



the Indian War. Daleville was chosen as the first county seat, but in 1845 it was removed to Newton and to Ozark in 1869. The settlement of the county began in the early twenties by emigrants from North and South Carolina, Georgia, and other eastern States. The development of the county has been gradual, with no sudden influx of immigrants. The present population is 21,608.

Ozark, the county seat, is situated about 20 miles northwest of the center of the county. It is on the main line of the Atlantic Coast Line Railroad, 90 miles southeast of Montgomery and about 300 miles from Jacksonville and Savannah, the latter being the principal export market. A branch line of the Central of Georgia Railway has its terminus at Ozark, which forms a competing line to Atlanta and Montgomery, the principal markets. Ozark is the largest town in the county and has a population of 3,647. It is equipped with electric lights, waterworks, sewerage, and other modern conveniences. The county high school is also located here, with its advantages for higher education. Ozark is rated as one of the substantial business towns in southeast Alabama.

Daleville, Newton, Pinckard, and Midland City in the southern part and Ariton in the northwestern corner of the county are the other principal towns. Other trading and shipping points include Waterford, which is the junction of the main line and Elba branch of the Atlantic Coast Line Railroad; Grimes, which is the junction of the Abbeville branch of the same railroad; Kelly Station or Douglas, Gerald, Haw Ridge, Clayhatchee, Ewell, Dillards, Skipperville, Mabson, Bertha, and Echo. The Baptist Collegiate Institute, with an average annual attendance of about 500 students, is located at Newton. Country stores conveniently located throughout the county supply the local needs of the communities in which they are located. The rural telephone and rural free delivery of mail have done much in recent years to develop the agricultural interests, placing the farmers in daily communication with the local and foreign markets, and enabling them to secure the highest prices for their products.

Transportation facilities are fairly adequate in the central and southern parts of the county, but in the eastern section the products have to be hauled long distances to market, Ozark being the center of trade. Haw Ridge, in the western part, and Clayhatchee, in the lower part of the county, have no railroad facilities. Some attention is being given to the construction of sand-clay roads, which considerably reduce the cost of marketing the products from the more remote sections.

The facilities for water power and the development of electricity for industrial purposes offered by the various rivers and creeks have received but little attention up to the present time. Some surveys

have been made along the course of Choctawhatchee River, with a view of utilizing the power thus awaiting development, but so far no electrical plants have been built.

Before the Atlantic Coast Line Railroad was built the principal markets were Troy, Eufaula, and Pensacola. But in recent years Montgomery, the State capital, has been receiving the bulk of the trade from this section.

The topographic features of Dale County are somewhat variable. The eastern and southern sections are cut by the Choctawhatchee River and its tributaries, while the northwest corner is drained by Pea River and its tributaries. The entire northern half of the county is gently rolling to hilly, especially the northeast section, which is made up of broken ridges. Here in many places gullies have been eroded to considerable depths, giving rise to the numerous springs which feed tributaries of the Choctawhatchee and Little Choctawhatchee Rivers. The southern half of the county consists of slightly rolling ridges to comparatively flat and level areas. Probably one of the most noticeable features is the flat, terracelike areas which border the stream courses in this section.

The general direction of the drainage of Dale County is toward the southwest. The East Fork of the Choctawhatchee River divides the eastern portion of the county into two main watersheds, lying between Little Choctawhatchee on the south and the main branch of the Choctawhatchee River on the west. The drainage of the southern divide is about equally distributed between Little Choctawhatchee and the East Fork of Choctawhatchee River. The drainage water from the northern divide has a general course into both the East Fork and main stream of Choctawhatchee River. The drainage of the western, central, and southwestern portions of the county has a general southerly direction into the Choctawhatchee. A small portion of the northwestern section of the county is drained by Pea River and its tributaries. Clay Bank Creek, which is fed by Strippling, Cowpen, Bowles, Bear, and Little Clay Bank Creeks, has an almost due south direction and drains the western section of the county. Another stream of considerable importance is Judy Creek, which is fed by Little Judy and its tributaries. This stream flows in a south or southeasterly direction and bisects the divide between the Choctawhatchee and Clay Bank Creek. The Central of Georgia Railway from Ozark until it leaves the county traverses the watershed between Judy and Bear Creeks, while in the northern half of the county the Atlantic Coast Line Railroad follows the course of Bear Creek from Ozark to Arifton, while to the south of Ozark the Atlantic Coast Line Railroad is located on the divide between Clay Bank Creek and Choctawhatchee River.

## CLIMATE.

The proximity of the Gulf of Mexico reduces to some extent the extremes of summer and winter temperature, but in general the summers are long and hot. June, July, August, and September have a mean monthly temperature of 80° F. The winters are usually mild, the minimum winter temperature being generally 10° to 12° F. Zero weather is almost unknown. Occasionally a cold wave from the north causes a sudden drop in the temperature, the duration of which, however, is rarely more than three days.

The mean annual precipitation is 51 inches, with a summer mean of 16.2. Showers during the growing season, when rain is most needed, constitute the greatest rainfall. The fall mean is the lowest, a condition which is especially favorable for harvesting crops. If more attention were given in the tillage of the soil to the conservation of the moisture the rainfall would at all times be adequate for all crops of the area. Heavy rains are a source of injury to the fields. Terracing would prevent the usual washing and gulying during the winter season, when the precipitation is generally heavy. The growing of winter cover crops would retard erosion and at the same time be the means of increasing the water-holding capacity of the soil if turned under as a green manure in the spring of the year.

Even during the coldest periods the soil rarely freezes to more than an inch or two in depth, and plowing can be done all through the winter. The growing season is long enough for the maturing of two plantings of many crops. Corn is usually planted about the first of March; the cotton planting season extends from the last of March to the first of May. The climate is especially favorable to the growing of cotton, corn, oats, rye, vetch, and clover. Trucking and tobacco may also be included in the list of products, though at present the extent of their production is limited to local consumption. The county in general is healthful. There is an abundance of good water supplied from artesian wells, springs, or dug wells, and in general the conditions favor the development of a very profitable and widely diversified agriculture.

The following table shows the mean annual and monthly temperature and precipitation, as well as the maximum and minimum, with other data, as recorded by the Weather Bureau station at Eufaula, Ala., which is the nearest to the area. The data given represent fairly well the climatic conditions in Dale 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.	Snow, average depth.
	° F.	° F.	° F.	Inches.	Inches.	Inches.	Inches.
December.....	49	82	10	4.0	3.4	5.1	0.0
January.....	47	81	12	3.8	3.5	4.3	0.1
February.....	50	81	-4	6.7	5.6	7.2	0.5
Winter.....	49			14.5	12.5	16.6	0.6
March.....	59	88	21	6.1	3.9	7.8	0.0
April.....	66	92	30	2.7	2.3	3.7	0.0
May.....	74	101	42	3.2	3.1	5.7	0.0
Spring.....	66			12.0	9.3	17.2	0.0
June.....	79	101	52	3.9	3.7	2.6	0.0
July.....	81	104	56	6.7	10.2	3.1	0.0
August.....	80	103	63	5.6	1.9	10.1	0.0
Summer.....	80			16.2	15.8	15.8	0.0
September.....	76	100	39	3.0	2.0	11.4	0.0
October.....	66	94	30	2.5	2.7	1.9	0.0
November.....	54	83	23	2.9	4.0	1.1	0.0
Fall.....	65			8.4	8.7	14.4	0.0
Year.....	65	104	-4	51.1	46.3	64.0	0.6

Average date of first killing frost in autumn, Nov. 9; of last in spring, Mar. 14. Date of earliest killing frost in autumn, Oct. 25; of latest in spring, Apr. 1.

## AGRICULTURE.

The agriculture of Dale County is centered upon the staples, cotton and corn, although in recent years stock raising has assumed considerable importance. In the early days of settlement this was the leading industry. At that time the stock was allowed to range at will and was of an inferior grade, but with the introduction of better methods of farm management a higher grade of stock is being raised, which is being fattened upon crops grown often in rotation with cotton and corn, thus developing a system of crop diversification favorable to the maintenance of better soil conditions.

The agricultural development of the county dates back to the early twenties, when the first settlers cleared only enough ground to supply the home with corn, potatoes, oats, tobacco, rice, cotton, wheat, and vegetables. At this time there was little incentive to produce a surplus of any of these commodities, since they had to be

hauled long distances in oxcarts to market. The cotton grown was ginned by hand and made into homespun clothing. Wool was used in the same way.

The real agricultural development, which began much later, has followed slowly upon the clearing of the forests, though in recent years it has not by any means kept pace with deforestation. The greater part of the merchantable timber has been removed, and the number of acres of improved farms is considerably less than half the total area of the county. The introduction of the cotton gin caused an extension of the acreage devoted to that crop, so that in a few years it became the leading staple, which distinction it still holds, although corn, oats, peanuts, hogs, and cattle have also become important products. The production of cotton in the past has been limited largely by the supply of labor or the ability of the planters or tenants themselves to cultivate and gather the crop. Corn has always ranked next to cotton as a money crop.

