

Issued September 22, 1913.

U. S. DEPARTMENT OF AGRICULTURE,

BUREAU OF SOILS—MILTON WHITNEY, Chief.

IN COOPERATION WITH THE STATE OF MISSISSIPPI, E. F. NOEL, GOVERNOR;
E. N. LOWE, DIRECTOR, STATE GEOLOGICAL SURVEY.

SOIL SURVEY OF WINSTON COUNTY,
MISSISSIPPI.

BY

G. A. CRABB, OF THE U. S. DEPARTMENT OF AGRICULTURE, AND
G. B. HIGHTOWER, OF THE MISSISSIPPI
GEOLOGICAL SURVEY.

HUGH H. BENNETT, INSPECTOR IN CHARGE SOUTHERN DIVISION.

[Advance Sheets—Field Operations of the Bureau of Soils, 1912.]



WASHINGTON:
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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS,
Washington, D. C., April 1, 1913.

SIR: During the field season of 1912 a soil survey was made of Winston County, Mississippi. This work was done in cooperation with the State of Mississippi, and the selection of the area was made after conference with State officials.

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 1912, as provided by law.

Respectfully,

MILTON WHITNEY,
Chief of Bureau.

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

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MAP.

Soil map, Winston County sheet, Mississippi.

SOIL SURVEY OF WINSTON COUNTY, MISSISSIPPI.

By G. A. CRABB, of the U. S. Department of Agriculture, and G. B. HIGHTOWER, of the Mississippi Geological Survey.

DESCRIPTION OF THE AREA.

Winston County is located in the east-central part of the State of Mississippi. It is bounded on the north by Choctaw and Oktibbeha Counties, on the east by Noxubee, on the south by Kemper and Neshoba, and on the west by Attala and Choctaw Counties. Leake County touches the southwest corner of Winston. The county comprises 17 townships, varying somewhat from the standard unit of 36 square miles, and embraces an area of 597 square miles, or 382,080 acres.

At the time of the incorporation of Winston County (December 23, 1833) its shape was a parallelogram, but in 1875 three townships were taken from the northwest corner, leaving the present boundaries. In the widest part

from north to south the county has a dimension of about 24 miles, and the extreme length from east to west is about 30 miles.

Winston County lies wholly within the Gulf Coastal Plains soil province and embraces three general physiographic divisions, viz, (1) the highlands and hills, which consist of soil material deposited

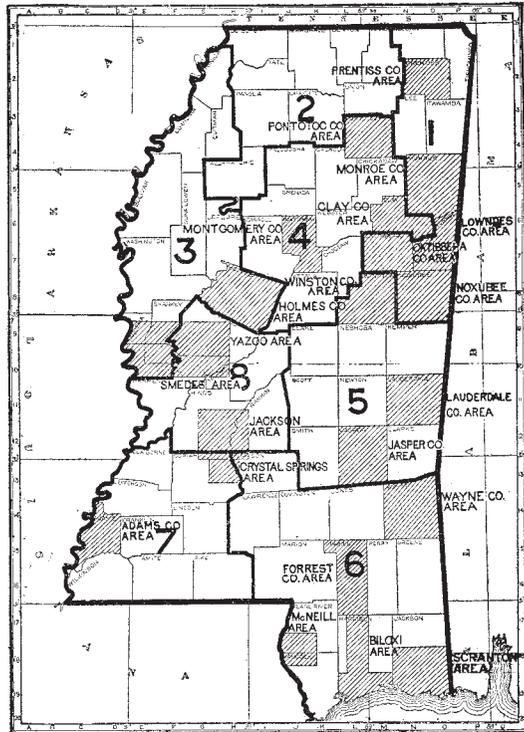


FIG. 1.—Sketch map showing location of areas surveyed in Mississippi.

in ancient seas and the rocks formed by the consolidation and cementation of these materials; (2) second bottoms or high alluvial terraces, deposited when the streams were flowing at higher levels than at present; and (3) the present alluvial first bottoms now subject to overflow.

The topography of the first or upland division has a varied character, ranging from the nearly level "flatwoods" areas to the rugged Noxubee Hills in the northern part of the county, the Ellison Ridge near Fearn Springs, and the Smallwoods Hills in the southwestern part of the county. The greater part of the uplands is rolling to ridgy and as a rule has good natural drainage. A peculiar feature of the topography of the northern and eastern parts of Winston County has also been noted in Oktibbeha County, many of the stream bottoms being bordered on the south by rather high, broken bluffs and rolling areas, while on the north the uplands are comparatively level and gradually merge into the stream bottoms. In some areas of gentle slope where the soils are heavy, artificial drainage would be very beneficial. On the steep slopes and hillsides it is necessary to practice contour cultivation, and it is often found advantageous to establish hillside ditches or terraces to prevent heavy rains from washing the fields and forming gullies.

Springs are fairly numerous in the hill portions of the county. The most noted are: Fearn Springs, situated about 14 miles southeast of Louisville; Webbs Springs, about 9 miles southwest; and Sulphur Springs, about 5 miles to the north. Numerous other small springs are found throughout the county, furnishing excellent drinking water. Good well water can usually be reached at depths ranging from 40 to 70 feet, although in sandy areas it is often necessary to go much deeper.

The topography of the "flatwoods" ranges from nearly level to gently rolling. Streams are not so numerous as in other sections of the county and consequently drainage is not so good. Well-defined second bottoms are not numerous. They are nearly level and merge gradually into the uplands. They are fairly well drained.

Nearly all the streams have areas of first bottoms, varying in width from more than a mile along the largest streams to strips along the smaller waterways so narrow that they can not be shown in their true proportion on a map of the scale used. All first-bottom areas are subject to overflow and during the winter and spring are in a semiswampy condition. The greater part of these lands is forested, especially along the larger streams, such as the Talla Haga, Nanne Warrior, and Lobutchy Creeks, and they are at present the chief support of the lumbering industry of the county.

The drainage of the northern and eastern parts of the county is through the Noxubee River and Hashuqua Creek and their tributa-

ries into the Tombigbee River to the east. The remainder of the county drains into the Pearl River through Nanne Warrior, Talla Haga, Noxapater, Pinishook, and Lobutchy Creeks and their tributaries. The watershed between these two systems is represented by the highlands to the south of the Noxubee Hills, near the middle of township 15, and eastward to the east-central part of range 13, thence southeast along the Ellison Ridge to the southeast corner of the county. With the exception of Noxubee River and Hashuqua Creek, nearly all the streams dry up occasionally.

The native vegetation of the uplands consists principally of short-leaf pine and numerous varieties of oak, with some cedar, walnut, persimmon, and other trees. Some of the most characteristic trees of the lowlands are holly, magnolia, beech, cucumber, cypress, elm, sweet and black gum, hickory, swamp maple, and sycamore. Mistletoe is a common parasite upon the branches of the oak, while the yellow jasmine, wild grape, "bamboo" or smilax, and wild cane are found along the banks of the streams.

Winston County was established December 23, 1833, from the territory acquired by the treaty of Dancing Rabbit Creek in 1830. Prior to this the Choctaw Indians inhabited the county and cultivated certain lands in the southeastern part along Nanne Warrior Creek. Some of the lands near the old Indian mound which were in cultivation by the Indians at the advent of the whites have been in continual cultivation ever since. A few descendants of the old Choctaws are still to be found living in the county.

Shortly before and after the organization of the county there was a strong tide of immigration from the older parts of Mississippi and from the States of Georgia, Alabama, Tennessee, Virginia, North Carolina, and South Carolina. In the year 1837 the population of the county reached 4,650. According to the last census, it has since increased to 17,139, about equally divided between whites and negroes, the former being mostly descendants of the original settlers. The population has almost doubled since 1870.

Louisville, the county seat, was on the important mail route from Nashville to New Orleans and was the terminus of five mail routes in the earlier days. Incorporated in 1836, it now has a population of 1,181. Near here are the well-known chalybeate springs, locally known as Sulphur Springs, said to have valuable medicinal properties.

Louisville, Noxapater, and Highpoint are on the New Orleans, Mobile & Chicago Railroad; Plattsburg, Fearn Springs, and Betheden are smaller towns still reached by wagon roads.

Until recently the county has been without a railway within its borders. In 1904 the Mobile, Jackson & Kansas City Railroad was built, which in 1910 was changed to the New Orleans, Mobile & Chicago. This railroad runs directly from Mobile, Ala., to Middleton,

Tenn., offering shipping facilities to Meridian, Mobile, and New Orleans to the south, and to Memphis, St. Louis, and Chicago to the north. These points furnish markets for the output of lumber, cotton, and other agricultural products.

Lumbering is an important industry in this county, the largest mills being located at Louisville, Noxapater, and Hight. A number of smaller mills are scattered throughout the county.

The best school of the county is the Louisville Training School, which covers the work from the primary department through the eleventh grade. Other well-established schools are found at Betheden, Noxapater, Plattsburg, and Highpoint, with a number of rural district schools conveniently located in different parts of the county.

CLIMATE.

The climate of Winston County is typical of the regions of like latitude in the Gulf Coastal Plains. The winters are short and mild, but variable. The summers are long and hot. The average length of the growing season is 227 days, making the area especially suited to cotton and corn. The mean summer temperature is 79° F., with 104° as a maximum. The mean winter temperature is 46° , the minimum being -13° , recorded in February. Such low temperature is, however, a rare occurrence. Little or no snow falls. The annual precipitation averages 50.9 inches. The season of heaviest rainfall is winter, but the mean for March, 6.2 inches, is greater than for any other month. There is usually a drought in the fall, but as the crops are mostly matured at this time little damage is done. Slight droughts may occur in May to the detriment of the growing corn, but on the whole the rainfall is well distributed throughout the growing season, when it is most needed. If conservation of moisture by cultivation were better understood and practiced, the spring drought would not do so much damage. The lowlands are liable to injury by flooding during the heavy spring rains and replanting is often necessary on the bottoms.

The humidity makes the summer heat oppressive and the winter cold frequently penetrating. Most of the winter days are mild and pleasant. There is pasture for cattle practically throughout the year, and it is usually considered unnecessary to house stock. The fruit trees often bloom in March, and the crop is liable to damage by late frosts. The fruit in the valleys where the cold air settles is more likely to suffer than that on the hills.

The following table is compiled from the local Weather Bureau station, situated 2 miles east of Louisville:

Normal monthly, seasonal, and annual temperature and precipitation near Louisville.

Month.	Temperature.			Precipitation.			
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.	Snow, average depth.
	°F.	°F.	°F.	Inches.	Inches.	Inches.	Inches.
December.....	47	80	3	4.6	1.0	2.7	1.2
January.....	45	77	6	5.5	4.8	3.5	0.8
February.....	47	84	-13	5.8	2.0	6.2	1.7
Winter.....	46			15.9	7.8	12.4	3.7
March.....	55	84	15	6.2	4.6	6.0	0.8
April.....	63	92	25	4.2	3.5	13.4	T.
May.....	70	96	38	3.1	0.5	6.6	0.0
Spring.....	63			13.5	8.6	26.0	0.8
June.....	77	102	43	4.4	6.1	14.0	0.0
July.....	80	104	55	5.0	9.3	3.9	0.0
August.....	79	103	43	4.7	2.3	1.2	0.0
Summer.....	79			14.1	17.7	19.1	0.0
September.....	74	100	38	2.6	1.0	1.0	0.0
October.....	64	99	26	1.8	0.2	5.6	0.0
November.....	54	86	14	3.0	3.8	1.1	T.
Fall.....	64			7.4	5.0	7.7	T.
Year.....	63	104	-13	50.9	30.1	65.2	4.5

Average date of first killing frost in Autumn, Nov. 3; of last in spring, Mar. 21. Date of earliest killing frost in autumn, Oct. 16; of latest in spring, Apr. 10.

