Issued May 17, 1915.

U. S. DEPARTMENT OF AGRICULTURE,

BUREAU OF SOILS—MILTON WHITNEY, Chief.

IN COOPERATION WITH THE STATE OF ALABAMA, EMMETT O'NEAL, GOVERNOR; REUBEN F. KOLB, COMMISSIONER OF AGRICULTURE AND INDUSTRIES; EUGENE A. SMITH, STATE GEOLOGIST.

SOIL SURVEY OF RUSSELL COUNTY, ALABAMA.

BY

N. ERIC BELL, OF THE ALABAMA DEPARTMENT OF AGRICULTURE AND INDUSTRIES, AND LEWIS A. HURST AND J. M. SNYDER, OF THE U. S. DEPARTMENT OF AGRICULTURE.

HUGH H. BENNETT, INSPECTOR, SOUTHERN DIVISION.

[Advance Sheets—Field Operations of the Bureau of Soils, 1913.]

WASHINGTON:
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1915.

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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS,
Washington, D. C., September 21, 1914.

SIR: One of the soil-survey projects of 1913 was the survey of Russell County, Ala. Work in this State is being carried on in cooperation with the Alabama Department of Agriculture and Industries, and the selection of this area was made after conference with the State officials.

I have the honor to transmit herewith the manuscript and map covering this work and to recommend their publication as advance sheets of Field Operations of the Bureau of Soils for 1913, as authorized by law.

Respectfully,

MILTON WHITNEY,
Chief of Bureau.

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

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SOIL SURVEY OF RUSSELL COUNTY, ALABAMA.

By N. ERIC BELL, of the Alabama Department of Agriculture and Industries, and LEWIS A. HURST and J. M. SNYDER, of the U. S. Department of Agriculture.

DESCRIPTION OF THE AREA.

Russell County, Ala., is in the extreme eastern tier of counties, about two-thirds of the distance from the north to the south State lines. It is bounded on the east by the Chattahoochee River, forming the State line, on the south by Baubour County, on the west by Bullock and Macon Counties, and on the north by Lee County. The county has an area of 655 square miles, or 419,200 acres.

The topography of the county is quite variable. In the eastern part, along the Chattahoochee River, there are large areas of flat terrace country, which extends usually from 1 to 2 miles, and in the Oswichee Bend for a distance of 8 to 10 miles, from the river. Westward from the river in this bend toward Oswichee five or six successive and distinct terraces are developed. Oswichee is located on the highest of these and is about 150 feet above the river.[1]

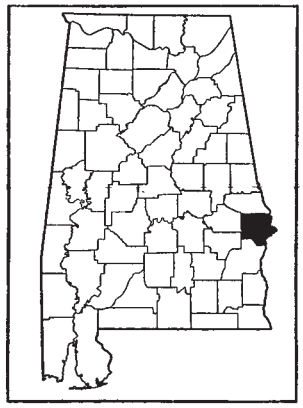

FIG. I.—Sketch map showing location of the Russell County area, Alabama.

While these terraces are comparatively new geologically, their stream systems are so well developed that the undulating appearance of the land in some places is suggestive of upland. In many places the streams have cut deep channels and the underlying residual material is exposed or covered only by colluvial material which has been washed down from the terraces. There are also extensive terraces, commonly called "hammock lands," along some of the creeks just above overflow.

In the northeastern part of the county, on the eastern side of Little Uchee Creek, the hills rise to the maximum elevation in the county, the highest having an altitude of 610 feet above sea level. The tops of some of these hills form small plateaus. Southward toward the river this chain of hills loses its knobby appearance. The slopes are generally farmed, but are sometimes steep and eroded.

[1] Topographic Sheet, U. S. Geological Survey, 1906–7.

Along Uchee Creek to the south is a ridge which, though not well defined, extends from the western boundary of the county in an easterly direction nearly to the Chattahoochee River, and then southward along the river terraces, terminating a few miles north of Hatchechubbee Creek. The continuity of the ridge in this direction is somewhat interrupted by streams, but before it turns southward from the western boundary of the county near Borom, Macon County, to a point known as Double Branches, near Youngs Bridge, over Uchee Creek, a distance of about 25 miles, no streams are encountered. On the north side of this ridge the slopes are steep and broken, while the south side is not well defined and presents a rolling surface with a slight dip to the south and southwest.

Between Uchee and Little Uchee Creeks in the northwestern part of the county there is a large area of rolling land, the surface becoming more nearly level as the western boundary of the county is approached. The level land a few miles west of Marvyn constitutes the divide in this county between the tributaries of the Chattahoochee River and those of the Alabama River.

The surface configuration of the southern part of the county is less varied than that of other sections, having for the most part a rolling to undulating appearance. The slope is steepest along Hatchechubbee Creek to the south, diminishing toward the west and southwest.

The county is well drained by the Chattahoochee and Alabama River systems. With the exception of the northwestern corner, the county is drained by the tributaries of the Chattahoochee River, which flow in a southeasterly direction. The northwestern corner is drained by Slosh Eye Creek, a tributary of the Alabama River. For the most part only the largest of the streams flow regularly, although some of the streams which issue from soils other than those having a stiff, plastic subsoil maintain a permanent flow.

In the areas of the Susquehanna soils the water supply is slightly inadequate, but in the other parts of the county a good supply of water is obtained from the surface wells, artesian wells, and springs. Perrys Well, near Glenville, has a flow of about 75 gallons a minute.

Russell County was established in 1832. It was formed from a part of the last Creek Indian land cession. This section was settled during the early part of the nineteenth century, the first settlers coming from Georgia and North and South Carolina. The county developed rapidly until about 1860, but since that time progress has been much slower. The population increased from about 25,000 in 1880 to about 27,000 in 1900. The census of 1910 gives the population as 25,937, showing a decrease of about 1,000 during the preceding 10 years. The greater part of the white population lives in the towns

and villages, there being only a few resident white farmers, except in the northern and eastern parts of the county.

Girard, situated across the river from Columbus, Ga., is the largest town in the county. It has a population, according to the 1910 census, of 4,214. Cotton milling and the brewing and distilling of alcoholic liquors are its chief industries. Hurtsboro is a thriving town of somewhat less than 1,000 inhabitants. Both the Seaboard Air Line and the Central of Georgia Railroad pass through this town, and it is the principal cotton market of the southwestern part of the county. Seale, the county seat, is located near the center of the county, on the Central of Georgia Railroad. Its population is given in the census of 1910 as 312. A number of other towns and villages are distributed throughout the county.

Public roads extend into all parts of the county. Some of the more important ones are graded and kept in fair condition. Little attention is given to the character of the material used in road building, this consisting mainly of the soil thrown up along or hauled only a short distance from the sides of the road. Sand is usually found at short distances and is being used at present to "sand" the clay roads. During the winter months the roads through areas of the Susquehanna and Henderson soils become so sticky and muddy that they are almost impassable.

The county is traversed by two railroads, the Central of Georgia and the Seaboard Air Line. They afford good transportation facilities and make direct connection with such markets as Atlanta, Columbus, and Savannah, Ga., and Montgomery, Ala. Boat lines furnish transportation from Columbus to the Gulf.

Schools and churches are conveniently located in all sections, and the county is well supplied with rural delivery mail routes.

CLIMATE.

The climate of Russell County is characterized by short, mild winters and long, warm summers. The warm weather usually begins in the early part of April and lasts until late October or early November. During this time a maximum temperature of 104° F. has been recorded, but this is exceptional. The mean temperature usually ranges from a little below 65° F. during April and October to 80° F. during the hottest part of the summer. Temperatures of 90° F. to 95° F. are common during July and August.

The winters are seldom cold enough to make it impracticable to grow hardy vegetables, and, with some protection during brief periods of exceptional cold weather, beans, onions, Irish potatoes, etc., may be planted as early as February. Snow is rare, and seldom covers the ground, melting away within a few hours. An absolute minimum temperature of —4° F. has been recorded at the Weather Bureau

station at Eufaula, and —7° F. at Opelika. Such extremes, however, are rare. The average temperature for the winter months is about 47° F., but temperatures of 70° F. are not uncommon. Short periods of cold, bracing weather are followed by clear, warm days, and these usually by a few days of rainfall or cloudy, misty days. Thin films of ice form occasionally during the winter.

The mean annual rainfall is about 52 inches. The precipitation is lightest in the fall, and this is favorable to the harvesting of the crops. The rainfall is probably heaviest in the winter, but it is relatively high in the summer, when it is most needed by the growing crops. The summer rains are sometimes accompanied by thunderstorms, but little damage is done by these, or by wind or hail.

There is no Weather Bureau station in this county. The tables given below are compiled from the records kept at the Eufaula and Opelika stations, the former being about 15 miles south of Russell County, in Barbour County, and the latter about 15 miles north, in Lee County. The physical features of this county do not differ greatly from those of the localities of these stations, so that the data in these tables are representative of conditions in Russell County.

Normal monthly, seasonal, and annual temperature and precipitation at Eufaula, Barbour County.

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.
	°F.	°F.	°F.	Inches.	Inches.	Inches.
December	48.3	82	10	4.60	5.02	5.13
January	46.3	81	12	4.33	5.07	4.28
February	49.0	81	—4	6.33	9.15	7.17
Winter	47.9			15.26	19.24	16.58
March	59.0	89	20	6.31	2.73	7.82
April	64.5	92	30	3.10	1.88	3.68
May	73.1	101	41	3.35	1.37	5.73
Spring	65.5			12.76	5.98	17.23
June	78.9	101	52	3.56	1.84	2.65
July	80.6	104	56	6.19	2.87	3.08
August	80.0	103	61	5.63	7.79	10.07
Summer	79.8			15.38	12.50	15.80
September	75.9	100	39	3.52	1.31	11.45
October	64.9	94	30	2.44	0.10	1.91
November	55.7	83	23	2.89	2.81	1.11
Fall	65.5			8.85	4.22	14.47
Year	64.7	104	—4	52.25	41.94	64.08

Normal monthly, seasonal, and annual temperature and precipitation at Opelika, Lee County.

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.
	°F.	°F.	°F.	Inches.	Inches.	Inches.
December	46.9	78	9	4.95	2.10	7.17
January	45.5	74	10	5.17	3.19	3.52
February	47.2	78	−7	5.95	2.22	10.87
Winter	46.5			16.07	7.51	21.56
March	57.2	90	16	5.61	1.75	6.10
April	63.6	92	30	3.83	0.48	4.51
May	71.9	98	37	3.41	1.98	0.07
Spring	64.2			12.85	4.21	10.68
June	78.6	103	49	4.10	0.18	9.89
July	80.4	101	58	5.12	2.34	4.64
August	79.2	104	58	4.52	5.03	4.05
Summer	79.4			13.74	7.55	18.58
September	74.6	98	42	2.76	1.47	6.16
October	64.0	95	31	3.01	3.17	8.29
November	54.5	81	20	3.22	0.72	7.80
Fall	64.4			8.99	5.36	22.25
Year	63.6	104	−7	51.65	24.63	73.07

The average date of the first killing frost in the fall recorded at both the Eufaula and Opelika stations is November 9, and the average date of the last in the spring is March 14, according to the records of the Eufaula station, and March 17, according to the records at Opelika. The earliest date of killing frost in the fall is recorded at both Eufaula and Opelika as October 25, and the latest date recorded in the spring is April 1 at Eufaula and April 15 at the Opelika station. On the basis of these records Russell County has an average growing season of about 240 days.

AGRICULTURE.

Russell County is within one of the oldest agricultural sections of Alabama. Long before the Civil War this county had an important part in the agricultural development of the State. Cotton, corn, and oats were the principal crops, with just enough wheat, sugar cane for sirup, and other crops to supply home needs. The plantations were made self-supporting, so far as possible, with regard to food supply, feed for stock, and clothing.

