Issued January 10, 1917.

U. S. DEPARTMENT OF AGRICULTURE,

BUREAU OF SOILS—MILTON WHITNEY, Chief.

SOIL SURVEY OF YELL COUNTY, ARKANSAS.

BY

E. B. DEETER, IN CHARGE, AND CLARENCE LOUNSBURY.

HUGH H. BENNETT, INSPECTOR, SOUTHERN DIVISION.

[Advance Sheets—Field Operations of the Bureau of Soils, 1915.]

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1917.

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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS,
Washington, D. C., May 12, 1916.

SIR: In the extension of the soil survey in the State of Arkansas work was undertaken in Yell County and completed during the field season of 1915.

I have the honor to transmit herewith the manuscript report and map covering this area, and to recommend their publication as advance sheets of Field Operations of the Bureau of Soils for 1915, as provided by law.

Respectfully,

MILTON WHITNEY,
Chief of Bureau.

Hon. D. F. HOUSTON,
Secretary of Agriculture.

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MAP.

Soil map, Yell County sheet, Arkansas.

SOIL SURVEY OF YELL COUNTY, ARKANSAS.

By E. B. DEETER, In Charge, and CLARENCE LOUNSBURY.—Area Inspected by HUGH H. BENNETT.

DESCRIPTION OF THE AREA.

Yell County, Ark., is situated in the west-central part of the State. It is bounded on the north by Logan and Pope Counties, on the east by Conway and Perry Counties, on the south by Garland and Montgomery Counties, and on the west by Scott and Logan Counties. The Arkansas River separates Yell County from Pope County, and Petit Jean Creek forms the boundary between Yell and Conway Counties. The extreme east and west dimension of the county is 42 miles, and its greatest extent north and south is about 39 miles. It has a total area of 943 square miles, or 603,520 acres.

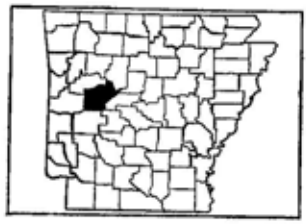


FIG. 1.—Sketch map showing location of the Yell County area, Arkansas.

Yell County lies in the Ouachita Mountains. Topographically the region comprises mountainous ridges of moderate elevation, with intervening broad valley lowlands. The maximum elevation of the mountainous area is approximately 2,600 feet above sea level, while the elevation of the lower or valley country ranges roughly from 400 to 750 feet above sea level. With the exception of Chickalah Mountain, the mountains, which have a general east-and-west trend, are predominantly narrow crested and steep sided, the degree of slope usually ranging from an angle of about 30° with the horizontal to precipitous. The slopes are so steep and stony that cultivation is difficult if not impossible. The top of Chickalah Mountain is a broad, undulating to gently rolling area, sufficiently smooth in the main for farming purposes, and to a considerable extent now in cultivation.

The lower, or valley, division of the county, comprising perhaps two-fifths of its total area, has by no means a flat topography. The surface configuration is undulating to rolling, with many isolated hills and ridges which approximate in surface characteristics the mountains proper, being steep sloped and stony. The surface, however, is prevailingly much smoother than that of the higher mountainous country, and there are included areas of level and nearly level

land both at low and at comparatively high elevations. A very much larger proportion of the valley land is tillable, probably 75 per cent of its total area being smooth enough for cultivation, while in the mountain division all but about 25 or 30 per cent of the land is uncultivable on account of steepness or stoniness.

The southern part of the county, including the broad, rough upland area south of the valley of the Fourche la Fave River, is wholly mountainous, with the exception of narrow valleys. It includes the separate ridges known as Fourche, Muddy Creek, and Powell Mountains. The surface is very uneven, with a culminating elevation of 1,700 feet above sea level on Powell Mountain, at the southern boundary of the county.

Danville Mountain, lying south and southwest of Danville, has rough and steep slopes, and the main part of its crest is comparatively narrow. Its maximum elevation is 1,800 feet above sea level. Petit Jean Mountain, in the western part of the county, between the valleys of Dutch Creek and Petit Jean Creek, is also narrow crested, with steep to precipitous slopes. Its maximum elevation is 2,550 feet above sea level, reached near the west county line. Chickalah Mountain, to the north of Belleville, is relatively broad and smooth crested, but it also has steep slopes. It rises to a maximum elevation of about 1,000 feet above sea level.

The stream bottom lands in Yell County are level and subject to overflow. They range in width from about 3 miles in the northeastern part of the county, along the Arkansas River, to narrow or negligible strips along the small streams. The principal developments of bottom land are along the Arkansas River, Fourche la Fave River, Petit Jean Creek, and Dutch Creek.

A comprehensive drainage system reaches out through all parts of the county. In their upper courses the streams are rapid, with rocky beds, and no bottom land whatever has been developed. As the lower levels are reached the currents become less swift, and the building up of flood plains takes place. The headwater streams, except where fed by springs, are mainly intermittent and flow for only short periods after rains. The Arkansas River and Petit Jean Creek are not of very swift flow at normal water stages, but the current of Fourche la Fave River is always swift. The Arkansas River is continually cutting into its banks, especially on the concave side of bends.

The early settlers of Yell County came from the Eastern and Southern States between the late thirties and 1850. The first settlements were made at Chickalah, Danville, and Dardanelle. Settlers have since come in from many parts of the Union. Of the total population, 91.3 per cent consists of whites of native parentage, and only 6.7 per cent of the population is colored.

The census of 1910 reports the population of Yell County as 26,323, an average of 27.6 persons to the square mile. The principal settlements are located in the Arkansas River, Petit Jean Creek, and Fourche la Fave River valleys. The southern part of the county is rather sparsely settled. Danville, with a population of 803, and Dardanelle, with 1,757 inhabitants, are the county seats of Yell County. The population of Plainview is reported as 853. Havana, Ola, and Belleville are towns of local importance.

In the early years of development practically all the trading was done at Dardanelle, on the Arkansas River. Pelts and products of the farm were hauled many miles overland to this river port, where they were exchanged for such necessities as could not be produced on the farm. The farm products were taken by boat to various points on the Mississippi, often as far as New Orleans. In recent years, with the advent of railroads, trading has extended to the interior towns. Most of the farm products are shipped by railroad to St. Louis, Kansas City, Memphis or Little Rock.

The transportation facilities of Yell County are fairly good. The Chicago, Rock Island & Pacific Railway passes through the northern part of the county east and west. A branch of this road extends from Ola north to Dardanelle. A pontoon bridge across the Arkansas River at this place facilitates communication with Russellville, about 4 miles north, on the St. Louis, Iron Mountain & Southern Railway. The Central Railway of Arkansas connects Ola with Plainview, 6 miles to the south, and extends southeastward into Perry County.

At the present time there is some effort made to keep the main public highways of the county in good condition. There are some roads, especially in the southern part of the county, which are too stony and too steep in grade for the convenient marketing of such products as cotton, fruit, and lumber.

With the exception of the southern part, the county is well served by rural mail delivery routes. In the more remote sections mail is brought in twice a week by mail riders. A large number of farm homes have telephone service.

CLIMATE.

Owing to the wide range in elevation, there is considerable diversity in the climatic conditions in Yell County. The records of the Weather Bureau station at Mount Nebo, in the northeastern part of the county, are considered as indicative of the climatic conditions prevailing over the mountain areas, and those of the station at Russellville, in Pope County, 4 miles north of Dardanelle, as applicable

to the lower, or valley, division. The elevation at Mount Nebo is 1,750 feet, and that at Russellville, 348 feet, above sea level.

The climate of Yell County is in general mild and equable. Such extremes as 107° F. and —20° F. have been recorded, but extremes of heat or cold are uncommon and are of short duration. In some winters there is a comparatively heavy snowfall, the fall occasionally amounting to as much as 25 inches, but the average annual snowfall does not exceed 6 or 7 inches.

The valley division of the county has a higher temperature than the more elevated areas. The mean annual temperature recorded at Russellville is 60.7° F., as compared with 58.4° F. recorded at the Mount Nebo station. The records at Russellville show a higher normal temperature for each month. While an extreme of 107° F. has been recorded at Russellville, 97° F. is the maximum to be expected in the mountain sections. The absolute lowest temperature recorded at Russellville is —15° F., whereas a temperature five degrees lower than this has been reached at Mount Nebo.

The mountain and lowland divisions differ little in the amount or distribution of rainfall, the mean annual precipitation being between 46 and 47 inches. More than one-third of the precipitation occurs during March, April, and May, and in general the distribution of rainfall throughout the year is favorable to crop production. The driest months are August, September, and October. The month of August, 1915, however, while the soil survey was in progress, was a notable exception. A heavy, prolonged downpour caused some streams to rise to almost unprecedented levels, with disastrous results to cotton and corn planted on the bottom lands. That there is occasionally a year of drought or an exceptionally wet season is indicated by the range between the extreme low and high annual precipitations, that for the driest year on record being 31.24 inches and for the wettest year recorded 63.69 inches.

The normal growing season in Yell County is of more than 7 months' duration and permits the maturing of two crops of certain kinds in one season. On the higher elevations, such as Chickalah Mountain, the active growing season begins considerably later than in the lowlands, notwithstanding that frosts cease earlier. This lateness of season is advantageous in fruit growing, as the buds are less liable to injury by frost.

In susceptibility to frost there is considerable difference between the mountain and valley divisions of the county. While the normal growing season is only about two weeks shorter in the valley areas, the latest killing frost in the spring recorded for this division occurred 17 days later than that recorded at the Mount Nebo station and the earliest in the fall 15 days earlier.

The two tables following give the normal monthly, seasonal, and annual temperature and precipitation as recorded at the Weather Bureau stations at Mount Nebo and Russellville.

Normal monthly, seasonal, and annual temperature and precipitation at Mount Nebo and Russellville.