AGRICULTURE.

The earliest settlers of Winston County located on the sandy lands of Ellison Ridge and near Betheden. Later other uplands were settled and developed. The last lands to be developed were the bottom lands along the streams. At the present writing (1912) numerous tracts of these lowlands are still undeveloped.

The products grown by the pioneers were designed to furnish food and clothing for home use, with a small surplus for market. They included corn, wheat, rice, sweet potatoes, peas, beans, and oats for food, cotton and wool for clothing, and hides for leather. One of the first mills in the county, located on the present site of Andersons Mill, near Fearn Springs, was operated by water power. It was used for grinding meal and flour.

The Thirteenth Census showed a valuation of land and buildings in the county of \$3,937,028. The land alone was valued at \$2,191,000, buildings at \$857,818, implements and machinery at \$189,625, and domestic animals at \$698,585. The average value per acre of farm holdings was given as \$7.90 and the average value per farm, including land and buildings, as \$1,013. The land in farms comprised 277,220 acres, or 72.6 per cent of the total area of the county, of which 116,143 acres was reported as improved. Of the land in farms the improved land represented 41.9 per cent. The average size of the farms was given as 92.1 acres,¹ of which 38.6 acres were improved.

The value of farms and buildings in 1850 was \$436,626, at which time about 30 per cent of the entire farm land was classed as improved. In 1860 the value was \$1,505,740; in 1870 it was \$351,897; in 1880, \$681,655; in 1890, \$750,090; and in 1900, \$1,152,790.

Cotton, corn, oats, sweet and Irish potatoes, sugar cane, and sorghum in the order named have been the important crops of the county since the time of its settlement. In 1860 the production of cotton was 9,690 bales of 400 pounds each. During the depression following the Civil War the yield dropped to 1,964 bales, according to the census of 1870, since then it has gradually increased, until in 1900 amounted to 11,889 bales. The Thirteenth Census showed a decrease to 8,621 bales. The acreage giving this production was 31,520 acres.

Corn has always been a leading crop in this county. As early as 1850 the production was 326,408 bushels. In 1860 it had reached 361,005 bushels; in 1870 there was a decrease to 151,238 bushels. It was 217,786 bushels in 1880; 320,905 bushels in 1890; 471,000 bushels in 1900; and 271,716 bushels from an acreage of 28,179 acres in 1910.

The production of oats has increased from 5,712 bushels in 1860 to 30,153 in 1910.

Sweet potatoes have always been grown for home use. According to the census figures the production was 26,103 bushels in 1890; 31,534 bushels in 1900, and 52,420 bushels in 1910. Irish potatoes have never been so important a crop in this county as sweet potatoes. The production in 1890 was 1,417 bushels, with 4,250 bushels in 1900 and 2,373 bushels in 1910.

Sugar cane is a crop of some importance, but is grown chiefly for home consumption. The output of sirup has shown an increase in recent years, the latest figures being 24,565 gallons for 1900. Sorghum has also received considerable attention since 1880. There were 14,958 gallons of sirup produced from this crop in 1890 and 25,682 gallons in 1900.

¹ This views each tenancy as a farm.

Wheat was formerly grown extensively, though in late years the production has declined to almost nothing. In 1860 the crop amounted to 16,688 bushels and by 1900 it had shrunk to the insignificant figure of 420 bushels.

Rice was also an important crop at one time, there being 4,937 bushels reported in the census for 1870. At present none is grown. Tobacco was never an important crop. The largest production reported by the census was 5,323 pounds in 1880. At present only a very small quantity is grown for home use.

It will be seen from the foregoing that there have been three distinct periods in the development of this county. In the antebellum period the county was most prosperous in 1860. Then followed a decided decline in land values and crops produced until 1880 as a result of the Civil War and the period of reconstruction. Since 1880 the agricultural development has been steady. A considerable impetus was given this and other lines of activity by the advent of the railroad in 1904. Prior to this time the main shipping points were Ackerman, 16 miles distant from Louisville on the Illinois Central; Starkville, Sturges, Brookville, Macon, Shuqualak, and Kosciusko. Cotton was the crop which most readily met the needs of the farmers and has always been the main money crop. Such a system of one-crop farming, aside from its natural effect on the soil, has been largely instrumental in retarding the complete economic development of the county.

The average yield of cotton is approximately two-fifths of a bale per acre, corn about 15 bushels, oats less than 7 bushels, sweet potatoes about 90 bushels, Irish potatoes 75 bushels, and sugar-cane sirup 110 gallons per acre. These yields under the best management are susceptible of being largely increased.

Little or no attempt has been made up to the present time to establish any system of diversified farming or a systematic rotation of crops. Cotton has always been the main money crop, and has been planted many years in succession on the same land with a consequent deterioration of the soil. Continued culture of a single crop shallow plowing, and clean cultivation without production of vegetable matter has robbed the soil of its organic matter and so changed its physical structure as to lower its productiveness to a point which would make farming hardly profitable under conditions where agricultural operations were confined to a limited acreage. As land is plentiful, when the soil becomes unproductive it has been the custom in many instances to allow the land to "lie out" for a period of years before attempting to cultivate it again.

That cotton is well adapted to the soils of this county is proved by the number of years it has been grown. Its popularity is due to the

admirable adaptation of the soils to this crop, to the fact that it furnishes ready money to the planter when ginned, and to the familiarity of the residents of the county with its cultivation. Its production should be continued, but under different methods. Instead of being grown as the only money crop, it should be one of many. A diversification of crops along well-directed lines would not only result in larger yields but would safeguard the planter against loss likely to occur as the result of the low price of cotton or the failure of that crop.

Too much of the money received for cotton is expended for supplies obtained outside of the county, such as meats, lard, meal, flour, horses, mules, and feedstuffs, much of which could be produced at home.

Farmers are giving more attention to the rotation of crops and a more diversified farming than formerly. Some pure-bred live stock is to be found. Most farmers appreciate the benefit derived from deeper plowing, better tillage, and the beneficial effects of growing leguminous crops, such as cowpeas and velvet beans. However, there is much room for improvement in this direction throughout the entire country.

The most fertile soils for the growing of cotton are types of the Bibb and Ocklocknee series, found in the first bottoms. They produce the largest crops in dry years. Because of their natural fertility they require very little commercial fertilizer. The average returns from these soils are, however, lessened considerably by overflows and wet seasons.

The upland sandy loams and fine sandy loams give the best average results, as they are less susceptible to extremes of wet or dry seasons. They require fertilizing to produce the best crops, but respond readily to good cultivation. These lands should be kept well supplied with organic matter, either in the form of stable manure or leguminous cover crops plowed under. Soils so treated give much better results in dry seasons than where commercial fertilizers alone are used, as the organic matter retains moisture.

The clay, clay loam, and silt loam of the uplands produce fair crops of cotton, but are not so early as the warmer sandy lands. They are more poorly drained than the lighter soils and show the effect of wet and dry seasons more strongly. They require more careful cultivation than the sandier lands because of their tendency to puddle and bake unless worked under proper moisture conditions.

The usual method where cotton follows cotton, as it very often does, is to plant it on beds 3 to 4½ feet apart, formed usually by running a center furrow down the old middles and then bedding over this by turning one or two furrows with a light turning plow. The land is then ready for the fertilizer and planting, which is done by

drills and planters. Most of the seed is drilled. Usually no cultivation is performed until the cotton is thinned, but if it becomes grassy before the cotton is large enough to "chop" the rows are "barred off" and left until thinned. This leaves a narrower strip to hoe. Thinning or "chopping" is followed by cultivating, first with a sweep, close up to the plants, and subsequently with sweeps or small-toothed cultivators. The crop is laid by in July before any of the bolls have matured.

A better plan of soil preparation would be to break the land thoroughly with a good, deep-running turning plow to a depth of 6 to 10 inches, harrow to good tilth, and plant more nearly on a level surface. This makes it easier to cultivate and keep down weeds and lessens the loss of moisture by evaporation. By this method also the soil is loosened to a greater depth, the roots are given a greater feeding range, tilth is improved, and conditions are made more favorable for the forming of a loose surface layer of soil to conserve moisture.

On the bottom lands where drainage is poor, ridge planting is advisable in order to prevent injury to the crop by excess of moisture. On some of the steeper slopes plowing, planting, and cultivating should follow contours. Under all circumstances the cultivation should be thorough and efficient. The greater part of the lands of Winston County will permit of the use of two-horse cultivators, which will do as efficient work as the one-horse plows and save much time and labor.

With the advent of the boll weevil the object of the farmer should be to procure a crop as early as possible. To do this the land should be prepared early and a fine seed bed established. Planting should be completed as early as the weather will permit, only the earliest varieties planted, and the crop hastened to maturity as quickly as possible after planting. Cultivation should be as frequent as the conditions demand and the soil should be kept in a loose, friable condition. Another thing to be emphasized is that farms should be kept clean, cotton stalks cut up and burned, brier patches and thickets grubbed out, and everything possible destroyed that furnishes shelter for the weevil through the winter. Cotton rows should be placed farther apart and the sunshine permitted to reach the surface of the middles. If the field is infested, it will often be found advisable to gather up and burn the first squares that fall. In planting, such fertilizers should be applied to the soil as will hasten the maturity of the crop.

The army worm, which did considerable damage to cotton in 1911, is somewhat difficult to control. It has been combated successfully by applying poison to the crop. Paris green and lead arsenate have been used. The poison can be dusted on or used as a spray. Power sprays can be had that will spray two or more rows at a time.

In planting cotton the seed should be carefully selected, and, if not home grown, obtained from trustworthy dealers. If possible, seed grown on soils similar to those on which it is to be planted should be used. Late-maturing varieties like the King do better on the heavier soils than on the sandy soils. Some varieties which do well in certain upland soils grow largely to weed in the bottom lands.

Fertilizers are not extensively used in the county. The applications usually vary from 150 to 300 pounds per acre. A few farmers use heavier applications, depending upon the character of the land cultivated. Cottonseed meal and acid phosphate are the most commonly used fertilizers, though ready-mixed brands, ordinarily of formulas approximating 10-2-2, are applied. Farmers should give more attention to the fertilizer needs of the soils and use only those mixtures which will give best results on the different types of soil on which the cotton is grown. One acre of land, fertilized with a mixture of 400 pounds of acid phosphate and 400 pounds of cottonseed meal, and given good cultivation, produced 2,600 pounds of seed cotton. Another field, fertilized with 200 pounds of phosphate, gave a yield of 1 bale per acre.¹

The importance of corn warrants a much larger acreage on the average farm than is grown at present. The average yield is low, about 15 bushels per acre, and could easily be more than doubled by careful fertilization, seed selection, better preparation of the land, and more careful cultivation.

