

Oklahoma Soils

Objective

Students will answer questions from a chart showing the many different varieties of soil in Oklahoma's Major Land Resource Areas.

Procedures

1. Show students the Soil Map of Oklahoma, available online: http://www.ogs.ou.edu/pubsscanned/EP9p16_19soil_veg_cl.pdf
 - Students will find your part of the state on the map.
 - Students will discuss what the map tells them about the soils found in your part of the state.
2. Provide copies of the chart included with this lesson, "Oklahoma Soils by Land Resource Area."
 - Look through the chart as a class, and determine which Land Resource Area covers your part of the state.
 - Students will answer the Comprehension Questions included with this lesson.
3. Research: Part of our state is classified as plains and part is classified as prairie. What is the difference? Students will write their explanations.
4. Students will select one or more of the Dominant Oklahoma Soil Orders and work in groups to build models of them, make posters, produce multimedia presentations or other means to provide information about them to the class.
5. Students will use online or library resources to find information about soil horizons and create models of them, using breakfast cereal or other common materials.
6. Students will use online search engines or library references to find soil maps of other states and compare the diversity of soils in Oklahoma with those in the other states.
7. Students will gather soils from the school yard, their homes and other areas.
 - Students will dry the soils on newspapers and label them as to location where they were found.
 - Students will sort the soils by color, particle size (Use magnifiers.) and other student-determined criteria.
 - Students will produce appropriate graphs to show the results of their investigation.
8. Students will use online search engines or library references to identify and find information about Oklahoma's state soil (Port Silt Loam). Students will show what they find in writing.

Oklahoma Academic Standards

GRADE 3

Oklahoma Geography: 1.BCE,2
Life Science: 4-1,3,4

GRADE 4

Regional Geography: 1,3,4,5
Earth Science: 1-1; 2-1

GRADE 5

Matter: 1-1,3. Ecosystems: 2-1.
Earth Science—2-1

GRADE 6

World Geography: 1.1,2,4; 2.2B;
5.2B
Ecosystems: 2-4

GRADE 7

World Geography: 1.1,2,4,5

GRADE 8

Life Science: 4-1,2. Earth Science:
1-4; 3-1

Dominant Oklahoma Soil Orders

Alfisols—Alfisols are in semiarid to moist areas. These soils result from weathering processes that leach clay minerals and other constituents out of the surface layer and into the subsoil, where they can hold and supply moisture and nutrients to plants. They formed primarily under forest or mixed vegetative cover and are productive for most crops. In Oklahoma they are found in the central part of the state, mostly east central and along the eastern part of southern border.

Mollisols—Mollisols are soils that have a dark colored surface horizon relatively high in organic matter. The soils are base rich throughout and therefore are quite fertile. Mollisols characteristically form under grass in climates that have a moderate to pronounced seasonal moisture deficit. In Oklahoma they are found throughout the central part of the state, from the northern border to the southern border.

Aridisols—Aridisols are soils that are too dry for the growth of mesophytic plants. The lack of moisture greatly restricts the intensity of weathering processes and limits most soil development. Aridisols often accumulate gypsum, salt, calcium carbonate and other materials that are easily leached from soils in more humid environments. Aridisols are used mainly for range, wildlife, and recreation. Because of the dry climate in which they are found, they are not used for agricultural production unless irrigation water is available. In Oklahoma they occur in the Panhandle.

Ultisols—Ultisols are acid forest soils with relatively low native fertility. Most nutrients are concentrated in the upper few inches. They are found primarily in humid temperate and tropical areas of the world, typically on older, stable landscapes. Intense weathering and leaching result in a clay-enriched subsoil dominated by minerals such as quartz, kaolinites and iron oxides. Because of the favorable climate regimes in which they are typically found, Ultisols often support productive forests. The high acidity and relatively low quantities of plant-available calcium, magnesium, and potassium associated with most Ultisols make them poorly suited for continuous agriculture without the use of fertilizer and lime. Oklahoma's Ultisols are located in the far eastern part of the state.

Entisols—Entisols are soils that show little or no evidence of horizon development. Entisols occur in areas of recently deposited parent material or in areas where erosion or deposition rates are faster than the rate of soil development, such as dunes, steep slopes and flood plains. They occur in many environments. Entisols of large river valleys and associated shore deposits provide cropland and habitat for millions of people worldwide. Globally Entisols are the most extensive of the soil orders. In Oklahoma there are Entisols scattered in small areas all across the state.

Vertisols—Vertisols are clay-rich soils that shrink and swell with changes in moisture content. During dry periods, the soil volume shrinks, and deep wide cracks form. The soil volume then expands as it wets up. This shrink/swell action generally prevents formation of distinct, well-developed horizons in these soils. They tend to be fairly high in natural fertility. Vertisols occupy small percentages of the land in an area that goes diagonally across Oklahoma from southwest to northeast, with a larger percentage located along the southern border in the eastern part of the state.

