

SOIL SURVEY OF THOMAS COUNTY, GEORGIA.

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DESCRIPTION OF THE AREA.

Thomas County, Ga., is situated in the southwestern part of the State, on the Florida line, and lies approximately between the parallels $30^{\circ} 30'$ and $31^{\circ} 10'$ north latitude and meridians $83^{\circ} 40'$ and $84^{\circ} 10'$ west longitude. It is bounded on the north by Mitchell and Colquitt counties, on the east by Brooks County, on the south by Leon and Jefferson counties, Florida, and on the west by Grady County. Thomasville, the county seat, is located near the center of the county. It is about 188 miles southwest from Savannah, 206 miles south of Atlanta and 48 miles north of the Apalachee Bay, on the Gulf of Mexico. In areal extent the county embraces 345,728 acres, or about 540 square miles.

The base map of the county showing the location of roads, towns, schoolhouses, churches, dwellings, railroads, streams, etc., was constructed with the plane table as the soil mapping progressed, and its scale is 1 inch to 1 mile.^a

^a The county was covered by an early survey, by which it was divided into lots of two sizes: Those east of a north and south line located about a mile and a half west of the court-house at Thomasville theoretically have an area of 490 acres, while those to the west of this line are 250 acres in extent. The actual size of some of these lots varies considerably, owing to inaccuracies in the original surveys. Owing to lack of time it was not possible to survey out and show these lot lines on the map.

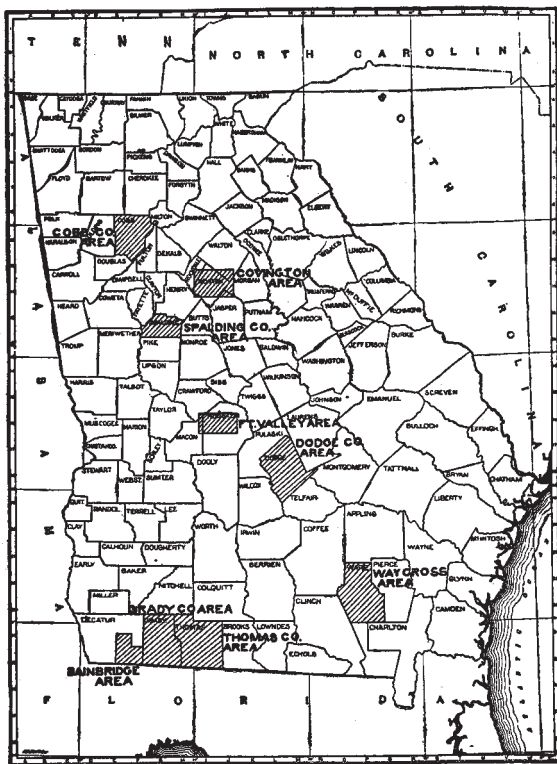


FIG. 9.—Sketch map showing location of the Thomas County area, Georgia.

The surface configuration of Thomas County is undulating to gently rolling, varied here and there by minor hills, depressions, and rather shallow, narrow valleys. A striking topographic feature is the great number of streams which ramify the county and form an intricate drainage system. Many of these streams in their upper reaches are mere drainage ways or wet-weather streams, and there is usually a conspicuous fringe of hardwood growth along them. From most elevations commanding any considerable view of the surrounding country streams can be seen running off in all directions. Broad stretches of flat and gently undulating interstream country are of common occurrence in the northern part of the area, particularly in the northeastern section, between Coolidge and Pavo. Sink holes occur throughout the county, and in places are so numerous and deep as to give the surface a peculiar billowy configuration. These sink holes are especially well developed upon the flat lands referred to above. Another peculiar but minor topographic feature is seen in an occasional amphitheaterlike excavation about the head of a small stream. It would seem that such peculiar surface dissection must have arisen from the removal of the sides of sink holes by the gradual encroachment of streams. There are several sink holes or "lime sinks" into which streams enter and disappear.

A number of ponds and shallow lakes occur throughout the county. Linton Lake and Heard's Pond are the largest bodies of still water. In the southern part of the county streams have cut deeper and broader valleys, giving rise to fairly well developed interstream ridges or drainage divides, and these are more or less parallel. Here is found the most rolling portion of the county, but even so, the highest elevations are hardly more than 100 or 125 feet above the valley floors. Going northward, surface contours become smoother and the valleys become shallower.

The streams of the county all have unbroken stretches of bottom or "low lands" which vary in width from a few rods to the broad stretches like the Ocklocknee River flats, which are nearly a mile wide in places. These wide bottoms are sometimes flanked on each side by bluffs 15 to 40 feet high. Above these bluffs there is sometimes a flat stretch, sloping away gently toward the main upland level and having somewhat the appearance of a former flood plain or second bottom. In places, however, the low bluffs are entirely lacking and there is a gentle slope upward directly from the margin of the bottom land. The stream meanders through the wide bottom, touching the bluffs here on one side and there on the other. The Ocklocknee River bottoms are overflowed quite frequently. The larger creek bottoms, except where the channels are choked, giving rise to a tendency to divide and form sloughlike streams as in case of the lower Oscillo

generally, are only partially overflowed under normal conditions of rainfall. The Pine Creek bottoms, in the southern part of the county, for instance, have not been overflowed completely in several years.

There is a gradual though imperceptible ascent in slope from the eastern county line to Thomasville, thence a descent to the Ocklocknee River on the west. From south to north there is a gradual ascent. The elevation at Boston, in the eastern part of the area, is 173 feet, at Thomasville 250 feet, and at Cairo, about $7\frac{1}{2}$ miles west of the western county line, it is 238 feet; the elevation at Metcalf, near the Florida line, is 170 feet, while that at Meigs, in the northwestern corner of the county, is 341 feet.^a While erosion has played the major rôle in dissecting and altering the surface configuration of the original nearly level plain, much of the surface unevenness such as sink-hole depressions and rounded hillocks with their intervening valleys is due to the "uneven dissolution of the underlying limestones."^b

There are in Thomas County some extensive bodies of longleaf pine interspersed occasionally with black pine, slash pine, scrub oak, and dogwood. Smaller bodies of "hammock land" supporting a growth of hardwood are found throughout the area. Magnolia, beech, dogwood, white oak, red oak, post oak, water oak, live oak, blackjack oak, sandjack oak, hickory, poplar, maple, bay, black gum, sweet gum, several varieties of pine and in wet places a number of water-loving trees and shrubs constitute the principal growth of the various kinds of "hammock land." Stream bottoms may be timbered either with longleaf or shortleaf pine or a growth of hardwood and pine, the last being true generally in case of streams having narrow bottoms and loamy soils. Shallow upland ponds frequently support dense growths of cypress, mayhaw, or black gum, being called according to the growth "cypress," "mayhaw," or "black gum ponds." The turpentine and sawmill industries have exhausted the merchantable timber over large sections of the county.

Wire-grass (*Aristida stricta*) flourishes everywhere on the well-drained longleaf pine lands and affords fair grazing for cattle at certain seasons of the year. Much land is burned over in the spring for the purpose of removing the old dead covering of vegetation so as to give the new grass an early start, and make it easily accessible to cattle.

Thomas County was laid off from Decatur and Irwin counties in 1825 and a part of Lowndes was added in 1826. Portions were cut off in 1856 and 1858 to be included in the formation of Colquitt and Brooks, respectively. About 190 square miles were detached in 1907

^a Atlantic Coast Line R. R. Survey. Elevation of roadbed at depot above mean low water at Savannah.

^b Soil Survey Leon County, Fla.

to form a part of Grady County. Settlement began in Thomas County in the early part of the nineteenth century, but advanced slowly until given an impetus by the opening of the present Atlantic Coast Line Railroad in about 1860. The population of 6,766 in 1840 had increased to 10,766 in 1860. The population according to the census of 1900 was 31,076, and of this number 8,116 lived in towns. Of course these figures have been changed by subdivisions of the county, but they represent the general trend of the increase in population.

The pioneers came largely from the older sections of Georgia. Before the war a number of slave owners came in from other States, seeking new fields for slaves not needed on their old plantations. Since the war a great number of settlers have come in from North Carolina and other southern States. Until recently there were a good many sparsely settled communities in the county, but a number of these, as, for example, Coolidge, are becoming quite prosperous, and unused lands are being brought more and more under cultivation. The construction of the Atlanta, Birmingham and Atlantic Railroad and the Florida Central Railway has stimulated effort along agricultural lines in formerly rather undeveloped sections, and with the construction of other railways more and more land will be brought under cultivation and the population should show a gradual and healthful increase. Thomasville, the county seat, has a population of about 8,000; Boston, Meigs, Ochlocknee, Pavo, Metcalf, and Coolidge are other important towns.

Railroads radiate in six directions from Thomasville. They are Atlantic Coast Line from Savannah to Montgomery, Ala.; the Albany and Monticello branches of that system; the Atlanta, Birmingham and Atlantic, and the Florida Central. The Georgia Northern runs from Boston northward along the eastern county line. Stations along these roads give the county exceptionally good shipping facilities. Fast service is offered to large outside markets. Public roads are generally exceptionally good. The county is rapidly grading, straightening, and putting all public roads into excellent condition.

CLIMATE.

The climate of Thomas County is what is known as "warm temperate." The winters are mild, and while the summers are long and warm they are moderated by Gulf breezes. The mean temperature for the months of October to March, inclusive, is 58° F., the normals for the coldest of these, December, January, and February, being approximately 53° F. Snow falls so rarely that there may be periods of ten years or more without even a flurry. Temperatures lower than

30° F. are rare, yet thin ice is often formed at night in the winter season. Usually there will be three or four days of cold, bracing weather, followed by about an equal number of warm or balmy days, frequently ending with a rain. The high humidity makes the cold somewhat more penetrating than would the same temperature in a higher altitude. Killing frosts, though erratic, are likely to occur any time between November 20 and March 1. Violets, japonicas, and roses bloom almost throughout the winter, the last blooming profusely nearly every month of the year. The yellow jessamine, dogwood, and wild azalea bloom in early March, while the magnolia and wistaria bloom in April. Vegetables like lettuce, beets, and spinach can be grown with little or no protection during winter, while very early vegetables, like garden beans, snap beans, radishes, and Irish potatoes, can be counted on as reasonably safe from frost after the middle of February. With pine needles or cloth available for immediate use as a covering, there need be but little fear of frosts on the part of those who keep in touch with the Weather Bureau predictions. Cabbage, blackberries, and dewberries seldom are injured by frost.

The mean temperature for the spring and summer months, April to September, inclusive, is 77° F. Temperatures of 100° F. are rather exceptional, although there are days when the temperature goes higher than this. Sunstrokes are almost unknown. The nights are usually made quite comfortable by the Gulf breezes. The rainfall, which is ordinarily sufficient for all crops, is quite favorably distributed throughout the year. The greatest precipitation occurs during the months of June, July, and August, the monthly average being about 6.2 inches. Corn and cane occasionally suffer during dry spells in June and July, particularly on the lighter soils, as the Norfolk sand and fine sand and the deep phases of the Norfolk sandy loam and fine sandy loam. Watermelons sometimes suffer on these soils in May and June. Cotton rarely suffers from drought, but it is not infrequently injured, particularly on these types, from too much rain. Occasionally there are heavy fogs in the morning, but these usually disappear about 10 o'clock.

The following table shows the meteorological records as kept by the Weather Bureau station at Thomasville, where the climate is quite representative of the country:

Normal monthly, seasonal, and annual temperature and precipitation.

Month.	Temperature.			Precipitation.		
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year.	Total amount for the wettest year.
	°F.	°F.	°F.	Inches.	Inches.	Inches.
December.....	53	79	13	3.9	2.5	7.0
January.....	52	81	17	3.5	3.5	3.8
February.....	54	81	2	5.0	4.1	4.8
Winter.....	53			12.4	10.1	15.6
March.....	61	87	22	4.7	3.4	5.4
April.....	67	92	35	3.6	3.4	5.8
May.....	74	101	43	3.7	1.3	7.7
Spring.....	67			12.0	8.1	18.9
June.....	80	102	48	5.4	6.6	8.8
July.....	82	106	62	6.8	7.7	4.8
August.....	81	101	61	6.3	4.3	5.5
Summer.....	81			18.5	18.6	19.1
September.....	77	99	46	4.8	0.7	6.4
October.....	68	97	35	3.4	3.3	2.0
November.....	59	88	26	2.7	0.5	3.1
Fall.....	68			10.9	4.5	11.5
Year.....	67	106	2	53.8	41.3	65.1

AGRICULTURE.

Notwithstanding settlement began in the territory now included in Thomas County in the early part of the nineteenth century, agricultural development had made but little progress until after 1830. The census of 1840 gives the following figures for the important agricultural products for the county, which then included a considerably larger territory than at present: Cotton, 1,565,262 pounds; corn, 149,736 bushels; potatoes, 49,169 bushels; rice, 23,625 pounds; oats, 1,138 bushels; and sugar, 52,445 pounds. Other, but relatively unimportant, products reported were tobacco and silk cocoons. Peas, beans, and potatoes were the important vegetables at this time; and cotton and corn were the staple crops almost from the inception of agriculture in the region.

The raising of stock was an important adjunct to farming. Cattle, hogs, and sheep were allowed to graze on the range the year around without shelter or additional feed, and naturally the breeds became stunted and run down. All land except cultivated fields, which were

fenced, was considered as open range for stock. The native cane, which grew in abundance along branches, furnished excellent green forage during both summer and winter, but with constant grazing this was soon exhausted, its place being taken by wire grass and broom sedge.

At first "hammock land" was considered as being the only land fit for cultivation. The limited extent of this, however, together with the constant cropping without applications of manure, soon reduced the crop yields to such an extent that cultivation was necessarily extended to the longleaf-pine forest or "piney woods" lands. The "piney woods" land, though not as productive as new hammock, proved quite satisfactory, as did also the "pimply," or gravelly lands, which, in some sections, were long considered as worthless. These "pimply" soils, after the first attempt, were and are still considered as the best cotton soils of the region.

Until about 1840 farms were generally self-sustaining, except as to draft stock. About this time cotton became almost the sole crop grown on the big plantations. After the war home supplies were high, there was little demand for cotton, and the labor could not be controlled. In consequence of this many large holdings were divided and either sold to small farmers or rented to tenants.

The agricultural development of Thomas County has been slow. According to the census, during the period 1849 to 1879 very little progress was made. In 1859 there were produced in Thomas County 6,582 bales of cotton and 337,675 bushels of corn. The live stock was valued at \$360,249. The corresponding figures for the year 1879 were 8,773 bales of cotton, 245,531 bushels of corn, and value of live stock, \$336,910. Following this period there came a gradual improvement. For the year 1889 there were produced 12,763 bales of cotton and 374,500 bushels of corn, while live stock was valued at \$437,870; and for the year 1899 the figures were: Cotton, 10,252 bales short staple, 594 bales long staple; corn, 549,780 bushels; the value of live stock had increased to \$488,814.