Month.	Mount Nebo.[1]						Russellville, Pope County.[2]					
	Temperature.			Precipitation.			Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.
	°F.	°F.	°F.	In.	In.	In.	°F.	°F.	°F.	In.	In.	In.
December	40.6	71	− 2	3.71	4.98	1.73	42.3	86	7	2.95	4.41	4.21
January	37.3	73	− 4	3.40	2.17	4.52	39.1	78	− 6	3.44	1.71	5.75
February	37.8	76	−20	3.37	2.62	1.70	40.1	82	−15	2.95	1.69	3.48
Winter	38.6	76	−20	10.48	9.77	7.95	40.5	86	−15	9.34	7.81	13.44
March	49.0	87	11	5.03	6.95	8.09	52.3	90	15	4.76	6.38	3.99
April	59.7	86	24	4.22	3.66	5.80	61.8	92	29	3.54	1.85	3.65
May	67.4	90	34	6.74	1.50	8.91	69.9	97	32	5.55	1.94	10.31
Spring	58.7	90	11	15.99	12.11	22.80	61.3	97	15	13.85	10.17	17.95
June	73.8	94	47	3.66	1.41	5.49	77.3	104	37	4.17	2.40	6.66
July	76.5	95	52	4.66	2.40	6.00	81.3	106	56	4.39	3.01	6.39
August	76.5	97	49	3.01	2.40	4.29	79.7	107	46	3.54	2.24	7.86
Summer	75.6	97	47	11.33	6.21	15.78	79.4	107	37	12.10	7.65	20.91
September	71.7	95	40	3.01	.35	7.71	73.4	102	36	4.14	.89	5.30
October	60.6	86	29	2.38	2.20	7.29	61.2	92	27	2.73	2.18	2.64
November	49.6	75	12	3.16	2.42	2.19	49.8	87	14	3.88	2.54	3.45
Fall	60.6	95	12	8.55	4.97	17.19	61.5	102	14	10.75	5.61	11.39
Year	58.4	97	−20	46.35	33.06	63.72	60.7	107	−15	46.04	31.24	63.69

[1] Average date of first killing frost in fall, Nov. 7; last in spring, Mar. 30. Earliest date of killing frost in fall, Oct. 24; latest in spring, Apr. 13.

[2] Average date of first killing frost in fall, Oct. 28; last in spring, Apr. 5. Earliest date of killing frost in fall, Oct. 9; latest in spring, May 1.

AGRICULTURE.

The principal agricultural products grown by the early settlers in Yell County were corn, wheat, and vegetables, with some cotton and fruit. The acreage of cotton and corn has steadily increased, and these two crops now constitute the principal agricultural products of the county. The most important product is cotton, which is practically the sole income crop. The acreage devoted to corn is about the same as that used for cotton, but the crop is largely used on the farm for making corn meal and for feeding work stock, hogs for home use, and beef animals.

No other crops have attained places of importance in the agriculture of the county. Next to cotton growing in point of development is the raising of live stock, but this industry has not nearly the importance in the agricultural economy of the county that cotton has. Practically all the beef cattle are shipped to the larger cities, only a few being disposed of to local butchers. Most of the hogs are slaughtered on the farm, but the county is not entirely self-supporting with respect to pork production. There is practically no commercial dairying carried on, the milk and butter produced being consumed locally. Poultry and eggs bring in a considerable part of the farm revenues, and honey is sold locally.

The table following shows the acreage and production of the principal crops in the last four census years:

Acreage and production of principal crops, census years 1880–1910.

Census.	Cotton.		Corn.		Hay and forage.		Oats.		Wheat.	
	Acreage.	Production.	Acreage.	Production.	Acreage.	Production.	Acreage.	Production.	Acreage.	Production.
		Bales.		*Bushels.*		*Tons.*		*Bushels.*		*Bushels.*
1880	16,598	10,428	22,791	495,138	285	217	2,654	42,480	5,954	32,678
1890	29,830	12,273	29,045	641,430	1,125	1,588	5,488	67,305	2,675	12,861
1900	31,824	13,954	39,536	775,340	1,914	2,366	7,928	120,840	7,564	44,980
1910	46,331	17,302	48,721	868,549	6,782	6,162	2,111	22,141	237	1,926

Minor crops grown in the county are peanuts, cowpeas, sorghum for sirup, and potatoes. Practically every farmer grows a variety of vegetables for home use. Peanuts, cowpea seed, and sirup are sold locally. Several carloads of sweet potatoes were shipped from the county in 1915. The production of hay has grown rapidly in the last few years. The hay and forage crops consist principally of lespedeza, cowpeas, redtop, sorghum, alfalfa, and prairie grasses.

The sale of fruit, principally peaches and strawberries, has in the last few years increased considerably. About 25 carloads of peaches were shipped this season (1915), chiefly from orchards in the vicinity of Belleville, Dardanelle, and Centerville, as well as about 10 carloads of strawberries, grown mainly in the vicinity of Dardanelle.

The census reports the number of cattle sold or slaughtered in 1909 as 10,748 and of hogs as 20,182. The value of animals sold or slaughtered on farms in 1909 was $439,618. This is two and one-half times the value of all animals sold or slaughtered in 1899. Since the 1910 census was taken, the live-stock industry has, according to investigations made during the progress of the soil survey, increased in importance considerably. About 15 silos have been constructed recently.

There is evidence of a decided tendency toward diversification of crops, and more attention is being given to the production of wheat, oats, forage crops, and fruit, and the raising of live stock. There is such an extent of land better suited to stock raising than to any other use, and in fact so much that is suitable only for this purpose, that the extension of the live-stock industry, principally beef and pork production, is the obvious step in the further development of agriculture. At present the raising of live stock is of most importance in the southern part of the county, where there is only a small proportion of land in cultivation and consequently a larger range for stock.

The surface configuration of the county exerts a direct influence upon the agriculture. It is over the easily tilled bottom lands and the comparatively smooth, low valley areas that the greater proportion of the land is under cultivation. Practically all the mountain slopes are too steep and rocky for other use than pasture, while a very large part of the mountain-crest areas, with the exception of Chickalah Mountain and several other inextensive, flat-topped elevations, is too rough and rocky for the cultivation of large fields.

The farmers of Yell County recognize to quite an extent the adaptation of the different soils to certain crops. The heavier bottom-land soils are known to be especially well suited to corn and cotton, and certain soils, particularly those of the Arkansas River bottoms, such as the Miller and associated well-drained types, are recognized as good alfalfa soils. The farmers generally appreciate the fact that the Hanceville soils in certain situations, such as on the mountain crests, are well suited to peaches, and that the well-drained loams and sandy loams of the uplands give good results with strawberries. The better-drained soils of the bottoms and the smoother mountain and valley soils are given preference for cotton, the less well drained areas being given over more generally to grasses and corn or used as pasture land. Selection of land for crops is made to some extent in accordance with these natural adaptations of the soils, but many farmers do not discriminate in planning their cropping systems.

The farmers generally realize that the prevailing system of agriculture, the production of cotton for sale and of corn for subsistence purposes, is deficient in that it does not provide adequately for crop rotations that will maintain or increase the productiveness of the soils. It further does not admit of the development of the type of agriculture best suited to the county as a whole, as not enough live stock is kept to utilize to the best advantage the areas of rougher land, which are suitable only for grazing and the production of forage.

Cotton is grown year after year on the same land, with corn only occasionally intervening. Corn is more generally grown in the bot-

toms. In recent years cowpeas have been more generally sown between the rows than formerly, and this is a step in the right direction, but in general the land is not handled according to the best methods of farming. The growing of various forage crops, including cowpeas, soy beans, bur clover or crimson clover, in rotation, should be generally adopted.

Intertilled crops are given frequent cultivations, but plowing for the preparation of the seed bed is not deep, and fall plowing is not practiced to the extent that prevails in regions where winter crops are more generally grown. The present system of farming requires only comparatively light teams and implements, and one-horse plows are common. The barns are mostly small, since little storage capacity is needed for the products grown, cotton being marketed soon after it is harvested and only enough corn being grown to meet the requirements of the farm. Shelter is not generally provided for stock, owing to the mildness of the winters, the cattle ranging in pastures and on unfenced land[1] and being provided with little feed.

Heavy financial losses have been sustained from the ravages of hog cholera, but vaccination against cholera is becoming general and this should bring this disease under control. At least four dipping vats are now in use to combat the Texas-fever tick, and it is expected soon to have Yell County within the zone exempt from quarantine.

During the harvest season efficient labor is usually available. Day wages are generally $1, while hands hired by the month receive $15 to $20 and board. Many settlers from the uplands camp in the Arkansas River bottoms during the cotton-picking season. In the strawberry-picking season of 1915 employment was given to several hundred persons in the vicinity of Dardanelle.

About 46 per cent of the farms in Yell County are operated by owners. Very few tenants pay cash rent, except in the Arkansas River bottoms, where the rate paid ranges from $5 to $11 an acre. Commonly where the tenant has his own team and equipment the owner receives one-third of the corn produced and one-fourth of the cotton. Where the landlord furnishes work stock and implements he receives one-half of each crop.

Poorly drained land in the uplands and the rougher mountain land can be bought at prices ranging from $5 to $10 an acre. The average upland farm, with ordinary improvements, commonly sells for $15 to $30 an acre. Good alluvial land along the smaller streams can be bought at $30 to $50 an acre. Land along the Arkansas River is seldom for sale, and here the prices range from $50 to $100 an acre.

[1] A stock law became operative in the county in 1915 providing that hogs, sheep, goats, and geese must be kept within inclosures.

SOILS.

The upland soils of Yell County, comprising more than 80 per cent of its area, are residual in origin, having been derived from the underlying sandstone and shales through the ordinary processes of weathering. The character of the soil material is dependent, to a considerable degree, upon the lithologic character of the underlying rocks, and ordinarily contains a relatively high percentage of quartzose particles, as do the parent sandstones and arenaceous shales. The soils are much more closely related to the rocks from which they are derived than soils in regions of limestone formation, where a large proportion of the original rock, calcium and magnesium carbonates, is removed in solution.

The underlying rocks in this county consist of consolidated sedimentary material, sandstone interbedded with arenaceous and argillaceous shales. The strata have been folded into anticlines and synclines and subsequently deeply eroded. The folding is responsible for the general topographic plan of the county as well as for the narrowness and steepness of the mountain ridges. This has in turn influenced the character and thickness of the layer of soil material, making it thin and stony on the steep ridge slopes and deeper on the smoother areas overlying soft rocks.

Since its formation, changes have been brought about in the soil material by differences in conditions of subsequent weathering, principally in the thoroughness of drainage and the consequent effect upon oxidation. For instance, in the better drained positions, where aeration and oxidation have been more nearly complete, brownish surface soils with red subsoils are developed, whereas in the more nearly level or depressed areas, where the drainage is poor, the surface soils, although brownish, are underlain by mottled grayish and yellowish and more plastic subsoils, with considerable black material, consisting apparently of oxide of iron.

The upland soils consist largely of loams, sandy loams, and stony loams, the stony loams occurring in the mountainous areas and on the lower hills and ridges; the sandy loams on the smoother mountainous areas and valley ridges and hills; and the loams usually in the more nearly level, low areas. The upland soils are included in the Hanceville and Conway series.

