Nitrogen should be 30:1 to 50:1*

Pueblo Extension

Compost Cooking: Containers



A container will cook the compost quicker than a pile and will work better in the winter

Pueblo Extension

Bins for Desert Composting:

Porous, place tape over holes

Too Porous for Desert

Bale bins, but top is exposed

Add Tarp

Pueblo Extension

Composting

- The *organization* of organic material so as to support its decomposition.

- Effective Composting Formula:
  - Organics (greens & browns) + air + water = Compost

Organic Material Produces Nutrition

- Anything that was once alive – plant and animal will decompose.
  - Dead organic matter usually ends up on the soil where it eventually decomposes.
  - OM does not decompose so easily in the desert

- Carbon: usually brown in color provides microbial nutrition. Alone, it decomposes slowly.

- Nitrogen: often green in color provides microbial nutrition and protein for cell wall formation – microbial reproduction!
  - Added to carbon it improves the decomposition process.

Browns

High carbon materials such as

- Leaves (30-80:1)
- Straw (40-100:1)
- Paper (150-200:1)
- Sawdust (100-500:1)
- Animal bedding mixed with manure (30-80:1)

Pueblo Extension

Greens

High nitrogen materials such as

- Vegetable/food scraps (12-20:1)
- Tea/Coffee grounds (20:1)
- Grass clippings (12-25:1)
- Manure
  - Cow (20:1)
  - Horse (25:1)
  - Poultry (10:1), with litter (13-18:1)
  - Hog (5-7:1)

Browns

- Decay very slowly
- Coarse browns can keep pile aerated
- Tend to accumulate in the fall
- May need to stockpile until can mix with greens
- Tie up nitrogen in soil if not fully composted

Greens

- Decay rapidly
- Poor aeration – may have foul odors if composted alone
- Tend to accumulate in spring and summer
- Supply nitrogen for composting
- Best composting if mixed with browns

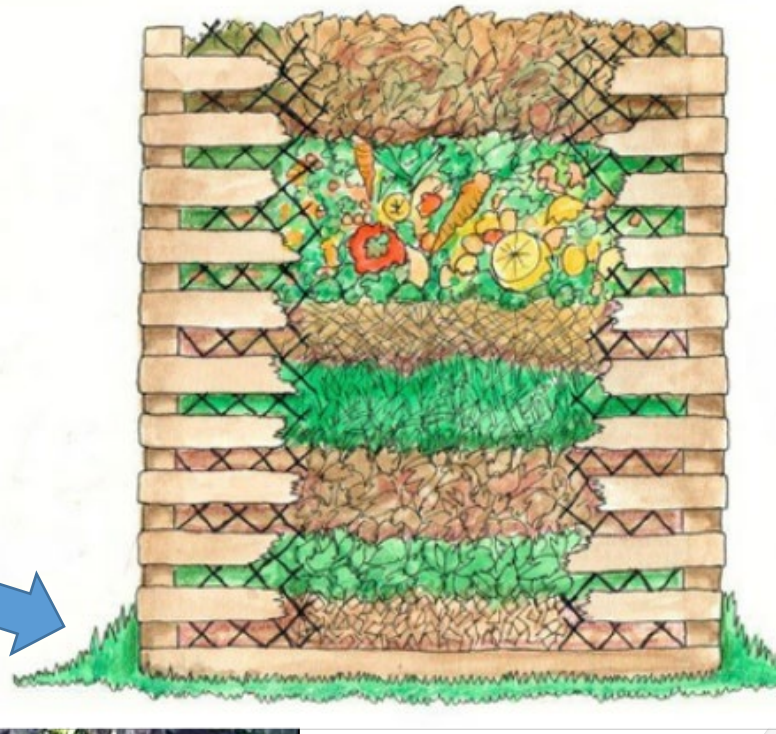
Pueblo Extension

Starting Your Bin

1. Start with a 6” -12” layer of:

- dry leaves
- pine needles and/or
- small sticks

(BROWNS)



This will help the air to circulate up and through the pile.