The Civil War had a demoralizing effect on the agriculture of Russell County, from which it has never entirely recovered. Since about 1870 agricultural progress has been slow but fairly steady, as indicated by the gradual increase in the acreage of improved farm land. In 1860 the total area of improved land in farms is reported as somewhat over 230,000 acres. By 1870 this had decreased to about 115,000 acres. Since that time this area has steadily increased, and the 1910 census reports a total of 266,784 acres in farms, of which 163,440 acres are improved. The average size of the farms is given as 89.3 acres, each tenancy being classed as a farm. The average holding of each landlord is, of course, much greater than this. Only about 64 per cent of the land area of the county is in farms. According to the 1910 census 2,367 farms, or 79.3 per cent of the total number, are operated by tenants, and of this number 2,181 are operated by negro tenants.

The principal crops grown in Russell County are cotton, corn, oats, and hay and forage, supplemented by sugar cane and truck crops.

Cotton occupies the greatest acreage and is the chief money crop of the county. According to the 1910 census, 83,750 acres were devoted to the production of cotton in 1909, with a total yield of 20,672 bales. The average yield for the county is about one-fourth bale per acre. Cotton is grown on all of the soils, regardless of whether they are adapted to it. Poor results are had on the very sandy soils and stiff clays and in poorly drained areas.

Very little attention is given in most cases to the preparation of the seed bed, the usual method being to throw up about 3 inches of loose soil, turning it from the old beds over the old middles; a furrow is run in this and the seed and fertilizer dropped in it and covered. This method is unsatisfactory. Good results are had only where the land is broken at least 6 to 8 inches deep and the seed bed made and allowed to settle for some days before planting in order to have a soft but firm bed for roots, and where the subsequent cultivation is shallow and frequent enough to keep down the grass.

Few farmers in the county realize the importance of selecting improved seed. Great losses result from the use of poor seed. In some cases 25 to 50 per cent and even more of the cotton crop is destroyed by wilt. In others the cotton sheds from the open bolls, and frequently good yields are not obtained because the cotton is not prolific. The crop is sometimes injured by frost, and the boll weevil is a menace of increasing seriousness. All these injuries may be in part prevented through the use of improved seed. The Dillon, Dixie, Modella, and Covington Toole are among the wilt-resistant varieties.

The fertilizer most commonly used on cotton is one consisting of 10 per cent phosphoric acid, 1.65 per cent nitrogen, and 2 per cent

potash. In general, this fertilizer seems well suited to the conditions in the county, but on light soils like those of the Norfolk and Kalmia series higher grades have proved profitable.

Corn ranks next to cotton in point of acreage and is a crop of increasing importance in this county. The 1910 census reports a total yield of 309,112 bushels in 1909 from 41,138 acres. Yields of over 100 bushels per acre are produced in exceptional cases, but the average yield is low. With thorough cultivation and the proper use of fertilizer 35 to 40 bushels per acre are produced. The recent organization of boys' corn clubs, providing prizes for best yields, have given a marked impetus to the growing of corn.

The Williamson method of cultivation, which embodies the principles of stunting the growth of the stalk in the early stages, with subsequent fertilization and cultivation in an intensive way in order to develop the ears, has received some attention in this county, and good results have been obtained. Some experiments for the comparison of this system with the ordinary methods indicate that where the same quantities of fertilizers are used and the cultivation is properly done, there is no marked difference in the yields.[1] The character of the soil will probably affect the results of this method; it is probable that favorable results will be obtained more often on sandy soils with sandy clay subsoils such as the Norfolk and Orangeburg sandy loams than on soils having a stiff clay near the surface such as the Suquehanna fine sandy loam.

Very little attention is being paid to seed selection, aside from the ordinary crib picking, and the production of seed corn offers an excellent opportunity in this county. Corn which has been bred up to a high standard within the county is naturally best adapted to local conditions.

The practice of "pulling fodder" or stripping the leaves from the stalk is general in this section. Some of the more progressive farmers are discontinuing this practice and instead are devoting a few acres to hay each year. While fodder is relished by animals, its feeding value is not sufficient to compensate for the time and labor used in pulling it and the subsequent damage to the grain. The growing of an acre or two of hay which receives the proper care in planting and some fertilization is far more satisfactory. One of the most satisfactory means of saving the stover for forage is to cut the corn and shock it. Where this method is practiced all the forage is saved and the stalks are removed, thus allowing easier subsequent cultivation and permitting more expeditious harvesting of the crop.

Many farmers are beginning to realize the value of a catch crop and are planting some legume in the corn middles at the last plowing.

[1] Results of experiments by Alabama Experiment Station.

For this purpose peanuts, cowpeas, or velvet beans are being used. Velvet beans make a good growth, but the seasons in this county are usually too short for their proper maturity. Peanuts may be planted between the rows of corn and, with practically no extra trouble, a good crop may be grown for hogs to feed on after the corn has been gathered.

As a main crop peanuts may be grown to great advantage. The crop requires little cultivation and has proved profitable where grown for the market or when used for hog pasturage. The sandy loams are excellent peanut soils. For growing market peanuts soils of light color are preferable, as the red soils stain the shell to a certain extent. The 1910 census reports a production of 2,785 bushels of peanuts in 1909 from a total of 223 acres.

Cowpeas are of great value as a catch crop, and may be planted either in drill or sowed broadcast at the last plowing of the corn. This has been the principal catch crop for some time, but, on account of its tendency to blight and the popular belief that it supports the same fungus that causes the cotton wilt, efforts are being made to develop some other crop as a substitute. The Iron cowpea is wilt resistant. This crop is either cut for hay, turned under for the improvement of the land, or produced for the grain. It is an excellent crop to use in rotations. For hay cowpeas have some disadvantages. The hay is hard to handle on account of the long, fibrous vines becoming tangled; unless cut at the proper time the leaves fall off and may be lost, and the hay is difficult to cure.

On account of these disadvantages of cowpeas some of the clovers, mainly crimson clover, bur clover, and lespedeza are coming into use for hay. Crimson and bur clovers are true clovers, and frequently require inoculation. This is accomplished by broadcasting soil from a field which has grown clover, at the rate of about 100 pounds per acre, and making liberal applications of lime. Acid phosphate and kainit are in most cases beneficial, but it is not necessary to apply nitrogen. Clover may be sown in the fall in the cotton or corn middles and cut in the spring in time to put in another crop. But the crop has the advantage of reseeding itself, so that some other crop may be grown during the summer, and, without further seeding, the bur clover will come again in the fall. Lespedeza, or Japan clover, makes its growth during the summer months. This is not a true clover and does not require as much care in its propagation as the crimson and bur clovers. Owing to its adaptability to a wide range in conditions and soils, this is probably the best hay and forage crop for the county. The crop is seeded in the spring, after danger of frost, at the rate of 1 to 2 bushels per acre. The plants are rather slender, and if an insufficient quantity of seed is sown the plants fall and cover the ground, but if the number is sufficient, they stand up well and no

trouble is experienced in cutting the hay. The hay is very easy to cure, usually requiring only one day. After it is once grown the crop reseeds itself.

Johnson grass is being grown for hay to some extent, principally on the lime lands and some of the bottom lands along the river. In most cases the quality of the hay is affected by the presence of weeds and lack of care in curing and handling. However, on some farms in the county, the quality of the hay is good, and there is always a ready market for the product at good prices.

In the census of 1910 a total of 1,123 acres is reported in hay and forage crops in Russell County, with a production of 1,442 tons. A production of 1,107 tons of hay is reported from 826 acres devoted to tame and cultivated grasses, exclusive of timothy, clover, and alfalfa.

A total of 3,402 acres is devoted to oats in this county, according to the census of 1910, with a yield of 64,514 bushels. The oats are sown broadcast, drilled, or in some cases planted in open furrows. Many farmers apply nitrate of soda to the oats in the spring at the rate of 75 to 150 pounds per acre. This seldom fails to give good results. Acid phosphate, and on poor soils small quantities of kainit, are beneficial. The oats are subject to rust and smut. The former may be controlled by growing rust-proof varieties and the latter by the formalin treatment of the seed.

Large quantities of sirup of excellent quality are produced from the sugar cane grown throughout the county, but practically all of it is consumed locally. This industry offers good opportunities, since the sirup finds a ready sale at outside markets if cooked to the proper consistency and sealed in jars or cans. The lighter soils, which have a good supply of moisture, are preferable for growing sugar cane, as the sirup is usually clearer and has a better flavor than that produced from cane grown on heavy soils. A fertilizer analyzing about 8 per cent phosphoric acid, 4.5 per cent nitrogen, and 4.5 per cent potash gives good results with sugar cane.

In the northeastern section of the county the soils are well suited to the production of watermelons, cantaloupes, fruits, truck crops, small berries, etc., and the farmers of this section find Columbus, Ga., located just across the river, a ready and convenient market for their produce. Soils of similar nature occur in other parts of the county, but are generally located so far from the railroads that the trucking industry is not profitable.

Sweet potatoes are grown extensively for home use. Practically none are shipped out of the county. The sandy soils, including the lighter fine sandy loams and sandy loams, are best adapted to this crop. Sweet potatoes require potash and nitrogen, and do best following peas or some other legume. The proper use of fertilizers

results in materially increased yields. The 1910 census reports a production of 58,962 bushels of sweet potatoes and yams from 975 acres in 1909. A total of only 49 acres is reported in Irish potatoes, with a yield of 2,362 bushels.

Dairying is of little importance in Russell County, except in the section near Columbus, Girard, and Phoenix. The demand for dairy products in other parts of the county is not sufficient to warrant the establishment of dairies to any great extent.

Some live stock is raised in the county, but it is of an inferior grade and receives very little care. Although the county has a stock law, it is customary to "turn out" stock during the winter months. The areas of cane brakes along the creeks afford good winter pasturage. With the development of agriculture it is becoming necessary to furnish pasturage at home during the winter as well as the summer months. Some of the so-called waste areas along the streams and the eroded slopes are best used for Bermuda grass and Japan clover to supply pasturage until late fall, and winter pasturage may be furnished by adding bur clover.

The raising and feeding of more hogs and cattle would in a measure solve the problem of disposing of crops grown under the new system of crop diversification, and also furnish a substitute for cotton as a ready-money crop. Where several animals are to be fed through the winter months a silo is of great advantage in supplying green forage.

One large pecan orchard and nursery is operated near Glenville, and many smaller groves of pecan trees are being set in different parts of the county. The loamy soils of the Orangeburg, Ruston, and Norfolk series are the principal soils used for this purpose, but there seems to be no reason why high, well-drained areas of the loamy types of the Kalmia and Cahaba series should not be used also.

The grade of fertilizer most commonly used is one containing 10 per cent phosphoric acid, 1.65 per cent nitrogen, and 2 per cent potash. This is applied generally at the rate of 200 pounds per acre, although many farmers use as much as 400 pounds, and some find it profitable to even double the latter amount. In the 1910 census an expenditure of $151,587 for fertilizer is reported in Russell County. It appears that practically all the soils of the county show a crop response to liming, particularly with such crops as the clovers and other legumes.

The figures in the accompanying table give the pounds of ground limestone or calcium carbonate required to give the soils indicated and at the place sampled a distinctly alkaline reaction. It is not to be inferred that, necessarily, it would be desirable to put such large applications on the soil at any one time. But it would, undoubtedly,

be good practice to add generous applications of lime to the soils of this county every few years, possibly once or more in each rotation of crops, and thus gradually bring the soils into good general condition. Quick response may be obtained by using air-slaked lime, but finely ground limestone may be found cheaper and in the long run as efficient.

Lime requirement of the soils of Russell County, Ala.