The lower portions of the county or "piny woods" upland were considered not only unproductive but unhealthful as well, and it was not until commercial fertilizers had been tried and proved profitable that this section of the county began to be settled. In recent years the lands have been cleared and now include some of the most productive and valuable farms in the county. Improved methods of cultivation have also aided in this development.

In 1880 the number of acres in improved farms was 72,465, as compared with 116,566 acres in 1890 and 148,763 acres in 1900. The census of 1900 showed that only 51.5 per cent of the farms were operated by the owners. The expenditure for fertilizers in 1879 was \$27,069, as compared with \$91,523 in 1889. The census of 1900 showed a reduction in the cost of fertilizers, the total being \$78,340, which exceeds the amount expended for labor by \$26,560.

The farm work is done principally by the owners or their families and tenants. Both white and negro tenants and laborers are employed, the average wage being from 50 cents to \$1 a day, or 50 cents to 75 cents per 100 pounds for picking cotton. The lands are usually rented upon a share basis, in which case the landlord furnishes the tools and stock and half the seed and fertilizers, the returns being divided equally. In some instances a cash rent of \$2.50 to \$4 an acre is paid.

In the interest of higher prices efforts have been made from time to time to limit the production of cotton, but as the crop serves to secure all rentals and liens it is practically impossible to control it.

The value of the peanut for fattening hogs and the ease with which the crop is made has led to its cultivation upon practically every farm in the county, even by tenants who only rent their places for a year at a time. The peanuts are seldom gathered, except

what seed is required for use the following year, but hogs are turned into the fields and allowed to forage for themselves. Peanuts are usually planted in rows between the corn and cultivated with the latter crop. In some instances they are planted in the cotton middles, but the advisability of this is questioned, unless the bunch or Spanish variety is used. It is said that the running varieties consume too much of the fertilizer intended for the cotton. Peanuts are also sown broadcast and the tops, together with crowfoot and other grasses, cut for hay, producing from 1 ton to 1½ tons of nutritious feed for stock to the acre.

Some attention is being given to crop rotation, but the practice is largely confined to the smaller farms, where the owners cultivate their own land. The tenants follow almost exclusively the one-crop system, the only rotation ever practiced being the substitution of corn for cotton occasionally. Almost no attention has been given to the planting of winter cover crops, which not only aid in conserving the moisture but also tend to prevent the land from washing during the rainy season. When turned under as green manures, they serve as valuable fertilizers by increasing the amount of humus and nitrogen in the soil. The winter cover crop also makes excellent forage or pasturage. Hairy vetch grown with some of the winter cereals, as oats or rye, is especially commended for this purpose. The largest returns from the application of commercial fertilizers can only be obtained when sufficient humus is present in the soil. By turning under winter cover crops, oat stubble, cotton stalks, weeds, grasses, cornstalks, pea vines, and velvet beans the supply can be economically maintained.

The practice of planting cowpeas between the corn rows and sowing broadcast after oats for hay has been largely discontinued in the last few years, on account of the blight or wilt which affects subsequent crops of cotton on such land. Some have taken the precaution to use the Iron cowpea, which is immune to root knot.<sup>1</sup>

The productiveness of the soils of Dale County is maintained largely through the use of commercial fertilizers, for which \$75,000 to \$100,000 is spent annually. It will thus be seen that the fertilizer problem is important. The aim should be to adopt methods which will yield the largest proportionate returns from the use of fertilizers rather than to discontinue their use. Better returns are usually obtained by high fertilization, provided the other conditions have been maintained whereby the soil is properly stocked with humus

<sup>1</sup> In the matter of crops grown in rotation with cotton on wilt-affected lands, Orton says (Farmers' Bulletin 302, p. 18): "On the other hand they are open to the serious objection that they (cowpeas) are very much subject to root knot and greatly increase this disease. On land infected by cotton wilt or blackroot the loss is increased by the presence of root knot. Fortunately the Iron cowpea is immune to root knot and can be used with safety. In fields where it is certain there is no root knot any pea can be planted, but the trouble is that root knot frequently appears where its presence was not suspected."

and the moisture supply is sufficient. Conservation of moisture is best effected through deep plowing and the maintenance of the supply of organic matter. Some fields are improved by subsoiling to open up the lower material, which not only promotes aeration and allows the water to move more freely through the soil, but also permits the roots of the plants to penetrate deeper into the soil, thus ramifying over a broader zone in search of nutriment. Deeper plowing is more essential on the heavier soils of the area, particularly the sandy loam and fine sandy loam types.

The adoption of systematic crop rotation is the only method of permanently maintaining the fertility of the soil. By this method land which formerly produced one-fourth to one-third bale of cotton per acre has been made to yield one-half to 1 bale per acre, with the same application of commercial fertilizers, and by higher fertilization an average of 1 bale to the acre over extended fields is frequently obtained. If more attention were given to stock raising a system of rotation could be more effectively followed. Instead of allowing the land to be idle, whereby it is subjected to washing and gullyng, it should be seeded down to either Bermuda, Johnson, or some other grass which would bind the soil together and prevent erosion and at the same time furnish pasture for stock. Johnson and Bermuda grass make a nutritious hay, which commands a ready market. The bottom lands and second terraces along Pea River and the other streams are particularly adapted to the growing of hay. The hay production seldom equals the demand, and the demand would be vastly increased if more attention were given to the raising of mules, horses, and cattle, the latter both for beef and dairy purposes. The objections to the culture of Bermuda grass, especially upon the uplands, has been the spreading of the grass when it was desired to follow up the rotation with cotton and corn or other crops requiring clean cultivation. It has been demonstrated that velvet beans, if allowed to form a heavy mantle over the ground, will completely smother out the Bermuda in one season. The large quantity of humus turned back into the soil from the velvet beans makes this a valuable crop; besides, they furnish excellent forage. The use of the velvet bean in connection with corn, sowing the seed broadcast, has gained in favor in the last two or three years and the practice is almost sure to be extended.

#### SOILS.

The geological formations in Dale County are similar to those in Coffee and Henry Counties.<sup>1</sup> In the northern two-thirds of the county the lignitic of the Tertiary, from the Nanafalia up, is the pre-

<sup>1</sup> See soil survey reports on Coffee and Henry Counties, Ala.

dominating formation, while in the southern part the beds of the Claiborne and St. Stephens white limestone represent the remaining underlying formations. But it is from the Lafayette and Ozark formations that most of the soils are derived, since these form the immediate surface. The Nanafalia series occupies a small area in the northwestern corner of the county. To the south of this follows the Tuscahoma or Bells Landing series of clayey sands and marls. The Woods Bluff and Hatchetigbee series make very little surface show in Dale County. The Buhrstone underlies a belt across the county from 6 to 12 miles in width. The southeastern portion of the county is underlain by the St. Stephens limestone. The sands and loam of the Lafayette probably covered the whole of the Tertiary formation of Dale County, but in many places it has been removed by subsequent erosion. The Lafayette is generally found upon the divide between the main watercourses. Another formation of later date than the Lafayette is the Ozark or Geneva sands. These are represented by the gray sands found around Ozark. The sands are very unevenly distributed and form a kind of terrace just outside of and slightly higher than the regular second bottom.

Dale County lies wholly within the physiographic province known as the Coastal Plain, and the soil materials were either laid down beneath the water or along the margin of an ancient sea which at one time covered this section. This bed was afterwards gradually elevated to its present position, so that the various soil types mapped in Dale County represent weathered or reworked materials of ancient marine deposition. This is evidenced by the presence of waterworn gravel, rounded sand particles, and various species of marine shells, etc. There is usually very little uniformity in the materials which have thus been deposited, and upon weathering they give rise to soils having a wide range in structure and texture even over small areas. In the deep or slowly moving waters the finer particles were laid down; the coarser particles where swifter currents prevailed.

The present differences in the surface formation are not due wholly to the manner in which the materials were originally deposited, for with the uplifting of the ocean bed and the subsequent receding of the waters, streams were formed which have cut deeper and deeper into the former ocean floor, thus removing or modifying the original deposits. By the erosive action of these streams, with their finger-like feeders, two distinct soil provinces are formed, including the rolling or undulating uplands of sedimentary origin and the level terraces of bottom lands, which have been formed from reworked alluvial materials.

The Lafayette mantle consists of loose gray sands or compact red and yellow sands and clays, depending somewhat upon the depth of weathering but more particularly upon erosion. Mixed with these

sands and clays are pebbles and iron concretions. Immediately underlying this formation, particularly in the northern half of the county, are strata of stiff, compact, plastic clays, with alternate layers of sandy material. By erosion these stratified clays and sands have been exposed and give rise to the Susquehanna fine sandy loam, which is the most variable upland soil in the area. The Ozark sands are even more recent than the Lafayette and are represented by a strip from 6 to 12 miles wide extending across the county between Ozark and Newton.

