Soils and Composting

David Rice

Conservation Programs

Weber Basin Water Conservancy District

The Importance of Soils

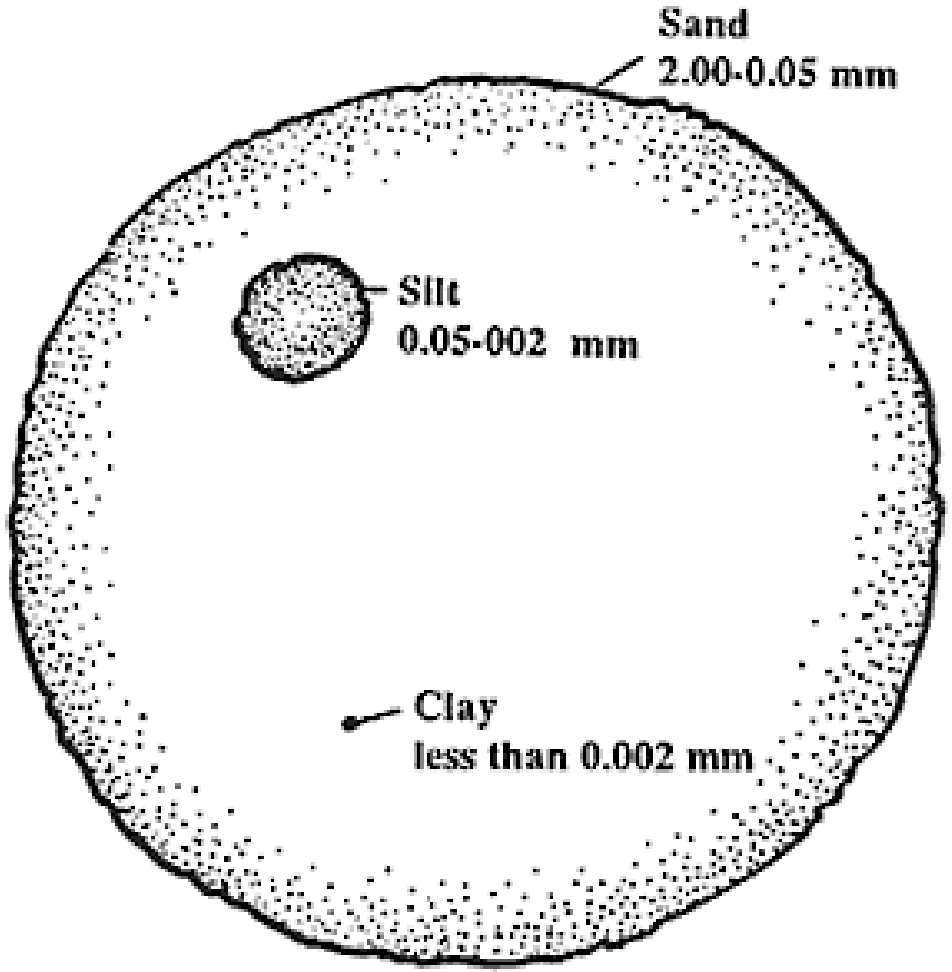
Your soil is the most important part of your landscape and garden.

Most soils in Utah are relatively low in organic matter.

The pH of Utah soils averages 8.0 which is ten times more alkaline than the neutral pH of 7.

Many Utah soils have poor structure due to lack of organic matter and heavy clay and subsoil particles.

Soil Texture vs. Soil Structure



Texture

- Texture refers to the proportion (%) of sand-, silt-, and clay-sized particles in soil. The percentages by weight of sand, silt and clay are used to assign soil to a specific texture class (e.g., silt loam).
- influences the water-holding capacity, aeration (gas exchange), drainage, tilth, and compaction and nutrient retention properties of soil.
- Large amounts of organic matter will improve the physical characteristics of soil composed of too much sand, silt or clay.

