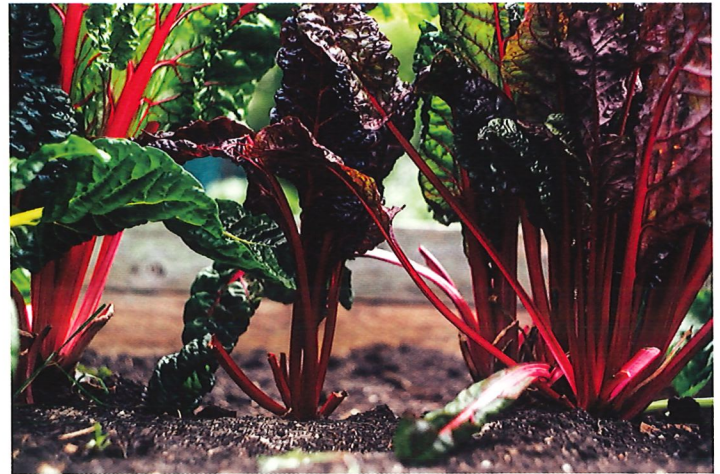


Smart Gardening: Smart gardens begin with healthy soil

Bob Bricault, Michigan State University Extension

Cultivating a robust vegetable garden or a dazzling flower bed starts with healthy soil. Soils are a combination of different-sized mineral particles, organic matter and living organisms. The non-living or mineral part of the soil is made up of sand, silt and clay. Sand is the largest of the three particles and is big enough for us to feel and see. Silt and clay, however, can be over 100 times smaller than sand. The proportion of each of these particles mixed with the living or organic component creates that magical ingredient to gardening success - soil!



What do healthy soils provide to plants?

Some of the beneficial aspects of healthy soils include:

- A physical composition that provides a place for the plant's roots to anchor.
- A reservoir for essential nutrients and water that promotes plant growth.
- Pore spaces that allow oxygen movement needed for healthy roots, nutrient uptake and support of living organisms.
- Organic matter that sustains the living component of the soil and releases nutrients as it breaks down.
- The promotion of plant health and resistance to disease and decline.

What is healthy soil?

The organic content is a critical key to healthy soil, whether the soil is primarily sand or clay. Clay soils, with their minute particles, have very tiny pore spaces that drain slowly. This slow draining can leave soils saturated with water, reducing space for oxygen. Since oxygen is a key element necessary for growing plants, any soil with poor drainage can lead to damage or death of the plant.

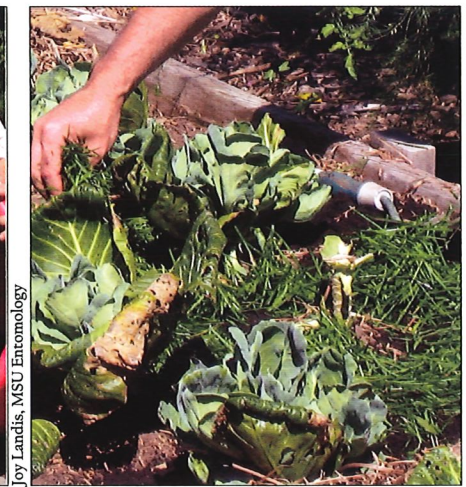
Organic matter acts as glue, holding soil particles together, creating larger pore spaces needed for



Too much clay causes soils to drain slowly, leaving soils saturated with water and little space for oxygen.



Organic matter can be increased by spreading compost or top soil around garden plants.



Grass clippings are another option to add more organic matter in vegetable gardens or flower beds.

oxygen and water exchange. Sandy soils often have too large pore spaces between particles, reducing the soil's ability to hold water and nutrients. Organic matter when added to sandy soil helps to hold moisture and makes nutrients available for plant use.

How much organic matter do I need?

Organic matter in soils can range from 5 percent to as high as 15 percent. Soils with less than 5 percent of organic matter tend to be less productive, often promoting deficiencies in plant tissues. Organic matter can be added to soils through composting, including well-composted animal manure, chopped up leaves, grass clippings and organic mulches, or by planting cover crops.

How to determine your soil's organic matter content, soil pH and nutrients

A soil test from Michigan State University Extension for a home garden will provide a measure of the organic content of the soil as well as information on soil type, nutrients, soil pH and recommendations to improve the soil. An annual application of compost, leaf mold and other material may be recommended to maintain ideal levels of organic matter that is slowly depleted each year by micro-organisms. If the soil has less than 3 percent organic matter, spread about 1 inch of fresh organic matter (3 cubic yards of organic amendment per 1,000 square feet) to help keep levels stable in the soil. Soil test self-mailers and information on how to take a soil test are available at www.msusoiltest.com.