The Hanceville series comprises light-brown to reddish-brown surface soils and red, moderately friable subsoils. The topography ranges from rolling to steeply rolling. These soils are derived from sandstones and shales which in places appear to be higher in iron-bearing minerals than the rocks giving rise to the Dekalb soils, so

extensive in the Appalachians east of the Mississippi River. In Yell County the Hanceville stony loam, fine sandy loam, very fine sandy loam, and loam are mapped.

The surface soils of the Conway series are yellow, and the subsoils yellowish to white. Iron concretions occur throughout the 3-foot soil section. In places a ferruginous hardpan is developed in the subsoil. Low mounds are common, but in general the surface varies from gently rolling to flat. Drainage is poorly established, water frequently standing on the surface for long periods after rains, and the water table is usually near the surface. The Conway soils appear to be derived from shales, although they are developed in close proximity to streams and sometimes have the appearance of terrace soils. Only one type of the series, the silt loam, is recognized in Yell County.

The soils of the stream terraces or second bottoms consist of material deposited when the streams flowed at higher levels than at present. The terraces along the Arkansas River comprise types having brownish or chocolate-reddish surface soils and chocolate-reddish, lighter textured subsoils; chocolate-brown surface soils and chocolate-reddish, heavy subsoils; black surface soils and black subsoils; and grayish surface soils and mottled grayish, yellowish, and brownish subsoils. Along the other streams the surface types are brownish soils and brick-red subsoils.

On the Arkansas River terraces the Bastrop, Reinach, Brewer, Teller, and Muskogee series are developed, and on the second bottoms of the smaller streams throughout the county the Waynesboro series.

The surface soils of the Bastrop series are brown or reddish brown, and the subsoils reddish. The series represents old alluvial material brought down in the past by the Arkansas River from the Permian Red Beds region and deposited on flood plains which now lie above overflow. The soils are the terrace equivalent of the Miller series, which occupies the first bottoms. The drainage is well established. Only the Bastrop very fine sandy loam type is recognized in Yell County.

The Reinach series is characterized by the red to brown color of the surface soils and by the lighter color and lighter texture of the subsoils. Enough of the soil material of this series has been derived from the Permian Red Beds region to give the soil its characteristic reddish color. In this county only one type of the series is mapped—the very fine sand.

The Brewer series is characterized by the dark-gray to black color of its surface soils and by the dark-drab to black subsoil color, with faint grayish and rusty-brown mottlings. The series occurs on

terraces of the Arkansas River where the drainage is imperfectly established. The material is largely derived from residual prairie soils. The Brewer is the terrace equivalent of the Osage series. The Brewer silt loam and clay are identified in Yell County.

Those types having a gray surface soil with red subsoil are correlated with the Teller series. The substratum has the characteristic reddish color of the material washed from the Permian Red Beds region. These soils occur on well-drained, comparatively high terraces of the Arkansas River. In places the surface has been eroded. The series is represented in this county by the very fine sandy loam type.

The Muskogee series is characterized by the gray to grayish-brown color of the surface soil, the yellowish color and friable structure of the somewhat heavier subsurface stratum, and by the yellow or mottled yellow and gray color and plastic structure of the heavy clay subsoil. The Muskogee types consist of material washed to a considerable degree from residual prairie soils. The surface is level and the drainage is poor. Only the Muskogee silt loam type is mapped in Yell County.

The Waynesboro series is characterized by the brown to reddish-brown color of the surface material and by the dull-red to brick-red color and friable structure of the subsoil. Water-rounded gravel and sandstone cobbles are of common occurrence. These soils occupy old stream terraces which in places have been considerably eroded. The drainage is well established. The material is washed from upland sandstone and shales, and the soils differ from those of the Cumberland series, mapped elsewhere, in that they do not contain wash from limestone soils. The loam is the only type of the Waynesboro series mapped in Yell County.

First-bottom alluvial soils are developed along all the streams. These soils consist of material deposited from stream overflows, and they vary in character with the source of the material and with the drainage conditions. In the poorly drained areas, particularly where there is an underlying stratum of impervious clay, the bottom soils are either black or mottled grayish, brownish, and yellowish. All the first-bottom land is subject to overflow, but it is not everywhere alike subject to poor drainage conditions between overflows. In those places where the drainage between inundations is good or moderately good the soils are of a more uniform color. The surface-soil material of the first-bottom types is grayish or brownish, with lighter brown subsoil material, where the soil constituents have been washed from the local uplands. The alluvium of the Arkansas River bottoms consists of wash from a wide range of soils, including enough material from the "Red Beds" of western Oklahoma to give the

soils here a pronounced brownish-red color of a distinctly different hue from that of the material of the local uplands, which is brick red.

The Pope and Atkins series are developed in the bottom lands of the smaller streams, and the alluvium along the Arkansas River is classed in the Miller and Osage series.

The soils of the Pope series are characterized by the brown color of the surface material and the usually light-brown color of the subsoil. They consist of alluvial material washed entirely or very largely from sandstone and shale soils and related sedimentary-rock soils of the Appalachian Mountains province, and differ from the typical Huntington soils, mapped elsewhere, in that they do not carry wash from limestone formations, or at least have not been influenced by calcareous material to any important degree, no limestone soils occurring in the drainage basins of streams along which the typical Pope soils are developed. In Yell County the Pope fine sandy loam, loam, and silt loam are mapped.

The Atkins soils are characterized by the gray color of the surface material and by the compact, dense structure, and the gray or drab, or mottled grayish, yellowish, and drab color, of the subsoils. The Atkins soils have poor drainage between overflows. The material consists entirely or very largely of wash from sandstone and shale or related sedimentary-rock material of the Appalachian Mountains region. The Atkins series is the gray equivalent of the Pope. In this county two types of the series are identified, the silty clay loam and clay.

The Miller series includes surface soils of chocolate-brown to pinkish-red color, with chocolate-red or pinkish-red subsoils. The soils of this series contain enough material brought down from the Permian Red Beds region to give the characteristic reddish color. The drainage is mostly good. The Miller very fine sandy loam, silt loam, and clay are mapped in Yell County.

The Osage series consists of dark-gray to almost black alluvial soils, containing much material from the soils of the prairie regions. The drainage is fair to good between periods of overflow. Only the clay type of the Osage series is encountered in Yell County.

Rough stony land and Riverwash are types of miscellaneous material, mainly nonagricultural. The former classification includes slopes too steep and stony for cultivation. Riverwash includes areas of mixed sands and clays occurring as overflow lands along the Arkansas River.

In the following pages the several soil types are described in detail, and their distribution is shown on the map accompanying this report. The table below gives the name and the actual and relative extent of each type mapped.

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Hanceville stony loam	200,576	33.2	Hanceville fine sandy loam	5,696	0.9
Rough stony land	89,920	14.9	Osage clay	3,968	.7
Hanceville loam	89,152	14.8	Muskogee silt loam	3,776	.6
Conway silt loam	72,832	12.1	Reinach very fine sand	3,712	.6
Pope silt loam	34,432	5.7	Brewer silt loam	3,008	.5
Hanceville very fine sandy loam	19,776	3.3	Miller silt loam	2,688	.4
Atkins silty clay loam	14,912	2.5	Miller very fine sandy loam	2,048	.3
Pope fine sandy loam	14,528	2.4	Teller very fine sandy loam	1,856	.3
Waynesboro loam	14,464	2.4	Bastrop very fine sandy loam	1,792	.3
Pope loam	9,536	1.6	Riverwash	1,024	.2
Miller clay	7,168	1.2	Brewer clay	896	.1
Atkins clay	5,760	1.0	Total	603,520	

HANCEVILLE STONY LOAM.

The Hanceville stony loam differs from the Hanceville loam principally in its rougher and steeper topography, its higher position, and its larger content of angular sandstone fragments. The surface soil is somewhat shallower and bedrock is usually encountered within 3 feet of the surface. The typical surface soil is a light-brown to brown loam, frequently somewhat sandy, underlain at about 5 inches by yellowish or reddish loam to clay loam, which passes quickly into friable or compact sandy clay or clay. The lower subsoil is often yellowish or reddish yellow. On some of the higher mountains the surface material below 5 or 6 inches grades abruptly into a stiff, red clay. The stone fragments are in most places sufficiently abundant to interfere considerably with cultivation, although most of the type is not rendered untillable by the stone content.

In the mountains the type along drainage courses includes narrow strips that approximate in character Rough stony land. There are also included small areas of Hanceville stony sandy loam, fine sandy loam, and very fine sandy loam.

The Hanceville stony loam is the most extensive soil type in Yell County, covering an area of 313.4 square miles, or 33.2 per cent of the area of the county. Its greatest development is in the southern part of the county. It is also well developed on the slopes of Danville Mountain, on the mountains about 3 miles south of Havana, and on those east of Plainview. It occurs throughout the uplands of the county, largely in the smoother areas on the mountains and on the tops and gentler parts of the slopes, as well as on hillocks and ridges through the valley lowlands of the county. Usually the

southern slopes of the mountains and higher ridges are steeper and have more stone material than the northern slopes. The type includes many slopes so steep that clean cultivation would be followed by severe erosion.

Although the Hanceville stony loam is of large extent, on account of its unfavorable topography and stoniness it is of less importance in the agriculture of the county than the loam type. At least 95 per cent of its total area remains in forest, the growth consisting largely of shortleaf pine, hickory, red oak, post oak, and blackjack oak. A considerable proportion of the mountain land included in this type is in the Arkansas National Forest. Various lumber companies own thousands of acres of land of this type and are engaged in cutting the pine over a large area.

At present the type is used mainly for the pasturing of cattle on the native grasses, which grow in abundance. Each autumn the mountains are burned over. The practice of raising cattle on grass and disposing of them to cattle buyers is becoming rather general, especially in the southern part of the county, which is somewhat remote from railroads. A little general farming is done on some of the smoother and gentler slopes, as well as on a few flat-topped ridges and benchlike areas.

Cotton and corn are the principal crops. Onions, cantaloupes, tomatoes, potatoes, and common garden vegetables do very well in small garden patches, where the stone fragments are not very abundant or have been removed. None of the small grains have been grown in an important way, but fair yields of cowpeas and various forage crops are obtained in small and widely scattered fields on the smoother areas of the type. Apples and peaches of excellent quality are produced. An orchard on the summit of Danville Mountain produces fruit of good flavor and color. A fairly large commercial orchard has been planted on the mountain east of Plainview. Some shipments of peaches are now made from orchards on the Hanceville stony loam.