Through the agencies of erosion, weathering, leaching, and chemical action, these formations have undergone certain changes affecting their texture, structure, color, topographic position, and drainage, all of which changes have influenced the agricultural value of the several resultant soils.

The soil type in classification is based primarily upon the physical properties of the component material, but all other factors bearing upon the relation of soil to crops are taken into account. The upland soils of the county were included under the following groups or series: The Norfolk, Greenville, Orangeburg, and Susquehanna. The bottom land and terrace soils were classed with the Kalmia and Cahaba series, while the undifferentiated first-bottom stream alluvium was mapped as Meadow.

The Norfolk series includes those soils which have grayish or brown surface soils and yellow subsoils. Five Norfolk types were mapped, as follows: Sandy loam, loamy sand, sand, fine sand, and gravelly sand. The sand, fine sand, and gravelly sand occur upon the ridges and slopes in the northern portion of the county, but in the southern part they are confined to the lower slopes adjacent to the stream valleys. The gravelly sand occurs principally in the southern portion of the county and is found both on the ridges and slopes. The flat or level areas of the Norfolk sand occur along the gentler slopes in the vicinity of the larger streams. The sandy loam and fine sandy loam are found principally in the southern portion of the county upon the broader interstream ridges and table-lands.

The Greenville soils are distinguished from the Orangeburg soils by the reddish-brown to nearly red color of the surface portion. They are found mostly upon the ridges and table-lands in the southern portion of the county and include some of the best general farming lands in the South. On account of the native growth of longleaf pine upon these soils they are called "piny woods" lands. Three types of the Greenville series were mapped, including loamy sand, sandy loam, and clay loam.

The Susquehanna fine sandy loam is derived from the weathering of the sands and stratified clays of the formation immediately underlying the Lafayette. The subsoil of this type is characterized by a

dark-brown or reddish-brown stiff, plastic, mottled clay. Eroded areas or "gall spots" occur throughout the type, in which the subsoil is exposed at the surface, from which it receives the local name of "clay land" or "cowhide land."

The Orangeburg soils are quite similar to the Greenville soils, the main difference being in the grayish color of the surface portion of the former. The Orangeburg soils are generally more rolling and occur largely in the northern portion of the county. They are also generally more eroded than the Greenville soils, owing to their topographic positions. Four types of this series were mapped: Sandy loam, fine sandy loam, sand, and gravelly sandy loam.

The terrace soils include the Kalmia sand, fine sand, and fine sandy loam, and the Cahaba fine sandy loam. The latter is characterized by a reddish subsoil. The Kalmia sand and fine sand are naturally fairly well drained, but the fine sandy loam often requires additional drainage. The Cahaba fine sandy loam, on the other hand, is fairly well drained.

The soils of Dale County are in general sandy but fairly productive. With careful management the returns from these soils could be greatly increased. Practically all the land of the area can be made suitable for cultivation.

The following table gives the name and extent of each of the different soil types mapped on Dale County:

*Areas of different soils.*

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Norfolk sand.....	118,400	33.2	Norfolk loamy sand.....	5,696	1.6
Susquehanna fine sandy loam.	74,880	21.0	Kalmia fine sand.....	5,440	1.5
Greenville loamy sand.....	25,920	7.3	Norfolk fine sand.....	5,120	1.4
Kalmia sand.....	22,016	6.2	Orangeburg fine sandy loam...	2,816	.8
Norfolk gravelly sand.....	17,408	4.8	Cahaba fine sandy loam.....	2,752	.8
Orangeburg sand.....	16,000	4.5	Orangeburg gravelly sandy loam .....	2,624	.7
Kalmia fine sandy loam.....	15,936	4.5	Greenville clay loam.....	704	.2
Greenville sandy loam.....	13,056	3.6			
Meadow.....	12,352	3.4			
Orangeburg sandy loam.....	8,640	2.4			
Norfolk sandy loam.....	7,360	2.1			
			Total.....	357,120	.....

NORFOLK GRAVELLY SAND.

The Norfolk gravelly sand, to a depth of 6 or 8 inches, consists of a light-brown to dark-gray medium to coarse gravelly sand. The subsoil is a yellow coarse sand or loamy coarse sand containing a small percentage of semirounded quartz gravel and iron concretions and in some places having a slightly reddish hue. The soil is generally quite coarse, but the gravel content is larger on the knolls, sharp ridges, and

about the heads of small streams. The type is generally associated with areas of Norfolk sand. The boundaries between the two are in places difficult to determine and therefore were more or less arbitrarily drawn. There is considerable variation in the type, but on the whole it is mainly a well-drained, gravelly sand, low in organic matter, and not very retentive of moisture.

The Norfolk gravelly sand occurs mostly in the southern portion of the county. The largest area lies about 3 miles south of Newton on each side of Mossy Camp Creek. Others occur scattered over the southern and eastern parts of the county.

The Norfolk gravelly sand generally occupies the steeper slopes adjacent to stream courses, and in some instances the drainage is excessive, but in general the occurrence of gravel upon the surface has a tendency to conserve the moisture, and the type is not as droughty as the coarse texture and uneven topography of the soil might suggest. The quantity of gravel upon the surface and throughout the soil profile is not generally sufficient to interfere with cultivation. The agricultural value of this soil is about the same as the lighter Norfolk sand.

This soil being open and porous is readily leached of its humus and the effects of commercial fertilizers are only temporary. To secure other than temporary improvement it is necessary to turn into the soil frequently large quantities of vegetable matter. As has been suggested for the other light sandy soils the growing of velvet beans is especially commended for this purpose.

Where this type occurs upon the steeper embankments along the streams it is not well suited to general farming and should either be seeded down to Bermuda grass for permanent pasture or used for forestry. The native timber growth consists of pine, oak, hickory, dogwood, elm, and persimmon. The growth of pine is rapidly being removed and the land cleared for cultivation. A scattering growth of black-jack and scrub oak generally succeed the native pine forests.

This land is valued at from \$5 to \$10 an acre, according to location and improvements.

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

*Mechanical analyses of Norfolk gravelly sand.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.	Per cent.
23934, 23936, 23938.	Soil.....	8.1	25.2	20.4	29.4	4.3	6.7	5.6
23935, 23937, 23939.	Subsoil.....	6.5	21.0	18.3	33.9	5.0	8.2	6.9

## NORFOLK SAND.

The Norfolk sand occurs in two phases, one occupying the rolling uplands and the other the level terracelike areas in the vicinity of the stream courses. To a depth of 5 or 6 inches the soil is usually a grayish to light-brown color. The subsoil is a yellowish loose sand extending to a depth of 3 feet or more. The soil of the level terracelike areas is generally darker and more loamy than the ridge phase. The texture varies from fine to coarse sand, but the average texture is that of a medium sand. This sandy material often extends to depths of several feet, and is usually shallower upon the crests of the ridges.

The surface features consist of elongated ridges and terracelike plains. The ridges form the stream divides. The drainage is generally excessive, particularly upon the ridges, so that the soil is inclined to be droughty. The open, porous nature of the soil admits of its easy cultivation and insures fair yields in wet seasons. It also withstands drought better than some of the heavier soils.

The Norfolk sand is the most extensive and widely distributed soil type in the county. The largest single area occurs southwest of Echo, and smaller areas occur throughout the county. The type is sedimentary in origin, being derived from the weathering of the sands and clays of the Lafayette, which is the surficial formation over a large part of the county.

This type being a warm, early soil is especially well suited to truck crops, such as peas, beans, radishes, lettuce, sweet and Irish potatoes, cantaloupes, and watermelons, and is especially valuable where it is desired to mature crops for the earliest market. Of the staple crops, it is probably best adapted to corn and oats, the average yields being about 10 to 15 bushels of corn and 15 to 20 bushels of oats per acre. Cotton yields from one-fourth to one-half bale per acre. Sugar cane yields 150 to 250 gallons of high-grade sirup. From 80 to 175 bushels of sweet potatoes and 60 to 150 bushels of Irish potatoes are representative yields per acre of these crops. If more attention were given to diversification of crops, with a view to increase the humus supply, much larger returns would be obtained from the use of commercial fertilizers than is the case at present.

The "firing" or shedding of cotton is sometimes attributed to the use of large amounts of commercial fertilizers. This is not so liable to occur where barnyard manure is used along with the commercial fertilizers or where an acreage application of about 200 or 300 pounds of kainit is made. Light applications of lime are also recommended for this soil, especially where green crops are turned back into the soil. The use of velvet beans for building up the humus content and

the planting of peanuts between the corn rows with the same end in view have done much to increase the yields upon the Norfolk sand. Sugar cane on this soil produces a mild-flavored, light-colored sirup, but even with heavy fertilization the yields are not as large as upon some of the heavier soils.

The level or flat areas are better suited to general farming than the ridge sands. They are easier to cultivate, not so subject to erosion, more retentive of moisture and fertilizers, and generally contain a higher percentage of humus than the more rolling areas.