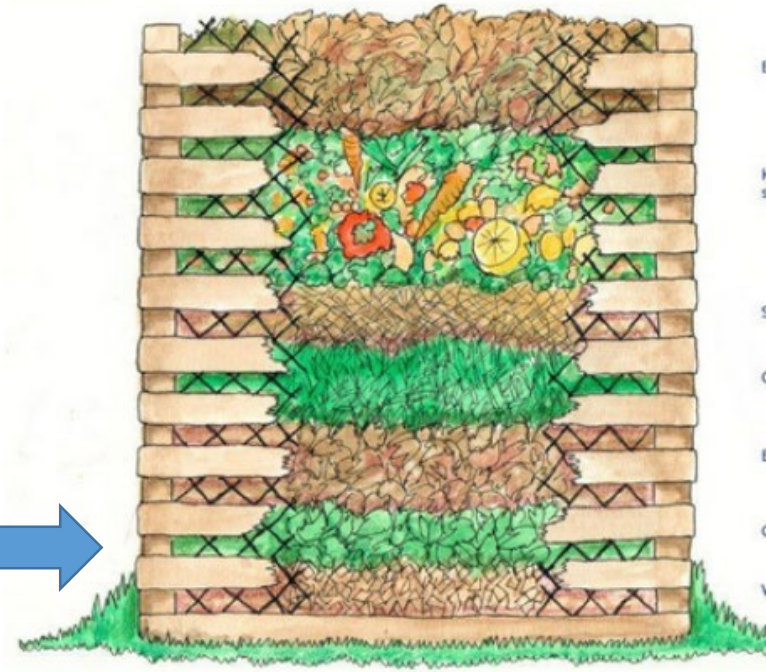
Pueblo Extension

Bulking Materials

Pueblo Extension

Layering

- **2.** Now add about 3” of Grass Clippings- **GREENS**
  - It helps to mix up the layers a little as you go.



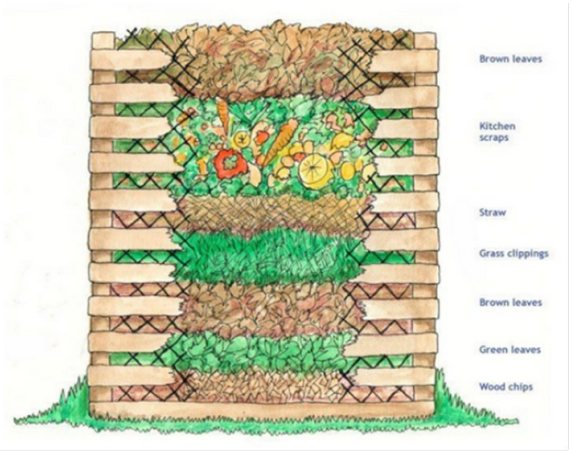
- **3. Optional:** Next, add a shovel of soil or compost to the bin.
  - This introduces micro-organisms into the bin.

Pueblo Extension

Layering

4. Keep adding the green and brown ingredients in layers until you fill the container or run out of material.

- NOTE: Add some water at each layer.



- Should be damp enough so handful feels a little moist.
- Should be dry enough if squeezed only a drop or two of water comes out.

When is decomposition complete?

- Appearance - dark brown particles
- No heat generation (hot method)
- Fragrance – “earthy”
- Bag test – not pungent
- Seed sprout test
- Mature compost generally has a pH between 6 and 8

Pueblo Extension

Simple Tests for Finished Compost

Bag test: sealing compost in a plastic bag for several days should produce no foul odor

Germination test: will seeds germinate in the compost? (good test to use if compost will be part of a potting mix)

Pueblo Extension

Benefits of compost
Promotes soil health

- Supplies organic matter to soil
- Attracts earthworms
- Stimulates beneficial soil microorganisms
- Increases soil water holding capacity
- Increases soil nutrient retention
- Improves soil tilth and friability
- Improves soil drainage
- Loosens heavy clay soils
- Suppresses soil-borne plant pathogens (diseases)

