

ANIMAL, PLANT & SOIL SCIENCE

LESSON D1-7 LAND CAPABILITY CLASSIFICATIONS



INTEREST APPROACH

 Ask students whether all crops are used for the same purposes. Similarly, are all agricultural animals raised for the same uses? Ask students if they think different pieces of land would differ in suitability for agricultural purposes.





 1 Define land capability and describe ways to improve it.

Output: 2 Identify factors that determine land capability.

 3 Explain the land capability classification system.



TERMS

- o arable land
- capability factors
- capability unit
- erosion
- internal drainage
- irrigation
- land capability
- Iand capability subclasses
- land forming
- slope
- soil depth
- soil permeability
- surface drainage
- surface runoff
- surface texture



• I. Land capability is the suitability of land for agricultural uses. The uses should not cause any damage to the land. Arable land is land that can be used for row crops. These crops typically require some form of tillage to the soil. To improve arable land, various cropping practices can be utilized. There are four common cropping practices.





WAYS TO IMPROVE ARABLE LAND

Irrigation

Erosion Control

Drainage

Land Forming



• A. Irrigation



- I. Irrigation is the artificial application of water to soil or to a growing medium to assure adequate moisture for plant growth.
- It is often used on a supplemental basis in areas where seasonal shortages of water may reduce crop yields.



B. Erosion control



- 1. Excessive erosion may result in land that is no longer fertile.
- 2. The long-term productivity of land can be assured by controlling soil erosion.



• C. Drainage



- 1. Land sometimes needs surface or internal drainage.
- 2. Surface drainage is the removal of water from the surface of the land. Ditches and terraces are most often used for this purpose.
- 3. Internal drainage is the removal of water within the soil profile. This may be improved with drain tiles or tubes installed below the normal plowing depth of the soil.



• D. Land forming

- 1. Land forming is the smoothing or reshaping of the land to enhance the use of the land. Small dips are filled and high places are taken down.
- Typically, land forming involves using laser-guided equipment to assure a good surface. This practice is routinely done in the production of rice.





 II. Capability factors are the characteristics of land that determine its best crop use. These factors include both surface and subsurface characteristics.



• A. Surface texture

- I. Surface texture is the proportion of sand, silt, and clay in the soil to plow depth, which is typically 7 inches.
- Soil can be classified as either sandy, loamy, or clay-like.



THE SOIL TEXTURAL TRIANGLE





SOIL TEXTURAL CLASSES

Sand	Dry—Loose and single grained; feels gritty Moist—Will form very easily (crumbled ball) Sand: 85–100%, Silt: 0–15%, Clay 0–10%
Loamy Sand	Dry—Silt and clay may mask sand; feels loose, gritty Moist—Feels gritty; forms easily (crumbled ball); stains fingers slightly Sand: 70–90%, Silt: 0–30%, Clay: 0–15%
Sandy Loam	Dry—Clods easily broken; sand can be seen and felt Moist—Moderately gritty; forms ball that can stand careful handling; definitely stains fingers Sand: 43–85%, Silt: 0–50%, Clay: 0–20%
Loam	Dry—Clods moderately difficult to break; somewhat gritty Moist—Neither very gritty nor very smooth; forms a ball; stains fingers Sand: 23–52%, Silt: 28–50%, Clay: 7–27%
Silt Loam	Dry—Clods difficult to break; when pulverized feels smooth, soft, and floury; shows fingerprints Moist—Has smooth or slick buttery feel; stains fingers Sand: 0–50%, Silt: 50–88%, Clay: 0–27%
Clay Loam	Dry—Clods very difficult to break with fingers Moist—Has slight gritty feel; stains fingers; ribbons fairly well Sand: 20–45%, Silt: 40–73%, Clay: 27–40%
Silty Clay Loam	Same as Clay Loam, but very smooth Sand: 0–20%, Silt: 40–73%, Clay: 27–40%
Sandy Clay Loam	Same as Clay Loam Sand: 45–80%, Silt: 0–28%, Clay: 20–35%
Clay	Dry—Clods cannot be broken with fingers without extreme pressure Moist—Quite plastic and usually sticky when wet; stains fingers (silty clay feels smooth, sandy clay feels gritty) Sand: 0–45%, Silt: 0–40%, Clay: 40–100%



- B. Internal drainage
- 1. Internal drainage is known as permeability.
- 2. Soil permeability is the movement of air and water through the soil. It is determined by the texture and structure of the soil.
- Soil permeability can be classified as very slow, slow, moderate, or rapid.