The production of long-staple cotton seems to be rather at a standstill, or perhaps on the decrease. The biggest crop of long staple was that of 1903, which amounted to 985 bales; the largest short-staple crop was that of 1904 and equaled 20,825 500-pound bales. Within the last twenty-five years the production of sugar cane for sirup has increased rapidly and has become one of the most profitable crops grown. The production for Thomas County increased from 165,717 gallons in 1889 to 361,463 gallons in 1899, since which time the acreage has been increased annually. Considerable rice was grown in the early days, and the census reports show that as late as 1899 Thomas County produced 109,242 pounds of it. The production of

this crop has fallen off so rapidly that at present practically none is grown.

About twenty-five years ago, during the "Le Conte pear craze," thousands of pear trees were sent out over a large section of "south Georgia," including Thomas County. When the orchards came into bearing there were tremendous crops with but little demand; and this unfortunate condition, together with the pear blight which soon followed, discouraged the farmers and caused them to neglect or cut down their orchards. Lately Le Contes gathered in June or July have been bringing fancy prices and those who allowed their trees to stand are making good profits on the crop.

Within the last ten or fifteen years pecans have become popular throughout this region and many trees have been set out and several nurseries started. It is believed the crop will prove successful and profitable.

Tobacco has been tried in Thomas County with rather unsuccessful results several times. Before the war "Florida tobacco" was grown by a number of planters. Some ten or fifteen years ago Cuban filler tobacco was grown quite extensively and considerable money was lost in the enterprise. The first crop proved profitable to a number of farmers, whereupon there was a general rush into the business without thought of market demands for this grade of tobacco and with far too little understanding of the proper methods of handling the crop. The failure of the attempt so discouraged the growing of tobacco that the crop was abandoned entirely and there has since been but little effort to establish the industry upon a substantial basis.

A crop of Sumatra cigar-wrapper tobacco was grown under shade in Thomas County in 1907, when a leaf of excellent quality was produced. Very little of this tobacco is grown at present, but whenever market conditions become more favorable this is an industry which may be profitably developed.

Nearly all crops suited to this latitude of the coastal region can be grown successfully in Thomas County. The principal crops at present are cotton, corn, sugar cane for sirup, watermelons, sweet potatoes, oats, peanuts, velvet beans, cowpeas, and pears, besides a great variety of vegetables and fruits for home use.

The long-staple, or Sea Island, variety of cotton is produced on a comparatively small scale at present, not because of poor yields, but rather because of its longer growing season and the fact that it requires much more cultivation and care and is more troublesome to pick than the short-staple variety. Complaint is made in some instances that the price received for the product is not commensurate with the efforts required in its production as compared with the short-staple variety. It is generally conceded that new seed should be

secured from the Sea Islands or coast regions at frequent intervals in order to preserve its vitality and keep it true to type. The only alternative is to practice careful seed selection.^a

Cotton does best on the Tifton sandy loam, the "pimply" areas of the shallow phases of the Norfolk fine sandy loam and sandy loam, and on the Orangeburg fine sandy loam. The plant goes too much to weed on the deep sandy soils, especially in wet years. Many farmers are quite careful in selecting their cotton fields, but the crop is grown more or less on all grades of well-drained upland throughout the county. The yields of short staple generally run from one-fourth to one-third of a bale an acre, but with careful soil selection and judicious management could be made to range from one-third to 1 bale an acre. The yield of the long-staple cotton, ordinarily somewhat less than that of short-staple, comes nearer to that of the latter variety on the "pimply" lands, especially the Tifton sandy loam, probably for the reason that these types usually maintain more favorable supplies of moisture throughout the growing season.^b According to the census, the acreage yield of short-staple cotton for Thomas County in 1899 was 0.35 bale, while that for the State was 0.38 bale.

Cotton is planted on ridges from $2\frac{1}{2}$ to $3\frac{1}{2}$ feet apart. These ridges are prepared either by rebedding (listing on the middles of old rows) or bedding up flat broken land. Sometimes the old beds are plowed out, then later turned back to the original position—a double bedding process which amounts to quite thorough breaking. Planting is often done on quite narrow ridges thrown up with two or three furrows, such ridges being brought up to the usual size by later plowing out the remainder of the old bed. The plan of flat breaking before bedding is generally the best, and the earlier it is done the better. Soils except the sands and deep phases of the sandy and fine sandy loams should be broken in the fall, when possible, to a depth of from 5 to about 8 inches.

The first cultivation consists either in running close to the plants on both sides with a small shovel, or in "barring off;" that is, throwing a portion of the bed toward the center of the row with a "dixie" plow. The last plan is quite effective for covering grass in the middles, especially in wet seasons. The plants thus left on narrow ridges are chopped out to a stand of one or two stalks at intervals of from 6 to 12 inches. The cotton is now run around with sweeps or shovels, the first furrow being close enough to throw dirt up to the

^a Farmers' Bulletin No. 302, U. S. Dept. of Agriculture.

^b Sea Island cotton requires more moisture than Upland cotton. Both the quantity and the quality of the staple depend upon the supply of moisture. In dry years the staple is poor, while in wet years it is good. (Bul. 95, Bureau of the Census, p. 19.)

plants, after which, with one to three furrows, the middle is completely plowed out, leaving the plants on a rounded bed. After "plowing out" each row from three to five times, according to weather and grass, and hoeing frequently to remove grass from the crest of the ridge, the crop is "laid by" about the last of June.

On the "hard pimply lands" cultivation is necessarily quite shallow on account of the resistance offered by the iron gravel. This more nearly flat cultivation gives excellent results on these types, but is not particularly necessary on other types, except in so far as the shallow cultivation of the more nearly flat method assists in conserving moisture. In the case of those flat, heavy soils which sometimes become quite soggy for lack of good surface drainage, it is necessary to grow all crops on ridges, so as to give the plants the advantage of the better drainage afforded by being placed slightly above the level of the field.

Considerable trouble is had in some sections with cotton wilt or "black root." Injury from such diseases seems more common on those areas where the clay comes near the surface, as in case of eroded soils. Such diseased land should be broken deep in the fall, then cultivated to other crops than cotton for a period of two or three years. A good rotation is: Corn with velvet beans, then oats, followed by sweet potatoes. Certain varieties of cowpeas sometimes suffer from a root-knot disease which it seems can increase the damage done to cotton.^a Cowpeas therefore, unless it be the Iron variety, which is resistant, should not be grown in rotation with this crop on such affected fields. Cotton often suffers from rust on the deep sandy types, but by keeping these well supplied with organic matter, as can be done by growing velvet beans and cowpeas in rotation with corn, cotton, and other crops, and by using barnyard manure and fertilizers high in potash and phosphoric acid, danger from this source could be largely diminished.

Practically nothing is done in the matter of selecting seed from the most productive stalks, notwithstanding improved varieties are being introduced constantly. These varieties procured from outside sources are grown indiscriminately on all types of soil, with the result that oftener than otherwise no particularly good results are secured. If farmers would make a thorough investigation as to the exact character of the land upon which improved varieties have been developed, and buy only seed that has been developed upon land similar to that which they own, much better results would come from the use of imported seed. A variety of cotton bred upon a stiff clay soil in central Georgia would hardly grow successfully on a deep, dry, sandy soil in Thomas County. Much improvement would result from

^a Bul. 142, Office of Expt. Stations, U. S. Dept. Agr., p. 142.

persistent effort at breeding cotton at home. Ten years spent in breeding up a variety by selecting and replanting seed from the most productive plants should not be considered a long period in breeding. The same applies in a general way to corn and oats.

In the preparation of the corn ground two methods are commonly used. According to the first the ground is well prepared and thrown up in ridges, and the corn is planted upon these. By the other method the ground is not plowed at all, but the corn is dropped in the water furrow of the preceding cotton or corn crop and covered with two light furrows. When planted on ridges the crop is cultivated about the same as cotton, though not as intensively. When planted in the furrow, or in the streaking-off furrow in flat-broken land, cultivation is delayed until the stalks are large enough to be plowed without being covered up, and as a result the middles often get quite grassy, and not infrequently the plants are injured by water standing in the gutterlike furrow. This method in effect is somewhat similar to the Williamson plan of corn culture, that is, the plants are stunted at first for the lack of good cultivation. The greater part of the corn crop is grown in rows from 4 to 6 feet apart, with a row of peanuts between. This practice originated in the belief that the same yield of corn could be made on the land as when cultivated only to corn. The peanuts are planted soon after the corn is up, and are cultivated about the same way as corn. Some farmers prefer to grow them alone. Peanuts are grown solely for hogs, and after the corn is harvested the hogs are turned into the field, where they make a rapid and healthy growth. Most farms are self-sustaining with respect to corn, but very little of the crop is sold. The average yield is far below what it should be. From 15 to 20 bushels an acre is accounted a good crop, while 30 bushels is considered extraordinary. With the best methods of preparing the land and with proper rotation and fertilization, yields of from 20 to 40 bushels should be regularly secured during average seasons. The deep phases of the sandy and fine sandy loam types, except those of the Portsmouth series, are much better suited to corn than to cotton, and produce better average yields of corn than do the heavier soils. Weevils are quite destructive to corn after housing. The carbon bisulphid treatment properly carried out is a quite effective remedy against this pest.^a Hard, flinty, weevil resistant varieties need to be introduced and bred up if possible.

Oats are grown according to both the broadcast and open-furrow systems. Broadcast-grown oats usually are sown by hand on unbroken land, plowed under, and left without harrowing on a rough, ill-prepared seed bed to struggle for existence. The land should be broken

^a Farmers' Bulletin 145, U. S. Dept. Agr.

and harrowed thoroughly and then seeded by harrowing in the broadcasted oats or by drilling in. According to the open-furrow system the seed are covered shallow in furrows laid off at a distance of about 15 to 24 inches apart. Very good yields of oats are made under this system, especially when given shallow but frequent cultivation. Occasionally peanuts are grown between the rows of oats.

Notwithstanding that the best time for seeding oats is in October or November, in order that the plants may get well started and thus be more resistant to the stunting effects of dry, hot spring weather, the crop is largely seeded in late winter and early spring. The crop is either mowed or harvested with cradle or reaper and is largely used on the farm without thrashing. Oats could be used to good advantage as winter cover crops on slopes subject to washing and they could also be grown more extensively for grazing purposes, especially for hogs and cattle. The rust-proof varieties should be grown. The crop does best on the Orangeburg fine sandy loam and the shallow phases of the Norfolk sandy loam and fine sandy loam. Sown after velvet beans, using a moderate quantity of barnyard manure, fair crops can be produced on all the well-drained soils.

Velvet beans, like peanuts, are grown on ridges between corn rows and in the rows with corn, and also in fields by themselves. They are cultivated about the same as corn. The crop makes such a rank growth that it is a very difficult matter to harvest corn grown with them and it is nearly impossible to harvest the beans for hay; therefore they usually are utilized for fall and winter pasturage. As a forage crop velvet beans are excellent for all kinds of stock, particularly hogs. The crop improves the land wonderfully, not only by storing nitrogen in the roots and replenishing the soil with healthy organic matter, but also by shading the soil, which also improves its tilth, through a proper adjustment of moisture conditions. In consideration of the ease with which they are grown, their fitness in good rotations, their beneficial effect upon the soil, and their excellence as forage, velvet beans merit much greater attention, particularly on deep sandy soils and those lands that have been abused. The crop is successful on all well-drained soils.

Cowpeas generally make an excellent growth of vine on the Norfolk and Orangeburg soils. Sometimes, however, the crop fails to produce seed on the deep sandy soils, especially in wet years. The late crop, that planted in late June and July, usually fruits better. Velvet beans should be grown instead of cowpeas on such areas as are affected with cowpea wilt or root rot. The Unknown, Iron, and Crowder cowpeas are quite successful. It is said the Iron variety is practically immune to root knot.^a Generally the crop is grown either

^a Farmers' Bulletin 302, p. 18.

in rows by itself or is sown between the rows of corn at the last cultivation of the crop. Cowpeas afford excellent pasturage for hogs and cattle and the hay properly handled can not be excelled. The practice of sowing them broadcast for hay could be extended profitably, as the hay baled brings a good price. The vines cut at the stage when about half the pods are ripe can be easily cured.

Cowpeas, like velvet beans, improve the land wonderfully. These crops can be substituted for each other in several good rotations that should be followed. A good scheme of crop succession is to follow velvet beans or cowpeas with corn, then fall-sown oats, followed in the spring by cowpeas or sweet potatoes, and by cotton the next year. Such a scheme can be changed in detail to suit the conditions, it being only necessary to crop land in such a way as to return an abundance of organic matter to the soil and to prevent the soil getting into bad tilth, as often results from continuous or long cultivation to one crop. An occasional crop of cowpeas plowed under when about half mature is markedly beneficial to soils that have deteriorated. An acreage application of from 25 to 40 bushels of lime in conjunction with green manure assists in the conversion of such vegetable matter into humus.

Under the system of farming where cotton, corn, cane, and peanuts are the principal crops, as a rule such little attention is paid to rotation and the humus content of soils that in about ten to fifteen years after clearing the land often gets into an apparently lifeless condition conducive of soil crusting and consequent susceptibility to drought. With such soils deep fall plowing should be practiced. The Orangeburg sandy loam and fine sandy loam and the shallower phases of the Norfolk sandy loam and fine sandy loam in particular should be plowed as early as possible in the fall to a depth of from about 6 to 10 inches, turning to the surface a small portion of the heavy subsoil where possible. Grass, cotton, and cornstalks are often burned during the spring or when the land is being cleared of litter prior to breaking. All refuse vegetation should be incorporated with the soil early enough to undergo decomposition before planting. The practice of resting land occasionally, while better than continuous cultivation to cotton or corn, is a defective system in that it is generally better to have land cultivated to some catch crop or legume than occupied with noxious weeds.

In 1899 expenditures for fertilizers in Thomas County (which then included a part of Grady County) amounted to \$57,860. Since that time there has been a gradual increase, and it is likely there will be an annual increase in the quantity used for some time to come. Cotton and corn are nearly always fertilized. The ordinary grades of commercial fertilizers having an average analysis of about 8-2-2^a

^a Eight per cent phosphoric acid, 2 per cent nitrogen, and 2 per cent potash.

are applied indiscriminately to all soils alike. From 200 to 400 pounds for cotton and from 150 to 250 pounds for corn are about the average applications. The fertilizers are distributed and listed upon before planting. Green cotton seed is quite extensively used as a fertilizer. The seed are often turned under and allowed to come up, it being claimed that as good results are had with a large percentage of sprouted seed as when the seed are killed before use. It is the practice of some to put the seed in before the ground warms up in the spring, so that the seed may be killed. The best practice is to use the cotton-seed meal, which carries practically all the fertilizing value of the seed; but in those cases where distance to market makes it an economic necessity to use seed for fertilizer they should be either killed before distributing or they should be plowed under sufficiently early to prevent sprouting. An excellent fertilizer is made by composting cotton seed with barnyard or stable manure, or these together with acid phosphate and kainit.

