Classification of Soils in the Savanna-Forest Transition in Eastern Oklahoma

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An intermingling of vegetation occurs between the tall grasses and the forests of Eastern Oklahoma. Over 6 million acres of forest lands are adjoined with over 6 million acres of tall grassed lands which interfinger with over 6 million acres of mixed lands of forests and tall grasses. Over 40 percent of Oklahoma's soils are found in four resource areas, Cherokee Prairies, Ouachita Highlands, Forested Coastal Plains and Cross Timbers (1).

Older classifications show Red-Yellow Podzolics to dominate the area with Brunizems and Lithosols, the lesser ones.

Soils of this area are transitional in that they occur on landscapes grading from grassland to savannah to trees. The grasses become less prominent going from west to east; thus, the soils decrease in organic matter and become lighter in color. The soils occurring under forest are more leached than those under grasses.

Data are needed to correctly classify these soils into the highest category (order) — Mollisols, Alfisols, or Ultisols and then into the other categories in the Classification scheme. Data on base saturation, exchangeable cation, pH and organic matter are particularly needed. Laboratory determinations on carefully selected soils provide information helpful for characteristizing Oklahoma soils and providing information useful in interpreting their morphology, genesis, classification and behavior. Quantitative measurements and field descriptions provide information necessary for fully utilizing the new comprehensive system of soil classification, the 7th. Some soil properties important to soil classification and soil behavior cannot be directly observed in the field mapping programs, but with combined field and laboratory studies such properties can be determined and used in classification and as guides in soil mapping.

The objectives of this study are to provide these data for selected soil series along 3 transects through the Savannas of Eastern Oklahoma and classify all the soils according to the recently employed system.

Definitions of Some Soil Classification Taxa

The location of pedons sampled along with important soil forming factors are given in Tables 1, 2, and 3.

Classification consists of an orderly grouping of soils according to a system designed to make it easier to remember soil characteristics and interrelationships.

The current system of classification has six categories. Beginning with the most inclusive, these categories are the order, the suborder, the great group, the subgroup, the family and the series (4). The criteria for classification are soil properties that are observable or measureable, but the properties are selected so that soils of similar genesis are grouped together. The placement of some soil series in the current system of classification, particularly in families, may change as more precise information becomes available. The following are brief descriptions of each of the categories along with some of the orders and suborders of the current system of soil classification.

Order. In the order, soils are grouped accordnig to properties that seem to result from the same processes acting to about the same degree on soil Vertisols, Incepisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. Entisols, Inceptisols, Aridisols, Mollisols, Alfisols, Ultisols and Vertisols are found in Oklahoma.

Suborder. Each order is divided into suborders, primarily on the basis of soil characteristics that seem to produce classes having the greatest genetic similarity. A suborder has a narrower climatic range than an order. The criteria for suborders reflect either (1) the presence or absence of waterlogging or (2) differences in climate or vegetation.

Great Group. Each suborder is divided into great groups according to the presence or absence of genetic horizons and the arrangement of these horizons.

Subgroup. Each great group is divided into subgroups, one representing the central (typic) concept of the group, and others, called intergrades, representing the soils that have mostly the properties of one great group but also have one or more properties of the soils of another great group, suborder, or order.

Table 1. Soils, Locations and Factors of Formation (Transect-1)

Soil Series	County and Sample No.	Parent Material	Topography and Landform	Rainfall and Vegetation
Hartsells—Like	Coal—1 (5)	Boggy—Sandstone	Uplands—gently sloping	38-42" Scrub oak + grasses
Hartsells	Coal—2 (6)	Boggy—Sandstone	sloping	38-42" Scrub oak + grasses
Stephenville—Like	Coal—3 (6)	Boggy—Sandstone	gently sloping	38-42" Scrub oak + grasses
Stephenville—Like	Coal—4 (5)	Boggy—Sandstone	sloping	38-42" Scrub oak + grasses
Homa	Coal—5 (5)	Boggy—Shale	strongly sloping to rolling	38-42" Scrub oak + grasses
Homa	Coal—6 (5)	Boggy—Shale	strongly sloping to rolling	38-42" Scrub oak + grasses
Hartsells	Atoka—1 (5)	Jackfork—Sandstone	gently sloping uplands	40-44" Oak—Pine
Hartsells	Atoka—2 (5)	Jackfork—Sandstone	gently sloping uplands	40-44" Oak—Pine
Enders—Like	Atoka—3 (5)	Stanley—Shale	strongly sloping	40-44" Oak—Pine
Enders—Like	Atoka—4 (5)	Jackfork—Shale	strongly sloping	40-44" Oak—Pine
Linker	McCurtain—1 (6)	Stanley—Sandstone	gently sloping	750" Oak—Pine
Linker	McCurtain—2 (5)	Stanley—Sandstone	gently sloping	750" Oak—Pine
Georgeville	McCurtain—3 (5)	Jackfork Shale	strongly sloping	750" Oak—Pine
Georgeville	McCurtain—4 (5)	Stanley Shale	strongly sloping	750" Oak—Pine
Hartsells	McCurtain—5 (5)	Stanley—Sandstone	gently sloping	750" Oak—Pine
Hartsells	McCurtain—6 (5)	Stanley—Sandstone	gently sloping	750" Oak—Pine

All <30 Evapotranspiration
Two P.F. Indexes 32-63 and 64-127

Table 2. Soil Locations, and Factors of Formation (Transect 2)

Soil Series	County and Sample No.	Parent Material	Topography and Land Form	Rainfall and Vegetation
Windhorst Like	Carter 1 (7)	Paluxy—soft Sandstones with interbedded clays	Uplands Rolling and dissected	34-38 Oak & Grass
Windthorst	Carter 2 (7)	Paluxy—soft Sandstones with interbedded clays	Uplands Rolling and dissected	34-38 Oak & Grass
Stephenville Like	Carter 3 (6)	Paluxy—soft Sandstones with interbedded clays	Uplands Rolling and dissected	34-38 Oak & Grass
Stephenville Like	Carter 4 (5)	Paluxy—soft Sandstones with interbedded clays	Uplands Rolling and dissected	34-38 Oak & Grass
Boswell Like	Bryan 1 (6)	Paluxy—soft Sandstones with interbedded clays	Uplands Rolling and dissected	Oak-hickory 40-44
Boswell Like	Bryan 2 (5)	Paluxy—soft Sandstones with interbedded clays	Uplands Rolling and dissected	Oak-hickory 40-44
Bowie Like	Bryan 3 (6)	Washita—Clays	Uplands Rolling and dissected	Oak-hickory 40-44
Bowie Like	Bryan 4 (6)	Washita—Clays	Uplands Rolling and dissected	Oak-hickory 40-44
Boswell	McCurtain 1 (6)	Washita—Soft Sandstones	Uplands Rolling and dissected	46-50 Oak-hickory
Boswell	McCurtain 2 (6)	Washita—Soft Sandstones	Uplands Rolling and dissected	46-50 Oak-hickory
Bowie	McCurtain 3 (5)	Paluxy—clays Paluxy—clays	Uplands Rolling and dissected	46-50 Pine—oak
Bowie	McCurtain 4 (6)	Paluxy—sandstones Paluxy—sandstones	Uplands Rolling and dissected	46-50 Pine—oak

Table 3. Soils, Locations, and Factors of Formation (Transect-3)

Soil Series	County and Sample No.	Parent Material	Topography and Landform	Rainfall and Vegetation
Enders	LeFlore S—68—OK—40—1(8)	Shale with sandstone and clay	Steep upland	Pine and Hardwoods 44"—48"
Enders	LeFlore S—68—OK—40—2(8)	Shale	Steep upland	Scrub oak and grasses 44"—48"
Enders	LeFlore S—68—OK—40—3(5)	Shale	Rolling upland	Scrub oak and grasses 44"—48"
Enders	LeFlore S—68—OK—40—4(7)	Shale	Rolling upland	Scrub oak and grasses 44"—48"

Family. Each subgroup is divided into families, primarily on the basis of properties important to plant growth. Some of the properties considered are texture, mineral composition, reaction, soil temperature, permeability, consistence, and thickness of horizons.

Series. A group of soils that have soil horizons similar in their differentiating characteristics and arrangement in the soil profile, except for the texture of the surface soil and are formed from a particle type of parent material.

Alfisols. Alfisols are a group of soils that are usually moist, have ochric epipedons, and have argillic horizons with medium or high base status. The Alfisols generally have a period when evapotranspiration exceeds precipitation and one or more horions drop well below field capacity or reach wilting point. This is the normal moisture regime of soils with argillic horizons. In addition, movement and accumulation of clay have gone on more rapidly than truncation by erosion, so the geomorphic surfaces have had some stability. At least eluviation and illuviation of clay have been more rapid than erosion. Water movement through the solum has been adequate to remove free carbonates from the fine earth in the epipedon and from most of the argillic horizon, but inadequate to remove a substantial part of the exchangeable bases held by the soil.

Similar conditions with respect to loss of bases are typical of Mollisols with argillic horizons, which we may consider to be parallel to Alfisols and to differ primarily in having a mollic epipedon.

Ustalfs. These are the Alfisols of climates with warm dry seasons. Rainy seasons may be warm, or cool with occasional frost, but the soils rarely freeze. They are dominantly but not exclusively subtropical.

In the warmer regions Pleistocene events caused cyclical changes in rainfall. Associated with these were cycles of erosion and deposition, just as in today's deserts. Some surfaces, however, appear to have been stable for long periods, and the soils in these have probably had one or more periods of higher rainfall.

Ultisols. The Ultisols are the soils that have argillic horizons and that have low base status in or below the argillic horizons. This is a limit of 35 percent saturation at a depth of 125 cm. below the top of the argillic horizon or 75 cm. below the top of any fragipan. They are primarily soils of regions with high rainfall relative to evapotranspiration in one or more seasons, but with some season of at least limited moisture deficiency. There is excess water virtually every year for leaching. The Ultisols occur from the cool temperature to subtropical and tropical regions. The balance between liberation of bases by weathering and re-

moval by leaching is normally such that a permanent agriculture is impossible without fertilizers.

The concept of Ultisols is one of soils in which vegetation plays a major role in the maintenance of the bases against leaching. The roots of trees go several meters deep in many soils, and the bases they extract at these depths are eventually returned to the surface of the soil. Before the bases can be moved very deeply into the soil, they are again taken up by roots. Thus, the bases are held against leaching primarily by the plants. The supply is partly a function of the species of plants. Some collect large amounts of bases, and the soil below one of these may be well supplied during the mature life of the plant. But the maintenance of bases in the surface horizons is at the expense of the supply in the deeper horizons.

When the soils are cultivated and limed, the base status of the argilic horizon is eventually raised but changes in the deepest horizons are very slow.

The age of the geomorphic surfaces of the Ultisols varies enormously. Some are post-Pleistocene and rich in weatherable minerals; others probably are pre-Pleistocene with few weatherable minerals.

In contrast, on young (late Pleistocene?) surfaces cut into these old surfaces, the A horizons are from about 25 to 40 cm. thick in fine loamy materials. Clay skins are abundant in the upper part of the argillic horizon, but are scarce below 75 cm. Plinthite is present only if inherited from the old parent materials, and then it is present in all horizons.

Ultisols normally have rather large amounts of KCl extractable aluminum. They have a rather wide variety of clays. In the U.S. most have appreciable amounts of vermiculite or chlorite in addition to kaolin.

Udults. The Udults are the Ultisols of humid regions with short or no marked dry seasons, with little organic matter, and without the gray mottled colors of Aquults. They may be found on both young and on very old surfaces. The Udults are very extensive in the southeastern U.S. Old surfaces and thick epipedons are normal. The mottled clays called C generally have the finest textures and most or all of the clay skins. An unknown number have bisequums in which what we formerly called C horizon is an A'2. Below it one finds remnants of fragipans, and probably argillic horizons.

Mollisols. The Mollisols are soils in which there have been decomposition and accumulation of relatively large amounts of organic matter in the presence of calcium, producing calcium saturated or calcium rich forms of humus.

The Mollisols therefore must have high base saturation with abundant calcium. This requirement tends to restrict the Mollisols to sub-

humid and semi-arid regions where the leaching of bases is slow or impossible, but where moisture is adequate for relatively large annual additions of organic matter. Grass is important to Mollisols because of its fibrous root system, but grass is not essential. In humid regions, under forest, calcium is rather quickly lost from the soil as a general rule. Mollisols can form if the soil is rich in bases, and the soil fauna carries the leaf litter into the soil to decompose. Mostly, this requires calcium carbonate in some or all of the soil horizons.

Inceptisols. The Inceptisols include soils with diagnostic surface or surface horizons in addition to the ochric epipedon and albic horizons of the Entisols. The Inceptisols lack illuvial horizons unless in a lower sequum. Inceptisols are restricted to climates in which there is some leaching in most years. Generally, the direction of soil development is not yet evident from the marks left by the various soil forming processes, or the marks are too weak to permit classification in another order. May have a cambic B.

Ochrepts. These Inceptisols are formed in parent materials with crystalline minerals. They are found in temperate to cold climates in which there is some annual excess of precipitation over evapotranspiration. They are characterized by the presence of eluvial horizons and the absence of illuvial horizons except in a lower sequum. Mostly, the colors are shades of brown and yellow, though those from red parent materials have reddish hues.

The absence of illuvial (argillic) horizons is correlated with the age of the geomorphic surface and with climate.

Soil Formation in the Oklahoma Savannas

The specific properties and horizon sequence that a soil acquires in the process of its development are determined by the nature of the parent material from which the soil develops; and the influence of such environmental factors as climate, vegetation, and topography, which act over a period of time to transform the parent material into soil. The factors and processes of soil formation that occur in the study area will be discussed in the following paragraphs.