The larger commercial orchards are well cared for, but many small orchards would be benefited by the thinning of the trees, spraying, and pruning, and the practicing of better cultural methods generally. All plowing is shallow. The cultivated crops are grown on ridges and given shallow cultivations. On some of the steep slopes the stones have been collected into rows running around the hills, in order to prevent erosion; otherwise little effort is made to check washing of the soil.

The selling price of land of the Hanceville stony loam, where the timber has been removed, ranges from $5 to $10 an acre. Where the original stand of timber remains, its quality governs the selling price of land.

The Hanceville stony loam is well suited to stock raising. Under the present conditions of transportation and markets it is probable that the type could be most profitably used for the raising of beef cattle, and possibly sheep and hogs. Peaches and apples can be successfully grown in the areas most favorably situated with respect to railroads. The best use for the steeper, rougher areas of this soil is forestry.

HANCEVILLE FINE SANDY LOAM.

The Hanceville fine sandy loam consists of 8 to 12 inches of a light-brown to reddish-brown fine sandy loam, underlain by red, friable sandy clay, often spotted with yellow in the lower subsoil.

The type is inextensive, its total area being 8.9 square miles. The principal areas of the type are to the west and south of Riley, north and southwest of Chickalah, at and a few miles north and northeast of Mount Nebo, and 2 miles south of Ola. The topography varies from level on the tops of mountains to gently rolling in the lower valleys.

A very small area of the mountain development of this soil is farmed, but at least 75 per cent of the type in the smoother areas is in cultivation. Much of the soil material on the slopes is colluvial, and there are numerous sandstone fragments of various sizes, washed and rolled down from areas of higher elevation, which interfere to some extent with cultivation.

The crops grown on this type are practically the same as those grown on the Hanceville very fine sandy loam. The type is suited to the same crops and the same methods of agriculture. With similar treatment the fine sandy loam may be expected to be slightly inferior in moisture-holding capacity and in productiveness, on account of its somewhat coarser texture. Deeper fall plowing and the more general growing of legumes are beneficial in keeping the soil in the best condition.

HANCEVILLE VERY FINE SANDY LOAM.

The Hanceville very fine sandy loam consists of a light-brown to reddish-brown very fine sandy loam, which passes at any depth between 5 and 15 inches into a subsoil of red, friable sandy clay, usually containing some yellowish material. On slopes where erosion has been most active the red clay comes close enough to the surface to give the surface soil a decidedly reddish color. In some places the subsoil is no heavier than a very fine sandy loam, ranging from a yellowish to a reddish or mottled very fine sandy loam and grading into partially decomposed sandstone. Over most of the type included patches, really constituting the Hanceville gravelly loam, contain small fragments of sandstone or shale

throughout the soil section. In many places bedrock is encountered within the 3-foot profile.

In the vicinity of Box Springs School and also just west of Mountain Springs School, on Chickalah Mountain, there are several small areas of Conway fine sandy loam which are included with this type on account of their small size. The soil here is a grayish loamy fine sand to fine sandy loam, underlain by pale-yellow or mottled yellowish and grayish fine sandy loam to fine sandy clay. The lower subsoil is frequently a plastic clay, mottled yellowish and grayish and containing black concretions. The Conway areas contain some mounds, where the surface soil is reddish brown and the subsoil reddish yellow, grading into yellow.

Although its total area is not very large, the Hanceville very fine sandy loam is found in many parts of the county, with its largest development in the northern part, on Chickalah Mountain. It occurs on comparatively low ridges and hillocks, on flat mountain tops, and in gently rolling country. The forested areas support a growth consisting largely of pine, blackjack oak, and red oak, with an abundance of cedar along stream courses.

The Hanceville very fine sandy loam is not of great importance in the county as a whole, but on account of its favorable topography it is quite generally utilized for farming, and it is an important soil locally. The crops grown are about the same as those grown on the Hanceville loam. Cotton and corn are the principal products. The type is a fairly strong soil for the general farm crops. Common garden vegetables, as well as watermelons and cantaloupes, do well, but are grown only for local use. A number of small peach orchards produce fruit of good quality, but there are no large commercial orchards. The soil is naturally adapted to vegetables and fruit. Peanuts of the Spanish variety are grown successfully. Milo and kafir do very well.

Crops mature a little earlier on the Hanceville very fine sandy loam than on the loam. The usual yield of cotton is one-third to three-fifths bale per acre, and of corn 10 to 15 bushels.

In general, light farm equipment and rather light work animals are employed in farming this soil. All cultural operations are easily performed.

The present selling price of land of the Hanceville very fine sandy loam ranges from about $15 to $25 an acre.

The prevailing practice of continuous cropping of clean-cultivated crops has caused a deficiency in organic matter in many of the fields. According to the experience of farmers, nitrogen is needed, more than any other element, to improve the productiveness. Where there is no barnyard manure available, the leguminous crops, such as cowpeas, peanuts, soy beans, crimson clover, and bur clover, can

be grown to good advantage for the purpose of supplying this element. Farmers who practice deep plowing and grow the legumes occasionally obtain yields much above those ordinarily produced. As much as 78 bushels per acre of Spanish peanuts has been obtained on this soil. In the more remote sections it would apparently be profitable to devote a larger acreage to forage crops to be used in connection with raising live stock.

HANCEVILLE LOAM.

The typical Hanceville loam is a brown to reddish-brown loam, which usually becomes somewhat heavier and more reddish below 5 or 6 inches, and grades into red or yellowish-red, friable clay loam or sandy clay at about 8 to 10 inches, and these into rather bright red, more compact sandy clay or clay. The lower subsoil is characteristically compact and light red or red in color, faintly mottled with yellowish. On some eroded slopes compact, rather tough, brittle red clay comes to the surface. Fragments of sandstone are usually present, but not in quantities sufficient to interfere with cultivation.

Many nearly level, low-lying areas in this type in the vicinity of streams bear a close resemblance to terraces. It is probable that the soil in some of these situations is really derived in part from terrace material forming the Waynesboro series, but the shallow depth to bedrock and the presence of angular rock fragments throughout the soil would indicate that even here the material is largely residual.

Included with the Hanceville loam are some small areas of Hanceville shale loam, consisting of a brown to reddish-brown loam underlain by yellowish-red to red silty loam or silty clay loam which quickly passes into moderately friable to rather stiff clay of a brick-red color. Shale fragments are usually abundant on the surface and throughout the soil section, the content increasing with depth, and chips of sandstone as well as larger fragments are common. Bedrock is frequently reached within the 3-foot section.

The Hanceville loam occurs throughout the valleys of the county and has a wide distribution. The type occupies comparatively low ridges and hillocks and some moderately steep slopes. It is largely confined to the lower valley areas, being seldom encountered on the higher mountains. Its surface is largely well suited to cultivation and the use of improved farm implements. The drainage is good. The run-off from the steeper slopes is so rapid that erosion follows the growing of clean-cultivated crops.

Although not nearly so widely developed as the stony loam type, the Hanceville loam is the most extensively cultivated upland soil

in the county. Probably nine-tenths of the type is now in cultivation. Cotton is by far the most important crop. Some corn is grown on every farm, principally for feeding hogs and work stock. Wheat, oats, various hay and forage crops, and sweet and Irish potatoes are grown to some extent. Many small fields are devoted to wheat, but the average yield is low. Oats usually occupy small fields also, but the total acreage devoted to this grain crop is considerable. A fairly large acreage is devoted to the production of hay. Native grasses produce hay of fairly good quality. Cowpeas are often sown broadcast and cured for hay. Sorghum is also used as a forage crop. The hay roughage produced is for the most part used on the farm for feeding work stock and the few cattle kept, but some hay reaches the local market.

Sweet potatoes are grown successfully on this type. The crop matures about the middle of August, and a few shipments have been made to outside markets, but sweet potatoes are grown mainly for home use. The Nancy Hall is a favorite variety. Irish potatoes also yield well, but are grown only for local use. Spanish peanuts are produced in many small fields, and yields are usually good. A number of farmers grow milo and kafir successfully. Near Dardanelle about 65 acres of soil of this type were devoted this year (1915) to strawberries for the market with good returns. Several shipments of peaches grown in small home orchards were made.

Practically every farmer fattens a number of hogs, but few hogs are shipped to market. The most common breeds are the Jersey Red, Berkshire, and Poland China. The raising of beef cattle and other stock for market on this type is of little economic importance. Many farmers keep one or more head of cows to provide dairy products for the home, but dairying is not developed to any appreciable extent. Most of the cows are grade Jersey or Shorthorn. The principal feed for cattle is cottonseed meal and hay, feeding being supplemented by pasturing.

Yields of cotton on the Hanceville loam ordinarily range from one-third to two-fifths bale per acre. Corn yields range from about 12 to 20 bushels per acre, and wheat yields average about 10 bushels per acre.

Cotton is commonly planted about the middle of April, when cool, wet weather is past. The crop is in most cases planted on low ridges, with the rows 3½ feet apart. The land is ordinarily broken about 4 or 5 inches deep. Cultivation given is shallow and at frequent intervals. Some farmers in growing cotton apply about 200 pounds of commercial fertilizer per acre in the drill before planting the seed. The leading varieties of cotton grown are Mebane Triumph, Rowden, and Simpkins Prolific.

Corn is usually planted early in April in rows 3½ to 4 feet apart, thinning the plants to stand about 2½ feet apart in the row. The practice of sowing cowpeas between the rows at the last cultivation is becoming more general. In many instances the corn rows are placed 6 feet apart, with a row of cowpeas or peanuts planted between. The usual method of harvesting corn is to snap the ears and allow the stalks to stand for winter grazing. Most of the corn grown consists of mixed varieties. Mosby's Prolific and Reid's Yellow Dent are grown by some farmers. The Boone County White, a rather late maturing variety, is also planted to some extent. Experiments have demonstrated that White Wonder is a good corn for the region.

Oats are usually sown the latter part of March, and in most cases are broadcasted. The greater part of the crop seeded is cut for hay. The most common varieties of oats grown are the Burt and Red Rustproof.

The ordinary selling price of land of the Hanceville loam ranges from $15 to $30 an acre, depending upon the character of the improvements.

In general, the yields obtained upon the Hanceville loam are low. This condition is attributable to some extent to the prevailing shallowness of the plowing, but principally to the constant cropping to clean-cultivated crops and the depletion of organic matter. This is particularly true on tenanted farms, where little or no provision is made to maintain the productiveness of the land. The good yields of cotton possible on this soil make it likely that this crop will hold its present place in the cropping system, and in order that it may do this indefinitely it will be necessary to maintain the organic content of the soil by diversifying the crops and using animal or green manures.