A good many farmers mix their own fertilizers—a practice thoroughly in accordance with modern methods of farming. Cotton-seed meal, kainit, and acid phosphate or bone meal can be mixed easily on the farm so as to make the mixture correspond with the percentage grades of fertilizers given under the heads of the several soil descriptions.

Oats and peanuts are very rarely fertilized, notwithstanding they would in most instances be materially benefited by acreage applications of about 250 pounds of the grades of fertilizers commonly used for cotton and corn. Commercial fertilizers when used should always be applied in conjunction with some form of organic manure, for the reason that the effect is better and more lasting than otherwise, especially when the soil is deficient in organic matter.

Both the disk and large turning plows can be used with ease upon the soils of the county; but few of the former are in use. Very few cultivators are used, although they could be employed to good advantage in the growing of cotton, corn, and sweet potatoes. The flat style of plows, sweeps, and scrapes in common use are well suited to the soil conditions, especially in dry season, for the reason that they allow a portion of the disturbed soil to fall over the plow so as to form a moisture-protecting mulch in the furrow. The general run of the soils requires frequent shallow cultivation to keep the surface soil well mulched and to break crusts formed by rains. In dry seasons the weeder is an effective implement in the destruction of weeds and soil crusts, especially in cross cultivation of young corn. Not much trouble is had with plowing too wet; however, care must be taken with the heavier soils, as they will puddle if disturbed anywhere near the point of saturation.

During the winter months many fields could be greatly improved by the use of the stump puller and by burning up or hauling off all old logs, limbs, and stumps.

Beggarweed can be successfully grown on the well-drained types. It makes a nutritious hay and improves the land, but only a small acreage is grown. Sorghum also succeeds on the well-drained upland soils and affords excellent summer pasture for all kinds of stock, being especially satisfactory for sheep and hogs. It comes in very timely to supplement failing midsummer pastures.^a Crabgrass grows luxuriantly in wet seasons and makes good hay if cut while in bloom. This grass is never sown, being indigenous and very prevalent on all the well-drained soils. Good yields are frequently secured after a crop of melons. Crowfoot grass and sandspurs are other valuable hay grasses. Bermuda grass does well on well-drained soils and withstands summer heat and drought better than any other grass, and besides affords good summer pasturage. It is easily propagated and good stands can be secured by scattering a few bunches of sod here and there and then cultivating the field to cotton or corn so as to distribute the grass over the field.^b

Crimson clover has been successfully grown on the shallow Norfolk soils, but its production has been attempted more as a novelty than for profit. Lespedeza (Japan clover) affords good grazing in some sections, and seems to be spreading over the area quite rapidly as a wild plant. Velvet beans afford good grazing until late in the season. English rye grass makes a beautiful winter lawn, but dies with the advent of dry, hot weather. Winter vetch could be grown advantageously, particularly on the well-drained shallow soils, for early spring grazing. Alfalfa probably would not prove very successful in this region without liming, soil inoculation, and fertilization. Inoculation can be done by incorporating about 500 pounds of soil taken from a successful alfalfa patch.^c The only alfalfa seen growing was cultivated in rows about 20 inches apart. The shallow Norfolk and Orangeburg fine sandy loams are best suited to the crop. Chufas can be grown very successfully as a root forage for hogs. Wire-grass and broomsedge when young afford good grazing for

^a Sorghum may be fed green to all kinds of stock, even to poultry, with very profitable results. A full feed should not be given at first, particularly if the animals are hungry. It is a good practice to give first a light feed of grain or other food and then a small amount of the sorghum. The latter may be increased day by day until a full feed is reached. Fresh sorghum is a very succulent forage and, like clover, is liable to cause bloating when fed in too large quantities at first. With ordinary precautions no trouble from this source need be feared. (See Farmers' Bulletins 246 and 288.)

^b For further information upon the proper methods of growing and handling Bermuda grass, see Farmers' Bulletin 102, p. 10.

^c Farmers' Bulletin 215.

cattle and sheep. The forests and old fields are burned over annually to get these grasses started and to remove obstructing vegetation in order that stock may graze it conveniently. Notwithstanding that a great abundance of forage can be produced easily farmers sometimes buy hay; and occasionally the section is referred to as not being suited to stock because it "is not a grass country." As for securing excellent feed for all kinds of stock very few sections are more favored. Stock can ordinarily be pastured nearly the year round. Beginning with rye and oats in the spring and following with sorghum, cowpeas, velvet beans, peanuts, vetch, ruta-baga, and rape, hogs and cattle can have a succession of excellent green feed throughout the year. Some farmers claim that pork can be produced at a cost of $2\frac{1}{2}$ cents a pound. Fed according to the above succession of crops and fattened on corn and sweet potatoes the production of pork on a very much larger scale could be carried on upon a profitable basis. A number of farmers sell dressed pork at quite remunerative prices.

The common breed of hogs, while well adapted to the prevailing conditions, is rather too inferior a type for best results. The animals too often are forced to look out for themselves until after the corn harvest, when they are turned on to peanuts. They fatten readily enough on this feed, but a more gradual growth the year around, as would be made if regularly well fed, would develop a much better animal. Running streams should be included in hog pastures where possible. Cattle are rarely fed for dairy purposes or for beef, but generally are turned loose to graze in the forests and unused fields. There are two well-kept dairies at Thomasville. The quantity of good milk throughout the county, however, is not enough to supply the demand.

Better breeds of both hogs and cattle are gradually being introduced and mixed with the old stock. A considerable number of sheep and goats are raised, but are given little care.

Farm tenure varies considerably. In the southern part of the county a large majority of the farmers are negroes, who rent "one-horse" and "two-horse" farms, including from 35 to 40 acres to the horse. They grow cotton almost exclusively as a money crop, usually paying a rental of one 500-pound bale of cotton per horse. In other parts of the county about 60 per cent of the farmers manage their own farms, in many cases solely with the assistance of their families. There are a good many "half-croppers," who pay one-half the fertilizer bill and a rental of one-half the staple crops produced for the use of the land, tools, stock, and stock feed.

The systems of renting in vogue are not generally conducive to the betterment of soil conditions, but rather the reverse. During the winter there is considerable moving on the part of renters,

many of whom seek new locations merely out of a desire for a change. This migratory class rarely accumulate property.

The farms range in size from a few acres to large plantations. The average size, however, is about 110 acres. In the vicinity of Thomasville large tracts of land are held by winter residents, and upon these very little farming outside of gardening is done. The high wages paid by the turpentine and lumbering industries have attracted much of the labor that was formerly available upon the farms, so that the problem of obtaining farm labor has become a very serious one.

Labor-saving farm implements are coming into use, though rather slower than the conditions warrant. Much labor could be saved by a more general use of stump pullers, cultivators, disk plows, harrows, weeders, and mowing machines.

It has been so easy to make a living in Thomas County that farmers generally in the past have been quite conservative and often have not exerted themselves strenuously in the accumulation of property. However, the standards of living are improving and diversification is becoming more popular, and farmers are getting interested in studying the individual needs and the exact crop adaptations of their soils and better methods of soil management. The rural free delivery of mail has helped to inculcate among farmers a greater interest in affairs outside their immediate neighborhoods and has caused them to think more of their agricultural relationship and the value of their products to other sections of the country.

In some sections, as in the neighborhoods of Pavo and Ochlocknee, efforts formerly given almost entirely to cotton lately have been divided between this crop and the growing of sugar cane for sirup. On account of the large acreage of land well adapted to both the Sumatra wrapper and Cuban filler types of tobacco it is likely that in time considerable attention will be turned to these crops.

The county offers extremely attractive inducements to the man of small capital or to the thrifty, ambitious man who is willing to borrow and work. At this time the best grades of land can be bought at from \$10 or less to \$15 an acre, according to location. In many instances land is held at higher prices on account of its timber, valuable for turpentine and lumber.

SPECIAL INDUSTRIES.

TRUCKING.

While there is a large acreage of land highly adapted to vegetables, trucking has not made any great headway outside of the watermelon industry.

Thomas County is probably the largest watermelon producing county in the United States, there being under ordinary seasonal conditions something like 1,000 carloads shipped annually. The crop is grown for market on a large number of the farms situated within 5 or 6 miles of the railroad. There is a large acreage of land highly adapted to the crop. The well-drained medium and deep phases of the Norfolk fine sandy loam and sandy loam and the Orangeburg fine sandy loam and fine sand are the best melon soils. The "pimply" areas of these and the Tifton sandy loam make an extra early melon. The Norfolk fine sand and sand are used quite extensively, but the crop is apt to suffer severely on these soils during dry spells. With moderate fertilization the average yield is about one-half carload an acre.

In the cultivation of watermelons the ordinary method is to break the land flat to a depth of 4 to 6 inches, check off so as to bring the hills from 10 to 12 feet apart each way, list on the fertilizers applied either in the drill or in the hill, and plant on the ridge thus made. Land could be brought into better condition generally by breaking in the fall to a depth of 8 inches with a later rebreaking in February. Planting begins about the first of March. It is the rule to plant fields over three or four times at weekly intervals so as to insure against possible damage from late frost. Cultivation is done in one direction first with a "dixie" or turning plow, throwing the dirt toward the vines, until the middle is plowed out. Later plowing is done with sweeps. Care should be taken not to disturb the vines, and when they have spread to such an extent as to limit cultivation to the center of the rows, the hoe should be used to cut out grass and weeds near the hills. In the cultivation of the crop, if the tendrils are broken the vines are blown about by the wind and the development of the plant is retarded.

The most effective fertilizer is stable or barnyard manure or cottonseed manure compost, used at the acreage rate of from 5 to about 10 tons, according to condition of the soil, in conjunction with 500 or 600 pounds of a fertilizer analyzing something like 10-3-4. The ordinary melon fertilizer runs about 8-2-2 in analysis. There is a difference of opinion among growers as to whether manure should be applied in the drill or concentrated about the hill. In view of the fact that the watermelon feeds over a considerable space and, under the prevailing practice of spacing, is quite able to reach the effects of all fertilizer between the hills, broadcasting with heavy applications of fertilizing material is recommended, for the reason that too heavy concentration in the hill often causes "burning," especially on the deep sandy soils.

The Kolb Gem, the Triumph or Blue, and the Rattlesnake are the standard shipping varieties of melons. The melons of better quality,

as the Thomas, Pierson, and others, are grown only for home use for the reason that they do not stand shipment well on account of their thin rinds. From 800 to 1,200 melons are shipped in a car, where they are piled one upon another, with only a bedding of straw on the car floor.

A number of farmers contract with local buyers or agents of commission houses at about \$40 to \$50 f. o. b. Extra early melons sometimes bring from \$100 to upward of \$150 a car. The crop is quite profitable in years of normal yields, but an overproduction or a sudden ripening of a large part of a crop on account of dry weather occasionally reduces the price below the point of profitability. Usually this is a profitable crop when handled through reliable marketers. The practice of shipping melons to a distant commission merchant and awaiting returns has become unpopular, and they are now largely sold for cash f. o. b. to traveling representatives of commission houses.

On account of the watermelon wilt, which affects a succeeding crop of melons, the same field should not be planted to this crop more than once in from five to eight years, but most other crops can be grown directly after melons. Fields receiving the drainage water from a watermelon patch may thus become affected, and even stock may carry the disease through the medium of dust from one field to another. All vines should be removed or burned as soon as possible after melons are gathered and hogs turned in to clean up the refuse crop where there is danger of spreading the disease.

Cantaloupes and cucumbers have been successfully grown on the shallow Norfolk soils. These crops offer excellent opportunities to the special-crop farmer, owing to the abundance of land well adapted to them.

There are good opportunities for building up a profitable industry in the growing of early sweet potatoes for shipment. While a large crop of sweet potatoes is grown annually for home use, but little attention has been given to their production for outside markets. In view of the fact that potatoes can be put on the market as early as the middle of June, which is considerably earlier than can be done by those more northerly sections that have become famous for their sweet potatoes, there is no reason, unless it be exorbitant freight rates, why this industry should not prove a paying one. There is a large acreage of land well adapted to this crop. The deeper phases of the Norfolk sandy loam and fine sandy loam and the Tifton sandy loam are the best suited to the crop. A great number of varieties do well, but those locally known as "Spanish yams," "parrot yams," "yellow yams," and "red yams" seem to give most satisfaction and are of such quality as unquestionably would meet the requirements of any market.

For an early crop the plants should be set in the field about the middle of March, on ridges from 8 to 10 inches high, and watered if the soil is not well supplied with moisture. An acreage application of from 500 to 1,000 pounds of an 8-2-10 fertilizer distributed in the drill and thoroughly mixed with the soil and listed on about three weeks before planting has proved very satisfactory on the Orangeburg and Norfolk fine sandy loams and sandy loams. Coarse barnyard manure, grain stubble, or some form of vegetable matter which when plowed under slightly opens up the soil so as to effect good aeration is advisable. The popular belief that new ground is best for sweet potatoes is accounted for in that the good results are largely due to the abundance of vegetable matter it contains. Well-rotted stable manure rich in nitrogen should be used sparingly, as such applications are apt to injure the crop, even to the extent of causing the potatoes to crack. Cultivation should be shallow, so as never to cut deeply into the bed, harrows and scrapers being good implements for this purpose. Cuttings from the early planted potatoes are used sometimes from the vines for a late crop, but slips from the bedded potatoes are used for the early crop.^a

The Irish potato is another crop that can be grown for market. From 100 to 200 bushels can be grown upon an acre of the Orangeburg and Norfolk soils having a depth of at least 8 inches and not much more than 20 inches to the clay subsoil. Barnyard manure or cotton-seed meal used liberally in conjunction with 300 to 500 pounds an acre of a phosphate-potash mixture analyzing about 8-6 gives good results. A crop of rye turned under green is quite beneficial to the crop on the deep sandy soils. Very early spring potatoes can be grown without trouble, but the fall crop sometimes suffers from drought. Cabbage does especially well on the deeper phases of Norfolk fine sandy loam, on which type they have been successfully grown for early shipment. Heavy applications of stable or barnyard manure in conjunction with about 1,000 pounds of a 9-4-4 fertilizer give best results.