Soil materials for soil development consist of both consolidated and unconsolidated sedimentary rock materials. These are alternating beds of sandstone and shales of Pennsylvanian age with some of Permian age on the western edge of the area. A major unconsolidated area includes the sandy cretaceous deposits which occur in the extreme southern part of the state. Because of a variation in rock composition, permeability, hardness, texture, chemical properties, mineralogy and thickness, soil

differences may occur and in some cases cause sharp boundaries between soil series. South of the Choctaw Fault the rocks are vertically tilted which also may be a reason for either vegetation or soil differences.

Climate and Vegetation (living organisms) are the active factors in soil formation. Temperature and rainfall govern rates of weathering of rocks and the decomposition of minerals. They also influence leaching, eluviation, and illuviation. The indirect effects of climate are through its controls over the kinds of plants and animals that can thrive in a region. Living organisms — plants, animals, insects, bacteria, fungi, and the like — are important chiefly to horizon differentiation and less so to the accumulations of soil parent materials. Gains in organic matter and nitrogen in the soil gains or losses in plant nutrients, and changes in structure and porosity are among the changes due to living organisms.

In the study area, both climate and vegetation change very gradually from forest (humid) to savanna (moist, subhumid) and then to grasses (dry, subhumid), see Figure 1. Neither vegetation nor climate are responsible for sharp soil boundaries. The vegetation on a given site is probably because of the kind of soil in which it grows. However, the processes of removals, additions, transfers, and transformations are controlled by these active factors of soil formation.

Local differences in soils may be due to the effect of topography or age. Topography helps determine the amount of water available for

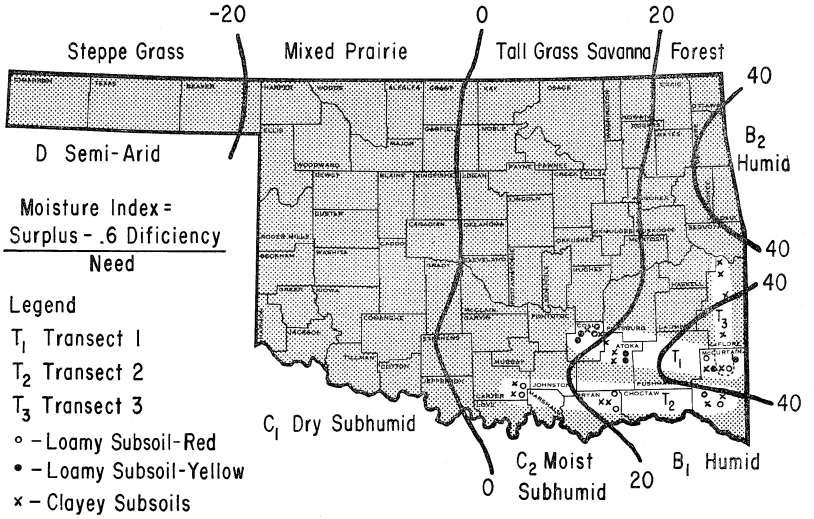

Figure 1. Location of Transects 1, 2 and 3 with respect to normal moisture index distribution for Oklahoma.

plant growth and soil development processes. The elevation varies from 400 feet to 2,600 feet with most of the land ranging from rolling to hilly with occasional flat surfaces. The mature soils (Ultisols) are found on the more stable or older landforms with younger soils (Inceptisols) on the changing or less table landforms.

For the purpose of this study only mature soils or those with B2t horizons will be selected for sampling, studying, and classifying along predetermined transect lines. Brief definitions of the new soil classification system along with differentiating criteria for Alfisols and Ultisols, the two orders of major concern in this savanna region are presented in the preceding section. Brief definitions of Mollisols and Inceptisols are included because they are likely associated soils in this area.

Methods and Materials

Representative soils of the savanna-forest transition were sampled along three transect lines, see Figure (1), by soil scientists of the Soil Conservation Service and the Oklahoma Agricultural Experiment Station; and were brought to the Soil Survey Research Laboratory of the Agronomy Department, Oklahoma State University. Analysis were made by standard methods (3).

The descriptions were abbreviated and are shown in Appendix Tables 1-32 along with important physical and chemical data. There were 16 profiles in Transect-1, 12 profiles in Transect-2 and 6 in Transect-3. Two profiles of the Georgeville soils are common to Transects-1 and 3.

Results and Discussion

Properties of Soils Along Transect-1

Sixteen profiles were sampled in the Ouachita Highlands Area along Transect-1, which extends from less than 20 to over 40 in moisture indexes, is forrested, developed in sandstone or shale, and occupies rolling to hilly topography. The data along with the soil classification of each pedon may be found in Appendix tables 1-16.

All of these soils have ochric epipedons, diagnostic surface horizons, and argillic, diagnostic subsurface horizons. They are all acidic, leached, weathered, and have developed B2t horizons. Based on these criteria, they all are either Alfisol or Ultisols. Mollisols are excluded because they lack thick dark colored horizons. Inceptisols are excluded because the B horizons are too well developed.

In order to determine criteria, processes, or factors responsible for either Alfisols or Ultisols the data were rearranged according to color

and texture of the B2t horizon or in some cases B3. No. B1 horizons were described in the sampled soils.

The properties which indicate soil development, removal of bases, and weathering were pooled by use of weighted averages for paired profiles. These weighted data are in Table 4. The percent base saturation ranges from 22-47 in the Argillic horizons of the loamy soils. The range for the clayey is 10 to 78 percent. The cut-off point for Alfisol and Ultisols is 35 percent. Ten of the soils are Ultisols. The six Alfisols occur in the landforms containing less permeable or more clayey soil materials or lower rainfall areas.

Criteria that correlates closely with 35 percent base saturation are extractable aluminum and pH in KCl measurement.

Properties of Soils Along Transect-2

Twelve profiles were sampled from the southern Cross Timbers through the Forested Coastal Plains in Southern Oklahoma. It crosses through gradual climatic and savanna-forest vegetative changes. The soils developed in weakly consolidated sands and clays of a Cretaceous age that have undulating to sloping topographies. The data along with the soil classification of each pedon may be found in Appendix Tables 17-28.

Table 4. Profile comparisons of Horizon Thickness, pH, Base Saturation and Cation-Exchange-Clay, Extractable Aluminum, Extractable Calcium-Magnesium ratios for the Soils of Transect-1.

Soil Profile and Diagnostic Horizon	Location of Profiles	Thickness (in.)	pH		Base Sat. (%)	Ext. Al	Ratios	
			H_2O	KCl			CEC C	Ca Mg
		YELLOW						
Hartsells Och[1]	Coal	12	5.9	4.9	59	0.2	0.5	4.0
Hartsells Arg[1]	Coal	23	5.3	4.1	47	1.2	0.5	1.1
Hartsells Och	Atoka	12	5.1	4.1	55	0.4	0.6	2.1
Hartsells Arg	Atoka	23	4.9	3.5	32	2.9	0.4	0.7
Hartsells Och	McCurtain	15	5.0	3.8	37	1.2	0.4	1.7
Hartsells Arg	McCurtain	21	5.0	3.5	22	4.2	0.5	0.6
		RED						
Stephenville Och	Coal	11	6.0	4.8	67	0.4	0.6	19.0
Stephenville Arg	Coal	18	5.2	3.8	35	3.4	0.4	0.5
Linker Och	McCurtain	12	5.4	4.0	47	0.8	0.7	1.0
Linker Arg	McCurtain	26	4.7	3.4	27	8.3	0.5	0.5
		CLAYEY						
Enders Och	Coal	6	6.0	5.2	56	0.0	1.0	2.4
Enders Arg	Coal	33	5.8	5.2	64	3.3	0.5	0.6
Enders Och	Atoka	7	5.7	4.9	78	0.1	0.7	59.0
Enders Arg	Atoka	42	4.6	3.4	45	3.2	0.6	0.3
Georgeville Och	McCurtain	4	5.1	3.7	26	3.8	0.4	2.7
Georgeville Arg	McCurtain	44	4.8	3.3	10	17.0	0.4	1.7

[1] Abbreviations for diagnostic horizons Och for Ochric, Arg for Argillic.
[2] Weighted average basis considering thickness of horizons of two duplicate profiles.

The diagnostic horizons are similar to those of Transect-1, all have ochric surface horizon and argillic subsurface horizons. For study the soils were grouped into those with loamy and clayey subsoils. Weighted averages were obtained for paired samples considering the thickness of horizons. The data are in Table 5. Solum thickness and extractable aluminum increased from west to east whereas pH and base saturation decreased in both loamy and clayey kinds of soil. Ratios indicated slight stratification in types of clays throughout this transect with it more pronounced in the west and central parts with more uniformity in clays in the eastern part (McCurtain County). From the criteria utilized, only the soils in McCurtain County may be classified as Ultisols and all others as Alfisols. The boundary for the Forested Coastal Plain soils (loamy) is between McCurtain and Bryan Counties; whereas for clayey soils it is near the Choctaw and McCurtain County line.

Properties of Soils Along Transect-3

Six clayey profiles were used in this transect. All are from the Ouachita Highlands. Three were from north of the Choctaw Fault and three south of the fault line. This is forested, hilly country with near humid climatic conditions. It is underlain with sandstone and shale which is layered horizontally north of the fault and vertically south of the fault.

Table 5. Profile Comparisons of Horizon Thickness, pH, Base Saturation, Extractable Aluminum, Cation Exchange-Clay and Extractable Calcium Magnesium Ratios for the Soils of Transect 2.

Soil Profile and Diagnostic Horizon	Location of Profiles	Thickness (in.)	pH		Base Sat. (%)	Ext. Al	Ratios	
			H_2O	KCl			CEC C	Ca Mg
		CLAYEY						
Windthorst Orch	Carter	10	5.7	5.0	75	0.2	0.9	0.9
Windthorst Arg	Carter	47	4.7	4.0	67	1.6	0.8	1.2
Boswell Och	Bryan	7	6.4	5.4	70	0.0	1.2	4.4
Boswell Arg	Bryan	58	5.0	3.9	57	4.2	0.6	1.8
Boswell Orch	McCurtain	8	5.2	4.4	39	1.2	1.4	8.0
Boswell Arg	McCurtain	67	4.3	3.4	24	10.0	0.5	3.0
		LOAMY						
Stephenville Och	Carter	9	6.2	5.3	81	0.0	1.1	2.5
Stephenville Arg	Carter	38	5.2	4.2	75	0.8	0.7	1.3
Bowie Och	Bryan	14	6.1	5.3	72	0.0	0.5	3.7
Bowie Arg	Bryan	57	5.2	3.9	50	3.2	0.4	1.5
Bowie Och	McCurtain	13	5.3	4.5	72	0.5	0.9	2.6
Bowie Arg	McCurtain	54	4.7	3.4	27	7.0	0.6	1.5

[1] Abbreviations for diagnostic horizons Och for Ochric, Arg for Argillic.
[2] Weighted average basis considering thickness of horizons of two duplicate profiles.

The data along with a classification of each pedon may be found in Appendix Tables 29-32.

By employing the data in Table 6, solums are thicker south of the fault, also the soils are more acidic, much higher in extractable aluminum. They are lower in base saturation and pH in KCl. The type of clays appear to be more uniform in the south and more mixed and stratified above the fault or to the north. Calcium-magnesium ratios are variable throughout the transect.

Using these data along with the morphology, mature soils located south of the Fault are Ultisols whereas to the north they are mixed Alfisols and Ultisols with a marked stratification as to the clay mineralogy. However laboratory data such as pH in KCL and extractable aluminum data may be utilized in helping classify these soils correctly.

Summary and Conclusions

The soils with developed B horizons of southeast Oklahoma can be classified into their correct order, Ultisol or Alfisol. Utilizing the chemical and physical data along with the diagnostic horizons the soils tend to group themselves into three areas, (1) Ultisol (2) Ultisol-Alfisol and (3) Alfisol. These areas correlate closely to the 40 and 20 and moisture

Table 6. Profile Comparisons of Horizon Thickness, pH, Base Saturation, Extractable Aluminum, Cation-Exchange-Clay and Extractable Calcium, Magnesium Ratios for the Soils of Transect 3, North-South Ouachita Highlands.

Soil Profile and Diagnostic Horizon	Location of Profiles	Thickness (in.)	pH		Base Sat. (%)	Ext. Al	Ratios	
			H_2O	KCl			CEC C	Ca Mg
Enders Och[1]	LeFlore, 9N, 24E (40-3)	10	5.2	3.7	38	0.3	1.0	1.6
Enders Arg[1]		25	4.9	3.3	20	7.4	0.3	0.8
Enders Och	LeFlore, 8N, 24E (40-2)	13	6.0	5.3	64	0.0	0.8	3.0
Enders Arg		27	4.9	3.1	32	7.2	0.4	0.3
Enders Och	LeFlore, 7N, 26E (40-4)	15	5.4	4.1	23	0.2	0.6	1.8
Enders Arg		33	4.8	3.2	41	9.0	0.3	0.5
	CHOCTAW FAULT							
Enders Och	LeFlore, 2N, 25E (40-1)	7	4.6	3.4	16	3.3	0.5	1.5
Enders Arg		39	4.5	3.0	7	18.0	0.4	2.2
Georgeville Och[2]	McCurtain	4	5.1	3.7	4	26.0	0.4	2.7
Georgeville Arg[2]	McCurtain	44	4.8	3.3	17	10.0	0.4	1.7

[1] Abbreviations for diagnostic horizons Och for Ochric, Arg for Argillic.
[2] Weighted average basis considering thickness of horizons of two duplicate profiles.

indexes and forest-savanna boundary. However, slight departures may occur due to change in landform such as the Choctaw-Fault to the north and coastal plains to the south. The loamy soil materials and bedded sedimentary rocks tilted on edge are subjected to more leaching and weathering because of higher soil permeability. Thus, Ultisols are formed rather than Alfisols. More clayey materials and horizontally bedded rock materials even if affected by similar climate develop soils with higher base status which is characteristic of Alfisols. Approximate boundaries incorporating all factors laboratory data, soil descriptions and processes responsible for the formation and classification of these soils are shown in Figure 2.