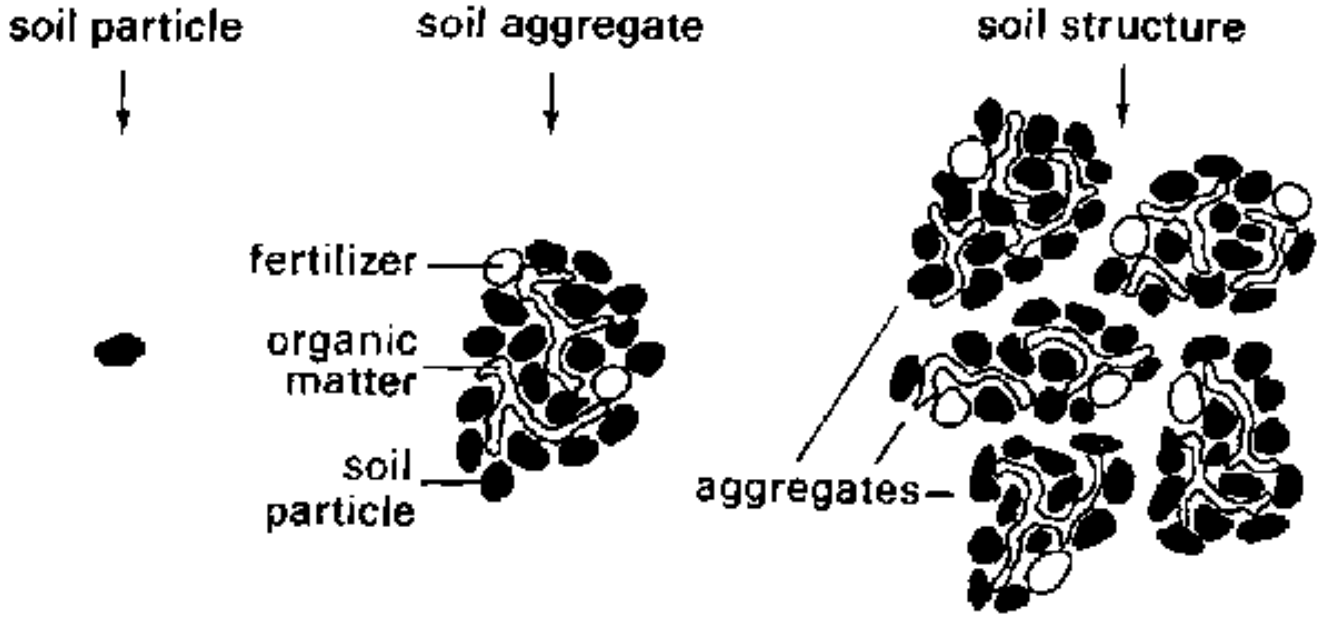
pH

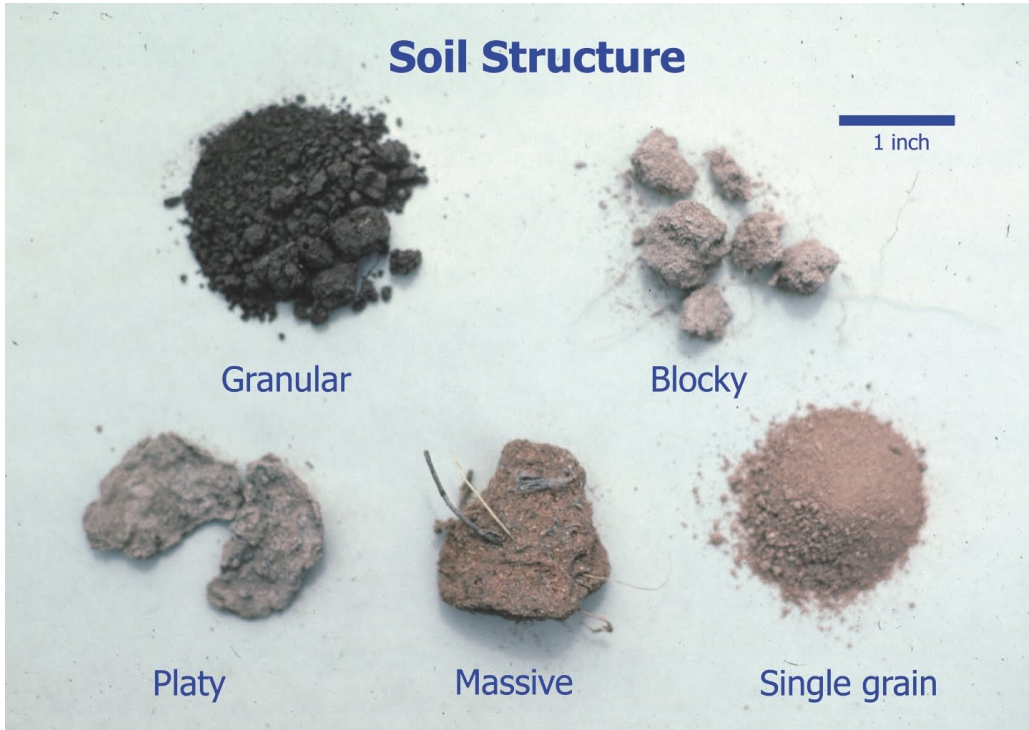
- PH is an indication of the acidity or alkalinity (basic nature) of soil. A pH of 7.0 is neutral, while values below 7.0 are acidic and values above 7.0 are alkaline or basic.
- Most Utah soils have pH values in the mid-7.0 to low 8.0 range. Many plants grow well over a broad range of soil pH; however, some acid-loving plants such as blueberry, rhododendron and azalea will not grow well above pH 7.
- Other sensitive plants are susceptible to iron deficiency (iron chlorosis) above pH 7.5.

Organic Matter

- Organic matter is essential in the formation of soil structure, reducing soil compaction and retaining essential plant nutrients. Generally, the higher the level of organic matter, the better the soil quality.
- In Utah, native soil organic matter levels are low, often less than 1 percent by weight. Soil organic matter content can be increased by adding compost, peat moss or other organic amendments.