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

*Mechanical analyses of Norfolk 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.	<i>Per cent.</i>
23930.....	Soil.....	2.3	21.3	31.1	33.5	2.6	5.8	3.0
23931.....	Subsoil.....	3.9	20.5	31.2	33.1	2.1	5.6	3.3

NORFOLK SANDY LOAM.

The soil of the Norfolk sandy loam is a dark-gray to brownish sandy loam ranging in depth from 5 to 20 or sometimes 30 inches, with an average depth of about 12 inches. The subsoil is a sandy clay, which in color resembles somewhat the yellow of cottonseed meal. The type occurs in two phases, a deep sandy phase and a shallow phase, locally designated "pimply" land. The former occurs in the more extensive level areas, while the latter has a generally rolling or undulating surface, being found upon the ridges and knobs, or about the heads of gullies, where erosion has been more or less severe. Varying amounts of iron concretions, quartz gravel, and iron sandstone occur upon the surface and throughout the soil and subsoil. The surface few inches of both phases of the type is dark gray or brown to almost black, where the native vegetation is heavy or where the land has been recently cleared and put under cultivation. With subsequent cultivation as the supply of organic matter becomes reduced the soil becomes lighter in color.

The subsoil of the shallow or "pimply" phase of this type is a sandy clay which below 18 to 20 inches becomes stiffer, more plastic, and lighter in color, sometimes being mottled. The lighter phase of the type shows a more gradual change, being a heavy sandy loam to 20 or 24 inches, underlain by a friable sandy clay.

In other sections of the Gulf States the "pimply" land sometimes occurs in large enough areas to be classed as a distinct soil type—the Tifton sandy loam. In Dale County, however, the two types are so closely associated as to render their separation impracticable.

The largest areas of Norfolk sandy loam occur in the southeastern part of the county in the vicinity of Midland City and Grimes. Other smaller areas are scattered over the county. The deeper phase of the type predominates.

This type usually occurs upon the wider divides and generally has adequate natural drainage, owing to the porous nature of the soil and its topographic position. The only artificial drainage required is to furnish outlets for the small low-lying areas or sinks which occur at intervals throughout the type. The shallow phase is more apt to suffer from drought than the deeper phase, especially where it occurs about the heads of streams or gullies.

The Norfolk sandy loam is derived mainly from the weathering of deposits of unconsolidated sands and clays. In addition to weathering, erosion has also taken an active part in the formation of this type. The occurrence of a pinkish-red, yellowish, or drab-colored rotten chalklike substratum below 5 or 6 feet and the outcropping occasionally of shell rock or St. Stephens limestone would suggest that the underlying materials had also entered somewhat into the formation of this type, particularly in case of the shallow phase. Where this material occurs near the surface, the subsoil is quite stiff, plastic, and "waxy."

The original timber growth was principally longleaf pine, although a scattering growth of hardwood, including oak, birch, elm, etc., was found. The timber has nearly all been removed and much of the land is now under cultivation.

The Norfolk sandy loam is considered a fairly good soil for general farming and is best suited to corn, which does best on the deeper phase. Cotton is usually planted on the shallow "pimply" land phase. The type is also well adapted to peas, beans, cucumbers, radishes, watermelons, muskmelons, and various other truck crops. The Norfolk sandy loam is used to some extent for growing sugar cane. The sirup produced is light colored and has a mild flavor, qualities essential to the highest market value of this produce.

The shallow phase of the type often becomes "soggy" in wet weather and stiff and hard when dry, so that it is not so easy to cultivate as the deeper phase. The former also suffers more from drought. These conditions can be overcome to a large extent by better methods of cultivation, designed to maintain a loose, friable soil. Deeper plowing, subsoiling, and the turning under of green manure are essential steps in handling this phase.

Bone and blood meal, cottonseed meal, and acid phosphate, combined in various proportions and applied in amounts ranging from 250 to 400 pounds an acre, are the principal fertilizers used. Nitrate of soda is also used to some extent for fertilizing corn and oats. Cotton seed is applied to corn land, especially in the more remote sec-

tions of the county, where distance to market does not warrant the exchange of cotton seed for cottonseed meal at the oil mills. As a rule all the fertilizer is applied at the time of planting the crop.

The Norfolk sandy loam is valued at \$10 to \$20 an acre, according to location and improvements.

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

*Mechanical analyses of Norfolk 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.	<i>Per cent.</i>
23948, 23950, 23952.	Soil.....	2.2	13.8	18.0	38.1	9.2	10.5	7.9
23949, 23951, 23953.	Subsoil.....	1.8	11.0	15.8	13.8	9.7	9.1	20.7

#### NORFOLK FINE SAND.

The surface soil of the Norfolk fine sand is a dark-gray to brownish colored fine loamy sand with an average depth of about 5 or 6 inches. The subsoil is a yellowish loose fine sand. Where this type occurs upon the ridges, the surface is usually light colored and of a loose, incoherent structure, while the lower lying areas along the streams are darker and more loamy—differences due to the higher content of organic matter.

This type generally occurs upon the gentler slopes adjacent to the stream valleys, though in areas associated with the Susquehanna fine sandy loam it is found more often in level uplands or on the crests of ridges.

The largest areas occur about 1½ miles east of Ariton and 3½ miles west of the same place. Other areas were found in the vicinity of Dillard's. This type was formerly covered with a native growth of longleaf and shortleaf pine. Most of the merchantable timber has now been removed and a second growth of pine, blackjack oak, and scrub oak form the principal growth at the present time. The Norfolk fine sand is generally considered a better farming soil than the Norfolk sand. Its finer texture makes it more compact and increases its power to retain moisture and fertilizers.

This soil is especially well adapted to early truck crops, such as watermelons, cantaloupes, cabbage, lettuce, and sweet and Irish potatoes. It produces highly flavored, juicy peaches, suitable for home use, but for the market those grown upon the Orangeburg soils are better, being more highly colored and firmer. At the present time the local markets for truck are limited, and the growing of fruits and vegetables for the northern markets has received but little attention in this section. In other parts of the South this soil is

highly prized for the production of early truck. Of the staple crops, this soil is probably best suited to corn, which gives an annual yield of 10 to 15 bushels per acre. Cotton yields from one-fourth to one-half bale per acre. Oats, peanuts, and sugar cane are also grown. Sugar cane yields a light-colored, mild-flavored sirup, but low yields are obtained unless the crop is highly fertilized. Sweet potatoes do especially well and yield from 200 to 300 bushels per acre with applications of 200 to 500 pounds of commercial fertilizer per acre.

More attention should be given to contour plowing, terracing, and the growing of cover crops to prevent erosion. The type has the same deficiencies noted in case of the types already described and the cropping recommended for increasing the humus apply equally well in the case of the present soil.

The Norfolk fine sand is valued at \$8 to \$10 an acre.

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

*Mechanical analyses of Norfolk fine 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.	<i>Per cent.</i>
23944.....	Soil.....	0.8	7.0	14.5	54.1	14.0	6.3	3.3
23945.....	Subsoil.....	.5	8.4	16.2	53.7	12.5	5.4	3.2

#### NORFOLK LOAMY SAND.

The soil of the Norfolk loamy sand, to an average depth of about 8 inches, is a grayish loamy sand which, in the lower portion, assumes a pale yellow color. The subsoil is a yellow loamy sand carrying a little more clay than the surface portion.

The surface of the type is rather flat, sometimes giving the land the appearance of a stream terrace. It lies for the most part well above the streams, and there is some doubt as to whether the material is strictly alluvial in origin. Therefore it was considered best to include it in the Norfolk series.

The Norfolk loamy sand is principally developed between Daleville and Piny Grove Church, another large area bordering the Kalmia sand along the Choctawhatchee River from near Hurricane Creek for a distance of several miles upstream, and in the long, continuous area following East Choctawhatchee River from a short distance north of its confluence with Choctawhatchee River.

The Norfolk loamy sand is decidedly more retentive of moisture than the Norfolk sand and consequently better adapted to corn, sugar cane, and forage crops, like cowpeas, soy beans, and velvet beans. Nevertheless it needs organic matter, and those rotations should be

practiced which include the legumes or some crop such as rye, to be plowed under to furnish this constituent. Fertilizers are also beneficial to all crops suited to the type, especially mixtures rich in nitrogen and potash. Sweet potatoes, Irish potatoes, watermelons, peanuts, and cantaloupes do well with liberal applications of high-grade fertilizers.

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

*Mechanical analyses of Norfolk loamy 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.	<i>Per cent.</i>
23940, 23942 .....	Soil.....	2.1	18.6	21.7	36.4	8.5	7.2	5.1
23941, 23943 .....	Subsoil.....	1.2	13.6	17.3	37.8	14.5	7.7	7.5

ORANGEBURG GRAVELLY SANDY LOAM.

The surface soil of the Orangeburg gravelly sandy loam to a depth of 5 to 12 inches consists of a reddish-brown or grayish-brown medium to coarse sandy loam containing a high percentage of gravel. The subsoil is a rather heavy red sandy clay, containing a small proportion of gravel. Iron concretions occur throughout both soil and subsoil.