Crimson clover is a good winter cover crop, affording grazing for live stock, preventing washing of the soil, and adding nitrogen. Little crimson clover, however, is grown in Yell County. In this latitude it can best be sown between September 10 and October 10, preferably when there is enough moisture in the soil to hasten germination. Hairy vetch, another valuable cover crop, is sown to best advantage in September. Sweet clover has been grown successfully by a number of farmers and is a good soil-improving crop. Bur clover is also a good cover crop for this soil, and the more extensive growing of cowpeas would be advisable. Spanish peanuts are beneficial to the soil, and in addition have proved to be an excellent field forage crop for hogs.

The farmers of Yell County have recently taken considerable interest in alfalfa. On several fields where stands have been obtained

the plants have turned yellow and died. In no case where this occurred had lime been applied. Litmus-paper tests of soil from affected fields indicate the need of lime. Inoculation also is usually required. Alfalfa does best on land that is well drained and has a good content of organic matter. It is advisable to experiment with the crop in a small way before sowing any considerable acreage.

Sudan grass has been grown experimentally, and fields observed in the course of the survey were apparently thriving. Sudan grass, which is drought resistant, produces a coarse hay of a quality superior to forage from sorghum.

CONWAY SILT LOAM.

The Conway silt loam consists of a light-brown to yellowish-brown silt loam, underlain at about 6 to 8 inches by pale-yellow to mottled yellowish and grayish silty clay loam. This quickly passes into pale-yellow or mottled yellow and gray silty clay, the mottling becoming more intense with increasing depth. At 28 to 36 inches there is a stratum of compact, tough clay, mottled gray or drab and yellowish, or a mixture of clay and black concretions, probably ferruginous. The black layer is in most cases a true hardpan, but it is not so patchy in distribution and is much less extensive than the clay stratum. Satisfactory separation of areas underlain by the hardpan was impracticable. Both the clay stratum and the black hardpan stratum are comparatively impervious and are probably responsible in large part for the poor drainage conditions on this type.

There is frequently a relatively high content of fine sand in the surface soil, so that some areas approach the texture of a loam. On the other hand, the type, as mapped, in places consists of a silty clay loam, passing at about 5 to 8 inches into yellow or mottled yellow and gray clay, underlain by a compact stratum of plastic clay mottled with drab and yellow, and frequently with red. The hardpan layer may be encountered in this variation at a depth of 26 to 30 inches. Such areas are developed just to the north of Petit Jean Creek between Ola and Centerville, and southeast of Plainview.

The surface soil of both the typical silt loam and the included areas of silty clay loam shows in many places a rather distinct brownish shade in the surface inch or few inches. Small concretions are numerous throughout the 3-foot section.

Dome-shaped mounds are of common occurrence in areas of the Conway silt loam. In these the surface soil is usually a brown to reddish-brown fine sandy loam or loam which, at 15 to 18 inches, passes into yellow to reddish-yellow silty clay loam or silty clay.

The Conway silt loam occurs extensively in all the more important valleys. Its surface is characteristically level to very gently undulat-

ing. There is some variation in the elevation above the associated stream bottoms, the type being found in all positions from the immediate banks of streams to successively higher levels, though it in no case lies at as high an elevation as the associated Hanceville soils. The drainage ranges from very poor to fair. On some of the low, flat areas, known locally as "slashy land," water stands for considerable periods after heavy rains. Some ditching has been done in the more poorly drained situations.

The Conway silt loam is a soil of considerable importance in Yell County, both in extent and in agricultural value. Probably 30 or 40 per cent of this type is farmed, the remainder being forested, principally with pin oak, post oak, and hickory. There are several small prairie areas, or glades.

The land cleared and farmed is devoted chiefly to cotton and corn, with a small acreage used for cowpeas, sorghum, oats, and hay and pasturage. Cotton is the money crop, the corn being used largely on the farm for feeding the work stock and the few hogs and cattle kept. The other crops are mostly used on the farm. Redtop is occasionally sown for hay, of which it produces good yields. Native grasses and lespedeza grow abundantly on this land, furnishing good grazing. They are cut to some extent for hay.

There is no important development in raising live stock or in dairying on this type, although many farmers raise a few hogs and keep one or more cows to supply milk and butter for home use.

The average yield of cotton is one-fourth to one-third bale per acre. Corn yields about 10 to 15 bushels per acre. The largest yields of both these crops are obtained on the better drained land. Cowpeas make an excellent growth on this type. The yield of sorghum sirup ranges from about 50 to 60 gallons to the acre.

In preparing the land the soil is broken to a depth of about 4 to 6 inches. The equipment and teams are rather light for the best results. Cultivation is frequent and shallow.

The present price of land of the Conway silt loam ranges from about $5 to $15 an acre, varying with the improvements and location.

The Conway silt loam is prevailingly in need of drainage, which can be accomplished in a fairly satisfactory way by ditching. The soil shows an acid reaction to litmus paper, and liming would therefore likely prove beneficial, especially if the soil is kept properly supplied with organic matter, as by growing and occasionally plowing under the legumes. Such treatment, in addition to other beneficial effects, would prevent to some extent the tendency of this soil to run together and bake after heavy rains. Deeper plowing would also improve the type.

Only the higher, better drained areas of the Conway silt loam are well suited to cotton and corn production. The less well drained areas would better be used as hay and pasture land. Oats could be grown more extensively for hay, as could also cowpeas, lespedeza, redtop, and other hay and forage crops. Bermuda grass furnishes excellent pasturage. The type is thus seen to be well suited to the development of the live-stock industries, especially the raising of horses, mules, beef cattle, and hogs. Close grazing would be followed by unfavorable compacting of the soil, but this could be avoided in some measure by increasing the organic-matter content.

BASTROP VERY FINE SANDY LOAM.

The surface soil of the Bastrop very fine sandy loam, to a depth of 12 to 24 inches, is a light-brownish loamy very fine sand, which grades into brownish-yellow loamy very fine sand. The subsoil is either chocolate red or salmon colored and ranges in texture from a fine sandy loam to a sandy clay or moderately stiff clay. In places the surface soil is dark brown, approaching in color the Brewer soils, and there are included with this type as mapped small spots of the less productive Brewer very fine sand.

The Bastrop very fine sandy loam is developed on the Arkansas River terraces and is of small extent. It occurs mainly to the south of Dardanelle. There are smaller areas east of Gibson Lake, along Mill Creek, and near the river in the vicinity of Fowler. The type is developed in situations associated with the Reinach very fine sand, the latter occurring on the margin of the terraces. The topography is level to very gently undulating. The drainage is good, and the type is not subject to overflow. This soil is locally important, but on account of its small extent it is not of great importance in the agriculture of the county. It is practically all under cultivation.

The Bastrop very fine sandy loam is used chiefly for cotton and corn. The usual yield of cotton is from one-half to two-thirds bale per acre, and of corn from 35 to 50 bushels. Wheat, in one 40-acre field on this type, yielded 15 to 18 bushels per acre this season (1915).

Land of the Bastrop very fine sandy loam rents at $6 to $10 an acre.

Many fields on this soil have been cultivated for a long time, and in several instances the yields appear to have decreased. Deep plowing and the addition of organic matter by growing legumes would go far toward the maintenance of good yields.

REINACH VERY FINE SAND.

The Reinach very fine sand consists of a grayish-brown to yellowish-brown very fine sand, which grades at about 15 to 20 inches into loose and lighter colored very fine sand, usually grayish yellow or

very light yellow. In the vicinity of the town of Dardanelle the type is known as "black sand." Here there are areas where the surface soil when wet has a dark-brown color and the subsoil is grayish yellow or faintly pink in color. On drying the surface material shows a faint reddish cast. The dark color is accentuated in imperfectly drained depressions.

As mapped, there are included with this type areas of Yahola very fine sandy loam. The Yahola soil is inextensive in this county and is not typical of the series, as much of it occurs above normal overflow. The Yahola very fine sandy loam consists of very fine sandy loam of a light-reddish color, underlain at 6 to 10 inches by loose very fine sand of a yellowish to reddish color.

The Reinach very fine sand occurs in the Arkansas River bottoms on slight ridges or in positions conforming with second bottoms—that is, standing above overflow. The surface for the most part is somewhat billowy. The drainage is good to excessive. The principal trees are red oak, elm, hickory, and sweet and black gum.

The type is mostly under cultivation. Cotton is the chief crop, with some corn, grown for feeding the work stock. Cotton yields one-half to three-fourths bale and corn 30 to 40 bushels per acre.

A light equipment of implements is used on this land. These meet all requirements of tillage, as the soil is very friable and easy to work.

The cash rent for land of this type averages $8 or $9 an acre. The valuation is about the same as that of other sandy types of the Arkansas River bottoms.

This soil is naturally productive, but the addition of organic matter will be necessary to maintain the type in this condition indefinitely.

Vegetables, melons, and peanuts succeed on well-drained soils of this character elsewhere, and under proper economic conditions vegetables and melons would likely prove remunerative crops here. Peanuts could be used in connection with the raising of hogs.

BREWER SILT LOAM.

The typical Brewer silt loam has a dark-brown to black silt loam surface soil, about 12 to 18 inches in depth, underlain by dark-drab, dark-brown or black, rather tough clay. In places the subsoil has a reddish tint.

The type occurs on comparatively low terraces of the Arkansas River, its largest area extending south from Fowler. The surface is practically level, but the drainage is good.

The Brewer silt loam is of small extent, but is of considerable importance in the agriculture of the county. Almost all the type is cultivated. It is productive and durable, yielding one-half to

three-fourths bale of cotton and 35 to 50 bushels of corn per acre. It is devoted almost exclusively to the production of these staple crops.

As is the case with all the Arkansas River valley soils, no commercial fertilizer is used on the Brewer silt loam. Deeper plowing and more frequent cultivation are needed on some of the farms.

BREWER CLAY.

Areas mapped in the Brewer silt loam color, but distinguished with inclusion symbols, represent the Brewer clay. The surface soil of the Brewer clay is a dark-brown to black clay, mottled in places with drab. The subsoil, beginning at 10 to 18 inches, is a tougher clay of a dark-brown to chocolate-brown or dark-drab or black color, in places having a faint greenish tint.

The Brewer clay is of small extent. The principal areas occur about 2½ miles south of Dardanelle, along the public road 2 miles west of Neelly, and near Pontoon. The type occurs on flat terraces of the Arkansas River. Drainage ranges from poor to fairly good. The soil is known locally as "black gumbo." It is distinguished from the Osage clay principally by its position above overflow.