Soil Texture vs. Soil Structure





Soil Test

- www.usual.usu.edu

or google "Soil Test USU"

Soil Test Report
and
Fertilizer Recommendations

USU Analytical Labs
Utah State University
Logan, Utah 84322-4830
(435) 797-2217
(435) 797-2117 (FAX)
www.usualt.usu.edu

Date Received: 4/20/2006
Date Completed: 4/27/2006

Name:
Address:

Phone:
County:

Lab Number: 501
Identification: GROSSL'S GARDEN
Crop to be Grown: Shrubs/Trees

Grower's Comments:

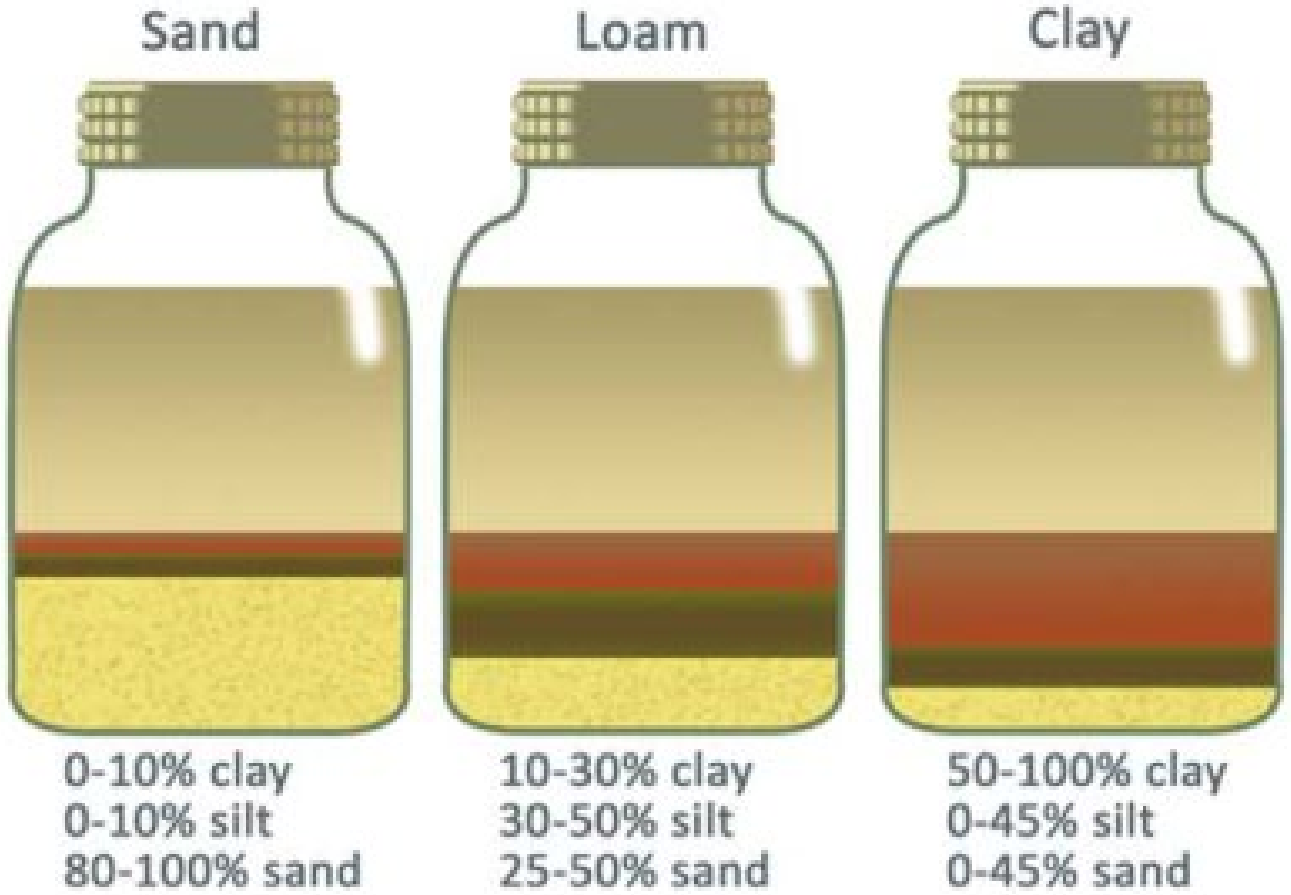
Acres in Field:

Soil Test Results			Interpretations	Recommendations
Texture		Clay Loam		
pH		7.5	Normal	
Salinity - ECe	dS/m	1.0	Normal	
Phosphorus - P	mg/kg	3	Very Low	2 lbs P2O5/1000 sq ft
Potassium - K	mg/kg	358	Adequate	0 lbs K2O/1000 sq ft
Nitrate-Nitrogen - N	mg/kg	7		2-4 lbs N/1000sq ft*
Zinc - Zn	mg/kg	1.8	Adequate	0 oz Zinc/1000 sq ft
Iron - Fe	mg/kg	1	Low	
Copper - Cu	mg/kg	1.4	Adequate	
Manganese - Mn	mg/kg	5.9	Adequate	
Sulfate-Sulfur - S	mg/kg	21.5	Adequate	0 lbs Sulfur/1000 sq ft
Organic Matter	%	2.1		
SAR				

Notes
*SEE GARDEN GUIDE.