Corn is planted in various ways. The rows are variously placed from 3½ to 5 feet apart. In the bottoms the seed is usually planted on ridges to lessen the evil effects of wet weather and possible overflows. This is advisable on lands composed of the Bibb and Ocklocknee soils. The ridge system is less satisfactory on the upland soils, for the reason that ridging increases the extent of surface exposed and the loss of moisture through evaporation. The heavier upland soils, such as the clays and silts, should be thoroughly broken with a good turning plow to a depth of 6 to 10 inches and then harrowed to produce a fine seed bed, and the after tillage should be frequent enough to maintain a loose soil mulch on the surface. Deep tillage should not be practiced after the first cultivation, in order that the feeder roots, which develop near the surface, may be disturbed as little as possible. On the sandy and fine sandy loams of the uplands the practice of planting in the water furrow is recommended.

Fertilizers are decidedly profitable in the growing of corn, but are not much used at the present time. An application of 300 to 500 pounds per acre of cottonseed meal and acid phosphate in the proportion of 2 to 1 will give good results on the upland soils. The effects

¹ The following is a list of reliable bulletins that will be found helpful in cotton growing: Farmers' Bulletins Nos. 302, 333, and 344; Miss. Agr. Exp. Sta. Buls. Nos. 99, 113, 116, 117, 120, 135, 139, and 140.

of fertilization will be less noticeable on the bottom soils. Some of the upland types, such as the Orangeburg fine sandy loam, will not require as much fertilizer as others, nor should soils rich in organic matter receive as heavy applications as those that are "thin" and impoverished.

Where corn is given careful attention good yields are obtained. When grown under the supervision of the county demonstrator from the United States Department of Agriculture there has been a marked increase in yield over the average. A field of 4 acres, well cultivated and fertilized with 100 pounds of acid phosphate per acre, gave an average yield of 35 bushels per acre. One fertilized with 200 pounds of acid phosphate yielded 60 bushels, and another fertilized in the same manner produced 50 bushels per acre. The highest yield, 82 bushels per acre, was obtained with the use of 400 pounds of cottonseed meal and 200 pounds of acid phosphate per acre. The above results show what marked increases in yields can be produced by proper methods of cultivation.

The question of seed selection is very important to the farmer, and should receive more attention. It is not difficult to improve the quality of this plant, and this can be done on each individual farm at little expense.¹

Oats are by far the most important of the grain crops. At the present time very little of this grain is thrashed, the greater part being used as hay. Large shipments are brought into the county annually.

Winter oats should be sown in November or early December on land well broken and harrowed. They may either be broadcasted and harrowed into the soil or sown with a grain drill. Spring oats seldom make sufficient growth to warrant harvesting. Fertilizers composed of cottonseed meal and acid phosphate in the ratio of 2 to 1 and applied in quantities ranging from 200 to 400 pounds per acre will give marked results in the growth of straw and the yield of grain. Nitrate of soda, if applied in the spring at the rate of 50 to 100 pounds per acre, will also aid in the growth. In addition to their value as a grain crop, winter oats furnish excellent pasture and make a good cover crop. This crop fits in well in crop rotations and is desirable from many points of view.²

Wheat formerly received some attention in the county, but of late it has been grown only on a very small scale and by only a few farmers. No doubt with care it could be produced profitably. Rye should be grown for winter pasture and as a cover crop to prevent the washing of soils during the period of heavy rains. It also adds

¹ The following list of bulletins will be found of value to those interested in the growing of corn: Farmers' Bulletins Nos. 281, 298, 303, 313, 400, and 414; Miss. Agr. Expt. Sta. Bul. No. 103.

² See Farmers' Bulletins Nos. 424 and 436.

much to the organic content of the soils when turned under in the spring. It yields best on the heavier types of soil.

Many of the legume crops can be grown in this county for forage and at the same time be used for improving the soils. The climatic and soil conditions make for heavy yields of forage crops and pasture grasses.

Cowpeas are grown extensively in the county both for feed and to be plowed under. They are planted in rows between corn and cultivated with the latter crop. After the corn is gathered stock is turned in and the field grazed off. Cowpeas are also sown broadcast and the vines cut for hay. Not only does this crop furnish good feed for stock, but it adds nitrogen to the soil during its growth and when the vines are plowed under furnishes an abundant supply of organic matter. The velvet bean is another legume which, though grown only to a small extent, is a very valuable forage plant and soil renovator. It can be planted either in drills or broadcasted and forms an excellent cover crop. Hairy vetch as a winter-growing legume also will be found valuable in building up worn-out lands. This crop furnishes a heavy yield of forage. It is planted in the late summer or early fall. The soy bean could be grown profitably. It fits into crop rotations, is an excellent soil builder, and furnishes good forage.¹

Lespedeza grows readily and is valuable to build up impoverished lands. It grows well on fertile soil, but on poor land the growth is stunted. It should be seeded in early spring, one-half bushel of seed per acre being ample. This plant makes slow growth in spring and early summer. The hay produced is very nutritious and is readily eaten by stock.

Alfalfa has been tried only in small areas, where it has given fair results. No doubt, with careful cultivation this crop could be grown profitably. Land to be used for alfalfa should be fertile and well drained. The alfalfa should be preceded by a crop of cowpeas, plowed under from 8 to 10 inches deep. Subsoiling would also aid in preparing a fine, deep seed bed. From 2 to 4 tons of burnt lime or twice this quantity of ground limestone per acre would insure better success; and if possible the soil should be inoculated² with soil from fields that have grown alfalfa.

Bermuda grass furnishes one of the best pastures for the uplands and could be utilized for hay. It does not seed here, so that planting is done by setting out roots or buying seed from other localities. When propagated by roots it spreads rapidly and soon forms a good sod. Besides furnishing pasture and forage, it is one of the best soil

¹ See Farmers' Bulletin No. 372.

² See Farmers' Bulletins No. 312, 318, 339, and 372.

binders that can be grown. Many of the steep slopes should be planted to Bermuda and used for pasture.¹

Johnson grass will grow and produce fair crops of hay, but is difficult to kill out if it is desired to cultivate the fields where it is seeded.

Carpet grass (*Paspalum compressum*) furnishes an excellent pasture grass on the bottom lands. It forms a dense sod and serves well as a permanent pasture.

Crab grass, which springs up quickly in cultivated fields, is considered by some a pest, but really is a very valuable forage crop. It will grow quickly after cultivation in a corn field has ceased and furnishes excellent pasture. To clear a field of this grass sow to a thick crop that will cover the soil, such as oats and peas.

Water grass and other wild grasses furnish good pasture in moist places.

Peanuts should be grown much more extensively. They are well adapted to most of the upland sandy and fine sandy loams and to some of the silt loams. This crop can be grown alone or between rows of corn. It furnishes excellent pasture for hogs and adds flavor to the meat. However, the hogs should be finished on corn. The physical structure of the soil is improved by being loosened up by the hogs in rooting for the peanuts. Peanuts, being a leguminous crop, are also valuable to the soil in storing nitrogen during their growth. Aside from their value as a forage crop, peanuts find a ready sale in the markets. Fertilizers of high grade will be found beneficial to their growth, and lime will aid in the filling of pods.²

The abundance of soils suited for the growing of potatoes offers excellent opportunities for their production on a large scale.

While practically every farmer grows sufficient sweet potatoes for home use, very few are grown for market. All of the light-colored upland sandy and fine sandy loams are well suited to the production of this crop. These soils should be well supplied with organic matter, such as cowpeas or barnyard manure plowed under. High-grade commercial fertilizers will also increase the yield. In addition to furnishing an excellent market crop, sweet potatoes make an excellent feed for hogs. They could be shipped to Northern markets and should bring good prices.³

Irish potatoes, especially as an early crop, should prove very profitable. They are adapted to those soils that are suited to the growth of sweet potatoes. For late varieties the silt loams are more suitable. Yields ranging from 75 to 150 bushels per acre are obtained. Northern cities offer markets for the early crops

¹ See Farmers' Bulletin No. 102.

² See Farmers' Bulletin No. 324.

³ See Farmers' Bulletin No. 356.

at good prices, which should warrant more attention to this crop. Best results will be obtained by maintaining a good organic content in the soil. Cowpeas, manure, vetch, or rye plowed under and allowed to decay are the best means of supplying this constituent. Commercial fertilizers composed of cottonseed meal, acid phosphate, and potash in an 8-2-8 composition and applied at the rate of 200 to 500 pounds per acre will be found valuable.¹

Sugar cane is grown to some extent, but only for the production of table sirup for local use. There are quite extensive areas suitable for this crop. The Bibb and Ocklocknee soils of the first bottoms, the Kalmia and Cahaba of the second bottoms, and the low depressions of the uplands are the soils best adapted to the growing of this crop. Of the soils named, the first bottoms are usually preferred, for the reason that they yield a good crop without the use of fertilizers. In the low areas of the uplands some commercial fertilizers are used. Organic manures are seldom applied, for the reason that sugar cane fertilized in this manner produces an inferior grade of sirup, of darker color and poorer flavor. The sirup would find a ready market in the distant cities were it possible to produce a uniform grade. The fact that it is manufactured at home makes this a difficult matter.

Sorghum is cultivated for table sirup and as a forage crop. It is adapted to those soils that are suitable for sugar cane and also to the fine sandy loams of the uplands. Its cultivation is similar to that of corn. When grown for forage it is usually sown broadcast and then cut and cured like hay. It is also used for green feed for stock, but when so used care should be taken not to overfeed at first, as it sometimes produces colic.²

At present very little attention is given to the growing of fruit, though the soils and climatic conditions make the area well adapted to orcharding, both for home use and on a commercial scale.

Apples, especially the summer and fall maturing varieties, should be grown, while pears do very well, particularly on the clay loams and silt loams. Plums grow wild and the cultivated varieties should give an abundance of fruit. Peaches of fine flavor are grown, but are not extensively cultivated. The Orangeburg soils are particularly suited to the production of peaches and considerable areas could be devoted to this crop. The Elberta is a variety that would yield well. Grapes, once grown to some extent, proved very profitable. Small fruits, such as blackberries, dewberries, strawberries, and currants, could all be grown and should find a place on the farms, at least for home use. A few figs are grown, but this fruit is too perishable to ship.

¹ See Farmers' Bulletins Nos. 324 and 407.

² Further information may be had from Farmers' Bulletins Nos. 246 and 288.

It would no doubt be necessary to spray in order to obtain the best results in fruit growing, but each farmer could at least have plenty of fruit for his own needs.

Every farmer should have a garden to supply vegetables for the home, and many could produce a surplus for local markets. With better shipping facilities trucking on a commercial scale could be made profitable in some sections of the county. The best soils for this purpose are the sand, sandy loam, fine sandy loam, and fine sand of the Orangeburg, Ruston, and Norfolk series. Almost all kinds of vegetables can be grown, such as asparagus, beans, beets, brussels sprouts, cabbage, cauliflower, cucumbers, carrots, lettuce, onions, okra, parsnips, peppers, garden peas, radishes, spinach, tomatoes, etc. All of these crops require that the soil be well supplied with organic matter. Applications of complete commercial fertilizers of high grade to these sandy soils will also be found advisable.

Another crop that grows extremely well is watermelons. It does best on the sandy loams and fine sandy loams. Many patches are planted every year, but very few melons are shipped. The most common varieties are the Georgia Rattlesnake, Kolb Gem, and Watson. Watermelons could be made a good commercial crop, as the soils and climate are very desirable and the melons easily shipped. The soil should be manured with well-rotted stable manure and plowed under to a good depth. The rows are usually 10 feet apart and a similar distance allowed between each plant. Cultivation should be sufficient to keep down weeds and maintain a good mulch.

