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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 AGRICULTURE AND INDUSTRIES;  
EUGENE A. SMITH, STATE GEOLOGIST.

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SOIL SURVEY OF MOBILE COUNTY,  
ALABAMA.

By GUSTAVUS B. MAYNADIER, W. J. GEIB AND RILDEN T.  
ALLEN, OF THE UNITED STATES DEPARTMENT OF AGRICUL-  
TURE, AND W. E. WILKINSON, L. CANTRELL, AND  
A. M. O'NEAL, OF THE ALABAMA DEPARTMENT  
OF AGRICULTURE AND INDUSTRIES.

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HUGH H. BENNETT, INSPECTOR IN CHARGE.

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[Advance Sheets—Field Operations of the Bureau of Soils, 1911.]



WASHINGTON:  
GOVERNMENT PRINTING OFFICE.  
1912.

**BUREAU OF SOILS.**

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LETTER OF TRANSMITTAL.

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U. S. DEPARTMENT OF AGRICULTURE,  
BUREAU OF SOILS,

*Washington, D. C., November 11, 1911.*

SIR: In the extension of soil survey work in the State of Alabama work was undertaken in Mobile County during the field season of 1911. This work was done in cooperation with the Alabama department of agriculture and industries, R. F. Kolb, commissioner, and the selection of this area was made after conference with State officials.

I have the honor to transmit herewith the manuscript report and map covering this area, and to recommend their publication as advance sheets of Field Operations of the Bureau of Soils for 1911, as provided by law.

Respectfully,

MILTON WHITNEY,  
*Chief of Bureau.*

Hon. JAMES WILSON,  
*Secretary of Agriculture.*

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### MAP.

Soil map, Mobile County sheet, Alabama.



# SOIL SURVEY OF MOBILE COUNTY, ALABAMA.<sup>1</sup>

By GUSTAVUS B. MAYNADIER, W. J. GEIB, and RISEN T. ALLEN, of the U. S. Department of Agriculture, and W. E. WILKINSON, L. CANTRELL, and A. M. O'NEAL, of the Alabama Department of Agriculture and Industries.

## DESCRIPTION OF THE AREA.

Mobile County occupies the extreme southwestern part of Alabama. It has an extreme length north and south of 60 miles, a width east and west of from 17 to 30 miles, and includes within its limits an area of 1,222 square miles, or 782,080 acres. It is bounded on the north by Washington County, on the east by the Mobile River and Mobile Bay, which separate it from Baldwin County, on the south by Mississippi Sound, and on the west by Jackson and Greene Counties, Miss.

The surface features of Mobile County vary from nearly level plains along the coast line to a series of sharply broken ridges in the interior, on the summits of which in many places are found level or slightly rolling plateaus. The topography of the southern part of the county is nearly level to undulating or slightly rolling for a distance of 3 to

5 miles inland, where it gradually rises until it culminates in a series of ridges extending beyond the northern and western limits of the county. In the northwestern portion of the area the surface is somewhat broken, the elevations reaching an extreme height of 452 feet above sea level. The inclinations are steepest in the north-

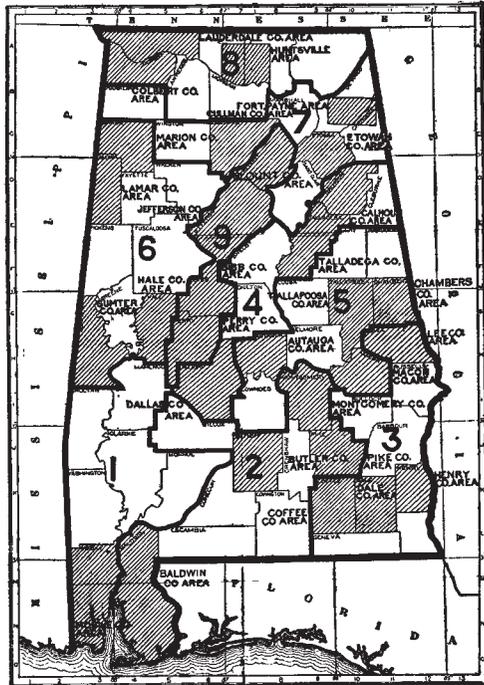


FIG. 1.—Sketch map showing areas surveyed in Alabama.

<sup>1</sup> The work of mapping the soils of this area was in charge of Mr. Maynadier; the preparation of the report devolved upon Mr. Geib.

western part of the county, diminishing toward the south and east. The area along the Gulf and Mobile Bay is frequently indented by tide-water estuaries, many of which are bordered by marshes. Along the Mobile and Middle Rivers, extending from the city of Mobile northward to the county line and varying in width from 1 to 5 miles, there is an extensive area of swamp intersected by numerous bayous. On account of the dense growth and almost continually submerged condition it is practically impossible to traverse this area.

The drainage of the eastern half of the area is chiefly through Cedar and Chickasaw Creeks, Dog River, and a number of smaller streams into Mobile River and Mobile Bay. The western part drains into Dog, or Escatawpa, River and Beaver Creek and their tributaries, both of which cross into the State of Mississippi before flowing into Mississippi Sound. In the southern part of the area the drainage is directly into Mississippi Sound.

Dauphin and Petit Bois Islands, two of the chain of barrier reefs that separate Mississippi Sound from the Gulf of Mexico, lie from 5 to 12 miles south of the nearest point on the mainland.

The region in which Mobile County is located was visited in 1519 by the Spaniard Piñeda in search of a western passage around Florida, and later in 1640 by his countryman, De Soto. In 1699 d'Iberville explored Mobile Bay and the adjacent territory, and the first settlement was effected under his leadership in 1702 near the mouth of Dog River, where he established a post called Fort St. Louis de Mobile. This post remained the headquarters of the French until 1711, when it was abandoned for a new one somewhat higher up the river, on the present site of the city of Mobile. The post was called Fort Conde and its building is regarded as the founding of the city of Mobile. Subsequently the name of the fort was changed by the British to Fort Charlotte, a name which the Spanish retained, and as such it was known in 1813, when the United States entered into possession of this section of the country.

In 1712 the population of Louisiana, of which this region was a part, numbered about 324. Mobile remained the capital until 1720. By 1813 the population of Mobile was upward of 500, exclusive of the garrison of Fort Charlotte. In 1799 it was visited by the eminent engineer Andrew Ellicott, of Maryland, and in his report he speaks of Mobile as "being handsomely situated, with some tolerable good homes." The mission that brought Ellicott into this region was his employment by the Federal Government to run the line between the United States and Spanish dominion under the treaty of 1795. Upon the acquisition of this region by the United States, and its subsequent political subdivision under the new conditions of government, Mobile County was established in 1813 with its present boundaries.

The census of 1910 states that the population of Mobile County is 80,854, of which 51,521 are found within the corporate limits of the city of Mobile. The surrounding country is but slightly developed, there being only about 2 per cent of the entire county actually under cultivation. A number of colonization projects are being developed at present with the idea of bringing settlers into this region.

Mobile, Alabama's only seaport, is situated on Mobile Bay, at the mouth of Mobile River, which is formed by the confluence of the Tombigbee and Alabama Rivers near the north boundary of the county. The channel leading from deep water to the wharves at Mobile is now 24 feet deep, and it is proposed to deepen it to 27 feet at an early date. Advantageously located as a port, Mobile has achieved a high rank among the commercial centers of the South. It has a large and increasing ocean and coastwise trade, ranking high in the importation of tropical fruits and the exportation of cotton and lumber. Much of the produce of the surrounding country is handled through its markets, being brought in by the boats that traverse the Tombigbee and Alabama Rivers and by rail. Excellent transportation facilities are afforded to many points in this and adjoining counties over the lines of the Southern, Mobile & Ohio, Louisville & Nashville, New Orleans, Mobile & Chicago, and the Tombigbee Valley Railroads. These lines put the city of Mobile and the surrounding country in close and convenient touch with the principal markets of the country. The city possesses a good water and sewerage system and all other modern conveniences in the form of gas and electric lighting plants and electric street-car service. Its growth and development has added much to the value and desirability of the surrounding property by providing a good home market for farm produce. It has a good school system and churches of nearly all denominations are to be found within its limits.

There are a number of small towns in the county—Citronelle, Theodore, Mount Vernon, Wilmer, Grand Bay, Coden, and Bayou Labatre. As the agricultural development of the county progresses many of these are destined to become important shipping points for the home products. Citronelle is well known as a health resort and a number of northern people spend the winter months there each year.

While Mobile furnishes a ready market for a large amount of farm produce, the greater proportion of the truck crops is shipped to Chicago, St. Louis, and Cincinnati.

The highways throughout the area are the ordinary dirt roads, and until a short time ago little attention was paid to them. There are local deposits of clay and some "shot ore" which can be used in

improving the roads, but it will be necessary to import road-building material for the improvement of most of the highways. The county is now considering the issuing of bonds to the amount of \$500,000 for the improvement of its public roads.

## CLIMATE.

The climate of Mobile County is mild and humid and usually free from extreme departures from normal temperature. There are but few cold days in the winter and the summers are not noticeably warmer than at many points considerably farther north, though the warm weather continues for a longer period each year. The mild climate and the abundant and evenly distributed rainfall and sunshine make cultivation possible almost throughout the entire year. It is no misnomer to speak of this section as "a three-crop country."

The following table, compiled from the records of the Weather Bureau station at Mobile, Ala., gives the normal monthly, seasonal, and annual temperature and precipitation, together with the average dates of the last killing frost in the spring and the first in the fall:

*Normal monthly, seasonal, and annual temperature and precipitation at Mobile.*

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.....	53	79	14	4.6	1.6	4.7	Trace.
January.....	50	78	11	4.8	0.6	4.1	Trace.
February.....	54	80	-1	5.3	3.0	10.1	Trace.
Winter.....	52	.....	.....	14.7	5.2	18.9	Trace.
March.....	59	85	25	7.4	2.2	6.8	.....
April.....	67	90	32	4.5	2.0	7.2	.....
May.....	74	98	46	4.2	5.5	10.1	.....
Spring.....	67	.....	.....	16.1	9.7	24.1	.....
June.....	80	101	50	6.1	4.2	26.7	.....
July.....	81	102	64	6.7	9.2	4.3	.....
August.....	81	101	57	6.9	4.8	4.7	.....
Summer.....	81	.....	.....	19.7	18.2	35.7	.....
September.....	77	96	49	4.9	3.6	4.0	.....
October.....	68	93	34	3.2	5.6	4.6	.....
November.....	58	83	25	3.5	0.3	3.8	.....
Fall.....	68	.....	.....	11.6	9.5	12.4	.....
Year.....	67	102	-1	62.1	42.6	91.1	Trace.

