

## Backyard Composting

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### Introduction

Composting is a process that allows naturally occurring microbes to convert yard waste, such as leaves and grass clippings, to a useful organic soil amendment or mulch. Gardeners have used compost for centuries to improve the physical condition of soil and to add some of the nutrients needed for plant growth. Incorporating compost into light, sandy soil helps it hold both moisture and nutrients, while adding it to heavy soil improves drainage.

To produce compost efficiently from yard waste several conditions must be met. The micro-organisms responsible for decomposition need oxygen, water, and nitrogen. Particle size also affects efficiency. The smaller the plant pieces, the more rapidly they will break down. Use a shredder or power mower to chop up leaves and small twigs before adding them to the pile.

### Compost Bins

Many commercially-available compost bin designs have open sides (mesh, wire, wood slats, etc.). While compost does require adequate aeration, we can conserve some water by using solid sidewalls on our compost bins in Arizona. Solid wood, sheet metal, and concrete blocks conserve moisture. Commercially available plastic bins also work well, but have a lower volume. It is also desirable to have two or more bins that can contain compost of varying degrees of decomposition.

### Raw Materials

Many organic materials can be composted besides grass and leaves: nonwoody shrub trimmings or twigs less than 1/4 inch in diameter, faded flowers, weeds, leftover plants at the end of the gardening season, lake plants, straw, coffee grounds, eggshells, fruit and vegetable scraps, shredded newspaper (black and white print), and sawdust (sawdust requires the addition of extra nitrogen).

There should be little need to compost grass, since clippings may be safely left on the lawn if you mow regularly and remove only 1/3 of the blade length each time. If you do compost grass, mix it with other yard waste. Grass clippings, alone, pack down and restrict airflow which limits the availability of oxygen that is needed for decomposition.

Some things should **NOT** be composted. Pet feces can transmit diseases. Meat, bones, grease, whole eggs, and dairy products attract rodents and other animals. Badly

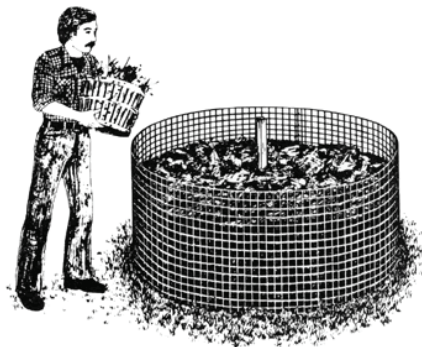
diseased or insect-infested plants and weeds that are loaded with seed may not heat up enough to be rendered harmless. Horse manure can also contain weed seeds.

### Microorganisms and Carbon:Nitrogen Ratio

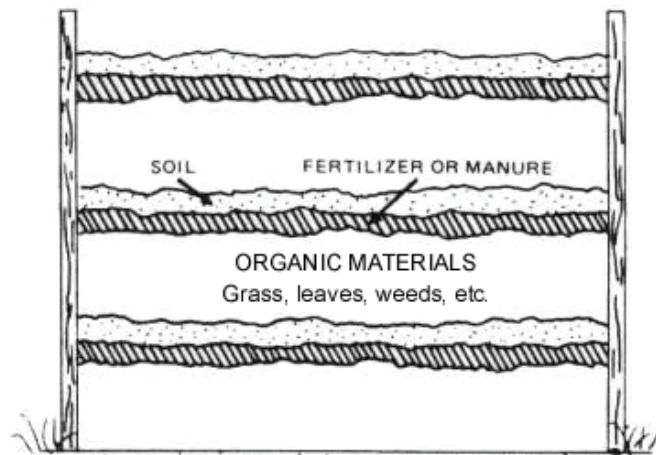
The organisms living in the compost use both carbon and nitrogen to grow, reproduce, and grow more. Once their populations increase, they begin to break down the organic matter more quickly. A food chain (or a food web) with many different organisms feeding on the raw materials and each other lives within the compost pile. Fungi, bacteria, actinomycetes, insects, and worms feed on the raw organic matter. Springtails, mold mites, beetles feed on the fungi. Protozoans, roundworms, rotifers, and other small organisms graze on bacteria. Larger arthropods such as centipedes, solpugids, beetles, mites, and flat worms feed on the smaller organisms. All the organisms produce waste and/or die to create the compost. It's a real jungle inside the compost pile.