DIY Soil Test

Layer Height
÷ Total Height
= Soil Percentage



DIY Soil Test

DIY Soil Test

Clay

Layer Height: 0.125”

÷ Total Height: 2.125”

X by 100 to get %

= 6% Clay

DIY Soil Test

Silt

Layer Height: 0.5”

÷ Total Height: 2.125”

X by 100 to get %

= 24% Silt

DIY Soil Test

Sand

Layer Height: 1.5”

÷ Total Height: 2.125”

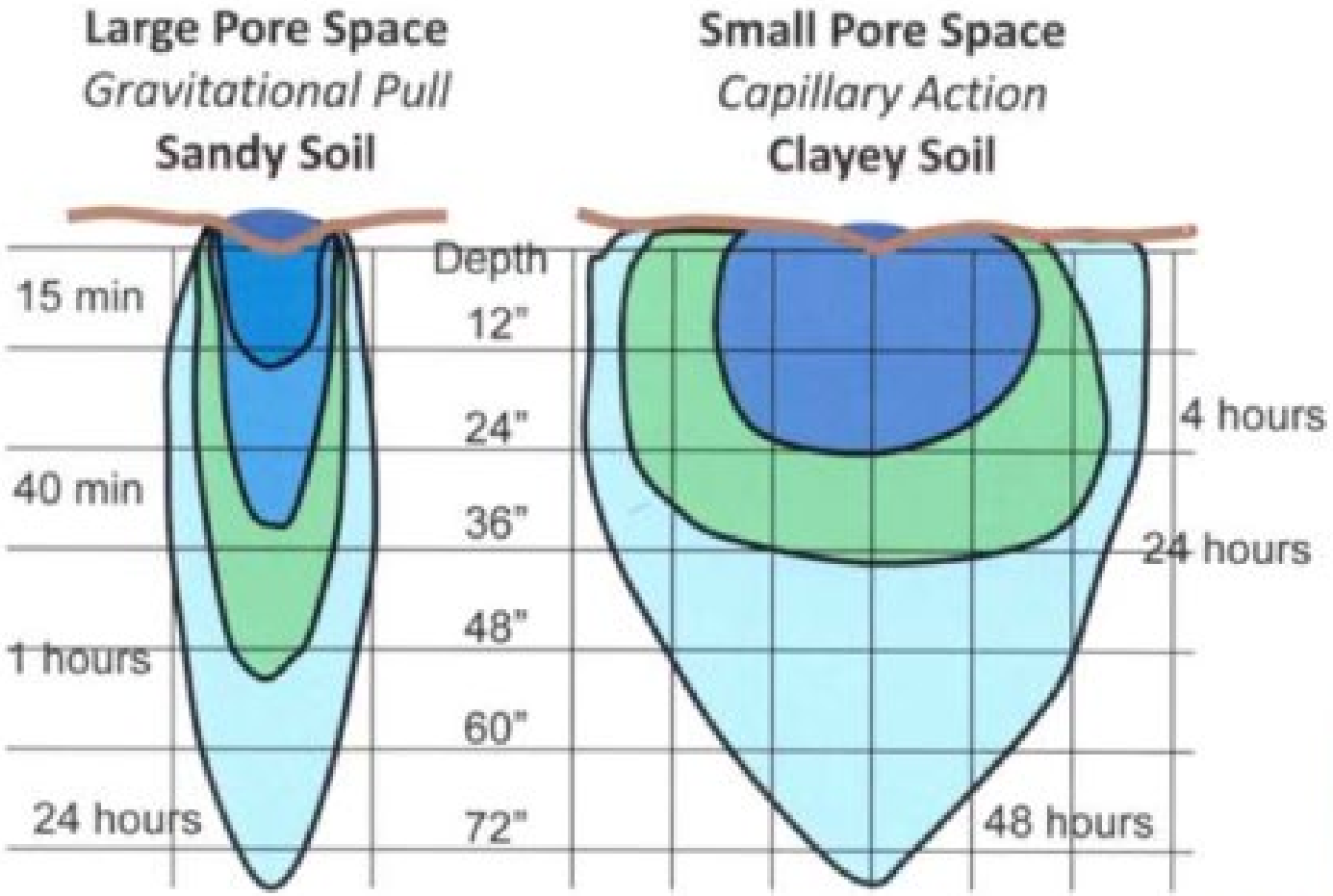
X by 100 to get %

= 70% Sand

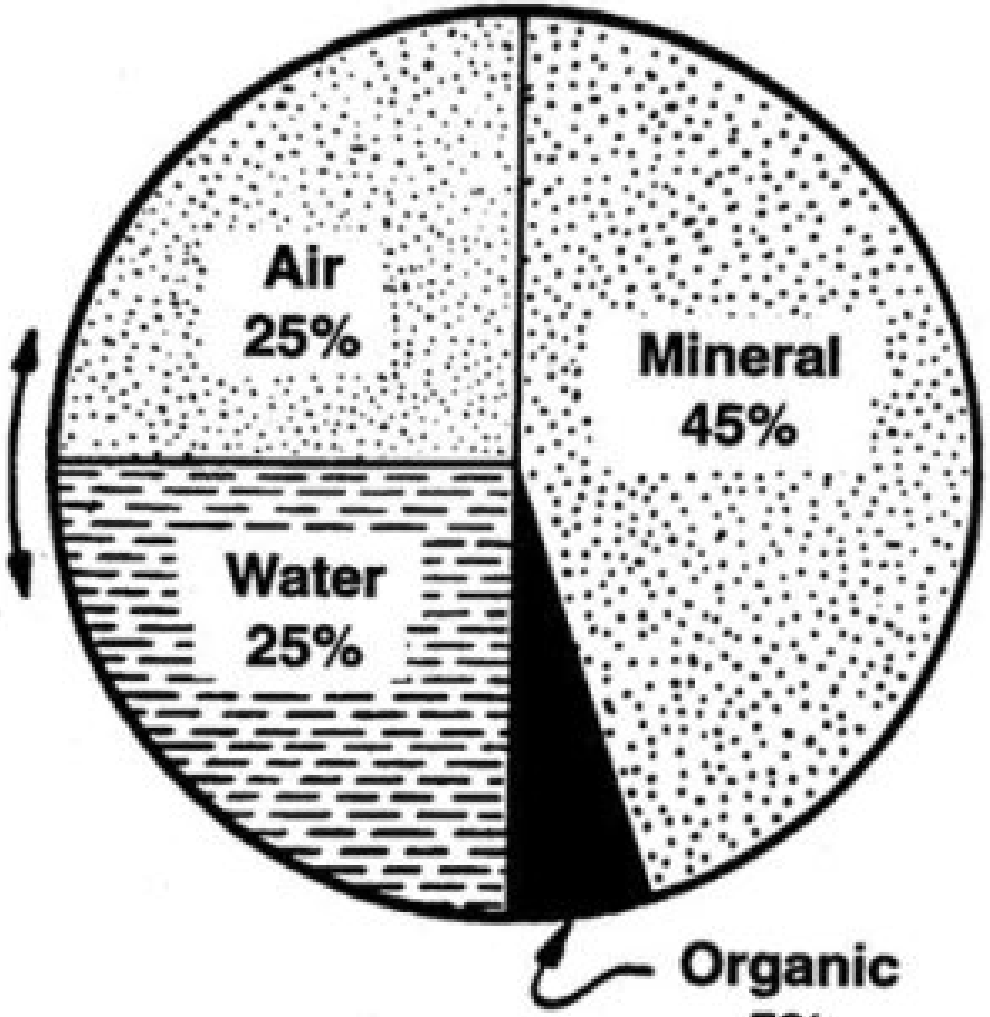
DIY Soil Test

- Clay: 6%
- Silt: 24%
- Sand: 70%

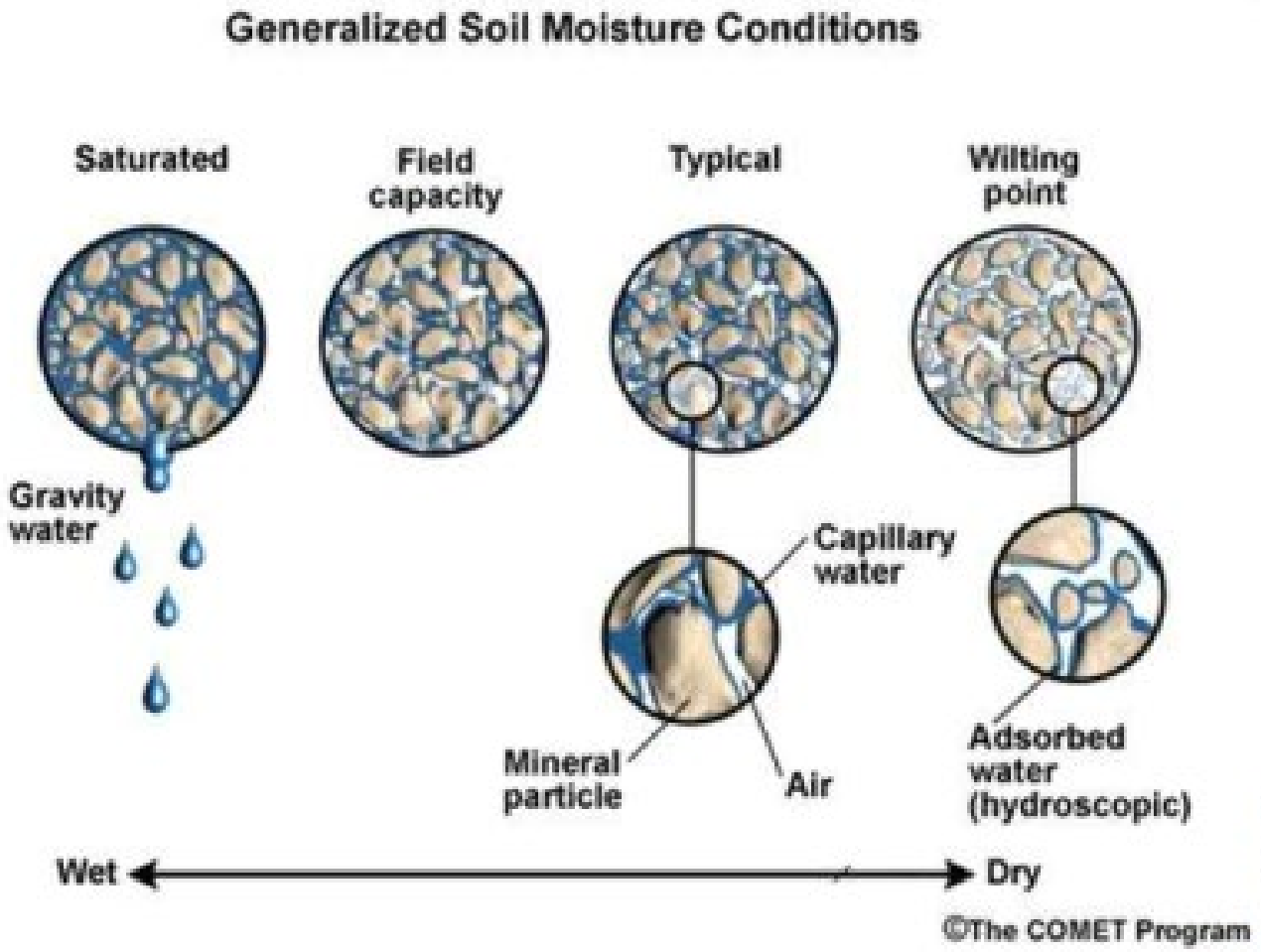
Watering Soils



Ideal Soil



Soil Moisture



What is topsoil?