ALLOWS WATER TO INFILTRATE AND PERCOLATE



Soil with high organic matter content and good structure permits water absorption.

Hard-packed surface soil plus impermeable subsoil prevents absorption. Rock layer prevents water from soaking deeply into soil.



• C. Soil depth



- I. Soil depth is the thickness of the soil layers that are important in crop production.
- Soil depth classifications are very shallow, shallow, moderately deep, and deep.



• D. Erosion

- I. Erosion is the loss of topsoil by water, wind, or other forces. Much of the fertility of land is in the topsoil.
- 2. Four categories of erosion are used: very severe erosion, severe erosion, moderate erosion, and none-to-slight erosion.



• E. Slope

- 1. Slope is the rise and fall in the elevation of land. It is commonly measured in percent or the number of feet of rise and fall in 100 feet.
- 2. Six classes of land slope are commonly used: very steep, steep, strongly sloping, moderately sloping, gently sloping, and nearly level.
- 3. The slope of the land plays a major role in the level of erosion of the soil.





• F. Surface runoff



- I. Surface runoff is the water from rain, snow, or other precipitation that does not soak into the ground. The amount of runoff depends on the soil texture and slope of the land.
- 2. The categories of surface runoff are very slow, slow, moderate, and rapid.



 III. The land capability classification system involves land classes, subclasses, and capability units.

 A. Land capability classes are based on the capability factors of the land. The Roman numerals I through VIII are used for land capability classes.



 1. Class I: Very good land—Class I has no limitations. It is nearly level and has deep soil, good internal drainage, and good surface drainage. This land can be cropped every year without special practices to control erosion.





 2. Class II: Good land—This land has deep soil with a few limitations. The soil requires moderate attention to conservation practices. Contour plowing and other easy-to-use practices are often used.





• 3. Class III: Moderately good land-This land has more limitations than Class II. Crops must be more carefully selected. This land is often found on gently sloping hills. Increased attention must be given to conservation practices, such as terraces and strip cropping. This land can be productive with proper management.





• 4. Class IV: Fairly good land-This class of land is the lowest that should be cultivated. It has very severe limitations that restrict the choices of crops and requires special conservation management practices. This land is on hills and has more slope than land found in Class **III.** The land is frequently subject to erosion, especially gullies.





• 5. Class V: Unsuited for cultivation-Class V land can be used for pasture crops, cattle grazing, hay crops, and tree farming. The land is often used for wildlife and recreation areas. The soil typically has good tilth and fertility but is restricted in use by rock outcrops or frequent overflow from nearby waterways. The land is often gently sloping or nearly level.





 6. Class VI: Not suited for row crops—This land class has too much slope for growing row crops. The soil may have fair productivity if it has not been damaged by erosion. Gullies often quickly form if not carefully managed.





• 7. Class VII: Highly unsuited for cultivation—Class VII land has severe limitations. This class should not be cultivated. Best uses are permanent pasture, forestry, and wildlife. Slope is often well over 12 percent. The soil is very shallow. Large rock surfaces may be present. This land is often found in dry areas.





• 8. Class VIII: Unsuited for plant production—This land cannot be used for row crops or other crops in which the land is tilled. It is often lowland covered with water most or all of the time. The soil may be wet and high in sand or clay. This class of land is often used for waterfowl habitat.





 B. All classes (except Class I) have one or more limitations. *Land capability subclasses* indicate factors that limit soil use by means of a single letter code added to the class number. The letter codes are e, w, s, and c.



- 1. e—Runoff and erosion. Land with a slope greater than 2 percent needs some form of water control.
- 2. w—Wetness. These soils may be poorly drained or occasionally flooded. Some such soils may be drained; others are classed as wetlands and are best left as is.





- 3. s-Root zone or tillage problems. These soils are shallow, stony, droughty, infertile, or saline. Wind and water erosion may be problems.
- 4. c—Climatic hazard. Areas of rainfall or temperature extremes make farming difficult.





 C. Soils in the same capability unit are enough alike to be suited to the same crops and pasture plants and require similar management.

1. A capability unit is a soil group within a subclass.



 2. Capability units are generally designated by adding the Arabic numbers 0 to 9 to the subclass symbol. Thus, in one symbol, the Roman numeral designates the capability class or degree of limitation, the small letter indicates the subclass or kind of limitation, and the Arabic number specifically identifies the capability unit within each subclass.





• 1. What is land capability and how can it be improved?

• 2. What factors determine land capability?

• 3. What system is used to classify land capability?

