

2021 Soils Learning Objectives & Resources

North Dakota

Envirothon *Updated 10/01/2021*

Overview

North Dakota is a “Prairie” State. The ND Envirothon Soils discipline will integrate the study and use of North Dakota’s soils.

Soils Learning Objectives

Physical Properties of Soil and Soil Formation

- Understand the importance of soils and appreciate the relatively small amount of usable soil that exists on Earth.
- Know the five soil forming factors, and understand how they influence soil properties.
- Understand the origin and types of soil parent materials.
- Understand basic soil forming processes: additions, losses, translocations, and transformations.
- Recognize and understand features of Soil Profiles, and be able to use this information to determine basic soil properties and limitations.
- Identify and describe soil characteristics (texture, structure, and color- using Munsell color charts).

Chemical Properties of Soil and Soil Fertility

- Know that plants must receive essential micronutrients and macronutrients from the soil in order to be healthy, and understand that soil fertility relates to the physical and chemical properties of the soil in addition to the quantity of nutrients.
- Understand soil pH, electrical conductivity, and other chemical properties.

Soil Ecosystems and Soil Health

- Recognize that biological diversity is important for soil health and hence plant, human and environmental health.
- Recognize that understanding soil ecosystems is important to soil management.
- Understand that soils are a biological system that require living organisms to provide nutrients to growing plants.

Soil Conservation and Land Use Management

- Compare different land uses and conservation practices and their impact on soils and erosion.
- Understand how soil is impacted by point & nonpoint source pollution & the importance of soil management to agriculture and clean water.
- Understand how the hydrologic, carbon and nutrient cycles relate to soil management.

Web Soil Survey and Soil Surveys

- Access and use published and on-line soil data and other resources to learn how land use affects soil, and the limitations of local soils.
- Understand the eight Land Capability Classes and how they are important in determining appropriate land use.
- Understand soil drainage classes and be able to recognize the characteristics of hydric soils and know how soils fit into the definition of wetlands.

Soils Resources

1. Eye on Agriculture today: Soil Texture by Feel, KSRE You Tube Video
2. Munsell Soil Color Chart by Jerry Delsol. You Tube Video
3. From the Surface Down, USDA/NRCS
4. Soil Physical and Chemical Properties, USDA/NRCS
5. Soil Biology Primer, USDA/NRCS
6. Soil Health for Educators, USDA/NRCS
7. Building Soils for Better Crops, SARE
8. Understanding Soil Risks and Hazards, USDA/NRCS
9. Urban Soil Primer, USDA/NRCS
10. Web Soil Survey, USDA/NRCS
11. [Field Indicators of Hydric Soils in the United States](#)
12. Soil Field Guide (Identifying Ecological Sites)
13. Soil Field Guide (Conservation Tree and Shrub Group)
14. Land Capability Classification

The resources listed above will be used to test the student's understanding of the learning objectives. These resources are on the internet so just google the title and the files should come up. For more information, students may consider exploring the USDA Plants Database.

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive land forming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for forestland, or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit.

Capability classes, the broadest groups, are designated by the numbers 1 through 8.

The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have slight limitations that restrict their use.

Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, e, w, s, or c, to the class numeral, for example, 2e. The letter e shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; w shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); s shows that the soil is limited mainly because it is shallow, droughty, or stony; and c, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the soils of this class have few limitations. Class 5 contains only the subclasses indicated by w, s, or c because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use to pasture, rangeland, forestland, wildlife habitat, or recreation.

Capability units are soil groups within a subclass. The soils in a capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, 2e-4 and 3e-6. These units are not given in all soil surveys.

The capability classification of map units in this survey area is given in the table "Land Capability and Yields per Acre of Crops and Pasture".