This type is quite similar to the Norfolk gravelly sand, the principal difference being the shallow depth of the surface soil and the reddish color of the subsoil. It is a better soil, however, than the latter type. The Orangeburg gravelly sandy loam is limited to a few small rolling to hilly areas, which occur in the northeast section of the county in the vicinity of Clopton and Echo. Owing to the topography the drainage is good, while the gravelly covering acting as a mulch tends to conserve the moisture by preventing evaporation.

The Orangeburg gravelly sandy loam seems to be derived mainly from the coarser materials of the Lafayette formation.

The native growth is pine, oak, and hickory. Cotton and corn are the chief crops. Cotton yields about one-fourth bale and corn from 8 to 15 bushels per acre. Land of this type can be bought for \$5 to \$20 an acre.

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

*Mechanical analyses of Orangeburg gravelly 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.	<i>Per cent.</i>
23958.....	Soil.....	12.2	24.0	14.4	30.6	8.5	4.2	5.5
23959.....	Subsoil.....	13.5	22.0	14.5	18.4	3.3	3.2	24.9

## ORANGEBURG SAND.

The Orangeburg sand consists of 15 to 30 inches, with an average depth of about 18 inches, of grayish to slightly reddish medium sand or loamy sand, underlain by a brick-red sandy clay or sticky sand. The texture varies from medium to coarse, with the medium sand predominating. Small fragments of mica are frequently found in the soil mass, while upon the surface of the knolls and sharper ridges iron concretions sometimes occur.

The Orangeburg sand is quite similar to the Greenville loamy sand, but is lighter colored at the surface and usually has a more rolling topography. Where it occurs in connection with the Orangeburg sandy loam the classification is more or less arbitrary, the depth of surface soil being the basis of separation. Where more than 12 or 15 inches in depth the land was classed as the Orangeburg sand. A light phase of the type is found associated with the Norfolk sand, while areas bordering the Susquehanna fine sandy loam are heavier than the typical soil.

The Orangeburg sand usually occurs upon ridges, where the drainage is more or less excessive. Unless terracing is practiced upon the steeper slopes, gullies are frequently formed, with destruction of much valuable land. In some instances these gullies have cut down to depths of 50 or 60 feet. If the steeper hillsides were seeded to oats or rye and vetch and the surface covered in the winter, or if Bermuda grass were grown as permanent pasture, the tendency to form these gullies would be materially lessened.

The largest continuous area of this type is found about 1 mile northwest of Bertha. The remaining areas are widely distributed over the northern portion of the county.

Most of the type is under cultivation, the chief crops being cotton and corn. The deeper phase is best suited to corn. This type is more productive than the deeper Norfolk sand, the yields ranging from one-fourth to one-half bale of cotton and from 10 to 20 bushels of corn per acre. The yields of corn are greater where the Williamson method and high fertilization are practiced. The planting of peanuts between the corn rows is meeting with success. In addition to affording fine forage for hogs, the vines and roots tend to render the soil more productive. The growing of velvet beans is probably the most rapid and efficient means of restoring humus to the soil where no systematic rotation of crops is practiced, but a three-year rotation of corn, oats, peas, and cotton is recommended as even the better practice. The yields of cotton and corn could also be increased by a more careful selection of seed especially adapted to this soil.

Fertilizers are usually applied at the rate of 250 to 300 pounds per acre. They are generally added at the time of planting. Brands

analyzing 10 per cent phosphoric acid, 2 per cent nitrogen, and 2 per cent potash are in common use. Some of the farmers prefer to distribute a part of the fertilizers during the growth of the crop.

The original timber growth consists of oak, hickory, dogwood, sweet gum, and pine, and upon areas cultivated in the early days of settlement and subsequently abandoned, of old field pine, blackjack oak, and scrub oak.

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

*Mechanical analyses of Orangeburg 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.	<i>Per cent.</i>
23954, 23956.....	Soil.....	2.6	18.1	25.3	42.3	3.6	3.3	4.5
23955, 23957.....	Subsoil.....	2.7	17.9	24.8	38.4	3.9	4.9	7.1

ORANGEBURG SANDY LOAM.

The surface soil of the Orangeburg sandy loam is a grayish to brown color, which distinguishes it from the Greenville sandy loam, the surface soil in this type being reddish-brown. The line of demarcation between these soils, however, is more or less arbitrary. The depth of soil ranges from 6 to 15 inches, with an average depth of about 9 inches, and the texture varies from medium to coarse, the medium predominating. A small percentage of iron concretions is sometimes found upon the surface. The subsoil consists of a light-red to dark-red friable sandy clay, becoming more plastic to a depth of 30 to 36 inches, below which it is more friable. Below 5 or 6 feet a loose red sand is often encountered. The subsoil is similar to that of the Greenville sandy loam, except that it is more friable in the lower part of the profile.

The largest single area of Orangeburg sandy loam lies south and southwest of Clopton. It also occurs in isolated areas throughout the northern half of the county, occupying positions about the heads of ravines and adjacent to the stream courses in the more broken sections. The topography is undulating to rolling. Upon the steeper slopes erosion is severe and bald spots of reddish clay are found. On the less rolling areas the soil is deeper and lighter in color. On the slopes of ridges and knolls terracing or contour cultivation should be practiced to prevent erosion. The growing of winter cover crops or Bermuda grass for permanent pasture should also be employed to prevent damage to the fields.

This type is well adapted to cotton, the yields ranging from one-third to one-half bale per acre. Corn does better on areas of deeper

soil, and in selecting the corn land this fact is generally recognized. Peaches find a natural habitat on this type, and for quality of color and flavor are superior to those grown upon the lighter soils.

The light-gray color of the soil is due largely to depletion of the organic matter. To restore humus to the soil leguminous crops, such as velvet beans, cowpeas, clover, vetch, and peanuts should be grown in rotation with the staples, cotton and corn. A large percentage of this land is leased to tenants, who cultivate it wholly for the immediate returns, and are not interested in building up the soil. Only a limited number of them carry leases for more than one year—the time required to make a single crop. Under such conditions the soil in some instances becomes so depleted of its humus as to make cropping unprofitable. Abandoned fields covered with a thick growth of broom sedge are the result of such practice.

This land is valued largely according to improvements and location with reference to market. The prices range from \$5 to \$15 an acre.

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

*Mechanical analyses of Orangeburg 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.	<i>Per cent.</i>
23960, 23962.....	Soil.....	0.8	9.9	19.4	56.5	3.9	5.6	3.4
23961, 23963.....	Subsoil.....	1.4	9.5	15.5	45.9	4.0	5.6	17.6

ORANGEBURG FINE SANDY LOAM.

The surface soil of the Orangeburg fine sandy loam consists of a gray to brownish colored fine sandy loam ranging in depth from 6 to 15 inches, with an average depth of about 8 inches. The subsoil consists of a red friable sandy clay becoming heavier with depth. Where this type occurs upon the lower slopes it contains rather a high content of silt, which gives a soft velvety feel.

The Orangeburg fine sandy loam occupies rolling to hilly areas in the northern part of the county. Well-developed areas occur about 1½ miles east of Arifton, in the extreme northern part of the county. The natural drainage is good, and on the steeper slopes sometimes excessive.

The Orangeburg fine sandy loam is derived through the process of weathering from beds of the finer sedimentary materials. It is closely associated with the Susquehanna fine sandy loam. The native growth is oak, pine, and hickory.

Where the soil is deep the Orangeburg fine sandy loam is easily cultivated, but in shallow areas the soil is more compact. The type is well suited to cotton, which yields about one-fourth bale under ordinary methods of culture. The average yield of corn is approximately 10 bushels. The soil is also well adapted to truck crops and fruit, especially peaches, which if properly handled could be grown with profit. Figs, plums, and strawberries do well. A good grade of filler tobacco has been grown upon this soil in some sections of the Gulf States.

Owing to the topography terracing and contour plowing should be practiced and winter cover crops grown to prevent washing. Land of this type of soil can be had for \$5 to \$15 an acre, the higher prices being asked for farms having the best improvements.

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

*Mechanical analyses of Orangeburg 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.	<i>Per cent.</i>
23964, 23966.....	Soil.....	1.1	3.5	5.2	42.4	30.4	10.1	7.1
23965, 23967.....	Subsoil.....	.9	2.7	4.5	34.7	22.5	19.6	14.5

GREENVILLE LOAMY SAND.

The Greenville loamy sand, to an average depth of 18 or 20 inches, is a brown to reddish-brown loamy sand, underlain by a dark-red heavy sandy loam to sandy clay. The type is intermediate between the Greenville sandy loam on the ridges and the Norfolk sand, which generally borders the stream courses. The surface is sloping to undulating, except in the vicinity of Midland City and Daleville, where it is more level. The color of the latter areas is lighter, and they are closely related to the Orangeburg sandy loam or sand. Bordering the Greenville sandy loam there is a gradation zone in which a heavier phase of the type occurs. A lighter phase is encountered in the transition along the Norfolk sand areas. The latter phase generally occurs upon the slopes, and here the soil and subsoil to 3 feet or more in depth consists of a loamy sand, the surface being dark brown and the underlying material a dark red to brick red.

