

U. S. DEPARTMENT OF AGRICULTURE  
BUREAU OF SOILS  
IN COOPERATION WITH THE GEORGIA STATE COLLEGE OF AGRICULTURE

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# SOIL SURVEY OF DOOLY COUNTY GEORGIA

BY

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[Advance Sheets—Field Operations of the Bureau of Soils, 1923]



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[PUBLIC RESOLUTION No. 9]

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

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

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

Approved, March 14, 1904.

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

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### MAP

Soil map, Dooly County sheet, Georgia



# SOIL SURVEY OF DOOLY COUNTY, GEORGIA

By S. W. PHILLIPS, of the Georgia State College of Agriculture, in Charge, and E. W. KNOBEL, G. L. FULLER, and J. W. MOON, of the U. S. Department of Agriculture

## DESCRIPTION OF THE AREA

Dooly County lies near the south-central part of Georgia. Vienna, the county seat, is about 55 miles south of Macon. The county is roughly rectangular in shape, its maximum dimension north and south being about 18 miles, and east and west about 25 miles. It contains 404 square miles, or 258,560 acres.

Dooly County is situated along the border between the divisions of the Coastal Plain known as the Dougherty Plain and the Altamaha Uplands. There are no prominent hills or ridges in the county, but the topography varies from gently rolling low ridges, which characterize most of the county, to steeply rolling and hilly terrain in the vicinity of the larger streams.

The highest land of the county is in the northern and western parts. In these sections the streams have cut deep valleys with steep slopes and the intervening land is high and rolling, such as occurs along Big Creek and Turkey Creek. The central and southern parts of the county consist of low rolling ridges, spotted with numerous lime-sink ponds, and separated by depressions which are connected and form drainage ways. The ponds are quite variable in shape and size, varying from small circular or elliptical depressions of an acre or less to large ponds or flats comprising several hundred acres, such as Wolf and Layfield Ponds near Pinehurst. The larger creeks have wide bottoms in which the streams meander and in places divide into branches which spread out over the bottoms. Such places remain wet throughout the year and are classified as Swamp. The prevailing southward slope of the county is shown by the fact that at Unadilla, in the north-central part, the elevation is 412 feet above sea level, while at Vienna, in the south-central part, the elevation is 350 feet.

Wide terraces have been formed in the western part of the county, which extend from just south of the point where the Atlanta, Birmingham & Atlantic Railway crosses Hogcraw Creek into Macon County southward to the Crisp County line. About a mile southeast of Bay Point Church, along the River Road, this terrace swings east and



FIG. 10.—Sketch map showing location of the Dooly County area, Georgia

merges with the high terrace along Turkey Creek, cutting off a hill of upland east of Holland Pond. These terraces are developed on two levels, the old high terraces about 30 feet or more above the present stream level and the more recent terraces developed at lower elevations just above the overflowed bottoms and swamps. The high terraces are the more extensive, and in places have become somewhat dissected so that they resemble upland. Small areas of terrace lands are developed along Big, Cedar, and Pennahatchee Creeks.

The western and central parts of the county drain into the Flint River through Hogcraw Creek, Turkey Creek and its tributaries, and Limestone Creek. The northeastern and eastern parts of the county, constituting about a third of the area, drain into the Ocmulgee River through Big Creek, Cedar Creek, and Tenmile Creek. Thus the eastern part of the county drains into the Atlantic Ocean and the central and western parts into the Gulf of Mexico. Natural drainage is mainly through surface streams and lime-sink drainage ways, and to a lesser extent through small streams which pass down through lime sinks into subterranean watercourses, which apparently have honeycombed the underlying soft siliceous limestone formation. These lime sinks are most numerous in the eastern and southeastern parts of the county. The larger streams in the county are bordered by wide bottoms or swamps which have been formed in part by the filling up of the channel with sand washed from the surrounding hills.

Every farm is connected with one or the other of these forms of drainage. The high northern and central-western portions of the county are well drained, with the exception of the small ponds and the wide creek swamps. In the section of the county between Unadilla, Pinehurst, and Harmony Church are found a number of large ponds and flats which are poorly drained. East and south of Vienna, where the drainage is not generally well established, are to be found numerous poorly drained ponds and flats. In the southeastern part of the county poorly drained seepy areas occur on the slopes where the underlying materials do not permit of complete drainage. The natural drainage on the higher river terraces is generally well established, except in the lime-sink ponds. The low terraces west of the main high terraces contain large areas of Swamp.

Springs issuing from the underlying limestone formation are numerous along the large streams and furnish drinking water in a number of places. Although surface wells supply most of the water, deep wells are being bored in increasing numbers. In the lower western part of the county several wells have been bored and are furnishing a supply of healthful artesian water where formerly the only source was from surface wells.

Dooly County originally included much of the territory now within the boundaries of adjacent counties, and has had its present area and boundaries only since 1905. The county seat was formerly at what is now the settlement of Drayton, but was later moved to Vienna. The early settlers followed up the river, which was then the chief means of transportation, and located on the adjacent terraces, later extending their settlements to the uplands. The settlers were mainly from the Carolinas and the present white popu-

lation consists almost entirely of the descendants from the early settlers.

The population, according to the 1920 census, is 20,522, all of which is classed as rural, the average density being 51.7 per square mile. The portions of the county in the vicinity of the towns and along the main roads are the most densely populated. South and southeast of Vienna, south and southwest of Tippettville, west of the River Road, and the northeastern corner of the county are the most sparsely settled.

Vienna, the county seat, located in the south-central part, had a population of 2,019 in 1920. It is an important trading and shipping point, and the site of a large pine-lumber mill. Unadilla, with a population of 1,103, is the second largest town and the principal trading center for the northern part of the county. Pinehurst and Byromville, with populations of 596 and 414, respectively, are trading and shipping points for the central and western parts of the county. Other locally important trading points are Dooling on the Atlanta, Birmingham & Atlantic Railway, Findlay and Richwood on the Georgia, Southern & Florida Railway, and Tippettville in the eastern part of the county.

The Atlanta, Birmingham & Atlantic Railway from Atlanta and Brunswick affords shipping facilities for the central and northwestern portions of Dooly County and makes connection with the Seaboard Air Line Railway and the Georgia Southwestern & Gulf Railroad at Cordele. The Georgia Southern & Florida Railway, belonging to the Southern Railway System, runs north through the center of the county, and connects at Atlanta for points north and west; at Cordele with the Seaboard Air Line Railway, and the Georgia Southwestern & Gulf Railroad, and at Macon with the Central of Georgia Railway, and Macon, Dublin & Savannah Railroad.

The county roads form a close network over the county. They are constructed of local sands and sandy clays, and are kept in fairly good condition throughout the year. Two main highways, the Dixie Overland Highway and the National Highway, cross the county, and are used by a considerable number of winter tourists. Telephone service is available over most of the county, and rural free delivery mail routes extend to all sections.

Macon and Atlanta are the principal markets. The peach crop is handled principally through Macon and shipped to northern points.

#### CLIMATE

The climate of Dooly County is typical of the southern Coastal Plain region. The summers are long and warm. The mean summer temperature is 80.7° F., the hottest weather usually occurring in July, with a maximum recorded temperature of 107° F. At times the heat becomes somewhat oppressive during the summer, but the nights are usually tempered somewhat by cooling Gulf breezes. The winters are short and mild with a mean temperature of 49.2° F. The cold is penetrating, owing to the humidity; but the temperature rarely falls to freezing point, and cold snaps are of short duration. A minimum of -3° F. occurring in February

has been recorded. The typical weather cycle during the winter consists of a cold period of two or three days followed by several warm days ending in rain, after which it cools off, and the cycle is repeated. Snow is rarely seen.

Rainfall is well distributed through the year, in that it is somewhat heavier during the growing season and lighter in the fall during harvesting and planting. The average annual rainfall is 48.57 inches; the maximum recorded precipitation (in 1912) being 62.29 inches, and the minimum (in 1909), 35.96 inches.

The first killing frost usually occurs about November 9, and the last in the spring about March 23, giving an average growing season of 231 days or about eight months. The open winters render unnecessary the construction of expensive shelter for stock, and grazing is afforded for cattle and hogs almost the year round. Unseasonable frosts, however, have occurred as early as October 21, and as late as April 26. The late spring frosts sometimes damage the peach crop, but a total loss has never been recorded.

The climatic conditions in this area during the winter are well suited to the growth of oats, wheat, rye, clover, and vetch, and such vegetables as turnips, collards and other greens, onions, cabbage, and lettuce. Early plantings of peas, beans, and corn can be made with little danger of frost damage.

The following table showing the normal monthly, seasonal, and annual temperature and precipitation at Americus, in the adjoining county of Sumter, is given as fairly representing the climatic conditions that prevail throughout Dooly County.

*Normal monthly, seasonal, and annual temperature and precipitation at Americus, Sumter County*

[Elevation, 362 feet]

| Month          | Temperature |                  |                  | Precipitation |   |  |                     |
|----------------|-------------|------------------|------------------|---------------|---|--|---------------------|
|                | Mean        | Absolute maximum | Absolute minimum | Mean          | Total amount for the driest year (1909) | Total amount for the wettest year (1912) | Snow, average depth |
|                | ° F.        | ° F.             | ° F.             | Inches        | Inches                                  | Inches                                   | Inches              |
| December.....  | 49.0        | 79               | 8                | 3.73          | 3.50                                    | 3.75                                     | 0.1                 |
| January.....   | 48.3        | 80               | 8                | 4.12          | .36                                     | 9.28                                     | T.                  |
| February.....  | 50.3        | 83               | -3               | 5.05          | 3.63                                    | 5.63                                     | .6                  |
| Winter.....    | 49.2        | 83               | -3               | 12.90         | 7.49                                    | 18.66                                    | .7                  |
| March.....     | 58.5        | 92               | 20               | 5.25          | 5.98                                    | 8.00                                     | .0                  |
| April.....     | 65.1        | 93               | 31               | 3.58          | 3.47                                    | 7.36                                     | .0                  |
| May.....       | 73.6        | 102              | 40               | 3.37          | 3.19                                    | 4.64                                     | .0                  |
| Spring.....    | 65.7        | 102              | 20               | 12.20         | 12.64                                   | 20.00                                    | .0                  |
| June.....      | 79.9        | 105              | 45               | 4.40          | 4.68                                    | 3.72                                     | .0                  |
| July.....      | 81.4        | 107              | 58               | 5.49          | 4.79                                    | 3.90                                     | .0                  |
| August.....    | 80.8        | 104              | 59               | 5.49          | 2.90                                    | 5.50                                     | .0                  |
| Summer.....    | 80.7        | 107              | 45               | 15.38         | 12.37                                   | 13.12                                    | .0                  |
| September..... | 76.5        | 102              | 43               | 3.12          | 2.71                                    | 4.21                                     | .0                  |
| October.....   | 66.7        | 97               | 29               | 2.26          | .25                                     | 2.30                                     | .0                  |
| November.....  | 56.1        | 85               | 20               | 2.71          | .50                                     | 4.00                                     | T.                  |
| Fall.....      | 66.4        | 102              | 20               | 8.09          | 3.46                                    | 10.51                                    | T.                  |
| Year.....      | 65.5        | 107              | -3               | 48.57         | 35.96                                   | 62.29                                    | 0.7                 |

## AGRICULTURE

At the time of its settlement the territory now included in Dooly County supported a heavy growth of forest, which consisted principally of long-leaf pine on the uplands and various hardwoods and pines in the lowlands and swamps. In the clearings, fields of corn and some small grains, such as wheat and rye, were planted, all of which were used for home needs. Some cattle and hogs were ranged in the open forests and supplied meat for home use and sometimes for bartering. The system of agriculture was confined to the production of subsistence crops, owing to the facts that transportation facilities were poor and that markets were few and far distant. Thus for a long period agriculture was stagnant. When cotton was introduced it soon became an important crop, mainly for two reasons: (1) An abundant supply of cheap labor was available for its production, and (2) its product, being not rapidly perishable and of small bulk, could withstand the long haul to market.

With the construction of the railroads through the county, transportation facilities improved, and, as the lumber and turpentine industries developed, local markets were created for farm products. Within the last 25 years extensive lumber operations have been carried on throughout the county and most of the pine timber has been removed, but much hardwood remains in the swamps and river bottoms.

