

## Composting

### The Recycling of Household and Backyard Wastes

Composting benefits you, your garden and your Community

- **Water conservation:** increases water holding capacity of soil.
- Lessens chance of erosion and run off.
- Less leaching of fertilizers into the water table.
- Improves ease of soil-cultivation.
- Acts as acid/alkaline “buffer” in the soil.
- Prevents soil crusting and aides in seedling emergence.
- Very good for sand and equally good for clay.

## COMPOST, NATURE'S RECYCLING METHOD

When you make compost you are doing what Nature does all the time, only a little faster. Compost making is nothing more than the fine-tuning and acceleration of a process that goes on all around us as bacteria and other soil-dwelling organisms break down organic matter and produce food for new plants. Composting is Nature's way of recycling. For many people, composting is a way to turn otherwise bothersome waste products from their kitchen, yards, and gardens into a valuable resource. ~From: Vegetable Gardener's Bible, Story Books 2000, Pownal, VT 05261.

**QUESTION:** What causes the intense heat in rapid composting?

**ANSWER:** Rapid bacterial multiplication produces heat and partially decomposed vegetable/animal material, which makes the compost.

### BASIC FORMULAS FOR COMPOST:

Air + moisture + Carbon + Nitrogen + bacteria = Compost in several months to two years.

Air + moisture + Carbon + Nitrogen + bacterial + TLC = Rapid compost in two to three weeks.

### BASIC FUNCTION OF A COMPOST BIN:

It can be in the form of a pile, a heap, in a tumbler or a pen, etc. to provide the best possible "bed and board" by reducing the time needed for micro organisms to decompose the organic matter..

## THE BIG PICTURE:

FEED THE BACTERIA AND ORGANISMS  
THAT MAKE THE COMPOST  
THAT MAKES THE HUMUS  
THAT FEEDS THE SOIL  
THAT FEEDS THE PLANTS  
THAT FEED US.

### A MOST IMPORTANT TIP!!

If you are going to be using lots of grass clippings, keep dry straw and dry leaves, shredded paper, or similar high-carbon material, on hand to mix with grass. This prevents the grass from self-composting into a smelly anaerobic mess. Straw is preferable. Keep one or two dry bales on hand.

### MOST COMMON CAUSES OF A NON- HEATING PILE:

1. The pile is not big enough
2. There is not enough air
3. There is too little or too much moisture

If you have internet access, there is much valuable information available on composting web sites. Search for “compost” or “rapid compost.”

## DEFINITIONS OF COMPOST

\*The microbial decomposition of mixed, raw, organic materials to a dark, fluffy product resembling rich soil. (Virginia Master Gardener's Handbook, Page 62)

A pile of organic materials deliberately assembled for fast decomposition. (Ann Lindsey, Public Education Coordinator at the UC Santa Cruz Farm and Garden Project)

## COMMENTS FROM THE EXPERTS

Whenever somebody tells me that I need just one answer for all my questions, I get suspicious. The snake oil that cures all ills doesn't really cure anything; the multi-purpose tool does none of its many tasks very well; and the one-size-fits-all garment doesn't really fit anybody. But then there's compost. Compost sounds too good to be true, but it actually is as good as it sounds. Compost nourishes both the garden plants and the creatures that live in healthy soil. It makes it easier for soil to receive and retain air and water, while stabilizing soil pH at the level most plants prefer. Compost even helps protect plants against some diseases and pests. It has been called "gardener's gold," and that's no exaggeration. The path to the garden of your dreams leads right through the middle of a compost pile. (The Vegetable Gardener's Bible: Storey Books, Edward C. Smith, 2000, Page 135)

Compost is almost a panacea for imperfect soil...and if it is made from a large variety of materials, contains a healthy balance of trace elements as well. (The Big Book of Garden Solutions: Time Life Inc. 1999, Page 106)

Magical stuff...unequaled as a soil conditioner, a pile of weeds, grass clippings, kitchen scraps, the natural process of decay leads to dark, rich crumbly compost. (Start with the Soil: Grace Gershuny, Rodale Books, Page 66)

If you don't have a compost pile make one! ...we are a trace element starved nation, compost will cure that. (MG Trainee Class 2000: Larry Griffith, Feb. 24, 2000)