Throughout the type occur small depressions or "sinks" in which organic matter and fine-earth materials have accumulated, forming a dark-brown to black, loose, fertile loam. Unless attention is given to the proper distancing of the cotton in these places the growth is frequently so rank that the bolls can not properly mature. Corn also produces a rank growth, with proportionately larger yields. Sugar

cane is sometimes planted in these basins and large yields are obtained, but the sirup is usually dark colored and of flavor inferior to that grown upon the lighter sands.

This type occurs largely in the southern part of the county, the largest continuous areas being found near Daleville and Midland City. The principal native growth consisted of longleaf pine, with some oak, hickory, persimmon, etc. The wire-grass found upon this and other types gives rise to the local name of "Wire-grass section." In recent years much of the timber has been removed and the land cleared for cultivation.

Of the deep sandy soils probably no other type can be built up to a higher state of fertility than the Greenville loamy sand. The growing of velvet beans has been found one of the best means used for this purpose, but peas, peanuts, native grasses, and oats and rye stubble are valuable when turned under green. Light applications of lime are recommended where green crops are turned under. The use of barnyard manure and compost can not be too highly recommended, the effects being more lasting than those obtained from the use of commercial fertilizers, but the supply of the former is entirely inadequate.

The Greenville loamy sand is an easily cultivated soil probably best suited to corn, peas, velvet beans, and peanuts, although fair yields of cotton are obtained, it being injured less by drought than on the heavier upland soils. The ordinary yields of corn range from 15 to 20 bushels and of cotton from one-fourth to two-thirds bale per acre. Much larger yields of both corn and cotton have been obtained by careful management and high fertilization.

This land is valued at \$10 to \$20 an acre, depending upon location with reference to market.

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

*Mechanical analyses of Greenville loamy 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.	<i>Per cent.</i>
23044, 23910.....	Soil.....	1.4	16.2	23.8	32.0	5.8	8.9	6.6
23045, 23911.....	Subsoil.....	1.4	13.1	23.9	32.1	8.1	8.4	12.9

GREENVILLE SANDY LOAM.

The Greenville sandy loam is one of the strongest upland soils in the area. The surface soil, from 5 to 15 inches deep, with an average depth of 7 or 8 inches, is a dark-brown or reddish-brown sandy loam of medium texture. The subsoil is a dark-red to brick-red

friable sandy clay. Below 20 to 24 inches the subsoil becomes heavier and more plastic. The color of the soil is darker than in case of the Orangeburg type. This is due largely to the high content of organic matter incorporated with it.

The Greenville sandy loam is confined entirely to the southern part of the county. It is most typically developed in the vicinity of Midland City and Pinckard, although there are other representative areas in other sections of the county. In some cases the soil has a grayish cast and closely resembles the Orangeburg sandy loam. A few small areas were mapped where the surface soil was quite shallow and of a deep-red color. These areas are similar to the Greenville clay loam in Coffee County.

This type occurs upon the more level ridges and table-land, but the surface is sufficiently undulating to give good drainage in seasons of average rainfall. During prolonged droughts it is inclined to lose much of its moisture and crops may suffer in consequence, but this can be overcome somewhat by better cultural methods, such as deep plowing with subsequent shallow cultivation. The land should not be broken too deep at first, but there should be a gradual deepening of the soil from year to year, until the required depth is reached. Subsoiling aids in loosening up the soil without throwing too much unweathered material to the surface. The present method of breaking the land, as practiced by the average tenant, consists in turning the soil with a one-horse plow, which seldom runs deeper than 3 to 4 inches. This is continued year after year until a plow-sole is often formed at this depth below the surface. Unless this compacted layer of soil is broken crops are almost sure to suffer from drought.

The native vegetation consists principally of pine and grasses, although scattering growths of hardwood trees are to be found. The famous "wire-grass" region received its name from the prevalence of this grass. Formerly it furnished excellent pasture for stock, but after the pine timber was removed the lands were mostly cleared and put under cultivation.

The Greenville sandy loam is particularly well adapted to cotton. It is capable of being built up to a high state of fertility and yields of 2 bales of cotton to the acre are not uncommon. The average yield is about one-half to three-fourths bale to the acre. Corn does fairly well if carefully handled and fertilized. Yields of 30 to 40 bushels are obtained, though the average yield seldom exceeds 15 bushels per acre. Where fertilized oats yield from 20 to 30 bushels per acre. The furrow method of planting the crop has been adopted by many. This consists in opening up a furrow with a single-shovel plow, putting in the fertilizer, and dropping the seed with a cotton planter. When planted in this way subsequent cultivation is possi-

ble, less seed is required, and the yields obtained are generally larger than where the seed is sown broadcast.

Although there is a relatively large content of humus in the virgin soil, with continual cropping to corn and cotton it soon becomes depleted and the returns from the land even with the use of commercial fertilizers are reduced. By practicing more diversified systems of cropping, including in the rotation as many leguminous crops as possible, the soil can be built up to a high state of fertility.

The Greenville sandy loam constitutes some of the most valuable land in the county and ranges in price from \$15 to \$50 an acre.

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

*Mechanical analyses of Greenville 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.	<i>Per cent.</i>
23912, 23914.....	Soil.....	3.1	18.6	20.4	28.3	8.7	11.7	8.8
23913, 23915.....	Subsoil.....	2.6	14.1	15.9	21.9	6.7	9.0	29.7

GREENVILLE CLAY LOAM.

The surface soil of the Greenville clay loam is a dark reddish-brown heavy loam or sandy loam, with a depth of 3 to 5 inches, underlain by a rather stiff, deep red sandy clay.

This type is usually well drained, but when wet is difficult to handle. It also becomes hard and difficult to cultivate when dry, and if not properly handled is more inclined to be droughty than some of the lighter soils. It represents one of the heaviest upland soils in the area and also one of the most productive under suitable cultural methods.

The Greenville clay loam has a limited acreage in Dale County. It occurs in four bodies, one lying about  $2\frac{3}{4}$  miles south and another 2 miles north of Midland City. Of the two remaining areas one is found  $2\frac{1}{4}$  miles southeast of Pinckard and the other about one-half mile west of Pine Level School, in the western part of the county.

The type occupies level to gently rolling areas. Where it occurs in the vicinity of Pine Level School and southeast of Pinckard it is quite level; the other remaining areas are rolling or occur in the form of ridges.

Probably no type in the area is more capable of being brought to a high state of productivity than the Greenville clay loam. The benefits derived from deep plowing and subsoiling are especially apparent, as shown by the various demonstrations made upon this soil. Barnyard manure and lime should be used in connection with commercial fertilizers. Corn, cotton, and forage crops under proper conditions of culture give heavy yields.

The Greenville clay loam, in conjunction with other types surrounding it, is valued at \$10 to \$20 an acre.

KALMIA SAND.

The Kalmia sand is a dark gray to brownish sand or light sandy loam with a depth of 5 to 6 inches, underlain by an incoherent yellowish sand.

The loose, open structure of the soil insures the free movement of water through it, and for this reason the type is not so inclined to be droughty as the heavier bottom land soils.

The largest single area of this type occurs in the vicinity of Waterford, where it occupies the second terrace along Choctawhatchee River. Other bodies occur throughout the county, principally along the larger streams.

This type was cultivated quite extensively prior to the Civil War, as the lighter bottom land soils were then preferred to the uplands. They were considered more productive, but with the introduction of commercial fertilizers the cultivation of the uplands was found more remunerative than the lighter bottom land soils. Many fields which were formerly under cultivation are now grown up in field pine, briars, and vines. In recent years many areas of these so-called "worn out" lands have been recleared and put under cultivation.

This soil is readily leached of its humus and to maintain the fertility it is necessary to follow some system of crop rotation. A three-year rotation of cotton, oats and peas or velvet beans, and corn is probably one of the best and the simplest. It is advisable, where the soil is well drained, to grow as many winter cover crops as possible. It is a warm, early soil and as such is valuable for trucking purposes where market facilities are available. The soil is well suited to Johnson and Bermuda grass, which for hay or pasture would yield good returns, besides "resting" the land. It is often objectionable to have Johnson or Bermuda grass in the fields which are to be cultivated later, but from experiments made it has been shown that it is practicable to get rid of these objectionable grasses by planting velvet beans and allowing them to cover the ground with a dense shade.

This land is valued at \$10 to \$15 an acre.

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

*Mechanical analyses of Kalmia 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.	<i>Per cent.</i>
23916, 23918, 23928.	Soil.....	2.2	15.0	18.8	46.6	5.5	7.6	4.1
23917, 23919, 23929.	Subsoil.....	2.2	15.9	18.1	45.7	6.2	7.8	4.1

## KALMIA FINE SAND.

The surface soil of the Kalmia fine sand is a brown to grayish fine loamy sand, with a depth of 4 to 6 inches. The subsoil is a yellowish fine loamy sand, becoming lighter in color below 30 to 36 inches. Both soil and subsoil contain a rather high content of very fine sand, which accounts largely for its compact structure.