Average date of last killing frost in spring, Feb. 24, and of first in autumn, Nov. 30.

It will be observed that in normal seasons there is a period of 279 days during which there is no danger from frosts. While the temperature during the remainder of the year may drop below freezing a few times, the cold spells are infrequent and of short duration. Such crops as cabbage, turnips, and even some of the more tender plants are grown during the winter months.

The average velocity of the wind at Mobile is about 7 miles per hour and the prevailing direction from the southwest. The average number of clear days per annum is 148, partly cloudy 107, cloudy with rain 110.

#### AGRICULTURE.

Little attention was paid to agriculture in the county prior to 1895. There were a few large plantations in operation and a number of small "one-horse farms" scattered throughout the region.

Until recently lumbering and turpentine production have been the principal industries of the county. It is situated in what is known as "the timber belt of Alabama," a region extending northward from the Gulf of Mexico for 100 miles or more. The uplands were profitably exploited for lumber and turpentine and the bottoms along the Mobile and Middle Rivers still contain much virgin forest of gum, cypress, oak, sycamore, and pine.

The land has always been held in large tracts by turpentine and lumber companies. As long as the pine would produce turpentine profitably the trees would not be cut for lumber and as long as the land was timbered there could be no agricultural development. In fact, the soils of this entire region were for a long time considered of no value for farming purposes. The reduction of the natural resources and the steadily increasing population have made agricultural development a necessity. The severe storm which swept this region in 1906 devastated thousands of acres of pine timber and put an end to the turpentine industry in those sections most affected. As the land was of no more value to the turpentine interests, it was placed upon the market. There are still large tracts of standing timber in various parts of the county. Much of this is being worked for turpentine and will doubtless be held as long as this industry is profitable. Lumbering is also being carried on quite extensively, but as rapidly as the timber is removed the land is placed upon the market.

The larger part of these large tracts has been bought up by speculative interests, subdivided into tracts of 5 to 160 acres, advertised extensively, and sold as general farming and trucking lands. The small tracts of 5 to 20 acres are often set to Satsuma oranges and pecans, to be cared for by the selling company for a period of years until the orange trees come into bearing. The larger tracts of 20 to

160 acres are sold for trucking and general farming purposes, and portions of the land cleared and crops planted by the land companies under various agreements with purchasers. Practically all of the agricultural development in Mobile County is being conducted along these lines. A large proportion of the settlers coming to this region are from the north central States.

The census of 1900 gives the total number of farms with buildings on them in this county as 854, occupying 105,136 acres, of which but 17,464 acres were classed as improved. Thus out of a total of 817,920 acres in the county, about one-seventh was nominally farm lands, and of this only one-sixth was classed as improved. The average size of the farms reported was about 120 acres each, the improved areas averaging about 20 acres per farm.

Under the conditions then existing in Mobile County these farms produced in 1899 crops valued at \$422,850, exclusive of products fed to stock on the farms. These products were obtained at a cost of \$48,020 for labor and \$69,710 for fertilizers. The total acreage devoted to cotton, as reported by the farmers of the county, was 201 acres, producing 116 bales, or a little over one-half bale to the acre. The 4,376 acres of corn yielded 78,780 bushels, or an average of 18 bushels per acre. Sugar cane was credited with 439 acres.

At the time this census was taken market gardening or truck farming was in its infancy in Mobile County. Irish potatoes yielded 112,800 bushels from 1,752 acres, and 1,011 acres of sweet potatoes yielded 68,132 bushels, an average of 63 bushels of Irish and 67 bushels of sweet potatoes per acre. Miscellaneous vegetables are reported to have yielded products to the value of \$75,110 from 1,375 acres, at the rate of \$54.64 per acre. The total value of small fruits was \$3,748, of which 40 acres were in strawberries, yielding 59,789 quarts. A comparison of the yields and values of truck and staple crops is in itself a sufficient argument for the adoption of a system of intensive cultivation in a location like this, where both soil and climate and unequaled transportation facilities favor the highly specialized industries. At this time also the cultivation of such garden crops as were produced was attended by all the difficulties usually surrounding the inauguration of any new enterprise. However, a just appreciation of the advantages offered by this section for truck farming has resulted in the establishment of a permanent, profitable, and steadily growing industry.

In studying the conditions of this region it must always be borne in mind that usually two and sometimes three crops are produced on the same field within one year. This explains the apparent discrepancy between the total improved acreage as compared with the acreage of different crops taken separately. In a statement showing

acreage of each crop the acreage appears three times, when in reality the whole area under cultivation would be but one-third of the apparent total when stated separately. This system of cultivation is the one most extensively practiced in this section for the production of truck crops, and accounts in no small degree for the prosperous condition of the industry.

While all types of soil found in the county are, as a general proposition, well adapted to truck growing, there are some areas which by reason of local conditions are more desirable than others. The early development of the trucking industry took place in the immediate vicinity of the city of Mobile to supply the local demand. With the improvement of transportation facilities more distant markets became accessible, and new areas were devoted to truck raising at many points along lines of transportation.

Theodore, on the Bay Shore Division of the Mobile & Ohio Railroad, about 19 miles by rail south of Mobile, is at present the center of the trucking industry. The distance to Mobile is considerably shorter by wagon road. The town is 5 miles inland from the shore of Mobile Bay. Cabbage is the crop most extensively grown, though the acreage devoted to peas, beans, and strawberries is gradually increasing. Throughout this section the predominating soil type is the Norfolk fine sandy loam, which is found occupying the level or gently undulating region between the ridges and the shore line. The nearly level topography of this section, together with the character of the soil, renders this land easy of cultivation, and with the intensive methods followed makes it highly productive.

Throughout the section are many slight depressions, some of which in their present condition are not sufficiently drained, but which are capable of great improvement by ditching to rapidly remove the surface water, which, owing to the generally level topography of this whole section, frequently passes off very slowly.

The character of the subsoil is sometimes such that water moves sluggishly through it, owing to a high clay content and also to the fact that the water table is near the surface, making necessary the use of raised beds or ridges in the cultivation of portions of this soil. By the use of tiles the structural condition of the subsoil would be improved, the aeration of the soil and its retentiveness of moisture would be increased, and the necessity of throwing up beds done away with. The expense of the installation of a system of tile drains would in very many cases be offset in a short time by the saving effected in the more level preparation of the land and in subsequent cultivation. In some instances the level character of the land, together with the very slight depressions and inadequacy of the near-by natural drainage channels, precludes at present the owners

of small individual holdings from adopting this method of improving their land. With the continued development of the truck-growing industry, however, it should be possible at no far distant day to have as the result of cooperation a system of main and lateral ditches sufficient to dispose of the drainage of every acre in this section.

In this locality, besides the Norfolk fine sandy loam, are to be found areas of Norfolk sand and sandy loam, together with members of the Scranton and Portsmouth series. Adjoining them on the west are soils belonging to the Orangeburg series. All are good trucking soils. The soils on the ridge have the advantage of better natural drainage, but are somewhat more remote from transportation. This defect will be remedied with the building of a spur or feeder from one of the main lines into this section, construction work on which is now under way.

In the vicinity of Citronelle, in the northern part of the county, the development up to the present time has been confined largely to the Orangeburg sandy loam. The area of the type as found there comprises several square miles occupying a table-land or plateau. Cabbage, strawberries,<sup>1</sup> beans,<sup>2</sup> peas, kohlrabi, melons, asparagus, and a number of other crops are being grown, though the trucking industry has not assumed very large proportions as yet. A number of pecan and Satsuma orange trees are being set out.

In the vicinity of Wilmer some improvement is noted and Bermuda onions are being grown with fair success. Other crops are also being tried, but not extensively as yet. Local interests have established a small experimental farm near Wilmer, on which many different crops are being tried. The results are expected to be of great value in the future development of that region.

At a number of points along the lines of the Mobile & Ohio and the Louisville & Nashville Railroads in the southern part of the county there are a number of development projects under way which are rapidly increasing the amount of land under cultivation and assisting greatly in directing the attention of prospective investors to this section of country.

The conditions under which truck crops are grown in this climate amounts to a constant forcing of plants from seed to maturity. To supply the rapidly developing plants large quantities of commercial fertilizers are used, sometimes as much as 4,000 pounds per acre being applied. A great variety of brands of commercial fertilizers were observed in the area and it was found that the proportion of the different elements varied to considerable extent. Undoubtedly a large amount is wasted each year through too liberal applications and also by using combinations which are not best adapted to the

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<sup>1</sup> See Farmers' Bulletin No. 198, "Strawberry Growing." <sup>2</sup> See Farmers' Bulletin No. 289, "Beans."

crops or the soil conditions. One fertilizer which seemed to be giving very satisfactory results consisted of 8 parts of 16 per cent phosphoric acid, 2 to 3 parts of nitrate of soda, and 5 to 6 parts of muriate of potash. Fractional applications are made at various stages in the growth of the truck crops, the whole averaging 1,000 to 1,200 pounds per acre. This same combination is also used for cotton and corn at the rate of 200 to 400 pounds per acre.

Considerable reliance is placed on cottonseed meal as a basis for many fertilizers, regardless of the crop to which it is applied, and there is no doubt that a considerable portion of it is not used by the crop to which it is applied. Its residual effects, however, probably affect the subsequent crop, though in most cases the proportion lost by leaching would make it more economical to fertilize both crops than to apply with such a lavish hand to the first crop only. In view of the heavy rainfall in this section it would probably be found that smaller applications of the more readily soluble fertilizing material after a period of wet weather, when the soil is still quite moist, would prove as effective as the use of larger amounts of cottonseed meal.

It is recognized that nearly all of the types found in Mobile County are adapted to truck crops and that some of the soils, owing to their texture, structure, topography, and location, are especially well suited for the extensive development of this industry. The Norfolk fine sandy loam as found in this area is a very good truck soil, though there are a number of localities in which it will be necessary to install tile drains when the land is improved. This type is also a fairly good general farming soil, though on account of its being located convenient to transportation lines its development will doubtless be more along the line of trucking. The Orangeburg sandy loam is the best general farming soil in the area. It is also a good truck soil. The Norfolk sandy loam will be developed largely as a general farming soil, while the Norfolk sand, loamy sand, and Orangeburg sand are best adapted to truck crops. Large areas of the Norfolk loamy sand will not be developed for a long time on account of the rough, broken surface and the distance from transportation. The greater proportion of the Scranton and the Portsmouth soils and a part of the Kalmia as found here require drainage before they can be highly improved. When well drained they will be well adapted to a great variety of truck crops.