About one-third of the type is in cultivation, the remainder being forested with pin oak, hickory, and sweet gum. Cotton is about the only crop grown. Ordinary yields range from one-half to three-fourths bale per acre. The soil has a tendency to bake and crack, and partly on this account corn does not do well.

The principal need of this soil is more efficient drainage. Cultivation is limited to a narrow range of moisture conditions.

TELLER VERY FINE SANDY LOAM.

The Teller very fine sandy loam consists of about 12 to 15 inches of yellowish-brown very fine sandy loam, this grading rather abruptly into red, friable sandy clay. Frequently the lower subsoil is rather stiff in structure and has a more pronounced yellowish-red color. The color of the typical subsoil tends more toward brick red than toward the characteristic brownish-red shade of the Miller and Bastrop subsoils. The substratum, as seen in some exposures, is brownish red in color. Erosion has exposed the clay subsoil in places. Near Alberta rounded gravel occurs abundantly on the surface of the type and through the soil section.

The type occurs on high terraces along the Arkansas River, near Neelly and Gibson Lake, with other smaller areas elsewhere. The topography is gently rolling or rolling, the surface having been eroded considerably since the formation of the terrace. Drainage is well established.

The Teller very fine sandy loam is inextensive in Yell County. Practically all the type, however, is under cultivation. Cotton and corn are the principal crops grown. The soil is fairly productive, the yield of corn ranging from 25 to 30 bushels an acre. Cotton averages about one-half bale per acre. The thriving condition of a number of small peach orchards on this type indicates that it is well adapted to this fruit. Vegetables are grown successfully for home use. Watermelons and cantaloupes probably would make good commercial crops, where conditions of transportation are favorable.

On some areas there is considerable erosion, and here terracing would be beneficial. Legume crops, such as cowpeas, could advantageously be introduced in the crop rotations, to increase and maintain the supply of organic matter.

MUSKOGEE SILT LOAM.

The surface soil of the Muskogee silt loam consists of 6 to 10 inches of a grayish silt loam, frequently mottled with pale yellow or rusty brown. This grades into silty clay loam of about the same color, and at about 15 to 18 inches there is encountered a compact clay, mottled with gray, drab, and yellow, or rusty brown. The lower subsoil is commonly mottled drab and red. In places a clay or clay and iron concretion hardpan is encountered at 24 to 30 inches. There are a few sandy dome-shaped mounds on this type, but in general the surface is flat.

There are included several small areas of Muskogee clay, two occurring between Neelly and Pontoon. These were too small to warrant separate mapping.

The Muskogee silt loam occurs in low, poorly drained terrace areas on the outer border of the Arkansas River lowlands. The type is not extensive in Yell County. The largest area occurs south of Neelly, and others south of Dardanelle.

Probably 60 per cent of the total area of the type is under cultivation, the remainder being forested, principally with pin oak, post oak, and hickory. Lespedeza grows wild in abundance. The principal crops are cotton and corn, with cowpeas, sorghum, and oats grown to some extent. Cotton yields on the average about one-third bale per acre and corn about 15 bushels. Oats do fairly well. This crop is grown mainly for hay.

Most of the land of the Muskogee silt loam is valued at $10 to $15 an acre.

Artificial drainage must be resorted to before this type can be used to best advantage, and about half its total area is not at present suited to cultivation. Only the higher and better drained land can now be used to advantage for cotton and corn production; the remainder is valuable hay and pasture land.

Loosening the compact subsoil by the use of dynamite is said to have been of some benefit on one small area of this type of soil.

WAYNESBORO LOAM.

The Waynesboro loam is somewhat variable in color characteristics, and as mapped includes small depressions occupied by another soil. The typical soil is a brown to reddish-brown loam, which passes at about 8 inches into reddish loam or clay loam, this being underlain in turn at about 12 to 16 inches by red or yellowish-red, rather friable clay loam or clay. The lower subsoil is usually more compact and often has a yellower color than the material above. Rounded sandstone gravel is scattered in places through the soil and on the surface.

In many places areas of this type contain mounds, the soil of which consists of reddish-brown loam and the subsoil of yellowish-red clay, passing below into yellowish clay, in places mottled somewhat with gray, compact, and poorly drained. Small concretions are common in areas of this variation. In the lower, more poorly drained situations, such as commonly occur between the mounds, the soil is essentially similar to the Conway silt loam in color, structure, and drainage conditions, and several small areas of the Conway soil are included with this type as mapped.

The Waynesboro loam is developed in a considerable number of areas, ranging in extent up to about 1 square mile. The most important areas occur along Gafford Creek, at various places along the Fourche la Fave River, and along Petit Jean Creek. The type is encountered on relatively low terraces or second bottoms, some of which are sloping, while others have a billowy surface, owing to the occurrence of the dome-shaped mounds. The surface is usually level or approximately so, except for the mounds. The drainage is good.

The Waynesboro loam is of only moderate extent, but it is locally an important soil. The greater part is in cultivation, cotton and corn being the chief crops. Corn yields from 15 to 30 bushels per acre and cotton one-third to one-half bale. Yields are higher on the better drained areas. There are many small fields in sorghum, which gives good yields. Peaches and vegetables do well in the higher, well-drained situations. The more poorly drained areas are used for pasture or left in timber.

The conditions of drainage and other improvements control the selling price of land of this type. Prices range from $15 to $30 an acre.

The growing of the legumes in rotation with the other crops and deep plowing are important in keeping this soil in a productive condition.

POPE FINE SANDY LOAM.

The Pope fine sandy loam typically consists of brown fine sandy loam which shows but little change in character of material to a depth ranging from 10 to 30 inches, where lighter brown to yellowish fine sandy loam, clay loam or sandy clay is encountered. In places the surface soil is light brown and is underlain by a yellowish-brown to yellow, compact fine sandy clay subsoil. In other places, where the drainage is especially good, the subsoil is reddish.

The most important areas of the type occur interruptedly along the Fourche la Fave River and in continuous strips along many of the smaller streams. The type occurs in the first bottoms of streams, largely along the immediate banks, where relatively swift currents have deposited coarser sediments. The surface is level to faintly undulating. The drainage is well established, except for overflows.

The Pope fine sandy loam is of only moderate extent in Yell County. It is a type of considerable importance, however, as a large proportion of it is under cultivation. Cotton and corn are the principal crops. Cotton ordinarily yields one-third to two-fifths of a bale per acre, and corn 15 to 25 bushels per acre. The higher areas, not subject to frequent overflow, are used to some little extent for the production of sorghum, peanuts, cantaloupes, watermelons, and various vegetables, to which crops the type is well suited. The soil is easily handled with light implements and teams.

Land of the Pope fine sandy loam sells for $15 to $30 an acre, the selling price depending largely upon the accessibility of markets.

The best practice in handling soil of this type is to plow to a depth of at least 8 or 10 inches and to keep up the supply of organic matter. This can be done by introducing the legumes in crop rotations.

POPE LOAM.

The Pope loam consists of a brown, mellow loam, underlain at any depth from 10 to 20 inches by light-brown to yellowish-brown, heavy loam to clay loam. In many places where there has been considerable wash from red upland soils of near-by areas the color of the material is reddish brown, and mounds appearing in places on this type have a reddish-colored soil. Included areas where the drainage is less perfect have a yellowish or mottled yellowish and grayish color in the subsoil. Fragments of sandstone are quite common over the Pope loam, the type in places approximating a gravelly loam and in others a stony loam.

As mapped along Dutch Creek, there are included small depressions containing the Pope silt loam. There are also included patches of Pope fine sandy loam.

The Pope loam is not nearly so extensive as the Pope silt loam. It occurs in continuous strips along the smaller streams. The larger areas are those in the bottoms along Gafford, Irons, Dutch, and Spring Creeks. The surface is practically level, and the type is everywhere subject to overflows, though between overflows the drainage is good.

The Pope loam is an important soil in Yell County, on account of its productiveness rather than its extent. Most of the land is farmed very largely to cotton and corn. Cotton yields commonly from one-third to one-half bale or more per acre, and corn 20 to 40 bushels or more. Lower yields are obtained from gravelly and stony areas.

Land of the Pope loam has about the same value as the silt loam, but much of the type occurs in narrow strips and is farmed with contiguous upland soils.

In places the water table is less than 3 feet below the surface, and here artificial drainage would be beneficial. For increasing the productiveness the growing of legumes in rotation with the other crops is suggested.

POPE SILT LOAM.

The Pope silt loam consists of a brown to reddish-brown silt loam, underlain at about 6 inches by a brown to reddish-brown, more compact silt loam to silty clay loam. This passes below into light-brown or yellowish-brown silt loam to silty clay. The lower subsoil is frequently yellowish in color and compact in structure, and in the more poorly drained places it is mottled with gray and contains some black concretions. On the other hand, in some of the situations where there is better drainage, the subsoil shows a reddish tint. There are included with this type, as mapped, areas which approximate closely in characteristics the Atkins soils, having a light-colored, mottled yellowish and grayish subsoil.

The Pope silt loam occurs in the bottom lands along the principa. streams tributary to the Arkansas River, being developed in continuous strips, in places 2 miles wide. The principal areas are those on Petit Jean Creek and Fourche la Fave River and their branches. The surface is level or nearly so, with occasional depressions, representing sloughs or abandoned stream channels. There are some low mounds. Overflows are of frequent occurrence. In 1915 overflows in the month of August ruined much of the corn and cotton planted on this type. Between overflows the drainage is fairly good.

The Pope silt loam is an extensive soil, and it is of much importance in the agriculture of the county. Probably 25 per cent of the type is under cultivation, the remainder being forested, chiefly with sweet gum, black gum, water oak, ash, sycamore, ironwood, and

hickory. Cane grows abundantly along the banks of the larger streams.

The Pope silt loam is highly esteemed for the production of corn and cotton, and by far the greater part of the type is devoted to these crops. Corn is grown mainly for feed for work stock, but to some extent as feed for hogs and beef cattle, though live-stock industries are of little importance. A small proportion of the crop is marketed. Wheat is grown in a small way in the higher, better drained places. Some of the more poorly drained areas are used as hay and pasture land.

The ordinary yield of cotton is one-third to one-half bale per acre, and of corn 25 to 35 bushels per acre. In favorable seasons, with good cultural methods, as much as 50 to 60 bushels of corn per acre has been produced.

The present selling price of land of the Pope silt loam ranges from about $30 to $50 an acre.