Organic matter in the form of decomposed plant material, often called humus, is the most valuable and versatile amendment you can apply to your soil. (Garden Naturally: Better Homes and Gardens, 1993, Michael Freidman Publisher Group, Inc. Page 18)

Compost and composting, are like water and air, essentials of life. (Book of Composting: New Revised Rodale Books, 1992, Page 1)

## MATERIALS FOR COMPOSTING

If you have a garden, a yard and a kitchen, you undoubtedly are generating great materials for your compost pile. Use materials that are readily available. Special ingredients, such as manure, are not necessary to make good compost. The raked leaves, grass clippings, and garden weeds yesterday's oatmeal, and even newspaper all can be composted easily. The list of organic materials that make good compost materials is longer than the list of things not to compost.

**Evaluating Compost Materials: What's Brown? What's Green?** Every piece of organic material contains carbon and nitrogen in differing ratios. Some materials are very high in carbon, such as sawdust and straw. Others contain a relatively generous amount of nitrogen compared to carbon, such as grass clippings, garden weeds and chicken manure. Understanding which materials are high in carbon, and which are high in nitrogen, will help you build a pile with a good balance of ingredients for decomposition. The following chart will give you an idea of the carbon-to-nitrogen ratio of some common compostable materials.

<u>Average Carbon-To-Nitrogen Ratios</u>		
Brown Materials	Sawdust	500:1
	Chipped wood brush	300:1
	Newspaper	170:1
	Pine needles (Dry)	80:1
	Straw	100 - 1
	Dry leaves	50:1
	Dry hay or weeds	40:1
Greenish-Brownish	Mixed green/brown plant	30:1*
	Horse manure w/straw	25:1
	Rotted manure	20:1
Green Materials	Timothy hay	25:1
	Green weeds	20:1
	Plants and prunings	20:1
	Kitchen scraps	20:1
	Grass clippings	15:1
	Alfalfa hay	19:1
	Chicken manure	10:1
	Humus	10:1
	Blood meal	5:1
	Alfalfa meal	4:1 (?)

\* The ideal carbon-to-nitrogen ratio for composting is around 25:1 to 30:1. This means most decomposer creatures prefer a diet that has 30 times as much carbon as nitrogen. These creatures use carbon for energy (as we use carbohydrates) and use nitrogen to build their bodies (as we use protein). Some compost materials, such as mixed weeds or horse manure in straw, may have a carbon-to-nitrogen ratio close to 30:1. These “greenish-brownish” materials can be composted successfully without adding any other materials. However, most compost materials are best balanced by other materials.

Note: The above ratios are approximate and should only be used as a general guideline. The actual workable ratios are much broader. Some claim that in certain circumstances, ratios as low as 15-1 to 10-1 will work!

## WHAT NOT TO COMPOST

Dairy products

Meat and fatty materials

Diseased plants

Weeds gone to seed

Manure of meat-eating animals

Herbicide-treated grass (except after two good rains or irrigations)

Municipal or industrial waste unless it has been cleared by certified laboratory analysis. Some authorities claim contaminant danger.

Coal ashes

Wood ashes, except in moderate amounts

The General Rule: if in doubt . . . **DON'T!**

## BUILDING THE PILE-- NINE KEYS TO SUCCESS HOT (RAPID) COMPOSTING METHODS

### 1. Carbon/Nitrogen Ratio (C:N)

- Approximately 30:1 by weight . This C:N ratio is only a rough guide, decomposers work best at this ratio.

### 2. Smaller Particles

- Exposes much greater surface area to the bacteria. Mulch with a lawnmower fitted with a *sharp* blade, or by other means of shredding.

### 3. 'Build in' and Continue to Supply Air

- Use straw in the pile. Straw is a hollow tube which decomposes slower than other sources of carbon.
- Use a 'compost tool' or other means to turn the pile every 2 or 3 days until the 10th day.
- Use a ventilation base.

### 4. Wetting Agent Added to Water

- A few drops of detergent, such as is used to wash dishes, will lower the surface tension of the water and more effectively wet the compost ingredients. This will clean and soften all surfaces and inhibit internal drying.

### 5. Diversity of Ingredients

- Better balance of nutrients results from use of a variety of ingredients.