Soil.	Location.	Lime carbonate required per acre.
		Pounds.
Kalmia fine sandy loam:		
Soil (18 inches)	NW. ¼ of SW. ¼, sec. 22, T. 15 N., R. 30 E.	3,300
Subsoil		4,900
Cahaba fine sandy loam:		
Soil (8 inches)	1½ miles east of Cottonton	2,800
Subsoil		4,200
Ocklocknee silty clay loam:		
Soil (6 inches)	South of Thomas Bridge on Uchee Creek	9,100
Subsoil		13,300
Leaf clay:		
Soil (4 inches)	SW. ¼ of SE. ¼, sec. 20, T. 15 N., R. 31 E.	9,100
Subsoil		14,000
Norfolk fine sandy loam:		
Soil (7 inches)	NE. ¼, sec. 16, T. 15 N., R. 30 E.	4,900
Subsoil		7,000
Ruston fine sandy loam:		
Soil (12 inches)	NE. ¼ of NE. ¼, sec. 18, T. 15 N., R. 30 E.	4,900
Subsoil		7,000
Susquehanna fine sandy loam:		
Soil (6 inches)	SW. ¼, sec. 28, T. 17 N., R. 28 E.	4,200
Subsoil		9,800
Susquehanna very fine sandy loam:		
Soil (5 inches)	SE. ¼ of SE. ¼, sec. 27, T. 15 N., R. 28 E.	5,600
Subsoil		12,800
Susquehanna clay:		
Soil (6 inches)	¾ mile northwest of Hooks	9,100
Subsoil		12,600
Susquehanna sandy loam:		
Soil (7 inches)	1 mile south of Uhland	2,100
Subsoil		12,600
Susquehanna very fine sandy loam:		
Soil (6 inches)	¾ mile southwest of Hurtsboro	2,800
Subsoil		2,800
Susquehanna very fine sandy loam (lime nodules):		
Soil (6 inches)	1 mile southwest of Hurtsboro	2,100
Subsoil		None.
Susquehanna clay (lime nodules):		
Soil (6 inches)	¼ mile west of Hurtsboro	2,100
Subsoil		None.

The last three of the samples given in the above table overlie considerable quantities of lime which may be seen as nodules in the road cuts. However, this lime occurs at varying depths below the surface, so that it may or may not affect the upper 36 inches of soil. The first of these three samples, taken three-fourths of a mile southwest of Hurtsboro, was taken where this lime deposit was about 5 feet below the surface. The last two samples came from areas having considerable quantities of the lime nodules in their subsoil, but none within the first 6 inches of the surface.

The Susquehanna soils are commonly called "red lime lands," and the idea is prevalent that they have an abundance of lime. On account of this belief, especial attention was given to securing samples of several different types of this series and those which were representative of the different conditions and localities in the county. A review of the table shows that these soils are among those most in need of lime.

Henderson clay and the small patches of Oktibbeha clay, included with the Susquehanna soils lying in the vicinity of Hurtsboro, are the only soils that do not actually need lime, and it is probable that the addition of ground limestone to the latter would prove beneficial. The heavier lime deposits in the vicinity might be made use of in this way by crushing the product before using.

Farm labor has been so cheap in this county that the extensive use of labor-saving machinery has received but little attention. Many farmers are now introducing improved types of implements, especially where they operate the farms themselves. Labor is ordinarily paid about $10 a month with rations. By the day laborers receive from 30 to 75 cents, with an average of about 50 cents. A cash expenditure of $170,849 for labor in Russell County is reported in the 1910 census.

The value of land situated some distance from the railroads ranges from $3 to $20 an acre, most of the land sold bringing $10 an acre. In some places near the railroads fairly good land may be had for this price. The greater part of the land in the more densely populated sections is valued at $20 to $75 an acre. The average value of land in the county is reported in the census of 1910 as $8.91 an acre, showing an increase of $3.97 over that reported in 1900.

SOILS.

Russell County lies wholly within the Coastal Plain, and its soils are embraced in those soil divisions of the United States known as the Atlantic and Gulf Coastal Plains and the River Flood Plains Provinces. The former extends from the vicinity of San Angelo,

Tex., on the Gulf side, to Long Island on the Atlantic side, ranging from a narrow strip up to 450 miles in width and broken only by comparatively narrow strips of alluvial soils formed by the streams which have cut through this belt.

The upland soils of the county are formed from materials laid down on the floor of the Gulf, which at one time covered this region. The present line between the Piedmont and the Coastal Plain, though not distinct, is approximately located in Lee County, about 7 miles south of Auburn.

As the suspended material was brought down from the uplands by streams and deposited in the ancient sea the shore line gradually receded through interrupted stages. The former sea floor had been so influenced by the different forms of sea life that it is now possible to distinguish the different stages or geological formations involved in this gradual change by the character of the fossils present. There is for the most part no definite line of demarcation between these formations, but the conditions under which each was laid down were such that each has distinct characteristics.

Differences in the origin of the soil-forming material and the agencies of weathering, leaching, erosion, and chemical action have affected the texture, structure, color, topographic position, and drainage of the soils and have given rise to many different soil types.

In many instances there is much variation within the soil type on account of differences in depth of the surface covering of sand and in the color of soil and subsoil. It is not possible to represent these variations on a map of the scale used, hence the average is described. The separation of the fine sandy, sandy, and coarse sandy loams from the corresponding sands was made on the basis of the depth of the sand, the rule being to class the soil with the former group where the sandy clay is encountered at depths of less than 3 feet. The transition from one type to another is usually gradual, especially if the types are closely related, and there are instances where the gradation from one to the other extends over considerable distances. In such cases the boundary lines are of necessity more or less arbitrary.

Gravel, consisting of waterworn quartz and quartzite, sometimes containing large quantities of iron, is common to most of the types, and this condition is not indicated except where the gravel considerably affects cultivation or the general texture of the soil. Areas of gravel beds which extend to depths of several feet are shown on the accompanying map by symbols.

Soils having the same range of color and subsoils which are similar in color and structure and which have, broadly, the same topography

and drainage and a common or similar origin are included in the same series. The types in each series are separated upon a basis of textural difference.

Twelve series, comprising a total of 38 soil types, are recognized in Russell County. In addition to these, 3 miscellaneous types—Meadow, Riverwash, and Muck—are encountered.

The following outline gives the origin and the chief color characteristics of the various soils of the county:

Origin and chief color characteristics of the various soils in Russell County.

Group.	Material from which derived.	Color characteristics.	Name.
Upland	From unconsolidated, sedimentary materials and consolidated material (rock) of sedimentary origin.	Gray soils; yellow subsoils	Norfolk coarse sand.
			Norfolk sand.
			Norfolk coarse sandy loam.
			Norfolk sandy loam.
			Norfolk fine sandy loam.
			Norfolk fine sand.
		Gray to brown soils; brown, red, yellow or gray, stiff, mottled subsoils.	Susquehanna gravelly sandy loam.
			Susquehanna sandy loam.
			Susquehanna fine sandy loam.
			Susquehanna very fine sandy loam.
			Susquehanna clay.
		Gray to brown soils; reddish-yellow to yellowish-red, friable subsoils.	Ruston sand.
			Ruston gravelly sandy loam.
			Ruston coarse sandy loam.
			Ruston sandy loam.
			Ruston fine sandy loam.
		Gray to brown soils; bright red subsoils.	Orangeburg sandy loam.
		Greenish-gray to black soils; greenish-yellow subsoils.	Henderson clay.
		Gray to brown soils; dull-red to reddish-yellow subsoils.	Cahaba sandy loam.
			Cahaba fine sandy loam.
			Cahaba silt loam.
		Gray soils; mottled red, yellow, and gray plastic subsoils.	Leaf sandy loam.
			Leaf fine sandy loam.
			Leaf clay.
Terrace	Old alluvium	Gray soils; yellow or mottled gray and yellowish, friable subsoils.	Kalmia loamy coarse sand.
			Kalmia sand.
			Kalmia fine sand.
			Kalmia coarse sandy loam.
			Kalmia sandy loam.
			Kalmia fine sandy loam.
		Gray soils; mottled gray and yellow, plastic subsoils.	Myatt sandy loam.
			Myatt fine sandy loam.
		Reddish-brown soils; red, friable subsoils.	Amite loamy coarse sand.
			Amite coarse sandy loam.

Origin and chief color characteristics of the various soils in Russell County—Continued.

Group.	Material from which derived.	Color characteristics.	Name.
First bottom:	Recent alluvium	Brown soils; yellowish and grayish mottled subsoils.	Ocklocknee sandy loam. Ocklocknee fine sandy loam. Ocklocknee silty clay loam.
		Reddish-brown to brown soils; brown to reddish subsoils.	Congaree silty clay loam.
		Gray to brown soil; gray to brown subsoil; variable; undifferentiated material; overflowed.	Meadow.
		Black soil and subsoil; principally organic material.	Muck.
		White to reddish sand; undifferentiated.	Riverwash.

The following table gives the actual and relative extent of each soil type mapped in Russell County:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Susquehanna very fine sandy loam	46,720	11.1	Cahaba fine sandy loam	4,544	1.1
Susquehanna clay	43,584	10.4	Norfolk sandy loam	4,160	1.0
Norfolk sand	38,016	9.1	Leaf sandy loam	4,096	.9
Susquehanna fine sandy loam	37,824	9.0	Orangeburg sandy loam	4,032	.9
Susquehanna sandy loam	36,480	9.0	Norfolk fine sand	3,264	.8
Deep phase	768		Ruston sand	3,200	.8
Leaf fine sandy loam	30,464	7.3	Cahaba sandy loam	3,072	.7
Ruston sandy loam	20,288	4.8	Kalmia loamy coarse sand	2,624	.6
Ruston gravelly sandy loam	17,984	4.3	Ocklocknee fine sandy loam	2,560	.6
Meadow	17,664	4.2	Kalmia fine sand	2,368	.6
Norfolk coarse sand	16,832	4.0	Kalmia sand	2,368	.6
Ocklocknee silty clay loam	9,280	2.2	Ruston fine sandy loam	2,176	.5
Susquehanna gravelly sandy loam	7,616	1.8	Ruston coarse sandy loam	1,984	.4
Norfolk coarse sandy loam	7,488	1.8	Amite coarse sandy loam	1,536	.5
Kalmia fine sandy loam	7,232	1.7	Norfolk fine sandy loam	1,088	.3
Ocklocknee sandy loam	6,592	1.6	Myatt sandy loam	1,024	.2
Kalmia sandy loam	6,464	1.5	Riverwash	832	.2
Henderson clay	5,888	1.4	Myatt fine sandy loam	704	.2
Cahaba silt loam	5,888	1.4	Amite loamy coarse sand	576	.1
Congaree silty clay loam	4,800	1.1	Muck	320	.1
Kalmia coarse sandy loam	4,608	1.1	Leaf clay	192	.1
			Total	419,200	

Norfolk Series.

The surface soils of the Norfolk series are prevailingly gray, ranging from light gray to grayish yellow. The subsoils are yellow, and have a friable structure. These soils occupy nearly level to rolling uplands throughout the Coastal Plain. They are derived from unconsolidated deposits of sands and clays. Six types of the Norfolk series are recognized in Russell County. These are the Norfolk coarse sand, sand, fine sand, coarse sandy loam, sandy loam, and fine sandy loam. They occur extensively on the Uchee Ridge, the river ridge, and in the north-central part of the county.

NORFOLK COARSE SAND.

The Norfolk coarse sand consists of a gray coarse sand underlain by yellowish-gray or pale-yellow coarse sand. Appreciable quantities of small and medium quartz gravel are present in places throughout the soil section. Areas in which these occur to such extent as to hinder cultivation are indicated on the soil map by symbols.

The greater part of this type occurs in the northern part of the county, but it also occupies some of the slopes along the streams which traverse the river terraces. The topography varies from rolling to hilly, and the drainage is usually excessive.

The Norfolk coarse sand supports a scattered growth of pine, blackjack, dogwood, and persimmon. Much of this type has been in cultivation, but is now growing up in weeds. The type is not adapted to general farming.

The areas which lie within reach of markets may be used for growing truck crops. Large quantities of fertilizers or manure are necessary to produce good yields of any crop. The growing of Bermuda grass for pasturage is one means of utilizing this type.

NORFOLK SAND.

The Norfolk sand consists of gray loose sand underlain by a pale-yellow to yellowish-gray loose sand, which extends to depths of 3 feet or more without perceptible change.

The type occupies slopes, ridge crests, and hilltops, occurring, in fact, in practically all topographic positions common to the uplands of the county. The largest area occupies Uchee Ridge and the ridge along the river, in the central and eastern part of the county. On these ridges there are many acres of level land. Owing to the sandy texture and incoherent structure of the soil, to the absence of any great amount of organic matter, and to the fact that the type is usually dissected by many streams, it is usually well or even exces-

sively drained. Water sinks so rapidly through the soil that it is possible to plow the land within a few hours after rain.