Mobile County lies within that section frequently referred to as a three-crop country, from the fact that three crops can be raised upon the same field within a period of 12 months. It is thus possible to have what might be classed as a three-year rotation in the North carried out in one year. There are a large number of crop combina-

tions which can be arranged to permit of something growing on the land practically all of the time. Owing to the limited development which has taken place only a few of the possible combinations have been practiced to any extent. One of these is to put out winter cabbage from October to December for shipment to market from January to March. The cabbage can be followed by corn in which cowpeas are sown at the last cultivation. After the corn is gathered the peas may be pastured, cut for hay, or the vines plowed under and the field made ready for a winter vegetable crop or for winter oats. Vetch, beans, or peanuts may take the place of cowpeas in the combination or a volunteer crop of crab grass may be permitted to come up and be cut for hay. If Irish potatoes are planted early in the spring, this crop may be followed by corn, with a legume sown in the corn at the last cultivation. Two crops of potatoes can be secured, followed by winter oats, or the early potatoes may be followed by cotton, after which a legume may be sown for pasture, hay, or green manure. This system makes a large number of combinations possible. In addition to those mentioned above, this section is adapted to a wide variety of truck crops, tomatoes, asparagus, strawberries, radishes, onions,<sup>1</sup> beans, peas, kohlrabi, okra, and melons receiving most attention at the present time. Several truck crops are sometimes grown in combination, and frequently three crops are to be seen on the land at the same time, though they are planted to mature at different periods. Sweet potatoes<sup>2</sup> do splendidly on the lighter soils.

At the present time there are but few peanuts<sup>3</sup> grown in the area. As they furnish excellent forage for hogs, as the vines can be utilized for hay, and as they can be profitably grown for the market, the industry could be greatly extended in this locality, where the soils are well adapted to this crop. The soil best suited to the peanut is one of a sandy, loamy nature, preferably light or grayish in color rather than dark. Soils that are dark and those carrying a considerable percentage of iron or other mineral are likely to stain the shells, rendering them less desirable for the trade. For use on the farm, however, the staining of the shells is of little consequence, as it does not materially injure them for stock feeding. In fact, soils that contain considerable clay and lime or are loamy in character produce heavier nuts than do lighter soils. As a rule the peanut does best on a sandy loam with a well-drained clay subsoil, but the crop may be grown under a wide range of soil conditions.

Cotton is grown only to a limited extent, and its production will so continue, as the boll weevil has reached this section. The farmers

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<sup>1</sup> See Farmers' Bulletin No. 354, "Onion culture."

<sup>2</sup> See Farmers' Bulletin No. 324, "Sweet potatoes."

<sup>3</sup> See Farmers' Bulletin No. 431.

coming in from the North hesitate to grow cotton even under favorable conditions.

Corn <sup>1</sup> does well and should be grown very much more extensively.

The growing of sugar cane for sirup making is in its infancy in this region, but since there are soils well adapted to its growth the industry should be greatly extended.<sup>2</sup> The lighter Norfolk soils produce the clearest and best-flavored sirup, but the heavier types give better yields of a somewhat inferior quality.

Satsuma oranges are receiving considerable attention at the present time, and a number of groves have been set out. During January, 1911, the temperature went to 18° above zero and stood below 32° for four consecutive days, yet the trees were not damaged. It is very seldom that the weather is as severe as this, and it is considered a comparatively safe proposition to grow this variety of orange in the Mobile County area. A large number of pecans are also being planted, conditions being favorable for their growth. This industry will doubtless develop to considerable proportions. Pears have been grown to a limited extent, but they are apt to suffer from blight, and but very few are being set out at the present time. Peaches could doubtless be grown in some portions of the county. Figs do very well and could be profitably grown on a large scale.

The live stock in the county at present is as a rule of inferior grade and poorly bred. There are a few dairies in the vicinity of Mobile which have well-bred cows and some good pigs. Dairying could be extensively developed, since Mobile furnishes an excellent market for all dairy products. At present a large amount of butter is shipped in from Wisconsin and other northern States, which could be produced at home at much smaller cost. The raising of hogs is another branch of stock raising which could be given attention, since pork can be raised much more cheaply here than in the northern States. At present most of the pork consumed comes through the large packing houses located in other parts of the country. Beef cattle and sheep could also be made sources of income for the farmers who come into this region. At present one great obstacle to the importation of well-bred cattle from the North is the tick, but by following proper methods throughout the county this objection can be eliminated in the course of a few years. The Bureau of Animal Industry at Washington, D. C., or the College of Agriculture at Auburn, Ala., will furnish specific information as to how this can best be accomplished. Peanuts, cowpeas,<sup>3</sup> velvet<sup>4</sup> and soy beans, vetch, oats,<sup>5</sup>

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<sup>1</sup> See Farmers' Bulletin No. 414, "Corn culture."

<sup>2</sup> See Report on Soil Survey of Grady County, Ga.

<sup>3</sup> See Farmers' Bulletin No. 318, "Cowpeas."

<sup>4</sup> See Circular No. 14, "Velvet beans," Bureau of Plant Industry, U. S. Department of Agriculture.

<sup>5</sup> See Farmers' Bulletin No. 420.

rye, corn, and bur clover are among the crops that can be profitably grown in connection with cattle and hog raising.

Up to the present time there has been but little difficulty in securing labor for the various lines of farm work. A large number of hands are required for picking peas, beans, and strawberries. Colored labor is used largely, though as the white population increases and as more farms are operated there will be a larger proportion of white labor. Families improving farms will have times when all the help will not be needed at home and during such times employment can be readily secured on the older farms of the region or in clearing new land.

Most of the land now on the market is cut-over tracts or areas where the timber was ruined by the recent storm. The clearing of such land is no small task. Stump-pulling machines and blasting powder are used and in many cases the stumps are burned out. The cost of clearing varies, the average being about \$15 an acre.

The value of the cut-over lands depends upon size of tract and location and character of soil. Large tracts of 5,000 to 10,000 acres can be bought for \$4 to \$20 per acre. When subdivided they sell at \$20 to \$30 an acre. Some of the cultivated land at Theodore could not be bought for \$100 an acre. Near Mobile the land values are high, being held for suburban home sites.

The soils of this county, in common with soils of the same character along the entire Atlantic seaboard, are generally deficient in organic matter, although in their virgin state there sometimes appears to be a considerable amount of humus-forming material. This soon disappears, however, under cultivation. The maintenance of the humus content is of the utmost importance, and in a climate like this, where the clovers, cowpeas, velvet beans, and other similar crops can be so readily produced, there is no lack of humus-forming material available, the growing of leguminous plants for green manuring at frequent intervals is an absolute necessity to the maintenance of productiveness. The incorporation of humus-forming material supplied by the growing of these crops improves the general chemical and physical condition of the soil and also increases its water-holding capacity. The experienced truck grower realizes this fact and for the beginner to overlook it is to court disaster. Stable manure when available is most valuable for this purpose. The greater proportion of the manure used in this area is shipped in from St. Louis. It costs the grower \$24 in carload lots, f. o. b. his station, but the supply is limited. It is usually of good quality, being practically free from straw.

Considering the area as a whole, the outlook for agricultural development is very promising. There are extensive areas of several types of soil well adapted to general farming and trucking and by



FIG. 1.—SMOOTH SURFACE OF THE ORANGEBURG SANDY LOAM.

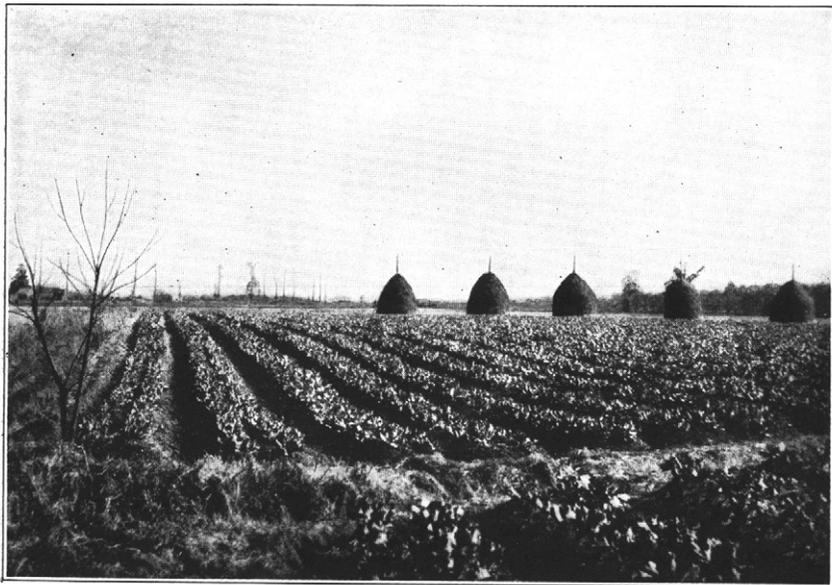


FIG. 2.—CABBAGE ON THE NORFOLK FINE SANDY LOAM.



proper methods of culture they can be brought to a high state of productiveness.

#### SOILS.

Mobile County lies wholly within that physiographic division of the United States known as the Gulf Coastal Plain, the sedimentary strata of which cover the southern part of Alabama and a large portion of all the States bordering on the Gulf. For a distance considerably beyond the limits of the county this plain, rising gradually as it recedes from the shore line, is covered with the material that has been described by geologists as the Lafayette formation, with the exception of a narrow strip immediately along the Gulf, where the Columbia formation is found at the surface.<sup>1</sup> The materials composing these geologic formations give rise to soils varying in texture from sand to loam. These vary in color as well as in texture and in depth and character of the subsoil. The occurrence of the light-gray or grayish-yellow surface soils with the distinct yellow subsoils to a depth of some feet, which in turn rest upon a bright red sandy clay, is common. In many cases there is a slight mottling of the deeper-lying strata where the red and yellow material meet. Frequently the original surface of light-colored sand and its attendant yellowish subsoil have been entirely removed, leaving the lower red subsoil exposed, which weathering and other agencies have reduced to dark-gray or reddish soils with red subsoils. Small iron concretions, "shot ore," or "buckshot" are quite common.

The soils of Mobile County belong for the most part to two series, the Norfolk and the Orangeburg. The distinguishing feature is the difference in the color of the subsoil, that of the Norfolk being yellow, while the Orangeburg subsoil is red.

In the original distribution of soil-making material what was first laid down seemingly contained a greater amount of iron than the more recent deposits. The decomposition and disintegration of this material forming the distinctly red, deeper subsoils underlies nearly the whole county. Upon this was subsequently deposited a layer of material less rich in iron that gave rise to the covering of lighter colored surface soils with yellow subsoils. The types recognized as belonging to the Norfolk series, as found in this area, are the Norfolk sand, coarse sand, loamy sand, sandy loam, and fine sandy loam, while those belonging to the Orangeburg series are Orangeburg sand, sandy loam, and fine sandy loam.