For More Information

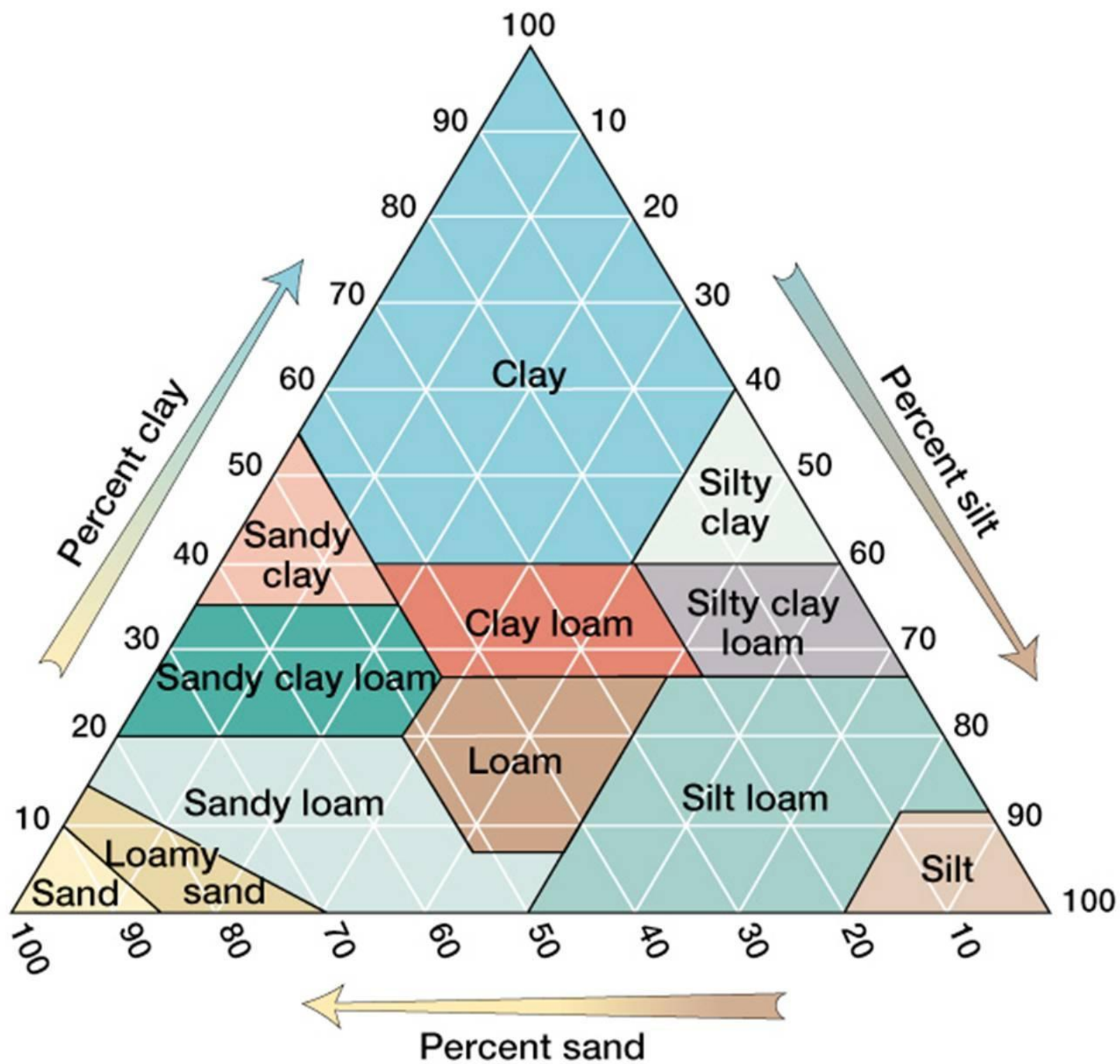
www.ndenvirothon.org

- Kyle Thomson, Soil Scientist
Bismarck MLRA Soil Survey Office
(701) 250-4518 ext. 125
kyle.thomson@nd.usda.gov
- Carol Peterson, Ecological Site Specialist

USDA/NRCS

(701) 252-1460 ext. 102

carol.peterson@nd.usda.gov



Start Here

Texture-by-Feel Analysis

Place approximately 25 g soil in palm. Add water drop wise and knead the soil to break down all aggregates. Soil is at the proper consistency when plastic and moldable, like moist putty.

Add dry soil to soak up water

Adapted by
Donald G. McGahan
from
Thein S.J. 1979. A Flow
diagram for teaching
texture-by-
feel_analysis J. Agron.
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