The MSU Extension publication "Advanced Soil Organic Matter Management" recommends using a diverse mixture of organic matter residues which will provide some materials that are slow to break down along with others that release nutrients more easily. To order this publication, go to www.bookstore.msue.msu.edu and search for the title.



Christopher Porter, Flickr.com

Purchasing a load of top soil may be necessary if covering a large area.

Cover crops or green manures are plants specifically grown as a ground cover to be tilled under while still in a green, vigorous stage to add organic matter and nutrients back into the soil. Legumes like clover and hairy vetch have the ability to fix nitrogen for plant use which adds the nitrogen in organic form back into the soil for future crops. For more information on gardening with cover crops, read the Cornell fact sheet "Improve Your Soil with Cover Crops" at <http://bit.ly/Garden-covercrops>.

For more information on a wide variety of Smart Gardening articles, or to find out about Smart Gardening classes and events, visit www.migarden.msu.edu.



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For more information on a wide variety of Smart Gardening topics, visit www.migarden.msu.edu or call MSU's Lawn and Garden hotline at 1-888-678-3464.

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Don't guess - soil test! Get your Home Lawn and Garden Soil Test kit today

Rebecca Finneran, Michigan State University Extension

Plant scientists know that lawn and garden plants require 18 nutrients for healthy, productive growth. Your lawn and garden "soil environment" is a reservoir that houses these nutrients, providing the platform for plant roots to acquire them. Understanding each individual plant's needs and the type of soil you have is the first step in properly managing soil fertility.

Often our lawn and garden soils are rich and productive, needing little or no enhancements. Others may be poor soils or depleted, needing to be replenished. Approaching plant care without conducting a baseline soil test may put gardeners at the risk of over fertilization. This not only can have negative effects on plant growth and create an imbalance in the soil environment, but can also lead to pollution of local water resources.

Michigan State University Extension provides an easy-to-use [soil test kit](#) that can be purchased online from the [MSU Extension Bookstore](#) (www.shop.msu.edu) or from your [local county MSU Extension office](#).

The **Home Lawn and Garden Soil Test Mailer** can be used to process any type of home soil sample, such as lawn, vegetable garden, tree, shrub, flower, and tree or small fruit. Based on your soil test results, you will receive a custom fertilization program to meet the needs of your plants and safeguard the environment. The cost of this mailer is \$25 plus shipping and handling fees. This mailer may also be available for pick-up at your local MSU Extension county office.

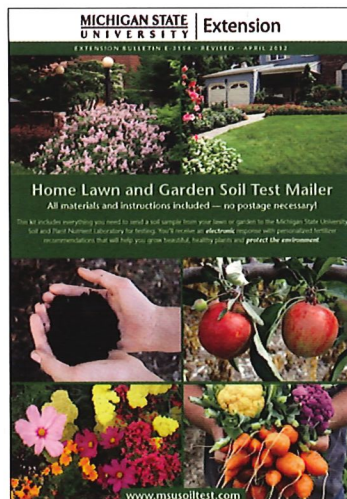
Why should I soil test?

- **Know your soil.** Soil testing is an important diagnostic tool to evaluate nutrient imbalances and understand plant growth.
- **Understand.** The most important reason to soil



test is to have a basis for intelligent application of fertilizer and lime.

- **pH.** Testing allows homeowners to adjust soil pH to the optimum range (6.0-7.0), which makes nutrients more available for plant growth.
- **Protection of our environment.** Avoid contaminants that can enter our surface and ground waters by over-application of phosphorous or nitrogen fertilizers.
- **Cost savings.** Why apply what you don't need? Soil test results provide information about the soil's ability to supply nutrients to plants for adequate growth and are the basis of deciding how much lime and fertilizer are needed.



What will I find out from my soil sample?

Home Lawn and Garden Soil Test Mailer results will determine your soil type, pH, level of organic matter and provide you with a reading for

nutrients including phosphorus, potassium, calcium and magnesium. The results will also provide a recommendation for nitrogen and will determine how much lime should be applied based upon the type of plant you specify.

How long before I receive my test results?

You should receive test results in about two weeks. The lab analysis takes three to five working days from the time samples are received. Remember, MSU recommendations are in pounds of nutrient needed, not pounds of fertilizer to be applied!

Your results will also include an area calculator that helps you determine how many square feet you need to apply fertilizer.

How do I take a soil sample?