Pecans are indigenous to the Gulf Coastal States and grow wild in this county. Part of the commercial supply comes from wild trees, but the pecan is being improved and is worthy of a place beside our profitable fruits. It is best to use budded stock in planting, which can be secured from reliable southern nurseries. Trees may produce a few nuts at 6 or 8 years of age, but large returns can not be expected for a much longer period. Pecans bring good prices and find a ready market. They require little care and warrant much greater attention than they now receive.

Many farmers appreciate the value of rotation of crops. Some are beginning to practice it and a few have already developed a systematic rotation. The custom of planting cotton and corn continually has not allowed a diversity of crops or a satisfactory rotation. Some have established a partial system by planting cowpeas between the rows of corn and then plowing them under for the next crop, supplying organic matter in this way. Where cotton has been alternated with corn for many years the exhausted condition of the soil is very marked. The heavier soils have become thin and worn and readily eroded. When cultivated they compact and crust easily. The sandy soils are loose, incoherent, and unretentive of moisture. This

is partly the result of the decrease in the content of organic matter, which, when present, gives a more porous structure to the heavier soils and acts as a binder to the loose sands. The general result is inability of soils to maintain a proper moisture content, difficulty in maintaining proper tilth, and a decrease in productiveness. One purpose of crop rotation is to maintain the organic content of the soil by growing crops that can be turned under. These crops should include cowpeas, soy beans, velvet beans, and vetch, which have the advantage of being legumes and add to the soil nitrogen gathered from the air. With the prevailing favorable climatic conditions growing crops may be kept on the ground throughout nearly the whole year and this greatly increases the power to improve the soil through rotation.

Various effective crop rotations can be established, of which the following may be mentioned: Corn, with cowpeas planted between the rows, followed by winter oats, with cowpeas after the oats are harvested, followed by rye as a winter cover crop and pasture, followed by cotton; or cotton, followed by vetch as a cover crop, then corn with cowpeas between the rows, rye for winter, followed by cotton.

The one-horse plow is being rapidly displaced by the heavier, deeper-running two-horse turning plow. The change is important, as plowing should be deeper than has been usual in the past. All stalks, pea vines, or other trash should be thoroughly covered, except where it is necessary to burn cotton stalks on account of the presence of the weevil. On the heavy clays subsoiling may be advisable. This should be done in the fall when the subsoil is most likely to be in a favorable condition. Sandy soils do not require such deep plowing, as they are usually loose. Subsequent cultivation should be more thorough than at present and performed by weeders, harrows, and light-running cultivators. Two-horse cultivators will be found advantageous in many instances. Shallow, level cultivation should be used more frequently, especially with corn, the main object being to produce a good, loose surface mulch for the purpose of conserving moisture and destroying weeds.

All of the bottom lands of the county are in need of drainage, which at present can best be accomplished by open ditches. Later the fields may be more completely drained by tile drains. Many of the uplands, while capable of producing crops in their present condition, would give much better returns if drained. This could be done most efficiently by the use of tile. As the county becomes more thickly settled and land becomes more valuable more attention will of necessity be given to this feature of good cultivation.¹

¹ See Farmers' Bulletins Nos. 266 and 326.

The census of 1910 showed an expenditure of \$45,391 for commercial fertilizers. Most of the mixtures have a formula approximating 10-2-2. The use of nitrogen in complete fertilizer mixtures could be materially reduced by growing the legumes. If more live stock were kept the manure could be used to advantage, thereby reducing the amount of commercial fertilizers necessary. In practically every case where barnyard or stable manure is applied to soil on which corn or cotton is grown the results are better than when commercial fertilizer only is used. Stable manure with acid phosphate has proved a good combination. The main use of fertilizers is in connection with cotton, little or none being applied to other crops. The quantity used ranges from 150 to 300 pounds per acre. In recent years corn has received applications of 100 to 200 pounds per acre. Such applications of the grade used are not so profitable as if larger quantities were applied or a higher grade were used. Few, if any, of the farmers mix their own fertilizers.

The various constituents of mixed fertilizers, such as cottonseed meal, nitrate of soda, acid phosphate, potash, etc., can be obtained and mixed at home in the quantities desired, or can be applied separately. No specific directions can be given for the use of fertilizers,¹ though, broadly speaking, the uplands respond best to nitrogen and phosphoric acid, while the bottoms are likely to be benefited by the use of acid phosphate to aid in maturing the crop.

Winston County affords a great field for the development of a stock-raising industry. Thousands of dollars annually are spent outside of the county for meats which could be produced profitably at home. Every farmer should raise enough hogs to supply meat for his family throughout the year. There are some pure-bred hogs in the county and they are rapidly displacing the old "scrub" stock. Berkshires, Poland Chinas, Chester Whites, and Duroc-Jerseys are bred to some extent. This work should receive more attention, for the reason that the improved breeds can be matured more rapidly than the "scrubs" and will dress a much higher percentage of meat and lard. Local markets should furnish profitable outlets for a part of the supply, and distant markets can be reached at New Orleans, Natchez, Memphis, and St. Louis.

In the past the raising of stock has been discouraged by the prevalence of the Texas fever. The matter of tick eradication has now been taken up, however, and dipping vats are being constructed and a general movement initiated to place the county out of quarantine. With the eradication of this pest, the raising of dairy or beef cattle presents a promising outlook. The fact that green feed can be had practically throughout the year and that the mild climate obviates

¹ See Bulletin No. 99, Miss. Agr. Expt. Sta.; Farmers' Bulletins Nos. 192, 286, 398, and 422.

the necessity for much shelter for the cattle places the cost of production at a minimum. Some pure-bred Jersey herds are to be found; in fact, the most improvement seems to be in dairy cattle, and the Jersey is the favorite breed. Dairying could be made profitable either for shipping cream or butter, though the local markets do not offer much inducement.

It would pay farmers to raise their own horses and mules, instead of importing the supply from Texas, Missouri, and Tennessee. Large mares would breed larger horses and mules to draw the larger and heavier plows and machinery used on the farm and for hauling heavier loads on the roads.

Little attention has been given to sheep raising, owing largely, perhaps, to the abundance of dogs scattered throughout the county, there being no dog tax. Many of the steep slopes and hillsides would make fine sheep pastures. These, in conjunction with the growing of some winter cover crop, as rye or vetch, would furnish pasture throughout the year.

The opportunity for poultry raising is good, as at many times during the year eggs can not be obtained in the local markets.¹

Renting is mainly "on shares," under various agreements. Cash rents range from \$1 to \$5 an acre, according to the productiveness of the land and the nature of the improvements. In some cases a "standing" rent of one 500-pound bale of cotton for 20 acres is paid. Others rent "on the halves." In the latter case the landlord usually furnishes land, stock, implements, and half the fertilizer, taking one-half of the crop grown. Tenants owning tools and stock usually give the landlord one-third of the crop—if corn, in the crib; if cotton, in the bale.

Labor conditions are fair. The daily wage ranges from 45 to 75 cents. By the month farm hands receive from \$10 to \$15, with rations. Cotton pickers receive from 45 to 50 cents per hundred pounds for the first picking, and 60 to 70 cents for later pickings.

SOILS.

The soils of Winston County vary in texture from clay to sandy loam. The topography ranges from flat to gently rolling, and the drainage conditions from the water-logged lands of the overflowed bottoms to well-drained upland. By far the larger proportion of the county is occupied by soils of a silt loam texture, both in the bottom lands and uplands. Texturally, therefore, the soils are dominantly much better suited to the general farm crops than to fruit and vegetables, although there is a fairly large area of fine sandy loam and sandy

¹ Information on the proper management of live stock can be found in Farmers' Bulletins Nos. 258, 350, 351, 355, 378, and 411.

loam in the uplands which gives good results with vegetables and peaches.

The upland soils are derived mainly from Coastal Plain sediments, including heavy clay and sandy materials. Several types are believed to be derived from or influenced by loessial material—the Yellow Loam formation. The bottom lands comprise first bottoms subject to frequent overflow, and older, higher bottoms or terraces which are seldom, if ever, flooded. They are of alluvial origin and represent accumulations of material washed from the various upland soil areas and deposited by overflow waters.

The Susquehanna soils are characterized by their heavy clay texture, plastic structure, and the red or mottled red, yellow, and gray color of their subsoils. The series includes three types and one phase—the silt loam, with a deep phase, the clay loam and clay. Owing to the heavy clay subsoil, these are the most difficult soils of the county to plow. They are derived from heavy clays of marine origin.

The Pheba soils are characterized by the yellow color of their upper subsoils, the mottled yellow, gray, and red color of the subsoils, and their prevailing flat topography. These soils are believed to be derived from or influenced by wind-blown material, the loessial or Yellow Loam formation, related to the loessial deposits so extensive on the uplands found along the Mississippi River bottoms.

The Norfolk soils, particularly the silt loam, are believed to be influenced by loessial deposits. The Norfolk silt loam differs from the corresponding member of the Pheba series in having a subsoil of uniform yellow color and more friable structure. The surface is not so flat and drainage is somewhat better, for which reason weathering appears to have been more complete.

In some respects the Ruston soils are related to the Susquehanna, the chief difference being the more friable structure and less pronounced mottling of the Ruston subsoils. Weathering has advanced farther than in the case of the Susquehanna, but not so far as with the Orangeburg. The material consists of various sediments.

The Orangeburg soils are among the most completely weathered, the best drained, and the most friable soils of the county. They have a grayish soil, with friable, red subsoil.

The Lufkin series is represented by a single type, the clay. The most conspicuous feature of this type is its gray, plastic clay subsoil. It is undoubtedly closely related in origin to the Pheba clay, the differences being due to a less advanced stage of weathering in the Lufkin soils.

The Lauderdale and Guin are soils of little importance, both in extent and agricultural value. Their distinguishing characteristics are brought out under the respective type descriptions.

The alluvial soils are included in two divisions, (1) the first bottoms and (2) second bottoms or terraces. Of the former division, the Ocklocknee series embraces the brown first bottoms, while the Bibb includes the gray and white lands. The soil mapped under the name Meadow includes a variety of material, differing both as to color and texture. Much of the land included under this classification could not be satisfactorily shown on a map of the scale used (1 inch to the mile).

The second bottoms, or stream terraces, embrace two series, the Cahaba and Kalmia. The former are grayish soils, with yellow and mottled yellow and gray subsoils, while the latter are grayish or brownish soils, with reddish-brown or dull-red subsoils. The material was deposited over the former flood plains of streams which flowed at higher levels than at present. These soils now stand above normal overflow and are rarely subject to inundation.

The following table gives the names and extent of the various soils mapped in the county:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Susquehanna silt loam.....	66,560	23.9	Kalmia silt loam.....	7,040	1.8
Deep phase.....	24,640		Ruston sandy loam.....	2,880	.8
Ruston fine sandy loam.....	16,080	22.5	Meadow.....	2,560	.7
Susquehanna clay loam.....	53,120	13.9	Guin stony sandy loam.....	1,600	.4
Ocklocknee silt loam.....	28,160	7.4	Norfolk silt loam.....	1,280	.3
Ruston silt loam.....	23,040	6.0	Kalmia fine sandy loam.....	1,280	.3
Orangeburg fine sandy loam.....	18,240	5.1	Cahaba fine sandy loam.....	960	.3
Eroded heavy phase.....	1,280		Norfolk fine sandy loam.....	960	.3
Bibb silt loam.....	19,200	5.0	Pheba fine sandy loam.....	640	.2
Susquehanna clay.....	9,280	2.4	Ocklocknee fine sandy loam.....	640	.2
Lufkin clay.....	9,280	2.4	Lauderdale stony loam.....	320	.1
Ocklocknee clay.....	8,320	2.2			
Pheba silt loam.....	7,680	2.0	Total.....	382,080	
Pheba clay.....	7,040	1.8			

PHEBA FINE SANDY LOAM.