At present agricultural activities are centered around the production of cotton and corn. Until about 1900 the acreage of corn exceeded that of cotton, but since that time the cotton acreage has increased until it now occupies the leading place in the agriculture of the county. According to the census, cotton was grown on 71,396 acres in 1909, with a yield of 35,365 bales, or an average of about half a bale per acre. Upon the advent of the boll weevil (about 1916) the production decreased, and in 1919 a yield of 12,131 bales on 63,394 acres was reported. Since that time, the higher price of cotton has made it profitable for the planters to fight against the weevil, and the total yield for 1922 is reported to have been about 15,000 bales, with an average of about one-fifth bale per acre, although yields as high as one-half bale were obtained where care was given to the selection of seed, use of fertilizers, frequent cultivation, and the use of poison.

The damage caused by the boll weevil has resulted in some diversification, but in spite of the low yields cotton still occupies the leading place in the agriculture of Dooly County in acreage, being followed by corn, wheat, peanuts, and oats in the order named. The raising of hogs for home meat supplies and for sale is growing in importance.

In 1919 corn was grown on 47,856 acres, with an average yield of about 11 bushels per acre. The county produces enough corn to meet the local requirements for food and feedstuffs for livestock.

Wheat was grown on 2,590 acres in 1919 and yielded 22,853 bushels, or about 9 bushels per acre. The individual farmers raising wheat produce quantities about sufficient to meet their needs, but the crop as a whole is not large enough to meet the needs of the county.

Peanuts have become the most important cash crop next to cotton. With the decrease in the production of cotton and the resultant smaller yield of cottonseed the demand of the oil mills for peanuts

for crushing has increased tremendously. The small Spanish peanut is the principal variety grown and is preferred by the oil mills and the candy factories. Yields average from 25 to 40 bushels per acre and the vines produce from one-half to 1 ton of excellent forage. Unadilla is an important peanut-shipping point.

Oats were grown on 2,206 acres in 1919, with an average yield of 18 bushels per acre, although yields as high as 60 bushels are reported. Oats are used locally for livestock feed and are harvested for both grain and hay. The acreage varies considerably, being affected by the prices of cotton and other farm products. Yields vary according to climatic conditions during the winter and spring.

Cowpeas are extensively planted upon wheat and oats land after the grains are harvested. They are used for forage and pasture, yielding from one-half ton to 1½ tons of hay per acre. The Brabham cowpea, owing to its resistance to the nematode, is the variety most commonly used. Velvet beans are usually planted in the corn rows, and the beans are picked by hand and ground for feed, while the luxuriant growth of vines furnishes excellent fall forage for stock. Some rye is grown.

Peach growing has become of considerable importance, particularly in the northern and northwestern parts of the county. In 1920 there were 51,157 peach trees in the county, which yielded 20,270 bushels. The 1920 census also reported 11,680 pecan trees in the county. A number of orchards have been set out recently with pecans planted in every third row.

Sweet potatoes and sugar cane are planted on most farms in sufficient quantities to supply the home needs, and in some years produce a surplus for sale.

Watermelons are grown for market by a number of farmers with considerable success. The Watson and Gray melons are the varieties most commonly grown.

Hogs are raised on practically all farms for the production of the home meat supply. Most of the hogs are the products of mixed breeding, but purebred Duroc-Jersey, Berkshire, and Poland-China hogs have been introduced and a number of fine hogs are now raised in the county. During the last few years the production of hogs has increased until at present there is a surplus for sale. Dairying is carried on in a small way in the vicinity of Vienna, Pinehurst, and Unadilla to supply local demand, and a few farmers ship cream to the creamery at Ashburn (Turner County), or deliver it to the creamery truck which is routed from Hawkinsville (Pulaski County) several times a week. Jerseys and crossbreeds are the principal dairy cattle.

Some beef cattle are raised, but not in sufficient number even to satisfy local demands. Most of the beef cattle are grades of the Shorthorn and Hereford breeds.

The adaptation of crops to soils is recognized by the farmers to some extent. Cotton and corn are planted on all of the better drained soils, but cotton has been found to produce best on the "pebbly land" (Tifton sandy loam) and the "red land" (Greenville sandy loam) of the uplands. Although some of the less completely drained soils, such as the Dunbar sandy loam, were formerly planted to both of these crops, they have been found to be poorly suited to cotton under

boll-weevil conditions, but well suited to corn and oats to which they are now devoted almost entirely.

The prevailing cultural methods in use in Dooly County are similar to those in general use throughout the Coastal Plain. The farm equipment commonly consists of light tillage tools and plows. The better improved farms and the large plantations are equipped with heavier machinery, such as binders, mowers, and in many cases, tractors. Over the larger part of the county the farmhouses are small, and modern conveniences, such as water and light, are rare.

The land for cotton is broken during the winter and spring, usually with a 1-horse plow, fertilizer is applied, the land bedded up, and the seed planted on the bed. After the plants are a few inches high the rows are barred off by running a small plow close to the plants. The cotton is chopped by hand, leaving the plants about 8 to 10 inches apart in the rows, the rows being  $3\frac{1}{2}$  to 5 feet apart. Cultivation is given as frequently during the season as weather conditions will permit. Some farmers make an effort to go over the field once each week, and others plan to cultivate each field about six times in all. The cotton crop receives most of the fertilizer used, the average application varying from about 250 to 350 pounds of a 9-2-3 or an 8-3-3<sup>1</sup> fertilizer per acre. The fertilizer is usually put in with a distributor. The principal varieties of cotton are the Cleveland and Toole. Some Willow Leaf cotton, a variety which fruits heavily, has been grown in the past; but since buyers object to its short staple, little is now being planted.

The land for corn is prepared in much the same manner as for cotton, and is bedded up. The fertilizer and seed are placed in the water furrow and the soil plowed toward the plants until after four or five cultivations when the corn stands on slightly elevated beds. Corn is planted with a 1-row planter in rows 4 to 6 feet apart, the hills in the rows being 10 to 18 inches apart. Lighter applications of fertilizer are made for corn than for cotton, the average being 200 to 250 pounds per acre, applied with a distributor. Velvet beans are usually planted in the corn rows and harvested by hogs and cattle in the fall and winter. Peanuts or cowpeas are commonly planted between the corn rows. Some farmers "pull" the leaves before the corn ripens and bundle them for winter forage, and others cut and shock the corn, particularly where it is to be followed by wheat.

Oats and wheat are seeded in the fall, either broadcast or drilled. Fertilizer is applied at the time of seeding, but nitrate of soda is often applied in the spring at the rate of 50 to 75 pounds per acre. Oats seem to do better if seeded in November than at an earlier date. Fulghum, Appler, and Rust Proof oats are planted, the Fulghum being the most popular. Blue Stem and May wheat are two varieties commonly seeded.

Peanuts are planted in rows from 20 to 30 inches apart. They are not commonly fertilized though applications of acid phosphate have been found to be beneficial.

Watermelons are planted in hills 10 to 12 feet apart each way, with 1 to 3 plants to the hill. Fertilizer analyzing 9-2-3 or 10-4-4

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<sup>1</sup> Percentages, respectively, of phosphoric acid, ammonia, and potash.

is applied at the rate of 300 to 400 pounds per acre. Available barnyard manure is also used.

Peaches have become of considerable importance in the northern and western parts of the county, near Unadilla, Byromville, Dooling, and Lilly. The Tifton, Orangeburg, and Greenville soils are favored for peaches. The varieties most commonly grown are Carman, Unceda, Mayflower, Belle of Georgia, Hiley Belle, and Elberta. The trees are set out in squares 16 by 16 feet or 18 by 18 feet, averaging about 130 trees per acre. Fertilizers are applied at the rate of 4 or 5 pounds of an 8-4-4 grade in January and February, and where crops are to be interplanted additional application is made at the time of planting. Trees on the red soils are said to produce more highly colored fruit and of somewhat better shipping quality than on any of the other soils. The trees are pruned in the fall and treated for borers. The scale, curculio, and brown rot are the most injurious enemies. The trees are sprayed during the winter with lime-sulphur for the scale and brown rot, and lead arsenate is applied at the time of blooming for the curculio. Brown rot is particularly injurious in the flats or slight depressions where drainage is somewhat imperfect. The picking season extends from the last of May to the middle or latter part of July, the fruit being graded and packed at the orchard packing house. The fruit is generally handled in carload lots through the fruit exchange. Pecans of the paper-shelled varieties have been set out in many peach orchards at intervals of 60 to 80 feet, and as the peaches pass their maximum production at about 10 or 12 years of age and the pecans come into full bearing the peach trees are removed and the pecans allowed to take up all the land.

Few farmers follow any definite crop rotation, but most farmers plant cotton for several successive years and then change to corn for a year or two before again planting cotton. Some farmers plant cotton for two years, follow it with corn one or two years, interplanted with velvet beans, peanuts, or cowpeas. The corn is followed first by oats in the fall and then by cowpeas in the summer after the oats are harvested; and the next year back to cotton. Owing to the facts that until recently there had been little terracing done and that few farmers had made a practice of keeping the land under a cover crop during the winter, many hilly and sloping fields have become badly washed. The practice of building broad base terraces which can be cross cultivated, even on gently sloping fields, is growing in popularity. They tend to reduce the loss from erosion that too frequently has been allowed to go on unchecked.

The use of commercial fertilizer was reported by 90 per cent of all farms in 1919, with an expenditure of \$625,244, or an average of \$250.80 per farm reporting its use. Fertilizers that analyze 8-2-3, 9-2-3, and 10-2-2 are commonly used, but higher grade fertilizers, analyzing 8-4-4 to 10-4-4, or even higher in potash, are being introduced and adopted by some farmers. The advent of the boll weevil has cut down the quantity of fertilizers used. Little fertilizer is used on the crops other than cotton, though nitrate of soda is applied as a top-dressing on oats.

Owing to the northward migration of large numbers of negroes, who comprise most of the farm laborers, the labor supply is in-

adequate. Sawmills and public works as a rule pay higher wages and require fewer hours of work, so that there is a steady drift away from the farm, and consequently many farms have been allowed to lie idle. Farm wages range from about 60 cents to \$1.50 a day, depending on the kind of work performed. Wages during peach harvest are paid on the basis of hours of labor or bushels picked.

The individual farm holdings range in size from a few acres to plantations of several thousand acres. Each tenancy is considered a farm in the census classification, and using that as a basis the average farm in Dooly County contains 68.6 acres, of which 72.9 per cent or 50 acres is improved land. Large bodies of cut-over land and swamp timberland are held by individuals and lumber companies.

Of the 2,772 farms in the county in 1920, the census reports that 22.7 per cent were operated by the owners and 76.3 per cent by tenants. Land is rented under both cash and share-rent systems or for a certain quantity of cotton. Under the share system, which is the most common, the owner supplies land, livestock, tools, and half of the fertilizer, and the tenant supplies all the labor and half of the fertilizer; the crop is equally divided.

Average farm land sells for prices ranging from \$20 to \$50 an acre, depending largely on the quality of the land and the location with respect to main roads and towns. The more highly improved farms bring the higher prices.

#### SOILS

The soils of Dooly County are prevailingly light in color, ranging from gray to red in the surface soil. The darkest-colored soils are found in depressions that occur through the uplands. The soils of the county are dominantly low in organic matter, as no grass or prairie areas exist except in some of the swamps or ponds. This area was in forest until opened for agriculture, and consequently there has been little chance for the accumulation of organic matter in the soil. In the wooded areas there is a noticeable accumulation of coarse, partly decomposed vegetable matter in the surface inch or two of the soil, but this has not become incorporated in the soil as is the case in areas originally covered with grass.

Active leaching has been and is still going on owing to the heavy rainfall, warm temperature, and the fact that clean cultivation has been the general farm practice. Therefore carbonate of lime has not accumulated in these soils, although the materials which have contributed to their formation contain lime. Few of the soils are decidedly acid in character, though practically all of them respond to liberal applications of lime, particularly the Grady soils, the Dunbar sandy loam, and the Susquehanna sandy loam.

The soils are derived from two geological formations. In the western and northern parts of the county the Vicksburg formation, which consists of flinty and siliceous limestone, sand, and clay, has been weathered to form the Orangeburg, Greenville, Ruston, Tifton, and Marlboro soils. In the eastern and southern parts of the county the Altamaha formation, consisting of sand, clay, and gravel,

has produced the Norfolk, Dunbar, Susquehanna, Plummer, and some of the Tifton soils.