The Pope silt loam is a productive soil, and it apparently can be depended upon to produce good crops, under proper methods of tillage, indefinitely, the sediment annually added by overflows enriching the soil.

The growing of legumes, ditching, and deep, thorough plowing are means by which the yields may be increased. In many fields corn does not receive sufficiently thorough cultivation, and cocklebur, which is especially troublesome in the bottoms, is not always kept down. There are places in this type where a single open ditch would improve the drainage of depressions of considerable area. Tile drains have been installed by some of the farmers, with good results.

ATKINS SILTY CLAY LOAM.

The Atkins silty clay loam consists of a mottled brownish and grayish, or yellowish and grayish, silty clay loam, underlain at 5 or 6 inches by yellow or mottled yellow and gray silty clay, the gray mottling increasing with depth. At about 18 to 28 inches a tough stratum is encountered, consisting either of mottled gray or drab and yellowish clay or of yellowish and grayish clay carrying a large quantity of black concretionary material, probably ferruginous. Frequently there is a thin surface layer of brownish silt loam. Small concretions are common throughout the soil section.

The type occurs in the bottoms along a number of streams draining the uplands of the county. The principal areas are those west of Danville on Dutch Creek and Petit Jean Creek, in the bottoms near Plainview, and along the upper Fourche la Fave River. The characteristic position is along the outer margin of the bottoms, in low,

level areas next the terrace or upland slopes. Both surface drainage and underdrainage are poor, and most of the type is subject to overflow. The impervious lower subsoil is in part responsible for the poor drainage.

The Atkins silty clay loam is a rather extensive soil, but it is of little importance in the agriculture of the county, owing to its poor drainage and unfavorable structure. Most of the land is forested, water oak, other varieties of oak, ash, shellbark hickory, and swamp maple being the most common trees. Small areas are each year cleared and brought into cultivation. The land is usually cleared by girdling the trees and allowing them to stand until blown down. This practice often results in considerable damage being done to crops during severe windstorms.

By far the greater part of the tilled area of the Atkins silty clay loam is devoted to the production of corn. Cotton is the second crop in acreage. The type is used to some extent, especially in the more poorly drained places, for hay. Redtop is the grass commonly sown. The raising of beef cattle and hogs is of some importance. Lespedeza and Bermuda grass grow wild and furnish excellent pasturage.

Corn yields from 15 to 20 bushels and cotton from one-third to two-fifths bale per acre. Redtop yields a ton or more of hay per acre.

The plowing is rather shallow, prevailingly light equipment being used. Heavy teams are necessary for efficient tillage of soils of this character. When the soil is plowed in a wet condition clods are formed which are with difficulty reduced. The land has a somewhat lower value than the associated Pope soils.

Artificial drainage is necessary for the efficient farming of the Atkins silty clay loam. The type is rather productive and the expense of reclamation would apparently be justified. Many farmers have constructed systems of open ditches, and some have installed tile drains. The soil gives an acid reaction to litmus, and liming undoubtedly would be beneficial.

ATKINS CLAY.

The Atkins clay typically consists of a mottled brown, rusty-brown, and gray silty clay, underlain at 5 or 6 inches by light-gray or drab, compact clay, mottled in varying degrees with yellow or yellowish brown, and containing black concretionary material. The lower subsoil is tough and impervious, and to this stratum is undoubtedly attributable the poor drainage and imperfectly oxidized condition of the overlying soil.

In the vicinity of Slaty Crossing the type contains a small percentage of sediment derived from the Arkansas River. During the spring floods, when backwater from the Arkansas River stops the

flow of Petit Jean Creek, the flood waters of the latter stream, carrying local upland sediments, mingle with the waters of the river, which carry principally residual prairie material. The surface soil here is a mottled drab, gray, and rusty-brown clay, underlain at 8 to 12 inches by bluish-drab or dull-red clay. Frequently the lower subsoil has only a suggestion of red color—a pale, pinkish hue.

The Atkins clay occurs chiefly along lower Petit Jean Creek from the vicinity of Ola eastward. It is developed in level stream-bottom areas, subject to overflow. The soil material is impervious, and its structure is unfavorable to the circulation of moisture and air. The drainage between periods of overflow is poor.

The Atkins clay has a total area of 9 square miles, and is not a soil of importance in the agriculture of the county. On account of its poor drainage only a small part is farmed, the remainder being forested with hickory, elm, sweet gum, and pin oak. A fair crop of cotton was seen in the course of the survey in one field which is subject to overflow only at times of exceptionally high floods. Several clearings on the type are used for the production of hay, largely of native grasses, which are fairly abundant.

Owing to its heavy character and its tendency to become compact on drying, this soil requires a heavy equipment of implements and teams for efficient cultivation. The type appears to be productive, and with proper drainage cotton and corn could be successfully grown, though on the whole the type is best adapted to hay production.

MILLER VERY FINE SANDY LOAM.

The Miller very fine sandy loam consists of a reddish-brown very fine sandy loam underlain at a depth of 15 to 24 inches by brown to dull reddish brown sandy clay or compact silty clay. The color is not so red as that of the Miller very fine sandy loam mapped in certain other surveys, but is sufficiently red to class the material with the Miller series.

There are included several small areas of Yahola very fine sandy loam, the subsoil of which is a light-colored loamy very fine sand. There are also included a number of areas having a dark-brown to black silty clay subsoil, which if larger would have been mapped with the McLain series.

The Miller very fine sandy loam occupies relatively high positions in the Arkansas River bottoms, being developed either along the banks of the river or separated from it by a strip of Yahola very fine sand.[1] The soil adjoining the channel of the stream is in places caving into the river. The surface of the type is nearly level, al-

[1] The inextensive Yahola very fine sand in this county is mapped with the Reinach very fine sand.

though it stands a little above the associated heavier soils. The drainage is excellent.

There is not a large total area of the Miller very fine sandy loam, but practically all the type is under cultivation. Almost the only crops grown are cotton, corn, and alfalfa, cotton predominating. Cowpeas are frequently sown broadcast in the corn at the last cultivation.

The soil is very easy to till and light farming equipment is sufficient in plowing and cultivating.

Cotton yields on this type range from one-half to two-thirds bale, and corn 35 to 40 bushels, per acre. About 5 tons of alfalfa hay per acre is cut in good seasons.

Land of the Miller very fine sandy loam rents for $7 to $10 an acre. Practically none of it is for sale.

While most of the type has been in cultivation for many years, it does not seem to have suffered any marked loss in productiveness. It is advisable, however, in farming this soil to include the legumes, such as alfalfa and cowpeas, in rotations, in order to maintain a good supply of organic matter.

MILLER SILT LOAM.

The surface soil of the Miller silt loam is a brown to dull reddish brown, mellow silt loam. This is underlain at about 6 to 15 inches either by brown to dark reddish brown, rather tough clay like the subsoil of the Miller clay, or less frequently by silt loam of about the same color. The type as mapped includes narrow strips of Miller silty clay loam, where the silt loam type grades into the Miller clay.

In places, especially near the banks of streams, pockets or strata of very fine sandy loam are encountered in the subsoil, such areas approaching the characteristics of the Yahola silt loam. Some typical Yahola silt loam, not extensive enough to be separately mapped, is included with the Miller silt loam, the largest area occurring south of Carden Bottom. The surface soil here is practically identical with that of the typical Miller silt loam, but very fine sandy loam of a light brownish red or salmon color is encountered at about 18 to 24 inches below the surface.

The Miller silt loam occurs in the Arkansas River bottoms. It is frequently developed between areas of the lower lying Miller clay on one side and the somewhat higher lying Miller very fine sandy loam on the other. The topography is level to gently rolling. A large proportion of the type lies above ordinary overflow, but it is subject to flooding at high stages of the river. The natural drainage is good.

The Miller silt loam is not an extensive type, but it is locally important, and nearly all of it is cultivated. Cotton is the principal

crop. Some corn is produced. There is no considerable development of the live-stock industries on farms on this type.

Cotton yields from one-half to 1 bale per acre and corn 40 to 50 bushels. Rather light teams and implements, such as are generally in use, are sufficient for satisfactory cultivation. The plowing done is usually deep enough. Corn is planted in rows 3½ feet apart, but on account of the greater productiveness of the land the stalks are placed considerably closer in the row than in fields on the upland soils. A fair value for land of this type would be $75 to $100 an acre.

In consideration of the excellent adaptation of this soil to alfalfa, as demonstrated in areas along the Arkansas and other rivers, elsewhere, it would seem that this legume could well be given an important place in the agriculture. Hogs could be raised to good advantage in conjunction with alfalfa production and the growing of such crops as cowpeas and sorghum.

MILLER CLAY.

The Miller clay consists of a brown to dull reddish brown clay, which quickly passes into rather tough, heavy clay, varying from brown to dark reddish brown in color. The surface material on drying assumes a reddish shade and the soil crumbles to a favorable structure. In the vicinity of Carden Bottom there are included some areas, too small to map, of the Yahola clay, a type having a sandy subsoil.

The Miller clay is confined to the Arkansas River bottoms. It usually occurs farther from the river than the lighter soils, but in places, as in the area east of Neelly, it lies close to the banks of the stream. Some of the land is subject to direct overflow from the river, and a large proportion of it is inundated during floods by water backing up the many sloughs, bayous, and depressions. The soil is well drained where there are sufficient outlets to allow the water to run off, and in the higher, level areas. In places the type occurs in slightly depressed situations, as near Lake View School and 2½ miles southeast of Fowler, and drainage here is naturally imperfect.

The Miller clay is a type of considerable importance, from the standpoint of extent as well as of agricultural value. Probably 60 to 75 per cent of it is under cultivation. The principal crops are cotton and alfalfa. The type apparently is not well suited to the production of corn. The yield of cotton ordinarily ranges from two-thirds to three-fourths bale per acre. On an average five cuttings of alfalfa are made in a season, with a total yield of 5 or 6 tons of hay to the acre. The first cutting is made about the second week in May. Alfalfa hay is usually baled and stored in sheds in the field.

The Miller clay is known locally as "red gumbo land." When wet, the soil becomes very sticky and plastic, and in this condition

it adheres to the moldboard of the plow as well as to other tools. Plowing under such conditions tends to form undesirable clods. If the soil is allowed to become too dry before being plowed, hard clods also are formed. Over part of the type, however, the soil breaks down into a mass of fine aggregates about the size of buckshot. Plowing can be done to best advantage when the soil is moderately moist, and when care is taken to break the soil in this condition subsequent tillage operations are rendered much less difficult. In periods of dry weather the surface cracks badly, allowing the soil to dry out rapidly.