- Determine which one lawn or garden area you would like to test. Don't combine these soils.
- Using a spade or trowel, collect 10 random soil samples from the area



Mary Wilson

- and place in a clean pail.
- Each sample should be a slice of soil as deep as the plant roots go (3 to 4 inches deep for lawn; 7 inches deep for gardens and all other plants).
- Remove plant debris, roots and thatch from the sample.
- Combine the 10 random samples in the pail, mix thoroughly and remove approximately

1 cup of mixed soil. If the soil is wet, spread it on paper and allow it to air dry overnight before filling the sample bag. Do not use artificial heat as it will skew test results.

- Fill the re-closable plastic bag included in the Soil Test Mailer with your dry soil and seal carefully.
- Place bag inside the white, postage-paid envelope and put in your mailbox for pick up.

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www.migarden.msu.edu.



Fertilizer basics for the smart gardener

Rebecca Finneran, Michigan State University Extension

Soils that contain adequate amounts of nutrients will enable gardeners to produce healthy plants. The nutrient requirement varies with each species. For certain crops such as trees and shrubs, Michigan soils provide abundant nutrients with little need for supplemental fertilizer. However, in some cases where a plant exhibits a deficiency or to ensure production of a crop with high nutrient requirements, fertilizers can be applied to enhance growth.

Deciding what type of fertilizer to buy can be confusing, but choosing the right one will help ensure successful plant growth. In general, there are two classes of products available to home gardeners: naturally derived and synthetic. Naturally derived (sometimes called natural organic) and synthetic fertilizers have different characteristics, variability in cost and availability to the plant.

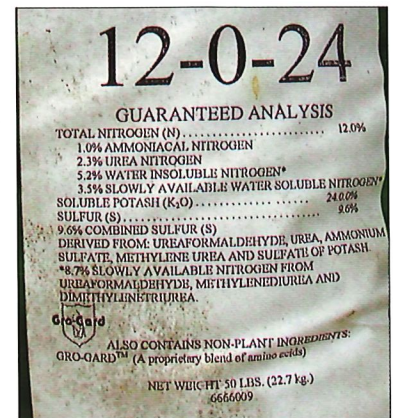


Pelletized or slow release forms of fertilizer can be used easily and have a high level of safety from over-application.

as a top dressing. Unless specifically designated as “slow release,” these products are quickly available for plants to take up once watered in. This makes this type of fertilizer especially useful for short-season, high need crops such as vegetables.

Pelletized fertilizer consists of granules that are

uniformly coated so they are easy to handle and spread, but tend to be more expensive. Either of these may have slow-release granules incorporated into the products or may be 100 percent slow release. A slow-release fertilizer has the advantage of being available to the plant over a much longer stretch of time. Formulations generally are sold to represent a three- to four-month window or five- to six-month window.



A wide variety of granular fertilizers with the nutrient analysis clearly printed on the label. Many are for specialty crops such as a lawn.

All photos Rebecca Finneran

Synthetic granulated fertilizers

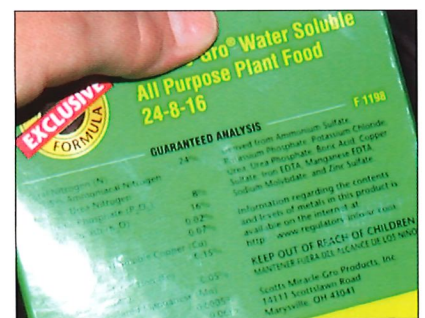
Synthetic, granulated fertilizer is commonly found in garden stores and products may list a specific target crop such as a lawn. Simple formulations are relatively inexpensive and easy to spread using a commercially available fertilizer spreader or by hand

Soluble fertilizers

Soluble fertilizers are sold as concentrated liquids or solids and are formulated to be diluted with water and applied directly to the plants. Nutrients in this form become available quickly to the plant and are used to augment plant growth for immediate response or to correct a deficiency. This very useful type of fertilizer is relatively low cost and most often used in tandem with a slow-release type of fertilizer.

What determines an organic fertilizer?

The term organic as defined by a chemist versus a home gardener may not be the same thing. Organic compounds contain the element carbon, which would represent naturally derived sources of fertilizer as well as urea, a synthetically derived fertilizer. Generally speaking, products that are composed of organic matter such as



Soluble fertilizers are sold in either solid form or as a liquid. Both are intended to be diluted with water according to the label.

composted animal manure, bone meal or leaf litter are accepted as “organic” by gardeners.