Microbial activity is greatest when the carbon-to-nitrogen ratio (C/N) is 30:1. For proper decomposition the nutrients in the compost heap should be in the right proportions. The carbon:nitrogen (C/N) ratio will determine how long decomposition will take. When the decomposing organisms do not have the proper diet of carbon, the organisms may lose nitrogen to the atmosphere as ammonia. If the initial carbon portion is too high in the compost heap, the process will be considerably slower and very inefficient. Materials can be blended and mixed to achieve a suitable C/N ratio. Over time, the C/N ratio will generally decrease. When adding compost to the soil, make sure that it has decomposed "properly"; if it is decomposed, it will be high in carbon and will have to use nitrogen from the soil in order to continue decomposition. On the next page is a table that

gives estimates of the C/N ratios of some compost ingredients. (The higher the number, the higher the carbon content and the longer the breakdown time.)



Carbon:Nitrogen Ratios of Some Raw Materials	
Raw Material	C:N
Vegetable Wastes	12-20:1
Alfalfa Hay	13:1
Coffee Grounds	20:1
Grass Clippings	12-25:1
Cow Manure	20:1
Horse Manure	25:1
Horse Manure (with litter)	30-60:1
Poultry Manure (fresh)	10:1
Poultry Manure (with litter)	13-18:1
Pig Manure	5-7:1
Leaves	30-80:1
Corn Stalks	60:1
Straw	40-100:1
Bark	100-130:1
Paper	150-200:1
Wood Chips and Sawdust	100-500:1



### Maintaining Your Compost Pile

An active compost pile will heat to somewhere between 130 and 160° Fahrenheit. As the center cools, turn the pile to help speed decomposition and minimize any objectionable odors. To produce compost quickly, you will need to do this once or twice a month. Continue to water your compost pile periodically to keep it moist but not soggy. You can add a little fresh material when you turn the pile, but generally, you're better off beginning a new pile. Using this system, your compost will be ready in two to four months in the warm season, whereas an untended pile will take a year or more to decompose. When completed, your compost pile will be about half its original height, and will have a pleasant, earthy smell.

### Troubleshooting Problems

If your compost smells like ammonia, then it has too much nitrogen. Add some materials high in carbon (straw, wood chips, paper, etc.).

If your compost is not heating up and decomposing, then it is probably too dry or has inadequate nitrogen. The moisture content should be about like a damp, wrung-out sponge. If moisture has been adequate, then add some nitrogen containing materials. If you do not have any manure or green waste, then you can add small amounts nitrogen fertilizer.

If the compost smells foul and is mucky, then aeration needs to be increased. This can be done by adding coarse materials or by burying a perforated drainage pipe in the compost pile.

### Using Compost in Your Garden

Compost is best used to amend soils where you plan to grow annuals and/or vegetable crops. You simply cannot add too much compost to most Arizona soils. If possible, cover the soil with 3 to 4 inches of well-decomposed compost and incorporate it as deeply as possible. Saving amounts of nitrogen fertilizer can also be added at this time. For crops requiring higher inputs of nitrogen fertilizers, such as corn, additional nitrogen can be side dressed during the growing season. Soils sulfur can also be added where alkaline soil conditions are present. Phosphorus fertilizer should be added to the soil in the

### Building a Compost Pile

Raw materials should be layered to create an optimal and uniform C:N ratio. Coarser materials should be placed near the bottom of the pile to maintain aeration. One approach is to add thick layers of leaves and other materials low in nitrogen with alternating thinner layers of nitrogen containing manures. You can also add soil at various stages to inoculate the center of the pile with locally adapted microorganisms. If the pile is large and deep, you may want to add water as you add materials. Continue to layer materials until the bin is filled (see picture below). Kitchen waste can be added to the top of the heap over time. If you have multiple bins, then you should stop adding kitchen waste about 6 weeks before you plan to use it.