

Ohio State University Extension Fact Sheet

Improving Soils for Vegetable Gardening

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Vegetable plants grow best in a fertile, well-drained soil of loamy texture. Sandy loam soils, well-supplied with organic matter, are easily worked and are quite productive. Unfortunately, many gardens do not contain such soils.

Very coarse, sandy soils dry out rapidly and are difficult to maintain at a high level of fertility. Clay soils are hard to work and usually remain wet until late in the spring. These soils are often yellow or dark brown and sticky when wet; or grayish in color where drainage is poor. Clay soils tend to form a hard crust after a heavy rain and become so compacted that the plant's root system is deprived of essential oxygen required for growth. Clay and sandy soils must be modified for successful vegetable gardening.

Basic Considerations

To obtain a desirable soil for gardening, consider the following areas of concern: water drainage, moisture condition at the time of working, erosion, texture and structure, fertility, and pH (acidity or alkalinity).

Water Drainage

Satisfactory vegetable production cannot be expected on poorly-drained soils. Where drainage problems exist, and where an outlet is available, four-inch drain tile in lines 25 feet apart is suggested. The tile should be at least 2 feet deep. The fall in the lines will depend on the outlet and length of lines, but water needs a fall of at least 2 inches per 100 feet of line.

In many home gardens, improving subsurface drainage with tile lines is not practical. Therefore, surface drainage is very important. The surface should be graded so that excess water will be removed promptly, but in a controlled manner, to prevent erosion. Leveling will eliminate pockets and low spots where water tends to stand for long periods. Adding organic matter to clay and clay-loam soils will also improve drainage and aeration.

Another option for dealing with poor drainage, is to grow the vegetables in raised beds or on planting ridges. However, keep in mind that proper water management during periods of drought may be more difficult in raised beds. See Home, Yard and Garden fact sheet 1641-92 for more details on raised-bed gardening.

Moisture Conditions at Time of Working

Many anxious gardeners work the soil in early spring when it is still too wet. The soil should not be tilled or spaded until it is sufficiently dry to crumble when worked. Experienced gardeners often use the "squeeze" test to determine if the soil is ready. With a spade, turn over a slice of soil about 6 inches deep. Pick up a handful of soil and squeeze it. If the soil remains in a tight ball when pressure is released, wait several days (without rainfall) before spading or tilling. If the soil crumbles when pressure is released, it is ready for working. Soils high in clay content are easily damaged if worked when wet.

Erosion

Some clay soils benefit from fall tilling or spading. Such soils will be loose and fluffy in the spring as a result of the conditioning effect of freezing and thawing that takes place in the winter. Fall-worked soils often require only leveling and a light raking in the spring before planting. Be cautioned, however, that such fall-worked soils can be compacted quite easily if worked too wet.

Texture and Structure

Soil texture and structure can be modified by using soil conditioners. Soil conditioners act to improve soil aeration, drainage, moisture-holding capacity and tilth, or workability, of the soil. Commonly used soil conditioners include compost, peat moss, sawdust, wood chips, composted animal manures, green manure crops, coarse sand, and perlite. By incorporating coarse, rather than fine sand, and organic matter into a garden soil, the gardener can, over time, produce a desirable loamy-type soil. The addition of fine sand to some soils, especially clay, however, will be detrimental to the soil structure.

A common mistake made when attempting to improve garden soil is failing to use enough soil conditioning materials. For chiefly clay or sandy soil, large amounts of conditioners must be used to effectively improve texture and structure.

Condition the soil by applying 3 to 4 inches of organic matter and, if available, 1 to 2 inches of coarse sand uniformly over the surface of the garden. Till or spade the material thoroughly into the top 8 to 10 inches of soil.

Avoid Temporary Nitrogen Deficiency

Organic materials such as straw, fresh sawdust, wood chips, and shredded bark require the addition of nitrogen fertilizer when they are incorporated into the soil. The nitrogen provides extra nutrition for microbes decomposing the added organic matter, preventing a temporary nitrogen deficiency in the vegetable plants.

Apply 1/4 lb. of ammonium nitrate or ammonium sulfate for each bushel of mulch material; or 2 lbs. per 100 sq. ft. of a complete fertilizer, such as 5-10-5, 8-8-8, 12-12-12 or similar analysis. If there is any yellowing of the lower foliage and garden plants lack vigor during early summer, apply additional nitrogen fertilizer.

Use of Cover Crops

Garden soils benefit by being protected by a winter crop such as rye or ryegrass (or winter barley in southern Ohio). Rye is preferable for late (after September 15) cover crops seedings.

Cereal rye and barley are seeded at a rate of 1/3 lb. per 100 sq. ft. of garden area. Ryegrass is a suitable soil cover crop, but should be seeded before September 15 for best results. It is seeded at a rate of 3 oz. per 100 sq. ft. or 1 and 1/2 to 2 lbs. per 1,000 sq. ft.

Cover crops prevent soil erosion and add organic matter when turned under in the spring. However, such crops should be turned over before growth is so tall they are difficult to handle. Cover crops may be seeded between garden rows in August through September, even if vegetables are not yet harvested.

Soil pH

A soil test should be made to determine if limestone is needed to adjust the pH of the soil. Most vegetables grow best under slightly acid conditions with a pH of 6.0 to 6.8. Contact your local Cooperative Extension office for information on getting your soil pH tested.

Other information is available at:

<http://www.garden.org/subchannels/care/soil?q=show&id=688&page=1>

<http://organiclifestyles.tamu.edu/publications.html#soil+>

<http://www.food-from-the-garden.com/soil-improvement.html>