Since the soil is composed chiefly of quartz sand and has poor water-holding properties, it is not well suited for general farming. It is planted to corn and to some extent to cotton, but the yields are low. The type is not selected for these crops as a rule, but is used for their production in connection with other soils. The yield of cotton seldom exceeds two-fifths bale per acre. Where cover crops are grown and large quantities of stable manure and other organic matter are incorporated with the soil fair crop yields are maintained.

The Norfolk sand is an excellent truck soil, on account of the fact that it warms up early in the spring. Where good shipping facilities are readily available it is used successfully in many parts of the South for vegetables and watermelons. It usually matures crops at least a week earlier than any other type in the same locality.

Peaches of good quality are produced on this soil, but the trees are usually short lived.

The natural vegetation consists principally of longleaf and shortleaf pine, dogwood, and scrubby blackjack and forked-leaf oak.

Much of this land can be bought for $5 or less an acre.

NORFOLK FINE SAND.

The typical Norfolk fine sand consists of a gray fine sand, underlain at about 3 to 5 inches by yellowish-gray or pale-yellow fine sand which extends to a depth of 3 feet or more.

The type occupies the crests and slopes of rounded ridges and comparatively smooth to nearly level low country. It occurs in small areas in the central section of the county, mostly between Uchee and Oswichee. The drainage is good to excessive. Where the fine sand is very deep, moisture sinks rapidly and the crops suffer from drought.

The Norfolk fine sand is adapted to practically the same crops as the Norfolk sand, but the yields are somewhat better, the soil being rather more retentive of moisture.

This is considered an excellent soil throughout the Coastal Plain region for early vegetables. On account of its small extent and inaccessibility to markets and railroads, a large part of the type in Russell County can not successfully be used for the commercial production of such crops. Near Hatchechubbee, however, it is well located for trucking.

Much of this type is devoted to cotton and corn, but the yields of both are low. Where it is necessary to grow general farm crops on this land it is a good practice to use implements which tend to pack the subsoil rather than to loosen it, in order to increase its water-holding capacity. Most of this soil is very deficient in organic mat-

ter, as is indicated by the light color of the surface soil. The plowing under of vegetable matter, preferably leguminous crops, and of liberal quantities of manure or commercial fertilizer is beneficial.

NORFOLK COARSE SANDY LOAM.

The soil of the Norfolk coarse sandy loam is a gray, loose, coarse sand which passes at about 8 to 10 inches into pale-yellow coarse sandy loam. The lower subsoil, beginning ordinarily between the depths of 15 and 30 inches, is a yellow, friable, coarse sandy clay. Small and medium quartz gravel are frequently present throughout the 3-foot section. In some places this gravel occurs in beds in large enough quantities materially to hinder cultivation, and such areas are indicated on the soil map.

In a few small areas, occurring between Little Uchee Creek and Girard, the subsoil is cream colored and has a greasy feel. These areas represent an approach toward the Hoffman soils.[1]

The type occupies broad, level divides in the central and northern part of the county, and the slopes and crests of narrow ridges, mainly in this section.

The drainage of the land is usually good to excessive, but in the broader or more nearly level areas a few depressions occur, where the soil is saturated the greater part of the time and considerable organic matter has collected, giving the soil a dark or almost black color. In these depressions the subsoil consists of a mottled gray and yellow coarse sandy clay. They represent areas of Portsmouth coarse sandy loam which, on account of their small extent, can not be satisfactorily shown on the map.

The greater part of this type is under cultivation, and fair yields of cotton, corn, grasses, and small fruits are obtained. With improper handling or with ordinary farm practice, crop failures occur during years of drought. To increase the water-holding capacity of the soil it is necessary to incorporate liberal quantities of organic matter. Shallow cultivation as soon as possible after each rain to maintain a "dust mulch" and prevent the evaporation of the moisture from the soil is highly beneficial.

NORFOLK SANDY LOAM.

The Norfolk sandy loam consists of a gray loamy sand underlain at about 5 or 6 inches by pale-yellow loamy sand which grades at about 10 to 24 inches into a yellow, friable sandy loam, and this in turn gradually passes into a yellow, friable sandy clay. This soil grades into the Ruston sandy loam so imperceptibly in places that it is difficult to draw definite boundaries.

[1] See Bul. 96, Bureau of Soils, U. S. Dept. of Agriculture.

The type occupies comparatively smooth areas on gentle slopes and the crests of ridges in practically all parts of the county. The drainage is good.

The Norfolk sandy loam is adapted to the growing of sweet and Irish potatoes and many other vegetables. It is one of the best soils in the county for peanuts and pecans, and is an ideal soil for early cotton. For corn its texture is a little light, but it is used extensively for this crop. In the Carolinas it is surpassed only by the Norfolk fine sandy loam for growing the bright-yellow tobacco. The sirup from sugar cane grown on this type has good flavor and light color, and the yield is good.

Agricultural conditions on the Norfolk sandy loam are good. The soil is easily cultivated, and with proper handling it may be built up to a high state of productiveness. It is necessary for best results with crops to maintain a good supply of organic matter.

NORFOLK FINE SANDY LOAM.

The soil of the Norfolk fine sandy loam consists of a gray fine sand, underlain at about 5 to 8 inches by a pale-yellow loamy fine sand, which passes into yellow, friable fine sandy loam, while the subsoil beginning at 10 to 24 inches is a yellow, friable fine sandy clay.

Areas of this soil occupy flat to gently rolling, broad and rounded ridges, gentle slopes, and comparatively low, undulating, or gently rolling country in the vicinity of streams. Some of these near Ihagee Creek and about 2 miles northwest of Oswichee are apparently remnants of an old stream terrace which has been dissected by erosion and from which much or most of the original alluvium has been removed. The areas have good drainage, and where a supply of organic matter is maintained in the surface soil it is distinctly loamy, easily cultivated, and retentive of moisture.

The Norfolk fine sandy loam has a small total area in this county. The greater part of the type occurs in the east-central section.

This is one of the best of the upland soils of the Coastal Plain for general farming. Cotton is the principal crop grown, yielding from one-fourth to three-fourths bale per acre. Corn ranks second to cotton in acreage and yields 10 to 20 bushels per acre. The type is capable of producing higher yields with proper handling. The variation in crop yields is due principally to differences in the preparation, fertilization, and cultivation of the land.

RUSTON SERIES.

The Ruston soils are gray, ranging to grayish brown. The subsoils are reddish yellow to yellowish red or dull red, and are moderately friable, consisting generally of sandy clay. Occasionally the

lower subsoils are mottled with gray and shades of yellow. This series is intermediate between the Orangeburg and Norfolk series in the color of the subsoil and between the Orangeburg and Norfolk on the one hand and the Susquehanna on the other in point of subsoil structure. All these soils are derived from material of similar origin, namely, unconsolidated deposits of the Coastal Plain. The Ruston series is represented in Russell County by five types—the sand, gravelly sandy loam, coarse sandy loam, sandy loam, and fine sandy loam. It is developed in all parts of the county except the southwestern section.

RUSTON SAND.

The Ruston sand consists of a grayish sand underlain at 5 to 6 inches by pale-yellow to yellow sand, which usually extends to about 10 to 20 inches. Below this the material has a reddish cast or a decidedly yellowish-red color and a more loamy character. In places the typical yellowish-red or reddish-yellow color of the Ruston subsoil does not appear at depths of less than about 30 inches, while in other places this typical color is encountered very near the surface. The subsoil sand is always more loamy than the yellow or pale-yellow, clean sand of the subsoil of the Norfolk sand.

Areas of this soil are found on high ridges and comparatively small level summits of hills. The largest areas occur in the vicinity of Hyram and Fort Mitchell. The drainage is good.

The Ruston sand is adapted to about the same crops as the Norfolk sand, but it is a somewhat stronger soil. It is a fair cotton soil, but owing to its somewhat leachy nature the yields decline under poor management. The greater part of this type is valued at $5 to $10 an acre.

RUSTON GRAVELLY SANDY LOAM.

The Ruston gravelly sandy loam is a grayish gravelly sand, underlain at about 5 inches by a pale-yellow gravelly sandy loam, which grades into reddish-yellow or yellowish-red, friable sandy clay carrying considerable gravel. In some places probably 50 per cent of the soil mass to a depth of 4 to 5 inches consists of gravel, which is mainly composed of quartz and ranges up to about one-half or three-fourths inch in diameter. The interstitial material is prevailingly medium sand, although coarse sand predominates in some places. The subsurface does not contain as much gravel as the surface layer, and there is considerably less gravel in the subsoil than in the overlying material. There is always present in this soil a sufficient quantity of gravel to have a decided influence upon cultivation. In some places the underlying formations impart to the lower subsoil a chalky appearance and sometimes a pinkish or red, purple, and white mottled color and greasy feel (Hoffman material). These areas occur for

the most part east of Little Uchee Creek in the northeastern part of the county.

This type occupies slopes and knolls and the drainage is good to excessive.

Although a number of crops, such as cotton, corn, and oats, are grown, and fair yields are obtained by the use of liberal quantities of stable manure and fertilizers, the soil in general has a low agricultural value. It is particularly in need of organic matter and requires careful management. The rotation of crops is highly beneficial. Since it comprises a large area in this county, especially in the northern tier of townships and in the hills south of Girard, it is necessary for the farmers in this section to make use of these lands to a considerable extent for general farming.

In the vicinity of Girard land of this type sells for $20 to $30 an acre, but the average value of the type is about $10 an acre.

RUSTON COARSE SANDY LOAM.

The Ruston coarse sandy loam consists of a gray, loose coarse sand, underlain at an average depth of about 5 inches by a yellow, coarse sandy loam which grades into a reddish-yellow or dull-red, moderately friable coarse sandy clay. The type frequently contains some gravel, which occurs principally in the surface soil, but not in large enough quantities to hinder cultivation.

The topography is undulating to rolling, and in general is somewhat more rolling than that of the Ruston sandy loam. The drainage on the gentle slopes is good, but owing to its coarse texture and loose structure the soil is likely to be excessively drained in the more rolling areas.

Practically all the type occurs in the northwestern corner of the county near and west of Marvyn.

It has practically the same range of crop adaptation as the sandy loam of this series, but since it does not retain moisture so well the tendency is to grow more cotton than corn on it. In order to secure best results with crops it is necessary to maintain a good supply of organic matter. This type has a somewhat lower value than the Ruston sandy loam.

RUSTON SANDY LOAM.

The Ruston sandy loam consists of gray sand which passes at shallow depths into pale-yellow loamy sand. At varying depths, usually between 10 and 20 inches, a reddish-yellow friable sandy loam is encountered, and this grades quickly into yellowish-red, friable sandy clay. The subsoil is frequently mottled with shades of yellow and red and shows in the lower part a slight plasticity which, combined with the mottled color, gives the material a character approach-

ing that of the Susquehanna subsoil. This condition is encountered mainly along slopes just above areas of Susquehanna soils.

This soil occupies ridges, hills, and slopes, its prevailing topography being gently rolling or rolling. The drainage of the type is good to excessive. In the vicinity of Seale most of the type has been eroded. There are a number of areas on slopes where the surface soil has been washed away, exposing clays in spots, and where gullies have been formed. Some of these areas are in reality Rough gullied land, but are too small to be indicated on the map. They are valuable only for pasturage and timber. There are some fairly large, gently rolling areas of this type which are well suited to tillage, mainly in the northwestern corner of the county.

The Ruston sandy loam is encountered in practically every part of the county. Where excessive erosion has not occurred it is considered one of the best of the upland soils, giving good yields of practically all the crops common to this region, particularly cotton, corn, oats, cowpeas, and sugar cane. Cotton and corn are grown more extensively than any other crops. Cotton yields from one-third to one bale, and corn 15 to 30 bushels per acre, the yields varying considerably with the differences in farm methods and quantities of fertilizers used.

The soil texture and structure are such that the type is easily cultivated and is retentive of moisture where properly handled. The more intensive methods of farming are most profitable on this type. This is considered one of the best soils for pecan planting in the county, and has been used to some extent for setting out orchards of this nut. A large pecan nursery near Glenville is located partly on the Ruston sandy loam.

The more nearly level areas of the type are valued at $20 to $25 an acre.

RUSTON FINE SANDY LOAM.