Soil is divided into horizonal layers or horizons

1. Surface layer (horizon A)
2. E, B, C horizons are the subsoil layers
3. Topsoil is the A horizon only and is characterized by a darker color due to organic matter.

Benefits of adding compost

- Increases
  - Soil tilth (ease of tilling)
  - Fertility
  - Water holding capacity
  - Aeration
  - Drainage

What happens during composting?

- Process begins as soon as the raw materials are mixed together
- Microorganisms use oxygen to consume and break down materials
- Their metabolisms generate heat. They also put of CO2.
- Half of the weight of the pile will be lost from CO2 or water vapor.

Steps for a Successful Compost Pile

1. Selecting the site

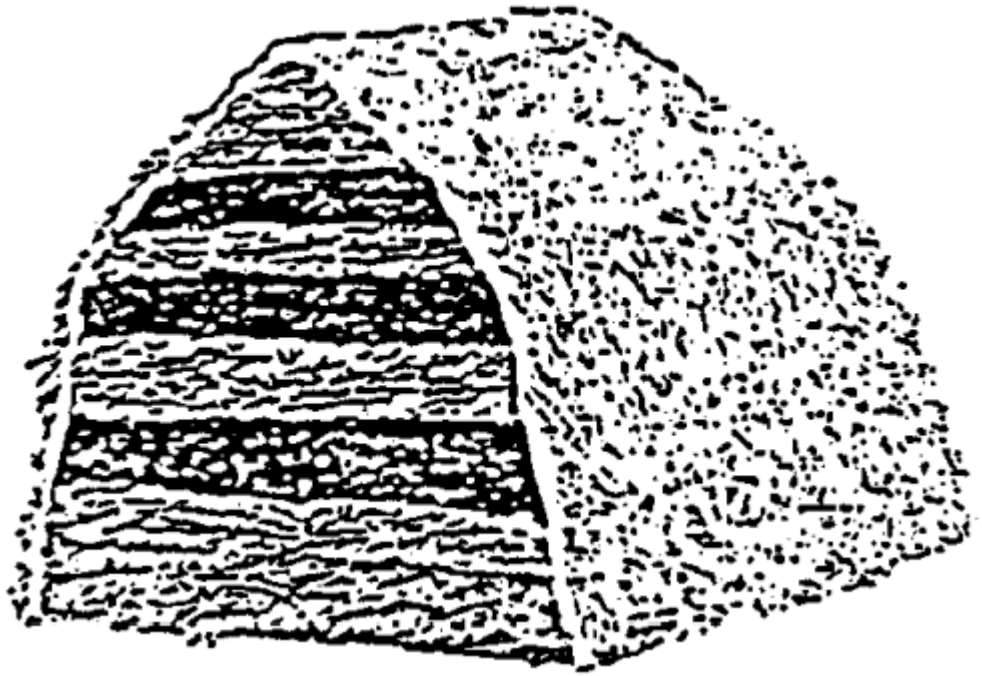
- Composting can get really stinky
- It should get six hours of sunlight
- It should have access to a water source
- It should be in an area with good drainage

2. Select a Compost Container

- Consider price, size, and convenience.
- They should allow air flow and resist decay.
- You can compost without a container

Heap

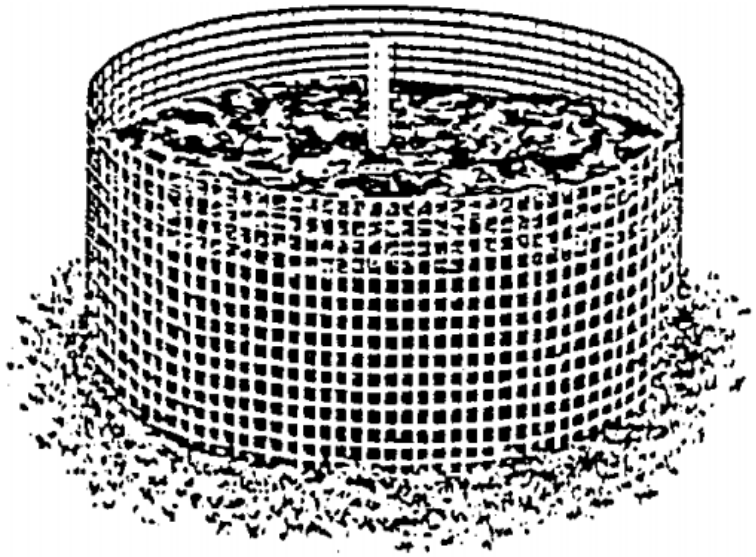
- Cheap
- Requires more space
- Great for “no turn” composting (which takes longer)