Little of the Miller clay changes hands, but several sales at $100 an acre have been recorded. The greater part of the type is operated by tenants. The land is usually leased to the highest bidder, the annual cash rental ranging from $7 to $10 an acre.

With the more extensive growing of alfalfa and other forage crops there seems to be no reason why hog raising would not be profitable on this land.

OSAGE CLAY.

The typical Osage clay consists of a black clay underlain at about 6 to 18 inches by bluish-drab or bluish-black, plastic clay, frequently somewhat mottled with rusty brown. Where the drainage is very poor, gray mottling is noticeable in the subsoil. The type is locally known as "black gumbo."

The Osage clay is encountered mainly in a large area between Petit Jean Creek and the Arkansas River southeast of Neelly. There is another area on Smiley Bayou and others on Petit Jean Creek at and east of Pontoon.

The surface is almost level, being broken only by minor drainage channels and depressions. Much of the land is subject to prolonged overflows, caused by backwater when the Arkansas River is at flood stage. Drainage conditions over a large proportion of the type are poor.

This type is fairly important in the agriculture of the county. It comprises altogether 6.2 square miles, of which about 50 per cent is farmed. The remainder is forested with pin oak, hickory, sweet gum, and elm. Cotton, almost the only crop grown, yields from one-half bale to one bale per acre. A good field of sorghum was seen on this soil in the course of the survey.

The Osage clay is a highly productive soil, but its physical characteristics make it difficult to handle. When dry it becomes hard and is difficult to break, and when wet it is extremely sticky.

The present selling price of land of the Osage clay ranges from about $30 to $55 an acre, depending upon the thoroughness of drainage and the improvements.

Artificial drainage is badly needed over a large area of this type. Only a small number of open ditches have been constructed and the number should be greatly increased.

An attempt was made several years ago to grow rice on this soil and a good yield was obtained, according to reports, although proper measures for the maintenance of irrigation water were not taken. It is probable that rice could be grown profitably if proper methods of flooding were employed.

RIVERWASH.

Riverwash includes areas only slightly elevated above the normal water level of the Arkansas River. The soil is variable and includes areas of sand, silt, and clay. Many sloughs and wet tracks have been included in this type.

Riverwash is fairly extensive east of Carden Bottom and 4 miles southeast of Dardanelle. A smaller area occurs northwest of Fowler, The higher land furnishes fairly good pasturage, and in its present state most of the type has no other value. Cottonwood and willow constitute the principal tree growth.

ROUGH STONY LAND.

Rough stony land includes slopes which are too steep and too stony for cultivation. Land of this kind is confined to the mountain slopes and valley walls.

There is a large total extent of Rough stony land distributed in areas of various size throughout Yell County. Large representative developments are encountered in the vicinity of Mount Nebo, Petit Jean Mountain, and Danville Mountain, and in the southern part of the county.

Rough stony land is valued almost solely for forestry and pasture. The greater part of the land is forested with post oak, blackjack oak, red oak, and shortleaf pine, with a scattered growth of hickory.

SUMMARY.

Yell County, having an area of 943 square miles, or 603,520 acres, is situated in west-central Arkansas, within the limits of the Ouachita Mountains. A large proportion of the county includes mountains rising to a maximum elevation above sea level of about 2,600 feet. Relatively broad, level to gently rolling, intervening valley areas constitute the principal farming land. Each valley has a principal stream which receives the drainage from swiftly flowing tributaries that have their sources in the adjacent mountains. The Arkansas River, Fourche la Fave River, and Petit Jean Creek are bordered with broad strips of level alluvial land.

The first important settlements in Yell County were made at Chickalah, at Danville, and at Dardanelle, between the late thirties and 1850. The settlers have come principally from other Southern States, and practically all the population is native. There are two county seats: Dardanelle, with a population of 1,757, and Danville, with a population of about 803. The census of 1910 reports the population of the county as 26,323.

The mean annual temperature, as recorded at the Weather Bureau station at Mount Nebo, representing the mountain division, is 58.4° F., and the mean annual rainfall is 46.35 inches. The means in the river bottom division are 60.7° and 46.4 inches. The growing season covers a period of over seven months.

Cotton is the chief income crop, corn, next in acreage, being grown as a subsistence crop or as feed for hogs and cattle. The raising of live stock is increasing in importance, and conditions favor the development of the animal industries. Dairying has received little attention.

Cowpeas, redtop, sorghum, oats, alfalfa, and native grasses constitute the principal hay and forage crops. Minor crops and products are wheat, sorghum sirup, peanuts, sweet potatoes, Irish potatoes, cowpea seed, poultry, eggs, and honey. Good opportunities exist for the production of strawberries and peaches on a commercial scale.

The use of commercial fertilizers is not general and is confined to the cotton crop. Systematic rotations are not practiced, and little effort is made to maintain the supply of organic matter in the soil.

About 46 per cent of the farms are operated by owners. Farm labor is usually available at wages of about $1 a day or $15 to $20 a month and board. The barns and houses are generally small and the farm improvements in general are not very substantial.

The upland soils are residual from sandstone and shale. The alluvial soils consist largely of material derived from the local uplands, although the soils of the Arkansas River bottoms are composed largely of residual prairie material. Including Riverwash and Rough stony land, 23 soil types are mapped in Yell County.

The upland soils are included in the Hanceville and Conway series. Some of the Hanceville stony loam is adapted to the production of fruit, but the steeper areas and those more remote from shipping points offer better opportunities for stock raising than for any other use. The Hanceville fine sandy loam and very fine sandy loam are fairly strong soils for cotton and corn, and produce fruit of good quality. They are deficient in organic matter. The Hanceville loam is extensively cultivated. Deeper plowing and the more general growing of legumes are necessary for best results on this type.

The Conway silt loam is an extensive upland soil type occurring throughout the valley areas. The surface is level to gently rolling and the type is, in general, poorly drained. Liming and artificial drainage should make the soil more productive.

The terrace or second-bottom soils include the Waynesboro, Bastrop, Reinach, Brewer, Teller, and Muskogee series. The Waynesboro series is developed along the smaller streams of the county, draining the local uplands, while the remaining terrace series named are developed in the Arkansas River valley.

The Waynesboro loam is a relatively inextensive soil of moderate productiveness. Cotton and corn are the chief crops. Corn yields from 15 to 30 bushels and cotton from one-third to one-half bale per acre. Drainage is deficient in places.

The Bastrop very fine sandy loam resembles the Miller very fine sandy loam. It is a well-drained, productive type, of small extent. The Reinach very fine sand is mainly used for cotton and corn, but melons and cantaloupes of excellent quality can be grown on this soil. The Brewer silt loam and Brewer clay are low second-bottom soils, dark brown to black in color. The silt loam is a durable soil and is well drained. The clay in many places is poorly drained. Both types are good cotton soils. The Teller very fine sandy loam is a high-lying second-bottom soil. It has a brick-red subsoil. The Muskogee silt loam is a poorly drained terrace soil developed on the outer margin of the Arkansas River bottoms. Artificial drainage is necessary to fit land of this type for cultivation.

The alluvial first-bottom soils along the smaller streams are classed in the Pope and Atkins series. The Arkansas River first-bottom soils, where the source of the alluvium is largely residual prairie soils and Permian Red Beds material, are classed in the Miller and Osage series.

The Pope series includes the fine sandy loam, loam, and silt loam types. These are productive soils. The Atkins silty clay loam and clay are poorly drained soils subject to overflow. They are best suited in their present condition for use as hay and pasture land.

The predominating color of the Miller very fine sandy loam, silt loam, and clay is brownish red. These soils produce good yields of cotton, corn, and alfalfa. They are naturally calcareous. The Osage clay is an intractable soil, generally poorly drained. It is known locally as "black gumbo."

Riverwash includes areas in which the soil is a mixture of river-deposited sands and clays. The land is frequently overflowed and is of little agricultural value.

Rough stony land includes slopes of rough topography and stony nature, valuable only for the timber and pasturage afforded.

[PUBLIC RESOLUTION—No 9.]

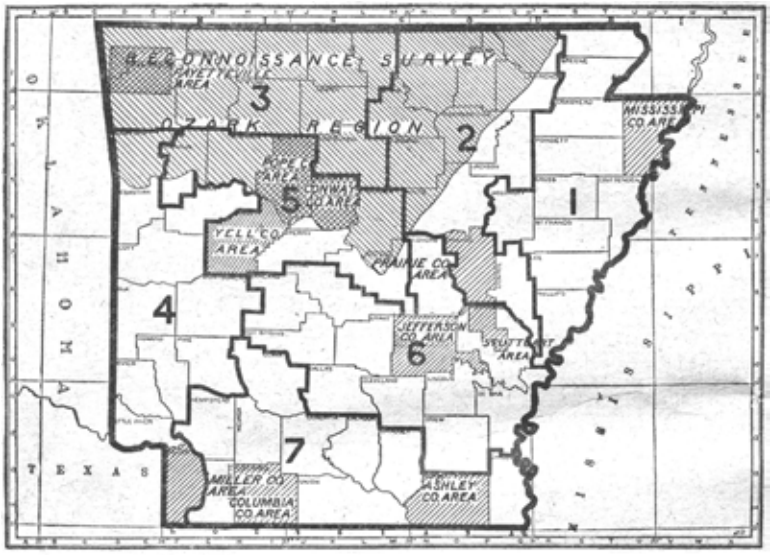
JOINT RESOLUTION Amending public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, "providing for the printing annually of the report on field operations of the Division of Soils, Department of Agriculture."

Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That public resolution numbered eight, Fifty-sixth Congress, second session, approved February twenty-third, nineteen hundred and one, be amended by striking out all after the resolving clause and inserting in lieu thereof the following:

That there shall be printed ten thousand five hundred copies of the report on field operations of the Division of Soils, Department of Agriculture, of which one thousand five hundred copies shall be for the use of the Senate, three thousand copies for the use of the House of Representatives, and six thousand copies for the use of the Department of Agriculture: *Provided*, That in addition to the number of copies above provided for there shall be printed, as soon as the manuscript can be prepared, with the necessary maps and illustrations to accompany it, a report on each area surveyed, in the form of advance sheets, bound in paper covers, of which five hundred copies shall be for the use of each Senator from the State, two thousand copies for the use of each Representative from the congressional district or districts in which the survey is made, and one thousand copies for the use of the Department of Agriculture.

Approved March 14, 1904.

[On July 1, 1901, the Division of Soils was reorganized as the Bureau of Soils.]



Areas surveyed in Arkansas.

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