The Ruston fine sandy loam has the essential characteristics of the Ruston sandy loam, except that its texture is fine. The typical soil consists of a gray fine sand, underlain at 4 or 5 inches by a pale-yellow loamy fine sand which grades quickly into yellow to reddish-yellow, friable fine sandy loam. This substratum in turn passes into the yellowish-red fine sandy clay subsoil. The subsoil is frequently either faintly or conspicuously mottled with shades of red and, in places, gray. The material of the lower part of the 3-foot section is more or less plastic. While it sometimes represents an approach toward that of the Susquehanna fine sandy loam, the subsoil is more sandy and more friable than the typical Susquehanna subsoil.

Areas of the Ruston fine sandy loam occupy high divides and long, gentle slopes. Its drainage is good.

This soil comprises only a small area of the farm land of the county. It occurs mainly in the eastern section, in the vicinity of Nuckolls and Kite School. That near Nuckolls is forested, the timber consisting mainly of longleaf pine. This is one of the best upland soils in the county. Like the Ruston sandy loam, it is well adapted to the general farm crops of the region. It is a somewhat stronger soil than the Ruston sandy loam. The Ruston fine sandy loam is valued at about $15 to $25 an acre.

Orangeburg Series.

The soils of the Orangeburg series are prevailingly gray, ranging to reddish brown. The subsoils consist of red friable sandy clay. This series is confined to the uplands of the Coastal Plain, being most extensively developed in a belt reaching from southern North Carolina to central Texas. The soils are sedimentary in origin and, like the Norfolk soils, are derived from unconsolidated sands and clays. Only one type of the Orangeburg series, the Orangeburg sandy loam, is mapped in Russell County. It occurs mainly in the vicinity of Glenville.

Orangeburg sandy loam.

The Orangeburg sandy loam consists of a gray to grayish-brown loamy sand, underlain at about 6 to 8 inches by a reddish, friable sandy loam, which quickly passes into red, friable sandy clay. In places the subsurface material is yellowish rather than reddish. This type grades into the Ruston sandy loam in such a way that definite boundaries can not everywhere be drawn. It often contains gravel and iron concretions, and platy fragments of ironstone are sometimes present in the lower subsoil.

This soil is typically developed on the crests and upper slopes of the ridges and on the smoother broad drainage divides. Its drainage is everywhere thorough and on a few of the steep slopes excessive.

The largest bodies of Orangeburg sandy loam are in the southeastern part of the county, but small areas are encountered in other localities.

This is one of the best soils in the Coastal Plain for growing general farm crops, and is the best of the upland types in Russell County. However, the more hilly and sloping areas are badly eroded, and their reclamation is a difficult matter. In many places the sandy covering has been removed, leaving the sandy clay exposed. These areas are unproductive. In order to prevent extension of erosion in such areas it is necessary to keep them covered with Bermuda grass, carpet grass, or some other sod-forming grass, wherever possible. It may be necessary even to reforest the steeper slopes. Second-growth pine is a good tree for this purpose, since it

grows rapidly and is able to establish itself under rather adverse conditions. Upon the more gentle slopes which are now being cultivated certain precautions must be observed in the tillage of this soil. All experience points to the necessity of increasing the depth of plowing from the present average of 3 or 4 inches to 8 or 10 inches or more. Better practice is to plow across rather than up and down the slopes.

The Orangeburg sandy loam is used in this county principally for the growing of cotton and corn and some winter oats, and it probably gives the best results with these crops. A pecan nursery is located partly upon this type, and trees set upon it apparently make good growth. It is also used in some parts of the South for the production of peaches.

As in the case of most of the soils of this region which have fair drainage and a rather open structure, organic matter seems to be the greatest need, but the application of commercial fertilizers has a marked effect upon the yields of crops.

The value of considerable areas of this type is affected somewhat by their condition as regards erosion, but the more nearly level areas are valued at $20 to $30 an acre.

Susquehanna Series.

The Susquehanna soils are gray, ranging to reddish. The subsoils are mottled gray and red or gray, red, and yellow, and consist of plastic heavy clay. The general color of the subsoils varies, often being red, white, drab, yellow, and sometimes purple, although red practically always predominates, the other colors appearing only as mottling in the lower part of the soil section. The soils of this series are derived from beds of heavy clay, and in places are influenced by material from marl and shell limestone. The Susquehanna series is most extensively developed in the higher part of the Coastal Plain from the vicinity of Chesapeake Bay to central Texas. In Russell County this series includes five types, the gravelly sandy loam, sandy loam, fine sandy loam, very fine sandy loam, and clay. These are the most extensively developed soils in the county, comprising 41.3 per cent of its total area. They occur mainly in the southwestern part of the county.

Susquehanna sandy loam.

The Susquehanna sandy loam consists typically of a grayish loamy sand, underlain at an average depth of about 5 inches by a yellow or reddish-yellow friable sandy loam. This is underlain usually at a depth of about 7 to 12 inches by a red, plastic, waxy, sticky clay mottled with drab, like that underlying the Susquehanna fine sandy

loam. Frequently the surface soil contains large quantities of iron concretions and plates and fragments of iron-cemented sandstone. Some quartz gravel is also present. In a phase of the type, of relatively small extent, the surface and subsurface soil resembles that of the Norfolk sandy loam, and has a considerably deeper layer of sandy material over the clay subsoil than the typical Susquehanna sandy loam.

The surface features of this type are variable. Some areas are nearly level and others are very steeply sloping. In general, this type occupies the divides and slopes down to the streams. Some of the steeper slopes are badly dissected by erosion, and even the more gentle slopes have suffered considerably from washing. In places the surface covering of sand has been washed away, leaving the clay exposed. These clay areas are not of sufficient size to be shown on the map.

The natural growth consists of pine and some hardwoods. The cropping practice on the type is about the same as that on the Ruston sandy loam, but the yields are slightly lower. The soil is somewhat droughty.

The Susquehanna sandy loam has a large total area, and occurs in practically all parts of the uplands of the county. The better areas are valued at $10 to $15 an acre.

Susquehanna sandy loam, deep phase.—The surface and subsurface soil of the Susquehanna sandy loam, deep phase, resembles that of the Norfolk sandy loam, and there is a deeper layer of sandy material over the clay than in the typical Susquehanna sandy loam. This sandy material is also somewhat coarser than in the case of the main type.

This phase occupies some of the ridges and slopes near Colbert and is of relatively small extent. The greater part of it is not cultivated, as it is considered unproductive, principally because continuous cropping without any effort to maintain fertility has caused it to become deficient in organic matter. The better areas with heavy applications of commercial fertilizer give fair to good returns with cotton, corn, oats, and the other crops commonly grown.

SUSQUEHANNA GRAVELLY SANDY LOAM.

The Susquehanna gravelly sandy loam differs from the Susquehanna sandy loam chiefly in that it carries on the surface and throughout the surface soil large quantities of quartz gravel, ferruginous pebbles, and frequently platy fragments of ferruginous sandstone. In some areas the interstitial material is principally coarse sand.

In topography the gravelly sandy loam is more rolling than the sandy loam, the soil occupying chiefly slopes, knolls, and ridges. Along the river terraces it is encountered on many of the slopes from the terrace down to the streams. In such areas the surface material usually contains considerable coarse sand and is colluvial; that is, it has been brought down from the higher slopes by the forces of gravity and surface washing. This type includes patches of Susquehanna clay. In places the subsoil is chalky and brittle, with considerable purple mottling.

Much of this land can not safely be cultivated on account of erosion and its unfavorable topography. The best areas produce fair yields of cotton, but it is better adapted to pasturage. Bermuda grass, broom sedge, and a number of wild plants which can be used for grazing do well. The type occurs in the northern and eastern sections of the county.

SUSQUEHANNA FINE SANDY LOAM.

The Susquehanna fine sandy loam is a gray fine sand to loamy fine sand which passes at about 4 to 6 inches into pale-yellow loamy fine sand or light fine sandy loam, this in turn grading through either yellowish or reddish fine sandy loam into the clay subsoil at a depth of 8 to 12 inches, or directly into the stiff clay at 7 or 8 inches. The subsoil is a brick-red to dull-red or brownish-red, stiff, plastic clay which extends to a depth of 36 inches or more without any material change, except that the lower part is characteristically mottled red, gray, and yellow, and is somewhat stickier, owing probably to the higher moisture content. In places the lower subsoil carries a sufficient quantity of mica flakes to impart a greasy feel and a slight degree of friability. Quartz gravel is commonly scattered over the surface.

In many areas the surface sandy material is deeper than in the typical soil as described above. Here the clay is encountered at depths between 12 and 24 inches. Where this deeper surface soil is present the subsurface material usually consists of a yellow fine sandy loam similar to the fine sandy loam section of the corresponding member of the Norfolk series. Such areas are most common on the lower slopes where the soil is frequently deeper than on the intermediate and upper slopes and the crests of ridges.

The type includes many patches of Susquehanna clay too small to map, particularly on the steeper slopes where erosion has been most active. Another variation is found in the northern part of the county where there are several areas in which the upper subsoil ranges from brownish red to chocolate brown, while the deep subsoil is usually mottled bright red or deep red, gray, and yellow, although

in places it is yellowish brown. These areas have an almost level surface.

The Susquehanna fine sandy loam occupies fairly level to rolling country, and, except in some of the flat areas, drainage is well established. Where there is considerable slope excessive erosion has resulted in the abandonment of much of the type, which is now growing up in second-growth pine.

The construction and maintenance of broad terraces in areas of moderate slope, deeper plowing, and plowing with the contour instead of up and down the slopes, are steps to be taken in preventing washing of fields of this type.

The Susquehanna fine sandy loam occurs in practically every part of the upland section of the county. It is one of the most extensive types in the county. It is not very well suited to the production of special crops, such as truck and fruit, on a large scale, but these may be grown for home use. Good results are obtained with peanuts, watermelons, sugar cane, and sweet potatoes, especially on the deeper phases of the type.

For general farming land this type answers very well, giving fair yields of cotton, corn, and oats, but it does not equal the Norfolk, Ruston, or Orangeburg soils, being rather droughty, especially in the areas which have a shallow covering of the lighter surface material.

SUSQUEHANNA VERY FINE SANDY LOAM.

The surface soil of the Susquehanna very fine sandy loam is typically a gray very fine sandy loam which quickly passes into pale-yellow very fine sandy loam. The subsoil, beginning abruptly at 5 to 8 inches, is a red, plastic, heavy clay, mottled in the lower part with gray, yellow, and even purple colors. In some areas the predominating color of the subsoil is yellow or drab. Quartz gravel is commonly scattered over the surface.

In the vicinity of Uhland a phase of the type occurs in which the color of the upper subsoil varies from dark brownish red to chocolate brown, while the deep subsoil is usually mottled bright red or deep red, drab, and yellow, although in places it is yellowish brown. Between Uhland and Marvyn another variation is encountered, the subsoil here being a very dark slate color to almost black, mottled with dark red and blue. Those areas in which these two variations occur have a smoother surface than the typical soil, being almost level. The topography of the type as a whole is nearly level or undulating to rolling. On account of the fine texture and close structure of the material the subsurface drainage is inadequate, though on the steeper slopes the surface drainage is excessive. The covering of very fine sandy loam has been removed from some spots, leaving the clay ex-

posed. The type as mapped includes many patches of Susquehanna clay, and of gradational soils between the clay and very fine sandy loam, in which the depth of the soil is so variable that it is difficult to determine the proper classification of the land.

This type occurs in practically every part of the upland section of the county, and is the most extensive type mapped, constituting 11.1 per cent of the total area. Locally the type is called "hog wallow," especially where the covering of very fine sand is shallow. The forest growth consists largely of pine, oak, and hickory.

Owing to the impervious, dense character of the subsoil, this land is somewhat droughty in dry seasons, while in wet seasons crops are likely to suffer from excess of moisture. In years of only moderate rainfall good yields of cotton and corn are obtained, but during wet years practically no crop is made.

The few terraces constructed are entirely too narrow to hold the water, and where it once breaks through, if the damage is not immediately repaired, large gullies develop. These places are usually neglected, and their reclamation is impracticable. It is doubtful whether it is a good practice to terrace the land where it is farmed by the average tenant. On moderate slopes, running the rows horizontally—that is, with the line of contour—gives practically the same results and a break in the row can be easily repaired. However, terracing is effective where the terraces are broad enough not to break easily. Erosion may largely be prevented by growing winter cover crops to hold the soil together. Deep plowing also is beneficial. This type is in need of lime.