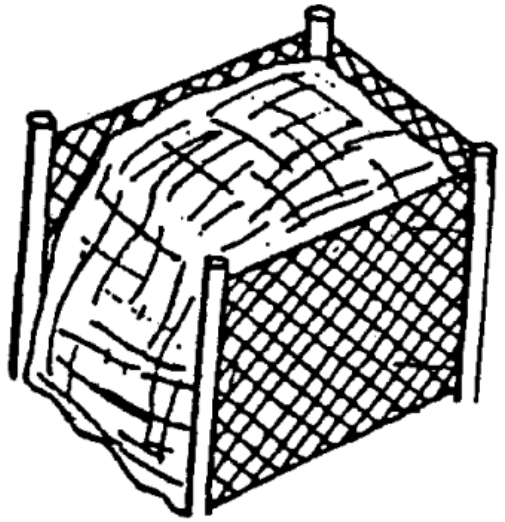



COMPOST

Hoop

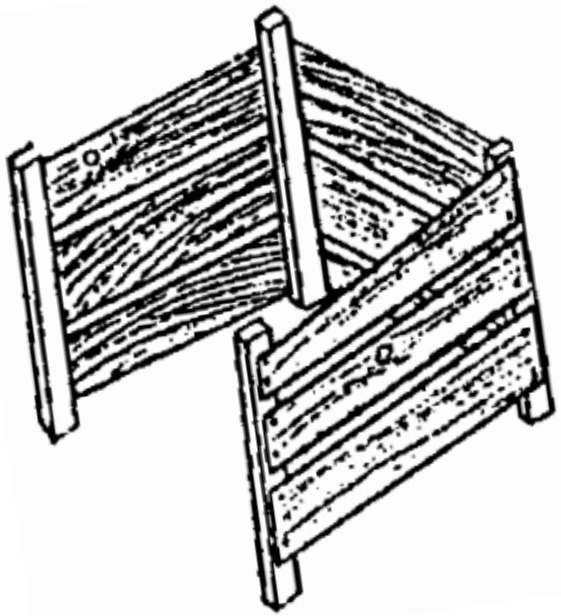
- Low cost
- Tidier than the heap
- Made of woven wire or fencing

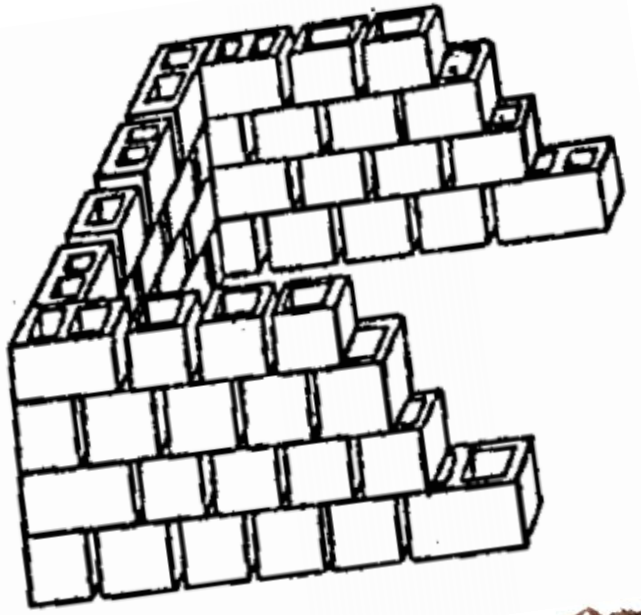




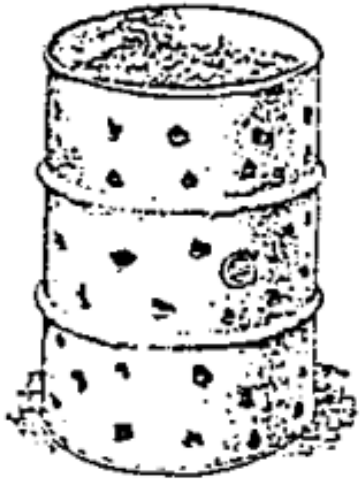
Box or Bin

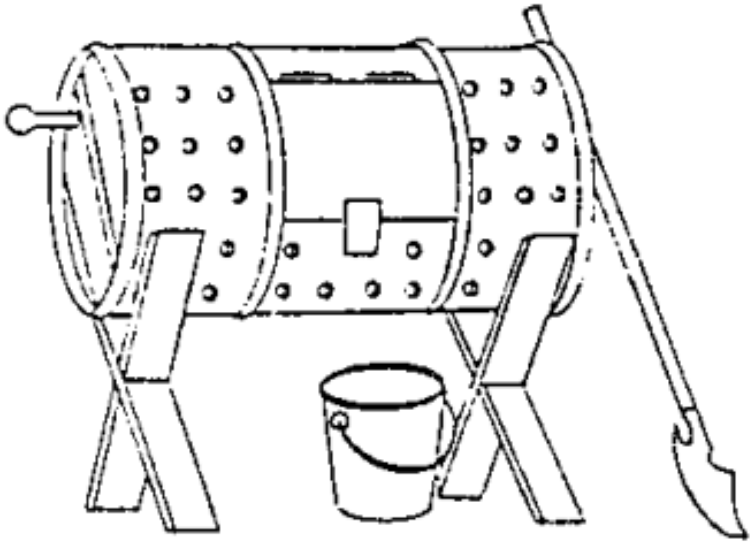
- Looks good
- Low to moderate cost
- Make sure to leave space between pile and sides of box for air flow





Barrel





- Moderate to high cost
- Tidy
- Great for limited space
- Quick composting


BIO ORB
COMPOSTER

Trench composting

3. Select Raw Materials

- “Almost all natural, organic material will compost, but not everything belongs in a compost pile.”
- Compost requires heat and the right balance of ingredients and nutrients

3. Select Raw Materials

YES or NO

Time to take a quiz!