Inceptisols—Inceptisols are soils with minimal horizon development. They are more developed than Entisols, but still lack the features that are characteristic of other soil orders. Although not found in dry areas, Inceptisols are widely distributed and occur across a wide range of ecological settings. Land use varies considerably with Inceptisols. A sizable percentage of Inceptisols are found in mountainous areas and are used for forestry, recreation, and watershed. Small percentages are located throughout Oklahoma, with a larger concentration in the west central part of the state.

Oklahoma Soils by Land Resource Area

LAND RESOURCE AREA	MOSTLY LOCATED IN (COUNTIES)	SOIL DESCRIPTION	SOIL ORDERS	PARENT MATERIAL	DEVELOPED UNDER
Canadian Plains and Valleys	Cimarron	brown, loamy	Entisols	sandstone escarpments, basalt, associated foot slopes	mid and short grasses.
High Plains and Breaks	Cimarron, Texas, Beaver Ellis, Harper, Woodward	dark-colored and clay loams subsoil: moderately clayey	Mollisols Aridisols Alfisols	limey unconsolidated loams, silts, caliche	mid and short grasses
Central Rolling Red Plains	Harper, Woods, Woodward, Major, Dewey, Roger Mills, Custer, Washita, Beckham, Greer, Kiowa, Harmon, Jackson, Tillman, Cotton	dark to various shades of red subsoil: clay to loam	Alfisols Entisols Inceptisols Mollisols	Permian shales, mudstones, and siltstones	mid and short grasses.
Central Rolling Red Prairies	Alfalfa, Grant, Kay, Noble, Garfield, Blaine, Kingfisher, Logan, Canadian, Caddo, Grady, McClain, Garvin, Comanche, Stephens, Jefferson, Cleveland, Oklahoma, Payne	dark and loamy subsoil: clayey to loamy	Mollisols Entisols Alfisols	Permian shales, mudstones, sandstones and/or alluvial deposits	tall grasses
Cross Timbers	Grady, Oklahoma, Stephens, Garvin, Cleveland, Lincoln, Logan, Love, Payne, Creek, Osage, Okfuskee, Seminole, Pawnee	light-colored, sandy subsoil: reddish	Alfisols Inceptisols	various sandy materials	post oak, blackjack oak, hickory forests with prairie openings
Bluestem Hills–Cherokee Prairies	Kay, Osage, Pawnee, Nowata, Craig, Rogers, Nowata, Washington, Tulsa, Mayes, Wagoner, Okmulgee, Muskogee, Hughes, McIntosh, Pittsburgh, Coal	deep, dark-colored subsoil: clay	Mollisols Alfisols Entisols	shales, sandstones, limestones	tall grasses
Grand Prairie–Arbuckle Mountains	Garvin, Pontotoc, Murray, Johnston, Marshall, Bryan, Choctaw	dark and loamy to clayey; thin and stony (Arbuckles)	Alfisols Mollisols Vertisols	shales, limestones; Precambrian granites (Arbuckles)	tall grasses, mid grasses, scrub oaks, cedars, and shrubs
Ozark Highlands–Boston Mountains	Delaware, Cherokee, Adair, Sequoyah, Ottawa	brown to light-brown, silty subsoil: reddish clay	Ultisols Inceptisols Entisols	cherty limestones (Ozarks) and sandstones and shales (Boston Mountains)	oak-hickory-pine forests and tall grasses
Ouachita Mountains	LeFlore, Latimer, Pushmataha, Atoka, McCurtain	light-colored, acid, sandy, loamy subsoil: clayey (Altisols Ultisols Inceptisols	sandstones and shales	oak-hickory-pine forests
Arkansas Ridge and Valley	Hughes, Pittsburgh, Pushmataha, Latimer, LeFore	loamy, rocky, well drained or very deep and loamy	Inceptisols Ultisols Alfisols)	steep slopes and ridges or on gentle slopes and shales in valleys	oak-pine forests
Coastal Plain	McCurtain, Choctaw, Atoka, and Bryan Counties	light-colored, acid, sandy subsoils: clay-loam to clay	Ultisols Alfisols Vertisols	sandstones	pine-oak (east) and oak-hickory (west) forests

Source: Carter, Bryan J., and Mark S. Gregory, Department of Plant and Soil Sciences, Oklahoma State University, http://www.ogs.ou.edu/pubsscanned/EP9p16_19soil_veg_cl.pdf

