

## *Sustainable Agriculture*

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### Soil Fertility and Organic Soil Management

"I suspect that the insects which have harassed you have been encouraged by the feebleness of your plants; and that has been produced by the lean state of your soil."

Thomas Jefferson

#### Know Your Soil

The soil is the focus of an organic farm. Any time spent to improve the quality of your soil will show in the health of your crops and the quality of your produce. These are the major elements of your soil that you need to be aware of:

#### Structure:

A good soil will have a light, loose, crumbly texture. All soils are made of some combination of sand, silt and clay. There is not much a farmer can do to change the basic nature of their soil type, but they do have control over the:

#### Organic Matter:

Organic Matter is made of broken down bits of plants and animals. Regular additions of organic matter will improve the structure of any soil type. Organic Matter will help to attract and hold nutrients in the soil and will improve both the drainage ability and the water holding ability of your soil.

#### Biological Activity:

Earthworms are a good indicator of soil health, but the real workhorses in a healthy soil are the billions of microscopic fungi and bacteria and other creatures that live there. These beneficial organisms break down organic matter and minerals into nutrients that plants can use. They can extract nitrogen from the air for use by your plants. They have been shown to actually coat the surfaces of plant roots and leaves, creating a physical barrier between the plants and potential disease organisms. We are just beginning to understand what goes on down there, but this much is clear - a healthy organic farm needs these creatures in the soil.

#### Minerals and Nutrients:

Certain minerals and chemical properties have been shown to be necessary for healthy plant growth. A good soil test will indicate minerals and nutrients that may be missing in your soil. It will also indicate the acidity (or pH) of your soil. Balancing these properties will improve many other aspects of your soil's health.

#### Air and Water:

Good soil structure will allow both air and water to move freely through the soil - feeding both the soil life and your plants

#### Improve Your Soil

Regardless of your soil type or condition, the time to start improving your soil is now.

#### Test Your Soil:

Your county extension agent can provide a free (or very low cost) soil test that will give you some basic information about your soil. For a more detailed soil test with organic recommendations, you will pay a small fee. For a list of labs, contact ASD.

Soil tests will give you a good idea about the mineral elements in your soil. Imbalances are generally easy to correct with applications of ground rock powders. ASD staff are available to help interpret your soil tests.

# Appalachian Sustainable Development

## Add Organic Matter:

Organic matter will feed the biological life in your soil, improving both its health and its structure. Organic matter in the soil will help to increase the pore space in your soil (improving the movement of both air and water), the ability of your soil to hold nutrients and the ability of plant roots to spread deep into your soil.

There are many ways to increase the organic matter in your soil including:

**Adding Compost** - Compost is the end product of a carefully managed pile of plant materials and/or animal manures. A "finished" compost will be dark and crumbly with a rich, earthy smell. It is alive with a host of microorganisms and, when added to your soil, improves the health and structure of the soil almost immediately.

Good compost is not hard to make, but it does require time and careful monitoring. The benefits of a good compost should far outweigh the time and trouble of making it.

**Growing Cover Crops and Green Manures** - These are crops grown on your land that are not intended for harvest, but directly for soil improvement. As they grow, the root systems of cover crops help to loosen packed soils, and many cover crops can take nitrogen from the air and deposit it in the soil for your crops to use later. All cover crops, when tilled or disked into the soil, add organic matter - some add incredible amounts.

Buckwheat is a summer cover crop that grows quickly and "mines" phosphorus from deep within your soil. Rye and Vetch are common fall planted cover crops that can help stabilize and protect soils from winter and spring erosion. Clovers and Alfalfa are perennial cover crops (they require a full season or more to be most beneficial) that can both break up compacted soils and "fix" nitrogen for your later crops.

If you plan to follow a cover crop with a production crop, you need to allow at least two weeks to a month after tilling or disking the cover crop before planting. This gives the cover crop time to be broken down by your soil critters. If you plant too soon, your crop can get off to a slow start.

**Using Certified Organic Fertilizers or Animal Manures** - Organic Fertilizers are generally derived from animal manures, and will feed your crop while also adding some organic matter to your soil. And, because the organic matter in your soil helps to hold the nutrients in place, you generally don't need to add as much as you would with chemical fertilizers (much of which leaches away from your plants and your soil).

The National Organic Program standards state that manure and manure based fertilizers cannot be applied to your crop within 120 days of harvest for root crops and 90 days of harvest for above ground crops. So, although these are excellent soil building tools, organic farmers need to be careful in timing the use of these fertilizers.

## Work Your Soil Wisely:

Every time you disk or till or cultivate your soil, you are adding oxygen into the soil, which enlivens your soil microorganisms. When they become active, they eat and that reduces your total soil organic matter - they eat it up. Of course that's what you want them to do because that helps make nutrients available to your plants, but it also means that you need to keep replenishing that supply. Adding organic matter is an ongoing responsibility.

Working your soil when it is too wet or too dry can seriously damage the structure of your soil - often for the entire growing season. Whenever possible, wait for conditions to be optimal, so that your soil retains its loose, crumbly structure.