English peas, tomatoes, radishes, lettuce, spinach, turnips, snap beans, and onions can be grown very successfully, especially on the well-drained Norfolk fine sandy loam and sandy loam. The Tifton sandy loam and the "pimply" areas of both the Norfolk and Orangeburg soils produce extra early vegetables.

The natural conditions in Thomas County are favorable for the development of a great trucking industry, but owing to the long distances to large markets and the resulting high freight and express rates trucking has not attained any considerable degree of importance.

^a For further discussion of the sweet potato see Farmers' Bulletin 324.

FRUIT AND NUTS.

Peaches do only fairly well. The fruit is inclined to rot and drop off. This may be accounted for, at least in part by the lack of care given the trees. There are many orchards of Le Conte, Kieffer, and Bartlett pears, and notwithstanding the fact that blight has checked the industry tremendously, some fairly good crops are made and sold at fair profits. Nothing is done to stop the spread of the disease. By pruning the affected branches and burning the badly diseased trees many orchards could be saved, at least for a much longer period than where carelessly left to the ravages of blight. The Kieffer is more resistant than other varieties. Plums, including Japanese varieties, can be grown successfully on most of the well-drained soils. Blackberries and dewberries grow in abundance and are rarely injured by disease or frost. The fig is preeminently suited to the soils and climate and grows profusely with little or no care. Strawberries can be grown quite successfully on the heavier phases of Norfolk and Orangeburg soils. The Scuppernong grape and a number of varieties suitable for marketing or wine do well, particularly on the well-drained Norfolk soils. There are several vineyards in the vicinity of Meigs.

Pecans do well, especially on the Norfolk fine sandy loam and the upland, well-drained hammock areas of both the Norfolk and Orangeburg soils. There is a pecan nursery near Thomasville, and many trees are being set throughout the county. Trees that have come into bearing give evidence of the probable success of the industry. The trees begin to bear at the age of 7 years. They should be set about 50 feet apart each way and cultivated carefully. Cowpeas can be grown between the trees to good advantage.

SUGAR CANE.

The growing of sugar cane for sirup is one of the most profitable industries of the county and its production is being increased rapidly. Large shipments are made from Ochlocknee, Pavo, and other points. On account of the wide areas of soil very well adapted to this crop the opportunities for development of the industry are almost unlimited. With the best of care and attention a very high-grade sirup is made. The deeper phases of the Norfolk fine sandy loam and sandy loam are the best for the crops. The sands and fine sands of both the Norfolk and Orangeburg series and the deep phases of the sandy loam and fine sandy loam of the Norfolk series produce a good grade of sirup, but require heavy applications of fertilizers, besides being so susceptible to drought as frequently to cause short crops. The Tifton sandy loam and the shallow phase of the Norfolk fine sandy loam and sandy loam and the Orangeburg sandy loam and

fine sandy loam make heavy yields of sirup, but the quality is decidedly inferior, particularly in color, to that produced on the other soils named. It is believed that Portsmouth soils having a heavy subsoil within 10 to 15 inches of the surface would make a fair grade of sirup if thoroughly drained and well fertilized.

The cane is planted on ridges 3 to 5 feet apart and is cultivated in very much the same manner as corn, the essential difference being that with corn the object is to throw considerable dirt toward the stalks, whereas with cane the object is to keep the soil away from the stalks at first, or until a good stand of suckers is secured. Usually all fertilizers are applied in the drill and the whole cane stalks or 18-inch sections are laid in the drill, either in contact with the fertilizer or after it has been mixed with the soil, and then covered to a depth of 2 or 3 inches. Planting begins as early in the spring as the condition of the ground permits.

Any surface crusting offering resistance to the sprouting cane should be destroyed by a spike-toothed harrow. Cultivation begins early and is carried on for a much longer time than in the case of cotton or corn. After a good stand is secured, which is generally about the middle of June, soil is thrown about the stalks with sweeps so as to stop suckering or "stooling." After this, interridge cultivation is continued and the crop finally laid by from the first to the middle of July with four or five sweep furrows, which leaves the stalks upon a ridge. Sirup making generally begins about the last of October and continues until after Christmas. The leaves are stripped from the stalks before cutting and left in the field. Cane should be cut as soon after frost touches it as possible. The crop is always fertilized. Cotton seed, barnyard manure, compost, various grades of commercial fertilizers, and mixtures of kainit, phosphoric acid, and cotton-seed meal are used as manures. About a ton of commercial fertilizer per acre used in conjunction with 25 to 50 bushels of cotton seed and about 5 tons of well-rotted barnyard manure is considered a good application, although the average application is very much lighter than this. The lighter the soil the greater the requirement of fertilizer. Most of the farmers apply all of the fertilizers before seeding. Some, however, apply all the cotton seed, barnyard refuse, and compost used and one-half of the fertilizer in the drill at the time of seeding, the balance of the fertilizer being applied near the stalks about the first of June. The latter method seems to be the better one.

Experiments conducted with cane on the Norfolk fine sandy loam near Cairo indicate that for the medium phase of this type, and also for the deeper Norfolk sandy loam, an acreage application of 1,200 pounds of a 10-3-5 fertilizer applied before seeding and followed with two applications of 100 pounds each of sodium nitrate along-

side the plants in June is a most effective method of fertilizing. For best results with the deep sandy soils the acreage application should be increased to from 1,500 to 2,000 pounds.^a

Heavy applications of stable manure or well-rotted barnyard manure sometimes gives the sirup a dark color and an unpleasant salty taste. Sirup made on "cowpen land" is always of a poor quality. However, barnyard manure and compost are, when used in moderate amounts, very beneficial. Nitrogen should be more largely supplied by preceding cane with cowpeas or velvet beans, which crop leaves the soil in a most excellent mechanical condition. The sweet potato also is a good crop to precede cane. Corn and watermelons do better after cane than does cotton. Cane land should be plowed in the fall, turning the soil, in the case of the type having a shallow to medium surface soil, to a depth of 9 inches.

Stubble cane when burned over in the spring, "barred off," and harrowed across with a disk to loosen up the turf makes with the same fertilization and cultivation about the same yields as seeded cane. However, a great deal more sirup is made from the first crop than from the second one. The seed cane is placed in windrows and lightly covered with earth during the winter months. Cold, wet weather frequently damages the stalks, and it would seem that some better method could be devised for saving the seed crop.

The acreage yields of sirup run from 200 to about 600 gallons, according to soil, quantity of fertilizer used, and care in cultivation. An average of 400 gallons can be reasonably counted on, with fair treatment. Most of the crop in Thomas County is manufactured in open kettles by the farmer and sold in 33-gallon barrels.

TOBACCO.

As yet the cultivation of Sumatra wrapper tobacco has been tried in only one instance in Thomas County, but inasmuch as some of the soil types here are the same as those previously surveyed in neighboring Florida territory upon which the Sumatra wrapper tobacco industry is well developed, it is believed that it is only a matter of time before the industry will spread all over the section of the county where these soils are found. The discussion of the subject is intended for the guidance of those who may be contemplating the growing of this tobacco upon the Thomas County soils.

The medium deep phase of the Norfolk fine sandy loam is the grade of soil best suited to the production of the Sumatra type of wrapper

^a It is fairly safe to conclude that there is little if any waste from an excessive application of potash and phosphate on plant canes, as the succeeding stubble crop will get the benefit; but an excessive application of ammonia will be lost, as it has practically all disappeared by the following year. Bul. No. 93, Bureau of Chemistry, U. S. Dept. of Agr., p. 30.

tobacco. There are other grades of soil that will produce a leaf of good quality, such as the deep phase of the Norfolk fine sandy loam and the Norfolk fine sand, but such deep soils would require irrigation for best results. The Orangeburg fine sand is fairly well suited to the wrapper and even the fine sandy loam of this series produces a medium grade, though it is much better suited to the Cuban filler type of tobacco. The color and texture of the leaf as produced on the light-colored, medium deep Norfolk fine sandy loam in the neighboring Georgia and Florida tobacco territories comes nearest to meeting the demands of the tobacco trade, which requires a leaf of fine texture, small veins, even color, and a good finish.

The cultivation of tobacco should not be rushed into, but should be tried at first cautiously and only in a small way until the trade recognizes that a first-rate article can be grown. Farmers should be sure they have the proper soil for the production of a high-grade wrapper and should thoroughly understand every step of growing and curing the crop. In this connection Wilder says:

For the average farmer there are several difficulties to contend with in growing this grade of leaf. The cost of erecting the shades and curing sheds is heavy, great care must be exercised in handling and curing the crop, small individual lots can not be assorted into the proper grades, and large areas require more capital than most farmers have. These conditions are sufficient to deter the average farmer from engaging in the business, but for the small grower the uncertainty of disposing of his crop for a satisfactory price, because he must take whatever is offered to him by controlling buyers, is even more serious. If the market were open to small growers, or if they could combine their crops in assorting and in sale, they might then, with large lots of a more uniform product, be able to dispose of their crop to better advantage. Of the success of the larger growers who are sure of a satisfactory market, there can be little question, and the industry offers excellent opportunities for extension on a large scale.^a

The erection of slat shade, the kind most generally used, ranges from about \$200 to \$250 an acre. The posts for carrying the slat supporters are usually set 12 by 20 feet apart and stand 9 feet in the clear. The intervals between the slats should be so arranged that one-third to one-half of the ground will be shaded, and in order to insure an even distribution of shade on the plants the slats should be laid with their longest axis north and south. If well constructed, shade should last five years. A barn with a capacity for curing 2 acres of tobacco will cost about \$250.^b

Tobacco seed should be sown from February 15 to March 15, on a moist, sandy soil, or in a box bed kept damp by watering and shaded with cloth if practicable. The tobacco field should be broken flat in the fall to a depth of 10 to 14 inches, using a subsoiler when necessary

^a Soil Survey of Leon County, Florida, pp. 29-30.

^b For plans and specifications of tobacco barns, see Report No. 62, U. S. Dept. of Agr., pp. 25-29.

so as not to turn up too much of the lower soil. About the first of March 20 tons (20 2-horse loads) of stable manure to the acre should be spread broadcast and plowed under to a depth of 6 inches, the furrows to be thrown at right angles to the first turning. Following this broadcast 400 pounds of slaked lime and harrow in thoroughly with a disk. About two weeks before transplanting a mixture consisting of 1 ton cotton-seed meal, 400 pounds steamed bonemeal, and 300 pounds carbonate of potash or 400 pounds sulphate of potash should be drilled in or applied broadcast and harrowed in. If the mixture is used in the drill, it should be thoroughly mixed with the soil with a shovel plow, listed on, and the bed broken open with a shovel plow, and listed back just before transplanting. Rows should be laid off 4 feet apart and the plants set from 10 to 14 inches apart in the row and watered. As it is desired to get a uniform growth and good stand the field should be gone over several times soon after transplanting to reset unhealthy or dead plants. The proper time for transplanting is between April 15 and May 20, although good crops have been made in adjoining territory when set late in June. Cultivation should begin five or six days after setting, and it should be at first deep and close to the plants with a straight plow, like a scooter. Subsequent cultivation should be shallow near the row and a little deeper in the center and should be done once a week or as often as necessary to keep the soil well mulched and as long as no injury is done the plants. Cultivation is sometimes carried on after harvesting begins. It is a common practice to plow one middle in the early part of the week and the alternate middle in the later part. It is especially necessary to plow as soon as possible after rains to destroy soil crusting, and any crust formed between the plants should be carefully broken with hoes. After the first hoeing a little dirt should be drawn around the stalks.

Various mixtures of Paris green are used to kill the bud worm and horn worm; these are also picked off by hand. The plant should be topped before the buds bloom. Following this topping suckers appear at the joint of each leaf and stalk, and these should be removed so as to direct the entire energy of the plant toward the development of the ripening leaves. On the stronger soils like the shallow Norfolk fine sandy loam and the Orangeburg fine sandy loam the top suckers are allowed to bloom so as to prevent too thick leaf development. A second crop, or sucker crop, is seldom gathered, and then only by some of the larger growers. Priming, as a rule, begins about sixty days after transplanting. The leaves are picked from the bottom a few at a time as they ripen and immediately carried to the barn, where they are strung 30 to 40 leaves to a stick and hung to cure. The curing takes more or less time, according to seasonal conditions, but the average period is about three weeks. In dry weather the barn is

usually kept closed for two or three days, or until the tips of the leaves begin to turn yellow, then opened. The air should be changed in this way so as to keep the leaf in a pliable condition—neither too wet nor too dry. In case of damp weather fires are sometimes necessary to drive off excess moisture and prevent pole-sweat and stem-rot. When the midrib is dry the tobacco is cured so far as the farmer takes it. It should now be in "good case;" that is, in a moderately pliable condition, ready for the warehouse, where it is graded and subjected to the further process of bulk fermentation. Sun-grown Sumatra wrapper is fertilized and grown in about the same way as the shade-grown. The ordinary yields of the shade-grown product run from about 700 to 1,300 pounds.

Irrigation is coming into favor rapidly, and is commonly practiced where cheese-cloth shade is used. The influence of soil texture, especially upon the yield, is minimized under irrigation.

The Cuban seed-leaf cigar-filler tobacco does well on the Orangeburg fine sandy loam. This type is grown very much in the same manner as the Sumatra. A good fertilizer consists of an acreage application of 1,200 pounds of cotton-seed meal and 300 pounds of sulphate of potash. In growing this tobacco it should be rotated with other crops so as to include a green manuring crop.

SOILS.

The soils of Thomas County are predominantly sandy, there being a textural range in the surface material from light sand to moderately heavy fine sandy loam. A large proportion of the upland soils, though sandy in the surface portion, pass at a depth of from a few inches to something like 3 feet into either a bright-yellow or bright-red sandy clay, which in turn passes at a depth of from 3 to 4 or 5 feet into a compact sandy clay highly mottled with pinkish-red, drab, and yellow colors. The only clay exposures represent those areas from which the surface mantle of sandy material has been removed through erosional processes, as in case of the "gall spots" sometimes seen on slopes where the surface flow-off has been most rapid. The limit of coarseness in the original sandy material, which was laid down as marine sediments, is represented closely by medium sand, there being a marked absence of coarse quartz sand and gravel. The iron sandstone and claystone pebbles so abundant in the northern part of the area evidently have been formed in the soils during the processes of weathering that have taken place since the recession of marine water. These pebbles do not show a concentric structure, but simply represent sandy or clayey material which has been cemented solidly by iron oxides and hydrates. Occasionally the cemented material occurs in the shape of hardpanlike layers, but by far the

greater part is found in more or less rounded fragments, varying from the size of small peas up to about 1 inch in diameter.