Classification in Relation to Future Soil Uses in this Area

Present uses are recreation, water supply, forestry and grazing. There are many acres of land within this area that could be used for cultivated crops, grasses, and trees. However, lime and fertilizers are needed in the Ultisols and Alfisols for high crop production. Much lime is needed to successfully crop the Ultisols. Cheap sources will need to be located and made available for the Ultisols located in 6 counties of southeast Oklahoma. Lime is available for most of the Alfisols which require less for most crops. Multiple land used could be planned for a large portion of this area.

Based on the accumulated soil data limitations vary from very slight to severe for nonagricultural uses such as trafficways, building, campsite

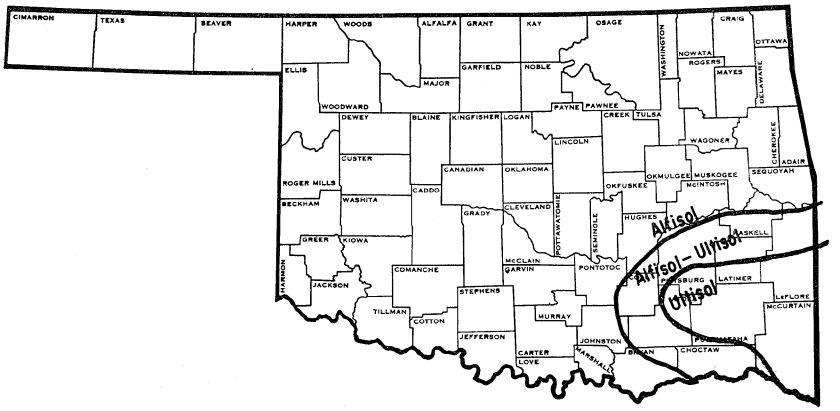

Figure 2. Approximate boundary of Ultisols and Alfisols in southeast Oklahoma.

and play areas, and septic tank filter fields. Enders offer severe limitations for highway and septic tank constructions whereas Bowie offers very slight limitations for building highways.

The information in this bulletin when correlated with other soil publications (1, 2) will be valuable for future soil resources planning and educational work for southeastern Oklahoma for both agricultural and nonagricultural uses.

References

1. Gray, Fenton and H. M. Galloway. 1969. Soils of Oklahoma. Misc. Publ. OSU Agric. Res., MP 56. Revised.
2. Smith, Roy M., Gray, Fenton and H. M. Galloway. 1959. Fertility Characteristics of Oklahoma Soil Associations. OSU Agric. Exp. Bul. B-528.
3. Soil Survey Laboratory Methods and Procedures for Collecting Soil Samples. Soil Survey Investigations Report No. 1. SSC, USDA, 1967.
4. Gray, Fenton and Clyde Stahnke. 1968. Characteristics and a New Soil Classification of Key Soils Developed in the Old Reddish Chestnut Zone of Oklahoma. Okla. Agric. Exp. Station Tech. Bul. T-122.

Appendix Table 1. Stephenville Sandy Loam

Soil Association: Darnell-Stephenville
Location: 570 yds. S. and 25 yds. E. of N.W. corner of Section 14, T 2 N, R 9 E, Coal County, Okla.

Relief: 1-3 %
Drainage: Well-drained
Geog. Position: Upland
Parent Material: Sandstone (Boggy)

Order: Alfisol
Classification: Fine-loamy, mixed thermic, Ultic Haplustalfs

PROFILE DESCRIPTION

No.	Horizon	Depth	Color	Texture	Structure	Consistence	Sample Nos.
1	A P	0-9	10 Y R 4/3 m	sl	1 f gr		S-66-OK-15-1-1
2	B 21 t	9-21	10 Y R 4/4 m	sl	1 m sbk		S-66-OK-15-1-2
3	B 22 t	21-29	10 Y R 5/6 m	scl	2 m sbk		S-66-OK-15-1-3
4	B 3	29-35	10 Y R 5/6 m	scl	1 m sbk		S-66-OK-15-1-4
5	R	35+					S-66-OK-15-1-5

CHEMICAL DATA

	pH			Extractable cations, meq/100 gms						% Base Saturation		%
No.	H_2O	KCl	CEC	H	Ca	Mg	K	Na	Al*	NaAc	Sum of cations	O.M.
1	5.7	4.7	5.7	2.9	2.84	0.75	0.35	0.18	0.0	72	59	0.9
2	5.4	4.1	11.8	4.7	2.41	1.91	0.36	0.13	1.1	41	50	0.7
3	5.3	4.1	10.1	6.0	1.93	2.22	0.41	0.49	0.6	50	46	0.5
4	5.0	4.2	11.4	4.3	2.10	3.00	0.36	0.13	0.7	49	57	

PHYSICAL DATA

No.	% Sand	% Silt	% Clay	% Sand Subfraction VFS (.1-.05 mm)	Textural Class
1	69.9	18.5	11.3	11.1	Sandy Loam
2	58.3	22.7	18.9	9.2	Sandy Loam
3	58.3	20.2	21.5	7.5	Sandy Clay Loam
4	60.9	17.7	21.5	7.1	Sandy Clay Loam

*Not included for purpose of calculating the percent base saturation.

Appendix Table 2. Hartsells Sandy Loam

Soil Association: Hector-Enders
Location: 225 yds. S. and 40 yds. W. of N.E. corner of N.W ¼ of Section 10, T 1 N, R 11 E, Coal County, Okla.

Relief: 1-3%
Drainage: Well-drained
Geog. Position: Upland
Parent Material: Sandstone (Boggy)

Order: Ultisol
Classification: Fine-loamy, siliceous, thermic, Typic Hapludults

PROFILE DESCRIPTION

No.	Horizon	Depth	Color	Texture	Structure	Consistence	Sample No.
1	A 1	0-4	10 Y R 4/3 m	sl	1 f gr	v fr	S-66-OK-15-3-1
2	A 2	4-9	7.5 Y R 6/4 m	sl	1 f gr	v fr	S-66-OK-15-3-2
3	B 1	9-14	7.5 Y R 6/6 m	sl	1 m gr	m fr	S-66-OK-15-3-3
4	B 2 t	14-20	5 Y R 5/8 m	cl	2 m sbk	m fr	S-66-OK-15-3-4
5	B 3 t	20-25	5 Y R 5/8 m	cl	1 m sbk	m fr	S-66-OK-15-3-5
6	R	25					

CHEMICAL DATA

	pH			Extractable cations, meq/100 gms						% Base Saturation		%
No.	H_2O	KCl	CEC	H	Ca	Mg	K	Na	Al*	NaAc	Sum of cations	O.M.
1	5.6	4.6	8.5	4.2	2.89	0.75	0.28	0.17	0.6	48	49	2.5
2	5.4	4.1	3.2	0.5	0.95	0.31	0.31	0.09	0.7	52	77	0.7
3	5.4	4.1	3.5	1.5	0.79	1.08	0.46	0.13	0.6	70	62	
4	5.0	3.7	13.0	9.5	1.11	3.77	0.21	0.09	3.2	40	35	
5	5.2	3.8	11.3	11.1	1.31	3.77	0.14	0.11	3.9	52	32	

PHYSICAL DATA

No.	% Sand	% Silt	% Clay	% Sand Subfraction VFS (.1-.05 mm)	Textural Class
1	57.3	33.9	8.8	37.8	Sandy Loam
2	61.1	31.4	7.5	37.4	Sandy Loam
3	61.1	28.9	10.0	37.6	Sandy Loam
4	40.4	29.2	30.5	26.6	Clay Loam
5	42.8	28.0	29.2	23.9	Clay Loam

* Not included for purpose of calculating the percent base saturation

Appendix Table 3. Hartsells Sandy Loam

Soil Association: Hector-Enders
Location: 265 yds. S. and 25 yds. W. of N.E. corner of Section 27, T 2 N, R 11 E, Coal County, Okla.

Relief: 3-5%
Drainage: Well-drained
Geog. Position: Upland
Parent Material: Sandstone (Boggy)

Order: Ultisol
Classification: Fine-loamy, siliceous, thermic, Typic Hapludults

PROFILE DESCRIPTION

No.	Horizon	Depth	Color	Texture	Structure	Consistence	Sample No.
1	A 1	0-7	10 Y R 4/3 m				S-66-OK-15-4-1
2	A 2	7-12	7.5 Y R 6/4 m				S-66-OK-15-4-2
3	B 2 t	12-24	5 Y R 5/8 m				S-66-OK-15-4-3
4	B 3 t	24-33	10 Y R 5/8 m				S-66-OK-15-4-4
5	R	33+					S-66-OK-15-4-5

CHEMICAL DATA

	pH			Extractable cations, meq/100 gms						% Base Saturation		%
No.	H_2O	KCl	CEC	H	Ca	Mg	K	Na	Al*	NaAc	Sum of cations	O.M.
1	6.6	5.8	4.0	1.3	1.72	4.36	0.20	0.11	0.0	159	83	1.0
2	6.4	5.1	3.1	4.2	1.92	3.18	0.23	0.09	0.6	175	56	0.3
3	5.1	3.7	13.4	9.3	1.31	1.83	0.36	0.09	3.9	27	28	
4	5.0	3.7	12.1	8.0	0.79	1.76	0.28	0.09	4.5	24	27	

PHYSICAL DATA

No.	% Sand	% Silt	% Clay	% Sand Subfraction VFS (.1-.05 mm)	Textural Class
1	72.4	21.3	6.3	22.8	Sandy Loam
2	74.9	17.6	7.5	17.5	Loamy Sand
3	54.3	15.2	30.5	15.5	Sandy Clay Loam
4	58.2	16.5	25.3	14.3	Sandy Clay Loam

* Not included for purpose of calculating the percent base saturation

Appendix Table 4. Hartsells Loamy Sand

Soil Association: Hector-Enders
Location: 90 yds. S. and 30 yds. E. of N.W. corner of Section 14, T 2 N, R 9 E, Coal County, Okla.

Relief: 3-5%
Drainage: Well-drained
Geog. Position: Upland
Parent Material: Sandstone (Boggy)

Order: Ultisol
Classification: Fine-loamy, siliceous, thermic, Typic Hapludults

PROFILE DESCRIPTION

No.	Horizon	Depth	Color	Texture	Structure	Consistence	Sample No.
1	A 1	0-8	10 Y R 4/3 m		1 f gr		S-66-OK-15-2-1
2	A 2	8-15	10 Y R 5/3 m		1 f gr		S-66-OK-15-2-2
3	B 21 t	15-22	10 Y R 5/6 m		1 m cbk		S-66-OK-15-2-3
3	B 22 t	22-28	10 Y R 5/6 m		2 m sbk		S-66-OK-15-2-4
5	B 3	28-32	10 Y R 5/6 m		1 m gr		S-66-OK-15-2-5
6	R 1	32+					S-66-OK-15-2-6

CHEMICAL DATA

	pH			Extractable cations, meq/100 gms						% Base Saturation		%
No.	H_2O	KCl	CEC	H	Ca	Mg	K	Na	Al*	NaAc	Sum of cations	O.M.
1	6.1	5.2	4.3	2.8	2.42	0.60	0.36	0.11	0.5	81	56	1.1
2	6.3	5.1	3.6	1.9	2.10	0.61	0.56	0.13	0.1	94	64	0.4
3	5.6	4.4	14.3	4.1	3.36	2.47	0.31	0.15	0.4	44	61	0.4
4	5.1	3.9	13.1	6.4	1.79	1.54	0.34	0.09	2.1	29	37	
5	4.9	3.7	14.1	8.0	1.58	0.82	0.44	0.24	3.8	22	28	

PHYSICAL DATA

No.	% Sand	% Silt	% Clay	% Sand Subfraction VFS (.1-.05 mm)	Textural Class
1	74.9	21.4	3.8	14.4	Loamy Sand
2	72.4	18.8	8.8	12.9	Loamy Sand
3	60.9	15.1	24.0	12.4	Sandy Clay Loam
4	59.6	16.4	24.0	11.2	Sandy Clay Loam
5	64.6	13.9	21.5	8.6	Sandy Clay Loam

* Not included for purpose of calculating the percent base saturation

Appendix Table 5. Homa Loam

Soil Association: Hector-Enders
Location: 350 yds. S. and 120 yds. E. of N.W. corner of Section 3, T 1 N, R 11 E, Coal County, Okla.

