

Building Healthy Soils In Home Gardens



Healthy soils rely on billions of tiny microscopic organisms like bacteria, fungi, protozoa, and nematodes to cycle nutrients, defend plants against diseases, and build stable organic matter.



SOIL HEALTH PRINCIPLES

- > **Minimize disturbance** – reduce tillage, chemicals, and fertilizers.
- > **Keep the soil covered** with mulch, grass clippings, or cover crops.
- > **Always have a living plant growing** with either crops or winter cover crops.
- > **Maximize diversity** by rotating crops, companion gardening, or planting cover crops. Use compost or manure amendments.

DON'T TREAT YOUR SOIL LIKE DIRT

Management decisions play a huge role in the soil quality in home gardens. Healthier soils support healthier, more productive plants. Rototilling every year lowers soil organic matter levels, kills earthworms, destroys the soil structure, and brings old weed seeds back to the surface. Leaving the garden bare after the summer crops are harvested will make the soil vulnerable to erosion and nutrient loss and rob the soil microbes of fresh food. Planting the same crop in the same place every year can make those plants vulnerable to diseases and insect damage.

It is possible to manage a garden by mimicking nature and following the key healthy soil principles outlined in the box on the lower left side of this page. But be forewarned, it may not always look neat and pretty. If you are willing to park the rototiller and ditch the big shovel to try some new gardening techniques, consider the following:

- > **Only disturb the soil where seeds and plants will be placed.** Why till the entire garden only to plant a few rows of tiny carrot or lettuce seeds? Instead, scratch a small trench wide enough to plant seeds and leave the rest undisturbed. When planting potted plants, dig a hole twice as big as the container to fully loosen the soil before planting.
- > **Control weeds** around the plants and seed rows by laying down three to four sheets of newspaper and adding a layer of compost (see photo left) or composted manure. This is an effective weed barrier, and the newspaper will break down over time and add carbon to the soil.
- > **Plant a cover crop.** Many vegetable seed catalogs also offer cover crop seeds. After crops are harvested, clean up the area by clipping the stem at the soil surface — leave those roots in place! Pulling roots disturbs the soil and takes fresh organic material out of the soil. Hand scatter the seeds or use a spinner spreader for large areas. Then gently scratch the top inch of soil with a garden rake to work in the seeds and ensure good seed-to-soil contact. Try to plant the cover crops just before a soaking rain (or water after planting.)
- > **Choose a cover crop mixture** if possible, but choose wisely. Mixes can generally be planted up to a month before a killing frost. If you want to avoid using a herbicide in the spring, select species that will frost kill over the winter (e.g., oats, buckwheat, radishes, or turnips). But to maximize the system, plant species that will survive the winter (e.g., cereal rye, wheat, crimson clover, or winter peas). Avoid annual ryegrass, as this species is hard to control without hand pulling or using a herbicide. Cereal rye is the best option for mid-to-late-fall planting.

PLANTING GREEN

To maximize the value of the cover crops in the spring, continue to let them grow until planting time. They can be cut with a weed eater or hedge trimmers as close to the soil surface as possible. They will be killed more effectively if they are mature and close to the flowering stage. If the grass species are not close to flowering when they are cut, there may be some secondary growth, but a second cutting of the regrowth efficiently manages this. The stems and leaves can be used as mulch to control weeds and keep the soil moist. Mulch also provides excellent habitat for beneficial insects such as ladybugs, praying mantis, ground beetles, and spiders.



25

Healthy soils can have as many as 25 worms per cubic foot. Worms are nature's tillage equipment and are essential for no-till gardening.

IT'S ALL ABOUT THE SOIL MICROBES

- > Legume crops such as beans and peas host bacteria on their roots. These bacteria can **fix atmospheric nitrogen** and convert it to a form that plants can use.
- > Plants make simple sugars through **photosynthesis**. These sugars leak out of the roots to feed soil bacteria and beneficial fungus.
- > **Mycorrhizal fungi** form partnerships with plant roots to supply water and nutrients. It is also essential for creating good soil structure and well-drained soils.
- > After tillage, bacteria populations increase and start **eating the soil carbon** stored in organic matter. This is bad!

NO-TILL GARDENING WITHOUT COVER CROPS

It may be easier to skip the cover crops and focus on reduced tillage if you're starting with this type of gardening. Even though cover crops provide a significant boost to building healthy soils and improving the soil structure, they take more effort to manage. You can ease into this system by first eliminating full tillage. By not tilling the soil, all the worm channels that help with water drainage are preserved, beneficial mycorrhizae fungus populations will increase, and the soil structure will improve over time.

In the fall or early spring, spread a six-inch layer of old hay or straw on the surface. In areas with heavy weeds, a layer of cardboard can be placed under mulched areas. This will smother the weeds and provide a thick layer of mulch for planting into. Be aware that the thick mulch may keep the soils cooler and wetter, so you may need to delay planting later than typical planting dates. Be sure to mulch a second time in the fall after harvest.



Photo courtesy of Kevin Brown, Bradford County Conservation District