Name _____

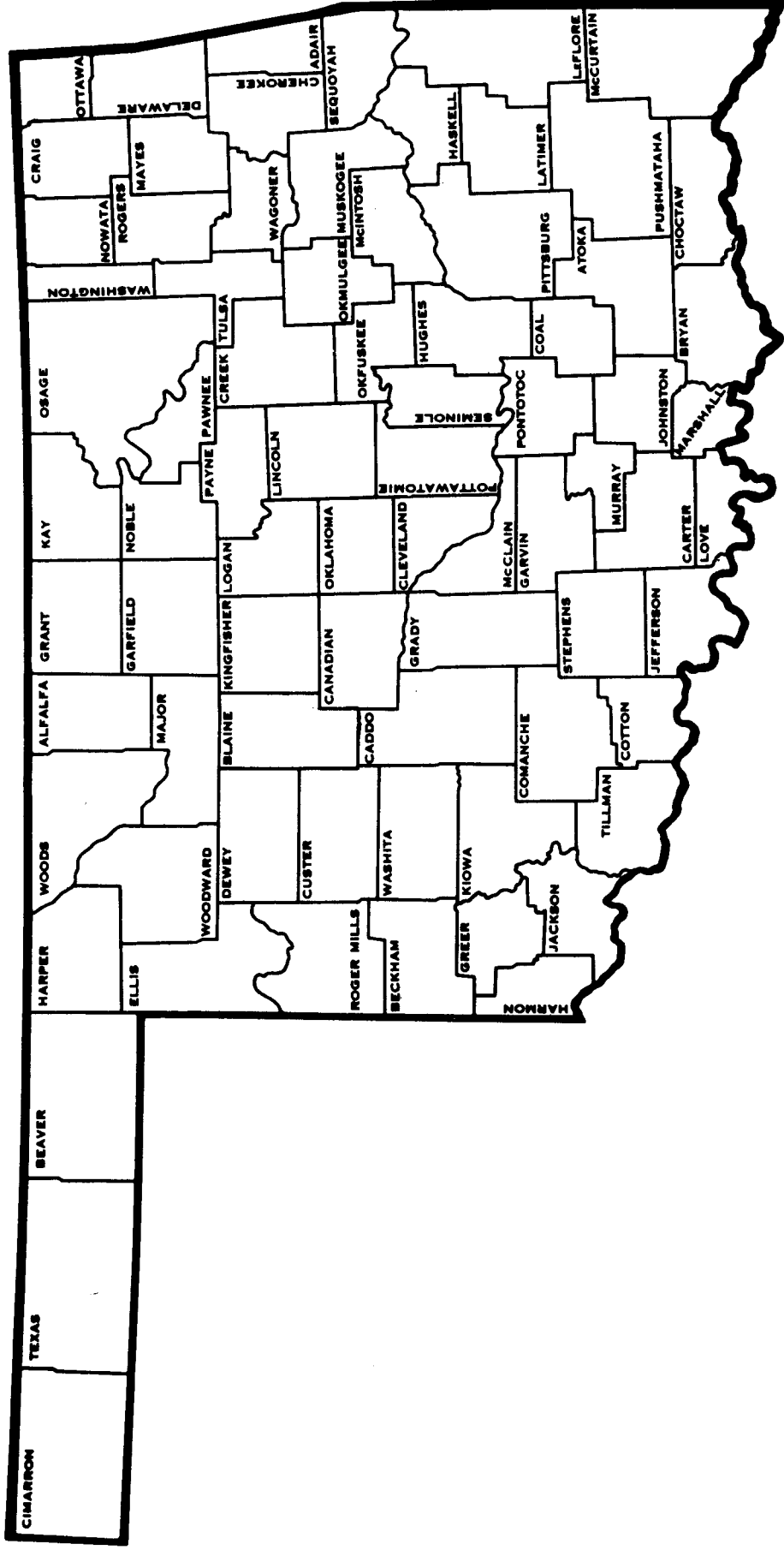
Comprehension Questions

Use the Oklahoma Soils by Land Resource Area chart and the information about soil orders to answer the following questions:

1. Write the name of the county where your school is located. Locate your county on the map of Oklahoma included with this lesson.
2. Based on the Oklahoma Soils and Land Resource Area chart, your county is located in what land resource area or areas.
3. Describe the soil(s) mostly found in your county, based on the chart.
4. The soil in your county belongs in which soil order(s)?
5. Describe the parent material(s) on which the soil in your county was built.
6. The soils in your area were built under what kind of vegetation?
7. The soil in your area belongs to what soil order(s)? Based on the information about soil orders, is the soil in your area suitable for farming?

Name _____

Oklahoma County Map



Oklahoma Ag in the Classroom is a program of the Oklahoma Cooperative Extension Service, the Oklahoma Department of Agriculture, Food and Forestry and the Oklahoma State Department of Education.