The Pheba fine sandy loam consists of a gray to grayish-brown, friable fine sandy loam, from 6 to 8 inches deep, underlain by a yellow fine sandy clay to silty clay, mottled with gray and shades of brown and in some instances with faint red. Clay is usually found in the substratum at depths varying from 3 to 8 feet.

The type is confined to the northeastern part of the county, in the "flatwoods" region, and has an undulating to flat topography and fair surface drainage, though the more level and lower-lying areas should be ditched to secure better drainage. The general farm crops of the region, consisting of cotton, corn, oats, and sorghum, are grown

with moderate yields. Deeper plowing is recommended, and leguminous crops should be more widely grown in systematic rotations. Fertilizers of cottonseed meal and acid phosphate would increase the yields. Land values vary from \$5 to \$10 an acre.

PHEBA SILT LOAM.

The Pheba silt loam is a gray to pale-yellow silt loam, 5 to 8 inches deep, underlain by a yellow silt loam mottled with gray and yellowish brown. Cultivation is easy over well-drained areas, and a good tilth can be readily maintained.

This type is found mainly in the eastern and northeastern parts of the county, in the "flatwoods" region. The topography is nearly flat to moderately rolling, and the surface drainage fairly good. The type overlies the clay of the Midway formation, and probably includes material from the Yellow Loam formation.

The native timber growth includes pines, oaks, and gums.

Only a small part of this soil type is under cultivation at present, owing, no doubt, to the scanty population occupying it. Where cleared and cultivated, cotton and corn are the principal crops. The yields secured with the prevailing methods are low, about one-fifth to one-fourth of a bale of cotton and from 10 to 15 bushels of corn per acre.

Owing to the fact that the low-lying areas are in need of drainage, some difficulty is experienced in cultivating this type. Where these conditions exist there is a tendency of the soil to run together and bake. Drainage by open ditches and adding lime to the soil would do much to remedy this, and the use of phosphatic fertilizers would also increase the yields.

Agricultural conditions at present are poor and land values low. The prices per acre range from \$4 to \$10.

PHEBA CLAY.

The surface soil of the Pheba clay consists of a grayish to yellowish-brown silty clay loam to clay from 4 to 8 inches deep. The subsoil is a yellowish-gray to yellow, compact and plastic heavy clay, mottled with gray and a little red, the mottling becoming very pronounced in the lower depths.

The type occurs in the eastern and northeastern parts of the county and is characterized by a flat to undulating topography. Drainage is generally deficient, owing to the flat surface and the absence of well-defined drainage courses.

This soil type seems to be derived from two geologic formations. The subsoil, and in some cases the surface layer, is probably from the clays of the Midway formation. In areas of lighter surface soil the upper portion is probably derived from the Yellow Loam formation.

Oak, pine, and gum are the principal trees and furnish much lumber.

Only a small proportion of the Pheba clay is in cultivation. The poor surface drainage and the tenacious character of the subsoil make cultivation difficult. The yields are low and the physical character of the soil is such as to cause the land to assume an unfavorable condition of compactness, especially after excessive rains or during periods of drought. The soil often cracks in dry weather.

Drainage is necessary before the best results can be secured with any of the crops grown. Liming will aid in producing a good tilth in the surface soils and fertilizers relatively high in nitrogen and phosphorus will be found beneficial. The legumes should be largely grown in rotation with other crops, and organic matter should be supplied by plowing under occasional crops.

Agricultural conditions are poor, the chief value of the land at present lying in its standing timber.

SUSQUEHANNA SILT LOAM.¹

The surface soil of the Susquehanna silt loam consists of 3 to 5 inches of gray silt loam, grading into a pale-yellow or reddish silty clay loam, extending to a depth of 8 to 10 inches. The subsoil consists of a red to reddish-yellow, compact and brittle clay, grading into a plastic clay, usually mottled with red, yellow, and gray. In many places, especially on the slopes where erosion has been active, the underlying clay has been exposed, but these areas are too small or their boundaries too irregular to be shown on a map of the scale used. The greater part of the type is a rather shallow phase of silt loam, with the clay so near the surface that the soil closely approaches the character of the Susquehanna clay. It is easier to plow, however, than the typical Susquehanna clay, and is considerably more productive than that type.

In some places the plastic clay subsoil is not reached within 24 to 30 inches, the upper subsoil having a moderate degree of friability, although the structure is not nearly so friable as that of the Orangeburg subsoil.

The topography of this soil varies from undulating to gently rolling, there being very few areas that could be classed as strongly rolling or hilly. The configuration is favorable to good surface drainage, yet is not so rolling as to have developed much serious erosion.

This is an extensive soil type. It occurs in large and small bodies throughout the greater part of the country. A considerable proportion is under cultivation to corn and cotton, with a smaller acreage devoted to cowpeas, sorghum, oats, and sweet potatoes. Probably 65 to 70 per cent of the entire area, however, is forested with old field

¹ Includes some small areas of Susquehanna clay.

and virgin shortleaf yellow pine, with some oak, hickory, and dogwood.

In years of favorable seasons the crops mentioned above give fairly good results. With the prevailing rather indifferent methods of treatment, corn yields from 25 to 40 bushels and cotton as high as a half bale or more per acre. Mixtures of cowpeas and sorghum afford heavy yields of good hay. Lespedeza and a number of wild grasses afford very good grazing. Deeper plowing and a larger supply of organic matter are two of the greatest needs of this soil. The plow depth should be gradually deepened to 8 or 10 inches, not more than an inch or two of the unturned surface or heavy subsoil material being brought up in a single year. Good results may be expected from fall plowing, especially where followed by rye, oats, or vetch as a winter cover crop. A crop of cowpeas, vetch, oats, or rye should be plowed under occasionally to supply the needed organic matter.

An average application of 1 ton of burnt lime or 2 tons of ground limestone to the acre would have a decidedly beneficial effect upon this soil, particularly where it is properly supplied with organic matter. The application should be repeated at intervals of 10 years or oftener when necessary.

Commercial fertilizers can be profitably used in moderate quantities. From 300 to 500 pounds per acre of a mixture analyzing about 10 per cent phosphoric acid, 3 per cent nitrogen, and 4 per cent potash may be expected to increase the yields of cotton, corn, sorghum, and potatoes noticeably.

The soil tends to lose moisture, especially in dry weather, and drains slowly, so that the best crops are secured in years of moderate, well-distributed rainfall. Less injury will result from unfavorable seasons where the land is broken deeply, given shallow cultivation, and kept well supplied with vegetable matter. The land should not be plowed or grazed when wet enough to be miry, as a very unfavorable, compact condition is likely to result with subsequent dry weather. Strong teams and tools are required to maintain the proper tilth.

Susquehanna silt loam, deep phase.—Throughout Winston County there are many small and large bodies of a deep phase of the type, comprising in the aggregate a considerable area. This soil is somewhat easier to keep in a good condition of tilth than that having the plastic, heavy clay nearer the surface. Typically it consists of a gray, floury silt loam, from 4 to 6 inches deep, underlain by pale-yellow or reddish silty clay loam, which grades at 8 to 12 inches into a dull-red or reddish-yellow, moderately crumbly, compact silty clay loam or silty clay, usually mottled with gray and streaks of yellow and red in the lower portion. In places the heavy mottled clay characteristic

of the Susquehanna series is reached at depths ranging from 24 to 36 inches, but often this heavy section comes in at about 36 inches.

The topography of this phase is a little less uneven than the more extensive, shallower soil, frequently occurring as undulating to nearly level, relatively high interstream areas.

The phase is adapted to the same crops as the normal soil. The yields average better, for the reason that the soil is more easily kept in a good structural condition and because crops suffer less from extremes of weather conditions. Deeper plowing is recommended, with the addition of vegetable matter and moderate applications of fertilizer and lime. Cotton, corn, vetch, cowpeas, sorghum, and sweet potatoes do very well. Irish potatoes, cabbage, and tomatoes give good results.

SUSQUEHANNA CLAY LOAM.

The surface soil of the Susquehanna clay loam consists of a friable gray silt loam, from 6 to 8 inches deep, underlain by a brownish or reddish clay loam, grading at 18 inches into a reddish-brown to red, heavy, plastic clay, mottled with gray and yellow. The upper soil is often yellowish instead of gray below the surface inch or so.

This type differs from the Susquehanna clay chiefly in the texture of the surface material. Both are derived mainly from the Wilcox formation, though a part of the surface material may come from the Yellow Loam. The type, however, is much easier to cultivate than the Susquehanna clay and is suited to a wider range of crops.

The Susquehanna clay loam is the most widely distributed member of this series. It is scattered over practically the whole county in close association with both the clay and the fine sandy loam.

The topography and drainage features are similar to those of the Susquehanna clay, the type occupying gently sloping areas to ridges and low hills. The surface configuration makes for good drainage, but the heavy, deeper subsoil hinders underdrainage and causes injury to crops during extended periods of rain or in times of extreme drought. The more friable surface soil permits rain water to saturate to a sufficient depth to lessen the effects of erosion, particularly as compared with the Susquehanna clay.

Fair yields of cotton, corn, oats, and peas are obtained where the soil is properly managed. Vegetables, peanuts, and melons can not be grown as successfully as on the lighter soils. Bermuda grass does well. Native grasses, such as carpet grass, afford considerable grazing.

Best results are obtained where deep plowing and thorough cultivation are practiced. Wherever an attempt is made at crop rotation benefits are shown in the increased yields and the improvement of the physical condition of the soil. Fertilizers are used to some

extent, although applications are not heavy. Large increases in the yields of cotton and corn have resulted from deep plowing, thorough cultivation, and the application of approximately 200 pounds per acre of acid phosphate and cottonseed meal mixed in equal proportions. Liming would improve the structure of the soil, but experiments would be necessary in order to determine whether the use of such material would be profitable.

Agricultural conditions on this type are better than on the Susquehanna clay, though not so good as on most of the other upland soils of the county. Land values at present range from \$10 to \$25 an acre, according to improvements and location.

SUSQUEHANNA CLAY.

The surface soil of the Susquehanna clay consists of a reddish-brown to red or yellowish-brown clay loam to clay, with an average depth of 5 inches. The subsoil is a reddish-brown to dull-red, sticky, plastic, and heavy clay, mottled with gray and yellow. Patches of Susquehanna fine sandy loam, clay loam, and silt loam too small to map are included with the type. In some areas small quantities of gravel are found on the surface. The subsoil is generally quite uniform, though there are sections in which gray is the dominant color, the mottling being red or red and yellow. In many places the surface soil has been washed away, leaving the clay exposed. These "gall spots" are of little value agriculturally.

The type is very difficult to cultivate, even where the surface drainage is adequate, as the compact, heavy, and tenacious clay subsoil gives poor internal drainage. This clayey substratum restricts cultivation to a narrow range of moisture conditions. During wet seasons the impervious nature of the soil as a whole prevents drainage of excess moisture, while in periods of drought the rate of evaporation is so great that crops suffer materially from lack of moisture. The type is easily eroded and contains many gullied and washed-out areas. The Susquehanna clay is widely distributed throughout the county. It supports a native timber growth consisting mainly of pine and oak.