The materials giving rise to the several soil series of the area were originally laid down as off-shore deposits in the sea that formerly covered the entire region. These deposits were more or less assorted at the time of their deposition, the coarser sands being laid down near shore, while the finer sands, silt, and clay were carried in suspension and laid down in deeper water. Since the region was elevated and made dry land these depositions have been further modified by the processes of weathering, erosion, and other modifying agencies, and this has given rise to the various soil types and to the differences in the depth to clay. From small local areas on slopes the surface material has been carried off bodily, leaving the heavier clay of the subsoil exposed; or the finer particles have been washed out and transported to lower levels, leaving superficial layers of light material. In the flat uplands rain water, by carrying off considerable quantities of the fine soil particles, has also played an important part in the formation of these flat sandy soils, and this accounts in part for the deeper surface soils. However, there probably were differences in the depth of the sandy mantle at the time of emergence, as in many cases the soils apparently have not been altered to any considerable degree as regards texture and profile arrangement since that time. Some of the sandy ridges unquestionably represent original deep sand beds or beach lines.

Solution and chemical changes, particularly oxidation processes, have been active agents in weathering, especially in the matter of color changes. There has been a tendency for the better drained and better aerated subsoil material to assume red colors through oxidation of the iron compounds. The high oxidation of the iron compounds giving rise to the red color of the Orangeburg subsoils doubtless has resulted in part at least from the better drainage and aeration of the Orangeburg series. Both the Orangeburg and Norfolk soils may carry iron sandstone and claystone pebbles of exactly the same character, and which, in both series, probably have been formed in situ and under similar conditions. Frequently the Norfolk soils grade from flat upland locations almost imperceptibly into the Orangeburg soils, occupying slopes where drainage has been good. Such gradations do not suggest marked differences in the manner and time of the deposition of the soil material here. However, the fact that the soils of the Orangeburg series occupy quite extensive areas in the southern part of the county with but little associated Norfolk soils, the converse being true in the northern part of the county, would indicate that there were differences in the time of deposition as well as in time of emergence. The drainage of these Orangeburg soils in the southern part of the county is much better than that of the Nor-

folk soils farther north, owing to the greater unevenness in the surface configuration and to the more mature drainage systems. The Orangeburg soils belong largely to the Lafayette of the Pliocene.

The Norfolk series is derived directly from the old Gulf floor, or what is usually referred to as the Coastal Plain deposits. The geological formation giving rise to the Norfolk of this region is described as the Columbia of the Pleistocene. The series is characterized by its rather even surface, which in places has only fair drainage. The surface soils are grayish in color and vary in depth from a few inches to 2 feet or more. The subsoils are uniformly yellowish.

The Portsmouth series is derived largely from the same materials as give rise to the Norfolk soils and owes its characteristics largely to the poor drainage conditions, which have favored the accumulation of dark-colored organic material and inhibited oxidation of the subsoil material.

The Susquehanna fine sandy loam probably represents more closely the character of the deep underlying materials of the area than do any of the other types, and probably belongs to a transition stage between the underlying limestones of the Eocene and the later formations which give rise to the Orangeburg and Norfolk soils.

The Chastain fine sandy loam is an alluvium type, confined to the broad stream bottoms. The lower plastic clay subsoil probably represents in part undisturbed sedimentary material.

The Meadow land along streams is quite variable, but is largely composed of sand and fine material washed down from the adjacent uplands. The upland areas of Meadow as found in depressions simply represent those poorly drained situations into which more or less fine material has been washed.

There are in the southern part of the county a few outcrops of limestone belonging to the Vicksburg-Jackson formation of the Eocene. A large part of the county is underlain by this limestone, but exposures are seen in but few places outside of stream slopes and "lime sinks." Sink holes represent depressions and openings into underground drainageways caused by the uneven dissolution of the underlying limestone formation. In a few unimportant spots the limestone has affected the character of the soil, giving rise in its decomposition to a greenish-yellow very plastic clay carrying considerable quantities of fragments of more resistant limestone or lime concretions.

Drainage conditions, texture, and soil depth are all factors that strongly influence soil productivity directly, while the organic-matter content and the condition of organic matter in soils largely determines structural conditions, and thus indirectly affect the productivity of soils very materially. Those soils that have good supplies of organic matter in favorable condition are less inclined to bake or

crust, are easier to cultivate, and are very much more productive than the apparently lifeless, crusty, droughty soils low in organic matter.

According to the relative percentage of gravel and of the medium fine and very fine grades of sand, clay, and silt, as determined by mechanical analysis, the soils have been classified into sands, fine sands, fine sandy loams, sandy loams, and gravelly sandy loams. The types have been grouped into series—that is, those soils having similar characteristics of structure, drainage, color, topography, etc., have been grouped under a series name. The Orangeburg soils are characterized by their bright-red friable subsoil; the Norfolk by their bright-yellow friable subsoil; the Portsmouth by the poor drainage conditions, high content of dark-colored organic material, and drab or gray clammy subsoils; and the Susquehanna by the mottled, extremely plastic clay subsoil. The following classification shows the soils of the county grouped according to mode of origin and processes of weathering resulting in the important differentiations of the original marine sediments:

Description.	Soil.
Grayish soils with red subsoils derived from old (Lafayette) sediments under best drainage conditions.	Orangeburg sandy loam.
	Orangeburg fine sandy loam.
	Orangeburg fine sand.
	Norfolk sand.
Grayish soils with yellow subsoils derived from later (Columbia) sediments under moderately good drainage conditions.	Norfolk fine sand.
	Norfolk sandy loam.
	Norfolk fine sandy loam.
	Tifton sandy loam.
Dark-colored soils with light-colored subsoils formed from Lafayette and Columbia materials under poor drainage or semiswampy conditions and intermittent wet and dry stages.	Portsmouth sandy loam.
	Portsmouth fine sandy loam.
	Portsmouth fine sand.
Grayish soils with mottled plastic subsoils derived from the exposures of the underlying older sedimentary material representing the deep substratum.	Susquehanna fine sandy loam.
	Chastain fine sandy loam.
Alluvium.	
Unclassified alluvium and poorly drained up-land depressions.	Meadow.
Unclassified alluvium, extremely poorly drained.	Swamp.

The local names of soils have been brought out in their proper relationship to the several types under the type descriptions. These local names in some instances do not correspond texturally with the class names as governed by analytic determinations of the percentages of the various sizes of soil particles. For instance, a sandy loam with the clay near the surface occasionally will be called "clay land." It is generally the custom in sections of predominantly light soils to speak of those soils as clays or loams which in a region of predominantly heavy soils would be called "sandy loams" or "clay loams."

Where soil boundaries have not been drawn with absolute accuracy, owing to the impracticability of determining the exact limits in some cases, and where small bodies of soil do not conform closely with the type in which they have been mapped, but have been included on account of the impossibility of showing such small areas on a map of the scale used (1 inch to the mile), careful consideration of the type description will eliminate the possibility of confusion on the part of one using the soil map. In some instances where a small area embraces considerable diversity in soils it was necessary to represent the general average of the area on the map, but with the soil descriptions carefully in mind little trouble will be had with such nonconforming areas.

The following table gives the names and areas of the several soil types shown on the accompanying map:

Areas of different soils.

Soils.	Acres.	Per cent.	Soils.	Acres.	Per cent.
Norfolk fine sandy loam	110, 016	31.8	Norfolk sand	5, 504	1.6
Orangeburg fine sandy loam .	53, 760	15.5	Portsmouth fine sand.....	3, 968	1.2
Norfolk sandy loam	49, 216	14.2	Swamp.....	3, 328	1.0
Meadow.....	29, 120	8.4	Norfolk fine sand	3, 264	.9
Orangeburg fine sand	28, 032	8.2	Orangeburg sandy loam	1, 344	.4
Chastain fine sandy loam ...	20, 928	6.1	Susquehanna fine sandy loam	832	.2
Portsmouth fine sandy loam..	13, 888	4.0	Total.....	345, 728	.....
Portsmouth sandy loam.....	12, 928	3.7			
Tifton sandy loam.....	9, 600	2.8			

TIFTON SANDY LOAM.

The surface soil of the Tifton sandy loam is a yellowish-gray to dark-gray moderately heavy sandy loam, from 5 to 15 inches deep, averaging about 10 inches. The subsoil is a bright-yellow moderately friable sandy clay to a depth of about 28 inches, below which it frequently passes into a compact though friable yellow clay mottled slightly with reddish colors, and slightly heavier than the overlying portion. A characteristic feature of the type is the presence of 10 to 25 per cent of small iron sandstone and claystone pebbles disseminated through the soil mass. These pebbles have the appearance of concretions and consist of a sandy and clayey material that apparently has been cemented through the precipitation and oxidation of iron salts carried into the soil mass in solution. Their interior color usually is dark red, but occasionally a small pebble is yellow throughout, in which case the pebble has a rather rotten or soft structure, indicating that the iron has not been thoroughly oxidized, or has assumed the form of hydrates through decomposition processes. These pebbles are most abundant in the surface soil on the crest of ridges and in the higher locations where erosion has removed

a portion of the finer material, and for the same reason the soil depth is shallowest in such locations. Usually the depth of soil increases and the content of pebbles diminishes with descent to lower levels, until the type passes into another soil, generally the Orangeburg or Norfolk sandy loam.

While the presence of large sand grains gives the soil quite a sandy feel, there is sufficient interstitial fine material to make the texture quite favorable with respect to the maintenance of moisture. The texture and structure of the subsoil also are such as favor the maintenance of supplies of moisture favorable to crops. Heavy rains cause the soil to run together and later it bakes and forms at the surface a crust, which is easily destroyed by shallow cultivation. Small hummocks of the heavy yellow clay subsoil are seen here and there, marking those places where trees have been blown down and turned up the underlying material on their roots. There are a few areas of considerable extent which approach quite closely the texture of a loam. The Tifton sandy loam is called "hard pimply land."

The timber growth consists of longleaf pine. Wire grass is abundant everywhere except in cultivated fields. In its surface configuration the type is generally undulating or flat, with gentle slopes toward the streams. Occasional sink holes and "black gum ponds" are seen. The surface drainage is excellent.

The greater part of this type of soil occurs in a large body in the northwestern part of the county in the neighborhood of Meigs. It is interrupted here usually by the Norfolk sandy loam and by lower wet land along the streams. There are several small isolated areas in the northern and southeastern parts of the county. Some of the lesser areas are too small to be shown on the map.

The Tifton sandy loam is the best cotton soil in the area, producing with fair treatment from one-half bale to 1 bale an acre. Cotton suffers but little from drought or rust. Long-staple cotton does better on this than on any other soil of the area, frequently yielding as much as the short staple. It is grown less extensively, however, on account of the greater care required in its production. Yields of from 15 to 20 barrels of sirup can be made, but the quality is not generally so good as that produced on the lighter Norfolk soils, being considerably darker in color. Corn does fairly well, but sometimes suffers from drought.

Good yields of oats and excellent crops of peanuts are made. This is not a typical vegetable soil, but cantaloupes, watermelons, cucumbers, onions, Irish potatoes, string beans, and strawberries find it well suited to their requirements. The soil is a little heavy in some places for the best results for sweet potatoes, but the well-drained areas make good yields. Velvet beans and cowpeas make heavy growths and improve the structure and general condition of the soil.

One of these should be grown in rotation with other crops regularly. Cowpeas sometimes fail to fruit in abnormally wet years and such failures have discouraged the less aggressive farmers in the cultivation of this crop. Rye, oats, and vetch could be produced to advantage as spring forage crops.

The ordinary grades of commercial fertilizers, together with considerable quantities of cotton seed, are used for cotton, corn, and cane. Some farmers apply 500 pounds or more for cotton, expecting with such an application 1 bale to the acre, but the usual application ranges from 300 to 500 pounds. Little nitrogen should be bought in the commercial form for cotton, oats, or corn, but should be secured by growing leguminous crops and by carefully saving barnyard manure. By growing a crop of velvet beans, or cowpeas with corn, then a crop of sugar cane or fall-sown oats and a crop of cotton the third year with an application of 400 or 500 pounds of a 10-2-5 fertilizer, an average yield of 1 bale to the acre should be made. The yields of the other crops grown in such a three-year rotation would all average much higher than at present and at the same time the expenses for fertilizer would be moderate. Cotton-seed meal, or the rotted seed, are decidedly beneficial to sugar cane, but less of this material would be required for this crop grown in the above rotation, although the usual application of potash and phosphoric acid would not be materially changed.

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

Mechanical analyses of Tifton sandy loam.

No.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>	<i>Per ct.</i>
18570, 18582, 18584....	Soil.....	4.6	14.2	9.9	35.1	15.6	8.5	11.6
18571, 18583, 18585....	Subsoil	2.6	10.0	8.7	27.8	12.7	10.2	28.3
18572	Lower subsoil ..	1.2	6.9	9.3	22.4	8.3	10.5	41.0

NORFOLK SAND.

The soil of the Norfolk sand to an average depth of about 6 inches is usually a dark-gray sand or a gray sand slightly darkened with organic matter. It is underlain to a depth of 36 inches or more by a yellowish-gray to pale yellow sand, which becomes coarser and looser in the lower portion. This sand material may extend to a depth of 10 feet or more near streams, but gradually becomes shallower as the distance from the stream increases. The material consists largely of subangular quartz grains, and whenever it is cultivated without frequent incorporation of vegetable matter it becomes lighter colored and more incoherent. When wet the virgin soil is moderately com-

pact. The type supports a growth of longleaf pine interspersed with scrub oak. This scrub oak grows more abundantly where the soil is a little coarser textured than usual and where the underlying clay is at a great depth. There is a scant sod of wire-grass on most of the uncleared land.

The Norfolk sand occurs as narrow strips bordering the bottom lands of the Big and Little Ocklocknee rivers and their tributaries. In some places there is a gradual rise directly from the bottom land to the general upland level. The topography of most of this land is flat or billowy, with usually a slight slope away from the margin of the bottom land. There are several small, rounded knolls and narrow ridges in the uplands.

The Norfolk sand owes its origin to an alteration of the original sedimentary material common to the area by which the finer soil particles were worked out to leave the sand matrix. The process of alteration consisted either of a translocation of the fine particles by erosion, a slight reworking of the original material by stream action when the water stood at a higher level, or the combined action of these agencies. The topography of these sand deposits in places is somewhat terracelike in appearance, but is not what would be classed as true stream terrace; in fact the topography in many places is not very unlike that of the heavier members of the Norfolk series occurring along the stream. The soil has not the appearance of true alluvium, although it is possible some of it was deposited by stream water during an earlier geological stage.