Pueblo Extension

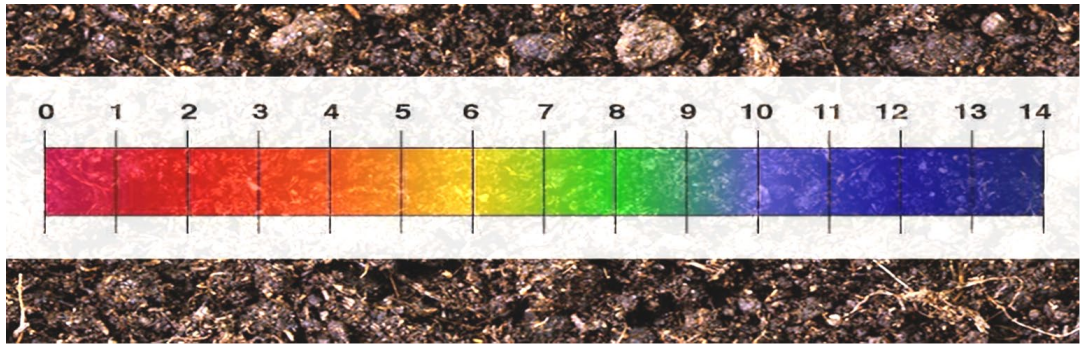
Benefits of compost

Plant nutrients

- Compost is not a fertilizer, but does contain plant nutrients
  - N-P-K: 1-1-1 ratio
  - Nitrogen and phosphorus are mostly in organic forms
  - Released slowly to plants
  - Not readily leached from the topsoil
- Compost contains many trace nutrients that are essential for plant growth

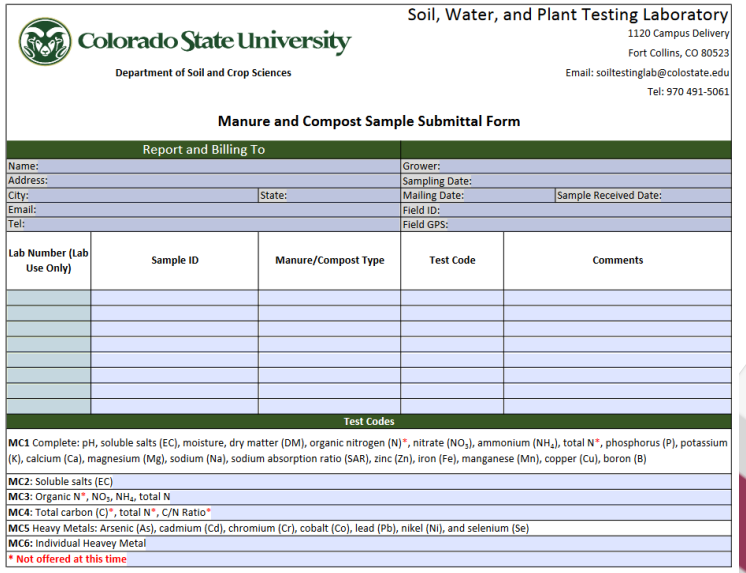
Pueblo Extension

Compost pH



- Mature compost generally has a pH between 6 and 8

- Unfinished compost will have a pH as low as 5.5
  - If anaerobic conditions develop, organic acids may accumulate rather than break down.
  - There is too much green/nitrogen materials
  - A very acidic compost can burn and kills plants
  - You can also submit to a soils and water lab i.e. CSU
  - https://agsci.colostate.edu/soiltestinglab/wp-content/uploads/sites/98/2022/01/Soil-Submittal-Form-for-Manure-and-Compost-Fillable.pdf



Colorado State University
Department of Soil and Crop Sciences

Soil, Water, and Plant Testing Laboratory
1120 Campus Delivery
Fort Collins, CO 80523
Email: soiltestinglab@colostate.edu
Tel: 970 491-5061

Manure and Compost Sample Submittal Form

Report and Billing To			
Name:		Grower:	
Address:		Sampling Date:	
City:	State:	Mailing Date:	Sample Received Date:
Email:		Field ID:	
Tel:		Field GPS:	