This soil is derived from the lignitic clays of the Wilcox formation. The variation in color is the result no doubt of the degree to which the original material has been subjected to weathering.

Cotton, corn, oats, and cowpeas are the usual crops grown. The yields are low.

Deeper plowing, subsoiling, and more thorough after tillage when the soil is in the proper moisture condition would do much to maintain a better tilth. The incorporation of vegetable matter and the application of lime would do much to improve the physical condition of

the soil. Fertilizers high in nitrogen and phosphorus give beneficial results with cotton and corn.

The type is perhaps better suited to the small grain and grass crops, such as wheat, oats, and Bermuda grass, and for pasture and forage, than to staples at present grown.

Agricultural conditions are only fair. Land values range from \$5 to \$12 an acre, depending on improvements, condition of land, and distance from markets.

LUFKIN CLAY.

The surface soil of the Lufkin clay consists of a grayish-brown to brown silty clay to heavy clay, from 4 to 6 inches deep. The subsoil is a tenacious, plastic, heavy clay of a gray color, mottled with reddish brown. Usually in the third foot the color becomes lighter and shows mottlings of yellow and red. The type clods badly unless cultivated under proper moisture conditions. This condition is reflected in the roads, which are heavy and almost impassable during the winter months and after heavy rains, but hard and easily traveled during the dry weather.

The surface varies from undulating to flat. The type occurs in the northern and eastern parts of the county and is locally known as "flatwoods." It is found largely in the vicinity of Loakfoma and Winston, along portions of Loakfoma Creek, and to the south of the Noxubee River bottoms. Drainage is poor, both on account of the flatness of the surface and the close, tenacious structure of the soil.

The type is derived from heavy, lignitic clays. A forest growth consisting principally of pine, oak, and hickory covers most of the areas.

Only a small proportion of this type is in cultivation, such lands being confined principally to the better drained areas of slight ridges and slopes.

Cotton, corn, and sugar cane are the principal crops. The yields are low, on account of the damage done by heavy rains or by periods of drought. The former often drown out crops, while the extremely tough, plastic character of the subsoil prevents root penetration below the surface few inches, causing injury from want of moisture during even brief periods of drought.

To obtain the best results the Lufkin clay should be drained by ditches. By this means surplus rain water will be removed and the level of the ground water lowered. This will permit of better cultural methods, that will foster greater root penetration and permit of keeping a better soil mulch on the surface, which, in turn, will help to tide the growing plants over periods of drought. Plowing should be done only when the soil is in a moderately moist condition. The type is better suited to grass than to the general farm crops. But

little fertilizer is used and of a rather poor grade. It is usually applied to the cotton crop only. The type occurs at a considerable distance from railway stations and land values are low.

The results of mechanical analyses of samples of the soil and subsoil of this type are shown in the following table:

Mechanical analyses of Lufkin clay.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
422401.....	Soil.....	0.9	3.2	2.9	3.5	1.3	58.4	30.2
422402.....	Subsoil.....	.6	2.7	2.0	2.8	1.5	50.8	39.8

LAUDERDALE STONY LOAM.

The Lauderdale stony loam consists of a gray to pale-yellow loam, from 6 to 10 inches deep, underlain by yellowish or pale yellowish brown loam to sandy clay loam, mottled with gray. The surface soil usually contains an appreciable proportion of very fine sand, while the subsoil becomes sandier with depth and is of a lighter color, showing mottlings of gray and yellow in the lower portion. Both the surface and the subsoil contain fragments of the underlying rock formation, varying in size from fine gravel to large blocks and sufficiently numerous to prevent successful cultivation.

The topography is usually very rough and rugged, high ridges and deep-cut, narrow valleys being the predominant features. The type is of limited extent, being found only in the southwestern part of the county. It is derived from the weathering of the Claiborne-Tallahatta formation.

While practically all of this type is wooded, very little valuable timber remains, the standing growth being principally scrub oak and pine. Only occasional patches of land are in cultivation, because of the rough topography and the abundance of rock fragments scattered on the surface and throughout the soil. Where cultivation is attempted, the crops are mostly cotton and corn, which give only low yields.

This soil is best utilized for forestry and pasture. Few people are found living on this type, and agricultural conditions are poor. Land values are low, because of difficulty in cultivation and distance from markets.

The following table shows the results of mechanical analyses of samples of soil and subsoil of the Lauderdale stony loam:

Mechanical analysis of Lauderdale stony loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
422429.....	Soil.....	1.3	4.4	9.4	10.4	3.3	63.3	7.9
422430.....	Subsoil.....	.2	5.9	15.8	15.5	4.9	42.3	15.3

ORANGEBURG FINE SANDY LOAM.

The surface soil of the Orangeburg fine sandy loam consists of a gray loamy fine sand to fine sandy loam from 8 to 12 inches deep. The subsoil is a deep-red, friable sandy clay. The depth of the soil varies somewhat with the slope and the degree to which erosion has taken place. Occasional "gall spots" are shown where erosion has been sufficient to expose the subsoil, while at the base of slopes areas may occur having a depth of 18 inches. Numerous fragments of ferruginous sandstone are sometimes found in this soil, and in areas of sharp ridges and narrow valleys the tops of these ridges are often so strewn with these fragments as to interfere seriously with cultivation. With the exception of these stony areas and those of broken topography the type is easily worked.

This type is quite widely distributed. The only parts of the county where it is not found are the central and south-central parts, in the vicinity of Louisville, Noxapater, and Claytown, and in the "flat-woods" section.

The topography of many areas is strongly rolling to broken, especially in the Noxubee Hill region, north of Louisville, and in the southeastern and southwestern parts of the county.

No extensively eroded areas were found, except in the southeastern part of the county near Fearn's Springs. This is because of the fact that most of the steeper areas of the type are well wooded. Drainage is excellent, except in some of the smaller and more nearly level areas.

The type is derived from Coastal Plain deposits overlying the older formations, such as the Claibourne-Tallahatta and the Lignitic clays.

Cotton, corn, oats, cowpeas, and sorghum are the principal crops grown. The yield of cotton ordinarily varies from one-fourth to one-half bale per acre, and of corn from 15 to 25 bushels. Special crops, such as melons, peaches, strawberries, plums, vegetables, Irish potatoes, and sweet potatoes, do well.

This soil responds readily to good methods of cultivation, such as deep plowing, thorough cultivation, and crop rotation. More attention should be given to maintaining a sufficient supply of organic matter in the soil. This is especially true on the steeper slopes, where it will aid in preventing erosion. Commercial fertilizers should be

used whenever possible, especially those high in phosphate. Where the organic matter content is low, cottonseed meal or other nitrogenous substances should be used.

Land values range from \$10 to \$20 an acre for selected acreage, the steeper and broken lands being valued at \$5 to \$10 an acre.

Orangeburg fine sandy loam, eroded heavy phase.—The Orangeburg fine sandy loam, eroded heavy phase, consists of a reddish-brown to deep-red clay loam or fine sandy clay loam, from 4 to 6 inches deep, underlain by a red, friable fine sandy clay, extending to a depth of 36 inches or more.

This phase is not extensive, occurring only in a few small areas in close association with the typical fine sandy loam. The topography is rolling or ridgy. The type represents eroded areas of Orangeburg fine sandy loam.

Surface drainage is well established, but the internal drainage is somewhat inadequate. The subsoil is so compact that the surface moisture can not penetrate it, and much of the rainfall is lost in the run-off, which is so rapid as to cause extensive gulying of the surface.

In its present condition this soil does not respond readily to cultivation or fertilizers. With deep plowing, the growing of leguminous crops, and the incorporation of organic matter the soil can be made productive. Fertilizers composed of acid phosphate and cottonseed meal should be used on all crops to obtain the highest yields.

Owing to the prevailing poor agricultural conditions, this phase is of low value.

RUSTON SANDY LOAM.

The Ruston sandy loam is a gray loamy sand to light sandy loam, underlain at 8 to 14 inches by dull-red or yellowish-red sandy loam, grading into a friable, yellowish-red or dull-red sandy clay at a depth of 24 to 30 inches.

Only a few scattering areas of the type are found in the county. The topography varies from gently rolling to ridgy and drainage is well established.

The loose, open structure of the surface soil and the excellent drainage make the type an early soil, well suited to vegetables, such as melons, and potatoes, both sweet and Irish. Cotton and corn mature earlier on this type than on the heavier upland soils. Good crops of cotton, corn, and oats can be grown with careful soil management. Cowpeas, peanuts, sorghum, sugar cane, and velvet beans do well.

The open structure of the type makes it necessary to supply organic matter. Mixtures of cottonseed meal, acid phosphate, and kainit are well suited as fertilizers for the crops to which the soil is adapted.

Agricultural conditions are fair, land values ranging from \$8 to \$15 an acre.

RUSTON FINE SANDY LOAM.¹

The surface soil of the Ruston fine sandy loam consists of a grayish, loamy fine sand to light fine sandy loam, from 8 to 14 inches deep. The subsoil varies from a faintly reddish fine sandy loam in the upper portion to a dull-red or yellowish-red, friable fine sandy clay below. In some cases a slight mottling of gray and yellow may be noted in the lower subsoil. The soil is friable and easily maintained in good tilth.

This type is closely related to the Orangeburg. It is derived from the same Coastal Plain material and differs chiefly in the lighter color of its subsoil. It frequently grades into the Susquehanna fine sandy loam along the lower slopes.

In some places the subsoil of the Ruston fine sandy loam approaches the characteristics of the subsoil of the Susquehanna, particularly in that it is similarly mottled in the lower portions and is often somewhat plastic. Presumably, however, the subsoil is much more friable and less mottled than that of the Susquehanna.

The Ruston fine sandy loam has a wide distribution throughout the county and is one of the most valuable types for general farming, except where the surface is too broken to permit of cultivation. The topography in the main is rolling to ridgy. In the southwestern and southeastern parts of the county it is more broken than in other sections, and characterized by high ridges and many deep-cut valleys. Both surface and under drainage are good.

The native timber growth consists of pine, oak, hickory, dogwood, black and sweet gum, and persimmon. Certain sections of the slopes and flat areas support a luxuriant growth of magnolias.

Cotton, corn, sweet potatoes, cowpeas, sorghum, and sugar cane are the principal crops grown. Cotton averages about one-third to one-half bale and corn from 15 to 25 bushels per acre. Sweet potatoes yield well, as do also early Irish potatoes. Peanuts give good yields, and cowpeas furnish satisfactory crops of seed and forage. Bermuda grass does well and makes excellent pasturage. It can be used advantageously on slopes to prevent erosion. On low-lying areas near stream courses sugar cane is often planted and yields a fair quantity of sirup. Fruit, especially peaches, blackberries, plums, and grapes, does well on this type wherever planted. The wild grape is found growing abundantly, while cultivated varieties give good yields.

In cultivation it should be the practice to establish a systematic rotation in which some legumes, such as cowpeas or vetch, have a prominent place. Organic matter should be returned to the soil in liberal quantities to supply nitrogen and prevent erosion and leaching

¹ Includes some small areas of Susquehanna fine sandy loam.

of the surface soil. Where cowpeas are grown extensively and where organic matter is liberally supplied commercial nitrogen carriers, such as cottonseed meal or sodium nitrate, need not be applied so extensively. Moderate applications of mixtures of cottonseed meal and acid phosphate with some potash in the form of kainit give good results. Winter oats do well, especially when following a legume, and with an application of about 50 pounds of nitrate of soda to the acre.