The second-bottom and first-bottom soils of the county, except those of the river bottoms, have been formed mainly from reworked materials brought down from the surrounding upland, while the first bottoms along the Flint River are composed of alluvial material transported by the river in part from the Piedmont Plateau in which it rises.

The most striking feature of the texture profile of the well-developed soils in the county is the presence in all of them of a relatively light-textured surface layer overlying a deeper horizon with a heavier texture, in many cases much heavier, and a third still deeper horizon which may vary considerably in texture, but which is prevailing lighter than the second horizon, but in most places heavier than the first or second layers of horizon A. The texture of these layers varies greatly in the soil of the region. The surface layers (horizon A) range from clay loam to sand, and the second or B horizon, from clay to very light sandy loam or sand. The third stratum, or horizon C, consists of unconsolidated geological material lying beneath the B horizon and may be composed of material varying extremely in texture, structure, and color.

The thickness of these soil layers also varies widely, the surface layer ranging from a few inches in the case of the clay loams to a maximum of 2 feet or more in the most sandy soils.

The soils of Dooly County may be placed into two main groups. The first broad group includes all the types of the Norfolk, Marlboro, Tifton, Greenville, Ruston, Orangeburg, Susquehanna, Dunbar, Kalmia, and Cahaba series. These soils are the more fully developed types, and have horizons A, B, and C.

The second group includes soils that have not yet reached the stage of development as indicated by those of the first group. These include the Grady, Plummer, Myatt, and the Congaree series and Swamp, and they are characterized by the absence of the relatively heavy horizon and in some cases by the absence of any horizon development at all.

As regards the second group, in the soils of the Grady series the surface horizon has a very light texture but the second horizon, which is heavy and tough, extends downward to a considerable depth. The profile of the Plummer soils is quite similar to the Grady except in the second layer, which is friable and may not become heavy for some distance downward, though in some cases, where it is associated with the Susquehanna soils, it does become heavy, tough, and plastic at depths of 4 or 5 feet. The two layers in the soils of the Myatt series are not essentially different from those of the Plummer, as the second layer may grade into either lighter or heavier textured material. The Congaree soils are subject to overflows and periodic additions of alluvium, so that the materials are variable and definite soil characteristics are lacking.

The soils of Group 1 may be subdivided into two subgroups on the basis of the general features of the color profile or the successive color layers or horizons in the soil section. The first subgroup, including the soils of Orangeburg and Greenville series, is marked by a color profile, in the uncultivated soils about as follows:

1. A layer of leaf mold mixed with the clay or sand of the soil. If it be mainly sand the grains will be gray or brown as a rule, but if it be silt or clay it will usually be rather well mixed with the organic matter of the leaf mold and will be dark in color. This layer ranges from a very thin layer to a maximum of about 3 inches. It is usually thickest on the sandy soils.

2. A pale-yellow or grayish-yellow layer, showing very little evidence of the presence of organic matter. In the heavy soils this layer is usually thin, sometimes so thin that it can not readily be recognized. Even when present it is often modified by the reddish color of the next horizon as though it formerly had had a red color. In the sandy soils it may range in thickness up to 2 feet or more. These two layers constitute part of the relatively light textured surface layer of the texture profile.

3. A red layer ranging from deep, almost blood red to crimson red. The soils of the Greenville series have the darkest red color of this group.

4. A reddish, grayish, yellowish, or mottled horizon corresponding to the third horizon of the texture profile. Where reddish the color is less strong than that of the third layer. Since this layer is part of the parent material its color varies not merely from type to type but somewhat from place to place in the same type.

The second subgroup of soils differentiated on the basis of the color of the several layers includes the members of the Norfolk, Marlboro, Tifton, Susquehanna, Kalmia, Cahaba, Dunbar, and Ruston series, and is characterized by a series of color layers in which the two upper layers are identical with the corresponding layers in the first group, but the third layer is yellow in color in its upper and by far the larger part. In its lower part, however, there is usually a thin red layer, sometimes so thin it is difficult to detect. This is true of the types of the Norfolk, Tifton, and Marlboro series while in the case of the Ruston and Cahaba series the reddish color, though it is not strongly red, is present throughout the whole horizon. The fourth horizon or color layer in these soils varies like the corresponding layer in the first subgroup. In the case of the Susquehanna the fourth horizon is usually heavier than the third, whereas in the Dunbar it is quite variable depending on whether it borders the Norfolk or the Grady soils.

The soil of the first bottoms along the river is classed in the Congaree series. Along the other streams, where the material is mixed and drainage so poor that the soil remains wet during most of the year, it is classed as Swamp.

The various soils of Dooly County are grouped into series on the basis of color, origin, and structural characteristics. The series are divided into types on the basis of difference in texture, or the proportion of sand, silt, and clay entering into their composition. The type is the unit of soil classification and mapping. In addition to the miscellaneous classification of Swamp, 20 types and 4 phases of types, representing 14 soil series, are mapped in Dooly County.

The Tifton series has a profile as follows: A-1, from 1 to 3 inches of grayish-brown to brown friable material; A-2, to depths of from 12 to 18 inches, a pale-yellow to bright-yellow friable single-grained material. These layers constitute the surface soil. The subsoil, or

horizon B, has a thickness of from 40 to 50 inches and is a deep-yellow to reddish-yellow, friable, crumbly, sandy clay. Horizon C represents the underlying parent material which is a hard and brittle material mottled red and yellow, the red coloration predominating near the subsoil and changing downward to a gray color. Another characteristic of this series is the presence of a large quantity of small, rounded brown accretions on the surface and mixed with the surface soil, and of a much smaller number of softer ones throughout the subsoil. The Tifton sandy loam, including a deep phase, is mapped in Dooly County.

The Norfolk series has the following characteristics: A top layer of gray material, from 2 to 4 inches thick, underlain by pale-yellow or grayish-yellow, single-grained, light-textured material, from 10 to 14 inches thick, constituting the A horizon; a subsoil (horizon B) consisting of a yellow, friable, crumbly sandy clay or sand, extending to depths of from 30 to 50 inches; and horizon C, consisting of a mottled brownish-red, yellow, and light-gray, brittle sandy material. The Norfolk sandy loam, together with a deep phase, and the Norfolk sand are mapped in this county.

The Marlboro series differs from the Norfolk series in having a shallower surface layer, and a subsoil (horizon B) that is heavier, somewhat stiffer, slightly sticky, and of a deeper yellow color. The upper part of the C horizon is decidedly red, with yellow mottlings, and is friable and crumbly. The Marlboro sandy loam occurs in the county.

The Greenville series has an A horizon of reddish-brown light-textured friable material or dark-red heavy material. The subsoil, or B horizon, is a dark and heavy stiff sandy clay, compact but fairly brittle, or a dark-red friable loose sand. Underlying the subsoil is horizon C which consists of a hard but brittle material mottled or streaked with red, yellow, purplish, and whitish colors. Small, rounded, brown accretions are present on the surface and in the soil of some of the heavier types. The Greenville sandy loam and clay loam are mapped in Dooly County.

The Orangeburg series includes types in which the A horizon consists of a top layer of grayish-brown friable material from 1 to 3 inches thick, and of a lower layer of yellow or brownish-yellow, friable, single-grained material extending to depths of 10 to 18 inches. Horizon B, the subsoil, is a bright-red, friable sandy clay of a crummy structure, ranging downward to depths of from 40 to 80 inches. Horizon C consists of hard but brittle material, mottled or streaked with red, yellow, and light gray. The Orangeburg sandy loam is the only type of this series mapped in the county.

The types in the Ruston series have shallow surface layers of light-brown or grayish-brown friable material, and subsurface layers of yellow or brownish-yellow, friable material reaching downward to depths of from 10 to 15 inches. Horizon B is a reddish-brown, rusty-brown to reddish-yellow, friable sandy clay or sand of a crummy structure. Horizon C typically begins at depths of from 30 to 60 inches and consists of mottled reddish-brown, yellow, and light-gray, hard but brittle sandy material. The Ruston sandy loam and loamy sand occur in the area.

The types of the Dunbar series have light-gray to gray surface layers, pale-yellow subsurface layers, and tough, heavy, sandy clay subsoils, mottled gray, rusty-brown, and red. The sandy loam is the only type of the Dunbar series mapped in the county.

In types of the Susquehanna series, the A-1 layer consists of 2 to 3 inches of gray friable material for the sandy members, and the A-2 layer consists of pale-yellow to grayish-yellow friable material. Horizon B-1 is a mottled light-red and yellow, heavy, sticky sandy clay, and the B-2 horizon is a mottled light-red, gray, and yellow clay, of heavy, plastic and sticky properties. The C horizon consists of laminated clay. The Susquehanna sandy loam is mapped in Dooly County.

The types of the Plummer series have gray to dark-gray surface soils, light-gray subsurface layers, and mottled gray, yellow, or rusty-brown, friable sandy clay subsoils. The Plummer sandy loam is the only type of this series in the county.

The types of the Grady series are distinguished by dark or gray surface layers 3 or 4 inches thick, passing into light-gray subsurface layers mottled with brown or yellow, mottled gray, brownish-yellow, and some red or purple, heavy, tough, and rather plastic subsoils. They differ from the Plummer soils in the tough plastic structure and the varied colorations in the subsoils. No definite soil profile is developed. The Grady sandy loam and clay loam are mapped in the county.

The soils of the Cahaba, Kalmia and Myatt series occur on the second bottoms and terraces along the larger streams. The Cahaba and Kalmia soils have fairly well developed horizons or layers, whereas the Myatt soils are extremely variable as regards color and structure.

The Cahaba series has an A-1 layer of brown friable material 3 or 4 inches thick, and an A-2 layer of reddish-yellow or brownish-yellow friable material. The B horizon is a reddish-yellow sandy clay or sand of a friable crummy structure, and the C horizon consists of more friable and lighter-colored material. The Cahaba sandy loam, with a low phase, and the loamy sand occur in the area.

The types of the Kalmia series have grayish-brown surface layers 2 to 4 inches thick and subsurface layers of pale-yellow friable material extending to depths of from 14 to 18 inches. The B horizon consists of yellow, friable sandy clay or sand, to depths of from 40 to 60 inches. The C horizon consists of mottled purplish-red, yellow, and whitish friable material containing a few soft iron accretions. The Kalmia sand and the sandy loam, together with a deep phase of the sandy loam, are mapped in the area.

The types included in the Myatt series have gray to dark-gray surface layers, pale-gray subsurface layers, and mottled yellow, gray, and rusty-brown subsoils varying in consistence from friable to rather compact. The sandy loam is mapped in this county.

The overflowed land along the Flint River is mapped as Congaree silt loam and consists largely of material brought from the Piedmont Plateau and deposited during periods of overflow.

Swamp includes those areas along drainage ways that are in a saturated condition most of the time. It has no present agricultural value other than the small quantity of pasturage furnished by some areas. Forest growth covers much of it.