Relief: 3-18%
Drainage: Well-drained
Geog. Position: Upland
Parent Material: Shale and Sandstone

Order: Alfisol
Classification: Very fine, mixed, thermic, Albaquic Hapludalfs

PROFILE DESCRIPTION

No.	Horizon	Depth	Color	Texture	Structure	Consistence	Sample No.
1	A 1	0-5	10 Y R 4/2 m	sl	1 f gr	V fr	S-66-OK-15-6-1
2	II B 21 t	5-20	10 Y R 5/6 m		2 m bk	m fi	S-66-OK-15-6-2
3	II B 22 t	20-32	5 Y R 4/4 m		2 m bk	m fi	S-66-OK-15-6-3
4	II B 3	32-38	10 Y R 5/1 m		1 c bk	m fi	S-66-OK-15-6-4
5	II R	38+					S-66-OK-15-6-5

CHEMICAL DATA

No.	pH		CEC	Extractable cations, meq/100 gms						% Base Saturation		%
	H_2O	KCl		H	Ca	Mg	K	Na	Al*	NaAc	Sum of cations	O.M.
1	6.0	5.2	12.0	6.6	3.66	2.16	0.51	0.54	0.0	63	51	2.8
2	4.9	3.5	43.4	16.3	6.05	7.64	0.92	0.68	7.4	35	48	1.2
3	5.0	3.6	36.7	11.5	8.20	11.36	0.92	1.17	2.9	59	65	1.0
4	5.1	4.1	32.7	8.8	8.81	10.94	0.77	1.74	0.8	67	71	

PHYSICAL DATA

No.	% Sand	% Silt	% Clay	% Sand Subfraction VFS (.1-.05 mm)	Textural Class
1	53.5	35.2	11.3	23.9	Sandy Loam
2	2.1	12.9	85.1	2.4	Clay
3	4.9	16.7	78.4	2.6	Clay
4	6.1	11.3	82.6	1.2	Clay

* Not included for purpose of calculating the percent base saturation

Appendix Table 6. Homa Sandy Loam

Soil Association: Hector-Enders
Location: 700 yds. S. and 110 yds. E. of N.W. corner of N.E. ¼ of Section 24, T 1 N, R 11 E, Coal County, Okla.

Relief: 3-18%
Drainage: Well-drained
Geog. Position: Upland
Parent Material: Shale

Order: Alfisol
Classification: Very fine, mixed, thermic, Albaquic Hapludalfs

PROFILE DESCRIPTION

No.	Horizon	Depth	Color	Texture	Structure	Consistence	Sample No.
1	A 1	0-7	10 Y R 4/2 m		1 f gr	vm fr	S-66-OK-15-5-1
2	B 21 t	7-17	10 Y R 5/1 m		2 m bk	m fi	S-66-OK-15-5-2
3	B 22 t	17-30	10 Y R 5/3 m		2 m bk	m fi	S-66-OK-15-5-3
4	B 3	30-40	10 Y R 5/2 m		2 m bk	m fi	S-66-OK-15-5-4
5	R	40+					S-66-OK-15-5-5

CHEMICAL DATA

	pH			Extractable cations, meq/100 gms						% Base Saturation		%
No.	H_2O	KCl	CEC	H	Ca	Mg	K	Na	Al*	NaAc	Sum of cations	O.M.
1	6.1	5.1	12.8	3.6	3.57	1.33	0.32	0.49	0.0	45	61	2.6
2	5.3	3.7	18.3	16.8	3.57	9.88	0.62	1.22	5.6	84	48	1.4
3	6.3	5.4	34.8	7.0	3.78	12.32	0.46	3.26	0.0	57	74	1.0
4	8.0	6.7	29.2	0.8	5.79	11.27	0.37	2.62	0.0	70	98	

PHYSICAL DATA

No.	% Sand	% Silt	% Clay	% Sand Subfraction VFS (.1-.05 mm)	Textural Class
1	58.4	27.7	13.9	10.9	Sandy Loam
2	0.0	28.2	71.8	0.9	Clay
3	0.0	34.5	65.5	0.8	Clay
4		39.5	60.5	0.6	Clay

* Not included for purpose of calculating the percent base saturation

Appendix Table 7. Hartsells Sandy Loam

Soil Association: Hector-Enders
Location: 900 ft. S. and 750 ft. W. of N.E. corner of Section 24, T 2 S, R 12 E, Atoka County, Okla.

Relief: 1-3%
Drainage: Well-drained
Geog. Position: Upland
Parent Material: Sandstone

Order: Ultisol
Classification: Fine-loamy, siliceous, thermic, Typic Hapludults

PROFILE DESCRIPTION

No.	Horizon	Depth	Color	Texture	Structure	Consistence	Sample No.
1	A 1	0-4	10 Y R 5/2 m		1 f gr	m fr	S-67-OK-3-2-1
2	A 2	4-10	10 Y R 6/2 m		1 f gr	m fr	S-67-OK-3-2-2
3	B 2t	10-24	10 Y R 5/2 m		2 m sbk	m fi	S-67-OK-3-2-3
4	B 3	24-32	10 Y R 5/2 m		2 m sbk	m fi	S-67-OK-3-2-4
5	R	32+					S-67-OK-3-2-5

CHEMICAL DATA

	pH			Extractable cations, meq/100 gms						% Base Saturation		%
No.	H_2O	KCl	CEC	H	Ca	Mg	K	Na	Al*	NaAc	Sum of cations	O.M.
1	5.6	4.9	7.3	1.6	3.03	1.00	0.08	0.04	0	57	72	1.1
2	4.9	3.8	3.6	2.4	2.48	0.79	0.05	0.04	0.4	93	58	0.5
3	4.9	3.5	8.9	8.2	1.30	1.80	0.38	0.14	2.9	40	30	0.3
4	4.8	3.5	13.6	10.5	1.60	2.80	0.51	0.09	4.2	37	32	
5	4.9	3.2										

PHYSICAL DATA

No.	% Sand	% Silt	% Clay	% Sand Subfraction VFS (.1-.05 mm)	Textural Class
1	58.5	33.9	7.5	8.7	Sandy Loam
2	61.2	30.1	8.8	9.3	Sandy Loam
3	53.3	25.3	21.5	7.0	Sandy Clay Loam
4	45.4	25.4	29.2	5.9	Sandy Clay Loam

* Not included for purpose of calculating the percent base saturation

Appendix Table 8. Hartsells Sandy Loam

Soil Association: Hector-Enders
Location: 2300 ft. E. and 100 ft. N. of S.W. corner of Section 7, T 2 S, R 13 E, Atoka County, Okla.

Relief: 1-3%
Drainage: Well-drained
Geog. Position: Upland
Parent Material: Sandstone

Order: Ultisol
Classification: Clayey, mixed, thermic, Typic Hapludults

PROFILE DESCRIPTION

No.	Horizon	Depth	Color	Texture	Structure	Consistence	Sample No.
1	A 1	0-5	10 Y R 4/2 m		1 f gr	m fr	S-67-OK-3-1-1
2	A 2	5-14	10 Y R 6/4 m		1 f gr	m fr	S-67-OK-3-1-2
3	B 2 t	14-26	10 Y R 5/6 m		2 m sbk	m fi	S-67-OK-3-1-3
4	B 3	26-38	10 Y R 5/6 m		2 m sbk	m fi	S-67-OK-3-1-4
5	R	38+					S-67-OK-3-1-5

CHEMICAL DATA

No.	pH		CEC	Extractable cations, meq/100 gms						% Base Saturation		%
	H_2O	KCl		H	Ca	Mg	K	Na	Al*	NaAc	Sum of cations	O.M.
1	5.5	3.8	4.8	7.0	0.81	0.99	0.26	0.09	1.0	44	24	3.0
2	5.2	3.9	2.4	1.8	1.52	0.96	0.14	0.04	0.4	110	59	0.6
3	4.7	3.6	18.2	12.8	3.0	3.3	0.44	0.11	2.1	38	34+	0.8
4	4.8	3.6	15.1	11.3	2.27	3.49	0.12	0.20	2.4	40	34+	

PHYSICAL DATA

No.	% Sand	% Silt	% Clay	% Sand Subfraction VFS (.1-.05 mm)	Textural Class
1	62.4	30.1	7.5	11.3	Sandy Loam
2	62.4	28.1	8.6	12.5	Sandy Loam
3	42.0	19.3	38.7	7.9	Clay Loam
4	46.6	17.8	35.6	10.2	Sandy Clay

* Not included for purpose of calculating the percent base saturation

Appendix Table 9. Enders Sandy Loam

Soil Association: Hector-Enders
Location: 500 ft. E. and 2000 ft. N. of S.W. corner of Section 25, T 2 S, R 12 E, Atoka County, Okla.

Relief: 3-18%
Drainage: Well-drained
Geog. Position: Upland
Parent Material: Shale

Order: Alfisol
Classification: Fine, mixed, thermic, Ultic Hapludalfs

PROFILE DESCRIPTION

No.	Horizon	Depth	Color	Texture	Structure	Consistence	Sample No.
1	A 1	0-8	10 Y R 4/2 m		1 f gr	v m fr	S-67-OK-3-4-1
2	B 21 t	8-26	10 Y R 3/3 m		2 f bk	m fi	S-67-OK-3-4-2
3	B 22 t	26-42	10 Y R 7/1 m		1 mbk	m fi	S-67-OK-3-4-3
4	B 3	42-50			1 mbk	m fi	S-67-OK-3-4-4
5	R	50+					S-67-OK-3-4-5

CHEMICAL DATA

No.	pH		CEC	Extractable cations, meq/100 gms						% Base Saturation		%
	H_2O	KCl		H	Ca	Mg	K	Na	Al*	NaAc	Sum of cations	O.M.
1	5.5	5.0	5.4	3.8	3.53	0.03	0.44	0.22	0.06	87	55	2.7
2	4.5	3.3	32.3	25.7	2.2	5.4	0.36	0.26	5.8	26	24	1.2
3	4.6	3.2	36.5	30.0	7.3	15.99	0.41	1.31	1.9	72	47	1.0
4	4.6	3.2	24.6	11.9	3.5	6.25	0.41	2.26	0	44	47	
5	4.3	3.3	28.5	12.8	5.96	8.52	0.44	2.13	0	58	56	

PHYSICAL DATA

No.	% Sand	% Silt	% Clay	% Sand Subfraction VFS (.1-.05 mm)	Textural Class
1	59.8	32.6	7.5	22.8	Sandy Loam
2	37.3	10.5	52.3	9.2	Clay
3	14.8	25.9	59.4	5.7	Clay
4	39.9	21.7	38.3	12.5	Clay Loam
5	8.8	41.1	50.1	2.5	Silty Clay

* Not included for purpose of calculating the percent base saturation

Appendix Table 10. Enders Sandy Loam

Soil Association: Hector-Enders
Location: S.E. ¼ of Section 3, T 3 S, R 24 E, Section, R 12 E, Atoka County, Okla.

Relief: 3-18%
Drainage: Well-drained
Geog. Position: Upland
Parent Material: Shale

Order: Alfisol
Classification: Very fine, mixed, thermic, Typic Hapludalfs

PROFILE DESCRIPTION

No.	Horizon	Depth	Color	Texture	Structure	Consistence	Sample No.
1	A 1	0-6	10 Y R 4/2 m		1 f gr	v m fr	S-67-OK-3-3-1
2	B 21 t	6-26	2.5 Y R 4/6 m		2 f bk	m fi	S-67-OK-3-3-2
3	B 22 t	26-40	10 Y R 5/6 m		2 m bk	m fi	S-67-OK-3-3-3
4	B 3	40-48	10 Y R 5/2 m		2 f bk	m fi	S-67-OK-3-3-4
5	R	48+					S-67-OK-3-3-5

CHEMICAL DATA

No.	pH H_2O	pH KCl	CEC	Extractable cations, meq/100 gms H	Ca	Mg	K	Na	Al*	% Base Saturation NaAc	Sum of cations	% O.M.
1	5.9	4.8	5.7	0	3.64	3.8	0.44	0.22	0.06	140	100	1.5
2	4.0	3.3	31.5	24.3	0.91	8.3	0.36	0.26	5.8	31	29	1.0
3	4.9	3.3	33.8	9.0	2.83	14.5	0.41	1.31	1.9	56	68	1.2
4	6.3	5.2	28.8	2.0	4.39	15.5	0.41	2.26	0	78	92	
5	6.2	5.8	23.1	1.3	4.06	13.2	0.44	2.13	0	86	94	

PHYSICAL DATA

No.	% Sand	% Silt	% Clay	% Sand Subfraction VFS (.1-.05 mm)	Textural Class
1	62.4	27.6	10.0	20.2	Sandy Loam
2	8.4	25.9	65.7	5.2	Clay
3	12.4	26.3	61.3	9.7	Clay
4	14.7	19.8	65.6	0.5	Clay
5	0.8	38.1	61.1	0.3	Clay

* Not included for purpose of calculating the percent base saturation

Appendix Table 11. Georgeville Clay

Soil Association: Hector-Enders
Location: S.E. ¼ of Section 3, T 3 S, R 24 E, McCurtain County, Okla.

Relief: 22%
Drainage: Well-drained
Geog. Position: Upland
Parent Material: Shale

Order: Ultisol
Classification: Clayey, mixed, thermic, Typic Hapludults

PROFILE DESCRIPTION

No.	Horizon	Depth	Color	Texture	Structure	Consistence	Sample No.
1	A 1	0-4	10 Y R 4/2 m		1 f gr	v m fr	S-66OK-45-4-1
2	B 21 t	4-16	5 Y R 5/6 m		2 m sbk	m fi	S-66-OK-45-4-2
3	B 22 t	16-38	5 Y R 5/6 m		2 m sbk	m fi	S-66-OK-45-4-3
4	B 3	38-48	5 Y R 5/6 m		2 m sbk	m fi	S-66-OK-45-4-4
5	R	48+					S-66-OK-45-4-5

CHEMICAL DATA

	pH			Extractable cations, meq/100 gms						% Base Saturation		%
No.	H_2O	KCl	CEC	H	Ca	Mg	K	Na	Al*	NaAc	Sum of cations	O.M.
1												
2	5.0	3.5	18.9	17.6	0.40	0.99	0.23	0.07	6.7	9	9	0.7
3	4.9	3.3	24.1	18.0	0.61	0.79	0.41	0.11	10.3	8	10	0.5
4	4.7	3.1	23.4	17.7	1.01	0.38	0.05	0.07	23.0	6	8	
5	5.2	3.3	23.7	17.7	0.61	0.49	0.12	0.09	23.6	6	7	

PHYSICAL DATA

No.	% Sand	% Silt	% Clay	% Sand Subfraction VFS (.1-.05 mm)	Textural Class
1					
2	8.6	38.1	53.3	1.3	Clay
3	3.1	35.7	61.2	1.0	Clay
4	4.3	31.9	63.8	1.1	Clay
5	7.0	30.6	62.5	1.5	Clay

* Not included for purpose of calculating the percent base saturation

Appendix Table 12. Georgeville Loam

Soil Association: Hector-Enders
Location: S.W. corner of Section 33, T 2 S, R 22 E, McCurtain County, Okla.