The Susquehanna very fine sandy loam is a better grass soil than cotton or corn soil. On fields which are lying out there is usually a heavy growth of native grasses. Lespedeza is becoming one of the most important hay crops on this type, and bur clover does well. Some included areas of Oktibbeha soil lying near Hurtsboro, in the subsoil of which lime concretions are found, probably could be used for the production of alfalfa.

Land of this type of soil has an average value of approximately $10 an acre.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of this type:

Mechanical analyses of Susquehanna very fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
414549	Soil	1.0	1.1	0.5	1.8	54.8	31.2	9.1
414550	Subsoil	.2	.2	.1	.6	19.6	21.4	57.9

SUSQUEHANNA CLAY.

The Susquehanna clay is a bright-red to dull-red, plastic, sticky clay, 10 to 15 inches deep, underlain by similar material mottled with drab, gray, and yellow. The surface material is identical with the subsoils of the other Susquehanna types, and really represents exposures of Susquehanna subsoil, as this type is a product of erosion. Where erosion of the original sandy covering has been incomplete the immediate surface material, to a depth of 1 to about 4 inches, may consist of a clay loam, sandy loam, fine sandy loam, or very fine sandy loam. In places quartz gravel is scattered over the surface. Large quantities of mica flakes are mixed with the clay of some areas.

In the vicinity of Hurtsboro small patches of clay are found the subsoil of which has practically the same range of texture as the typical soil, but contains varying quantities of white, chalky lime, usually in the form of nodules. Much of the subsoil is greenish gray. These represent areas of Oktibbeha clay which on account of their small size can not be satisfactorily shown on the soil map.

This type occurs mainly on steep and gentle slopes. Some areas have an almost level surface. These areas are hard to drain and are for the most part allowed to remain forested. Even on the slopes water stands in slight depressions for long periods, and it sinks with such difficulty into the soil that practically all the rainfall is lost in the run-off. The same condition leads to considerable erosion, and in the absence of vegetation the land becomes hopelessly gullied.

Extensive areas of the Susquehanna clay occur throughout the uplands of the county. It is called "hog wallow" or "clay lime" land.

The hilly lands and slopes are best suited for pastures, while all slopes susceptible of washing should be terraced or cultivated on the contour plan, if they are to be cultivated at all. The steeper slopes are not suited to the growing of intertilled crops. The greatest needs of this type are the application of lime, deep plowing at time of breaking, and the addition of vegetable matter.

Good yields of cotton are obtained from the better areas of this type during favorable seasons; during years of excessive rainfall or of insufficient rainfall the yields are low. Oats are used extensively as a winter cover crop. Owing to the danger of injury from drought corn is not grown extensively. The soil when inoculated is suited to the growing of bur clover and crimson clover.

This type is well adapted to use as pasture, and to that type of farming which is dependent on it, namely, stock raising. It supports a good growth of native grasses and, with the addition of lespedeza and bur clover, furnishes both summer and winter pasturage.

The streams, especially the smaller ones, that traverse the areas of this type, however, usually dry up during the summer, and provision will have to be made to supply the pastures with water.

The type is not valued very highly, some of the hilly lands selling as low as $1.50 to $3 an acre. The better areas are held at $6 to $10 an acre.

Henderson Series.

The Henderson soils are prevailingly yellow. The subsoils consist of greenish-gray or greenish-yellow, sticky, refractory clay. These soils are derived from limestones, and usually contain large quantities of weathered limestone fragments or marly material. Drainage is well established. The Henderson clay is the only representative of this series in Russell County. It is encountered in the vicinity of Uchee.

Henderson clay.

The soil of the Henderson clay consists of a greenish-yellow or olive-colored, plastic, waxy, heavy clay which in places extends to a depth of 3 feet without material change and in others is somewhat lighter in color in the lower depths or mottled with shades of gray and yellow, or gray, yellow, and red. Near the Susquehanna soils the surface soil of this type contains some Susquehanna material. There is considerable variation in the color of the soil at the surface. This type ranges in color from almost black, through brown, having a greenish cast, and olive to red, and in texture from heavy sandy loam or sandy clay to stiff, heavy clay. Fossil shells and fragments of limestone are abundant in some areas over the surface and throughout the soil section, while in places the subsoil contains small fragments of yellowish or olive-colored soft clay shale. This soil does not run together as in the case of the Susquehanna clay. In many places the loose soil has been washed away, and the underlying limestone rock is exposed. It is generally difficult to determine definitely the boundary between the Henderson clay and the Susquehanna soils occupying a higher position.

The material of this type in Russell County is largely residual from marl and shell limestone. Some of it seems to be derived from clay shales or at least shaly clay.

The type occupies low ridges and occurs also on slopes, extending from near the general upland level to the stream bottoms. A large part of the surface is steep and irregular. The type is encountered mainly among the Uchee hills on the south side of Uchee Creek, in the northwestern part of the county. The Henderson clay is locally called "black uplands" and "shell lands."

A part of the type is successfully used for the production of corn and cotton. The soil is very productive, and where it is handled in

such manner as to conserve moisture large yields of these crops are made.

Johnson grass is becoming an important hay crop. On the steeper slopes the growing of lespedeza, Bermuda grass, bur clover, and other grasses is an effective means of checking erosion.

On account of the large area of steep and broken lands included with this type, it is not valued very highly, being held at prices ranging from $3 to $10 an acre.

Cahaba Series.

The surface soils of the Cahaba series are brown, ranging to reddish brown, and the subsoils are yellowish red to reddish brown. Soils of this series occupy old stream terraces. They are largely above overflow and comprise the best drained land of these terraces. They are most extensively and typically developed in the Gulf Coastal Plain of Alabama and Mississippi. The soil material consists of wash from the Coastal Plain soils, with some admixture along the larger streams issuing from the Appalachian Mountains and Piedmont Plateau of material from the soils of those regions. Three members of the Cahaba series are encountered in Russell County, the sandy loam, fine sandy loam, and silt loam. These occur mainly on the terraces along the Chattahoochee River. The surface soils of this series in Russell County range to grayish in color.

Cahaba sandy loam.

The Cahaba sandy loam consists of a brownish-gray to reddish-brown sand or loamy sand which passes through a subsurface layer of yellowish or reddish sandy loam into yellowish-red to red friable sandy clay. Small mica flakes are often present in large quantities.

This type occurs on the terraces along the Chattahoochee River and in small patches along some of the smaller streams. It is prevailingly level, but on the older terraces where drainage lines have developed it occupies the crests and slopes of comparatively low, broad stream divides.

The Cahaba sandy loam is an excellent soil for cotton, corn, oats, and forage crops. Where plowed deeply, well supplied with organic matter, and moderately fertilized it produces from three-fourths to 1 bale of cotton, from 25 to 60 bushels of corn, and 25 to 65 bushels of oats per acre. The type is primarily in need of organic matter.

Cahaba fine sandy loam.

The soil of the Cahaba fine sandy loam consists of a loamy fine sand, varying in color from grayish to reddish brown. The subsoil is encountered at about 5 to 10 inches and consists of a dull-red,

moderately friable fine sandy clay to silty clay. The subsoil is not as friable as that of the Cahaba soils occurring on the higher and older terraces. The soil and subsoil usually contain large quantities of minute mica flakes, which give the material a slick feel.

The capillarity of both soil and subsoil is good and the general physical structure is highly favorable to the maintenance of good moisture conditions and good tilth.

The surface of the type is almost level, with slight swells. It occupies the lower, younger terraces of the Chattahoochee River, and a few small patches occur on terraces along other streams. The drainage is usually well established. A small part of the type is inundated during the highest floods.

This type is included in the area farmed principally by negro tenants. Corn, cotton, and some oats are the principal crops. While good yields of these are secured, with improved methods they could be materially increased. Cotton usually produces one-half to three-fourths bale and corn 25 to 40 bushels per acre.

In addition to these crops, crimson clover, bur clover, lespedeza, and, on those areas of the type having a deeper surface soil, sugar cane, sweet potatoes, and practically all of the crops ordinarily grown on the farms of the region succeed. Land of this type is valued at $15 to $75 an acre.

CAHABA SILT LOAM.

The typical Cahaba silt loam is a reddish-brown silt loam, underlain by yellowish-red to reddish-brown silty clay. In places, especially in the slight swales, the surface soil is a brown silt loam, while the subsoil varies to a yellowish-brown plastic clay. In a freshly plowed field the soil varies in color from brown in the swales to reddish brown on the slight swells. Mica is present in both soil and subsoil.

The type occurs in the lower part of the main lower terrace of the Chattahoochee River, which is subject to inundation during occasional high floods. The soil occupies a position intermediate between the more frequently overflowed and less completely weathered first-bottom soils, such as the Congaree silty clay loam and the typical Cahaba soils of the higher terraces, which are never overflowed. It therefore can not be considered as altogether typical Cahaba, and it sometimes grades into the Congaree silty clay loam in such a way that it is impossible to draw a definite boundary. In places it passes into the Cahaba fine sandy loam in the same indefinite manner. The terrace upon which this type is largely developed stands about 20 feet above the Congaree silty clay loam.

The Cahaba silt loam is, as a rule, in need of artificial drainage, which can be accomplished by means of open ditches and tile drains.

The greater part of the type is cleared and farmed by negroes under the supervision of overseers. There is a tendency on the part of these overseers to permit the land to be broken while too wet, especially in the spring when the progress of breaking has been retarded by rain or floods. This causes clodding, and in many cases these clods are present in sufficient quantity and size to interfere with the proper development of the cotton and corn plants. The same unfavorable cloddy condition may sometimes result from breaking the land while the soil is too dry. Applications of lime or ground limestone counteract the tendency to clod.

Corn, cotton, and oats are the principal crops grown. The yields are good in favorable seasons, the principal difficulty being in getting a stand. In many cases yields of three-fourths bale of cotton or 60 bushels of corn per acre are obtained without the use of fertilizers. Besides these crops, Johnson grass, lespedeza, and other grasses thrive. Where heavily limed and well drained, areas above overflow are capable of producing clover and alfalfa successfully. The value of the Cahaba silt loam ranges from $15 to $75 an acre.

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

Mechanical analyses of Cahaba silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
414507	Soil	0.1	1.5	2.4	14.1	20.9	47.8	12.8
414508	Subsoil	.0	.6	.7	3.8	11.6	38.3	44.9

AMITE SERIES.

The Amite soils are prevailingly brown. They range from brown to chocolate brown or reddish brown, and the subsoils vary from reddish brown to red. A substratum of water-rounded gravel is frequently encountered at a considerable depth. These soils occur on stream terraces, and the material from which they are derived is thus of alluvial origin. The areas lie above overflow. The Amite series is represented in this county by two types, the loamy coarse sand and the coarse sandy loam. These occur in close association with the Cahaba soils.

AMITE LOAMY COARSE SAND.

The Amite loamy coarse sand consists of a loamy coarse sand of a brownish color, becoming reddish brown or red at about 6 to 10 inches. This material extends to a depth of 36 inches or more without any

material change in color or texture, although in occasional areas the texture is somewhat heavier—close to a light coarse sandy loam.

Only a small total area of this soil is found in Russell County. It occupies high terraces along the river, and has a generally level surface. Although its texture is coarse and its structure loose, the run-off is not rapid, and there is little trouble in maintaining good moisture conditions.

The type has about the same range of crop adaptation as the Amite coarse sandy loam, but the tendency is away from growing corn and toward the production of late truck crops.

In the following table the results of mechanical analyses of samples of the soil and subsoil of the Amite loamy coarse sand are given:

Mechanical analyses of Amite loamy coarse sand.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
4145105	Soil	6.4	30.0	19.6	20.6	12.0	9.4	2.4
4145106	Subsoil	2.1	20.2	17.2	23.0	11.6	14.6	11.4

AMITE COARSE SANDY LOAM.

