



**CORNELL
COOPERATIVE
EXTENSION OF
ONEIDA COUNTY**

HOME GROWN FACTS

121 Second Street, Oriskany, NY 13424-9799

(315) 736-3394 or (315) 337-2531

FAX: (315) 736-2580

Soil Basics

With gardening, it all starts with the soil. It's your key to success. If you're new to gardening—or even if you're not—here's a checklist of things to keep in mind when starting a garden or taking care of the on-going need to improve your soil.

Plan ahead. If you plan to plant a flower or vegetable garden, the time to get started improving your soil is the fall before you plant (if not earlier). It takes time to build healthy soil, but you and your plants will be much more satisfied with the results than if you wait until the last minute just before you want to plant.

Check the drainage. Most plants like soil that is well-drained, so avoid locating gardens and planting beds in places where water pools and stands after heavy rains. Hard layers under the topsoil may be preventing water from draining away. To find out, try probing the ground with a metal rod or digging into the soil with a shovel. If for other reasons a poorly drained spot seems attractive, you may be able to break up the hard layer so water won't collect, or build raised beds to help keep plant roots out of standing water.

To test drainage, dig a whole about 1 foot deep. Fill with water and allow it to drain completely. Immediately refill the pit and measure the depth of the water with a ruler. Fifteen minutes later measure the drop in water in inches and multiply by 4 to calculate how much water drains in an hour.

Less than 1 inch per hour is poor drainage, indicating the site may stay wet for periods during the year. Plants that don't tolerate poor drainage will suffer. One to 6 inches of drainage per hour is desirable. Soils that drain faster than 6 inches per hour have excessive drainage, and you should consider choosing plants that tolerate dry conditions and "droughty" soils.

Observe the existing vegetation. Does your potential garden spot currently support a healthy lawn; or if it's a neglected site, a robust population of weeds? If the existing vegetation is weak, it may be a sign that you will have to work harder at improving the soil so your plants will thrive.

Helping You Put Knowledge to Work

Cornell Cooperative Extension provides equal program and employment opportunities. NYS College of Agriculture and Life Sciences, NYS College of Human Ecology, and NYS College of Veterinary Medicine at Cornell University, Cooperative Extension associations, county governing bodies, and U.S. Department of Agriculture, cooper-

Explore the soil. Take a shovel and dig around your potential garden area and explore the soil. Can you dig down 8 to 12 inches or more without hitting hard layers? Do roots from existing plants penetrate that far? The deeper they can go the better, but it's the top 6 to 8 inches of soil where you need to focus your attention on soil improvement. Look for earthworms and other signs of healthy soil life.

What color is your soil? You can tell a lot about soil just by looking at its color:

- **Dark soil:** In general, the darker the soil the more organic matter it contains. Many garden plants perform better in soils that are high in organic matter.
- **Brown-red:** This is usually a sign that the soil has adequate air and good drainage.
- **Blue-green or gray:** This is usually a sign that the soil is continuously wet or saturated, a condition that's not good for most garden plants.
- **Yellow:** This is usually a sign that the soil is imperfectly drained.
- **Mottling or streaking:** This is usually a sign of seasonal or periodic drainage problems.

What's your soil's texture? At one extreme, soils can be like porous beach sand. At the other end of the texture spectrum, they can be like sticky modeling clay. Neither extreme is ideal, but you need to know your soil's texture to know the best ways of helping your plants thrive.

Test the soil. Contact your local Extension office for information about soil testing. Basic soil tests can tell you whether or not you will need to apply lime or sulfur to adjust the acidity of your soil and let you know whether your soil is high or low in the essential nutrients plants need most. If you plan to grow edible plants in an urban area (or near a building where lead-based paint chips may have contaminated soil), it's important to test for contaminants.

Other site considerations. Before you settle on a garden spot, consider other aspects of your site. Avoid steep slopes unless you will be installing terracing. (Otherwise, soil not protected by mulch or vegetation can wash away.) Keep in mind that most vegetables and many flowers need 6 or more hours of direct sun each day. Also avoid areas where there are tree roots, septic systems or underground utilities. If you are planting trees, make sure that overhead wires won't be a problem.