One of the advantages of using a naturally derived fertilizer is their ability to release nutrients slowly to plants. This is especially helpful to plants that live for more than one season, such as perennials, woody trees and shrubs, etc. Natural organic fertilizers will not quickly correct a nutrient deficiency and may not supply enough nutrients for crops such as



Many varieties of organically derived fertilizers are available which may have a lower analysis, but are also slow release and non-burning to plant material.

tomatoes that utilize larger amounts of fertilizer for optimum performance.

The second advantage of using a naturally derived fertilizer is its positive impact on the soil’s ability to hold nutrients, water and air. Because of the time involved in producing these products, they can often be more costly.

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Composting: A smart gardening practice to recycle garden and yard waste

Rebecca Krans, Michigan State University Extension

Composting lets smart gardeners use chemistry to produce their own garden soil amendment. Some consider it black gold! Compost is decomposed organic material such as leaves or vegetable scraps that, once broken down, turns into humus and resists further breakdown. Decomposition takes place through the work of microscopic organisms including fungi and bacteria, and larger organisms like earthworms, sow bugs, millipedes and many more.

Composting is a smart gardening practice because it recycles and reuses valuable nutrients through organic matter returned to the garden. Using compost in your garden will benefit soil health by improving tilth, increasing water retention and creating air pockets for plant roots to grow. It is a free source of organic matter or natural fertilizer for your garden!

Interested in trying composting? The amount of time and effort you'd like to spend recycling your garden waste will help you choose whether to use a "cold" or "hot" composting method.

Cold composting – easier but slower

If you don't care if you get finished compost within one growing season, cold composting is likely for you. Simply pile up your yard and kitchen vegetative material as it becomes available and let nature take its course. If you mix it occasionally and it has a moist sponge consistency, then you should have some usable composted material the following season.

Hot composting – a smart, faster pile

For hot composting, locate your compost pile near a water source where it is convenient to transport



All photos Rebecca Finneran, MSUE

Compost as a sidedressing on cabbage.

the finished compost for use in the garden. Make sure the ground is level so water will drain evenly from the pile. The size of your pile should be no more than 4 feet by 4 feet. Anything larger will make it difficult to get in and mix it. Make sure you can easily access one side so you can mix the pile from ground level. You can buy one of the many different compost bins sold by retailers, or create your own from various materials.

The hot composting technique usually produces compost within six to eight weeks. To be successful, you will need to provide the microorganisms in the pile with the materials they require to complete the process of decomposition: food, water, proper temperature and oxygen. Usable food materials are referred to as "brown or coarse" (carbon source-C) or "green" (nitrogen source-N). Browns include any coarse, dried vegetative material such as twigs, straw or dried grass stalks. Greens include kitchen wastes (except meat and dairy as



Compost ready for use in the vegetable garden.

these take longer to break down and tend to attract critters), grass clippings, weeds and other green vegetative material. It's always a smart practice to pull weeds before they set seed, reducing the chances of spreading those weeds.

The recommended ratio of mixing browns to greens is 2:1 or 3:1 (C:N). Start your pile by piling up two times the amount of browns (by volume) to greens. Follow the browns with one amount of greens. On top of this layer, sprinkle some existing soil or compost to supply the necessary microbes. Wet this layer so it's moistened, but not oversoaked. Continue to layer, add soil or compost, and water this way until the bin is full.



Homemade compost bin made of boards with one side accessible.

Make sure you thoroughly mix the pile weekly using a garden fork, moving the outer layer to the inside and vice versa. Frequent mixing allows adequate oxygen to be added to your pile. This insures aerobic or oxygen-loving bacteria are doing the decomposing and, therefore, your pile should not stink, but have an earthy smell.

Check the moisture level of the pile and add water if necessary. Too much water in your pile can also reduce the level of oxygen and invite oxygen-deficient bacteria and a foul odor. When your pile is actively decomposing, a handful of the compost should have the consistency of a wet sponge with only a few drops able to be squeezed out.

Smart composting options

If you would like to have a continuous supply of compost, consider a three bin system. Once one bin is full and decomposing, you can work on filling another. When you reach the third bin, you can use the finished compost from the first bin. Visit MSU's www.migarden.msu.edu to view [composting videos](#).

Use your finished compost as a 3-inch layer of mulch around herbs and annuals, or a 6-inch layer around perennials, trees and shrubs. Not only will it provide nutrients, but it will help decrease topsoil erosion, reduce evaporation from the soil surface and create a more even soil temperature. You

can also mulch around or sidedress your vegetables with the compost.

Although composting takes some extra effort and planning, the finished product is a free source of organic matter and nutrients that, when returned to your garden annually, will reward you with improved soil health and lush garden plants. The nutrients in the compost will be released slowly throughout the growing season, providing valuable food and shelter for the various microorganisms and insects that continue breaking it down.

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