In the following pages of this report the soils of Dooly County are described in detail and their relation to agriculture is discussed; their distribution is shown on the accompanying soil map; and their extent is given in the following table:

*Areas of different soils*

| Soil                        | Acres   | Per cent | Soil                      | Acres    | Per cent |
|-----------------------------|---------|----------|---------------------------|----------|----------|
| Norfolk sandy loam.....     | 34, 112 | } 19. 4  | Grady clay loam.....      | 6, 784   | 2. 6     |
| Deep phase.....             | 16, 256 |          | Norfolk sand.....         | 3, 968   | 1. 5     |
| Tifton sandy loam.....      | 47, 552 | } 19. 0  | Kalmia sand.....          | 3, 904   | 1. 5     |
| Deep phase.....             | 1, 472  |          | Cahaba loamy sand.....    | 3, 840   | 1. 5     |
| Grady sandy loam.....       | 24, 448 | } 9. 5   | Marlboro sandy loam.....  | 2, 816   | 1. 1     |
| Greenville sandy loam.....  | 19, 392 |          | Cahaba sandy loam.....    | 1, 792   | } 1. 0   |
| Ruston sandy loam.....      | 18, 112 | 7. 0     | Low phase.....            | 768      |          |
| Swamp.....                  | 16, 576 | 6. 4     | Greenville clay loam..... | 2, 048   | . 8      |
| Orangeburg sandy loam.....  | 12, 480 | 4. 8     | Congaree silt loam.....   | 1, 920   | . 7      |
| Susquehanna sandy loam..... | 11, 648 | 4. 5     | Myatt sandy loam.....     | 1, 856   | . 7      |
| Dunbar sandy loam.....      | 10, 752 | 4. 2     | Ruston loamy sand.....    | 1, 216   | . 5      |
| Plummer sandy loam.....     | 7, 488  | 2. 9     |                           |          |          |
| Kalmia sandy loam.....      | 3, 072  | } 2. 9   | Total.....                | 258, 560 | -----    |
| Deep phase.....             | 4, 288  |          |                           |          |          |

#### TIFTON SANDY LOAM

The surface layer of the Tifton sandy loam in virgin areas is a brown to grayish-brown loamy sand 1 to 2 inches deep and a pale-yellow to bright-yellow light sandy loam or loamy sand to depths of from 12 to 18 inches. The subsoil to depths of from 40 to 50 inches is a deep-yellow to reddish-yellow sandy clay of a crummy structure, and slightly sticky owing to the presence of a large proportion of fine material. This is underlain by a mottled red and yellow hard but brittle material, the red coloration predominating near the subsoil while gray color increases with depth. In cultivated fields the surface soil to depths of plowing usually has a brownish-gray to yellowish color. On the surface and mixed with the soil is a large quantity, usually about 10 to 40 per cent, of small rounded brown accretions, while a smaller quantity but softer ones are found throughout the subsoil. Accumulations of these accretions may be seen locally along the lines of contact between the subsoil and the parent material.

Owing to the presence of these pebbles this kind of land is referred to locally as "red pebble land" or "pimple land." In wooded areas these pebbles are not very noticeable on the surface, but are encountered when the soil is penetrated. In cultivated fields they are present in large quantities and are particularly in evidence after a rain.

The type as mapped includes variations and small areas of other types. In small areas there are few pebbles in the surface soil and upper subsoil, and the lower subsoil contains a large quantity of pebbles, in places being concentrated into a layer at depths of from 18 to 20 inches. Small areas of Norfolk sandy loam are included in places, as well as patches of Marlboro sandy loam in level areas and Ruston sandy loam on the slopes. Around the heads of small drainage ways the accumulation of small amounts of vegetable matter gives the soil a darker color than typical. On slopes where the underlying siliceous rock outcrops some fragments of flint rock are encountered. Stony areas are found chiefly along Hogcraw Creek

and are indicated on the map by stone symbols. This variation seems well suited to strawberries. Northwest of Byromville, small areas are included which have subsoils somewhat redder than typical. In this vicinity small areas occur which have much higher percentages of pebbles than typical, and the surface soils approach a clay loam. In the vicinity of Turkey Creek and Hogcrawl Creek, where Susquehanna sandy loam occupies the steep slopes, the lower subsoil of some of the Tifton sandy loam is tough and hard and the soil is of lower agricultural value than the typical soil, but such areas are small and unimportant. Just west of Nelson Grove Church small areas are included which are more sandy in the surface soil than typical and of lower agricultural value.

The Tifton sandy loam is one of the most extensive upland soils in the county. The largest areas are mapped south and north of Dooling, in the vicinity of Snow Springs and Emerich, west and south of Pinehurst toward Findlay, on the ridge extending south from St. Paul Church toward the Double Lime Sinks, east and southwest of Vienna, and southeast of Rock Hill School. Other areas are scattered through the eastern and central parts of the county.

The type occupies smooth, gently rolling or undulating land, and ridge tops and slopes. It is closely associated with the Norfolk soils in the eastern and southern parts of the county, and with the Greenville and Marlboro in the northwestern and western sections. The surface is marked by numerous small ponds or depressions (Grady soils), but the natural drainage throughout the type is well established.

About 90 per cent of the type is under cultivation, and the rest, found chiefly south of Vienna, is in forest consisting mainly of long-leaf pine, which is being rapidly cut and the land cleared. The type is considered by farmers to be one of the best soils in the county and particularly well suited to cotton under present conditions. All of the crops common to the section are successfully grown on this type. A number of peach and pecan orchards have been set out and are doing well. Corn, oats, peanuts, cowpeas, wheat, and watermelons are the principal crops.

Before the advent of the boll weevil, yields of one-half to over 1 bale of cotton per acre were common on the fields of Tifton sandy loam, and under present conditions the average is one-fourth to one-half bale. The heaviest yields of cotton in the county in 1922 were gathered from this type of soil.

Corn yields from 15 to 30 bushels per acre with an average of about 20 bushels. Oats do very well and yield from 25 to 40 bushels per acre. In good seasons yields as high as 60 bushels have been reported. The Texas Rust Proof and Fulghum are the most common varieties. Peanuts have become very important on this type; they yield from 25 to 50 bushels of peanuts and about half a ton of peanut-vine hay per acre. At present the peanut crop is one of the most profitable. Wheat yields from 12 to 20 bushels with an average of about 15 bushels. A considerable number of hogs are grazed on this land and fattened on peanuts and corn. Cowpeas are planted for hay following the harvesting of the small grains and they are also planted between the corn rows. Some farmers cut the entire

plant for hay at the time the vines begin to turn yellow; this produces a high grade of hay. Others use it for grazing and harvest only enough peas for seed.

A rotation of cotton, corn, oats, and peas is followed by some of the better farmers, but no regular rotation is in general use.

Fertilizers are commonly applied on corn and cotton at the rate of from 250 to 350 pounds per acre of a 9-2-3 analysis, but the better farmers have adopted a fertilizer analyzing 8-4-4 or even higher in potash and use from 300 to 500 pounds per acre. Little fertilizer is used on the small grains and peanuts.

Tifton sandy loam is easily handled with light plows and tillage tools, is well drained, and is comparatively early. The topography is favorable for improved implements over most of the type. The soil is productive, and by the use of legumes and proper fertilizers the productivity can be economically maintained. It is one of the best and strongest upland soils in the Coastal Plains and is adapted to a wide range of crops. In other parts of Georgia it is successfully used for tobacco, truck, small fruits, and berries. This type is very well suited to the growing of pecans. It is probable that the use of acid phosphate on peanuts would be found profitable.

Farms consisting largely of Tifton sandy loam are valued at prices ranging from \$25 to \$60, averaging about \$40 an acre. The more highly improved farms are held at higher prices, according to the improvements and location.

*Tifton sandy loam, deep phase.*—The deep phase of the Tifton sandy loam differs from the typical soil in having a deeper surface layer of loamy sand. The surface soil is a grayish-brown to gray loamy sand, 12 to 18 inches deep, underlain by a yellow sandy loam, passing, at depths from 22 to 26 inches, into the typical deep-yellow sandy clay, which is usually not quite so sticky as the typical subsoil. The small brown iron pebbles are present throughout the soil section but are more abundant in the subsoil. This phase is adapted to the same crops as the typical soil, but has a lower agricultural value and produces lower yields.

The deep phase is mapped principally in the southeastern and eastern parts of the county in rather widely scattered areas. It is small in total extent and of little agricultural importance.

#### NORFOLK SAND

The surface soil of the Norfolk sand is a gray sand to depths of from 2 to 6 inches, passing downward into a yellow or pale-yellow sand extending to a depth of 3 feet or more. In places the type areas include small patches of Norfolk loamy sand, such as found about 1½ miles southeast of Franklin School along Limestone Creek, about 1 mile southeast of King School, and a quarter of a mile east of the point where the road from Blackshear enters the county. In cultivated fields the surface soil is either a light gray or gray, depending on the quantity of organic matter present.

The type is inextensive and is mapped principally in the southeastern part of the county where it occurs in close association with the Norfolk sandy loam, deep phase, and the Susquehanna sandy loam. The largest areas are north of Tippettville, in the vicinity

of the Double Lime Sinks, and along Sandy Mount Creek west of Sandy Mount Church. Small areas are scattered through the eastern part of the county, and are mapped on low ridges beside ponds and between ponds and depressions in the northeastern part of the county.

The type has a level or gently rolling topography. Its open porous structure permits the rapid loss of moisture, so that crops suffer during dry periods. It is composed largely of quartz sand and the natural fertility is low.

About 75 per cent of the Norfolk sand has been cleared of its original growth of pine, but now most of it is covered by a second growth of scrub oak and pine. Not more than 25 per cent of the type is under cultivation. Corn and cotton are the principal crops, corn yielding from 8 to 12 bushels per acre and cotton from one-tenth to one-eighth bale when fertilized. Peanuts are grown to some extent.

This type requires heavy applications of fertilizer and manure for crop production, and much of the value of these applications is lost through leaching. Near Macon some of this land is devoted to peach orchards. In North Carolina dewberries, other small fruits, and vegetables are successfully grown where heavy applications of commercial fertilizers are made.

#### NORFOLK SANDY LOAM

The surface soil of Norfolk sandy loam, in virgin areas, consists of a gray loamy sand from 2 to 4 inches deep. The subsurface or main part of the soil is a pale-yellow to grayish-yellow loamy sand extending to depths of from 12 to 16 inches. The typical subsoil is a crummy and granular sandy clay having a yellow color. This is underlain, at depths of from 34 to 48 inches, by a mottled brownish-red, light-gray and yellow, friable material. In places a thin, red, or mottled red and yellow layer underlies the subsoil. In cultivated fields the surface 5 to 7 inches is a light-gray to yellowish-gray loamy sand, the color depending on the content of organic matter and the manner of soil management.

The type as mapped includes some patches of the deep phase of the Norfolk sandy loam which are too small to be separated. In the vicinity of areas of Dunbar and Marlboro sandy loams the Norfolk sandy loam includes small areas of these soils. In places a few brown iron pebbles are present.

This type is extensively developed through the central and east-central parts of the county, in close association with the Ruston and Tifton soils. The largest areas are north of Vienna, between Lilly and Pinehurst, and east and southeast of Pinehurst. Small areas are mapped in the vicinity of Unadilla.

The Norfolk sandy loam occupies smooth, gently rolling to rolling land and gentle slopes. The surface is broken here and there by depressions or sinks, but the type as a whole is well drained.

Over 80 per cent of the type is cleared and under cultivation. All of the crops of the county are grown on this soil; but the yields vary, depending on farm practices. Cotton and corn are the prin-

cipal crops, followed by oats, wheat, peanuts, and cowpeas. Cotton averages about a quarter of a bale per acre, corn produces from 12 to 20 bushels and even higher when heavily fertilized, and oats yield from 20 to 35 bushels and in favorable seasons as high as 50 bushels. Peanuts do well on this soil and yield from 20 to 30 bushels per acre. Wheat yields from 10 to 12 bushels per acre.

The Norfolk sandy loam has a wide range of crop adaptation and its fertility can be readily maintained and increased. It is well suited to the production of vegetables and truck crops. Near Macon this type of soil is devoted extensively to the production of melons, sweet potatoes, and cantaloupes. It is well suited to the growing of asparagus and all kinds of early vegetables.

The Norfolk sandy loam is capable of being brought to a high state of cultivation. It has a tendency to leach and the organic matter rapidly burns out during the hot summers, but it responds quickly to good farming methods and proper fertilization. Application of farm manure or the turning under of legumes or green cover crops is necessary for the maintenance of the productivity of this type. From 350 to 500 pounds per acre of 8-4-4 fertilizer should be used on general crops and heavier applications on truck crops. Rotation of crops would prevent the impoverishment of the land and aid in the control of the boll weevil. Terracing of the slopes is necessary to prevent erosion. In southern Georgia and North Carolina the Norfolk sandy loam is considered the finest soil for bright tobacco and hence is very highly regarded by tobacco growers. It is an excellent peanut soil.

This type of soil is usually considered as having a lower value than the "pebbly land," or Tifton sandy loam. It ranges in price from \$20 to \$40 an acre, depending on improvements and location.

*Norfolk sandy loam, deep phase.*—The Norfolk sandy loam, deep phase, differs from the typical Norfolk sandy loam mainly in having a deeper surface layer of sand or loamy sand. It consists of from 6 to 10 inches of gray sand, with a subsurface layer of pale-yellow loamy sand, which grades, at depths of from 20 to 24 inches, into a yellow friable sandy clay. It is an intermediate soil between the Norfolk sandy loam and the Norfolk sand.