Relief: 16%
Drainage: Well-drained
Geog. Position: Upland
Parent Material: Shale

Order: Ultisol
Classification: Clayey, mixed, thermic, Typic Hapludults

PROFILE DESCRIPTION

No.	Horizon	Depth	Color	Texture	Structure	Consistence	Sample No.
1	A 1	0-4	10 Y R 5/2 m		1 f gr	v m fr	S-66-OK-45-3-1
2	B 22 t	4-10	7.5 Y R 5/4 m		3 f sbk	m fi	S-66-OK-45-3-2
3	B 22 t	10-36	5 Y R 4/6 m		3 f sbk	m fi	S-66-OK-45-3-3
4	B 3	36-48	5 Y R 4/6 m		2 m sbk	m fi	S-66-OK-45-3-4
5	R	48+					S-66-OK-45-3-5

CHEMICAL DATA

	pH			Extractable cations, meq/100 gms						% Base Saturation		%
No.	H_2O	KCl	CEC	H	Ca	Mg	K	Na	Al*	NaAc	Sum of cations	O.M.
1	5.3	4.0	6.3	3.9	2.42	0.46	0.12	0.1	0.9	49	44	2.7
2	5.1	3.6	20.0	15.4	1.41	2.39	0.23	0.04	7.8	20	43	1.2
3	4.8	3.4	31.7	30.6	0.61	1.78	0.20	0.04	18.3	8	8	0.5
4	4.9	3.4	25.2	26.1	0.91	1.28	0.17	0.08	13.2	10	9	
5	5.0	3.7	21.2	17.5	0.81	1.37	0.54	0.11	10.0	13	14	

PHYSICAL DATA

				% Sand Subfraction	
No.	% Sand	% Silt	% Clay	VFS (.1-.05 mm)	Textural Class
1	49.1	35.8	15.1	10.8	Loam
2	15.9	36.9	47.2	4.7	Clay
3	3.4	22.3	74.4	0.9	Clay
4	8.6	41.9	49.5	1.2	Silty Clay
5	13.4	52.2	34.4	2.5	Silty Clay Loam

* Not included for purpose of calculating the percent base saturation

Appendix Table 13. Hartsells Loam

Soil Association: Hector-Enders
Location: N.W. ¼ of S.E. ¼ of Section 3, T 3 S, R 24 E, McCurtain County, Okla.

Relief: 1-3%
Drainage: Well-drained
Geog. Position: Upland
Parent Material: Sandstone

Order: Ultisol
Classification: Fine-loamy, siliceous, thermic, Typic Hapludults

PROFILE DESCRIPTION

No.	Horizon	Depth	Color	Texture	Structure	Consistence	Sample No.
1	A 1	0-6	10 Y R 4/2 m		1 f gr	m fr	S-66-OK-45-5-1
2	A 2	6-16	10 Y R 6/4 m		1 f gr	m fr	S-66-OK-45-5-2
3	B 22 t	16-26	10 Y R 5/6 m		2 m sbk	m fr	S-66-OK-45-5-3
4	B 3	26-34	10 Y R 5/6 m		2 m sbk	m fr	S-66-OK-45-5-4
5	R	34+					S-66-OK-45-5-5

CHEMICAL DATA

No.	pH H_2O	pH KCl	CEC	Extractable cations, meq/100 gms H	Ca	Mg	K	Na	Al*	% Base Saturation NaAc	Sum of cations	% O.M.
1	5.1	3.7	10.9	11.1	1.61	0.87	0.3	0.04	1.9	26	20	2.7
2	5.2	3.9	4.7	2.6	0.61	0.98	0.05	0.04	1.8	36	39	0.7
3	5.1	3.6	14.6	12.0	0.71	1.57	0.34	0.04	5.7	18	18	
4	5.4	3.6	14.7	13.1	0.91	0.48	0.2	0.07	6.1	11	11	
5	5.2	3.7	12.1	12.1	0.71	0.98	0.05	0.09	6.3	15	13	

PHYSICAL DATA

No.	% Sand	% Silt	% Clay	% Sand Subfraction VFS (.1-.05 mm)	Textural Class
1	47.1	39.1	13.9	17.5	Loam
2	48.5	37.7	13.8	19.8	Loam
3	33.8	31.8	34.4	12.7	Clay Loam
4	53.2	26.6	20.3	15.3	Sandy Clay Loam
5	52.0	31.6	16.4	20.8	Sandy Loam

* Not included for purpose of calculating the percent base saturation

Appendix Table 14. Hartsells Loam

Soil Association: Hector-Enders
Location: 300 ft. E. of N.E. corner of Section 20, T 1 S, R 27 E, McCurtain County, Okla.

Relief: 1-3%
Drainage: Well-drained
Geog. Position: Upland
Parent Materials: Sandstone

Order: Ultisol
Classification: Fine-loamy, siliceous, thermic, Typic Hapludults

PROFILE DESCRIPTION

No.	Horizon	Depth	Color	Texture	Structure	Consistence	Sample No.
1	A 1	0-4	10 Y R 5/2 m		1 f gr	m fr	S-66-OK-45-6-1
2	A 2	4-14	10 Y R 6/3 m		1 f gr	m fr	S-66-OK-45-6-2
3	B 2 t	14-28	10 Y R 5/6 m		2 m sbk	m fr	S-66-OK-45-6-3
4	B 3	28-37	10 Y R 6/4 m		1 m sbk	m fr	S-66-OK-45-6-4
5	R	37-45					S-66-OK-45-6-5

CHEMICAL DATA

No.	pH H_2O	pH KCl	CEC	Extractable cations, meq/100 gms H	Ca	Mg	K	Na	Al*	% Base Saturation NaAc	Sum of cations	% O.M.
1	4.6	3.7										
2	4.9	3.9	3.5	3.7	1.82	0.66	0.14	0.07	0.6	76	42	0.6
3	4.9	3.5	13.9	10.2	1.62	1.75	0.18	0.09	2.7	26	29	
4	4.6	3.4										
5	4.5	3.4	6.8	7.4	0.91	0.68	0.10	0.07	4.1	26	19	

PHYSICAL DATA

No.	% Sand	% Silt	% Clay	% Sand Subfraction VFS (.1-.05 mm)	Textural Class
1	49.8	42.7	7.5	28.9	Loam
2	49.8	40.18	10.05	29.1	Sandy Loam
3	41.9	29.1	29.1	18.5	Clay Loam
4	55.9	20.2	24.0	16.9	Sandy Clay Loam
5	73.6	13.8	12.6	16.8	Sandy Loam

* Not included for purpose of calculating the percent base saturation

Appendix Table 15. Linker Loam

Soil Association: Hector-Enders
Location: N.E. ¼ of S.W. ¼ of Section 30, T 2 S, R 24 E, McCurtain County, Okla.

Relief: 1-3%
Drainage:
Geog. Position: Upland
Parent Material: Sandstone

Order: Ultisol
Classification: Clayey, mixed, thermic, Typic Hapludults

PROFILE DESCRIPTION

No.	Horizon	Depth	Color	Texture	Structure	Consistence	Sample No.
1	A 1	0-4	10 Y R 5/2 m		1 fr gr	v m fr	S-66-OK-45-1-1
2	A 2	4-12	10 Y R 6/3 m		1 f gr	v m fr	S-66-OK-45-1-2
3	B 21 t	12-18	5 Y R 5/6 m		2 m sbk	m fi	S-66-OK-45-1-3
4	B 22 t	18-28	2.5 Y R 4/6 m		2 m sbk	m fi	S-66-OK-45-1-4
5	B 3	28-38	5 Y R 5/6 m		2 m sbk	m fi	S-66-OK-45-1-5
6	R	38-46					S-66-OK-45-1-6

CHEMICAL DATA

No.	pH H_2O	pH KCl	CEC	Extractable cations, meq/100 gms H	Ca	Mg	K	Na	Al*	% Base Saturation NaAc	Sum of cations	% O.M.
1	5.1	3.9	9.6	10.9	1.41	1.17	0.26	0.04	1.8	36	21	3.4
2	5.6	4.1	2.6	1.3	0.61	0.78	0.18	0.09	0.5	64	56	0.4
3	4.9	3.5	11.3	4.8	1.62	1.14	0.47	0.22	1.8	31	42	
4	4.9	3.5	22.7	14.3	1.05	2.74	0.35	0.07	7.5	19	23	
5	4.9	3.4	22.3	14.2	0.61	2.09	0.15	0.11	8.9	13	17	
6	4.8	3.4	10.9	10.8	0.56	1.23	0.2	0.09	7.0	19	16	

PHYSICAL DATA

No.	% Sand	% Silt	% Clay	% Sand Subfraction VFS (.1-.05 mm)	Textural Class
1	48.4	41.6	10.1	24.3	Loam
2	47.4	43.9	8.8	22.4	Sandy Loam
3	35.6	36.6	27.8	18.1	Clay Loam
4	28.5	26.8	44.7	15.2	Clay
5	36.2	29.4	34.5	21.2	Clay Loam
6	56.3	32.4	11.3	33.6	Sandy Loam

* Not included for purpose of calculating the percent base saturation

Appendix Table 16. Linker Silt Loam

Soil Association: Hector-Enders
Location: N.W. ¼ of N.W. ¼ of Section 3, T 3 S, R 24 E, McCurtain County, Okla.

Relief: 1-3%
Drainage: Well-drained
Geog. Position: Upland
Parent Material: Sandstone

Order: Ultisol
Classification: Clayey, mixed, thermic, Typic Hapludults

PROFILE DESCRIPTION

No.	Horizon	Depth	Color	Texture	Structure	Consistence	Sample No.
1	A 1	0-5	10 Y R 4/2 m	1 f gr		v m fr	S-66-OK-45-2-1
2	A 2	5-12	10 Y R 6/3 m	1 m sbk		m fr	S-66-OK-45-2-2
3	B 22	12-30	5 Y R 5/6 m	2 m sbk		m fr	S-66-OK-45-2-3
4	B 3	30-38	7.5 Y R 6/6 m	2 m sbk		m fr	S-66-OK-45-2-4
5	R	38+					S-66-OK-45-2-5

CHEMICAL DATA

No.	pH H_2O	pH KCl	CEC	Extractable cations, meq/100 gms H	Ca	Mg	K	Na	Al*	% Base Saturation NaAc	Sum of cations	% O.M.
1	5.6	4.2	13.1	5.3	3.23	4.96	0.29	0.04	0.6	65	62	3.8
2	5.4	3.9	4.4	2.9	1.01	0.68	0.05	0.07	0.7	41	38	0.5
3	5.5	3.5	17.2	7.7	1.41	3.87	0.31	0.07	12.3	21	32	
4	5.4	3.3	20.0	12.6	1.21	2.07	0.26	0.04	8.2	18	22	
5	4.9	3.2	13.9	10.2	0.71	1.37	0.34	0.09	8.1	25	20	

PHYSICAL DATA

No.	% Sand	% Silt	% Clay	% Sand Subfraction VFS (.1-.05 mm)	Textural Class
1	29.8	56.4	13.8	16.6	Silt Loam
2	37.2	49.0	13.8	20.8	Loam
3	30.6	32.8	36.6	20.8	Clay Loam
4	33.8	34.4	31.8	25.8	Clay Loam
5	46.7	35.5	17.8	34.0	Loam

* Not included for purpose of calculating the percent base saturation

Appendix Table 17. Stephenville Loamy Sand

Soil Association: Darnell-Stephenville
Location: 300 ft. S. and 100 ft. E. of the half mile line on the W. side of Section 25, T 4 S, R 2 E, Carter County, Okla.

