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SOILS

A handful of soil is filled with thousands if not millions of life forms working together to create nutrients, aerate the soil, and turn nitrogen from the air into a form that roots can absorb. Soil is a natural resource that is commonly overlooked because we see it everywhere, yet the kind of soil needed for food production is being lost rapidly across the country and the world. Urban development and land use changes are removing productive agricultural land from our soil base. Today, roughly 40% of the soils in Marion County are ideal for agriculture. The state has zoned these resources specifically for agricultural uses. Efforts to increase production, however are causing erosion.

Soil conservation starts with the property owner. If property owners understand how the soil works they can begin to improve it and more easily identify and correct problems. All rural property owners and agricultural producers should be aware of their role in protecting this vital resource.

SECTIONS

- 6.1 Soil Basics*
- 6.2 Soil Management*
- 6.3 Web Soil Survey*



SOIL BASICS

Soil, the skin of Earth

Soil is a vital resource in the production of food, fiber, and many other necessities of life. Soil delivers water and nutrients to crops, physically supports plants, helps control pests, and protects the quality of drinking water, air, and wildlife habitat. Property owners who understand the basic facts about soil should be better prepared to identify and address issues on their property.

IMPORTANCE OF SOIL

Soil is a medium for plant life and its quality is directly related to the success of that plant. The types of soil on your property have a huge influence on:

- Type and quantity of grass/crops/trees your land can support.
- Ability to absorb water, determining when and how much you will need to irrigate.
- Ability to construct buildings with foundations.
- Soil erosion and runoff.

The attributes that determine soil productivity are: *soil type, compaction, pH level, and nutrient levels*. Property owners who identify these characteristics for their soil will have a good understanding of what can be grown on their property and can determine if the soil needs any amendments. Many resources are available to help property owners identify their soil profile.

SOIL TYPES

Soils consist of organic material, minerals and air space, and are classified into three basic types, or textures:

Clay Soils, fine-grained, nutrient rich, heavy, under-draining.

Sandy Soils, coarse-grained, light, easy to work, over-draining.

Silty Soils, fine but coarser grains than clay, high in nutrients.

Individually these three types may present some challenges for irrigation and workability. Loam, a combination of the three, is the ideal soil type. Clay is a common soil type in the county that doesn't drain or provide water to plants well. Adding compost or organic material to your soil is a good idea and will help improve drainage, prevent erosion, and balance the pH levels of most soils.

Soil Type Example: **Abiqua <silty clay loam>, 3 to 5 % slope**

↑
Soil Name

↑
Soil Type

↑
Slope

SOIL TESTS

Soil testing can help property owners understand their soils' nutrient deficiencies, and identify soil characteristics that can be improved for a better growing environment. There are several ways you can test your soil to determine the physical properties and nutrient levels. These include: "Do it yourself" home tests, home commercial soil testing kits, and professional soil testing laboratories. The home commercial test can be purchased at a local gardening store for a relatively low cost (~\$20) given the money one can save from fully

understanding the irrigation and amendment needs of their soil.

The "do-it-yourself" methods can provide fairly good results if done correctly; soil type, compaction, pH, and biological health are the four characteristics of a soil that can be tested with these methods. (*see Additional Resources.*)

The NRCS or the OSU Extension office can assist property owners with collecting a soil sample and locating a testing lab.

NUTRIENT MANAGEMENT

Nutrient Management is used to manage the amount, source, placement, form and timing of the application of plant nutrients and soil amendments. The goal is to optimize crop yields and minimize non-point source pollution while maintaining or improving soil conditions. The most common soil nutrient amendments are: nitrogen (N), phosphorous (P), and potassium (K).

Nutrient Application should be done in response to a plant's uptake characteristics, while considering weather and climate conditions to minimize runoff.

- Apply nutrients uniformly
- No direct nutrient application in established buffer areas
- Don't apply to frozen, snow-covered or saturated soils
- Don't apply dry manure when there is potential for wind-driven loss
- Delay application if precipitation is forecasted within 24 hours of the time of application.
- Avoid applying upwind of occupied structures.

For more information contact OSU Extension or the local NRCS office.

Additional Resources

Soil Testing: OSU Extensions Small Farms

smallfarms.oregonstate.edu/soil-testing

"Do it Yourself" Soil Tests

organicgardening.about.com/od/soil/a/easysoiltests.htm

Web Soil Survey

websoilsurvey.nrcs.usda.gov/app/



SOIL MANAGEMENT

Keep it on the land

Practicing good soil management can help limit the amount of soil that leaves a piece of property and increase the soil's biology. Property owners can reduce the amount of sediment that leaves their property through consistent land monitoring and implementing conservation practices. Soil nutrient depletion, loss of healthy soil characteristics, reduced soil productivity, and water pollution are just some of the consequences of improper soil management.

SOIL EROSION

Soil erosion and its impacts are some of the most important but poorly understood environmental concerns we face. Soil erosion can be caused by:

- Water
- Wind
- Tillage Practices
- Development
- Agricultural practices

Soil erosion is a consequence of

over-grazing or leaving land bare, combined with damaging rains and winds. Stream banks are highly susceptible to soil erosion when left bare because of the constant force of the waterway. Removal of riparian plants can cause large amounts of land to be washed away. Maintaining vegetation or residue on the land year-round is the best strategy against excessive soil erosion. "No-till" is another land management strategy that can greatly reduce the amount of soil that leaves your land.

SOIL COMPACTION

Soil compaction is a change in the soil structure and not just an increase in soil density. This causes the soil to have smaller pores, limiting its ability to absorb water, and decreasing crop yields.

Compaction is primarily caused by wheel and animal traffic. The size, weight, and frequency of traffic directly relates to the speed and level of compaction that is occurring.