A large proportion of the Ruston fine sandy loam lies remote from shipping points, which tends to lower land values. Land of this type can be purchased for prices ranging from \$5 an acre in the more remote and rougher sections to about \$25 in the better developed parts of the county.

RUSTON SILT LOAM.

The Ruston silt loam consists of a gray silt loam, from 3 to 5 inches deep, underlain by a pale-yellow to reddish silty clay loam, grading at 10 to 12 inches into a reddish-yellow to yellowish-red or dull-red, rather compact, moderately friable silty clay, often faintly mottled in the lower part with shades of gray and yellow. The subsoil frequently approaches closely the characteristics of that underlying the deep phase of the Susquehanna silt loam, the resemblance being so close in places that the line of division between the two types is established with difficulty. On the other hand, this type grades into the Pheba silt loam, but usually that type is not so red in the subsoil, and is further distinguished in having a more prevailing flat surface and poorer surface drainage.

The type is most extensively developed several miles east of Louisville, with smaller bodies scattered over the county. The topography is undulating to gently rolling and favorable to good surface drainage. Owing to the more friable structure of the subsoil, this type has prevailing better underdrainage than the deep phase of the Susquehanna silt loam, and is more easily kept in a good condition of tilth.

The type is adapted to cotton, corn, cowpeas, sorghum, oats, vetch, sweet and Irish potatoes. Lespedeza and a number of wild grasses afford good grazing. Crop yields will average somewhat better than on either the Pheba silt loam or the Susquehanna silt loam, deep phase, on account of better drainage and greater friability of the soil.

Fall plowing to a depth of 8 to 10 inches and frequent shallow cultivation of intertilled crops should be practiced. The soil is in need of vegetable matter, which can be advantageously supplied by growing and occasionally plowing under crops like cowpeas and vetch. Winter cover crops should be sown on the steeper slopes

following fall plowing. The depth of plowing should not be increased more than 1 or 2 inches a year.

Fertilizer mixtures averaging 10-2-3 in composition give good results in applications varying from 250 to about 500 pounds per acre, particularly with cotton, corn, oats, sorghum, and potatoes. Better and more lasting results are secured with fertilizers where the soil is kept supplied with organic matter to prevent the land from compacting in dry weather.

Cabbage, onions, tomatoes, and a number of other vegetables, as well as strawberries, can be successfully grown on this type.

GUIN STONY SANDY LOAM.

The surface soil of the Guin stony sandy loam is a grayish to brownish sandy loam from 8 to 12 inches deep, underlain by a reddish sandy clay. In many places the clay approaches the surface and in others the sand is 3 feet deep. The surface is usually strewn with fragments of red or reddish-brown ferruginous sandstones, while the soil section is usually filled with smaller fragments of the same material. The type does not embrace an extensive area and most of it is practically without agricultural value. It is quite variable in character of material, including in places several soil types or gradations so mixed as to preclude satisfactory separation into types.

Areas of the Guin stony sandy loam are widely scattered. It is most frequently met in the eastern part of the county, where it occurs on the tops of the hills and high ridges and along some of their steeper slopes. The topography is rough and deep valleys are abundant. The type in the main can not be cultivated economically, because of this topography and the high rock content. Where cleared it is most valuable for pasture land, and it should be kept in forest whenever possible.

Some of the more level and less stony areas are cultivated. Where such areas are available fruit and vegetables can be grown to advantage.

NORFOLK FINE SANDY LOAM.

The Norfolk fine sandy loam consists of a gray, loamy fine sand to fine sandy loam, from 5 to 10 inches deep, underlain by a yellow, friable fine sandy clay. In places the subsoil is quite silty. It is possible that in such areas the soil is not wholly derived from Coastal Plain deposits, but includes some material from the Yellow Loam.

This type is found mainly in the northern part of the county. The topography is gently rolling to slightly ridgy. Drainage is good. The principal timber growth remaining consists of different species of pine and oak.

Cotton, corn, cowpeas, and sweet potatoes are the usual crops. These, as a rule, give fair yields. A great variety of vegetables

could be readily grown. Peanuts, oats, and sweet potatoes could be made much more important crops. Sorghum, sugar cane, velvet beans, and vetch do well.

Systematic crop rotation would do much to increase the yields of all crops. Legumes should hold a prominent place in all rotations. The fertilizers are generally of low grade and sparingly applied. Mixtures of cottonseed meal, acid phosphate, and kainit or other potash salts can be used profitably for nearly all crops.

NORFOLK SILT LOAM.

The soil of the Norfolk silt loam is a grayish to pale-yellow silt loam, from 4 to 6 inches deep. The subsoil is a yellow, friable silt loam to silty clay loam. In places the lower subsoil is slightly mottled with gray and contains some black oxide or iron stains. Small iron concretions are present in places. The origin of this type has not been positively determined. The material is apparently related to the Yellow Loam formation, but the soil through the entire section is so like the typical Norfolk silt loam in other parts of the Coastal Plain that it seems best to correlate it as such, at least for the present.

The soil is easily tilled and kept in good, mellow condition. Exceptions to this are found in local areas where the supply of organic matter is so low that the soil tends to puddle and bake, being reduced to friability with difficulty. In such areas crops suffer more severely from extremes of wet and dry weather. This tendency can be overcome by the addition of organic matter and by the growing and plowing under of legumes, especially cowpeas.

The areas of Norfolk silt loam in Winston County are generally small, the largest being found to the northeast of Louisville. The topography is undulating to gently rolling and drainage is good.

This type is a good farming soil. The principal crops are cotton, corn, cowpeas, and peanuts, although Irish potatoes and sweet potatoes, strawberries, cabbage, onions, asparagus, and other vegetables, soy beans, velvet beans, Bermuda grass, vetch, and oats can all be grown. Cotton yields an average of one-fourth to one-half bale and corn 15 to 25 bushels per acre. The use of fertilizers would increase these yields.

The Norfolk silt loam can be kept in the best physical condition by deep plowing, thorough cultivation, and a systematic rotation of crops in which cowpeas hold a prominent place. The organic-matter content of the soil should be maintained by liberal applications of manure where available and by plowing under of green crops.

Agricultural conditions over this type are fair and land values range from \$10 to \$25 an acre.

KALMIA FINE SANDY LOAM.

The Kalmia fine sandy loam consists of a grayish or grayish-brown loamy fine sand to fine sandy loam, from 8 to 10 inches deep, with a subsoil of yellow, heavy fine sandy loam to fine sandy clay more or less mottled with gray, the mottling becoming more pronounced in the lower part of the subsoil of the poorer drained areas. In some of these areas small, rounded iron concretions are found. Such land is known locally as "buckshot land."

The type is developed on the second bottoms or terraces of the larger streams. Some patches of the silt loam member of the series are included as they are too small to separate on a map of the scale used.

The elevation of the type is sufficient to prevent overflow, except on some of the lower portions during times of unusually high water. The material is undoubtedly mainly or wholly alluvial, having been deposited over the flood plains when the streams flowed at higher levels.

The native vegetation is about the same as that of the first-bottom soils, consisting largely of pine, beech, oak, magnolia, holly, and some of the smaller swamp plants.

Where natural drainage is good, or where artificial drainage has been established, good yields of cotton, corn, oats, cowpeas, and sorghum are obtained. Sugar cane is grown to some extent, though a first-bottom soil is generally preferred in this region for this crop.

The first requisite in the successful cropping of this soil is drainage. As the type generally occupies long, narrow strips between the uplands and first bottoms, drains should be placed at the base of upland slopes. This will intercept both surface water and seepage from the uplands, and will prevent the saturation of the second bottoms. When this is accomplished other drainage ways may be placed as needed.

After drainage is established deep plowing should be practiced with a thorough cultivation of established crops. A systematic crop rotation should be instituted, and the soil kept well supplied with organic matter. The addition of fertilizers or barnyard manure is necessary for best results.

Land values of this type range from \$5 to \$15 an acre, depending upon location and improvements.

KALMIA SILT LOAM.

The surface soil of the Kalmia silt loam is a pale-yellow or yellowish-brown, friable silt loam from 10 to 16 inches deep. The subsoil is a pale-yellow or yellow silt loam to silty clay loam, mottled with gray and orange.

The largest areas of this type are found along those streams having the widest flood plains. They are generally quite level and occur as terraces or second bottoms, standing above normal overflow.

The material is largely alluvial, as in the case of the Kalmia fine sandy loam, having been deposited by the streams before they had cut down to present levels. Pine and oak constitute the principal forest growth. Some of the largest areas are still forested.

Corn, cotton, oats, sugar cane, sorghum, and hay do well. Phosphatic fertilizers should be used to hasten the maturity of cotton. Composite mixtures are beneficial for use on the cultivated crops.

As this type is generally fairly level, drainage under ordinary conditions is poorly established. Ditches should be dug or underdrains installed to remove excess water. Applications of lime would also be found beneficial to the crops. The type is valued at \$5 to \$15 an acre at the present time.

CAHABA FINE SANDY LOAM.

The surface soil of the Cahaba fine sandy loam consists of a brown or grayish-brown fine sandy loam, from 6 to 8 inches deep. This is underlain by a reddish-brown, moderately friable fine sandy loam to fine sandy clay. Slight mottlings of yellow and gray are occasionally encountered in the subsoil, which in some places is decidedly silty. Such areas are usually not so well drained as those having a sandier subsoil. In general this type is easily cultivated. A portion of the largest body of this soil lying to the north of the junction of the Nanne Warrior and Talla Haga Creeks is reported to have been in cultivation by the Indians at the coming of the first white settlers and to have been in crops continuously since that time.

This type, like the soils of the Kalmia series, occurs on the second bottoms of streams and the material is believed to have been laid down when streams were flowing at higher levels than at present. It occurs above ordinary overflow.

Some areas are poorly drained, on account of seepage from the adjoining uplands. The structure of the type favors better drainage than is found on the Kalmia fine sandy loam, making it a better agricultural soil. Crops do not suffer so much from the effects of excessive rains or periods of drought, nor does an undesirable physical structure establish itself so rapidly as in the corresponding member of the Kalmia series.

This soil is well adapted to all of the general farm crops of the region, such as cotton, corn, cowpeas, sorghum, and peanuts. Sugar cane is grown to some extent. Irish and sweet potatoes and other vegetables could be grown. The type also furnishes excellent pasture.

Best results will be obtained from cultural methods similar to those recommended for the Kalmia fine sandy loam. Deep plowing,

thorough cultivation, and systematic crop rotation are the three prime requisites. Fertilizers are used profitably. The average price of land of this type now ranges from \$10 to \$15 an acre.

OCKLOCKNEE FINE SANDY LOAM.

The Ocklocknee fine sandy loam varies considerably in texture. The soil to a depth of 8 to 12 inches is usually a brown fine sandy loam, often high in silt and showing faint mottlings of rusty brown. The subsoil is a brown or brownish fine sandy clay to silty clay, mottled with gray, drab, and rusty brown, and occasionally showing a uniform drab color.

The type occurs only in a few strips in the first bottoms of streams. Drainage is poorly established, overflows being frequent. The material is of alluvial origin and the type is still in process of formation, new material being added during each overflow.

Much of this type is forested with oak, pine, and gum. Where cultivated fair yields are obtained during favorable years. Cotton averages from one-fourth to one-half bale per acre and corn 10 to 20 bushels. With better drainage these yields should easily be doubled or trebled. Good yields of sugar cane are obtained in favorable years. Land values are low, owing to the frequency of overflows.