Lab Number (Lab Use Only)	Sample ID	Manure/Compost Type	Test Code	Comments

Test Codes

MC1 Complete: pH, soluble salts (EC), moisture, dry matter (DM), organic nitrogen (N)*, nitrate (NO_3), ammonium (NH_4), total N*, phosphorus (P), potassium (K), calcium (Ca), magnesium (Mg), sodium (Na), sodium absorption ratio (SAR), zinc (Zn), iron (Fe), manganese (Mn), copper (Cu), boron (B)

MC2: Soluble salts (EC)

MC3: Organic N*, NO_3, NH_4, total N

MC4: Total carbon (C)*, total N*, C/N Ratio*

MC5 Heavy Metals: Arsenic (As), cadmium (Cd), chromium (Cr), cobalt (Co), lead (Pb), nikel (Ni), and selenium (Se)

MC6: Individual Heavey Metal

* Not offered at this time

Pueblo Extension

How do I check the pH of my compost?

- If your compost is moist but not muddy, you can insert a pH indicator strip into the compost,
  - let it sit for a few minutes to soak up water
  - then read the pH using color comparison

- Measure pH in a compost extract made by mixing compost with distilled water.
  - Using a calibrated meter or pH paper, you can

- How do you balance pH in compost?
  - Turning or aerating your compost to improve air circulation and foster aerobic bacteria is the best way to reduce acidity.
  - Be sure that there is plenty of “brown” material in the compost.

Pueblo Extension

Using Finished Compost for Soil Health

Soil amendment

- Be sure that compost is mature, has an earthy smell (no ammonia or rotten smell), looks dark and crumbly with no recognizable pieces
- Compost improves soil health when
  - Mixed in the top 4 to 6 inches of a 12 inches of top soils
  - Placed near the root zone (work in no more than a 2” layer of compost)
  - If limited supply, you can add directly to the planting hole before placing plants
  - For existing plants apply 0.5 to 1 inch of top dressing (soil surface addition) near the base of the plant
- How often should you amend:
  - 1-2 times a year between growing seasons (warm / cool season)
- How often to you amend or top dress your soil?
  - 1-2 times a year when the beds or planting site are clear
  - Use natural mulch to protect the compost and soil surface
- Compost improves water and nutrient retention of sandy soils
- Compost loosen compacted clay soils and make them more friable

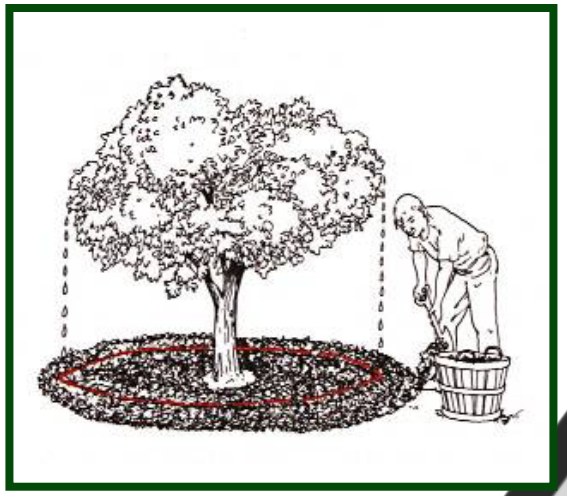
Pueblo Extension

Using unfinished compost

Unfinished compost will have a pH as low as 5.5

Surface mulch in the garden/landscape

- Maximum 3” depth
- Start 3-4” from trunk
- Extend out to dripline



Mulch provides

- Protection from temp extremes
- Slows moisture loss from soil
- Provides some slow release nutrients

Pueblo Extension

QUESTIONS?

BE BOLD. Shape the Future.
College of Agricultural, Consumer and Environmental Sciences

Charlene Carr,
NMSU Southern Pueblo Extension Agent

Email: ccarr@nmsu.edu

Pueblo Extension