

EASY GARDENING: COMPOSTING TO KILL WEED SEEDS

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Composting occurs when organic materials—such as yard trimmings, food wastes, and animal manures—decay to form compost, an earthy material that can be used to improve garden soil.

Compost benefits gardens by:

- ▶ Supplying many nutrients that plants need
- ▶ Improving the soil's physical characteristics, such as texture
- ▶ Enabling the soil to better hold water and nutrients
- ▶ Helping aerate the soil

The composting process also naturally kills weed seeds. Properly managed, a compost pile should easily reach 140 degrees, which breaks down all organic matter, including weed seeds.

The key word is *properly*. Organic matter that is improperly composted can introduce problems into a garden. Raw animal manure often contains disease-causing organisms such as *E. coli* and *Salmonella*, which can make people sick if they eat vegetables contaminated with them.

Manure can also contain live weed seeds. These seeds can spread easily from one farm, field, or garden to another, multiplying the problem from one weed to thousands of new weeds.

HOW DOES COMPOSTING REDUCE WEED SEEDS?

Proper composting occurs under the following conditions:

- ▶ The ratio of carbon to nitrogen (C:N) ranges from 25:1 and 40:1. This ratio balances both energy (carbon) and nutrients (nitrogen).
- ▶ The compost is about 40 to 60 percent moisture by weight.



Figure 1. Build your compost pile with alternating layers of green matter (grass clippings), and brown matter (dead leaves) to maintain a proper carbon-to-nitrogen ratio.

- ▶ The oxygen content is 5 percent or more.
- ▶ The pH level ranges from 6 to 8.

In these conditions, microorganisms begin breaking down the organic residues and releasing heat. A clear sign that the compost pile is decaying properly is the release of steam when the surface of the pile is disturbed (Fig. 2). As the temperature rises above 113 degrees F, heat-loving microorganisms replace the earlier microorganisms. At that stage, the pile will enter the active phase, with temperatures reaching 131 to 170 degrees F in 1 to 3 days.

These high temperatures are the key to killing weed seeds in a compost pile. In general, more seeds will die the longer that the temperature in the pile remains within this range (Table 1).

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Figure 2. The release of steam from a compost pile when its surface is disturbed indicates that the compost is decaying properly.

TABLE 1. ESTIMATED AMOUNT OF TIME REQUIRED TO KILL 90 PERCENT OF SEEDS AT VARIOUS TEMPERATURES.

	TEMPERATURE (F)			
	140°	122°	115°	108°
WEED	NUMBER OF HOURS REQUIRED TO KILL 90% OF SEED			
Annual sowthistle	<1.0	2.1	13.3	46.5
Barnyardgrass	<1.0	5.4	12.6	Unaffected
London rocket	<1.0	4.0	21.4	83.1
Common purslane	1.3	18.8	Unaffected	Unaffected
Black nightshade	2.9	62.0	196.6	340.6
Tumble pigweed	1.1	107.0	268.5	Unaffected

Source: Time and Temperature Requirements for Weed Seed Thermal Death, by N. Dahlquist et al., 2007

HOW TO COMPOST PROPERLY

Most gardeners have a static compost pile. They believe that composting consists of filling the pile, waiting a few weeks, and then magic happens—the compost is ready. In reality, most compost piles are merely trash heaps of garden and kitchen waste.

To compost properly, keep the C:N ratio at 25:1 to 40:1 and the moisture, oxygen, and pH in the pile at optimum levels.

C:N ratio: To maintain the correct C:N ratio, build the pile with alternating layers of brown matter such as dead tree leaves, and green matter such as grass clippings. Adding equal amounts of green matter (grass clippings, kitchen waste) and dry matter (dry leaves) will often achieve this desired ratio.

Moisture: Water the compost pile regularly to keep the microorganisms alive and to soak the weed seeds

fully. Don't add so much water that it flows out from the bottom of the pile.

pH: pH meters are available in garden centers and can be used to estimate the pH level of the compost pile. However, an easy and more practical way to tell whether the compost pile is “cooking” properly is by its smell. If the compost pile smells sour or like a rotten egg, the pH is not correct. A compost pile at the proper pH should smell earthy, like freshly dug garden soil.

If the pile smells bad, check to see if it is too wet. You may be adding too much water or wetting too often. Let the pile dry for a while, and wet it less often. Another option is to turn the pile and mix it thoroughly.

If the first two measures do not help, mix lime into the pile to correct the low pH level and reduce the rotten egg smell.

Turning: Periodically mix the materials within the pile to introduce more oxygen and distribute the moisture evenly (Fig. 3). To add as much air into the pile as possible, break up any clumps, and move the drier material from the outer edges into the center.

Turning the compost will also enable the temperatures at the edges and surface of the pile to rise high enough to kill weed seeds. The pile must be mixed thoroughly during the active phase to ensure that all the material is heated for a long enough period to kill the seeds.



Figure 3. Watering and turning the compost ingredients regularly will help keep microorganisms alive, aerate the pile, and distribute the moisture evenly.

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