The Portsmouth series has about the same derivation as the Norfolk, but owing to its low-lying position and its poorly drained condi-

<sup>1</sup> See "The Coastal Plain of Alabama" and geologic map of Alabama, by Dr. Eugene A. Smith, State geologist.

tion there is a larger amount of vegetable matter in the surface soil, which imparts the dark color characteristic of the series. The subsoil somewhat resembles the Norfolk, but is more mottled. The types belonging to this series in Mobile County are Portsmouth loam, sandy loam, and fine sandy loam.

The Greenville series is represented by one type, the Greenville loam. It is developed only in small areas.

The Scranton fine sandy loam, the only member of this series mapped in the county, is characterized by a dark-colored surface soil, often quite like that of the corresponding Portsmouth type, underlain by a lighter colored subsoil similar to that of the Norfolk series. In topography this soil is slightly elevated and undulating enough to afford partial relief from surface water, though the run-off is seldom as complete as it should be. Practically the entire type requires underdrainage. In nearly all of its characteristics the Scranton series is intermediate between the Norfolk and the Portsmouth.

The Kalmia series occupies terraces along the stream courses in various parts of the Gulf Coastal Plain and is represented here by only one type, the fine sandy loam.

The Ocklocknee series is represented in the area by one type, the clay loam, which is an alluvial soil found along the Mobile and Middle Rivers.

The soils on the barrier reefs along the coast have all been classed as one type, Coastal beach.

The type mapped as Swamp occurs along the margins of rivers and creeks and is of the same character as that generally found throughout the Southern States. It consists of strips of lowland subject to inundation and more or less covered with water at all times of the year. It supports a dense growth of gum, bay, canes, reeds, and other moisture-loving species.

Muck consists of limited areas of partly decomposed vegetable matter occurring in a few poorly drained depressions, where conditions favor the growth and decay of large amounts of water-loving plants.

Tidal marsh includes the low-lying lands influenced by tides and in which the water is always brackish.

As all of the soils in the county were originally derived from the same or similar geological formations, and as characteristic features which warrant separations are not always distinctly developed, there are a number of instances where the gradation from one type to another extends over considerable distance. In such cases boundary lines have of necessity been located arbitrarily. In 1906 this region was visited by a severe storm, which blew down much of the standing timber which previously covered practically the entire county. As a result fallen trees and brush are scattered in every direction, making

it almost impossible to penetrate some regions and locate soil boundaries accurately. Over the greater part of the survey the soil types as classified here occur with uniformity over areas of considerable extent. On account of the conditions indicated above and the fact that only about 2 per cent of the county is under cultivation the field work was conducted on the order of a reconnoissance rather than a detailed survey.

The following table gives the actual and relative extent of the various types of soil mapped in Mobile County:

*Areas of different soils.*

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Norfolk loamy sand.....	214,016	27.4	Tidal marsh.....	9,024	1.1
Norfolk fine sandy loam.....	121,152	17.9	Ocklocknee clay loam.....	6,144	.8
Light phase.....	19,584		Coastal beach.....	5,120	.7
Swamp.....	102,016	13.0	Greenville loam.....	4,352	.6
Orangeburg sandy loam.....	96,960	12.4	Orangeburg fine sandy loam..	4,160	.5
Norfolk sandy loam.....	71,808	9.2	Portsmouth fine sandy loam..	1,664	.2
Norfolk sand.....	53,440	6.8	Portsmouth loam.....	1,600	.2
Orangeburg sand.....	33,600	4.3	Muck.....	576	.1
Kalmia fine sandy loam.....	17,472	2.2	Norfolk coarse sand.....	192	.1
Scranton fine sandy loam.....	9,856	1.3			
Portsmouth sandy loam.....	9,344	1.2	Total.....	782,080	.....

ORANGEBURG SANDY LOAM.

The surface soil of the Orangeburg sandy loam consists of a gray to reddish-brown sandy loam running from 6 to 12 inches deep, with an average depth of 10 inches. It is underlain by a red sandy clay subsoil to a depth of more than 36 inches, becoming more clayey with depth. Where the land is cleared and cultivated the surface soil is usually gray in color, while in the uncleared lands it often shades to brown, owing chiefly to the larger amounts of organic matter found in the virgin areas. In some sections a scattering of small iron concretions ("shot ore") is present on the surface and mixed with the soil, this condition usually being found along the crests of small ridges and never over areas of any considerable extent.

The red sandy clay subsoil throughout the entire type has a granular structure which makes it a good absorber and retainer of moisture, and to this property is due in a large measure the excellent agricultural value of the soil. The humus content of the surface soil is comparatively low, except in some of the small depressions where there has been an accumulation of vegetable remains by local wash. Some areas of limited extent represent more nearly the true Greenville loam, and wherever large enough they were mapped as that type. There are, however, a number of patches too small to be

indicated. On the steeper slopes much of the surface soil has been removed by erosion, exposing the underlying red clay, while on the lower slopes the sand has accumulated to a depth of 15 to 18 inches. On account of the sandy nature of the surface soil the type as a whole is easy to cultivate, and a fine mellow seed bed can always be secured without difficulty. The only exception occurs on the small ridges where the iron concretions are found. In breaking up the virgin soil in such places some difficulty may be experienced, though these areas are too small to be given serious consideration.

The Orangeburg sandy loam is the most important though not the most extensive soil type in the county. The largest single area is found in Townships 4 and 5 south, range 3 west, from 10 to 16 miles west and southwest of Mobile. The surface in this region varies from level to undulating and gently rolling. Taking all things into consideration this is without doubt the finest tract of land in Mobile County. This same area forms a part of an extensive and somewhat irregular ridge of Orangeburg sandy loam, extending from the Louisville & Nashville Railroad between Grand Bay and McGowan northward over 30 miles to a point a short distance above Georgetown. This tract is interspersed with numerous areas of Orangeburg sand, Norfolk sand, sandy loam, loamy sand, and several other minor types. It forms what might be called the backbone of the county, as throughout the greater part of its extent it is the main drainage divide of the area. Another area of Orangeburg sandy loam, much smaller in extent, is found in the immediate vicinity of Citronelle. Numerous other areas are found throughout the survey, many of them too small to be mapped.

The topography of the type varies from level to rolling and broken (Pl. I., fig. 1). The level and undulating tracts are usually found as table-lands capping the low, broad ridges, while the broken areas occur chiefly along the margin of these table-lands, which are often considerably dissected and eroded. On account of the sandy nature of the surface and the granular structure of the subsoil the natural drainage is good. Even on the most level tracts there is usually sufficient fall to remove the surface water, though in a few localities tile drains would be found beneficial.

The Orangeburg sandy loam is derived from the mantle of the Lafayette formation which covers a large part of this region to a considerable depth and extends far to the east and west beyond the boundaries of the present survey. The original timber growth consisted chiefly of longleaf pine with some Cuban pine and a few live and water oaks.

Only a comparatively small proportion of the Orangeburg sandy loam is under cultivation at the present time, but the projects now under way for its improvement give promise of making it the most

highly developed type in the county within the course of a few years. It is without doubt the best all around soil within the survey and the general farming and trucking experience of those who have already worked with this type is sufficient to demonstrate its adaptation to a great variety of crops. While all truck crops common to the region give very satisfactory returns on this soil, the Orangeburg sandy loam may be considered best adapted to a system of agriculture in which general farming and stock raising form the most important features. By following proper methods of cultivation and fertilization the following yields of the ordinary farm crops can be easily obtained: Hay, consisting of oats and peas, oats and vetch, or oats alone, will yield from 2 to 4 tons per acre; volunteer grasses, chiefly crab grass, come up after the corn is "laid by," and yield upwards of 1 ton of hay per acre. Oats as a grain crop yield from 25 to 40 bushels per acre, though at present none is thrashed out owing to the lack of machinery for that purpose; corn from 30 to 45 bushels; cotton one-half to 1 bale per acre; Irish potatoes 125 bushels, sweet potatoes 150 bushels, and sugar cane from 300 to 600 gallons of sirup per acre. The quality of the sugar-cane sirup does not come up to that produced on the Norfolk soils, especially in color, being usually of a darker color, particularly when grown on those phases of the Orangeburg sandy loam in which the red sandy clay comes within 6 or 8 inches of the surface. Tobacco has been successfully grown in Mobile County, and this soil is better adapted to its production than any of the other types. Best results would probably be had with the cigar-filler leaf of the Cuban type. The industry might profitably be developed on this soil, but the inexperienced farmer should plant only a small area at first in order that he may learn the best methods of handling the crop without taking the chances of heavy loss. It is a difficult crop to handle both in the field and the curing shed, and if taken up extensively should be supervised by an expert. Small preliminary crops are also recommended as a safeguard against loss through inability to market profitably a leaf coming from a new and heretofore unknown tobacco-growing district.

Of the trucking crops, cabbage, beans, peas, asparagus, tomatoes, radishes, onions, okra, strawberries, and melons are the most extensively grown at present, though a much greater variety could be successfully grown. A large number of Satsuma orange trees are being planted and give promise of developing into an important industry, though at present only a few small groves are in bearing. Pecan trees are also being planted quite extensively on this type and do very well. It is unlikely that peaches will ever be grown extensively, but they can be raised and enough should be planted on each farm on this soil to supply the home demand. Pears also grow

well on this type, but are apt to suffer from blight. Peanuts<sup>1</sup> would do well and could be given an important place on the farm as a forage crop for hogs.

On account of the extremely mild climate and even distribution of rainfall it is possible to have some crop occupying the land during the entire year, and what may be considered a three-year rotation can be followed out within 12 months. The crop combinations given herewith are only a few of those suited to this soil in Mobile County. Winter cabbage may be set out from October to December and shipped to market from January to March, followed by corn in which cowpeas, velvet beans, or peanuts may be sown at the last cultivation. When the cowpeas, beans, or peanuts are harvested, plowed under, or grazed, a crop of winter oats may be sown, or winter vegetables grown again. If Irish potatoes are planted early in the year this crop may be followed by either cotton or corn, after which some leguminous crop can be planted. It will be evident that a large number of similar combinations may be successfully handled on this soil.