Relief: 2%
Drainage: Good
Geog. Position: Rolling uplands
Parent Material: Soft Sandstone

Order: Alfisol
Classification: Fine-loamy, mixed, thermic, Ultic Haplustalfs

PROFILE DESCRIPTION

No.	Horizon	Depth	Color	Texture	Structure	Consistence	Sample No.
1	A 1	0-4	10 Y R 3/2 m		1 f gr	v m fr	67-OK-10-1-1
2	A 2	4-9	10 Y R 5/3 m		1 f gr	v m fr	67-OK-10-1-2
3	B 21 t	9-22	2.5 Y R 4/6 m		2 f sbk	m fi	67-OK-10-1-3
4	B 22 t	22-39	2.5 Y R 4/6 m		2 f sbk	m fr	67-OK-10-1-4
5	B 31	39-48	Mottled		2 c sbk	m fr	67-OK-10-1-5
6	B 32	48-57	Mottled		1 c sbk	m fr	67-OK-10-1-6
7	C	57-70	10 Y R 7/4 m				67-OK-10-1-7

CHEMICAL DATA

	pH			Extractable cations, meq/100 gms						% Base Saturation		%
No.	H_2O	KCl	CEC	H	Ca	Mg	K	Na	Al*	NaAc	Sum of cations	O.M.
1	5.6	4.6	5.1	2.38	2.21	1.08	0.10	0.04	0.21	67	59	1.4
2	5.8	4.5	3.4	0.84	1.89	.88	0.08	0.04	0.21	85	77	0.5
3	5.3	4.2	18.6	6.30	6.3	4.93	0.31	0.09	1.19	63	65	0.8
4	4.9	3.9	20.0	6.86	8.58	4.39	0.28	0.13	1.92	67	66	
5	5.1	4.1	18.2	5.37	5.93	5.12	0.27	0.17	1.82	63	68	
6	5.0	3.9	11.4	2.47	5.67	3.91	0.19	0.17	0.83	87	80	
7	5.3	4.4										

PHYSICAL DATA

				% Sand Subfraction	
No.	% Sand	% Silt	% Clay	VFS (.1-.05 mm)	Textural Class
1	78.0	17.0	5.01	28.1	Loamy Sand
2	79.3	15.7	5.01	33.3	Loamy Sand
3	57.0	13.6	29.4	25.1	Sandy Clay Loam
4	55.6	17.5	26.9	37.2	Sandy Clay Loam
5	63.4	13.6	23.0	50.9	Sandy Clay Loam
6	74.9	12.4	12.7	66.6	Sandy Loam

* Not included for purpose of calculating the percent base saturation

Appendix Table 18. Stephenville Loamy Sand

Soil Association: Darnell-Stephenville
Location: 50 ft. E. and 645 ft. S. of N.W. corner Section 17, T 5 S, R 3 E, Carter County, Okla.
Relief: 2%
Drainage: Good
Geog. Position: Rolling uplands
Parent Material: Soft Sandstone
Order: Alfisol
Classification: Fine-loamy, mixed, thermic, Ultic Haplustalfs

PROFILE DESCRIPTION

No.	Horizon	Depth	Color	Texture	Structure	Consistence	Sample No.
1	A 1	0-4	10 Y R 4/2 m		1 f gr	v m fr	67-OK-10-2-1
2	A 2	4-10	10 Y R 6/3 m			v m fr	67-OK-10-2-2
3	B 21 t	10-17	2.5 Y R 4/6 m		2 m sbk	m fi	67-OK-10-2-3
4	B 22 t	17-25	Mottled		3 m bls	m v fi	67-OK-10-2-4
5	B 23 t	25-40	Mottled		3 m bls	m v fi	67-OK-10-2-5
6	B 3	40-56	Mottled			m fr	67-OK-10-2-6
7	C	56-70	Mottled				67-OK-10-2-7

CHEMICAL DATA

No.	pH H_2O	pH KCl	CEC	Extractable cations, meq/100 gms H	Ca	Mg	K	Na	Al*	% Base Saturation NaAc	Sum of cations	% O.M.
1	6.1	5.5	4.8	1.31	3.05	0.77	0.15	0.04	0	83	75	1.3
2	5.4	4.4	4.9	0.58	1.79	2.92	0.10	0.04	0.26	99	89	0.4
3	5.0	3.9	16.5	7.14	4.4	5.68	0.28	0.04	1.35	63	59	0.7
4	5.0	3.9	25.7	11.34	6.51	7.39	0.40	0.11	3.07	56	56	
5	5.0	4.1	22.9	8.40	7.14	7.90	0.38	0.17	1.98	66	65	
6	50.	3.9	11.2	3.50	3.68	5.60	0.22	0.11	1.35	86	73	
7	5.3	4.3	5.3		2.63	2.01	0.13	0.13	0.42	92	85	

PHYSICAL DATA

No.	% Sand	% Silt	% Clay	% Sand Subfraction VFS (.1-.05 mm)	Textural Class
1	74.2	22.1	3.8	46.7	Loamy Sand
2	73.7	20.0	6.3	39.8	Loamy Sand
3	52.3	19.6	28.1	33.9	Sandy Clay Loam
4	45.0	19.0	36.0	32.5	Sandy Clay
5	51.0	19.5	29.5	38.8	Sandy Clay Loam
6	70.0	14.8	15.2	51.8	Sandy Loam
7	87.8	5.9	6.3	38.6	Sand

* Not included for purpose of calculating the percent base saturation

Appendix Table 19. Stephenville Loamy Sand

Soil Association: Darnell-Stephenville
Location: 400 ft. E. and 100 ft. N. of the S.W. corner of Section 25, T 4 S, R 2 E.

Relief: 4%
Drainage: Good
Geog. Position: Rolling Uplands
Parent Material: Soft Sandstones

Order: Alfisol
Classification: Fine-loamy, mixed, thermic, Udic Haplustalfs

PROFILE DESCRIPTION

No.	Horizon	Depth	Color	Texture	Structure	Consistence	Sample No.
1	A p	0-6	10 Y R 5/3 m		1 f gr	m v fr	67-OK-10-3-1
2	A 2	6-11	10 Y R 5/3 m			m u fr	67-OK-10-3-2
3	B 21 t	11-19	5 Y R 5/6 m		1 c sbk	m fr	67-OK-10-3-3
4	B 22 t	19-30	5 Y R 5/6 m		c pr, m bls	m fr	67-OK-10-3-4
5	B 3	30-43	7.5 Y R 6/6 m				67-OK-10-3-5
6	C	43-70	10 Y R 7/3 m			m fr	67-OK-10-3-6

CHEMICAL DATA

	pH			Extractable cations, meq/100 gms						% Base Saturation		%
No.	H_2O	KCl	CEC	H	Ca	Mg	K	Na	Al*	NaAc	Sum of cations	O.M.
1	6.5	5.8	7.5	0.58	4.52	1.77	0.17	0.04	0	87	92	1.3
2	6.3	5.3	3.9	0.44	2.63	0.98	0.13	0.04	0	97	90	0.4
3	5.1	4.0	17.9	2.24	6.93	3.89	0.27	0.09	0.99	62	83	0.6
4	5.0	3.9	15.8	6.30	6.41	3.79	0.27	0.13	1.51	67	63	
5	5.3	4.0	8.7	0.58	3.7	3.2	0.15	0.09	0.68	82	93	
6	5.7	4.6	4.3	1.40	2.1	1.09	0.08	0.04	0.36	80	70	

PHYSICAL DATA

				% Sand Subfraction	
No.	% Sand	% Silt	% Clay	VFS (.1-.05 mm)	Textural Class
1	85.0	10.0	5.0	48.1	Loamy Sand
2	82.3	14.0	3.8	46.1	Loamy Sand
3	65.4	9.1	25.5	33.9	Sandy Clay Loam
4	73.9	7.6	24.5	27.3	Sandy Clay Loam
5	84.9	3.8	11.4	22.2	Sandy Loam
6	94.7	1.5	3.8	28.4	Sand

* Not included for purpose of calculating the percent base saturation

Appendix Table 20. Stephenville Loamy Sand

Soil Association: Darnell-Stephenville
Location: 1200 ft. W. and 50 ft. N. of S.E. corner of Section 8, T 5 S, R 3 E, Carter County, Okla.
Relief: 3%
Drainage: Well-drained
Geog. Position: Upland
Parent Material: Soft Sandstones
Order: Alfisol
Classification: Fine-loamy, mixed, thermic, Ultic Haplustalfs

PROFILE DESCRIPTION

No.	Horizon	Depth	Color	Texture	Structure	Consistence	Sample No.
1	A p	0-7	10 Y R 4/3 m		1 f gr	m v fr	67-OK-10-4-1
2	B 21 t	7-18	5 Y R 5/6 m		1 c sbk	m fr	67-OK-10-4-2
3	B 22 t	18-38	5 Y R 5/6 m		pr, 2 c sbk	m fr	67-OK-10-4-3
4	B 3	38-52	Mottled			m fr	67-OK-10-4-4
5	C	52-70				m v fr	67-OK-10-4-5

CHEMICAL DATA

No.	pH H_2O	pH KCl	CEC	Extractable cations, meq/100 gms H	Ca	Mg	K	Na	Al*	% Base Saturation NaAc	Sum of cations	% O.M.
1	6.0	5.1	5.5	1.74	2.84	1.39	0.13	0.04	0	80	72	1.0
2	5.6	4.6	15.1	4.49	6.30	4.21	0.35	0.07	0.10	72	71	0.8
3	5.4	4.3	16.1	4.78	6.62	4.82	0.35	0.09	0.57	74	71	0.5
4	5.1	4.3	13.1	4.93	5.15	5.98	0.25	0.09	0.89	88	70	
5	5.2	4.4	8.2	1.89	3.8	5.18	0.19	0.07	0.52	113	83	

PHYSICAL DATA

No.	% Sand	% Silt	% Clay	% Sand Subfraction VFS (.1-.05 mm)	Textural Class
1	76.1	17.7	6.3	37.6	Loamy Sand
2	62.4	13.4	24.2	23.3	Sandy Clay Loam
3	58.5	17.3	24.2	19.7	Sandy Clay Loam
4	58.3	23.9	17.8	40.8	Sandy Loam
5	77.0	12.9	10.1	39.3	Sandy Loam

* Not included for purpose of calculating the percent base saturation

Appendix Table 21. Boswell-Like Sandy Loam

Soil Association: Bowie-Caddo-Boswell
Location: ¼ mile W. and 500 ft. N. of the E. ¼ corner of Section 22, T 6 S, R 12 E, Bryan County, Okla.

Relief: 7%
Drainage: Well-drained
Geog. Position: Upland
Parent Material: Washita Clays

Order: Alfisol
Classification: Fine, mixed, thermic, Udic Haplustalfs

PROFILE DESCRIPTION

No.	Horizon	Depth	Color	Texture	Structure	Consistence	Sample No.
1	A 1	0-4	7.5 Y R 4/2 m		1 f gr		S-67-OK-7-1-1
2	A 2	4-8	7.5 Y R 5/4 m		1 f gr		S-67-OK-7-1-2
3	B 21 t	8-18	2.5 Y R 4/6 m		2 f gr		S-67-OK-7-1-3
4	B 22 t	18-31	2.5 Y R 4/6 m		2 m bk		S-67-OK-7-1-4
5	B 23 t	31-50	10 Y R 7/2 m		2 m bk		S-67-OK-7-1-5
6	B 3	50-65	2.5 Y R 5/2 m		1 m to c bk		S-67-OK-7-1-6

CHEMICAL DATA

	pH			Extractable cations, meq/100 gms						% Base Saturation		%
No.	H_2O	KCl	CEC	H	Ca	Mg	K	Na	Al*	NaAc	Sum of cations	O.M.
1	6.3	5.8	10.5	2.52	8.43	1.78	0.52	0.44	0	106	82	2.9
2	6.3	5.5	5.84	2.24	4.16	0.49	0.36	0.72	0.15	98	72	0.7
3	4.9	3.8	27.1	13.3	11.01	3.57	0.63	1.09	4.24	60	55	0.7
4	4.9	3.5	24.7	14.88	9.05	4.48	0.44	0.95	7.71	69	50	
5	4.7	3.6	22.5	11.62	10.82	2.90	0.63	1.07	4.95	69	57	
6	5.05	4.5	25.7	7.14	17.37	4.29	0.85	1.46	1.50	93	77	

PHYSICAL DATA

No.	% Sand	% Silt	% Clay	% Sand Subfraction VFS (.1-.05 mm)	Textural Class
1	62.7	32.2	5.1	17.3	Sandy Loam
2	70.0	22.4	7.6	26.8	Sandy Loam
3	38.2	19.9	41.9	19.3	Clay
4	39.1	25.7	35.2	11.9	Clay Loam
5	39.5	23.9	36.6	35.9	Clay Loam
6	34.3	32.0	37.7	10.4	Clay Loam

* Not included for purpose of calculating the percent base saturation

Appendix Table 22. Boswell-Like Sandy Loam

Soil Association: Bowie-Caddo-Boswell
Location: 350 ft. W. and 50 ft. N. of the S.E. corner of Section 29, T 6 S, R 13 E, Bryan County, Okla.

Relief: 6%
Drainage: Well-drained
Geog. Position: Upland
Parent Material: Washita Clays

Order: Alfisol
Classification: Fine, mixed, thermic, Udic Haplustalfs

PROFILE DESCRIPTION

No.	Horizon	Depth	Color	Texture	Structure	Consistence	Sample No.
1	A 1	0-6	7.5 Y R 4/4 m		1 f gr		S-67-OK-7-2-1
2	B 21 t	6-21	2.5 Y R 4/6 m		2 f m bk		S-67-OK-7-2-2
3	B 22 t	21-36	2.5 Y R 4/6 m		1 m bk		S-67-OK-7-2-3
4	B 23 t	36-54	10 Y R 7/2 m		1 c bk		S-67-OK-7-2-4
5	B 3	54-65	10 Y R 7/2 m		1 c bk		S-67-OK-7-2-5

CHEMICAL DATA

No.	pH H_2O	pH KCl	CEC	Extractable cations, meq/100 gms H	Ca	Mg	K	Na	Al*	% Base Saturation NaAc	Sum of cations	% O.M.
1	6.4	5.3	6.5	3.22	3.75	1.55	0.56	0.96	0	105	66	1.5
2	5.0	4.5	17.4	7.19	6.45	4.22	0.53	0.89	1.56	69	63	0.9
3	5.1	3.8	14.0	10.64	3.12	2.85	1.01	1.91	4.83	63	45	0.3
4	4.9	3.8	15.5	9.38	3.43	3.52	0.40	1.56	6.33	57	49	
5	5.1	3.7	15.1	8.68	4.27	3.67	0.54	1.37	5.01	65	53	

PHYSICAL DATA

No.	% Sand	% Silt	% Clay	% Sand Subfraction VFS (.1-.05 mm)	Textural Class
1	70.5	24.4	5.1	5.0	Sandy Loam
2	40.3	24.2	45.5	9.9	Clay
3	50.0	19.5	29.6	9.0	Sandy Clay Loam
4	53.9	28.9	27.2	10.3	Loam
5	62.3	13.2	24.5	12.9	Sandy Clay Loam

* Not included for purpose of calculating the percent base saturation

Appendix Table 23. Bowie-Like Sandy Loam

Soil Association: Bowie-Caddo-Boswell
Location: 21 ft. W. of the N.W. corner of Section 33, T 6 S, R 13 E, Bryan County, Okla.