The type is an open, well-drained, warm-natured soil which is only moderately productive. All crops are apt to suffer for lack of moisture. Cultivated areas are used principally for the general farm crops—cotton, corn, and cane—the yields of which are even lower than on the Norfolk fine sand. Owing to its good drainage and thorough aeration it is best adapted to early truck. Sweet potatoes, English peas, beans, cantaloupes, watermelons, and strawberries would do well with liberal applications of fertilizer. The organic matter or humus content, which in no little degree determines the productivity, is exhausted so rapidly that all crops should be grown in rotation with cowpeas or velvet beans. These are crops that grow readily and afford a comparatively inexpensive means of supplying the much-needed vegetable matter and nitrogen. One or the other of these legumes should be turned under while partly green every two or three years. An acreage application of about 25 to 40 bushels of burned lime at the time of turning under the vines would assist in decomposing the material, in neutralizing any acid effect, and in binding and firming the soil particles. Liberal applications of barnyard manure are beneficial. Phosphoric acid and potash should be supplied in the percentage ratio of about 2 to 1 and at the rate of from

500 to 1,500 pounds an acre for sweet potatoes, melons, cane, and vegetables. Cotton-seed meal is quite beneficial to Irish potatoes and sugar cane. It is said that heavy applications of commercial fertilizers cause "firing" or shedding of the bolls in the case of cotton; but it is believed the danger would be largely diminished by using such fertilizers in conjunction with liberal applications of vegetable manure, either barnyard or green manure or the vegetable refuse left by crops of cowpeas or velvet beans. A mixture analyzing 10-2-8 applied at the rate of 300 to 400 pounds to the acre has given very good results with cotton grown on this grade of soil.

From 80 to 175 bushels of sweet potatoes, 60 to 150 bushels early Irish potatoes, and from 200 to 300 gallons of sirup of a very superior quality can be secured with judicious management. Under the prevailing treatment yields of from one-sixth to one-fourth bale of cotton and from 5 to 15 bushels of corn are considered good. Cotton, corn, and oats should not be grown extensively, as the soil unquestionably is an early-truck type. Of the general farm crops, it is best adapted to cane and potatoes. Wrapper tobacco has been grown on this soil in Grady and Decatur counties by using large quantities of fertilizers and irrigating. The leaf produced has a very fine texture. Cultivation should be quite shallow and frequent in order to conserve moisture. Fall plowing is unnecessary, except for the purpose of turning under vegetation.

The following table shows the texture of the soil and subsoil of the Norfolk sand:

Mechanical analyses of Norfolk sand.

No.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
18564.....	Soil	2.2	21.5	20.2	38.3	8.8	5.9	3.2
18565.....	Subsoil.....	3.1	25.9	16.4	36.1	11.7	4.5	2.3

NORFOLK SANDY LOAM.

The Norfolk sandy loam consists of a medium heavy grayish to dark-gray sandy loam from 8 to 16 inches deep, underlain by a yellow clayey sand which quickly passes into a mealy, friable, bright-yellow sandy clay. Generally at a depth of from 40 to 60 inches there is a substratum of mottled yellow, reddish, and drab compact sandy clay which usually persists to great depths. Usually the surface soil changes to pale yellow at about 5 inches. Often the soil portion carries from 10 to 20 per cent of small iron gravel (iron sandstone and claystone), in which case the type is locally termed "pimply land," This gravelly material does not in itself affect the value of the land;

but usually its presence is an indication of a subsoil comparatively near the surface. The nearer the sandy clay comes to the surface the stronger the land, for as a rule the soil in such areas is loamier and better suited to the maintenance of favorable supplies of moisture. In some of these shallow "pimply" areas the type resembles quite closely the Tifton sandy loam, the important difference being the lighter average texture of the Norfolk sandy loam. Not infrequently the soil is gravelly, while the subsoil is practically free from gravel. Again, the subsoil may have these pebbles interspersed throughout its mass, or they may occur at various depths in strata of several inches thickness so compact as to approximate the condition of hardpan. Such land as this last is locally spoken of as having a rock bottom.

Sometimes the soil extends to a depth of 26 or more inches, in which case the crop adaptation and productiveness is noticeably different from the shallow phase. In this deep phase the soil is a light sandy loam and the subsoil either a clayey sand or distinctly a sandy clay. There is a gradual increase in the depth of the soil as the Norfolk sand is approached; a gradual transition is particularly noticeable with the descent of slope. The deep phase, however, sometimes occurs at numerous places in the uplands where it is not associated with the Norfolk sand. The extent of this deep phase is quite large, but individual areas are comparatively small. There is in some places a transitional phase between the Norfolk sandy loam and the Norfolk fine sandy loam, in which the medium and fine grades of sand predominate, to the exclusion of the coarser grains common to the true type. This is quite noticeable in the section to the south and southwest of Pavo and east of Boston, in fact, all along the southern border of the general belt of the coarser soils in the northern part of the county. On the other hand, there are some few areas that approach in texture quite closely to Norfolk coarse sandy loam, as is seen in the body just southwest of Coolidge and along the county line between Pavo and Barwick.

Along the stream slopes where the drainage has been particularly good the color of the subsoil is redder, and the material is heavier and more clayey than is usual for the type. In places it is decidedly plastic and quite similar to that of the Susquehanna fine sandy loam. Such nonconformities, when extensive enough to be outlined on the map, were separated and mapped as that type. The native timber growth consists almost entirely of longleaf pine, there being here and there only small clusters of shortleaf or slash pine, and occasionally a sprinkling of dogwood, oak, and hickory. In the flat and poorly drained areas gallberry bushes are found. Wire grass flourishes throughout the pine forests. Most of the merchantable timber has been cut.

The Norfolk sandy loam is confined largely to a belt in the northern part of the country lying north of a line drawn through Ochlocknee toward Merrillville and thence to Oaklawn on the eastern county line. There are several areas outside of this general belt, as those to the east and southeast of Boston.

The topographic features of the type include many broad and sometimes rather indistinct interstream ridges with long, gentle slopes, and many well-defined ridges between lesser streams, low hills, and broad, flat, upland stretches. In some sections, as those to the west of and between the Ochlocknee rivers, the surface configuration is that of an undulatory to rolling country of smooth contours, with here and there an amphitheaterlike escarpment near the head of a stream. In the northeastern part of the county there are broad, flat and nearly flat stretches which slope almost imperceptibly toward and merge with the poorly drained members of the Portsmouth soils. The drainage here is often inadequate, owing to the absence of a well-established drainage system. There are within such flat areas, and also in the gently undulating phases of the type, many small depressions and sink holes which hold water throughout a good part of the year and support growths of either black gum, cypress, or mayhaw. The greater part of the type has excellent surface and underdrainage. Very little complaint of droughtiness is heard from farmers on the shallow phases, but crops frequently are injured in dry weather where the surface soil is deeper than 15 or 20 inches.

The natural productivity of the Norfolk sandy loam is quite variable, depending, as does its crop adaptation, upon the depth to the subsoil. The type as a whole is a good cotton soil, but the shallow phase makes better yields and the effect of manures is more lasting. Where the surface soil is deeper than 15 or 20 inches cotton is inclined to go too much to weed in seasons of heavy rainfall. The shallow phase is better suited to peanuts and oats, while the deep phase makes better average yields of corn, watermelons, and sweet potatoes, and a brighter colored sirup. The type as a whole is well suited to forage crops, particularly cowpeas, velvet beans, and sorghum. Cucumbers, beans, tomatoes, and Irish potatoes do well. The chief crops grown are corn, cotton, cane, peanuts, watermelons, and sweet potatoes. The acreage yields usually range from one-third to one-half bale of cotton, 10 to 20 bushels of corn, 300 to 450 gallons of sirup, 100 to 300 bushels of sweet potatoes, and about one-half a car of watermelons. Heavy yields of sirup are made on the "hard pimply" areas, but the quality is not generally as good as that from the lighter phase. Oats are generally put in after Christmas on rough, poorly prepared land, and the yields rarely go higher than 15 to 20 bushels an acre. This crop should be seeded in the fall on thoroughly prepared land, or else cultivated by the open-furrow system,

In view of the fact that the Norfolk sandy loam is susceptible to rapid improvement by having its organic-matter content built up through the medium of cowpeas and velvet beans grown in regular rotation with other crops, the average yields of all crops should be markedly increased without any considerable extra effort. Cotton, on the shallow phase, in rotation with corn, oats, sweet potatoes, and the legumes, and properly fertilized should average upward of three-fourths of a bale to the acre, while 35 bushels of corn, 30 bushels of oats, and 300 to 350 bushels of potatoes should be secured in years of normal seasons. This is one of the best sweet potato soils of the area. Long-staple cotton does very well on the shallow phase, especially the "pimply" areas. Strawberries, English peas, and pears can be grown quite successfully.

Commercial fertilizers, mostly of the ordinary grades (analyzing approximately 8-2-2), are generally used for cotton at the rate of from 250 to 400 pounds per acre; for corn, at the rate of 150 to 250 pounds; for watermelons, 300 to 600 pounds; and for sugar cane, 500 pounds or more. The best mixture, according to practical experience of many good farmers, for cotton should analyze 10-2-3 for the shallow phase and 10-3-5 for the deep phase. Barnyard manure is very beneficial for all crops.

Commercial fertilizers should be used always in conjunction with some form of vegetable manure, either barnyard or green manure or the refuse of crops of cowpeas and velvet beans, as the effect is more lasting and more favorable. Cotton seed and cotton-seed meal are beneficial, particularly for cotton, corn, and sugar cane. Sweet potatoes do not require much organic matter, especially barnyard manure. They do well with applications of 500 to 1,000 pounds of 10-2-5 fertilizer per acre, following oats, corn, sugar cane, or cotton. Nitrogen should always be reduced to the lowest possible point in commercial fertilizers by being supplied through the growing of leguminous crops.

The soil should be fall broken in case of the shallow phase to a depth of from 6 to 10 inches. The deep phase would not be materially benefited by fall plowing, except to turn down a covering of vegetation. Cultivation should be shallow and frequent. However, this frequent cultivation is less necessary, perhaps, than in case of the Norfolk fine sandy loam, for the reason that the Norfolk sandy loam is not so inclined to crust.

It is believed that the medium-textured grades of the type, that is, those areas carrying only a small proportion of coarse sand, would produce a fair grade of Sumatra wrapper tobacco.

The Norfolk sandy loam can be bought for about \$7 to \$15 an acre, where there is not a heavy growth of merchantable timber.

The following analyses of soil and subsoil show the composition of the Norfolk sandy loam:

Mechanical analyses of Norfolk sandy loam.

No.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
18578	Soil	6.2	20.6	10.5	32.7	14.7	7.2	7.7
18579	Subsoil	4.5	12.8	8.2	23.6	11.8	8.6	31.4

NORFOLK FINE SAND.

There are two important phases of the Norfolk fine sand: The soil of the "scrub oak" phase consists of a loose gray fine sand of a soft feel, ranging in depth from about 8 to 20 inches. The subsoil, to a depth of 3 feet or more, is a light-gray to pale-yellow fine sand of a distinctly velvety feel. The timber growth is mainly longleaf pine interspersed with scrub oak. Such land is locally called "white sand" or "scrub oak sandy land." It occurs in comparatively small areas, largely as narrow strips along stream slopes, and in the uplands as ridges or hillocks.

A second phase, known as "sandy hammock" and "river hammock," consists of 5 to 10 inches of a grayish-brown or dark-gray slightly loamy fine sand overlying a pale-yellow fine sand. Both soil and subsoil of this phase are rather more compact than in case of the "scrub oak" phase. The soil is found in rather flat areas along the Ocklocknee River and along the slopes of smaller streams. That along the river is generally flat, and the subsoil is usually not encountered nearer the surface than 10 or 15 feet. In the case of that found along the slopes of smaller streams a friable, compact fine sandy clay mottled pinkish red, drab, and yellow is usually encountered at from 3 to 5 feet.

The hammock phase of the Norfolk fine sand supports a growth of magnolia, bay, beech, hickory, white and post oak, ironwood, maple, and some shortleaf pine. The loamy structure of the surface soil is due largely to the accumulation of leaf mold.

The Norfolk fine sand is confined largely to the west-central part of the county, where it occurs in small, widely separated areas. The type is usually well drained and very little of it is subject to overflow.

Those areas along the Ocklocknee River probably owe their origin in a measure to the work of the river in its earlier stage of development, while those along slopes of the smaller streams represent both material left upon the removal of clay and silt by erosion from an original heavier soil and that which has accumulated as wash material. In some of the higher lying positions the type seems to have been but little altered since its emergence.

The scrub-oak phase of the Norfolk fine sand is considered rather an undesirable agricultural soil for the reason that it is necessary to make frequent and heavy applications of fertilizer in order to produce anything like fair crops. Owing to its open nature and its low organic-matter content it is rather droughty. Manurial applications are not as lasting on account of the rapid decomposition of organic matter induced by thorough aeration and also on account of the ease with which fertilizers are carried downward out of reach of the plant roots. This soil, however, can be built up and kept in fair condition by turning under at frequent intervals crops of velvet beans and cow-peas in conjunction with applications of barnyard manure and fertilizers. The incorporation of vegetable matter brings about a desired loaminess of structure which makes the soil very much more resistant to drought and much more productive.

The Norfolk fine sand is naturally a warm soil, well adapted to the production of early vegetables like Irish potatoes, watermelons, cantaloupes, cucumbers, lettuce, English peas, radishes, etc. Velvet beans, sorghum, and cowpeas can also be grown successfully. Sugar cane does well when heavily fertilized. With an acreage application of from 1,500 to 2,000 pounds of an 8-3-4 fertilizer, from 250 to 400 gallons of a light-colored sirup of excellent flavor can be produced. From 100 to 200 bushels of extra early sweet potatoes of good shipping quality can be grown with an acreage application of 1,000 pounds of an 8-4-4 fertilizer. The type is much better suited to corn than to cotton, the latter going too much to weed in wet years. Cultivation should be more nearly flat than with the heavier soils. Fall plowing is necessary only for the purpose of turning under vegetable matter. Vegetation should be turned under to a depth of 6 to 8 inches. Frequent shallow cultivation is absolutely necessary in dry seasons in order to conserve moisture. Watermelons and sugar cane are particularly apt to suffer from drought.

This type is a special-purpose soil and should not be used for general farming. Its most attractive possibilities appear to be in the production of the early vegetables enumerated above. The hammock phase is naturally the more productive, at least for a period of several years following clearing. Good crops of corn, sugar cane, peanuts, and potatoes and fair crops of oats can be secured with smaller applications of manure than in the case of the scrub-oak phase. This sandy hammock land always holds moisture exceptionally well for so light a type. These damp locations near streams, where the organic content is higher, are admirably suited to growing tobacco plants for resetting. A fine grade of Sumatra wrapper tobacco may be grown on this phase, especially with irrigation. Under cultivation the differences in the two phases gradually disappear and after 4 or 5 years the crop yields are about the same on the one as on the other.