This phase is developed principally south and southeast of Vienna. Other areas are mapped north and south of Tippettville, and on ridges between ponds and depressions east of Pinehurst. It has a level to gently sloping topography and is closely associated with the Norfolk and Dunbar soils. Where it is most extensively developed the depressions are composed principally of Plummer sandy loam.

About 50 per cent of this phase is cultivated, the remainder being in forest or in cut-over land used for pasture. This phase has about the same crop adaptation as the Norfolk sandy loam, but produces lower yields. Plant nutrients leach out readily and after several years of cropping the yields fall off rapidly. For improvement and maintenance of fertility, large additions of organic matter and heavy applications of fertilizer are essential.

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

*Mechanical analyses of Norfolk sandy loam*

| Number  | Description                   | Fine gravel     | Coarse sand     | Medium sand     | Fine sand       | Very fine sand  | Silt            | Clay            |
|---------|-------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|         |                               | <i>Per cent</i> |
| 257732  | Soil, 0 to 6 inches.....      | 14.3            | 22.4            | 10.6            | 35.2            | 8.4             | 5.1             | 4.0             |
| 257733  | Subsoil, 6 to 18 inches.....  | 10.4            | 17.2            | 9.4             | 32.0            | 9.2             | 7.8             | 14.2            |
| 1257734 | Subsoil, 18 to 36 inches..... | 5.2             | 13.2            | 7.9             | 29.2            | 8.0             | 6.6             | 29.9            |

## MARLBORO SANDY LOAM

The surface soil of the Marlboro sandy loam is a grayish-brown sandy loam or loamy sand, 5 to 7 inches deep, underlain by a yellow sandy clay or heavy sandy loam, which, at depths of from 14 to 18 inches, grades into a bright-yellow or golden-yellow clay or sandy clay which is moderately stiff and somewhat sticky. This type differs from the Norfolk sandy loam, the latter having a shallower surface layer and subsoil. In places brown pebbles appear, a characteristic of the Tifton sandy loam. The large proportion of fine material in the subsoil imparts to it firm, stiff, and somewhat sticky qualities. In places the subsoil below 28 inches is somewhat more friable than in typical soil bodies. This type is closely associated with the Tifton sandy loam and Norfolk sandy loam and hence mapped areas include patches of these other types.

Marlboro sandy loams are not extensively developed in Dooly County. They occur mainly in the central-western and northwestern parts, and are also mapped west of Lilly, north, west, and southwest of Byromville, southwest and southeast of Emerich, and in scattered areas north, east, and southeast of Pinehurst.

The Marlboro sandy loam has a smooth, level to gently undulating or slightly sloping topography. Depressions or ponds, having soils of the Grady series, occur in many places adjacent to this type, thus affording means of drainage. The type is well drained throughout; but since it is retentive of moisture, it suffers less loss from leaching than do the soils with very open friable subsoils.

This type is productive and is practically all in cultivation. It requires somewhat heavier implements than the more open Norfolk soils. Cotton, the principal crop, yields about the same as on the Tifton sandy loam and averages about a quarter of a bale per acre, although before the advent of the weevil yields of a bale or more per acre were common. Yields varying from 15 to 30 bushels of corn, 20 to 40 bushels of oats, 12 to 20 bushels of wheat, and 20 to 40 bushels of peanuts per acre are produced.

Fertilizer analyzing 9-2-3 is applied for cotton at the rate of from 300 to 400 pounds per acre, and somewhat less for corn. A top-dressing of 75 to 150 pounds of nitrate of soda is applied to oats in the spring. Cowpeas are planted between the corn rows and cut for hay in the fall, and are also planted after oats and wheat.

Application of fertilizer at rates of from 400 to 500 pounds of a 10-3-4 grade for cotton and corn, the adoption of rotations including leguminous crops, and the addition of organic matter by turning under cover crops, would increase the productiveness of this type. The use of 2-horse implements for plowing and cultivating would

give better results. This type is adapted to peaches and pecans as well as vegetables and berries. It is one of the strongest soils in the county and can be built up to a high state of productivity by the addition of green-manuring crops or barnyard manures and lime. Deep plowing and thorough preparation of the seed bed are more essential in the management of this soil than of the Norfolk and Tifton soils.

#### GREENVILLE SANDY LOAM

The surface soil of the Greenville sandy loam is a dark-brown loamy sand, from 1 to 2 inches deep, passing into a reddish-brown light sandy loam having a depth of from 5 to 10 inches. This is a mellow soil and one easy to handle. The subsoil (horizon B), to depths of from 40 to 70 inches, is a deep-red, stiff sandy clay to clay, being compact but brittle when dry and sticky when wet. Underlying this subsoil is a hard but brittle material, mottled or streaked with red, yellow, purplish, and whitish colors. This is the unweathered material and it varies greatly in color, depth, and structure. In places the mottled purplish material immediately underlies the subsoil and an accumulation of iron accretions is found in this layer or in the lower portion of the subsoil.

Small ironstone concretions are commonly found in the surface soil but not in sufficient quantities to affect the structure. In the northwestern part of the county, between Byromville and Dooling, on the east slope above Hogcrawl Creek, and in scattered small areas eastward toward the Pulaski County line, they are present in considerable quantities. Such areas are indicated on the map by gravel symbols. On the slopes above the larger creeks, such as Big and South Prong Creeks in the eastern and northeastern parts, and Turkey and Hogcrawl Creeks in the northwestern part of the county, the underlying siliceous and cherty rock crops out in places; and hard fragments, remnants of that formation, are present on the surface. Such areas are shown by stone symbols. In a few places these rocks are so abundant as to interfere with farming operations.

Northeast of Lester Bros. Store are several areas of soil having a darker surface soil than the Greenville type, due possibly to organic matter or manganese oxide. Such areas resemble the Blakely sandy loam. On slopes, particularly in the vicinity of Lilly, there are patches from which the surface soil has been eroded, leaving the subsoil exposed and having developed qualities approximating a clay loam. In the western part of the county a few areas of soil having surface layers of loamy sand or sandy loam deeper than typical are included in the areas mapped as Greenville sandy loam. Such included areas occur on lower slopes where the sandy materials washed from higher land have accumulated. A number of areas of Greenville loamy sand, too small to map separately, are also included in type areas of Greenville sandy loam. Several such included areas occur on the east side of Big Creek, in the northeast corner of the county, and about  $1\frac{1}{2}$  miles north of Lester Bros. Store.

The Greenville sandy loam is level or undulating to sloping and somewhat hilly where it occurs on slopes extending to large stream bottoms. It is most typically developed on the flat ridge crests between Turkey Creek and the river terraces west and southwest of

Byromville. The surface is marked by numerous depressions or sinks which contain Grady soils and which vary in size from an acre or less to 20 acres or more. The type is extensively developed north and east of Unadilla, south of Lilly along Pennahatchee Creek, on both sides of Turkey Creek as far up as Oakland Church, in and around Byromville, and on the broad divide between Turkey Creek and Flint River. Numerous smaller areas occur between Pinehurst and the National Highway.

The soil is well drained either through small natural drainage ways, ponds, or sinks. Practically all of the type has been cleared of its forest growth and only a few scattered wooded areas remain along steep slopes or on stony areas. Erosion quickly becomes active after clearing unless the slopes are protected by terraces.

The Greenville sandy loam is regarded as one of the strongest and most productive soils in the county and includes some of the finest agricultural land. It seems especially well suited to cotton, which yields from a third to half a bale per acre under boll-weevil conditions. Previous to the advent of the weevil, cotton on this type of soil is said to have averaged better than one bale per acre. Corn produces well on this soil and yields from 15 to 35 bushels per acre, and even higher returns are obtained where the land is carefully handled and the supply of organic matter maintained. Oats, wheat, and peanuts are grown by many farmers. Oats yield from 25 to 60 bushels per acre, and peanuts from 25 to 50 bushels. Cowpeas and velvet beans are planted in the corn for fall grazing, and cowpeas are usually seeded after the small-grain crops are harvested. Corn is sometimes planted following oats. A number of peach and pecan orchards are located on this soil type and are said to produce more highly colored peaches than the light-gray or yellow soils. Sweet potatoes do well on this type and watermelons are grown.

No definite rotation is practiced on this soil. The common fertilizer application is about 250 pounds per acre of a 9-2-3 mixture. This type is somewhat more difficult to plow and cultivate than the gray sandy soils, and, owing to its greater power to retain moisture, it must be cultivated with greater care, since it can not be worked under a very wide range of moisture conditions. The land is usually "flat-broken" for cotton and corn during the fall and winter. The corn land is bedded and the seed and fertilizer are dropped into the water furrows. For cotton the land is barred off, the fertilizer is placed in the furrows, the land is then bedded back over this furrow, and the cotton is planted in the beds.

Most of this type of soil is included in large plantations and holdings and was formerly entirely under cultivation, but because of scarcity of labor much of it has been allowed to "lie out," particularly in the extreme northeastern part of the county and on the east side of Turkey Creek east of Byromville. It is held at prices ranging from \$25 to \$75 an acre, depending on topography, location, and improvements.

In the Fort Valley peach section Greenville sandy loam is considered the best soil for peaches and the finest orchards are located on it. It is well suited to the growing of sweet potatoes and melons, and in the vicinity of Macon it is extensively used for trucking. It is not so early as the Norfolk and not so well suited to trucking, but

where the market is near by the heavy yields compensate for a later crop. A fertilizer analyzing about 10-4-4 has been found to give good results on this soil, particularly for cotton. Terracing to prevent erosion and adding organic matter in the form of cover crops will improve the tilth and lessen the injury from washing. In other parts of the State alfalfa is grown successfully on this soil. The wider use of legumes is recommended for hay and soil improvement. The use of lime with legumes would prove profitable.

#### GREENVILLE CLAY LOAM

The surface soil of the Greenville clay loam is a dull-red or brownish-red loam or clay loam, 4 to 6 inches deep, resting on a bright-red, heavy, somewhat sticky, sandy clay subsoil. It generally contains some of the small brown pebbles and is referred to locally as "stiff red pimply land." On the map gravel symbols mark the places where the pebbles are present in abundance. Mapped areas of this type include some patches of Greenville loam and sandy loam too small to be mapped separately, particularly along lower slopes.

Where this soil occurs near Susquehanna sandy loam the subsoil in places is stiff and somewhat mottled with streaks of gray and yellow. Where the underlying siliceous rock is exposed or lies near the surface, rock fragments are numerous in small areas, but such areas are unimportant.

The Greenville clay loam has a rolling to steeply rolling topography and is well drained. The somewhat compact nature of the subsoil has a tendency to cause excessive run-off, accompanied by severe washing.

This type occurs principally in small detached areas in the western and northwestern parts of the county along the slopes of drainage ways. It is not extensive nor agriculturally important. About 90 per cent of the type is cleared and about half of it is devoted to pasture.

The Greenville clay loam is regarded as an excellent soil for the production of peaches. It is well adapted to alfalfa and other legumes and to hay and pasture grasses. It is a very strong soil and responds to careful management and retains the fertilizing elements applied to it. Crop yields are about the same as on the Greenville sandy loam.

The soil is difficult to handle, as its heavy texture requires heavy 2-horse plows, and it can be plowed only through a narrow range of moisture conditions. If plowed when wet, the land becomes cloddy and is pulverized with difficulty. The plowing under of organic matter will make the soil more tractable. Terracing is essential to prevent washing.

#### ORANGEBURG SANDY LOAM

The surface soil of the Orangeburg sandy loam to depths of from 1 to 3 inches, in virgin areas, is a grayish-brown loamy sand grading downward into a brownish-yellow or yellow loamy sand to depths of from 10 to 18 inches. These two layers (horizon A), are of single-grained structure, and mellow. The subsoil is a red sandy clay, friable and crummy, and extends to depths of from 40 to 72 inches. Below this is a hard but brittle material mottled or streaked

with red and yellow. In places this material is red with streaks of yellow and light gray. In cultivated fields the surface 5 to 8 inches is a light-brown to brownish-gray color.

In places areas of this type consist of fields having a spotted appearance, showing numerous patches of red soils which, if of larger extent, would have been mapped as Greenville soils. In many places this type closely resembles the Greenville soils except for the gray surface tinge. As a rule the subsoil of the Greenville sandy loam is somewhat more sticky. In the vicinity of Butler Hill School the surface layer is deeper than typical, which tends to make the soil less desirable for most crops.