### 6. Intimate Premixing Rather Than Layering

- Provides an instant "full course" of carbon and nitrogen to the bacteria. Most experts are switching to this method.

### 7. Starter Bacteria

- Diversity of the starter bacteria is best. Garden loam and some of last years compost are very good starters. Alfalfa meal, blood meal, and cottonseed meal can also be used. Alfalfa meal, according to recent research, may contain growth hormones.

### 8. Additional Nitrogen

- It is always better to err on the side of too much nitrogen (slight ammonia smell) than to have a non-heating pile. If you do not have significant heating in 24 hours, add a dry form of nitrogen. If the pile is dry and not heating, add water as well.

### 9. Pile Size

- Minimum pile size is 277 cu-ft (3'x3'x3'). Most experts prefer a pile size of 64 cu-ft (4'x4'x4'). Over 4' high is too high. The larger pile has a small surface to volume ratio and therefore retains heat better than a smaller pile.

## HOMEMADE COMPOST – THREE MAJOR CLASSIFICATIONS

### 1. Natural/Cold

Example: “Throw ingredients in a pile and forget it”.

Effort required: very little

Amount produced: very little, per unit of time. Varies with volume used.

Time required: one to two years. Time will vary greatly with individual circumstances.

### 2. Conventional/Cool

Example: “Throw it in a bin and turn it if you think about it”.

Effort required: moderate

Amount produced: moderate (sufficient for limited use only)

Time required: several months to a year

### 3. Rapid/Hot/Batch

Example: “Give the decomposing bacteria what they want . . . use all “10 Keys to Success Principles”

Effort required: lots, up front. Suggest team effort. The initial complete pile should be built in one or two days. More material may be added later. Kitchen scraps, on the surface of the pile, will attract flies and animals. Bury new material 6” or more.

Amount produced: lots . . . 600 to 700 lbs. of quality compost

Time required: two to three weeks!!

Large amounts of ingredients required

## DIFFERENCES BETWEEN COLD AND HOT PILES

### 1. Cold and Cool Piles

Cold-loving bacteria, called psychrophiles, are at work up to 50 degrees F., but continue some activity even below freezing.

A cold pile very seldom reaches 90 degrees F.

Continuous additions are made to the pile and compost is removed from the bottom.

When, and if, enough of the “10 Success Keys” are instituted (especially smaller particle size, increased aeration, and improved carbon nitrogen ratio), the stage is set for the mesophile bacteria to increase. They work best at 70 to 90 degrees F.

### 2. Hot (Rapid) Piles

Thermophilic bacteria, which work best in the 104 to 200 degrees F. range, multiply very rapidly in the first two or three days, producing temperatures beyond 160 degrees F. The high heat does one important thing that is not accomplished in cold piles: it kills most weed seeds and pathogens. The high heat also breaks down pile ingredients into readily available nutrients for soil bacteria, which then feed plant roots. Normally, the volume of a hot compost pile must be a minimum of a 3'x 3'x 3' cube. This volume has the ability to favor rapid bacterial multiplication with high-heat generation and with slower heat dissipation.

## TROUBLE SHOOTING FOR HOT/BATCH PILES

SYMPTOM: Pile not heating up

1. Possible cause

a. Pile is too small

Solution: gather more materials. 3'x3'x3' pile is minimum.

b. Lack of nitrogen

Solution: add high nitrogen materials such as grass, manure, blood meal, alfalfa meal, etc.

c. Lack of moisture

Solution: Feel deep into pile (use gloves!) for moisture. Add water if needed

d. Lack of air

Solution: Turn, or aerate with drill auger

SYMPTOM: Pile smells like rotten eggs

1. Possible cause

a. Pile is too wet

Solution: aerate and add dry material

b. Pile is compacted

Solution: aerate

SYMPTOM: Pile smells strongly of ammonia

1. Possible cause: pile has an excess of nitrogen

Solution: Add carbon ("brown") material

SYMPTOM: Pile is attracting flies and other pests

1. Possible cause: pile has attractive kitchen scraps left on surface.

Solution: Bury kitchen scraps in center of pile

Never use meat, dairy products, or any greasy foods in pile

REMEMBER!!: None of these problems will occur if you follow the "Ten Keys" and

Use a ventilation base and regularly aerate the pile.