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

Mechanical analyses of Norfolk fine sand.

No.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
18566	Soil	1.1	2.6	2.5	68.4	11.8	8.8	4.8
18567	Subsoil .....	.0	1.9	3.2	66.7	18.1	4.3	5.7

NORFOLK FINE SANDY LOAM.

The Norfolk fine sandy loam of Thomas County was divided and mapped in three phases—shallow, medium, and deep. The constituent materials of these phases are the same, and the separations were warranted mainly on the basis of differences in crop values, as determined by the depth of the surface soil.

Shallow phase.—The soil of the Norfolk fine sandy loam, shallow phase, to a depth of 5 to 10 inches consists of a light to a moderately heavy fine sandy loam. The color, usually a dark gray in the surface soil, changes to a lighter tinge a few inches below. Where the dark-colored organic matter has been more or less exhausted or the top soil mixed by cultivation, with the lighter colored material beneath or with the yellow subsoil, the color varies from dull gray to pale yellow. On the other hand, where the native vegetative growth and undergrowth is heavy the color may be a very dark gray or nearly black, this being especially true in the poorer drained situations. The subsoil, to a depth of 18 or 20 inches, is a yellow fine sandy clay and below this a bright-yellow fine sandy clay. Where the drainage is poor, the subsoil sometimes is slightly mottled with reddish or drab in the lower portion. It is usually quite friable when moderately dry but is noticeably plastic when wet. Quite frequently both soil and subsoil carry small iron pebbles in quantities ranging from 10 to 20 per cent of the soil mass. These pebbles occur either disseminated throughout the soil mass or in strata anywhere in the profile, being sometimes conspicuous in the surface soil and absent below, or the reverse. The deep substratum, as frequently exposed in road cuts, presents a variegated mottling of yellow, drab, and pinkish red and is a compact clay somewhat coarser grained than the overlying soil.

The type is sometimes called "clay land," "hard land," or where gravelly, "pimply," or "hard pimply land." It is confined largely to the western part of the county north of Pine Creek, occurring most extensively in the vicinity of Thomasville and Ochlocknee. It is conspicuously absent from the southern, southeastern, and northeastern parts of the county and the country lying between the Big

and Little Ocklocknee rivers. The greater proportion occurs as flat or undulating interstream country like that to the south of Ochlocknee. Where the streams are more abundant and have cut comparatively deep valleys, as in the sections to the south and north of Thomasville, the topography is more rolling, and the type is more frequently encountered on the slopes where a more pronounced erosion has removed a part of the top soil. On the slopes and in the more rolling country the drainage is quite good, and at the same time a supply of moisture very favorable to crops is maintained throughout the year, even in dry seasons. Surface drainage is so poor in case of the flat stretches that the soil becomes saturated in wet weather and soon gets into a soggy condition. This feature could be remedied easily by digging drainage outlets to the branches, which can be reached within short distances nearly everywhere. These branches near their heads often amount to mere wet places, but they mark the natural drainageways, which can be opened and extended without any great outlay of money.

The soil is inclined to run together during heavy rains, so that subsequent sunshiny weather frequently causes an undesirable baking or surface crusting, necessitating immediate shallow cultivation to restore favorable tilth and to prevent excessive surface evaporation of moisture. Such crusting is perhaps more common with this type than with any other in the area. This tendency can be reduced to a minimum by keeping the soil well supplied with organic matter, as by turning under barnyard manure, cowpeas, or coarse litter of any description.

The native timber growth consists mainly of longleaf pine. There are "hammocky" spots which support a growth of oak, dogwood, and hickory, and often a scattering of dogwood is seen in the pine timber. There occur here and there small sinks or basins, rarely of more than 1 acre, which hold water most of the year. Thick clusters of black gum and mayhaw grow in these. The well-drained areas, as with all the types, support a sod of wire-grass throughout the pine timber, while a scattering growth of gallberry bushes is generally seen in the poorly drained areas.

The shallow phase of the Norfolk fine sandy loam is one of the best cotton, oats, peanut, and forage crop soils of the county. Corn does not do quite so well as on the deeper phases, and, also, crops like watermelons, sweet potatoes, cantaloupes, cucumbers, and tobacco prefer a deeper top soil. Sugar cane gives a heavy yield of sirup—300 to 500 gallons to the acre—but the quality is inferior to that produced on the Norfolk soils having a greater depth to the clay. With proper treatment cotton should yield from one-half bale to 1 bale, oats from 20 to 40 bushels, corn 10 to 30 bushels or more. The type has considerable merit as a medium late truck soil for such

crops as strawberries, Irish potatoes, tomatoes, beans, and onions. Cabbage does well only when the drainage is thorough, and at the same time when a readily available supply of moisture is maintained. A crop should never be grown in flat locations, except where the drainage conditions have been so perfected as to insure against the occurrence of soggy conditions. Pecans and pears do well where the drainage is good. Crimson clover, Bermuda grass, cowpeas, velvet beans, beggarweed, crab-grass, and sorghum find this soil well suited to their requirements. With deep plowing so as to turn up and thoroughly mix with the surface soil a small portion of the subsoil, coupled with fall seeding following either cowpeas, velvet beans, or crimson clover, oats could be grown quite successfully.

Commercial fertilizers should be used in conjunction with organic manures as much as possible. The legumes should be depended upon largely for nitrogen and should be grown in rotation with the various crops at least as often as once every two or three years. Following a leguminous crop there should be very little nitrogen in the fertilizer to be used. In accordance with practical experience the best fertilizer for this soil should analyze about 10-2-4 for cotton, oats, and vegetables.

In view of the marked adaptation to peanuts, cowpeas, velvet beans, and sorghum, more hogs and stock could be raised and marketed at a profit. Fall plowing to a depth of 6 to 11 inches is advised for all crops. Considering that the type is especially benefited by deep plowing and thorough preparation, stumps should be more generally removed, so as to fit the land to the use of disk plows, drills, and harrows. Oats should be drilled in for best results. The ridge cultivation in vogue is well suited to this type of soil.

The Norfolk fine sandy loam, shallow phase, can be bought at from \$8 to \$15 where there is not a considerable growth of merchantable timber.

Medium phase.—The soil of the Norfolk fine sandy loam, medium phase, consists of a light to medium heavy fine sandy loam 10 to 20 inches deep. Under virgin timber the color varies from dark gray in the surface 5 or 6 inches through light gray to very pale yellow in the lower portion, while that which has been under cultivation for several years is usually dull gray in the surface portion. The content of silt averages considerably less than in the shallow phase of the Norfolk fine sandy loam. The subsoil passes from a yellow fine sandy clay into a heavier bright yellow fine sandy clay at about 26 inches, and finally, at from 4 to about 10 feet, into a compact mottled sandy clay substratum. For the most part, when normally dry, the subsoil possesses a mealy, friable texture, although in the poorer drained situations it may be fairly plastic, while on the lower slopes it not infrequently is reddish yellow in color and quite plastic. As a rule the sub-

soil possesses that texture and structure favorable to the maintenance of a supply of moisture almost exactly meeting the requirements of crops growing under normal conditions of weather and cultivation. The soil is less inclined to run together during rains than its shallower correlative, on account of its lighter texture. However, though to a lesser degree, slight crusts do form, which require light cultivation as early as possible after rains. In the vicinity of Aucilla and Linton Lake, in the southeastern part of the county, the soil is noticeably heavier, approaching a light fine loam in texture, while the subsoil is a very friable, mealy yellow fine sandy clay, somewhat heavier than the average of the medium phase. Here the subsoil frequently becomes reddish yellow at about 3 feet. The soil in this locality is more apt to assume a compact, hard structure in dry weather. A scattering growth of hardwood is quite common in the pine forests. In some locations, particularly in the vicinity of Patton and Boston, this phase of the Norfolk fine sand loam grades into the Norfolk sandy loam so gradually as to make it rather difficult to draw the boundary between the two.

Small red iron pebbles are quite common, occurring in the surface soil or anywhere throughout the soil mass. A considerable area of the type carries enough iron-sandstone and claystone pebbles to give the soil a decided gravelly nature. Some of these more pronouncedly "pimply" or gravelly spots have been indicated on the map by symbols. There are gall spots here and there on slopes and knolls, indicating those places where the surface soil has been washed off, leaving the clay subsoil exposed. On the lower slopes the phase generally passes into the deeper Norfolk fine sandy loam. The timber growth is about the same as that of the shallow phase of the Norfolk fine sandy loam, consisting in the main of longleaf pine, with here and there a scattering of dogwood and occasionally a "hammock" area. On the slopes near streams magnolia, bay, maple, beech, and shortleaf pine are common.

The Norfolk fine sandy loam, medium phase, occurs throughout the greater part of the area outside of the country south of Pine Creek, northwest of Ochlocknee, the forks of the Ocklocknee rivers, and the northeastern part of the county above a line drawn through Coolidge, Patton, and Oaklawn.

Its surface configuration is quite variable and includes many broad, gentle slopes, nearly flat to gently rolling interstream country, and crests of imperfectly developed ridges. It is more generally rolling and better drained than the shallow phase. The natural drainage is such that ditches are very seldom needed, and cultivation is easy over a wider range of moisture conditions.

The soil is susceptible of much improvement by growing and turning under leguminous crops, either after the crop has matured or in

the green stage. Such a practice would greatly benefit succeeding crops. Preparation of the land should be done in the fall, plowing preferably to a depth of 6 to 10 inches.

This is one of the most desirable soils of the area. It is adapted to a wider range of crops than most of the types and probably is the surest soil in the county to produce good average yields. Under the prevailing system of soil management cotton produces about one-third bale, corn from 8 to 20 bushels, sirup of excellent quality 250 to 450 gallons, oats 15 to 20 bushels, and sweet potatoes from 100 to 200 or more bushels an acre. The pebbly areas are considered best for cotton and earliest for watermelons. The loamy phase, like that in the southeastern part of the county, produces the best average crops of corn. All the crops grown in the county do at least fairly well. Those that seem best adapted to this soil are corn, peanuts, cane, watermelons, cabbage, cantaloupes, cucumbers, beans, English peas, sweet potatoes, Irish potatoes, rye, and tobacco.

The medium phase of the Norfolk fine sandy loam is the best wrapper-tobacco soil in the county, or in this general region of southern Georgia and contiguous Florida, being identical with that on which the better yields and grades are secured in Florida and in Decatur and Grady counties, Georgia. From 1,000 pounds to 1,400 pounds of shade-grown and from 500 to 1,000 pounds of sun-grown wrapper can be produced.

Cabbage of the early varieties, for example, the Wakefield, does well. Excellent yields of this crop were grown for shipment near Thomasville this year. Heavy applications of stable manure and about 1,000 pounds of a 9-4-4 fertilizer per acre were used.

Fertilizers for cotton and corn, according to best results secured, should analyze about 10-2-5. Applications of from 500 to 1,500 pounds of commercial fertilizer are used for sugar cane, 500 pounds for watermelons, 150 to 250 pounds for corn, and 200 to 500 pounds for cotton. Sweet potatoes of the Spanish yam variety, fertilized with an 8-2-10 grade, at the rate of 1,000 pounds to the acre, should yield upward of 300 bushels.

Deep phase.—The surface soil of the Norfolk fine sandy loam, deep phase, is quite similar in texture, color, and general appearance to that of the medium phase of the type, differing essentially in the greater depth to the subsoil, in structure, which is more open, and in a slightly lighter average texture. In a typical section the soil consists of a dark-gray or gray loamy fine sand to very light fine sandy loam which at a depth of about 10 inches overlies light-gray to pale-yellow material of about the same texture. The color of the surface soil depends largely upon the drainage conditions and the organic matter content. In the virgin forests and poorer-drained

areas and fields, where the supply of vegetable matter has not been allowed to run low, the color is a dark gray. Where the organic matter has accumulated under good conditions of drainage, or has been pretty thoroughly depleted, the color is a decided gray.

The fine sandy material overlies the true subsoil anywhere between 20 and 36 inches, averaging about 2 feet. The subsoil consists of a yellow fine sandy loam, generally becoming heavier with depth, and quickly passing into a bright-yellow clay loam or sandy loam, which sometimes is very silty. Where the depth to this heavier subsoil material is as much as 36 inches the soil has been mapped as Norfolk fine sand. Iron pebbles occur here and there on the surface and throughout the soil mass just as with the shallow and the medium phases.

The timber growth is mainly longleaf pine. There is considerable shortleaf pine and hardwood on the stream slopes. Locally the type is termed "sandy land." It is closely associated with its shallower correlatives occurring in the same general belt. While in its surface configuration it presents the same variety in topography, this phase is more generally found on the lower slopes and on knoll-like hills. As a slope soil it owes its origin, in part at least, to accumulation of sandy material washed from higher levels. Away from streams it has been formed by a washing out of the finer particles from the superficial material.

Natural drainage is so good that crops frequently suffer from drought. In general the soil needs vegetable matter to increase its loaminess and retentiveness of moisture.

The deep phase of the Norfolk fine sandy loam is not as strong a soil as the shallow and medium phases of the type, but on the other hand it makes heavier yields than does the more droughty Norfolk fine sand. It is especially adapted to sugar cane, watermelon, sweet and Irish potatoes, and corn. The varieties of cotton grown are inclined to produce heavy growth of stalk with but little fruit, particularly in wet years. The crop also suffers considerably from rust. The average yield of sirup is not as high as on the heavier soils, but the quality is superior. Heavy applications of fertilizer are needed to bring the yields up to as much as 400 gallons an acre. From 1,500 to 2,000 pounds of high-grade fertilizer, in conjunction with liberal applications of cotton-seed meal or barnyard manure, is not considered too much for a good crop. Barnyard manure is less apt to cause deterioration in qualities of the sirup than on the heavier soils. A yield of one-half car of watermelons per acre can be secured with an application of from 500 to 800 pounds of a 10-3-4 fertilizer, used in conjunction with cotton-seed meal or barnyard manure. Sweet potatoes run from 150 to 300 bushels. Cotton yields from one-fifth to one-

third bale under the prevailing methods of soil treatment, while corn runs from 10 to 25 bushels. The yield of oats is relatively low. Cabbage, tomatoes, and English peas can be successfully grown with heavy applications of fertilizer and barnyard manure. The soil is a little too light for best results with peanuts and onions. Fairly good crops of crab grass are secured from watermelon fields.

The organic-matter content should be increased by plowing under green or half-matured crops of grass, cowpeas, and other legumes. Cowpeas and velvet beans should be grown in rotation with all crops. Fall plowing is not needed, except to turn under a covering of vegetable matter. Fertilizers for cotton should run high in phosphoric acid and potash and low in nitrogen. Five hundred pounds of a 10-2-8 brand per acre has been found a very effective application.