The Orangeburg sandy loam generally occupies gently undulating ridges and slopes, including the more rolling and hilly slopes along the borders of the large streams. Hilly areas are found along South Prong Creek and Big Creek in the northeastern part and along Turkey Creek in the northwestern part. The type occurs widely distributed over the northern and western parts of the county, in close association with the Ruston and Greenville sandy loams. An area of it caps the outlying hill south of Holland Pond on the River Road. Toward the Pulaski County line east of Butler Hill School it is one of the most important farming soils. It also occurs in important bodies south of Snow Springs, west of the National Highway, south of the Dixie Overland Highway, north of Smiths Store, around Lester Bros. Store, east of Byromville, and in the vicinity of Lilly.

In places, notably on each side of Turkey Creek above Byromville, fragments of chert and numerous small ironstone pebbles are present through the type, such areas being indicated on the map with stone and gravel symbols. East of Smiths Store the fragments are so numerous in places as to render the land fit for little except grazing.

Drainage is well established throughout the type, and, as in the case of the Greenville soils, erosion develops gullies unless checked by means of terraces. About 65 per cent of the type is cleared and in cultivation, but west of Double Churches a considerable part of the more hilly land along branches remains in pine, with a scattering of oaks, hickory, and dogwood.

This soil is devoted to the general farm crops and is handled in the same manner as the Greenville sandy loam, but yields are somewhat lower. It is well suited to peanuts, sweet potatoes, melons, vegetables, and peaches. It is in need of organic matter, and hence more frequent growing of legumes is recommended to build up its fertility. Fertilizer analyzing 9-3-4 or 10-4-4 should be applied to cotton and corn at the rate of from 300 to 400 pounds per acre. This land is considered as having somewhat less value than the Greenville sandy loam.

#### RUSTON LOAMY SAND

The Ruston loamy sand consists of a light-brown to grayish-brown loamy sand or sand, 10 to 12 inches in depth, grading downward into a brownish-yellow to reddish-brown loamy sand which extends to depths of from 40 to 60 inches, where the material becomes a mottled, hard but brittle sandy clay. The type includes several patches of

soil in which the subsoil is more reddish than in typical areas, they being, rather, Orangeburg sandy loam, but of such small extent that they are not indicated on the map.

The type is not extensive and occurs principally in widely scattered areas through the southwestern and northern parts of the county. It is mapped along the county line about 2 miles south of Franklin School, along Pennahatchee and Sandy Mount Creeks, near Camp Ground, near Cedar Creek Church on the Pulaski County line, and in several small areas in the northeastern part of the county. It has a sloping to rolling topography and is thoroughly drained. The open porous structure of the subsoil sometimes results in excessive drainage and consequently crops may suffer for want of moisture during dry periods.

About 50 per cent of the type is cleared of its forest growth, which consisted of pine, oak, dogwood, and some hickory. The general farm crops are grown, but yields are low. Peanuts do well.

The Ruston loamy sand is not naturally so strong a soil as the Ruston sandy loam. It is an excellent early trucking soil, and also well suited to pecans and peaches. It requires liberal applications of high-grade fertilizers and the incorporation of vegetable matter, such as barnyard manure or cover crops plowed under, to increase its content of organic matter and its water-holding capacity.

#### RUSTON SANDY LOAM

The surface soil of the Ruston sandy loam in virgin areas is a grayish-brown loamy sand, 2 to 4 inches deep, grading into a brownish-yellow loamy sand or light sandy loam and extending downward to depths of from 10 to 18 inches. The subsoil may be a reddish-yellow, yellowish-red or yellowish-brown sandy clay having a crumby structure and a thickness of from 2 to 8 feet. Below this sandy clay is a hard but brittle material, mottled with red, yellow, and whitish colors, the upper part near the subsoil assuming a red color and the part 7 or 8 feet lower down assuming mainly the gray and yellow colors. Cultivated fields have a brownish-gray to gray color.

The Ruston sandy loam as mapped in Dooly County is somewhat variable in structure, especially in the subsoil. Spots of Greenville and Orangeburg soils particularly on steep slopes or small knolls, are included because they are too small to show on the map. On steep slopes in the western and northwestern parts of the county the subsoil is somewhat stiff and mottled yellow and red, resembling that of the Susquehanna sandy loam. Type areas on the map include patches that are gravelly and stony and others which contain numerous reddish-brown iron pebbles.

The Ruston sandy loam is mapped principally west and north of Vienna. Smaller areas occur near Poplar Springs Church, along Cedar Creek, south and west of Pinehurst, and widely scattered over the northwestern part of the county. An area occurs on the ridge east of Holland Pond, which is an outlier completely surrounded by terraces.

The Ruston sandy loam is closely associated with the Greenville, Orangeburg, Tifton, and Norfolk soils. It has a gently rolling to hilly topography, on the whole is well drained, and is suited to the

use of improved machinery. Some of the more rolling areas having mottled subsoils are of rather low agricultural value.

About 70 per cent of the type is cleared of its forest growth which originally consisted mainly of pine with a scattering of hardwoods. Most of the remaining forest is second-growth pine and oak.

On this soil the common crops are grown, with cotton and corn predominating. Some oats and wheat are grown and peanuts are becoming important. Crop yields are variable, depending on the uniformity of the soil, methods of cultivation and fertilization. Cotton yields from one-eighth to about three-eighths bale per acre; corn from 15 to 30 bushels, with an average of about 20 bushels; oats from 20 to 40 bushels, averaging about 25 bushels; and peanuts from 20 to 35 bushels, with an average of about 25 bushels. Fertilizers are applied at the rate of about 200 or 300 pounds of a 9-2-3 analysis per acre. Little attempt is made to increase the soil content of organic matter, although cowpeas are frequently grown between the corn rows and velvet beans are commonly planted in the corn rows. Terracing of the slopes is practiced to some extent and as a result erosion is being checked. Several excellent herds of dairy cattle are grazed on this type of soil. In the vicinity of Macon this type of soil is used for the growing of sweet potatoes, tomatoes, melons, cantaloupes, peppers, and other truck crops for canning and marketing.

The Ruston sandy loam is well suited to general farming. It is easily cultivated and responds readily to good farming methods. It needs organic matter in the form of barnyard manure or cover crops plowed under. Fertilizer analyzing 8-4-4, applied at the rate of from 350 to 450 pounds per acre, is recommended for the principal crops. The use of acid phosphate would probably prove profitable on peanuts. Alfalfa has been successfully grown on this soil, and clovers and vetches would do well.

#### DUNBAR SANDY LOAM

The surface soil of the Dunbar sandy loam is a dark-gray to grayish-yellow loamy sand or sandy loam, 6 to 8 inches deep, underlain by a pale-yellow rather compact sandy clay which becomes, at 20 to 24 inches, mottled light gray, rusty brown and red, and tough. In some counties previously surveyed, soil of this character has been classed as a well-drained phase of Coxville sandy loam. In places it might be considered as a poorly drained phase of Norfolk sandy loam, since it occupies a position between the Norfolk sandy loam and the depression soils (Grady and Plummer). Some of the type areas, where they occur in conjunction with the deep phase of the Norfolk sandy loam, have deeper surface soil than typical. Mapped areas of Dunbar sandy loam include small areas in which the subsoil is quite plastic below 26 or 28 inches, resembling the Grady sandy loam. In the vicinity of Dooling the subsoil resembles the Susquehanna subsoil in structure.

The Dunbar sandy loam occurs around the borders of ponds and depressions, on lower slopes and flats adjacent to the watercourses, and in level or slightly depressed flats. It is mapped in the comparatively low country southeast and south of Vienna from the vicinity of Richwood toward Double Lime Sinks, southeast of

Unadilla, and in the vicinity of Dooling. Other small areas are scattered through the eastern part of the county.

Owing to its flat topography and compact subsoil, the type is not thoroughly drained, although the greater part of it is adequately drained, except during wet seasons. In many places artificial drainage is effected by ditches.

About 75 per cent of the type has been cleared of its original forest growth, consisting of long-leaf pine, short-leaf pine, gum, water oak, haw, and dogwood, and about 40 per cent of it is farmed. The remainder is devoted to grazing or has been allowed to remain in woodland.

This soil is easily handled with the usual farm implements, but it can not be worked until the excess water has drained off. After periods of long-continued rains the surface becomes soft and "boggy" to a depth of from 8 to 12 inches, and it is difficult for mules to get a good footing. It should not be plowed when too wet, since it clods and bakes and remains rough through the season.

The Dunbar sandy loam is not well adapted to cotton under present conditions, because it tends to produce too much weed growth, and injury from the boll weevil is very heavy. Little cotton is now planted on this soil, although before the advent of the weevil it produced medium to good yields. The soil is well suited to corn, oats, and sugar cane in a normal season. It retains moisture well and crops do not suffer during dry periods. Corn yields from 15 to 30 bushels per acre. Oats yield from 20 to 40 bushels. Oats on this soil have a tendency to lodge in wet seasons, making harvesting difficult. Some peanuts are grown on the higher and better-drained patches.

Insufficient drainage is the limiting factor in the cropping of this soil. Open ditches will suffice for complete drainage except on the flattest areas. Where the type is at about the level of the adjacent depressions, deepening of the watercourse in the depression would materially improve the drainage. Application of lime would prove beneficial, and heavy applications of organic matter in the form of barnyard manure or cover crops, in conjunction with lime and drainage, would make it a productive soil for most of the general farm crops. Cotton should not be planted upon it.

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

*Mechanical analyses of Dunbar sandy loam*

| Number | Description                   | Fine gravel     | Coarse sand     | Medium sand     | Fine sand       | Very fine sand  | Silt            | Clay            |
|--------|-------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|
|        |                               | <i>Per cent</i> |
| 257748 | Soil, 0 to 7 inches.....      | 3.6             | 19.4            | 12.9            | 15.4            | 12.8            | 11.2            | 24.5            |
| 257749 | Subsoil, 7 to 24 inches.....  | 5.6             | 17.4            | 10.2            | 26.2            | 10.0            | 10.4            | 20.2            |
| 257750 | Subsoil, 24 to 36 inches..... | 3.8             | 13.2            | 8.7             | 22.4            | 8.3             | 10.5            | 33.1            |

SUSQUEHANNA SANDY LOAM

The surface soil of the Susquehanna sandy loam in wooded or old-field areas to a depth of 2 or 3 inches is a light-gray to gray

loamy sand, and below this is a pale-yellow to grayish-yellow loamy sand or light sandy loam extending to depths of from 8 to 15 inches. The subsoil begins as a mottled light-red and yellow, heavy, sticky sandy clay which, in a few inches, grades into the mottled red, gray, and yellow clay, being very sticky when wet and very hard when dry. This heavy mottled layer has a thickness of from 20 to 50 inches and it is underlain by a light-gray or bluish-gray (with faint mottlings of yellow or brown), sticky, plastic clay, being laminated in places.

Where the type occurs close to the Norfolk soils the surface layer is somewhat deeper than typical. Between Double Lime Sinks and Rock Hill School it is gravelly in places. In the western and northwestern parts of the county areas are included along slopes in which the soils are badly mixed, and in small areas siliceous rock fragments are common. Along Cedar Creek, South Prong Creek, and Big Creek the type resembles the Greenville soils in color, but has a compact subsoil and is quite stony, and in places is less than 3 feet in depth. Included with the type areas as mapped are patches of clay and clay loam. Patches of Plummer sandy loam, too small to be shown on the map, are included in flats or depressions in the southeastern part of the county. Some areas of the type assume a very spotted appearance, due to the exposure of the subsoil in clay galls or on eroded slopes.

The Susquehanna sandy loam is most typically developed in the southeastern part of the county where it occupies a large part of the section extending south and southeast of Atkins School. It also occupies some of the steep slopes on the east side of Turkey Creek and Hogcrawf Creek, and small widely scattered areas in the eastern and northeastern parts of the county.

The topography is rolling or sloping to hilly and the surface drainage is well established. The internal drainage is not very good, owing to the plastic, compact consistence of the subsoil which interferes with the movement of water through the soil. Erosion has badly cut many of the slopes as terracing is rarely practiced. In places the topography is sinky, and a number of streams that flow on the surface during wet spells are intermittent or they flow for some distance on the surface and then in depressions or open sinks, pass into underground water channels in the soft underlying rock formations. In most of the open drainage ways and flats may be found Plummer sandy loam. The Grady soils are found in similar positions associated with the Tifton, Greenville, and Orangeburg soils.