Mark the boundaries. Once you've settled on a site, mark the boundaries to distinguish your garden from lawn. Stakes and string work well for straight edges. Use a hose or heavy rope for curved beds. Or you can mark the edges with a little lime, flour, or special landscape spray paint. It's a good idea to live with the marked off beds for a few days or weeks if you have time. As you navigate through your yard, you may discover that their boundaries need adjusting. Before you start preparing the soil, make sure you haven't committed yourself to too big an area. It's better to start small and focus your efforts, then expand your garden as you gain experience.

Kill existing vegetation. If you're growing vegetables or flowers, one of the first things you need to do is kill the existing lawn or other vegetation that would otherwise compete with your plants. You have several options. You can:

- Cover the area with black plastic for a month or more, and then work the dead vegetation into the soil with a tiller or hand tools. (This works faster during summer.)
- Cover the area with newspaper (five sheets or more thick) or cardboard. Cover this with a thick layer of straw, grass clippings, or other organic material. This will smother the sod in a month or more, then you can work in the dead vegetation, newspaper and/or cardboard and organic mulch with a tiller or hand tools. (This works faster during summer.)
- Use a nonselective herbicide. In a few weeks, after the vegetation is completely dead, you can work it into the soil.
- For small areas, turn over sod with a shovel and then kill weeds and grass with a hoe as they regrow. For larger areas use a tiller to work in sod and regrowth as it occurs until the vegetation is suppressed. Careful: Over-tilling can hurt soil.
- Remove grass sod with a flat spade taking the top several inches of soil with it. Replace with purchased topsoil and other organic materials. (Using purchased topsoil may only be practical for small areas.) You can compost the sod and add it back to the soil later.

Add organic matter. Whether you are trying to get a heavy clay soil to drain better or light sandy soil to retain water and nutrients, one of the surest ways of improving your soil is to add organic matter. Spread 2 to 4 inches of compost or well-rotted manure, for example, and work it into the soil after you kill the vegetation. Make additional applications as often as you can. Grass clippings, leaves, organic mulches, peat moss, and topsoil are other good sources of organic matter. Adding sand to clay soil will not make it drain better. When you mix sand and clay with water and then allow the mix to dry, the result closely resembles concrete.

Add other materials. While you are adding organic matter to your soil, mix in any fertilizer, lime or sulfur that you need. Your soil test should offer recommendations for how much to apply. Be careful not to over-fertilize. More is not always better.

Avoid compaction. You've worked hard to make your soil nice and fluffy and hospitable to plants. Don't ruin it by compacting it. When it's wet, avoid walking on the soil or working it with hand tools or tillers. Create permanent paths separating wide (3 to 4 feet) planting beds, and only walk in the paths. If you make wider beds, place stepping stones strategically to help you reach areas for weeding or maintenance without walking on the soil.

Continue adding organic matter. Every summer, microbes in the soil literally digest and burn up some of the organic matter in the soil. You need to keep adding more to keep improving your soil. In vegetable gardens, consider planting cover crops such as buckwheat, annual ryegrass, clover or winter rye. You grow these crops to protect the bare soil after you harvest vegetables, then till them in as another source of organic matter.

*This publication may contain pesticide recommendations. Changes in pesticide regulations occur constantly and human errors are still possible. Some materials mentioned may no longer be available, and some uses may no longer be legal. All pesticides distributed, sold or applied in New York State must be registered with the New York State Department of Environmental Conservation (NYSDEC). Questions concerning the legality and/or registration status for pesticide use in New York State should be directed to the appropriate Cornell Cooperative Extension Specialist or your regional NYSDEC office. **Read the label before applying any pesticide.***

DISCLAIMER: *Please note that neither Cornell Cooperative Extension of Oneida County nor any representative thereof makes any representation of any warranty, express or implied, of any particular result or application of the information provided by us or regarding any product. If a product is involved, it is the sole responsibility of the User to read and follow all product labeling instructions and to check with the manufacturer or supplier for the most recent information. Nothing contained in this information should be interpreted as an express or implied endorsement of any particular product or criticism of unnamed products. With respect to any information on pest management, the User is responsible for obtaining the most up-to-date pest management information. The information we provide is no substitute for pesticide labeling. The User is solely responsible for reading and following the manufacturer's labeling and instructions. (October 2009)*

Updated: 2010

Source: <http://www.hort.cornell.edu/gardening/factsheets/misc/soilbasics.html>