In its typical development the Amite coarse sandy loam consists of a dark reddish brown or brown coarse sandy loam, underlain at about 6 to 10 inches by dark-red coarse sandy clay. Frequently the soil is a brown loamy coarse sand, underlain at about 10 inches by a red, friable coarse sandy loam which passes into red, friable coarse sandy clay.

A variation from this description is encountered in slightly higher areas on the terraces—that is, on the occasional almost imperceptible swells. Here the soil is a grayish-brown loamy coarse sand, passing at a depth of 14 to 24 inches into dull-red or yellowish-red, friable coarse sandy clay. This lighter soil really represents areas of Cahaba coarse sandy loam too small to be separated on a map of the scale used in this survey.

The Amite coarse sandy loam occupies almost level areas on stream terraces, mainly the higher terraces of the Chattahoochee River. Drainage is well established, but where a normal content of organic matter is maintained in the soil no difficulty is experienced in keeping it well supplied with moisture.

The Amite coarse sandy loam is suited to the production of corn, oats, cotton, hay, and all other crops ordinarily grown in this section. Pecan trees on this type are in a thrifty condition.

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

Mechanical analyses of Amite coarse sandy loam.

Number.	Description.	Fine gravel.	Coarse sand	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
414501	Soil	8.6	24.0	13.6	21.7	13.4	13.1	5.7
414502	Subsoil	3.8	15.8	10.0	15.0	8.2	14.2	33.0

KALMIA SERIES.

The surface soils of the Kalmia series are gray, ranging to grayish yellow, and the subsoils are mottled gray and yellow. The series is developed along streams of the Coastal Plain region on terraces lying largely above overflow. It occurs most extensively in Mississippi and Alabama. The soils are formed largely of material washed from Coastal Plain soils, although along the larger streams issuing from the Appalachian Mountains and Piedmont Plateau more or less sediment from these regions is mixed with the deposits. In the better drained situations the subsoils are yellow, the soils of such areas resembling very closely the corresponding members of the Norfolk series. These soils are closely related to the Cahaba soils, differing mainly in their poorer drainage and the consequent less oxidized condition of the subsoils.

The Kalmia series in Russell County comprises six types, the loamy coarse sand, sand, fine sand, coarse sandy loam, sandy loam, and fine sandy loam. They occur on the stream terraces in all sections of the county.

KALMIA LOAMY COARSE SAND.

The Kalmia loamy coarse sand consists of a grayish coarse sand which passes at about 10 to 15 inches into yellow loamy coarse sand.

The type occupies well-defined stream terraces, some of which are 100 feet or more above the first bottoms, along the Chattahoochee River and Uchee Creek. It occurs in broad, level areas.

Although it has a coarse texture and loose structure to a considerable depth and is well drained, the soil, as a rule, is retentive of moisture. With liberal fertilization, good yields of cotton, sweet potatoes, and melons are obtained.

This type is not as productive as the corresponding member of the Amite series.

KALMIA SAND.

The Kalmia sand consists of a gray to yellowish-gray sand, underlain by pale-yellow to yellow sand or loamy sand which extends to a depth of 3 feet or more.

The type occupies level or undulating stream terraces, above overflow, along the river and the creeks of the county. It is not extensively developed.

The Kalmia sand is adapted to about the same crops and has about the same value as the Norfolk sand, which it resembles very much in color and texture. It produces somewhat better yields than the latter type because it is a little more retentive of moisture.

KALMIA FINE SAND.

The Kalmia fine sand is a gray or grayish-brown fine sand, underlain by yellowish-gray or pale-yellow fine sand, resting below 30 inches on gray material of the same texture.

This type occupies undulating or gently sloping stream terraces and bottoms lying above overflow. The drainage is usually good, but in places the water table lies relatively near the surface and the lower subsoil has a high moisture content. Owing to the high percentage of very fine sand in both soil and subsoil, the entire soil mass is inclined to become compact.

Under proper management the soil is easily cultivated, and it gives better yields than the somewhat similar upland type, the Norfolk fine sand. Corn, forage crops, melons, potatoes, and a number of vegetables do well upon it.

KALMIA COARSE SANDY LOAM.

The Kalmia coarse sandy loam is a gray or grayish-brown to brown loamy coarse sand, underlain at about 6 to 10 inches by coarse sandy loam, which ordinarily grades at 15 to 20 inches into friable coarse sandy clay.

The type occupies high and level stream terraces along the Chattahoochee River and Uchee Creek. The drainage of both soil and subsoil is good, and if the supply of organic matter is kept up the moisture conditions will be favorable. A coarse texture and loose structure make cultivation easy, and many farmers prefer this and other like soils on this account.

The crops grown are practically the same as on the Kalmia sandy loam. The type has a slightly lower value than the Kalmia sandy loam.

Below are given the results of mechanical analyses of samples of the soil and subsoil of this type:

Mechanical analyses of Kalmia coarse sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
414521	Soil	4.0	19.6	18.0	29.5	13.8	12.3	3.1
414522	Subsoil	3.4	16.6	14.9	24.2	11.2	15.6	14.4

KALMIA SANDY LOAM.

The Kalmia sandy loam consists of a gray to brownish-gray sand, underlain at about 5 inches by a pale-yellow loamy sand to sandy loam, which passes at 10 to 15 inches into yellow, friable sandy clay, sometimes mottled with gray in the lower depths, particularly where the drainage is not well established. The surface soil is darker in these poorly drained situations.

The type occupies flat areas on stream terraces along the Chattahoochee River and many of the creeks. The drainage is good, except in low-lying areas, where artificial drainage is necessary if good results with crops are to be obtained.

The Kalmia sandy loam is a good general purpose soil, giving fair yields of cotton, corn, oats, and hay. It may also be used successfully for growing vegetables, such as watermelons, Irish and sweet potatoes, tomatoes, peas, and beans. Pecan trees do well on the higher, well-drained areas. As with the fine sandy loam, the lower lying areas are best used for lespedeza, sugar cane, and grasses.

Most of the type has been under cultivation for years, being used principally for cotton. The clean cultivation which is given this crop prevents the growth of vegetation and the consequent addition of plant debris, and the open structure of the soil hastens the decay of that already present. There is therefore a general lack of this important soil constituent, and the productiveness of the type is considerably increased by adding organic matter. The Kalmia sandy loam ranges in value from $8 to $30 an acre.

KALMIA FINE SANDY LOAM.

The Kalmia fine sandy loam consists of a gray fine sand, underlain at 4 to 6 inches by a pale-yellow loamy fine sand. This grades through yellow fine sandy loam into yellow, friable fine sandy clay. In poorly drained areas the subsoil is usually mottled with gray.

The type occurs in flat areas or on terraces along the Chattahoochee River and many of the creeks in the county. It is fairly well drained,

as a rule, but there are some low-lying areas in which artificial drainage is necessary. These places almost always support a growth of gallberry bushes.

Cotton, corn, oats, and hay are grown, but the yields, owing generally to poor methods, are low. In some localities cotton has been the principal crop for many years, and the supply of vegetable matter in the soil is consequently low. In order to secure best results on this type it is necessary to follow some system of crop rotation, including an occasional leguminous crop to be turned under for green manure. On the lower lying areas the growing of sugar cane for sirup, and lespedeza and several grasses for grazing, and hay crops probably would be a better use of the land than the growing of cotton and corn. Pecan trees apparently do well on the higher well-drained terraces along the river.

Leaf Series.

The surface soils of the types included in the Leaf series are light gray to gray. The subsoils characteristically consist of gray or mottled gray and yellow, compact silty clay, which grades downward into mottled red and gray or red and yellow plastic impervious clay. Iron concretions are common on the surface. These soils are developed on stream terraces in the Coastal Plain region.

The Leaf series is represented by three types in Russell County—the sandy loam, fine sandy loam, and clay. These types have almost the same range in subsoil color as the corresponding upland soils of the Susquehanna series.

LEAF SANDY LOAM.

The Leaf sandy loam consists of a gray loamy sand changing at about 5 inches to a pale-yellow sandy loam, which is underlain at a depth of about 8 to 15 inches by the subsoil consisting of a mottled drab or dark-drab and red clay of extreme toughness and plasticity. In places the red mottling gives way to yellow with increase in depth. In fact, the subsoil may have practically the same range of color as the subsoil of the Susquehanna sandy loam. The clay subsoil of the Leaf sandy loam, however, is stiffer and more tenacious than even the most plastic portions of the Susquehanna clay material.

This type occupies more or less undulating stream terraces along the river and the creeks of the county. In places it occurs in slightly depressed situations on the terraces, where the drainage is not well established.

During favorable seasons fair yields of cotton, oats, and hay are obtained, with the use of commercial fertilizers or stable manure in liberal quantities. Crops suffer from drought in dry seasons, but this

condition is largely remedied by incorporating liberal quantities of organic matter with the soil.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Leaf sandy loam:

Mechanical analyses of Leaf sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
414505	Soil	3.8	12.4	8.8	26.8	27.0	16.4	4.7
414506	Subsoil	.1	1.4	1.4	10.2	14.6	21.2	50.7

LEAF FINE SANDY LOAM.

The Leaf fine sandy loam characteristically consists of gray to dark-gray or nearly black fine sand or loamy fine sand which quickly passes into yellow or grayish fine sandy loam, this in turn being underlain at about 6 to 12 inches either by mottled yellow, drab, and red plastic clay or by yellowish, moderately plastic fine sandy clay, which grades into a mottled gray, yellow, and red plastic clay. There are many included patches, usually in the higher areas, in which the material consists of a grayish fine sand or loamy fine sand, underlain at about 18 to 20 inches by a yellowish or mottled yellow and gray fine sandy loam, which passes within the 3-foot section into mottled yellow and gray fine sandy clay, usually showing some red mottling. The soil in the more poorly drained situations is always darker colored than that of the higher, well-drained areas. Along the foot of the uplands there are frequently strips of colluvial soil in which the clay subsoil lies at greater depths than is typical.

This soil occurs on nearly level stream terraces which stand above overflow. There are slight inequalities in the surface, but these are not conspicuous. The drainage is not so well established as that of the corresponding Kalmia type on account of the greater imperviousness of the heavy clay subsoil. On this account the soil is not so productive as the Kalmia fine sandy loam. The terrace on which this type is developed is not always separated from the associated streams by first bottoms, but has a second-bottom position even along stream banks, the streams having cut deep channels capable of carrying the water of even the highest floods.

While the type is developed in all parts of the county, the most extensive area occurs along Hatchechubbee and Cowikee Creeks and their tributaries. In this section the type comprises some of the best farm lands.

The Leaf fine sandy loam is fairly well suited to the production of cotton, sugar cane, corn, peanuts, sorghum, and lespedeza, but the

yields are subject to considerable fluctuations from year to year as the result of variations in rainfall. In wet years yields of cotton are poor, while in dry seasons corn suffers severely. The greater part of the type, particularly that which has a dark-gray to black surface soil, needs artificial drainage. The application of lime is beneficial. Plowing under occasional crops of cowpeas has been found advantageous. The land of this type has a value of about $10 to $25 an acre.

LEAF CLAY.

The Leaf clay consists of yellowish-brown to brown clay, which passes at about 3 to 5 inches into a dull-red, stiff, plastic clay, faintly mottled with brown and yellow.

The type occupies flat areas on the terraces of the Chattahoochee River. Its total area in this county is small. The agricultural value of the type is low. Where it is cultivated, hay is the best crop.

The results of mechanical analyses of samples of the soil and subsoil of the Leaf clay are given in the following table:

Mechanical analyses of Leaf clay.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
414523	Soil	0.6	1.3	2.1	17.2	21.0	38.2	19.8
414524	Subsoil	.4	.4	.9	6.2	7.7	21.3	63.1

MYATT SERIES.

The Myatt soils are gray. The subsoil ranges from a gray to mottled gray and yellow, practically impervious clay. These soils occupy the poorest drained areas in the Coastal Plain stream terraces. They are mainly above overflow, but the surface is so flat that they are inundated for long periods after heavy rains. They are closely associated with the Cahaba and Kalmia soils, and are composed of old alluvium consisting of Coastal Plain material. Two types of the Myatt series are mapped in Russell County—the sandy loam and the fine sandy loam. Neither of these is extensively developed.

MYATT SANDY LOAM.