Relief: 2½%
Drainage: Moderately well
Geog. Position: Upland
Parent Material: Soft Sandstones

Order: Alfisol
Classification: Fine-loamy, mixed, thermic, Ultic Haplustalfs

PROFILE DESCRIPTION

No.	Horizon	Depth	Color	Texture	Structure	Consistence	Sample No.
1	A 1	0-5	10 Y R 4/3 m		1 m gr		S-67-OK-7-3-1
2	A 2	5-15	10 Y R 5/5 m		1 m gr		S-67-OK-7-3-2
3	B 21 t	15-30	10 Y R 6/6 m		2 m sbk		S-67-OK-7-3-3
4	B 22 t	30-42	10 Y R 6/6 m		2 c sbk		S-67-OK-7-3-4
5	B 23 t	42-60	10 Y R 7/2 m		1 c sbk		S-67-OK-7-3-5
6	B 24 t	60-70	Mottled		1 c sbk		S-67-OK-7-3-6

CHEMICAL DATA

No.	pH H_2O	pH KCl	CEC	Extractable cations, meq/100 gms H	Ca	Mg	K	Na	Al*	% Base Saturation NaAc	Sum of cations	% O.M.
1	6.2	5.8	7.2	3.22	5.83	1.13	0.13	0.22	0	101	70	1.9
2	6.2	5.3	6.2	2.24	4.37	1.31	0.32	0.76	0	110	75	0.7
3	5.3	3.8	8.9	8.40	1.97	3.24	0.40	0.30	3.7	66	41	0.7
4	5.0	3.7	9.9	11.76	1.46	2.56	0.58	0.65	4.9	53	31	
5	5.1	3.8	11.8	8.54	2.91	2.97	0.35	0.70	5.6	59	45	
6	5.3	3.7	16.7	5.18	6.76	0.32	0.42	2.42	1.5	59	66	

PHYSICAL DATA

No.	% Sand	% Silt	% Clay	% Sand Subfraction VFS (.1-.05 mm)	Textural Class
1	55.3	39.7	5.0	9.1	Sandy Loam
2	56.4	32.2	11.4	15.2	Sandy Loam
3	47.9	31.6	20.5	11.2	Loam
4	47.0	27.4	25.6	16.3	Loam
5	47.7	24.1	28.2	9.2	Sandy Clay Loam
6	43.8	23.9	32.3	15.3	Clay Loam

* Not included for purpose of calculating the percent base saturation

Appendix Table 24. Bowie-Like Sandy Loam

Soil Association: Bowie-Caddo-Boswell
Location: 1450 ft. S. and 50 ft. W. of the N.E. corner of Section 5, T 5 S, R 13 E, Bryan County, Okla.

Relief: 2%
Drainage: Moderately well
Geog. Position: Upland
Parent Material: Soft Sandstones

Order: Alfisol
Classification: Fine-loamy, mixed, thermic, Ultic Hapludalfs

PROFILE DESCRIPTION

No.	Horizon	Depth	Color	Texture	Structure	Consistence	Sample No.
1	A p	0-7	10 Y R 4/3 m		1 m gr		S-67-OK-7-4-1
2	A 2	7-12	10 Y R 5/4 m		1 m gr		S-67-OK-7-4-2
3	B 21 t	12-24	10 Y R 5/6 m		2 m sbk		S-67-OK-7-4-3
4	B 22 t	24-38	10 Y R 6/6 m		2 m sbk		S-67-OK-7-4-4
5	B 23 t	38-58	Mottled		1 c sbk		S-67-OK-7-4-5
6	B 24 t	58-70	10 Y R 7/2 m		1 c sbk		S-67-OK-7-4-6

CHEMICAL DATA

	pH			Extractable cations, meq/100 gms						% Base Saturation		%
No.	H_2O	KCl	CEC	H	Ca	Mg	K	Na	Al*	NaAc	Sum of cations	O.M.
1	5.9	5.2	4.29	1.82	2.81	0.82	0.87	0.82	0	124	75	1.1
2	6.4	5.4	3.63	2.45	3.02	0.81	0.66	0.39	0	135	67	0.5
3	6.5	5.5	9.36	2.94	3.82	3.00	0.37	0.30	0	80	72	0.5
4	5.0	3.9	9.90	6.16	2.91	2.87	0.48	0.56	2.59	69	53	
5	5.0	3.8	11.9	8.68	3.01	2.28	0.38	0.39	3.80	51	41	
6	5.0	3.7	14.0	7.56	4.57	4.05	0.31	0.57	3.56	68	56	

PHYSICAL DATA

No.	% Sand	% Silt	% Clay	% Sand Subfraction VFS (.1-.05 mm)	Textural Class
1	58.3	34.1	7.6	13.8	Sandy Loam
2	57.5	32.4	10.1	11.6	Sandy Loam
3	45.5	31.5	23.0	7.7	Loam
4	42.7	27.8	29.5	10.8	Clay Loam
5	37.1	29.4	33.5	8.0	Clay Loam
6	27.5	40.3	32.2	6.4	Clay Loam

* Not included for purpose of calculating the percent base saturation

Appendix Table 25. Boswell Sandy Loam

Soil Association: Bowie-Caddo-Boswell
Location: 400 ft. E. and 800 ft. S. of the N.W. corner of Section 14, T 6 S, R 25 E, McCurtain County, Okla.

Relief: 8%
Drainage: Well-drained
Geog. Position: Rolling uplands
Parent Material: Clays

Order: Ultisol
Classification: Fine, mixed, thermic, Typic Paleudults

PROFILE DESCRIPTION

No.	Horizon	Depth	Color	Texture	Structure	Consistence	Sample No.
1	A 1	0-4	10 Y R 3/2 m		1 f gr	m fr	S-67-OK-45-1-1
2	A 2	4-8	10 Y R 6/3 m		1 f gr	m fr	S-67-OK-45-1-2
3	B 21 t	8-26	5 Y R 4/6 m		2 m sbk	m fi	S-67-OK-45-1-3
4	B 22 t	26-40	5 Y R 4/6 m		1 m bk	m fi	S-67-OK-45-1-4
5	B 23 t	40-60	10 Y R 7/1 m		1 m bk	m fi	S-67-OK-45-1-5
6	B 3	60-70+	7.5 Y R 6/6 m		1 m bk	m fi	S-67-OK-45-1-6

CHEMICAL DATA

	pH			Extractable cations, meq/100 gms						% Base Saturation		%
No.	H_2O	KCl	CEC	H	Ca	Mg	K	Na	Al*	NaAc	Sum of cations	O.M.
1	6.2	4.7	11.7	4.4	6.5	0.19	0.15	0.15	0	59	61	4.0
2	5.6	5.2		3.1	2.2	0.9	0.13	0.13	0.1		52	0.8
3	4.7	3.6	30.3	18.4	3.29	2.55	0.63	0.53	7.8	23	28	0.7
4	4.7	3.6	21.3	14.2	1.2	0.14	0.26	0.09	9.8	8	11	
5	4.4	3.4	32.8	25.8	0.8	0.1	0.71	0.22	16.0	6	7	
6	4.4	3.7	7.6	6.5	0.5	0.7	0.41	0.15		23	10	

PHYSICAL DATA

No.	% Sand	% Silt	% Clay	% Sand Subfraction VFS (.1-.05 mm)	Textural Class
1	68.1	25.6	6.3	17.1	Sandy Loam
2	65.2	29.8	5.0	14.7	Sandy Loam
3	25.0	22.9	52.1	8.9	Clay
4	36.1	33.8	40.1	16.8	Clay
5	15.4	32.0	52.6	5.7	Clay
6	63.6	18.6	17.8	32.5	Sandy Loam

* Not included for purpose of calculating the percent base saturation

Appendix Table 26. Boswell Sandy Loam

Soil Association: Bowie-Caddo-Boswell
Location: 500 ft. N. of the S.E. corner of the N.W. ¼ of Section 21, T 6 S, R 24 E, McCurtain County, Okla.
Relief: 7%
Drainage: Well-drained
Geog. Position: Rolling Uplands
Parent Material: Clays
Order: Ultisol
Classification: Fine, mixed, thermic, Typic Paleudults

PROFILE DESCRIPTION

No.	Horizon	Depth	Color	Texture	Structure	Consistence	Sample No.
1	A 1	0-3	10 Y R 5/2 m		1 f gr	fr	S-67-OK-45-2-1
2	A 2	3-7	10 Y R 7/2 m		1 f gr	fr	S-67-OK-45-2-2
3	B 21 t	7-25	5 Y R 5/6 m		1 m bk	fi	S-67-OK-45-2-3
4	B 22 t	25-47	5 Y R 5/6 m		1 m bk	fi	S-67-OK-45-2-4
5	B 23 t	47-65	10 Y R 5/4 m		1 m bk	fi	S-67-OK-45-2-5
6	B 3	65-70	10 Y R 5/4 m		1 m bk	fi	S-67-OK-45-2-6

CHEMICAL DATA

	pH			Extractable cations, meq/100 gms						% Base Saturation		%
No.	H_2O	KCl	CEC	H	Ca	Mg	K	Na	Al*	NaAc	Sum of cations	O.M.
1	4.4	3.6	10.0	9.6	2.4	0.1	0.20	0.09	1.87	28	22	3.9
2	4.4	3.7	3.5		0.9	0.11	0.20	0.04	1.56	36		1.0
3	4.5	3.5	22.4	12.2	1.87	1.46	0.50	0.37	11.77	19	26	0.6
4	3.7	3.2	28.3	15.6	3.2	3.3	0.05	0.22	9.65	24	30	
5	4.0	3.5	21.3	9.2	3.43	9.01	1.17	1.35	3.08	70	62	

PHYSICAL DATA

No.	% Sand	% Silt	% Clay	% Sand Subfraction VFS (.1-.05 mm)	Textural Class
1	60.0	32.0	8.0	28.2	Sandy Loam
2	51.4	39.8	8.8	22.3	Loam
3	17.6	35.8	46.6	9.8	Clay
4	35.0	11.7	53.3		Clay
5	9.6	41.4	49.0	5.8	Silty Clay
6	9.5	42.6	47.9	6.2	Silty Clay

* Not included for purpose of calculating the percent base saturation

Appendix Table 27. Bowie Sandy Loam

Soil Association: Bowie-Caddo-Boswell
Location: 600 ft. E. and 100 ft. S. of the N.W. corner Section 14, T 6 S, R 25 E, McCurtain County, Okla.

Relief: 8%
Drainage: Moderately well
Geog. Position: Rolling uplands
Parent Material: Soft Sandstones

Order: Ultisol
Classification: Fine-loamy, mixed, thermic, Typic Paleudults

PROFILE DESCRIPTION

No.	Horizon	Depth	Color	Texture	Structure	Consistence	Sample No.
1	A 1	0-5	10 Y R 4/2 m		1 f gr	m fr	S-67-OK-45-3-1
2	A 2	5-14	10 Y R 5/3 m		1 f gr	m fr	S-67-OK-45-3-2
3	B 21 t	14-32	10 Y R 5/6 m		2 m sbk	m fr	S-67-OK-45-3-3
4	B 22 t	32-54	10 Y R 6/4 m		2 m sbk	m fr	S-67-OK-45-3-4
5	B 23 t	54-65	10 Y R 7/2 m		1 m sbk	m fr	S-67-OK-45-3-5

CHEMICAL DATA

No.	pH H_2O	pH KCl	CEC	Extractable cations, meq/100 gms H	Ca	Mg	K	Na	Al*	% Base Saturation NaAc	Sum of cations	% O.M.
1	5.6	4.9	10.2	0.4	4.7	1.6	0.20	0.07	0	64	95	3.4
2	4.8	4.1	5.2		2.3	0.9	0.36	0.11	0.7	71		0.7
3	4.6	3.5	14.1	9.3	2.2	1.1	0.05	0.09	5.4	24	27	0.5
4	4.8	3.4	16.5	14.3	1.5	2.6	0.51	0.46	7.5	30	26	
5	4.6	3.4	16.6	14.1	1.8	1.2	0.40	0.35	7.8	22	21	

PHYSICAL DATA

No.	% Sand	% Silt	% Clay	% Sand Subfraction VFS (.1-.05 mm)	Textural Class
1	51.8	40.6	7.6	22.7	Sandy Loam
2	47.1	42.8	10.1	23.2	Loam
3	36.2	39.6	24.2	17.6	Loam
4	33.4	40.9	25.7	14.5	Loam
5	38.6	38.3	23.1	11.5	Loam

* Not included for purpose of calculating the percent base saturation

Appendix Table 28. Bowie Sandy Loam

Soil Association: Bowie-Caddo-Boswell
Location: 200 ft. W. and 50 ft. N. of the S.E. corner of Section 11, T 6 S, R 23 E, McCurtain County, Okla.