As a type the Orangeburg sandy loam is deficient in organic matter, and in any system followed the deficiency should be supplied by the addition of humus-forming material. Organic matter may be most cheaply supplied by plowing under cover and catch crops grown in rotation with the staples. Cowpeas, vetch, bur clover, oats, and rye all furnish good forage and an abundant supply of vegetable matter. Commercial fertilizers are used extensively, especially with the truck crops, and a mixture of 8 parts of 16 per cent phosphoric acid, 2 or 3 parts of nitrate of soda, and 5 or 6 parts of potash is a combination which gives good results. For truck crops this is applied at the rate of 1,000 to 1,200 pounds per acre at different times during the growth of the plants. For general farm crops, cotton, and corn, from 200 to 400 pounds are used per acre. In the cultivation of this type deeper plowing than is the custom in this region should be practiced, and very thorough after-cultivation should be given all intertilled crops. Mixtures of cottonseed meal, acid phosphate, and kainit are also well suited for all crops except tobacco.<sup>2</sup>

The value of farm lands on the Orangeburg sandy loam varies with location, size of tract, and improvements. In remote districts uncleared land may be bought for \$6 to \$15 an acre, while the same class of land closer to lines of transportation ranges from \$15 to \$30 an acre. In the vicinity of Citronelle land of this type held in small tracts of 5 to 10 acres and improved is valued as high as \$75 an acre, with some sales at that figure.

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<sup>1</sup> See Farmers Bulletin No. 356, "Peanuts."

<sup>2</sup> For a discussion of tobacco fertilizers see Soil Survey report on Grady County, Georgia.

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

*Mechanical analyses of Orangeburg sandy loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
23536.....	Soil.....	0.6	11.6	30.4	37.4	7.1	7.3	5.4
23537.....	Subsoil.....	.2	4.6	17.0	48.0	7.2	3.3	19.7

#### ORANGEBURG SAND.

The surface soil of the Orangeburg sand, to a depth of about 8 inches, consists of a grayish-brown to reddish-brown medium sand underlain by a brown to red sand of about the same texture, frequently extending to a depth of 3 to 10 feet or more. The subsoil often grades into a red sticky sand or sandy clay, and the nearer the surface this occurs the better the type is for farming. The better phases often grade rapidly into the Orangeburg sandy loam type. The loose, open structure of the soil makes it very easy to cultivate, and no heavy stock or tools are required.

The Orangeburg sand is confined almost entirely to the southern half of the county and is found closely associated with the Orangeburg sandy loam. One of the largest areas occurs 6 to 8 miles west of Mobile, while another lies about 10 miles south of Wilmer. Other smaller patches occur directly south of these two as far down as the Louisville & Nashville Railroad.

The topography is usually rather rough, and by reason of its position, open structure, and surface features the natural drainage is good—in some cases excessive—and crops occasionally suffer during periods of dry weather.

The Orangeburg sand is derived from the deep sands of the Lafayette formation. There may, however, be areas which have resulted from the sandy clay where the clay particles have been removed by drainage waters. The chief constituent of the type is quartz sand. The reddish color is one of the characteristics separating this type from the Norfolk sand, which it very much resembles in texture, usually averaging somewhat more clayey, however, in the subsoil. The original timber growth consisted chiefly of long-leaf pine, with some scrub oak.

Where the sand is not too deep, this type is well adapted to trucking, especially in those areas lying adjacent to the Orangeburg sandy loam, where there is a greater proportion of clay in the subsoil. Only a very small part of this soil is under cultivation, and for this reason it would be difficult to give a correct estimate of yields which would

be obtained. The type responds quickly to fertilizers and should be devoted chiefly to the production of such truck crops as can be forced to early maturity, thereby reaching the market more quickly than products from the heavier soils, which are always somewhat slower in maturing.

The soil is very much in need of vegetable matter, such as can be supplied by growing, and occasionally plowing under, cowpeas, velvet beans, vetch, oats, and rye. Heavy applications of mixtures of cottonseed meal, kainit, and acid phosphate analyzing in the neighborhood of 8-4-4 give good results with the various crops adapted to the type.

Land values for this type range from \$6 to \$10 an acre, uncleared, when purchased in large tracts.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Orangeburg sand:

*Mechanical analyses of Orangeburg sand.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
23528.....	Soil.....	1.4	11.1	28.4	47.0	6.7	2.0	3.3
23529.....	Subsoil.....	.0	4.0	14.9	46.4	10.1	4.6	19.9

**ORANGEBURG FINE SANDY LOAM. ...**

The surface soil of the Orangeburg fine sandy loam consists of a grayish to reddish-gray loamy fine sand to light fine sandy loam extending to a depth of 10 to 20 inches, underlain by a friable red fine sandy clay. Because of the sandy nature of the soil the type is easy to cultivate when cleared and developed.

In topography, drainage, origin, and crop adaptation it is very similar to the Orangeburg sandy loam, and has a very limited extent in the county. The largest area, of about 2 square miles, is found 1½ miles southwest of Orchard. A few other smaller patches are found associated with the Orangeburg sandy loam.

The type has about the same value as the Orangeburg sandy loam and differs from that soil chiefly in having a fine texture. Under similar treatment it is likely to be a little more retentive of moisture.

**GREENVILLE LOAM.**

The Greenville loam consists of a surface soil averaging 4 to 6 inches in depth, of a red or reddish-brown, medium textured, heavy sandy loam to loam, underlain by a red sandy clay, usually becoming heavier with increased depth. On level uncleared tracts the surface covering is quite sandy and light in color, but when cultivated the

underlying red material is turned up, giving it a darker appearance. On the broken tracts the surface material has often been entirely removed by erosion, leaving exposed the red sandy clay. The Greenville loam is more difficult to cultivate than the Orangeburg sandy loam type, but when worked under proper moisture conditions can always be brought to good tilth.

The Greenville loam is of limited extent in Mobile County. There are several small areas along the Louisville & Nashville Railroad between Saint Elmo and Grand Bay and a small level tract just west of Citronelle. Other patches of minor importance are scattered about, closely associated with the Orangeburg sandy loam.

The topography is at times rough and broken, chiefly owing to erosion, with a few level areas like the one near Citronelle, which make very good farming land. The occurrence of such level tracts at the elevated portions of the upland indicates that the present crests of the hills and ridges are remnants of a former extensive and uniformly level peneplain and that these hills and ridges are the results of excessive erosion. On the broken phase the natural drainage is good, but on the level tracts tile drains could in a few instances be installed to advantage.

The Greenville loam owes its origin to marked erosion of the Lafayette sands and clays in the uplands, and is developed where the sandy surface soil has been largely removed from such soils as the Orangeburg sandy loam or the fine sandy loam.

The type is a good general farming soil, though it is not extensively developed in Mobile County. The area near Citronelle is devoted to general farming and very good results are obtained. Because of its limited extent and the fact that few fields are made up entirely of this type, it would be difficult to give yields which would represent its actual producing power as found under the conditions prevailing in this region. Excellent results can be had with cotton, corn, oats, cowpeas, vetch, sorghum, and velvet beans.

The value of land of this character is about the same as that indicated for the Orangeburg sandy loam.

#### NORFOLK FINE SANDY LOAM.

The surface soil of the Norfolk fine sandy loam for a depth of about 6 to 14 inches consists of a fine sandy loam to heavy fine sandy loam often containing a considerable quantity of silt. The color of the surface 3 to 6 inches ranges from yellowish gray in cultivated fields to dark gray or sometimes black in timbered areas. The subsurface color is usually pale yellow and the texture heavier. Frequently the sand is so fine that it can scarcely be distinguished from the silt when the soil is wet. In many places there is a considerable amount of organic matter in the first few inches which

imparts a dark color to the soil, but when the land is put under cultivation this dark color usually disappears in the course of a few years. The subsoil consists of a bright yellow comparatively friable fine sandy loam to fine sandy clay loam, becoming heavier with depth. Where the heavier subsoil is found it is frequently slightly mottled with drab and occasionally streaks of red are found, due to iron stains. In some localities the heavy subsoil is found within a foot of the surface, while again the sandy covering may extend to a depth of 24 or 30 inches. On account of the undeveloped condition of the country it was not practicable to separate out such small areas of slight variation. The type is easy to cultivate and under the proper moisture conditions no difficulty is experienced in securing a good seed bed.

While there are two other soils found occupying a greater territory than the Norfolk fine sandy loam it is the second type of importance in Mobile County. The largest occurrence extends north from Mobile to the county line, comprising an area from 1 to 5 miles in width, bordered by the swamp along the Mobile River on one side and by the Norfolk loamy sand and other types of the higher-lying land on the other. Below the city of Mobile it borders Mobile Bay, extending southward and then westward along Mississippi Sound to the Mississippi State line. Along the southern end of the county its continuity is broken by areas of Norfolk sand, Tidal marsh, and the soils of the Scranton and Portsmouth series.

The topography is level to undulating, but nearby natural drainage courses afford relief from standing water in most instances. These can also serve as outlets for artificial drainage systems where it is advisable to install them. In some cases the subsoil is compact and does not allow much movement of the ground water, and tile drains will be found necessary in the highest development of the type. The Norfolk fine sandy loam is variously known as "second bottom," "Mobile terrace," or "Mon Louis terrace."

The Norfolk fine sandy loam is derived from the weathering of materials which seem to have been deposited as estuarine or marine terraces, or both. Where the type borders the Mobile River, the soil is partly recent alluvium, and at times of extreme high water is submerged for a short time. This phase is very limited or it would have been mapped as a separate soil. The native vegetation is long-leaf pine, with some Cuban pine and a few live and water oaks. Wire grass is one of the distinctive species of smaller plants found on this soil. It is of value chiefly for grazing. Gallberry is also plentiful, indicating poor drainage.

The Norfolk fine sandy loam is one of the best general farming soils in the area and also well adapted to the production of truck crops. There is more trucking carried on at the present time on this type

than on any of the other soils in Mobile County. In the vicinity of Theodore, where the industry is most extensively developed, it has been satisfactorily demonstrated that a great variety of crops can be successfully and profitably produced on a commercial scale. Cabbage is the leading crop at present (Pl. I, fig. 2), but the type is well suited to tomatoes, melons, potatoes, cucumbers, cowpeas, garden peas, beans, radishes, and a number of other vegetables. Strawberries also do very well, and the acreage of this crop is being gradually increased. Commercial fertilizers are used very extensively in growing truck, from 1,000 to 1,200 pounds per acre being the ordinary quantity used by growers. Frequently much larger applications are made. The fertilizer usually consists of 8 per cent phosphoric acid, 2 to 3 per cent nitrate of soda, and 5 to 6 per cent of potash salts. Fractional applications are found to be the most efficacious. Under proper methods of cultivation corn will yield from 35 to 45 bushels or more and cotton from one-half to 1 bale per acre. Irish potatoes, sugar cane, oats, and cowpeas are also grown. In a number of places Satsuma orange and pecan trees are being planted and give promise of success. Peanuts would do well, especially where the drainage is well established. This crop could be profitably grown in connection with hog raising.