This type represents the better drained areas of fine alluvial deposits along the stream courses and is of Recent geological origin. It is not so subject to overflow as the heavier bottom land soils, yet there are periods of extreme high water when additional alluvium is added which increases its natural fertility. It has sometimes happened that coarse sand is deposited over the fine sand, and this has lessened considerably the agricultural value of certain areas.

The structure of this type is not so compact as to interfere with the ready passage of water through it, so that it is not generally affected by wet weather as those soils having a clay subsoil, nor is it as subject to drought. Being well drained, it is naturally an early soil and is easy to cultivate. Cotton requires higher fertilization upon this soil than on some of the other bottom soils, but the crop is less liable to be cut short by the early frosts than that which is grown upon the heavier soils.

The largest single area of the Kalmia fine sand occurs in the vicinity of Clayhatchee; other smaller areas occur throughout the county along the stream courses.

The native growth consists of long and shortleaf pine, water oak, persimmon, hickory, ash, elm, and poplar. The greater part of the type is under cultivation, the original timber having been removed for lumber. Where these lands were cleared by the early settlers and cultivated largely to cotton or corn, the yields declined and the fields were finally abandoned. The scarcity of labor following the Civil War also caused many of the fields to be thrown out of cultivation. These have grown up in old-field pine and black-jack oak.

Before the use of commercial fertilizers made it profitable to cultivate the piny woods upland soils, the lighter bottom lands were rated as the best agricultural lands in the county for cotton and corn.

Where this soil is so situated as to command a ready market for its products, the largest returns would probably be obtained from the growing of small fruits and vegetables, including strawberries, peas, cucumbers, watermelons, beans, muskmelons, and potatoes. It is especially valuable where it is desired to place these products on the early markets.

Of the staple crops, this soil is best suited to corn, although fair yields of cotton are obtained, ordinarily between one-fourth and one-half bale per acre. By the Williamson and other modern methods of

culture as much as 50 to 60 bushels of corn per acre are obtained. The average yield is seldom more than 10 or 15 bushels per acre.

This soil is well suited to barley, oats, rye, and vetch, which should be grown in rotation with corn and cotton, as winter cover crops. They would aid materially in building up the soil by enriching it in humus.

The price of this soil is dependent largely upon the character of the improvements. From \$10 to \$15 an acre is a fair estimate for much of the land.

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

*Mechanical analyses of Kalmia fine 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.	<i>Per cent.</i>
23920 .....	Soil.....	0.2	3.0	11.9	67.6	6.4	6.5	4.1
23921 .....	Subsoil.....	.4	2.1	8.4	63.4	6.7	9.2	10.0

KALMIA FINE SANDY LOAM.

The soil of the Kalmia fine sandy loam, to an average depth of 10 or 12 inches, is a grayish to light-brown fine sandy loam. The color becomes lighter or yellowish below 4 to 6 inches. The subsoil is a yellow silty to fine sandy clay to a depth of 20 to 30 inches, below which it is heavier in texture and lighter in color, being mottled gray and yellow. Some finely divided particles of mica were also noticeable in the subsoil.

The Kalmia fine sandy loam occurs upon the higher bottoms and second terraces along the main rivers and creeks. The largest continuous bodies are found bordering Clay Bank and Judy Creeks. Other areas are located on the Choctawhatchee River, the largest one being about 1 mile south of Clayhatchee.

Associated with this type were small bodies of fine and medium sand, which were confined to low narrow ridges or knolls usually immediately along the streams. Where separation was practicable these areas were classed with the Kalmia sand or fine sand, in other cases they were included with the fine sandy loam.

The surface soil of the Kalmia fine sandy loam contains a rather high content of fine sand and silt, giving the soil a fine mealy texture, and causing it to compact after heavy rains, although in general it is considered an easy soil to cultivate.

The position of this soil upon the river terraces insures fairly good natural drainage. During the rainy season it is frequently partially inundated and in such areas artificial drainage is required to obtain the best results. Open ditches are generally used for this purpose.

The native growth upon this type usually consists of longleaf and shortleaf pine, water oak, hickory, sweet gum, post oak, elm, live oak, and other hardwoods. Most of the merchantable timber has been cut and a large percentage of the type has been cleared for cultivation.

The Kalmia fine sandy loam is of alluvial origin, having been formed by the deposition of sand and finer materials by the streams along which it occurs.

This soil is probably best suited to corn, oats, and hay, but with proper drainage fair yields of cotton are obtained, though on account of its low-lying position the crop is sometimes so late in maturing that the early frosts reduce the yield.

Deep plowing, preferably in the fall, and the seeding of oats or rye, which can be turned under as green manure, or cut for hay, before time for planting cotton or corn, are two ways of improving existing conditions. A variation of the latter giving satisfactory results is to turn under only that part of the land needed for the cotton rows and to allow the intervening strips of oats or rye to mature for grain. This aids in conserving the moisture and at the same time yields a profit from both crops. Owing to the fact that this type is adapted to both corn and cotton, they are sometimes made to form a two-year rotation, but on the whole not enough attention is given to diversification of crops to obtain the best results from this soil. Leguminous crops, as vetch, peas, velvet beans, peanuts, etc., should be grown in rotation with cotton and corn wherever possible.

Where the Kalmia fine sandy loam is near enough to markets, profitable returns could be obtained from truck. Bermuda and Johnson grasses are also well suited to this soil and make valuable forage, and if cut for hay command a ready sale in the local and more distant markets. This soil is especially valuable to the stock raiser on account of its adaptation to forage crops and the presence of running water.

The Kalmia fine sandy loam is valued at \$10 to \$20 an acre according to its improvements and proximity to market.

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

*Mechanical analyses of Kalmia 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.	<i>Per cent.</i>
23924, 23926.....	Soil.....	1.8	10.8	12.5	39.2	10.5	17.7	7.4
23925, 23927.....	Subsoil.....	1.3	7.6	12.5	38.8	11.6	13.7	14.3

## SUSQUEHANNA FINE SANDY LOAM.

The surface soil of the Susquehanna fine sandy loam is a grayish to light-brown fine sandy loam, with an average depth of 8 or 10 inches. This is probably the most variable type as to depth in the area. In places the surface material is only 4 inches deep; in others it extends to 30 inches. The fineness of the soil particles seems to bear some relation to the depth, the shallower soil being finer and the deeper soil coarser. The former phase is confined mostly to the slopes and undulating areas and the latter to the less rolling uplands where erosion has not been sufficiently active to influence the surface soil to any extent. The predominating texture is fine.

The subsoil consists of a reddish-brown or terra-cotta colored clay which is very stiff and plastic when wet but hardens on drying, making it difficult to cultivate the type in areas of shallow soil. Below 20 to 30 inches the subsoil is generally less plastic and is usually mottled. The stratum in which the mottling occurs generally contains a higher percentage of fine sand and silt than the other parts of the section, and this gives it a more friable structure.

Owing to the presence of finely divided mica the subsoil has a slightly greasy feel. Where weathering has taken place to a considerable depth, as seen in gullies and road cuts, the lower-lying materials are composed of strata of gray or mottled joint clays alternating with layers of sandy material. A distinct feature of the lower depths of the subsoil is the occurrence of shale-like stratified clays, with cleavage surfaces, which break up into white or grayish chalklike flakes or thin blocks. The stiff waxy clay cracks into small cubes when exposed to the sun.

The variation over small areas which occurs throughout this type is due to some extent to irregularity in the early deposition of materials, but more to erosion. The soil is found in two phases, as has been stated, but the areas of each are so intermingled that a separation on the scale of 1 inch to the mile was found impracticable. The shallow phase is best suited to cotton, while corn is generally planted upon the deeper sandy soil. Small patches of deep, loose, fine to medium sand occur throughout the type. These would have been classed with the Norfolk fine sand had they occurred in sufficiently large bodies to warrant their separation.

The Susquehanna fine sandy loam occurs in the northern part of the county, where the land is rolling or broken. It is generally found in the vicinity of stream courses, where erosion has removed the Lafayette materials and exposed the underlying sands and clays from which this type is derived. The largest single area occurs west and north of Ozark. Other areas occur scattered throughout the northern part of the county.

Drainage is usually effected by a network of springs-fed branches, gullies, and other drainage ways, which serve as feeders to the larger streams. This insures a fairly adequate drainage for the type, but occasionally in narrow valleys and depressions artificial drainage has been supplied. The necessity for this occurs more frequently with the larger bodies where the surface is less rolling. The stiff, impervious nature of the subsoil has a tendency to retard the movement of the soil water downward. Seasons of excessive rains as well as drought affect this soil, but for the average season the drainage and moisture supply are adequate, and fair yields of the staples, corn and cotton, are obtained. Where the surface soil of this type averages about 6 to 8 inches and it is properly cultivated and fertilized, from one-half to 1 bale of cotton per acre should be obtained. The present yields of cotton range from one-fourth to one-half bale and of corn from 10 to 20 bushels per acre.

