Where great gardens are grown everyday!
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Improving Your Soil for Healthier Plants

What is Healthy Soil?

Healthy soil contains the right proportions of air, water, minerals, and organic matter that plants need for growth.

Soil Structure

This determines how water drains and is held in the soil, the amount of air space, and if nutrients are easily released for use by plants. Add organic matter to improve soil structure: 1" of fine compost or manure per year, 3-4" of bulkier materials like straw or leaves. (Turn leaves, other non-composted material into your garden in the fall, so it will have broken down by the time you plant in spring.) Avoid compacting soil by walking on your garden beds, or working soil when it is wet.

Nutrients

Plants need macro-nutrients like nitrogen, phosphorus, potash (the N-P-K in fertilizers) calcium, magnesium and sulfur to thrive, and other minerals in smaller amounts (iron, manganese, copper, zinc and others). The availability of nutrients in the soil is affected by ground and air temperatures, moisture levels and soil pH. Organic fertilizers slowly break down in the soil and make nutrients available to plants as they need them.

Have your soil tested by the University of Minnesota (information: 612/625-3101, http://soiltest.coafes.umn.edu/index.htm) to determine the percentages of nitrogen, potassium and phosphorus present in your garden, amount of organic matter, and its PH. Add amendments to your soil to replace missing nutrients.

Soil Amendments

Fertilizers

Many types of fertilizers are available for various types of plants. General purpose fertilizers will provide the basic nutrients your plants need in few applications. Always follow directions on the package to make sure you do not harm your plants

Organic Fertilizers

Apply dry organic fertilizers in spring before planting, in amounts recommended on the package. Spread evenly over your garden and work them into the top 4-6" of soil. Common organic sources of macro-nutrients are:

> **Nitrogen** Cottonseed meal, alfalfa meal, blood meal, fish emulsion and fish meal, soybean meal, animal manure, coffee grounds

Phosphorus Bonemeal, phosphate rock

Potash Granite dust, greensand, kelp meal

Calcium Eggshells, gypsum, limestone

Magnesium Epsom salts, limestone

Compost

Compost is a combination of organic matter that is decomposed to form humus. It improves soil structure, helps retain moisture and contains a balance of macro-nutrients. Add 1" of fine compost each season (more if you need to improve soil structure), or use compost as a mulch.

Make compost in your garden or backyard from plant waste and food scraps. Combine "green" materials like veggie peels and grass clippings with "brown" materials like leaves and dead plants, add water and let microorganisms such as bacteria and fungi break down your plant wastes.

Layer green and brown materials, with a little soil between layers, and water so pile is the consistency of a wet sponge. Periodically turn the layers with a pitchfork to provide air and speed decomposition. A properly constructed and maintained compost pile will not smell. Your compost is ready to use when it looks like soil. Do not add the following to your compost pile: animal wastes, meat scraps, fats or oils.

Animal Manure

Animal manures provide nutrients and organic matter. They must be well composted before using in the garden, or you risk damaging your plants. Look for a crumbly texture and pleasant smell. Apply 1" on top of your garden and turn into the soil.

Using Cover Crops to Fertilize

Cover crops, also known as green manures, are any green plant tilled back into the soil. Cover crops can add nitrogen and organic matter to the soil, catch nutrients and moisture that have leached deep into the soil, loosen compacted soil and reduce soil erosion over winter. They may be planted in late summer/ early fall to mature in the following spring, or sown in spring and used as living mulch.

Resources:

www.organicgardening.com

Soils & Composting
www.extension.umn.edu/distribution/horticulture/DG3899.html

www1.extension.umn.edu/garden/yard-garden/soils