3. Select Raw Materials

Weeds

YES

3. Select Raw Materials

Paper

YES & NO

3. Select Raw Materials

Grass Clippings

YES

3. Select Raw Materials

Cow Manure

YES

3. Select Raw Materials

Dog & Cat Poo

NO

3. Select Raw Materials

Dairy Products

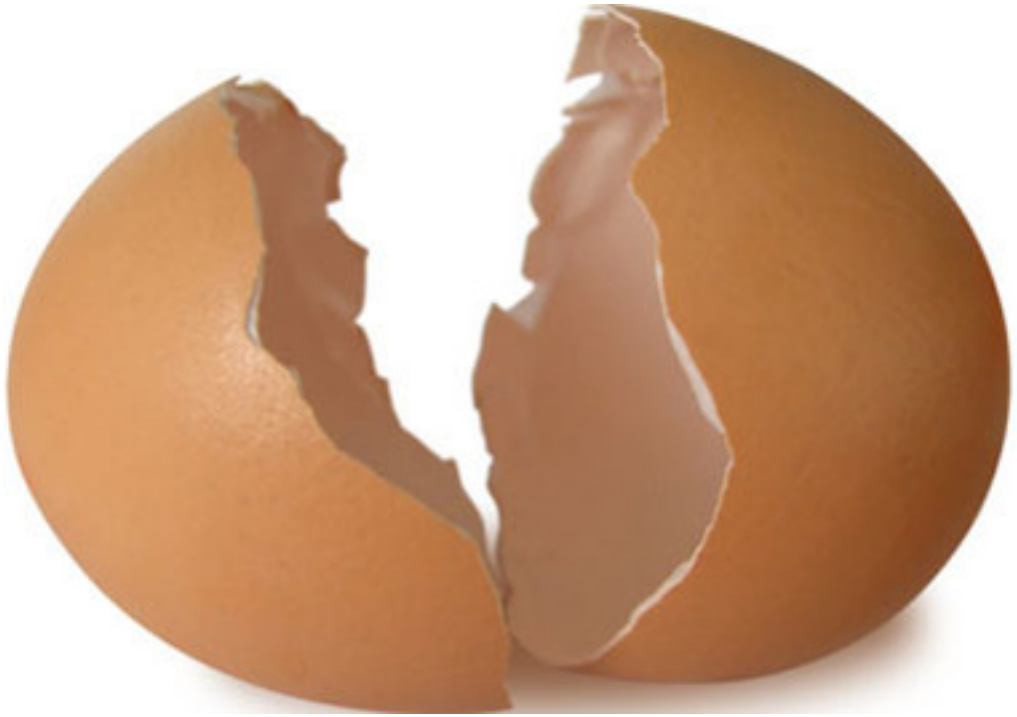
NO

3. Select Raw Materials

Meat

NO

3. Select Raw Materials



Egg Shells

YES

3. Select Raw Materials

Plastics

NO

3. Select Raw Materials

Coffee Grounds

YES

3. Select Raw Materials

Tea Bags

YES & NO

3. Select Raw Materials

Wood

YES

3. Select Raw Materials

Citrus Fruit

Technically

3. Select Raw Materials

- Carbon Rich vs Nitrogen Rich Materials
  - Getting the right balance
  - 2 parts carbon to 1 part nitrogen

3. Select Raw Materials

- Carbon Rich Materials

3. Select Raw Materials

- Nitrogen Rich Materials

3. Select Raw Materials

- How do I know if I've hit the balance?
  - Too much nitrogen
    - Carbon is used up before nitrogen is stabilized, causing foul odors and excess ammonia
  - Too much carbon
    - Not enough nitrogen to break down materials, composting slows dramatically

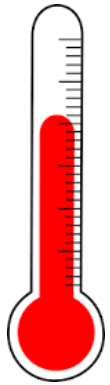
4. Aerating the Pile

- Composting consumes large amounts of oxygen
- If not enough oxygen is available, the process will slow down and become odorous.
- Turning a pile weekly can produce finished compost in one to two months
  - Monthly turning =4-6 months
  - No turning=6-12 months

5. Keeping the pile moist

- Moisture is important for the metabolic processes of microorganisms
- Keep pile within 40-65% moisture range
  - If you can squeeze water out its too wet
  - If it feels dry its, well, too dry
  - Add water as needed

6. Keeping the proper temperature



- 110-150°F is ideal
  - Kills most pathogens, weed seeds, and fly larvae
  - If too low, try turning the pile
  - If still doesn't heat up and the pile has the proper amount of water, air, and C:N, then the composting process in complete

7. Curing the pile

- Finished compost is dark, crumbly, and has an earthy smell
- Most piles benefit from an additional curing phase to allow any final chemical or decomposition reactions to occur
- Allow pile to sit 1-2 months

Questions?

Happy composting!

Resources

- Farrell-Poe, Kitt and Koening, Rich, “Backyard Composting in Utah” (1997). *All Archived Publications.* Paper 707. http://digitalcommons.usu.edu/extension_histall/707