This type, especially the deeper phase with the sandier subsoil, is fairly well adapted to grapes, the Scuppernong being the variety grown. The occurrence of blight and other diseases common to fruit trees in this section has discouraged fruit growing in the past few years. No attention is given to the spraying or pruning of trees so as to check the ravages of disease. If more attention were given to this industry it could be made a profitable line for the small farmer, who does his own work, especially if a home cannery were provided to take care of the fruit which could not be handled by the local market.

Practically all of the areas of this type under cultivation are used to grow cotton and corn. A crop rotation suitable to the requirements of the soil should be practiced and this should include some forage crop. A three-year rotation of cotton, oats, and peas, or velvet beans and corn, is recommended for the small farmer who has stock to feed. Peanuts should be sown between the corn rows to be used as feed for hogs.

Farms composed of this type of soil bring from \$5 to \$15 an acre.

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

*Mechanical analyses of Susquehanna 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.	<i>Per cent.</i>
23968, 23970.....	Soil.....	1.1	5.2	9.2	47.6	19.8	10.0	7.1
23969, 23971.....	Subsoil.....	.8	3.8	7.1	29.3	10.3	9.6	39.0

## CAHABA FINE SANDY LOAM.

The surface soil of the Cahaba fine sandy loam ranges in depth from 4 to 15 inches, with an average depth of 9 to 10 inches and consists of grayish to light-brown light fine sandy loam. The subsoil is a light-red to dark-red fine sandy clay, which is lighter colored and mottled below 20 to 30 inches.

This type occupies high bottoms and second terraces along the larger streams. It is naturally fairly well drained. This feature and the red subsoil distinguish it from the Kalmia fine sandy loam. It is an easy soil to cultivate, especially where the soil is more than 8 or 10 inches in depth. It lies partly above overflow.

The largest single area of this type occurs in the vicinity of Woodham bridge. Other smaller areas are found in the vicinity of Waterford, Clayhatchee, and elsewhere along Choctawhatchee River. The native growth has largely been removed and most of the land is now under cultivation. It is probably the best cotton soil of any of the bottom land types in the area. It is also well suited to corn where the soil is more than 10 inches in depth. Cowpeas, peanuts, rye, oats, or barley do well and should be included in a systematic rotation with cotton and corn. It is especially recommended that oats be followed by cowpeas or velvet beans so as to give a three-year rotation.

The topography of the Cahaba fine sandy loam is flat to very gently undulating. This type is of alluvial origin, being derived from the deposition of materials formerly laid down by the streams along which it occurs.

This type is usually plowed shallow, the average depth of breaking being about 3 or 4 inches. Much larger returns could be obtained if the soil were plowed to 6 inches or more. It is advisable to follow the regular breaking with a subsoiler to insure the best results. This increases the moisture-holding capacity of the soil and also permits the capillary water to move more freely, so that crops are not so subject to drought.

The most practicable method of incorporating organic matter in the soil is by growing legumes, though where available stable manure gives even better results. Applications of lime in connection with the green manures increase considerably their efficiency. The effect of commercial fertilizers is markedly increased by maintaining a goodly supply of humus in the soil.

The price of this land ranges from \$5 to \$15 an acre. Most of it is cultivated under the tenant system.

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

*Mechanical analyses of Cahaba 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.	<i>Per cent.</i>
23906, 23908.....	Soil.....	0.9	5.1	7.1	40.7	28.3	12.5	5.0
23907, 23909.....	Subsoil.....	.6	4.6	4.0	23.1	19.4	12.6	35.4

## MEADOW.

Where the bottom lands are subject to frequent overflow the alluvium thus deposited is usually of a miscellaneous character and can not be correlated with the established soil types. The term Meadow has been used to cover these conditions and includes the low-lying, flat, poorly drained areas along the various stream courses. The soils vary from dark-brown to black heavy loams, muck, peat, clay loams or clay to the loose, incoherent sands and sandy loams. The heavier soils are found in the back-water basins or sinks and usually have grayish mottled subsoils, while the lighter sands are found in line with the swifter currents during periods of overflow. They frequently form low dikes along the streams. Since additional material is deposited with each subsequent overflow, the character of the bottom lands necessarily changes, in some instances becoming sufficiently elevated to admit of cultivation. These areas are used mostly for sugar cane, corn, oats, and hay. Meadow is usually too wet for cultivation, unless artificially drained, though it is not permanently covered with water, in which case it would be classed as Swamp.

Strips of Meadow border nearly every stream in the county, but in some instances these strips are too narrow to be represented upon the map and are included with the more extensive areas of other types bordering the streams. An occasional basin or sink in the uplands is shown as Meadow. Most of these were too small, however, to be mapped. The soil in these basins usually consists of a dark-brown heavy loam, or clay loam, underlain by a grayish, mottled, plastic clay subsoil. Such areas are used mostly for pasture, although good yields of hay and oats are obtained where artificial drainage is supplied. The largest areas of Meadow occur along the Choctawhatchee River northwest of Clayhatchee.

Meadow supports a dense growth of gallberry, bamboo, briars, laurel, ivy, and other water-loving vines and shrubbery, together with longleaf and shortleaf pine, water oak, black and sweet gum, bay, magnolia, hickory, ash, and some cypress. The surface is flat or depressed and is frequently cut by oxbows, sloughs, bayous, etc., which were formerly a part of the main stream channels.

Only a limited acreage of this type has been formed and its use as "wild range" for stock constitutes about its only value at present aside from the timber growth. These soils are high in organic matter and if reclaimed by ditching would make valuable corn and oat land. They could also be utilized for hay and pasture, being especially well adapted to Bermuda grass. Since most of the streams are fed by perennial springs, stock raisers are generally assured of clear running water throughout the year.

On the lighter sandy areas, which receive wash material from the uplands, sugar cane is grown. The yields are satisfactory and a clear, high-grade, mild-flavored sirup, which meets with a ready sale in the local markets, is ordinarily secured.

The present value of Meadow is based upon its growth of timber and the range which it affords for stock.

#### SUMMARY.

Dale County, with an area of 357,120 acres, or 558 square miles, is situated in the south-central part of Alabama. The surface varies from flat to hilly, the greater part being gently rolling. The county is well drained.

Cotton and corn are the principal crops. Other crops, among them cowpeas, peanuts, velvet beans, and sugar cane, are gradually becoming important.

Many of the soils are deficient in organic matter and legumes—such as cowpeas, velvet beans, vetch, and crimson clover or bur clover—should be grown more extensively.

The upland soils have been classified into four series: The Norfolk, characterized by gray surface soils and yellow subsoils; the Orangeburg, with gray surface soils and red fraible sandy clay subsoils; the Susquehanna, with grayish to brown soil and mottled red and gray clay subsoils; the Greenville with reddish-brown to dark-red soils and dark-red sandy clay subsoils.

The bottom-land soils are included in three groups: Meadow, comprising the poorly drained first bottom soils subject to frequent overflow; the Cahaba series, consisting of second bottom soils with reddish subsoils; and the Kalmia series, second bottom soils with yellow or mottled yellow and gray subsoils.

The Norfolk series includes five types—gravelly sand, sand, fine sand, sandy loam, and loamy sand. These soils are well drained and inclined to be droughty. The lighter types are especially adapted to early vegetables; the heavier to sugar cane, watermelons, and cantaloupes. The sandy loam is a good cotton and corn soil.

The Orangeburg series includes a gravelly sandy loam, sand, sandy loam, and fine sandy loam. These soils are much more productive

than the Norfolk soils. Cotton, corn, oats, sugar cane, peaches, and pecans and a number of forage crops do very well.

The Greenville soils, including the loamy sand, sandy loam, and clay loam are decidedly the most productive upland types of the area. They are highly adapted to cotton, corn, peaches, pecans, and forage crops. Sugar cane makes heavy yields, but the sirup is inferior.

Only one member of the Susquehanna series is developed in Dale County—the fine sandy loam. This is a moderately good cotton and oat soil, and with careful treatment fair yields of corn can be secured. Peaches do not do so well on this type as on the Orangeburg and Greenville soils.

The Kalmia series includes a fine sand, sand, and fine sandy loam. These soils give only moderate results with the general farm crops, but are capable of marked improvement by proper management.

The Cahaba series represents the better drained second bottom land. Only one type was mapped—the fine sandy loam. This is an excellent soil for cotton, corn, and forage crops.

Meadow is mainly poorly drained and subject to frequent overflow. Very little of it is used at present, but most of it could be reclaimed and made to produce good crops of corn, grass, and forage.

The price of land is gradually increasing in Dale County. There is a large area of excellent soil suited to a wide range of crops that can be bought at a very reasonable price.

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