OCKLOCKNEE SILT LOAM.

The surface soil of the Ocklocknee silt loam is a brown, friable silt loam, from 10 to 14 inches deep, frequently faintly mottled with rusty brown. The subsoil to a depth of 36 inches or more is a brown silt loam or occasionally a silty clay, somewhat heavier than the surface soil and mottled in the lower depths with gray and drab. When properly drained this type proves a friable, mellow soil, easy to cultivate and very productive. It is most extensively developed along the larger streams of the county—the Nanne Warrior, Talla Haga, Noxapater, Pinishook, and Lobutchy Creeks, and along the Noxubee and Little Noxubee Rivers. Numerous other smaller areas border many of the small streams.

The type is an alluvial soil, deposited over present flood plains of the streams along which it occurs during periods of overflow. The surface is flat and the natural drainage is poor. The type is subject to overflow and crops are more or less uncertain for this reason. Notwithstanding possible losses by floods, many areas have been drained and placed under cultivation. Yields in most cases have proved satisfactory. Corn is most commonly grown, as it withstands floods better than cotton. Both of these crops are planted on ridges, with a water furrow between the rows, which aids the run-off during times of heavy rains. Corn yields from 25 to 50 bushels and cotton from one-half to 1 bale per acre.

The native timber growth includes pine, oak, hickory, sweet and black gum, beech, and magnolia. Only a small proportion of the type is in cultivation, its present value being mainly in its timber. Lespedeza and carpet grass afford excellent grazing. These, with the large water grasses, Bermuda, and Johnson grass, could be profitably grown for hay.

Sugar cane does well, yielding a sirup of good quality and color and in some instances as high as 500 gallons per acre have been obtained. Cottonseed meal is often used as a fertilizer in growing sugar cane. Stable manure is not generally used, as it results in a darker-colored sirup of inferior quality.

Early varieties of cotton have been found most successful. The later varieties grow too much weed and often fail to mature the later crop of bolls. The use of nitrogenous fertilizers in growing either cotton or corn has not generally proved profitable. An application of acid phosphate aids in the early maturing of both crops, especially cotton.

The greater portion of this type could be protected from overflow by straightening and deepening the stream channels and by diking.

Land values range from \$5 an acre in the case of uncleared, undrained areas, to as high as \$30 for the best-developed tracts. Cotton land can be rented on a cash basis of \$5 an acre.

OCKLOCKNEE CLAY.

The surface soil of the Ocklocknee clay consists of a brown clay loam to clay, from 8 to 10 inches deep, faintly mottled with rusty brown. The subsoil is a brown clay, mottled with gray, drab, and rusty brown and becoming lighter in color with depth. The soil is generally friable in the surface few inches, but changes to a plastic, compact clay below. Local variations in color and texture occur as a result of accretions of material washed in from the surrounding uplands and to the deposition of material in currents of varying velocity. These local variations could not be shown on the map in all cases, on account of their small size.

The type occurs mainly in the northern part of the county along the Noxubee River and its tributaries. It is of alluvial origin and subject to overflow. The surface is flat, and because of this fact and the nearness of the water table to the surface, drainage is poor.

Corn is the principal crop, as it withstands possible damage by floods better than other crops. Cotton is grown to some extent, though failures because of floods are more common than in growing corn. This type is quite fertile and good average yields are obtained. Corn ordinarily yields from 15 to 25 bushels per acre, and cotton from one-third to 1 bale, depending upon the season and cultivation.

These crops when grown are planted on beds to lessen the damage in case of heavy rains and possible floods.

The Ocklocknee clay furnishes good pasture, and on many areas wild hay could be cut with profit. Lespedeza, carpet grass, water grass, and Bermuda grass will give heavy yields of hay. Many of the areas are still uncleared.

Acid phosphate is generally used as a cotton fertilizer to hasten maturity.

The average price of land of this type ranges from \$10 an acre upward, some of the improved tracts commanding a cash rental of \$5 an acre.

BIBB SILT LOAM.

The surface soil of the Bibb silt loam consists of a light-gray to nearly white, compact silt loam, from 3 to 6 inches deep. The sub-soil is a light-gray silt loam, mottled with yellow and shades of brown. Rusty brown mottlings are conspicuous in the soil profile from the surface downward. The color becomes lighter with depth and the structure more compact. When broken, the soil has a "floury" tilth, and when properly drained it is easily cultivated.

This type is widely scattered over the entire county, occupying nearly level first bottoms along stream-flood plains. Drainage is necessarily poor and overflows frequent. Seepage from the adjacent uplands keeps much of the type in a waterlogged condition, the water table approaching the surface and making artificial drainage necessary before crops can be grown successfully.

The material is strictly alluvial in origin. The native forest growth includes water and white oak, hickory, poplar, black and sweet gum, beech, and swamp pine.

Because of lack of proper drainage comparatively little of this soil is under cultivation. It is one of the main sources of the present lumber supply of the county. Where cleared it furnishes abundant pasture. Carpet-grass, water-grass, and lespedeza flourish, affording abundant grazing through even the driest seasons. Where the land is drained cotton, corn, and sugar cane give fair crops.

Drainage should be thorough, and deep plowing the general practice. In the case of cotton or corn it will be found generally advisable to plant on ridges to insure better drainage for the plant roots. Fertilizers should be largely phosphatic, though cottonseed meal is found to be efficient when combined with acid phosphate. Liming would probably improve the condition of the soil for crops like corn and cotton.

At present the Bibb silt loam is valued mainly for its timber. It can usually be purchased at a low price after the forest has been removed.

MEADOW.

Meadow includes narrow stream-bottoms and poorly drained areas that are too variable in texture to permit of satisfactory separation into soil types. These areas are generally narrow and composed of material washed in from the uplands or represent narrow flood-plains of streams, receiving fresh depositions of soil material after each heavy rain. They include loam, sand, sandy loam, silt loam, clay, and clay loam, occurring in small areas. The materials vary in texture and color throughout the soil profile. Owing to its low position, the soil is usually wet and "crawfishy."

The native vegetation consists largely of willow, black and sweet gum, magnolia, and the larger growths of alder and cane, rushes, grasses, and other water-loving plants. Where cleared and drained Meadow is generally productive. It furnishes excellent pasturage, and good yields of cotton, corn, sugar cane, and sorghum have been obtained.

DRAINAGE.

Drainage is necessary over a large proportion of Winston County for the material improvement of agricultural conditions. This is particularly true with reference to the low-lying lands along the stream courses. These areas for the most part consist of stream bottoms ranging in width from a few rods to more than a mile. The stream channels, as a rule, are very meandering, and many of the wider valleys contain numerous old stream channels, which, during seasons of heavy rain, are filled with water. During certain seasons of the year many of the uncleared bottoms are in a semiswampy or swampy condition. All are subject to overflow.

These lands can be successfully drained by straightening and deepening the stream channels and leading lateral ditch or tile drains into them. Surface drains should be constructed along the base of the uplands to care for seepage and surface waters coming from the higher lying lands. Underdrains lower the water table effectively and do not interfere with cultivation as open ditches do. Shallow, open ditches, however, will care for the excess water from heavy rains. The advantages of drainage will be readily apparent in increased crop yields.

On the flat to gently undulating uplands, where the heavier types, such as clay, clay loam, silt loam, and occasionally the fine sandy loam, are found, artificial drainage can be used to advantage, particularly on the types having a heavy subsoil near the surface. Although in many instances these lands are farmed without drainage other than that supplied by the natural contour of the land, open ditches or tile advantageously placed to care for excess surface waters now causing erosion would markedly increase the crop yields and materially lessen

the damage now traceable to the washing of the soil. Granulation of the soil would be improved, the water table lowered, local sanitary conditions bettered, and farm work advanced because of the more rapid warming up of the soils. These improvements would be reflected in increased crop returns and a substantial increase in land values.

SUMMARY.

Winston County lies in the east-central part of Mississippi. It contains 597 square miles, or 382,080 acres. The county was incorporated in 1833, the early settlers coming from the Carolinas, Georgia, Tennessee, and Alabama, and locating in the vicinity of Fearn's Springs on the Ellison Ridge and near Betheden. The present population is 17,139.

Louisville, the county seat, is the largest town, with 1,181 inhabitants. Highpoint and Noxapater are shipping points on the one railroad which touches the county.

The county lies within the Gulf Coastal Plains Province and embraces three general physiographic divisions—highlands and hills, second bottoms or high alluvial terraces, and present alluvial first bottoms.

The northeastern part of the county is generally flat and comprises the "flatwoods" region. The roughest portions are found in the Noxubee Hills in the northern part, the Ellison Ridge region in the southeastern part, and the Smallwoods Hills in the southwestern part of the county. The remainder of the county varies from undulating to ridgy. Numerous fertile stream bottoms occur throughout the county, all of which are more or less subject to overflow.

The winters are mild and the growing seasons long, climatic conditions which favor a widely diversified farming.

Cotton is the money crop, though other crops, such as corn, oats, potatoes, cowpeas, and peanuts, often exceed it in point of acreage.

Stock raising is beginning to receive some attention, and a few pure-bred hogs and cattle are found in the county.

Fruit and vegetables should be more largely grown for home use.

There is much need for improvement in general farming methods, drainage, deep plowing, crop adaptation to soils, systematic rotation, and better cultural methods. Live stock should be more extensively raised.

Twelve soil series are found in the county, including 22 soil types, in addition to Meadow.

The larger part of the Pheba soils is at present in forest. When drained these soils could be made quite productive of corn, cotton, oats, and cowpeas. They would also make excellent pasture.

The Susquehanna soils are represented by three types. Of these the silt loam is the most valuable for general farming. The clay member of the series is extensively developed, but is much more difficult to handle successfully. This type requires drainage, and great care in the plowing and cultivation is necessary to avoid unfavorable physical conditions. Liming and organic manures will improve this defect. The clay loam is not so heavy as the clay and is more easily handled.

The Lauderdale stony loam is of small extent. Its rough topography makes it practically unsuited for farming.

The Orangeburg soils are fertile and adapted to a wide range of crops. They should be kept well supplied with organic matter. The fine sandy loam is well adapted to the production of peaches.

The Ruston soils are widely distributed and make good farming lands where not too rough or sandy. The fine sandy loam and silt loam are best adapted to the general crops. The sandier types are better suited for special crops, such as truck crops, peanuts, watermelons, and sweet potatoes.

The Guin stony sandy loam is largely nonagricultural and suited only to pasture or forestry.

The Norfolk soils are adapted to the general farm crops, such as cotton, corn, potatoes, and cowpeas; and also to special crops, such as truck, peanuts, watermelons, and fruit.

The Kalmia and Cahaba soils occupy second bottoms, and while above the reach of ordinary floods, are often in need of drainage because of seepage from adjacent uplands. They are fairly productive of the general farm crops.

All of the first-bottom soils, which include the Ocklocknee and Bibb series, as well as Meadow, are subject to overflow, and should be drained. They are capable of producing good crops, but are largely dependent upon favorable seasons. Liming in many cases would improve them, while phosphatic fertilizers will aid in hastening maturity of the crops. In favorable seasons these soils produce excellent crops of corn, cotton, and sugar cane.

Land values throughout the county, particularly on the bottom land, would be much enhanced by the installation of a comprehensive drainage system.

[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 for 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.]

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