The Myatt sandy loam is a gray loamy sand to sandy loam, underlain at 6 to 10 inches by gray or drab sandy clay, mottled with yellow. The lower subsoil in typical areas is a plastic sandy clay, usually mottled with gray or drab and yellow. Frequently the immediate surface material is dark gray to black.

The type occupies poorly drained areas on stream terraces, usually in small basinlike depressions.

Water usually stands on these areas for long periods, and for this reason the agricultural value of the type is low. Their best use is as pasture. With thorough drainage the soil is capable of producing fair yields of corn and hay.

MYATT FINE SANDY LOAM.

The Myatt fine sandy loam is a gray to dark-gray loamy fine said, underlain at about 5 to 10 inches by gray or light-gray sand or loamy fine sand. This continues to a depth of 15 or 20 inches, grading into mottled yellow and gray or light-gray fine sandy clay, which has a moderately friable to moderately plastic structure, and is usually wet.

The type occupies poorly drained, flat areas and slight depressions on low stream terraces. It has only a comparatively small total area, and occurs along the creeks in the central and southern parts of the county.

In its present condition the Myatt fine sandy loam has a low agricultural value, but with proper drainage it is a suitable soil for corn, cotton, oats, watermelons, and grasses. Lespedeza does well. Very little of the type is cleared. The soil is in an acid condition, and the addition of lime should be made a step in its reclamation for agriculture.

CONGAREE SERIES.

The types included in the Congaree series have brown to reddish-brown soils and subsoils, there being comparatively little change in color, structure, or texture from the surface downward, though occasionally grayish and yellowish mottling is encountered in the subsoil of poorly drained areas. These soils are developed in the overflowed first bottoms of the streams of the Piedmont region and in similar positions in the Coastal Plain along streams issuing from the Piedmont. The material is derived as wash from the soils of the Piedmont region, with some admixture of Appalachian material, and in the Coastal Plain a slight mingling of Coastal Plain material. The soils are usually poorly drained. The Congaree series is represented in this county by a single member—the Congaree silty clay loam—which is developed only along the Chattahoochee River.

CONGAREE SILTY CLAY LOAM.

The Congaree silty clay loam is a reddish-brown silty clay loam which either continues downward without much change throughout the 3-foot section or grades into brownish or yellowish tough clay. The surface has much the same appearance as that of the Cahaba silt

loam, which is usually above overflow, but is slightly darker. In places the Cahaba silt loam adjoins this type, and it is difficult to draw a definite line of separation. Large quantities of mica flakes are present throughout the soil section.

The type occupies the first bottoms of the Chattahoochee River, where overflows are of frequent occurrence. As a rule the surface is fairly level, but in places it is undulating and may even embrace successive rises or terraces where the bottoms extend over a large area. Aside from overflows, drainage is usually well established, though in some cases the construction of ditches is advantageous.

Corn, cotton, and Johnson grass are the principal crops. Cotton has a tendency to grow too much weed, but in spite of this fact yields of one bale per acre are sometimes obtained during favorable seasons. Lespedeza forms a good hay crop on this type. The value of the Congaree silty clay loam ranges from $15 to $65 an acre.

Ocklocknee Series.

The Ocklocknee soils are prevailingly brown, ranging to dark gray. The subsoils are brownish or mottled brownish, yellowish, and gray. This series comprises the darker colored soils of the first bottoms of Coastal Plain streams. The soils are composed mainly of wash from the Coastal Plain soils. They are generally subject to overflow. The Ocklocknee sandy loam, fine sandy loam, and silty clay loam are encountered in Russell County. They occur in all parts of the county.

OCKLOCKNEE FINE SANDY LOAM.

The typical Ocklocknee fine sandy loam is a light-brown to yellowish-brown fine sandy loam, underlain at variable depths by a mottled yellowish and drab or yellowish-brown and gray to light-brown, heavy fine sandy loam to fine sandy clay. As mapped, the surface soil varies from a dingy-gray to brown fine sandy loam to loam, while the subsoil varies from fine sand to silty clay, frequently consisting of alternating strata of material of varying color and texture. There are also some included patches of Bibb fine sandy loam, a poorly drained soil having a light color.

This type occupies overflowed first bottoms. Between overflows the greater part of the type has fair to good drainage and can be cultivated, and by ditching nearly all of it could be utilized for farming. It is well suited to the production of corn, hay, and sugar cane. A number of wild grasses and lespedeza thrive upon it.

The forest growth consists of sweet gum, bay, pine, magnolia, willow, alder, black gum, and poplar, with an undergrowth of vines, briers, and switch cane.

OCKLOCKNEE SANDY LOAM.

The Ocklocknee sandy loam is essentially the same as the Ocklocknee fine sandy loam, except that it has a finer texture and includes, as mapped, a greater variety of material which does not conform with the typical soil. In addition to spots of fine sandy loam, sand, and fine sand, there are strips of heavier soil along the foot of the uplands composed of colluvial wash from the higher areas, including some material from the Henderson clay. The largest areas of this type occur along Uchee Creek. Corn and hay are the crops giving the best results on the Ocklocknee sandy loam. A number of wild grasses, switch cane, and lespedeza make a luxuriant growth. Sugar cane does well.

There are some areas in which the drainage is not well established and upon which water stands for long periods. These areas are "crawfishy", and ditching is necessary before they can be cultivated profitably, except to lespedeza and other moisture-loving plants. Such areas represent patches of Bibb sandy loam.

OCKLOCKNEE SILTY CLAY LOAM.

The Ocklocknee silty clay loam is much more variable in the character of its material, especially the subsoil material, than any of the upland or terrace soils. The surface soil, extending to a depth of about 5 to 10 inches, is a brown or mottled brown and rusty-brown silt loam to silty clay loam, while the subsoil is usually a plastic silty clay of a mottled gray or drab and yellow color. In some places the rusty-brown silty clay continues throughout the 3-foot section. In other places the subsoil varies from reddish coarse sand to grayish or yellowish sand or sandy loam, interstratified with layers of brownish, silty material.

There are some included strips adjoining the Henderson clay in which the soil has been markedly influenced by wash from the Henderson. These strips are too small to be shown separately on the soil map. They consist of black silty clay, underlain by mottled gray and yellow, sticky, plastic clay, and include spots of fine sandy loam, loam, or silty clay loam, underlain by drab to greenish-yellow clay. Such included areas represent Trinity soils and are colluvial in origin.

The Ocklocknee silty clay loam occupies overflowed first bottoms, but the highest areas are above overflow from the average freshets, so that they may be completely submerged only once in a period of two or three years, or even at longer intervals. The drainage is usually poor, especially in those areas that adjoin the streams. Here swales and secondary stream channels have been washed out in times of flood, and water sometimes stands in these depressions for long

periods. Numerous small swampy areas also occur within the type, but these differ from the typical soil only in their very poor drainage.

In order to drain successfully the wetter areas of this type it is necessary to straighten the stream channels, so that the high waters may be removed rapidly. This can be done only at considerable expense, and it is doubtful whether the value of the land at present would justify the undertaking.

The wet areas of this type support a dense growth of switch cane, which furnishes pasturage for cattle and horses during the winter. They also support a growth of bay, magnolia, black gum, tupelo, sweet gum, and other moisture-loving trees.

Higher portions of the type are partly cleared and have long been used for growing corn and cotton. During favorable seasons and with good cultivation yields of three-fourths bale of cotton and 40 to 80 bushels of corn per acre are not uncommon. Crops do not suffer from drought so much as from excessive rainfall. Grass also does very well on the type. It is well adapted to lespedeza.

The productiveness of the type may be increased by drainage and the application of lime in comparatively large quantities. Even those strips where the material has been washed down from the Henderson clay—a soil derived from limestone—are acid, as shown by the analysis of a sample taken from such a position.

Since the Ocklocknee silty clay loam is largely included in the lowlands and is sold in connection with other soils, it is impracticable to estimate its value. The relatively high yields of cotton and corn obtained upon this alluvial type are enough to show that it is one of the more valuable soils of the county where it is properly drained and farmed.

Miscellaneous Material.

MEADOW.

Meadow consists of poorly drained overflowed first-bottom alluvium. The material is extremely variable; in fact there is too much variation to admit of any definite classification of the material. Meadow is differentiated from Swamp mainly on a basis of the moisture conditions. At present the land is used only for pastures.

RIVERWASH.

The material mapped as Riverwash is a white to reddish fine to medium sand which shows little change within the 3-foot section. It consists of recent stream deposits, laid down as slight hummocks and swells over the first bottoms. A small part of it is being cultivated, but for the most part it is unproductive.

MUCK.

Muck consists mainly of dark-brown to black, partially decomposed, vegetable remains, ranging in structure from pasty to somewhat fibrous. There is an admixture of soil and in places a thin overwash of Ocklocknee material, chiefly silt loam.

The Muck areas occur in very poorly drained stream bottoms. They remain in a very wet condition throughout the year and have a quaky, miry character. This land supports a growth of bay, magnolia, black gum, swamp pine, bamboo vines, and ferns.

Muck is not cultivated in this county, but with proper drainage it is a cultivable soil. Owing to its miry nature it can not be used to any great extent for pasture.

SUMMARY.

Russell County is located along the eastern State line of Alabama. It has an area of 655 square miles, or 419,200 acres.

The topography in general is undulating to rolling, but there are hills rising 600 feet above sea level. The general slope is from the north to the south.

Tributaries of the Chattahoochee River drain most of the county, a single tributary of the Alabama River caring for a small part of the run-off in the northwestern corner.

Russell County was established in 1832. It developed rapidly until about 1860, but since the Civil War progress has been comparatively slow. The land is mainly held in large tracts and farmed by negro tenants. According to the 1910 census the population is 25,937. Girard, the largest town, has a population of 4,214, Hurtsboro about 1,000, and Seale, the county seat, 312.

The county is traversed by two railroads, the Central of Georgia and the Seaboard Air Line, which afford good transportation facilities.

The climate of Russell County is marked by short, mild winters and long, warm summers. The average annual temperature is about 65° F. The mean annual precipitation is 52 inches. The growing season has an average length of 240 days.

There are 266,784 acres in farms, of which 163,440 acres are improved. The average size of the farms is given as about 90 acres, each tenancy being classed as a farm. Approximately 80 per cent of the farms are operated by tenants.

Cotton, corn, oats, and hay and forage crops are the leading crops, with sugar cane for sirup and vegetables of secondary importance.

Cotton is the money crop, and occupies the greatest acreage of any crop grown. Corn is next in importance, with an acreage about one-half that of cotton.

Farm values range from $3 to $75 an acre, with the average price about $10 an acre. The average assessed value as given by the census was $8.91 an acre in 1910 and $4.94 in 1900.

The upland soils are derived from consolidated and unconsolidated Coastal Plain deposits. The Orangeburg, Norfolk, and Ruston series include soils derived from unconsolidated beds of sand and sandy clay. The Susquehanna soils are derived from beds of heavy clay and, in places, are influenced by material from marl and shell limestone. The Henderson soils are derived from shell limestone and marl.

The heavier of these soils are suited to use in the production of the general farm crops; the lighter in texture, though not utilized in this way commercially in Russell County, have been proved in other southern areas to be valuable trucking and fruit-growing soils.

The stream-terrace soils, including the Cahaba, Kalmia, Leaf, Amite, and Myatt, are composed of old alluvium derived either wholly from Coastal Plain upland soil or from a mixture of Coastal Plain and Piedmont material.

The question of drainage is of greater importance in determining the value of the terrace soils than of the upland soils, but aside from this the soils are texturally adapted to the same range of crops as the upland types. Many of the terrace soils are valuable farming types and somewhat more productive than the Norfolk or Ruston soils of the same class.

The first-bottom soils consist of Piedmont material mixed with Coastal Plain and other material along the Chattahoochee River (Congaree soils) and material washed from Coastal Plain uplands along some of the smaller streams (Ocklocknee soils). Meadow, Riverwash, and Muck represent undifferentiated first-bottom alluvium.

The Congaree and Ocklocknee soils are naturally productive but are subject to overflow, making crops more or less uncertain. The other river-bottom types in their present condition are nonagricultural.

The soils of Russell County are generally in need of lime and organic matter.

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[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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