There are different types of compaction, each with different causes and treatments.

The types are:

- Surface Crusting
- Surface Compaction
- Deep Compaction
- Plow Pan

Wet soil is the most susceptible to soil compaction, so limiting heavy machinery operations during these times is ideal but can also be a tough decision. If soil compaction is causing you problems, contact the NRCS or an agronomist.

PRACTICES TO IMPROVE SOIL PERFORMANCE

Add organic material

Regularly adding organic material helps enhance soil quality, soil structure, water and nutrient holding capacity, and helps protect the soil from erosion and compaction.

Avoid excessive tillage practices

Tillage is a necessary practice for preparing fields, but unfortunately it makes soil more susceptible to erosion, causes compaction, and can alter the productivity of the soil. By reducing tillage practices you can minimize these problems, diminish the loss of organic material and increase the amount of residue on the land.

Cover the soil

Bare soil is much more susceptible to erosion than land that has crop or residue cover. Many farmers leave the residue on their land between growing seasons for the purpose of reducing erosion. In addition, cover crops, once decomposed, can add important nutrients and organic material to the soil. Ground cover needs to be managed for diseases, pests, and phosphorus build-up.

Reduce Chemical Use

The use of fertilizers and chemicals for pest management can greatly impair a soil's healthy biology. Chemicals can harm naturally-occurring organisms crucial to its fertility and structure. Utilizing primarily non-chemical approaches to land management and only applying chemicals as a last resort can help increase the natural biology of the soil.

Increase Crop Diversity

Different crops provide unique beneficial factors to the soil. These factors help control pests and weeds naturally due to the diversity of organisms in the soil. By rotating vegetation or crops and increasing the diversity, you can increase the types of insects, microorganisms, and wildlife that are present on your land.

Soil Monitoring

Day-to-day observation and the development of a soil management plan will assist property owners in identifying changes to their soil and its productivity. Periodic soil tests can assist with identifying necessary soil amendments.

SOIL BIOLOGY

Soil biology is one aspect of soil that is commonly overlooked but is important to the soil's fertility. Diverse and balanced soil biology creates a high-quality soil. Soil is an ecosystem where thousands of different creatures interact and contribute to the overall health of the soil. One simple indicator of healthy soil biology is the presence of earthworms and nematodes, the

more the merrier. Soils that have a healthy biology are much more resilient to extreme environmental conditions and severe disturbances. Those soils can also produce healthier plants that are more resistant to disease. Many land management choices, like spraying and tilling, if done improperly, will disturb and damage the soil's biology.

SOIL MANAGEMENT PLAN

Conducting a visual site analysis and documenting problem areas and changes to the land over time could greatly benefit any grower.

The Plan

- Base Map of the property with a soil inventory. Provide a means for recordkeeping on the map.
- Inventory of soil issues on the property.
- Land management practices that can resolve the soil issues.
- Goals that the property owner wants to accomplish.
- A list of resources.

COMPOSTING

Composting is the process of turning plant remains and other once-living material into fertilizer and organic matter that is ideal as a natural soil amendment. There are multiple containers and methods for composting, all of which share primarily the same process. The main difference is in the amount of time it takes for the material to fully

compost. Composting helps reduce household trash production while providing a valuable resource that can help increase crop yields. If you want to start composting at home, there is no better time to start. There are many online and local resources available to residents. (*see Additional Resources.*)

Additional Resources

The Soil Management Series

www.extension.umn.edu/distribution/cropsystems/DC7398.html

USDA: Oregon Natural Resources Conservation Service

www.or.nrcs.usda.gov/

Soil Data Mart

soildatamart.nrcs.usda.gov

OSU Extensions: Soil and Compost

www.extension.org/pages/Soils_and_Composting



WEB SOIL SURVEY

Data you could use

The web soil survey provides property owners with up-to-date soil information used for making land-use and management decisions on their property. Forestland in eastern Marion County is excluded from the Web Soil Survey. The tools' interface can be a bit overwhelming at first, so here are the steps to obtain soil information for your property.

STEP 1

Go to their website: websoilssurvey.nrcs.usda.gov

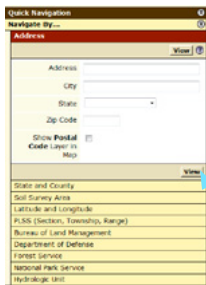
STEP 2

Click the "Start WSS" button located at the top of the page.



STEP 3

Define your "Area Of Interest" (AOI)



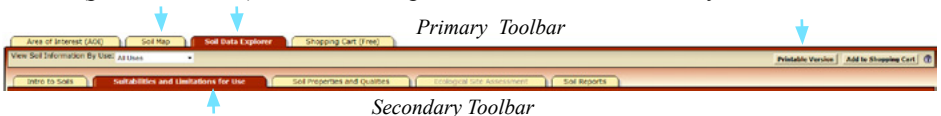
- Using the toolbar to the left, you can specify an area of interest with an address, state, county or other geographic characteristics. Once entered hit the "View" button and the map should automatically zoom to the area entered.
- You will then need to define the area where you want to acquire soil data. Use the zoom and "AOI" tools to define this area. "AOI" tools allow users to draw a rectangle or irregular shape to define the area.



STEP 4

View Soil Data and Explore Soil Information

- Once you have defined an area of interest you will then use the primary toolbar (pictured below) to access and print information related to your area of interest.



- Clicking on the "Soil Data Explorer" button will bring up a secondary toolbar that can generate thematic maps on the chemical and physical properties of a soil. Once you have chosen an attribute from the sidebar (not shown), click "View Rating" to generate a thematic map and an information table.

Play around and see what else the WSS can offer.