Only a small proportion of the Norfolk fine sandy loam is under cultivation at present, but, as it is well suited to a variety of crops and well located in regard to transportation lines, its further development will be rapid. The type as a whole is deficient in organic matter. The systems followed and the rotations practiced should be so arranged that leguminous plants and cover crops can be plowed under at intervals to furnish humus-forming material. Cowpeas, velvet beans, vetch, oats, and rye are a few of the crops which may be utilized for this purpose. The same or similar crop combinations may be followed as suggested for the Orangeburg sandy loam, and something can be kept growing on the land practically all of the time. Wherever it can be obtained, stable or barnyard manure should be used extensively. Excellent results are obtained when it is used in conjunction with commercial fertilizers. The sandy clay subsoil retains fertilizers better than the lighter soils of the Norfolk series. Some good grazing is secured on the unused lands from wild grass. In the longleaf pine woods broom sedge offers good spring grazing, while carpet grass can be had in unused cleared areas.

The uncleared land of this character ranges in value from \$10 to \$30 an acre, and where under cultivation from \$30 to \$100 an acre.

*Norfolk fine sandy loam, light phase.*—The soil of the Norfolk fine sandy loam, light phase, consists of a gray to grayish-brown loamy fine sand to fine sandy loam extending from 10 to 20 inches deep.

In the lower portion of the soil proper the color becomes yellowish gray or pale yellow and the texture slightly heavier. The subsoil is a bright yellow friable sandy clay or heavy fine sandy loam extending to a depth of 36 inches or more. The lower part of the material is occasionally mottled with iron stains. Iron concretions are frequently found strewn upon the surface and disseminated throughout the soil section. The type is usually loose and friable in structure and when first cleared and cultivated is quite loamy in feel, owing to the organic matter incorporated with it. It loses this characteristic to some extent after a few years of cultivation. On account of its loose incoherent structure it warms up early in the spring and is easy to till.

This phase is of comparatively limited extent. The largest area, 6 to 8 miles in extent, lies directly northeast of Chunchula. Another small tract is found 2 miles south of Saint Elmo, and still another 2 miles south of McGowan. A few smaller patches are found in the southern part of the area, but they are of little importance.

In topography the surface is somewhat variable. The area near Chunchula is quite broken, being traversed by numerous small streams and eroded to considerable extent. The smaller tracts in the southern part of the county are undulating to gently rolling. The natural drainage in all cases is good. The soil is derived principally from the weathering of the sands and clays of the Lafayette formation. The native growth consisted chiefly of longleaf pine, with a few live oaks and water oaks.

Only a small proportion of the light phase of the Norfolk fine sandy loam is under cultivation. It is a fairly good general farming soil, and where the topography is not too broken it is well adapted to a variety of truck crops. In some sections of the South an excellent grade of tobacco is being produced upon it. Peanuts give excellent results on this type of soil throughout the Atlantic and Gulf Coastal Plains. Pecans are well adapted to the type.

The soil is deficient in organic matter, and in developing any system of farming some means should be provided for the incorporation of vegetable matter. As indicated for other types, cowpeas, vetch, bur clover, peas and beans, oats, and rye are crops which can be used for this purpose. Stable manure should also be applied whenever it is possible to obtain it. The Norfolk fine sandy loam, light phase, on account of the clay in the subsoil, retains fertilizers better than the Norfolk sand or loamy sand types.

Uncleared stump land of this character ranges in value from \$4 to \$20 an acre.

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

loam and also results of mechanical analyses of samples of the soil and subsoil of the light phase of this type:

*Mechanical analyses of Norfolk fine sandy loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
Typical:		<i>Per cent.</i>						
23524, 23526...	Soil.....	0.4	3.9	6.9	30.7	14.1	27.7	15.8
23525, 23527...	Subsoil.....	.0	.7	1.5	14.9	30.2	26.2	26.5
Light phase:								
23516.....	Soil.....	.3	2.3	3.6	37.3	30.2	18.8	7.1
23517.....	Subsoil.....	.0	.7	1.2	25.5	34.1	25.1	13.1

NORFOLK SANDY LOAM.

The surface soil of the Norfolk sandy loam, to a depth of 8 to 24 inches, consists of a medium-textured loamy sand or light sandy loam, grayish to dark gray in the immediate surface and pale yellow below. This is underlain by a friable yellowish sandy clay, which becomes heavier with increased depth. The soil is deficient in organic matter except in small depressions, where an abundant moisture supply has favored the growth of a more luxuriant vegetation. In some sections where the land is rolling the surface soil has been eroded, leaving exposed the sandy clay subsoil. Some of these exposures are slightly mottled with red, and a few closely resemble the subsoils of the Susquehanna soils. They differ very widely from the Susquehanna in texture and general character, being distinctly a sandy clay. This variegated subsoil is found only in small areas, never large enough to map separately, along road cuts or on the crests of eroded hills or ridges, where the high color stands out and makes such patches very conspicuous. Where the soil has been partly eroded, aggregations of "shot ore" or ferruginous concretions are sometimes found on the surface and throughout the soil section. As these weather they give a reddish tint to the soil, which in all other respects is Norfolk. Some of these pebbly areas really represent occurrences of Tifton sandy loam too small to map. In the distinctly yellow subsoil which has been exposed one may sometimes see bright red spots one-fourth inch or more in diameter, the result of decomposition of these small concretions. Owing to the sandy nature of the surface soil, the Norfolk sandy loam is an easy type to cultivate.

The type is not as extensive in Mobile County as the sand and loamy sand members. The largest area occupies about one-half of the township directly west of Gulferest. Another tract of considerable size occupies the eastern portion of township 2 south, range 3 west. There are a number of smaller patches scattered throughout

the survey closely associated with the other types of the same series and with the Orangeburg sandy loam.

The surface varies from undulating to rolling and rather broken. Over the greater portion of the type the natural drainage is good. The native growth consisted chiefly of longleaf pine, though the greater part of the timber has been cut off or blown down, leaving the type a jumble of logs, tree tops, and stumps.

Only a very small proportion of the Norfolk sandy loam has been cleared and put under cultivation, although it is capable of profitable development. Where the topography is not too rough it is a good general farming soil and fairly well adapted to the growing of a variety of truck crops. The same crop combinations as suggested for the Orangeburg sandy loam and similar methods of handling can well be followed in improving it. The heavy nature of the subsoil makes the type retentive of moisture and any fertilizers which may be applied. As the soil is deficient in organic matter, this should be supplied by plowing under such crops as cowpeas, vetch, velvet beans, oats, or rye. Peanuts do well and should be grown for forage and as pasturage for hogs. Cotton, corn, oats, and a number of forage crops do very well. Pecans also do well.

The value of this land is about the same as that of the Orangeburg sandy loam, though the Orangeburg type is considered a slightly stronger soil.

#### NORFOLK LOAMY SAND.

The Norfolk loamy sand consists of a gray medium sand to loamy sand, yellow below the surface and extending to a depth of 12 to 16 inches. This surface mantle is underlain by a medium yellow sand with enough clay to make it slightly coherent when wet. The subsoil is almost uniformly a yellow sandy clay, varying in depth from 26 and 30 inches to 8 feet. At depths of 2 feet or more the clay content will run slightly in excess of 10 per cent.

Other members of the Norfolk series found in areas too small to map separately were found in the county, among them areas of Norfolk sandy loam, Norfolk fine sandy loam, and Norfolk sand; Orangeburg sandy loam and a few small patches of Susquehanna fine sandy loam were also included with the type. The predominant soil, however, is a distinct loamy sand with a sticky sand to sandy clay deep subsoil.<sup>1</sup>

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<sup>1</sup> A distinct soil type, resembling somewhat the Plummer fine sandy loam, was found in some of the narrow winding swales and drainage depressions of the area, particularly to the west of Citronelle. It usually consists of a fine sandy loam, reddish and mottled brown to gray, underlain by clayey material of similar mottling to the soil. Numerous patches of Muck 15 to 30 inches deep occur throughout this type. Both the Muck and the mottled soil occur in lower, more nearly level bottoms of the swales and on the slopes, sometimes running 15 to 20 feet above the bottoms. None of this soil was seen under cultivation, being covered with sedges, pitcher plants, trailing vines, and a few scattering pine trees. To reclaim such land, close ditching would be necessary to insure requisite drainage. Applications of burnt lime at the rate of at least 1 ton per acre would go far toward establishing a good soil condition following drainage, especially on the Muck areas. Corn and probably a number of vegetables, such as cabbage, onions, and celery, would give good results on the Muck areas.

The Norfolk loamy sand is the most extensive type in the county, though by no means the most important. The largest area extends north from Spring Hill to the county line occupying nearly all of the territory between the Mobile & Ohio and the Southern Railroads north of Mobile. Another large tract is found in the extreme north-western corner of the county on both sides of the Dog, or Escatawpa, River. Other small patches are found throughout the northern half of the county.

The surface varies from smoothly rolling to hilly and broken. On account of the topography and structure of the soil the natural drainage of the type as a whole is good. There are a number of places along the lower slopes where the water seeps out, making the land somewhat springy or boggy. Such places represent the source of a number of rivulets which unite to form the creeks draining the region. These areas are comparatively small and could not be shown for this reason. The Norfolk loamy sand very much resembles the Norfolk sand, but differs from it in having a greater percentage of clay in the subsoil and a more broken topography. The natural growth consists of longleaf pine, scrub oak, and in some localities palmetto. The most plentiful growth of scrub oak is usually confined to the ridges, on which the loose sand extends to considerable depth.

Most of the timber on the Norfolk loamy sand has been removed or blown down, but only a very small proportion of the type is cultivated. It is not a strong general farming soil, but where the topography is not too rough it is superior to the Norfolk sand because of the heavier subsoil. Where it is not too broken it is well adapted to a great variety of truck crops and will return slightly better yields than the Norfolk sand, though crops mature a little later. The suggestions for the use of green and stable manure on the Norfolk sand will also apply to this soil, and the effect of commercial fertilizers in connection with them will be noticed for a longer time than on the lighter soil. Heavy applications of mixtures of cottonseed meal and kainit with some acid phosphate are necessary to secure good yields. The roughest portions of the type, which are but poorly adapted to any cultivated crops, could be profitably reforested, especially to longleaf pine, if proper precautions were taken to prevent forest fires from destroying the young trees. It would not be necessary to plant any trees, as an abundant growth of young pines spring up each year, but as there is no protection from fires they are quickly killed over a large part of the type.

Cut-over land of this character is valued at \$4 to \$16 an acre.

