

# Desert Home Composting Basics

## History

1. Albert Howard, 1873-1947
2. Law of Return
3. Indore composting method

## What is Composting?

1. Recycling compostable material
  - a. A compilation of once living materials that are biologically decomposing under controlled conditions either aerobically or anaerobically creating humus

## Why Compost?

1. Improve soil
  - a. Adding humus which holds moisture and nutrients in soil and beneficial microorganisms to soil
  - b. Supplies plants with essential nutrients
  - c. Improves soil structure, protecting from erosion and compaction
  - d. Decreases the need for manmade fertilizer
  - e. Saves money and makes gardening rewarding
  - f. Rejuvenates dead soil
2. A way to address the solid waste disposal crisis
  - a. There is a shortage of space for landfills
  - b. Large scale disposal sites can be anaerobic compost which can produce methane gas
  - c. Rain water percolates through and washes out the acids that are produced by decaying organic matter which can potentially contaminate groundwater, lakes and streams
3. Conserve resources
  - a. Back to the soil
  - b. Protects the environment

## Desert Climate

1. We need to adjust our composting practices to minimize evaporation
  - a. Frequent sunshine
  - b. Intense UV radiation in the summer
  - c. Frequent dry winds
  - d. Low precipitation
  - e. Low humidity
  - f. Broad day to night temp. fluctuations
  - g. Seasonal temp. variations

## Decomposition Formula

1. Basic requirements:
  - a. Organic Matter + Air + Water + Time = Humus
2. Specific interpretations
  - a. Organic substrate: greens and browns (for microbial *nutrition*)
    - i. greens usually are moist, contain nitrogen, provide nutrients, protein for microbial cell wall formation allowing for reproduction
    - ii. browns are often dry and contain carbon (a nutrient source for microbes)
    - iii. When combined, microbes have a balance of life thus sustaining nutrients
  - b. Air – Oxygen (for microbial *respiration*)
    - i. 10% or more oxygen is useful in composting.
      - Most methods are aerobic (requiring oxygen)
      - Anaerobic (without oxygen) composting results in unpleasant smells
    - ii. In desert composting air flow is facilitated by convective air movement
      - Materials such as twigs, pine cones, etc. are space savers. This decreases compaction of wet ingredients. A setup is bulked as it is built
  - c. Moisture in and on the organic substrate is for microbial survival
    - i. Functional levels of moisture are around 50-60% saturation. (i.e. brewed coffee grounds, squeezed out tea bags, or a wrung-out sponge).
      - Browns need to be soaked to saturate before adding
      - As you build the pile, sprinkle with water as needed, then cover with a non-porous material (i.e. plastic)
  - d. Time for the microbial community to transform the substrate
3. Interdependent variables which influence the basic formula
  - a. Temp. within the setup
    - i. When internal temperatures drop below 55°F, microbial action slows.
      - Cold composting generally takes 12 months
      - Hot composting generates heat and is not impacted by seasonal temperatures and generally takes 3-6 months from organization to completion.
  - b. Particle size
    - i. Chopping, shredding, grinding, and ripping increases surface area which allows better water absorption and allows better exposure for micro-organisms to produce enzymes on the substrate
  - c. Volume
    - i. Cold processes do not require a certain amount of material, it is more dump and run, using what is on hand
    - ii. Hot processes need to be a minimum of 3x3x3 to generate heat and to insulate the pile

- d. Location
  - i. Shade is the best place for composting, if shade is not available then cover with shade cloth or a tarp
- e. pH
  - i. When aerobic conditions are maintained the pH of a pile self-adjusts to neutral or slightly alkaline
- f. Carbon to Nitrogen ratio of the mix
  - i. An ideal ratio for decomposition is 30:1 or 2-parts brown to 1-part green by weight. This provides for microbial nutrition, growth and reproduction. This ratio can be applied to any setup but is very important for the hot composting setup, so that it generates heat

### Two Basic Categories

1. Specific guidelines:
  - a. this is a batch method which must be a minimum size of 3x3x3
  - b. must have a c:n ratio of 30:1
  - c. bulked as it is built
  - d. must be turned and churned
  - e. should reach target temperature in 72 hours, if it doesn't add more nitrogen
  - f. maintain the target temp of about 150°F for 7-14 days, turn and churn then let heat up for 7-14 more days, repeat until decomposition is finished.
2. Turning the pile provides:
  - a. aeration for efficient microbial function
  - b. mixing so that all ingredients are exposed to heat
  - c. the opportunity to add greens for microbial proliferation and target temperature
  - d. Addition of water to maintain moisture
  - e. lowering the temperature if it becomes too hot
  - f. heat of at least 150 destroys pathogens and seeds
  - g. a well-maintained pile can take 3-6 months to a finished product which then cures for 4-6 weeks

### Cold Composting

- dump and run, adding what you have on hand
- static or actively managed
- maintain moisture
- add coarse bulking material as you add to the pile for air flow reducing compaction
- requires roughly 12 months to finished product

#### 1. Aerobic Types

- a. Sheet composting
  - b. Vermicomposting (worm composting)
  - c. Pits or trenches
  - d. Piles
  - e. Different types of bins
    - i. Tumblers
    - ii. Garbage cans
    - iii. New Zealand style bins
2. Anaerobic Types
- a. Bags
  - b. Bokashi bucket method

### Materials

1. To use:
- a. Garden waste, leaves, pine needles, pine cones, small twigs
  - b. Paper products, cardboard, office papers, Kleenex, paper towels, toilet paper rolls, etc.
  - c. Lint, vacuum cleaner dirt, pet hair
  - d. Kitchen waste, vegetable and fruit scraps, coffee grounds, tea bags
  - e. Animal waste, horse, goat, chicken, sheep, cow (vegetarian)
  - f. Fabric, old socks, scraps, thread
2. To avoid:
- a. Chemicals: pesticides, herbicides, fungicides, vermicides
  - b. Meat, fish, oils
  - c. Glossy paper
  - d. Diseased plants, weeds with seeds
  - e. Pet manure, dog, cat, pig, bird

### The End Product

#### Humus (black gold)

1. Contains carbon, nitrogen, and plant nutrients
2. Absorbs water like a sponge
3. Buffers soil pH
4. Helps protect the soil
5. NPK of 1:1:1
6. Helps the whole ecological system by recycling plant nutrients back to the soil

#### Uses of Humus

1. Soil amendment
2. Mulch or top dressing
3. Fertilizer, compost tea
4. Component in potting mixes