The original forest, which consisted of magnificent long-leaf pine, has been largely cut off, about 25 per cent of the type remaining in woodland consisting of long-leaf and short-leaf pine, several varieties of oak, and, on lower slopes, dogwood. Approximately a third of the type is under cultivation. Crop yields are low, and in many cases the land is cleared and farmed for a few years and then allowed to revert to pasture or woodland. Cotton and corn are the principal crops. Cotton yields on an average of about one-eighth or one-tenth bale per acre, and corn averages about 10 or 12 bushels. Other crops when grown give correspondingly poor average yields. Fairly good pasture is afforded during spring. It is a common

practice to burn over the woodlands in order to favor the young grass. This is a very wasteful practice, since it destroys the organic matter in the soil, as well as the forest litter, and does untold damage to the young pine seedlings which begin to grow as soon as the land is allowed to remain idle for some time.

The methods and equipment employed on the other sandy soils are used on the Susquehanna sandy loam. Light tillage tools are used and very small quantities of commercial fertilizers are applied. Owing to its compact, more or less impervious subsoil, the land dries up slowly in the spring and is usually late in maturing the crop. Boll-weevil damage to cotton has been very heavy.

Most of the hilly and eroded portions of this type of soil are better adapted to forestry and grazing. Pine reseeds itself rapidly, and if fires were kept out pine would pay better than any cultivated crop. Land of this type sells for prices ranging from \$8 to \$12 an acre, and higher where it is associated with some of the better soils. Where gravel is present on the surface this type of land furnishes fairly good road-building material.

#### PLUMMER SANDY LOAM

The surface soil of the Plummer sandy loam consists of a gray loamy sand, 4 to 6 inches deep, underlain by a light-gray loamy sand or sandy loam, slightly mottled with yellow. Below 16 or 18 inches the subsoil is a mottled gray and yellow, friable sandy clay. The type areas as mapped in Dooly County include small areas of Plummer sand and loamy sand and a few small areas approaching the Grady sandy loam in the structure of the subsoil.

The type occupies low drainage ways and flats or depressions in the southern and southeastern parts of the county, south of Vienna and extending eastward to Tippetville, and north along the Pulaski County line. The type occurs in association with the Dunbar sandy loam, Susquehanna sandy loam, and the Norfolk soils. It remains wet practically throughout the year.

Practically none of the type is farmed. Some efforts have been made to drain it, but drainage is very difficult owing to the seepage of water from the surrounding higher land. Some of it has been cleared and used for grazing, but it soon grows up to a thicket of gallberry and gum bushes. Most of the type is covered with a thin forest growth of water oak, black gum, sweet gum, cypress, and pine. It should be devoted to forestry or grazing.

#### GRADY SANDY LOAM

The surface soil of the Grady sandy loam consists of a dark-gray to bluish-gray sandy loam, 3 to 6 inches deep, underlain by a gray, friable sandy loam, ranging in depth from 12 to 16 inches. The subsoil consists of a heavy clay mottled with light-gray, yellow, and brown. In places considerable red mottling occurs in the subsoil, while in others the gray and yellow predominate.

The Grady sandy loam occurs in sinks or ponds and depressions scattered throughout the county, but is most extensive in the eastern, central, and southern parts. In the larger pond areas the type usually includes some Grady clay loam. The Grady sandy loam is

developed where the surrounding soils are the so-called "gray sandy lands" which include principally Norfolk, Ruston, and Tifton soils; but where Tifton, Marlboro, and Greenville soils predominate, the heavier Grady clay loam is found in these pond areas.

The type is poorly drained, and during the winter months and after rainy spells much of it remains covered with water for considerable periods. Many of the ponds are connected by sinuous depressions and form drainage ways through which water passes sluggishly. Some of the ponds drain slowly downward into subterranean watercourses while others retain pools of water throughout most of the year and dry out only by evaporation. These ponds are thought to be formed as a result of the dissolving out of the lime in the underlying formations and the subsequent dropping of the surface.

Only a very small proportion of the type is in cultivation, including only those small areas in fields of better drained soils. Even in the driest season this soil is too wet for farming unless artificially drained. A few fields have been drained and produce fairly good corn, some cane and a little rice and oats.

Most of the type is covered by a forest growth of gum, pine, water oak, some maple, tulip poplar, and a few cypress with gall berry and haw.

For utilization of this type, drainage is the first step. This can be accomplished by surface ditches where there is a natural outlet; but for the ponds and depressions, this is not always practicable. In a number of places in southern Georgia shafts sunk in the center or lowest part of the ponds to the porous substrata act as outlets for the excess water. The soil could be made fairly productive for corn and oats; and rice seems particularly well suited to it, while much of it could be profitably devoted to pasture. Drainage of these ponds would materially improve the sanitary condition of the communities and reduce the breeding places for mosquitoes.

#### GRADY CLAY LOAM

The Grady clay loam consists of from 3 to 6 inches of dark-gray to bluish-gray loam to clay loam, underlain by a gray to light-gray clay loam which grades, at depths from 10 to 12 inches, into a gray, mottled yellow, and rusty-brown, sticky, plastic clay. On the map this type, along the borders of ponds, includes small areas of the Grady sandy loam. In some of the large ponds it includes areas of Portsmouth loam or clay loam, which has a dark-gray to black loamy surface soil, is rich in organic matter, and has a bluish-gray, sticky clay subsoil. Such dark-colored areas are found in Wolf Pond near Pinehurst, in the pocoson east of Pinehurst, in Holland Pond north of Drayton, and in the pond about one-eighth mile west of Byromville. In places the subsoil is mottled with gray, red, and yellow.

The Grady clay loam is developed principally in the larger ponds of the county and in the small ponds in the northern and western parts in close association with the Greenville, Tifton, and Marlboro soils. Ponds containing Grady clay loam are readily distinguished by the presence of a larger proportion of cypress. The Grady clay loam also occupies depressions and sinks which lie at elevations of 2 to 15 feet or more below the general level of the surrounding land.

These areas act as basins for the drainage waters from the surrounding higher land and they hold water through most of the year except when they have natural outlets, either surface or subterranean.

Very little of this type has been artificially drained and most of it is still covered with a forest growth of cypress, gum, and magnolia, with an undergrowth of gall berry and bay bushes around the borders. When drained artificially, this soil is well adapted to corn, oats, rice, cane, and pasture; but under present conditions drainage is expensive and would hardly be profitable except in the case of some of the smaller ponds.

#### CAHABA LOAMY SAND

The surface soil of the Cahaba loamy sand is a grayish-brown to dark-brown loamy sand, 6 to 8 inches deep, passing into a lighter brown subsurface layer. Beginning at depths of from 16 to 18 inches, the subsoil is a yellowish-brown to a slightly reddish brown loamy sand. In places the surface soil is a fairly loose sand and the subsoil contains layers of sand. Below 30 inches a very friable reddish-brown sandy clay is encountered in some areas. Where this type is mapped along Turkey Creek the subsoil averages somewhat redder than on the river terraces. On the slope from the high terrace to the low terrace along Turkey Creek the type areas on the map include some sandy spots that are less productive than the typical loamy sand.

This soil occupies flat to undulating or sloping terraces along the Flint River and the large creeks in the western part of the county, and is very thoroughly drained. Large areas of it are mapped just south and west of Bakerfield, along the River Road south of Drayton, and in a continuous strip on the west side of Turkey Creek from about Byromville to within 1½ miles of Holland Pond. Smaller areas occur along Pennahatchee Creek.

About 85 per cent of the type is cleared and farmed. It is not so well suited to cotton as the sandy loam type, but produces fairly good corn, and is well adapted to peanuts. Pecans also do well. Incorporation of organic matter would aid in checking loss of moisture and increase the productiveness of this type of soil. It is not generally so productive as the sandy loam, and needs somewhat heavier applications of commercial fertilizer. The selling price ranges from \$10 to \$20 an acre.

#### CAHABA SANDY LOAM

In wooded areas the surface soil of the Cahaba sandy loam to a depth of 3 or 4 inches is a brown, loamy sand which becomes reddish-yellow to depths of from 14 to 18 inches. The subsoil is a yellowish-red to reddish-brown sandy clay of a crummy structure, usually extending to depths of from 40 to 60 inches. This is underlain first by a reddish-yellow sandy loam or loam, compact but very brittle, and finally by yellow compact sand. In cultivated fields the surface may be somewhat leached and a grayish-brown color results.

The type is somewhat variable in texture and, as mapped, includes small areas of Cahaba fine sandy loam and Cahaba loamy sand. About 1 mile south of Bay Point Church are areas in which the surface is darker brown, and the subsoil is much redder than typical

and slightly compact in structure. About three-quarters of a mile southwest of Bakerfield an area is included in which the surface soil is deeper and lighter than typical. In general characteristics the Cahaba sandy loam somewhat resembles the Ruston sandy loam, and is usually considered its terrace equivalent.

The Cahaba sandy loam is formed from old river deposits, and occurs upon the low and high terraces along the Flint River, and along Turkey, Hogcrawl, and Pennahatchee Creeks. Its best development is found south of Bay Point Church along the River Road. It has a flat or gently undulating topography and good drainage.

The type is practically all in cultivation and is considered the best cotton soil of the terraces. Cotton, although seriously damaged by the boll weevil, is the leading crop, followed in order by corn, and peanuts which are becoming increasingly important. Some melons are grown. Cotton yields one-eighth to one-quarter bale per acre, corn from 15 to 25 bushels, and peanuts from 20 to 40 bushels. Fertilizer applications are generally light. In southern Georgia some excellent pecan groves are located on this type. The prices of this land range from \$15 to \$25 an acre.

This type of soil is well suited to pecans, peanuts, watermelons, and cantaloupes, and is a fairly early soil suitable for early vegetables and truck crops. Fertilizer analyzing about 8-4-4 should be applied at the rate of from 350 to 450 pounds per acre, and organic matter should be added in liberal quantities.

*Cahaba sandy loam, low phase.*—The low phase of the Cahaba sandy loam is developed in a few small bodies west of Pleasant Hill Church and Bay Point Church, on the Americus road at the bridge, and in a few other places. This phase occupies low flat areas which lie only a few feet above the first bottoms. The natural drainage is only fair. Its position is such that it is not considered so desirable a soil as the typical Cahaba sandy loam.

#### KALMIA SAND

The Kalmia sand consists of a grayish-yellow to gray sand, 6 to 10 inches deep, passing into a yellow sand that continues to a depth of 3 feet or more. The texture varies somewhat from sand or fine sand to coarse sand, and in places, at the base of slopes, there are accumulations of quartz pebbles.

This type occurs principally at the edge of the high terraces and on the slopes to the low terraces. From Mount Olive Church, near Hogcrawl Creek, it extends southward in a crooked, almost unbroken band to the Americus road. Large areas are mapped on the low terrace southwest of Bakerfield, south of the Americus road, and along Turkey Creek from near the point where it enters the river to some distance above its junction with Pennahatchee Creek. It is also mapped in scattered bodies along these creeks and along Big Creek.

The Kalmia sand has a sloping or gently undulating to billowy topography. In places the slopes are badly washed. The areas of the type on the low terrace southwest of Drayton are subject to occasional overflow.

About 15 per cent of the type is in cultivation. Corn, some cotton, and cowpeas are grown, but yields are low. Corn yields from 10 to

15 bushels, and cotton from one-tenth to one-sixth bale per acre. Red oak, loblolly pine, slash pine, haw, broom sedge, dog fennel, and bear grass constitute the vegetation upon the uncleared parts and abandoned fields. The soil is deficient in organic matter, and applied fertilizer is rapidly leached out. Much of it had been cleared of its virgin timber and afterwards abandoned. This type should be devoted to forestry.

#### KALMIA SANDY LOAM

The surface soil of the Kalmia sandy loam on virgin or old-field areas is a grayish-brown to light-brown loamy sand, from 2 to 4 inches deep, which grades into a pale-yellow loamy sand extending to depths of from 14 to 18 inches. The subsoil to depths of from 40 to 60 inches is a yellow sandy clay, friable and crummy. In some places, particularly on the flat areas, gray and rusty-brown mottlings are common in the lower layer of the subsoil. Below the subsoil is a very friable sandy clay, mottled with purplish-red, yellow, and whitish colors, and containing a few soft iron accretions. Where cultivated, the upper layers have been mixed, thus producing a light-gray to brownish-gray color.