## NORFOLK SAND.

The surface soil of the Norfolk sand, to a depth of 6 to 12 inches, consists of a gray to pale yellow, loose, incoherent sand of medium texture. The surface 2 or 3 inches usually contain a very small amount of organic matter. The subsoil to a depth of 3 feet or more consists of a yellowish-gray or pale yellow loose incoherent sand which at 3 feet frequently contains sufficient fine material to render it slightly coherent when wet. In some places the loose sand extends to a depth of 10 feet. On account of the loose open character of the soil it is very easy to cultivate.

The Norfolk sand is confined entirely to the southern half of the county. One area of considerable size lies directly west of Mobile and extends southward to the vicinity of Theodore. Another extends from the vicinity of Delchamps to Coden and Bayou Labatre. There are a number of other smaller areas throughout the southern part of the area, associated with the Norfolk fine sandy loam, the Scranton, and the Portsmouth soils.

The surface for the most part is undulating to gently rolling, though there are some areas which are nearly level. On account of the loose, open character of the soil and its topography the natural drainage is good. The original timber growth consisted chiefly of longleaf pine, with some palmetto and scrub oak.

Very little of the type is under cultivation at present and it is not a good soil for general farming. With proper methods of cultivation and fertilization it could, however, be maintained in a very fair state of productiveness and made to yield crops of fine quality. The Norfolk sand is a typical early truck soil and in many sections along the Atlantic coast it is the most valuable type used in this line of agriculture. It is especially adapted to melons and with proper care can be made to produce good yields of Irish potatoes, strawberries, peas, beans, lettuce, cucumbers, and a number of other truck crops. Its value is due less to the possibility of high yields than to the fact that with reasonably heavy fertilization crops of excellent quality can be matured earlier than upon any other soil and thus gain the advantage of high prices.

The ample average rainfall of this region is of great advantage to this soil, which under less favorable conditions would suffer more from drought than the other types. At least two crops of most varieties of vegetables can be grown in one season, but it will be found best in the future development of the Norfolk sand to confine the vegetables to one early crop. As soon as this is harvested the land can be put in cowpeas, vetch, velvet beans, or some similar crop to be plowed under as a green manure in preparation for the next year's planting. In addition to this a heavy application of stable

manure will be found of great benefit and more lasting in the soil than commercial fertilizers. The use of coarse organic manure is beneficial, not only in furnishing plant food, but also in increasing the power of the soil to hold water. In the use of commercial fertilizers small fractional applications should be made on account of the loose, open character of the soil, which will permit losses during heavy rains. Mixtures of cottonseed meal and kainit with some acid phosphates seem to give best returns.

The following table gives the results of mechanical analyses of samples of the soil and subsoil of the Norfolk sand:

*Mechanical analyses of Norfolk sand.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
23512.....	Soil.....	0.7	10.7	32.3	42.1	4.5	5.8	3.9
23513.....	Subsoil.....	1.4	10.3	20.4	35.2	12.6	16.0	4.0

NORFOLK COARSE SAND.

The surface soil of the Norfolk coarse sand consists of a loose, incoherent, coarse sand of a light-grayish to almost white color, 4 to 6 inches in depth, underlain by a gray or light-yellow coarse sand of the same structure extending to a depth of over 3 feet. The surface is so deficient in organic matter and so free from vegetation that when seen from a distance it presents the appearance of drifted snow.

There is only one small area of this type in the county, less than 1 square mile in extent. It lies  $1\frac{1}{2}$  miles northwest from Mann. The surface is rolling and on account of the loose open structure the natural drainage is so complete that crops would suffer from drought were the land put under cultivation. The natural vegetation comprises a sparse growth of longleaf pine and some scrub oak.

On account of the inferior quality of this soil and the fact that there are large tracts of much better land in all parts of the county the Norfolk coarse sand will probably continue undeveloped.

SCRANTON FINE SANDY LOAM.

The surface soil of the Scranton fine sandy loam, to a depth of 8 to 10 inches, is a very dark gray to nearly black fine sandy loam. In some places it contains a high percentage of fine sand and in others there is considerable silt. The distinguishing feature of the type, however, is its dark color, due to its high organic-matter content. The more mucky areas appear very silty, but a careful exam-

ination discloses a high content of very fine sand. At 10 to 15 inches the color of the soil usually changes quite abruptly to a yellow or yellowish-gray. The texture becomes heavier with depth and below 18 to 24 inches is generally a heavy, yellow, fine sandy loam. The subsoil of the poorer drained areas is often mottled with gray and in some instances with red and grades into heavy yellow sandy clay at about 3 feet. The phase with red mottling represents an approach to the Coxville fine sandy loam.

This soil is confined to the southern part of the county in bodies varying in size up to several square miles. The largest area is found 2 miles west of Parker.

The larger areas of the type are level or very slightly undulating. Smaller bodies occupy either slightly raised positions or partially drained areas adjoining members of the Portsmouth or Norfolk series. Surface drainage is but partially established and in most cases there is but inferior underdrainage. The areas surveyed are, as a whole, nearly level and the water table is so near the surface that very little opportunity is afforded for the escape of excess water downward. The installation of tile drains will be essential for the highest development of this soil.

The original timber growth consisted of longleaf yellow pine with some Cuban pine. On cleared tracts a heavy sod of coarse grasses is found.

When thoroughly drained the Scranton fine sandy loam is a strong soil, adapted to cotton, corn, sugar cane, oats, grasses, potatoes, cabbage, and numerous other truck crops. When first brought under cultivation the high organic-matter content gives it a decided advantage over the corresponding Norfolk type. This will, however, gradually disappear with cultivation and for this reason care should be taken from the beginning to maintain the supply of organic matter by the use of green and stable manure. Fertilizer mixtures, as indicated for the Norfolk sandy loam and Norfolk fine sandy loam, will be required for this soil in order to secure good yields.

Land of this character can be bought for \$10 to \$20 an acre.

Below are given the average results of mechanical analyses of samples of the soil and subsoil of the Scranton fine sandy loam.

*Mechanical analyses of Scranton fine sandy loam.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
23544, 23546, 23548, 23550.....	Soil.....	0.0	1.2	4.3	42.5	26.9	14.9	9.9
23545, 23547, 23549, 23551.....	Subsoil.....	.0	.3	1.0	23.7	47.2	13.4	14.1

## PORTSMOUTH SANDY LOAM.

The soil of the Portsmouth sandy loam consists of a dark gray to black medium sand which in places becomes very loamy. The dark color and loamy structure are due to the large amount of organic matter present. The subsoil consists of a yellowish or mottled sticky sand or very sandy clay extending to a depth of 3 feet and usually becoming slightly heavier with increased depth. Only a very small proportion of the type is at present improved, but where the moisture conditions can be controlled or where it is not naturally too wet it is easy to cultivate.

The Portsmouth sandy loam is one of the minor types of the survey, being found only in restricted areas. The largest area lies from 2 to 4 miles south of Grand Bay. Other small patches are found scattered throughout the southern part of the county.

The surface over the greater portion of the type is flat or slightly depressed, and in several places this soil receives the drainage from surrounding types. Water finds its way from the surface very slowly, as there are few drainage channels. Although the subsoil is quite loose, the water table is too close to the surface to permit drainage water to pass downward. The type is often under 1 to 3 inches of water for several days at a time.

The Portsmouth sandy loam has been subjected to more swampy conditions than have prevailed over the better-drained types, and weathering consequently has been less active. The native forest growth was mostly pine, with a little cypress. A wire-grass sod with many varieties of water-loving weeds now occupy the open or cleared areas.

Under its present wet condition this soil is of little agricultural value except for pasture. Drainage would be unprofitable unless done in connection with a general system covering an area of considerable extent. When once properly reclaimed, this type will be well adapted to potatoes, cabbage, lettuce, celery, and a variety of other truck crops. Sugar cane, corn, and oats also should do well. Notwithstanding the expense of putting the land in good cultivable condition, there can be little doubt that the special crops to which it is well adapted would give profitable returns if proper methods were followed in their production.

## PORTSMOUTH FINE SANDY LOAM.

The surface soil of the Portsmouth fine sandy loam is a very dark gray to black fine sandy loam, with a high content of organic matter. In places the organic content is so high as to practically mask the sandy nature of the material, and in such places when wet the surface is soft and mucky. At from 8 to 12 inches, where the organic matter

becomes less pronounced, the color is a little lighter—often a dark gray or brown. This color may continue to 3 feet, though it sometimes changes to a mottled gray and yellow below 2 feet, and the texture becomes gradually heavier with increased depth.

The type is of very small extent and of little importance in the present survey. A representative area is found directly south of Whistler.

The surface is flat and poorly drained. Before it can be put under cultivation it will be necessary to install a thorough system of drains. The type has the same origin as the Portsmouth sandy loam, and when developed will be adapted to the same crops.

#### PORTSMOUTH LOAM.

Typical areas of the Portsmouth loam consist of dark-brown to black loam high in organic matter, extending to a depth of 10 inches. The subsoil is a dark-gray or brown loam, gradually becoming lighter in color and heavier in texture with depth. At 30 inches it becomes a heavy yellow loam or sandy clay loam mottled with drab. The soil material is very variable throughout its extent.

This type is of small extent and little importance. It is closely associated with the Norfolk fine sandy loam in the eastern and southern parts of the county. All of the areas are small and uncultivated. The surface is flat and poorly drained, but when proper drainage systems are established the type will be adapted to the same variety of crops as the Norfolk fine sandy loam.

#### OCKLOCKNEE CLAY LOAM.

The Ocklocknee clay loam, to a depth of 10 inches, consists of a dark-brown or grayish clay loam underlain by a brown to drab or grayish plastic clay, frequently mottled in places. A bed of fine sand is sometimes encountered at 3 feet. The soil immediately bordering the river contains more silt and fine sand than farther back, and the surface is a little higher along the river front, grading back into a more swampy region at varying distances from the stream. In places the swamp proper borders the stream.

This type occurs only to a limited extent in the county, and is confined to the highest part of that region bordering the Mobile and Middle Rivers, commonly referred to as Swamp. Practically all of this is in timber, consisting of gum, sycamore, and bay, with a dense undergrowth of cane and other moisture-loving shrubs and vines. On account of the wet condition of the land at the time the survey was made it was impossible to outline this type except in a general way. It is entirely of alluvial origin and subject to overflow every year. It is slightly higher than the type which has been mapped as Swamp.

Owing to frequent overflows crops would suffer heavily were the land put under cultivation. It is unlikely that any attempt will be made to clear and improve it for some time, but when this is done dikes will be necessary to afford protection from high waters.

It is probable that the soil material in the swamp along Mobile River is very similar to that of the Ocklocknee clay loam, and the two should be improved at the same time, since diking the clay loam will also protect a large proportion of the swamp.