Relief: 3%
Drainage: Moderately well
Geog. Position: Rolling uplands
Parent Material: Soft Sandstones

Order: Alfisol
Classification: Fine-silty, mixed, thermic, Ultic Hapludalfs

PROFILE DESCRIPTION

No.	Horizon	Depth	Color	Texture	Structure	Consistence	Sample No.
1	A 1	0-6	10 Y R 4/2 m		1 f gr	m fr	S-67-OK-45-4-1
2	A 2	6-12	10 Y R 6/4 m		1 f gr	m fr	S-67-OK-45-4-2
3	B 21 t	12-32	10 Y R 6/6 m		2 m sbk	m fr	S-67-OK-45-4-3
4	B 22 t	32-50	10 Y R 6/3 m		2 m sbk	m fr	S-67-OK-45-4-4
5	B 23 t	50-68	10 Y R 7/1 m		1 m sbk	m fr	S-67-OK-45-4-5
							S-67-OK-45-4-6

CHEMICAL DATA

No.	pH H_2O	pH KCl	CEC	Extractable cations, meq/100 gms H	Ca	Mg	K	Na	Al*	% Base Saturation NaAc	Sum of cations	% O.M.
1	6.5	5.5	8.6	3.9	5.0	1.8	0.31	0.09	0	84	65	2.2
2	4.9	4.0	7.3	7.0	2.1	1.2	2.23	0.11	1.0	50	34	0.9
3	4.9	3.7	13.5		2.4	1.1	0.36	0.09	3.9	29		0.2
4	4.7	3.6	14.8	8.6	2.0	2.4	0.28	0.44	4.5	35	37	
5	4.7	3.4	25.4	12.8	4.1	3.3	0.15	0.26	7.8	31	39	

PHYSICAL DATA

No.	% Sand	% Silt	% Clay	% Sand Subfraction VFS (.1-.05 mm)	Textural Class
1	31.3	54.9	3.8	17.2	Sandy Loam
2	26.5	60.8	12.7	14.3	Silt Loam
3	26.0	51.1	22.9	12.0	Silt Loam
4	25.4	51.6	23.0	14.6	Silt Loam
5	22.3	45.2	32.5	13.5	Clay Loam

* Not included for purpose of calculating the percent base saturation

Appendix Table 29. Enders Silt Loam

Soil Association: Hector-Enders
Location: 50 ft. S. and 50 ft. E. of the N.W. corner of Section 34, T 2 N, R 25 E, LeFlore County, Okla.

Relief: 18-35% steep upland
Drainage: Well to moderate, well drained
Geog. Position: Upland
Parent Material: Shales

Order: Ultisol
Classification: Clayey, mixed, thermic, Typic Paleudults

PROFILE DESCRIPTION

No.	Horizon	Depth	Color	Texture	Structure	Consistence	Sample No.
1	A 1	0-2	10 Y R 6/2 m		2 f gr	fr	S-68-OK-40-1-1
2	A 2	2-7	10 Y R 8/4 m		1 f gr	fr	S-68-OK-40-1-2
3	B 21 t	7-20	5 Y R 6/8 m		2 m f bk	v fi	S-68-OK-40-1-3
4	B 22 t	20-30	5 Y R 6/8 m		1 m f bk	v fi	S-68-OK-40-1-4
5	B 23 t	30-38	2.5 Y R 5/8 m		1 m f bk	v fi	S-68-OK-40-1-5
6	B 3	38-46	2.5 Y R 5/8 m		1 m f bk	v fi	S-68-OK-40-1-6
7	R 11	46-70					S-68-OK-40-1-7
8	R 12	70-76					S-68-OK-40-1-8

CHEMICAL DATA

No.	pH H_2O	pH KCl	CEC	Extractable cations, meq/100 gms H	Ca	Mg	K	Na	Al*	% Base Saturation NaAc	Sum of cations	% O.M.
1	4.5	3.2	12.8	15.60	0.75	0.84	0.21	0.07	4.1	14.5	10.7	4.6
2	4.7	3.5	7.5	8.55	1.12	0.68	0.13	0.07	3.0	25.3	18.2	1.9
3	4.6	3.2	23.0	27.26	0.86	0.64	0.29	0.08	17.2	8.1	6.4	1.2
4	4.5	2.9	29.1	28.07	1.60	0.29	0.35	0.07	20.1	7.9	7.6	.6
5	4.5	3.0	28.8	28.42	0.64	0.75	0.22	0.07	19.6	7.3	5.8	.4
6	4.45	3.0	24.0	24.26	0.86	0.64	0.29	0.07	16.4	7.7	7.1	
7	4.4	3.0	27.4	26.57	0.43	0.77	0.30	0.09	19.6	5.8	5.6	
8	4.2	3.0	22.3	22.06	0.53	0.46	0.30	0.08	15.8	6.1	5.8	

PHYSICAL DATA

No.	% Sand	% Silt	% Clay	% Sand Subfraction VFS (.1-.05 mm)	Textural Class
1	22.4	59.8	17.8	7.9	Silt Loam
2	28.2	54.1	17.7	10.7	Silt Loam
3	8.0	27.1	64.9	5.4	Clay
4	2.0	30.4	67.6	1.6	Clay
5	2.5	31.3	66.2	1.4	Clay
6	2.4	36.2	61.4	2.8	Clay
7	1.3	31.1	67.6	1.0	Clay
7	3.2	33.2	63.5	1.9	Clay

* Not included for purpose of calculating the percent base saturation

Appendix Table 30. Enders Loam

Soil Association: Hector-Enders
Location: 1050 ft. S. and 300 ft. E. of the N.W. corner of N.E. ¼ of Section 1, T 8 N, R 24 E, LeFlore County, Okla.

Relief: 4-18% strongly sloping
Drainage: Well to moderate, well drained
Geog. Position: Upland
Parent Materia: Shales

Order: Ultisol
Classification: Clayey, mixed, thermic, Typic Hapludults

PROFILE DESCRIPTION

No.	Horizon	Depth	Color	Texture	Structure	Consistence	Sample No.
1	A 1	0-3	10 Y R 5/3 m		2 f gr		S-68-OK-40-2-1
2	A 2	3-13	7.5 Y R 7/4 m		1 f gr		S-68-OK-40-2-2
3	B 21 t	13-21	5 Y R 6/6 m		2 f bk		S-68-OK-40-2-3
4	B 22 t	21-29	10 Y R 7/4 m		1 f bk	ıʇ ɯ	S-68-OK-40-2-4
5	B 3	29-40	10 Y R 8/2 m		1 f bk	ıʇ ɯ	S-68-OK-40-2-5
6	R 11	40-50				ıʇ ɯ	S-68-OK-40-2-6
7	R 12	50-70				ɹʇ ɯ	S-68-OK-40-2-7
8	R 13	70+				ɹʇ ɯ	S-68-OK-40-2-8

CHEMICAL DATA

	pH			Extractable cations, meq/100 gms						% Base Saturation		%
No.	H_2O	KCl	CEC	H	Ca	Mg	K	Na	Al*	NaAc	Sum of cations	O.M.
1	6.9	5.6	13.8	4.62	8.23	2.71	0.28	0.09		81.5	71.0	3.3
2	5.7	5.2	7.0	3.35	4.10	1.30	0.09	0.09		79.4	62.5	0.8
3	5.1	3.1	18.8	13.05	2.03	5.43	0.10	0.09	4.51	40.7	37.0	.5
4	4.9	3.1	20.8	16.40	1.18	4.89	0.10	0.13	7.55	30.2	27.8	.5
5	4.6	3.0	23.0	17.67	1.10	5.90	0.10	0.24	9.65	31.8	29.4	.4
6	4.0	3.0	23.9	15.88	1.78	6.53	0.11	0.37	7.84	36.8	35.6	.4
7	4.8	3.0	21.3	13.86	2.41	8.50	0.13	0.39	5.01	53.6	45.2	.3
8	4.95	3.2	19.2	2.82	2.94	8.70	0.11	0.52	1.88	63.7	55.6	.4

PHYSICAL DATA

No.	% Sand	% Silt	% Clay	VFS (.1-.05 mm) % Sand Subfraction	Textural Class
1	43.3	41.5	15.2	11.4	Loam
2	43.6	37.5	18.9	11.5	Loam
3	6.1	42.5	51.4	1.9	Silty Clay
4	8.1	40.4	51.5	1.3	Silty Clay
5	2.6	43.1	54.3	.3	Silty Clay
6	3.9	43.1	53.0	.9	Silty Clay
7	6.7	49.4	43.9	1.4	Silty Clay
8	6.4	52.5	41.1	1.5	Silty Clay

* Not included for purpose of calculating the percent base saturation

Appendix Table 31. Enders Loam

Soil Association: Hector-Enders
Location: 1750 ft. N. and 20 ft. W. of the S.E. corner of Section 15, T 9 N, R 24 E, LeFlore County, Okla.

Relief: 5% Rolling
Drainage: Moderately well drained
Geog. Position: Upland
Parent Material: Shales

Order: Alfisol
Classification: Clayey, mixed, thermic, Typic Hapludults

PROFILE DESCRIPTION

No.	Horizon	Depth	Color	Texture	Structure	Consistence	Sample No.
1	A 1	0-10	10 Y R 5/3		1 f gr	m fr	S-68-OK-40-3-1
2	B 21 t	10-20	5 Y R 6/6		2 m sbk	m fi	S-68-OK-40-3-2
3	B 22 t	20-30	10 Y R 7/3		2 f bk		S-68-OK-40-3-3
4	B 3	30-35	10 Y R 8/1		1 f bk		S-68-OK-40-3-4
5	R 11	35-45				m fr	S-68-OK-40-3-5
6	R 12	45+				m fi	

CHEMICAL DATA

	pH			Extractable cations, meq/100 gms						% Base Saturation		%
No.	H_2O	KCl	CEC	H	Ca	Mg	K	Na	Al*	NaAc	Sum of cations	O.M.
1	5.2	3.7	12.8	10.05	3.67	2.35	0.09	0.09	0.27	48.3	38.1	2.7
2	4.7	3.3	18.5	18.89	1.7	1.40	0.08	0.09	7.26	17.7	14.8	1.2
3	5.0	3.3	22.5	18.52	1.57	2.21	0.08	0.22	8.45	18.1	18.0	1.4
4	4.9	3.3	19.8	14.12	1.99	4.98	0.10	0.57	5.62	38.7	35.1	0.6
5	5.25	3.6	21.3	6.35	3.57	11.19	0.10	0.87	0.53	73.8	71.2	0.5

PHYSICAL DATA

No.	% Sand	% Silt	% Clay	% Sand Subfraction VFS (.1-.05 mm)	Textural Class
1	27.5	47.0	25.5	12.1	Loam
2	4.6	30.8	64.6	1.8	Clay
3	4.7	29.0	66.3	1.3	Clay
4	5.8	41.4	52.8	2.5	Silty Clay

* Not included for purpose of calculating the percent base saturation

Appendix Table 32. Enders Clay Loam

Soil Association: Hector-Enders
Location: 850 ft. W. and 20 ft. N. of the S.E. corner of Section 14, T 7 N, R 26 E, LeFlore County, Okla.

Relief: 5-20%
Drainage: Moderately well drained
Geog. Position: Upland
Parent Material: Shales

Order: Ultisol
Classification: Clayey, mixed, thermic, Typic Hapludults

PROFILE DESCRIPTION

No.	Horizon	Depth	Color	Texture	Structure	Consistence	Sample No.
1	A 11	0-9	10 Y R 5/3		2 f gr	m fr	S-68-OK-40-4-1
2	A 12 & R	9-15	10 Y R 5.5/3		2 f gr	m fr	S-68-OK-40-4-2
3	B 21 t	15-29	2.5 Y R 6/6		2 f bk	m fi	S-68-OK-40-4-3
4	B 22 t	29-40	2.5 Y R 6/4		1 f bk	m fi	S-68-OK-40-4-4
5	B 3	40-48	10 Y R 6/2		1 f m bk	m v fi	S-68-OK-40-4-5
6	R 11	48-53					S-68-OK-40-4-6
7	R 12	53-60+					S-68-OK-40-4-7

CHEMICAL DATA

	pH			Extractable cations, meq/100 gms						% Base Saturation		%
No.	H_2O	KCl	CEC	H	Ca	Mg	K	Na	Al*	NaAc	Sum of cations	O.M.
1	5.5	4.2	12.7	8.29	4.5	1.9	0.08	0.09	0.04	51.6	44.2	2.8
2	5.4	4.0	13.5	8.29	3.04	1.9	0.06	0.09	0.32	37.6	38.0	1.8
3	4.9	3.2	22.5	18.62	1.7	3.6	0.09	0.09	7.60	24.3	22.8	0.7
4	4.8	3.2	24.6	17.87	1.78	2.28	0.10	0.09	9.86	17.3	19.2	0.7
5	4.7	3.15	19.9	14.67	1.76	3.11	0.09	0.09	8.90	25.4	25.6	0.3
6	4.5	3.0	22.4	14.89	3.25	2.25	0.10	0.11	8.85	25.4	27.7	0.5
7	4.7	3.0	22.4	17.74	2.31	5.28	0.11	0.09	10.02	34.8	30.5	0.5

PHYSICAL DATA

No.	% Sand	% Silt	% Clay	% Sand Subfraction VFS (.1-.05 mm)	Textural Class
1	22.8	50.4	26.8	8.0	Clay Loam
2	37.1	39.9	23.0	8.0	Loam
3	6.0	22.3	71.7	1.5	Clay
4	1.3	34.0	64.7	0.2	Clay
5	5.4	37.7	56.8	0.8	Clay
6	3.4	45.0	51.6	0.4	Silty Clay
7	7.2	37.0	55.8	1.3	Clay

* Not included for purpose of calculating the percent base saturation