At the junction of the Pennahatchee and Turkey Creeks the texture in places is a fine sandy loam.

The Kalmia sandy loam resembles the Norfolk sandy loam but has a somewhat more open subsoil. It has a flat to undulating topography and is well drained. South of Drayton some of the type areas are slightly rolling, owing to the cutting back of drainage ways, so that they could readily be mistaken for uplands.

This type is developed on the Flint River terraces. Large areas are mapped northeast and west of Holland Pond, south of Mount Olive Church on the River Road, in and around Drayton, and at the junction of Turkey and Pennahatchee Creeks, and a small area lies south of Vienna.

About 85 per cent of the type is in cultivation, the remainder being in forest, principally long-leaf pine. The ordinary crops of the section are grown, but the soil is generally considered somewhat late for cotton owing to the fact that it does not dry out so early in the spring as do some of the more rolling upland soils. The crops grown are corn, cotton, peanuts, and oats, in order of their importance and extent. Corn yields from 12 to 25 bushels; cotton, from one-eighth to one-fourth bale; peanuts, from 20 to 35 bushels; and oats, from 20 to 25 bushels per acre. Fertilizer applications are usually small. Commercial fertilizer analyzing 8-4-4 is being adopted as a standard. This type is well suited to sweet potatoes, melons, and truck crops. Near Macon this same type of soil is extensively devoted to truck crops. Methods of improvement recommended for the Norfolk sandy loam are applicable to the Kalmia sandy loam.

*Kalmia sandy loam, deep phase.*—The deep phase of the Kalmia sandy loam differs from the typical soil in having a deeper surface layer, the sandy clay subsoil being encountered at depths ranging from 20 to 24 inches. In places the type approaches a loamy sand. This phase is mapped principally on the Flint River terraces, large bodies being located at Bakerfield, northwest, east, and southwest of

Holland Pond, and east of Morgan Grove School. Smaller areas are mapped along Big Creek, Pennahatchee Creek, and Cedar Creek, and several areas occur on the low river terrace.

About 55 per cent of the phase is in cultivation, principally to corn, with a considerable area in peanuts, and cotton ranking third in acreage. This phase has a tendency to be somewhat droughty and hence crops suffer some in dry seasons.

This phase is comparable to the deep phase of the Norfolk sandy loam. It is rather low in natural fertility; and, owing to its open sandy structure, the organic matter burns out rapidly during the hot summers. It is less productive than the main type, but if enriched constantly with commercial fertilizer and supplied with organic matter, it would be fairly productive.

#### MYATT SANDY LOAM

The surface soil of the Myatt sandy loam is a gray loamy sand, 6 to 8 inches deep, which grades into a pale-yellow or light-gray sandy loam having some gray mottlings. Below 20 inches the subsoil is a mottled yellow, gray, and rusty-brown, somewhat compact, and in places a slightly sticky, sandy clay.

On the low terrace southwest of Bakerfield a number of small areas are included with this type that are on slightly elevated ridges and somewhat better drained, and the subsoil has brighter mottlings of brown and yellow than typical. Included with this type also are several areas on the low terrace which consist of a gray, heavy silt loam or silty clay loam, which, at 5 to 6 inches, grades into a mottled gray, yellow, and brown silty clay, and then, at 18 to 20 inches, into a stiff, compact, light-gray clay. These areas occur 2 miles west of Bakerfield, 1½ miles southwest and 2 miles south of Bay Point Church, and one-half mile west of Morgan Grove School.

The Myatt sandy loam is developed on both the high and low river terraces. Fairly large areas lie just west of Lester Pond, 2 miles west of Bakerfield, 1½ miles west of Pleasant Hill Church, and 2 miles southwest of Bay Point Church. Other smaller areas are found north of Bakerfield and are widely scattered over the terraces. The topography is flat to very slightly billowy. Drainage is imperfect over most of the type, but on the narrow ridges and on the heavy-textured, included areas the drainage is somewhat better than typical.

About 60 per cent of the type has been cleared of its forest cover, which consisted of loblolly pine, slash pine, water oak, and gum; and a small part of the type, including the higher-lying land, is farmed, principally to corn.

Drainage is essential to the improvement of this type. Liming would also be beneficial. The heavy variations are suited to the growing of rice and the production of hay and forage. Most of it should remain in forest or be used for pasturage.

#### CONGAREE SILT LOAM

The Congaree silt loam consists of reddish-brown to brown silt loam or heavy silt loam, 6 to 10 inches deep, underlain by a rather compact silty clay loam subsoil, somewhat lighter brown in color than the surface soil. The type is quite variable owing to the

numerous old stream channels which cut across it. In low places it includes some silty clay loam, and the subsoil in a number of places is mottled with gray and rusty brown, owing to imperfect drainage. Along the river banks small areas of fine sandy loam are included. Practically all of it is more or less micaceous.

This type occurs only on the first bottom along the Flint River. It is composed of recently deposited alluvium, being subject to frequent overflows. Some of the type is in cultivation but most of it remains in virgin forest, consisting of gum, cypress, magnolia, oak, hickory, and swamp pine, with some ironwood and haw around the edges. At present these areas are used for pasture and range for hogs and cattle.

If this land were protected from overflow and thoroughly drained, it could be developed into some of the best land in the county for corn, sugar cane, and hay. It is naturally a strong, productive soil, being rich in plant nutrients, and is particularly adapted to grain and forage crops.

#### SWAMP

Swamp includes areas of undifferentiated texture in stream bottoms which are so poorly drained that they never completely dry out. This classification covers areas only along running streams, as distinguished from wet areas in ponds or depressional drainage ways that are included in the Plummer and Grady soils. This class also includes a number of small areas of Meadow along small drainage courses in the northwestern part of the county, where the soil is so variable in texture and is subject to such constant change that it is impossible to classify its texture. Some of these Meadow areas are included in fields of other soils and are farmed, but the Swamp areas are unused except in a small way for hog and cattle range. About 1½ miles southwest of Bakerfield an area of mucky loam, which is now covered with marsh grasses, but was once used for the production of rice, is mapped as Swamp.

Swamp is mapped extensively on the Flint River bottoms, and along Turkey, Pennahatchee, Hogcrawl, Bratcher, and Big Creeks. The Turkey Creek swamps in particular are covered with a heavy forest growth, consisting of sweet gum, slash pine, black gum, bay, magnolia, water oak, ash, pignut hickory, hard maple, poplar, and sycamore, and below its confluence with Pennahatchee Creek some cypress are present.

The cost of draining and clearing the Swamp areas for farming would be greater than the land is worth under present conditions, but drainage would greatly improve sanitary conditions. It should remain in forest.

#### SUMMARY

Dooly County is located near the south-central part of Georgia, and contains 404 square miles, or 258,560 acres. The topography is gently rolling to rolling, and the upland ridge land is well drained, much of the drainage being through subterranean waterways. The surface over most of the county is marked by ponds, sinks, and depressions, and in the southeastern and east-central parts by poorly drained flats. Wide terraces are developed along Flint River and Turkey Creek.

The county has had its present boundaries only since 1905. The 1920 census gives the population as 20,522, averaging 51.7 persons per square mile, all of which is classed as rural. Vienna, the county seat and the largest town, has a population of 2,019.

Shipping facilities are provided by two railroads. Dirt roads form a network over the county, and rural mail routes extend to all sections.

Dooly County has mild open winters and long hot summers. The mean annual temperature is 65.5° F., the hottest weather being recorded in July. The average annual rainfall is 48.57 inches and is heaviest during the summer growing season. The growing season averages about eight months.

Cotton remains the principal crop in spite of serious damage by boll weevils. The other important farm crops are corn, peanuts, cowpeas, and oats. Some efforts toward diversification are being made. Watermelons, peaches, and pecans are important in some sections.

Commercial fertilizers are in general use and higher grade mixed fertilizers are gradually being introduced. The labor supply is inadequate. Farms vary in size from a few acres to holdings of several thousand acres, the average size being 68.6 acres, of which 50 acres are improved. Of the 2,772 farms in the county, 22.7 per cent are operated by owners and 76.3 per cent by tenants. The share-rent system is the most common method of renting land.

Twenty soil types, representing fourteen series, are mapped in Dooly County. In addition some Swamp is mapped. Fourteen types are upland soils derived from the weathering of unconsolidated sands, clays, and siliceous limestone. Five types include the terrace or old alluvial deposits, and one type and the Swamp include the newly deposited alluvial materials subject to overflows.

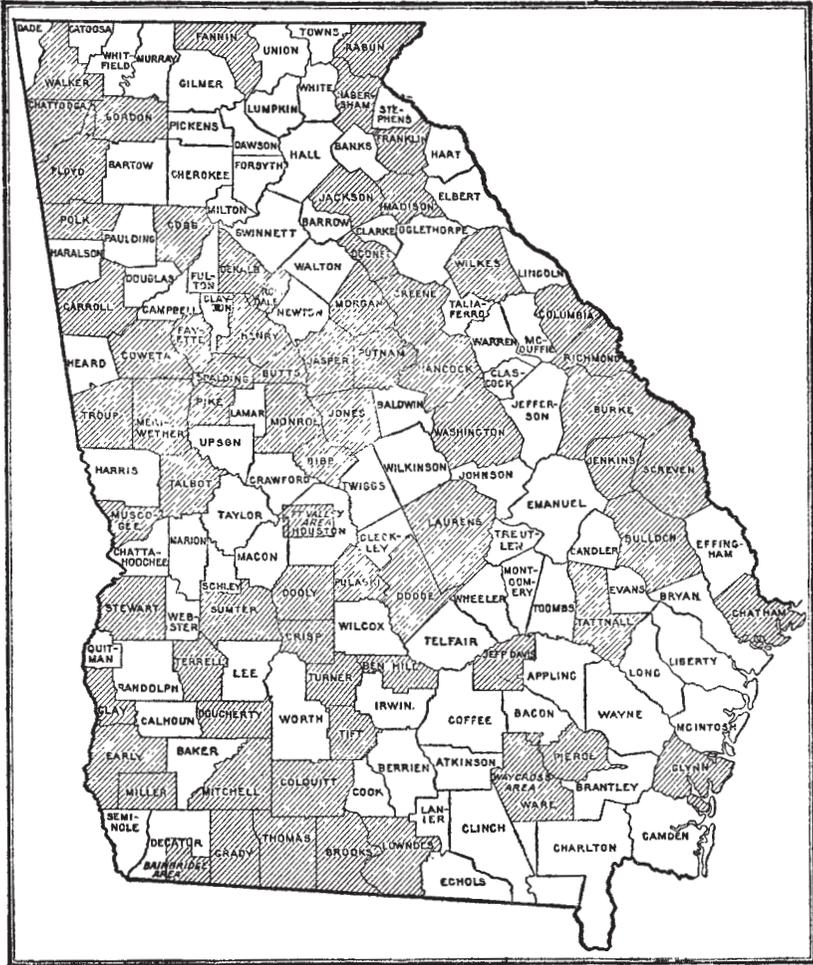
The Tifton sandy loam, locally known as gray "pebbly land," the Norfolk sandy loam and Norfolk sand, called "gray land," and the Marlboro sandy loam represent the light-colored soils of the uplands. They are adapted to cotton, peanuts, bright tobacco, melons, truck crops, peaches, pecans, sweet potatoes, and sugar cane.

The Greenville clay loam, Orangeburg sandy loam, Ruston sandy loam, and Ruston loamy sand are recognized as the red lands of the upland. These soils are suited for peaches, pecans, and the general farm crops common to the region. Grain crops do better on these soils than on the light-gray soils; and fruits, especially peaches, do well.

The Cahaba and Kalmia are the prominent soils developed on the high bottom areas or terraces. These soils are closely related in color and crop adaptation to the red lands and gray lands, respectively.

The Susquehanna sandy loam is a type of soil occurring chiefly in the southeastern part of the county. This soil, Plummer sandy loam, Grady soils, Kalmia sand, Myatt sandy loam, and Swamp are best suited for grazing or forestry.

There is much good soil in this county which can be built up to a high state of productivity, and which can be purchased at a low price.



Areas surveyed in Georgia, shown by shading

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