This soil is very fertile, and once drained corn, oats, and forage crops would give good results.

#### COASTAL BEACH.

The surface soil of the Coastal beach consists of a medium to coarse white beach sand containing a number of small shell fragments. The subsoil consists of a loose, incoherent sand of the same texture to a depth of over 3 feet. The type occurs as barrier reefs, and in this area is confined to Dauphin and Petit Bois Islands, lying from 5 to 12 miles off the coast, along the southern shore of the county, separating Mississippi Sound from the Gulf of Mexico. Their surface is flat and only a few feet above high tide.

At present there is but little development on the islands. Dauphin Island has been recently purchased with the idea of connecting it with the mainland by a railroad and establishing a deep-water coaling station. A fine hotel is also planned to convert the island into a winter and summer resort. Surf bathing on the Gulf side and fine fishing and sailing on the Mississippi Sound are features which will make the place attractive.

The following table gives the results of a mechanical analysis of a sample of the soil of Coastal beach:

*Mechanical analysis of Coastal beach.*

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>						
23509.....	Soil.....	0.8	34.1	45.2	19.0	0.0	0.1	0.8

The following sample contained more than one-half of 1 per cent calcium carbonate ( $\text{CaCO}_3$ ) No.23509, 1.45 per cent.

#### KALMIA FINE SANDY LOAM.

The surface soil of the Kalmia fine sandy loam consists of a dark-gray or grayish-brown fine sandy loam, sometimes rather heavy, extending to a depth of 10 to 14 inches. In places the upper portion of the soil is quite dark, a feature which would disappear after a few years' cultivation. The subsoil is a yellowish fine sandy clay, becoming heavier with depth, and frequently mottled with gray at from 2 to 3 feet.

The type is confined to one area in the northwestern part of the county, where it occurs as a terrace formation along the Dog, or Escatawpa, River. The material composing this soil was probably deposited at a time when the water was running at a much higher level than at present. The topography is level to slightly undulating. The terrace lies often 15 feet above the stream level and is never subject to overflow. The entire type could be put under cultivation. To a less extent there is developed a second terrace about 15 feet above the first. The natural drainage is fairly good, though over the nearly level tracts underdrainage will be necessary before the best results can be obtained.

At present only a few small patches are cultivated, but when developed this type will be well adapted to general farm crops, particularly corn, sugar cane, and oats, and also to a variety of truck crops. The Dog, or Escatawpa, River, along which the Kalmia fine sandy loam occurs, is a stream of considerable size and would furnish an abundant supply of water for irrigation should this be desired in connection with the future development of this soil.

#### TIDAL MARSH.

Tidal marsh is the low, flat region bordering the Gulf and along the tideways of streams. The greater part of it is true salt marsh. It is of comparatively small extent, much less than the Swamp, and is not continuous even along the Gulf. -

The surface is flat and much of it stands within the limits of high and low tide levels, so that it is periodically overflowed with salt water of decreasing concentration with distance back from the coast. The soil is a sticky mud, probably a clay loam, in which there is an accumulation of decomposing marsh grass. It is seldom if ever dried out on the surface. The material is a recent sediment which is still in process of deposition, and the type represents the first stage in the formation of a soil from coastal deposit. It is occupied by a coarse grass of little value for feed or pasture. It can be reclaimed only by diking, which is not warranted under the existing conditions of settlement in the region and the ruling prices of land.

#### SWAMP.

The areas mapped as Swamp are those portions of the permanently wet land occupied chiefly by a tree growth as distinguished from the Tidal marsh which bears only coarse grass. The Swamp is also at a slightly greater elevation. The prevailing type of soil would doubtless be silt loam and silty clay loam, though being of alluvial origin it would be subject to considerable variation. In places it is a typical cypress swamp, with a thick stand of this and other water-

loving trees, and under water much of the time. In other places there is some pine, bay, titi, and considerable gum, and in still others a heavy undergrowth of shrubs and vines. The areas thus mapped were mostly inaccessible at the time the field work was being done because of overflow water. During drier months the rank vegetation would make much of it impassable. All of the Swamp is subject to overflow and will not warrant reclamation until the higher land in the area is more extensively developed and diking is employed to reclaim the remaining areas. Considerable muck is comprised under this type.

The largest body of swamp land in the county lies along the Mobile and Middle Rivers, between Mobile and the northern county line. Narrow strips of Swamp are also found along nearly all of the smaller streams within the county.

#### MUCK.

The material mapped as Muck consists of black decaying organic matter in varying stages of decomposition, which has incorporated with it a small amount of mineral matter. It has a depth of 2 to 6 feet or more. The areas are few in number and of limited extent. The largest is found about 4 miles northwest from Grand Bay. It is covered with a dense growth of bay, gum, cane, and other water-loving plants. None of the Muck within the area has been cleared and cultivated, but the type is capable of being highly developed when properly drained. It is well adapted to such crops as celery, onions, and cabbage. Small areas occur here and there in the swales and drainage-way depressions of the uplands.<sup>1</sup>

#### SUMMARY.

Mobile County lies in the extreme southwestern corner of Alabama, comprising an area of 1,222 square miles, or 782,080 acres. The surface varies from level and undulating along the Mobile River, Mobile Bay, and Mississippi Sound to rolling and somewhat broken in the northwestern part of the county.

The city of Mobile is an important shipping point for cotton and lumber and distributing point for large importations of tropical fruits from Central America and the West Indies. It is connected with the Gulf of Mexico by a 24-foot deep-water channel and has a large ocean and coastwise trade. Numerous trunk lines making this point their tidewater terminal offer excellent transportation facilities to all important centers in the North, East, and Middle West. The Tombigbee and Alabama Rivers connect the city with the interior of the State, offering cheap and convenient water transportation.

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<sup>1</sup> See footnote to Norfolk loamy sand, p. 30.

The county was first visited by the Spaniards in 1511 and the site of the present city of Mobile settled in 1711. The county boundaries were established and the county incorporated in 1813.

Only about 2 per cent of the county is actually under cultivation. The agriculture of the region is developing rapidly, and many of the smaller towns give indications of becoming important shipping points.

The climate is very mild in winter, and the summers are not excessively warm, since the prevailing winds are from the Gulf of Mexico. The growing season lasts practically the year round.

The agriculture of the area is in its infancy, although enough has been done along this line to demonstrate that the soils and climatic conditions of the county are suitable for the development of general farming and trucking. The original timber growth over the major portion of the area consisted of longleaf and Cuban pine. In 1906 a severe storm destroyed several thousand acres of this timber, and the turpentine industry of the county was seriously affected.

The land has been put on the market and is now held in large tracts by real estate operators and speculators, who are disposing of it in small farms to home seekers from other sections of the country. Prices range from \$4 to \$20 an acre for the larger tracts to \$15 to \$30 an acre for the smaller holdings, cleared of standing timber but in stumps. An additional outlay of approximately \$15 an acre is necessary to remove the stumps and prepare the land for plowing.

The most extensively developed trucking region in the county at present is at Theodore. Other centers are found at Citronelle, Wilmer, Grand Bay, and a number of other places along the Mobile & Ohio, the Louisville & Nashville, and the New Orleans, Mobile & Chicago Railroads.

Cabbage is grown more extensively than all other truck crops put together, but the soils are well adapted to a great variety of crops, and tomatoes, onions, asparagus, strawberries, peas, beans, melons, radishes, okra, kohlrabi, lettuce, and cucumbers are being given more attention each year.

The soils as a rule are deficient in organic matter, which should be supplied by growing such crops as vetch, cowpeas, peanuts, beans, etc., to be pastured by stock, or the entire growth plowed under as green manure. Stable manure should also be used when it is possible to obtain it. At present there is but little stock kept, hence the supply made in the area is limited. It is shipped in from the stockyards at St. Louis at a cost of \$24 a car, delivered, and many farmers take advantage of this low rate.

The soils of the area are derived for the most part from the Lafayette formation, which covers the southern half of Alabama and a large proportion of the adjoining States. Seven soil series were

mapped in the area, comprising 15 soil types, exclusive of Swamp, Tidal marsh, Coastal beach, and Muck. The larger part of the survey is covered by two series, the Orangeburg and Norfolk. The distinguishing feature between these two soils is the color of the subsoil, the Norfolk being yellow and the Orangeburg red.

The Norfolk series is represented by 5 members—the fine sandy loam, sandy loam, loamy sand, sand, and coarse sand. The fine sandy loam type occurs most extensively around Theodore, now the center of the trucking industry of the county. Nearly all of the members of this series are good trucking soils, and where located near transportation are being rapidly developed. The Norfolk loamy sand is the most extensive in area, while the fine sandy loam type is the most extensively cultivated. Only a small portion of the Norfolk sand is under cultivation, but much of it lies convenient to transportation, and it is rapidly being developed.

The Orangeburg series comprises 3 members—sandy loam, sand, and fine sandy loam. The sandy loam is the most important type in the area, though not as extensively cultivated as some of the Norfolk soils. Numerous projects for the development of this soil are now under consideration. The sand type of the series is confined to the southern part of the county, where it is associated with the sandy loam. It is but slightly developed. The fine sandy loam is only cultivated to a limited extent, but ranks with the Orangeburg sandy loam as a farming soil, being generally preferred for truck crops.

The Portsmouth series, comprising the sandy loam, fine sandy loam, and loam, occupy generally level areas and are all poorly drained. All of the areas of these types are small, and artificial drainage will be necessary before they can be profitably cultivated.

The Greenville loam is of slight extent and in places badly eroded. It is a good general farming soil, though it is not extensively developed in Mobile County.

The Ocklocknee clay loam is confined to the swampy region along the Mobile and Middle Rivers. It is subject to overflow at various times during the year, and none of it has ever been cleared for cultivation.

The Scranton fine sandy loam is confined to areas in the southern part of the county. It differs from the Norfolk fine sandy loam in having a much darker surface soil and being poorly drained. The type must be drained before it can be highly improved.

The Kalmia fine sandy loam is a terrace soil found along Dog, or the Escatawpa, River. It is a fairly good soil for truck crops, and with irrigation could be profitably developed. But little of it is under cultivation at present.

Coastal beach is confined to Petit Bois and Dauphin Islands and the barrier reefs lying parallel to the southern shore of the county. None of it is cultivated.

Tidal marsh, Swamp, and Muck are nonagricultural types. The first named is almost constantly inundated, the native growth consisting of coarse grasses. On the Swamp and Muck areas the tree growth consists of bay, gum, cypress, and other water-loving trees. Extensive diking and drainage would be necessary to reclaim either of the last two types, which is hardly warranted by existing conditions in the area.

[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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