The following table gives the results of mechanical analyses of the several phases of Norfolk fine sandy loam:

Mechanical analyses of Norfolk fine sandy loam.

No.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>
Shallow phase:								
18058.....	Soil.....	0.0	2.5	3.4	48.9	23.6	17.6	4.8
18059.....	Subsoil.....	.3	1.7	3.2	42.7	17.7	18.9	16.3
18060.....	Lower subsoil....	.4	2.3	3.2	45.6	9.8	18.5	21.1
Medium phase:								
18589.....	Soil.....	.1	4.7	7.3	48.3	17.8	9.2	12.6
18590.....	Subsoil.....	.1	3.0	6.3	34.6	13.3	5.8	37.1
Deep phase:								
18045, 18047.....	Soil.....	.3	3.1	2.3	55.1	23.9	10.0	4.6
18046, 18048.....	Subsoil.....	.3	2.7	1.8	48.0	19.2	7.8	19.5
18049.....	Lower subsoil....	.3	3.1	3.3	40.1	23.9	9.0	20.2

ORANGEBURG SANDY LOAM.

The Orangeburg sandy loam is a dull-gray to grayish-brown medium sandy loam, underlain at from 10 to 15 inches by a red friable sandy clay. It is generally rolling and well drained, usually occupying the slopes of streams. There are only a few small isolated areas in the county. It is confined largely to the general belt of the coarser soils in the northern part of the county.

The type is adapted to about the same crops as the Orangeburg fine sandy loam, from which soil it differs only in being coarser in texture and a little less productive.

The following analyses of soil and subsoil show the composition of this type:

Mechanical analyses of Orangeburg sandy loam.

No.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
18593	Soil	4.3	31.2	7.6	30.6	17.3	4.7	3.9
18594	Subsoil	3.8	28.7	6.4	16.8	8.1	4.1	32.2

ORANGEBURG FINE SAND.

The Orangeburg fine sand is a gray to grayish-brown fine sand, underlain at from 15 to about 28 inches by a reddish fine sandy loam, which quickly passes into a friable red fine sandy clay. A substratum of compact fine sandy clay mottled pinkish red, yellow, and drab is generally encountered at from 4 to 5 feet. Occasionally on steep slopes the surface soil has been washed off, leaving the clay subsoil exposed. Such "gall spots" are generally too small to be shown in the map. As a rule the depth of the surface soil increases with descent of slope, the depth to the clay not infrequently being 3 feet or more on the lower slopes and in the valleys or in the interridge flats. The timber growth is mainly longleaf pine. Wire grass is abundant everywhere in the timber.

The topography of the type for the most part is rolling. In the southern part of the county it has been cut up considerably by erosion. The stream valleys are deep and broad and there are a number of hills or eminences from which good views of the surrounding country can be had. The slopes, however, are mostly gentle and washing is not serious. Sidehill ditches or terraces which follow the contours of the slopes are invaluable in the prevention and checking of erosion. Toward the northern part of the county the type gradually gives way to members of the Norfolk series and its surface configuration becomes less uneven. The natural drainage is good. Crops sometimes suffer from drought where the depth to clay is more than 20 inches.

The most extensive areas are those in the southern part of the county in the section drained by Pine, Wards, and Connell creeks and between Thomasville and Boston in the sections drained by Olive and Aucilla creeks. A considerable portion of the Orangeburg fine sand is under cultivation. Cotton is the principal crop, and generally enough corn is grown for home use. The average yields are lower than they should be, largely for the reason that much of the land is worked by careless tenants. When the soil is well supplied with organic matter, as can be readily done by growing cowpeas or velvet beans in rotation with cotton, corn, oats, or other crops, yields of from

one-half to three-fourths bale of cotton, 25 to 40 bushels of corn, and 20 to 40 bushels of oats per acre can be secured. The usual yields, however, are lower than these figures. Cotton seems to go less to stalk in wet seasons than on the Norfolk fine sand; still there is considerable trouble on account of this tendency of the plant. The crop suffers from rust occasionally and needs more potash than is generally applied. The experience of some of the most successful farmers on this soil indicates that a complete fertilizer carrying approximately 8 per cent phosphoric acid, 2 per cent nitrogen, and 6 to 10 per cent potash, applied at the rate of from 300 to 500 pounds an acre is a most excellent application, particularly when made in conjunction with barnyard manure, or a green manuring crop, as, for instance, cowpeas. Sorghum and sugar cane do well, and a good quality of sirup is made. Vegetables, like beans, Irish potatoes, watermelons, cantaloupes, and cucumbers, can be successfully grown. The type produces a good grade of cigar-wrapper tobacco when the depth to the clay is 20 inches or more.

Land of this type of soil can be bought for \$5 to \$10 an acre.

The following table shows the results of mechanical analyses of typical samples of the Orangeburg fine sand:

Mechanical analyses of Orangeburg fine sand.

No.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
18596	Soil.....	0.1	1.5	2.7	65.5	18.3	6.1	5.5
18597	Subsoil .....	.0	.9	1.7	52.6	12.1	5.3	27.7

ORANGEBURG FINE SANDY LOAM.

The surface soil of the Orangeburg fine sandy loam consists of a brown, reddish-brown, or dull-gray fine sandy loam, ranging from a few inches to 15 inches in depth. The brown and reddish-brown colors in the soil usually give way to lighter colors with increase in depth to clay, and the texture also becomes somewhat lighter where the subsoil lies at a greater distance from the surface. The subsoil is a friable red fine sandy clay to a depth of 36 inches or more, below which is usually found a mottled compact friable sandy clay, similar to that underlying the Orangeburg fine sand and the better drained Norfolk soils. Along the steep stream slopes the subsoil sometimes becomes quite plastic and the type here occasionally grades into the Susquehanna fine sandy loam. Both soil and subsoil hold moisture well and under normal conditions the subsoil usually has about the same degree of friableness as that of the Norfolk fine sandy loam, but when wet it is a little more sticky and plastic.

Small iron concretions or pebbles occur in local areas, most commonly on the crests of ridges and knolls, where erosion has been active and the surface soil is shallow. These pebbles may be found interspersed evenly throughout the soil and subsoil, or they may occur most abundantly in sections of the soil mass at various depths. The pebbly or "pimply" areas are considered most productive. The depth to the subsoil usually increases on the lower slopes, owing to removal of the soil from higher to lower positions by wash. In some of the small valley-like locations between knolls and hills, the soil depth is sometimes greater than 15 inches, and the subsoil instead of being red is more nearly yellow in color. The type is locally styled "red clay" or "red land" according to the color of the soil and depth to clay.

This soil is more inclined to wash than any other type in the area, owing to the fact that the subsoil takes up water rather slowly. During the heavy rainfalls the soil soon becomes supersaturated and has a tendency to flow and wash away. This accounts for the "gall" or "clay spots" here and there on the steeper slopes. On the whole such eroded areas are scarce and the total acreage of land damaged in this way is small. The tendency to wash can be reduced to a minimum by increasing the water-holding capacity of the soil and subsoil by means of deep plowing and the incorporation of organic matter by turning under manure, cowpeas, or other crops. Much can also be done to check erosion by constructing sidehill ditches and by terracing.

The Orangeburg fine sandy loam occurs most extensively in the southern half of the county. Its surface is generally the most rolling of any soil type in the area, excepting perhaps the Orangeburg fine sand. Much of it occurs on the steeper stream slopes. It is also sometimes encountered in small areas in nearly flat bodies on the uplands and often on the crests of ridges and hills. Sink holes are fairly abundant.

On account of the rolling character of the surface the natural drainage is good. Crops suffer very little from drought; in fact, rather more injury comes from an overabundance of moisture in wet seasons, when cotton frequently produces an immense stalk with but little fruit.

The timber growth is mainly longleaf pine. There are hammock areas, both in the uplands and along slopes, which support heavy growths of dogwood and oak, with a scattering of hickory. Here the soil is generally shallow and more loamy than usual. Clumps of mayhaw, black gum, and cypress are frequently seen in the sink holes and swampy depressions, while in the better drained pine woods there is always a good growth of wire grass.

The Orangeburg fine sandy loam is a productive, durable soil. It is best adapted to cotton, oats, and forage crops. Corn does only

moderately well. Heavy yields of sirup can be made, but the quality is inferior both in color and flavor to that produced on the Norfolk soils. The acreage yield of cotton runs from about one-half to 1 bale, of corn from 8 to 15 or 20 bushels, and of oats from 15 to 30 bushels. Rather poor average yields of oats are secured, for the reason that the crop is too often sown in late winter or spring on, roughly prepared land, whereas it should be sown in the fall or early winter on a well-plowed and thoroughly harrowed seed bed.

Judging the experiences of good farmers, the best commercial fertilizer for cotton, corn, and oats should analyze about 10-2-5. Fertilizer applications for cotton should be somewhat lighter upon this type than upon the Norfolk soils, the usual rate being from 300 to 400 pounds to the acre, according to the depth of soil and the organic matter content, lighter applications being necessary on the shallow "pimply" phase. For corn and oats, 250 to 350 pounds is sufficient. Barnyard manure is the best fertilizer that can be used on this soil, although cowpeas and velvet beans help wonderfully, whether cut for hay, grazed, or plowed under. These crops should be grown in rotation with the other general farm crops and occasionally on the deep phase a crop of cowpeas should be plowed under while in the half-matured stage. Commercial fertilizers should always be used in conjunction with some form of organic matter. Deep fall plowing should be practiced generally.

The Orangeburg fine sandy loam is not considered a good wrapper-tobacco soil. The leaf is inclined to be thick and coarse textured, and the burn is often poor, but it is the best filler-tobacco soil in the country. It should produce from 500 to 1,000 pounds or more per acre of the Cuban filler type. Crimson clover would do well on this soil. Alfalfa probably would succeed on the heavy or hammocky areas. Irish potatoes do well where the soil is from 10 to 15 inches deep. The type is not so generally suited to vegetables as are the Norfolk soils. Peanuts, sorghum, and vetch can be grown successfully. Cowpeas for hay would prove a profitable crop. Vetch as a winter cover-crop would protect slopes from washing and at the same time improve the soil and furnish an excellent early spring forage or grazing crop.

The following table shows the results of mechanical analyses of this type:

Mechanical analyses of Orangeburg fine sandy loam.

No.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
18591	Soil	0.6	5.9	9.8	50.0	16.7	7.5	9.3
18592	Subsoil .....	.3	4.0	6.4	41.6	11.4	8.5	27.4

PORTSMOUTH SANDY LOAM.

The soil of the Portsmouth sandy loam is a dark-gray to nearly black medium sandy loam, carrying a high percentage of organic matter and averaging about 15 inches in depth. The subsoil is a gray or drab sandy loam, frequently mottled with reddish and yellow colors. It is always quite compact and usually saturated with water below 24 inches. Sometimes the soil is a sand to a depth of 3 feet or more, in which case the lower material is exceedingly compact and wet. The type represents areas in which the drainage has been so imperfect as to favor the accumulation of organic matter.

The Portsmouth sandy loam occurs largely in the northeastern part of the county, occupying gentle undulating and flat upland country, stream slopes, and slight depressions. The timber growth is largely longleaf pine, and in the poorer-drained locations it usually supports a thick growth of gallberry bushes, and frequently "bugles" and palmettoes. The type is sometimes spoken of as "mud-land," and is generally considered poor, and but little is under cultivation. When drained, good cotton can be grown where there is a sandy loam subsoil within 10 to 20 inches of the surface, and upon such areas good sugar cane, rice, corn, and strawberries could also be produced. By means of open ditches drainage may be established with little difficulty, except upon those areas which have a quicksand subsoil. The quicksand caves in and causes much trouble with the ditches. Such areas, however, are easily determined by the fact that they support a growth of "bugles" or palmettoes.

The following analyses of soil and subsoil show the composition of the Portsmouth sandy loam:

Mechanical analyses of Portsmouth sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
18556	Soil	1.0	17.1	11.5	38.6	23.4	6.4	1.9
18557	Subsoil	1.5	14.9	10.9	33.5	18.6	5.3	15.0

PORTSMOUTH FINE SANDY LOAM.

The Portsmouth fine sandy loam occurs as flat upland, as upland depressions, and as areas along the slopes and around the heads of streams. The soil varies from a dark-gray to nearly black loamy fine sand to a fine sandy loam, and generally passes at from 10 to 15 inches into a light-gray fine sand. At about 20 to 25 inches this light material grades into a gray or drab heavy fine sandy loam to clay loam, mottled with yellowish and reddish colors. The lower subsoil is almost always saturated. Frequently in the flat areas the

material included between 10 to 20 inches has a dark-brown, iron-stained appearance, which has been caused by the precipitation of iron hydrates from the leachings of the surface soil. In many places the light-gray fine sand persists to a depth of 3 feet or more, but such bodies represent areas that were too small to warrant separation. In the depressions fine material has washed in from the surrounding higher land, giving the soil here a more loamy texture than is typical.

The Portsmouth fine sandy loam consists of the same soil material that constitutes the Norfolk fine sandy loam, except that there is more clay in the subsoil of the latter. The difference between these types has been brought about largely by the poor drainage conditions that have obtained in the Portsmouth fine sandy loam, conditions that have favored the accumulation of dark-colored vegetable matter in the soil portion and that have hindered oxidation of the subsoil by exclusion of air.

The timber growth consists mainly of longleaf pine. There is, however, considerable "slash" pine along the slopes of streams and in depressions. A dense undergrowth of gallberry bushes is everywhere present, and in places where the soil is underlain by "quicksand" or saturated material palmetto and pitcher plants (locally called "bugles") are common. The bugle land and palmetto flats are considered as being extremely poor. The line of separation between this soil and the better drained Norfolk and Orangeburg soils can be pretty accurately determined by a careful observation of the vegetal growth. There is much less wire grass and always a heavier growth of gallberry on this type than on the well-drained soils. The stream slope phase often follows up gentle slopes nearly to the general upland level, and occasionally extends out into the uplands as broad stretches of "piney woods" or "gallberry flats," as in the case of the large area on Lost Creek. There are some level areas lying next to and at a slight elevation above the bottom land along the rivers and some of the larger streams, such as the body west of the Ocklocknee River on the Atlantic Coast Line Railroad. Although these areas at first sight have the appearance of second bottoms, they probably are not true second terraces, inasmuch as similar flat areas are common in the uplands at considerable distances from streams. On the steeper slopes the type is generally found next to the stream meadow land as narrow strips. Many areas occur as slight depressions around the heads of streams, occasionally in deep amphitheaterlike excavations, representing probably old sink holes which have had their sides eroded away.

The type is found largely throughout that part of the county lying north of the main line of the Atlantic Coast Line Railroad. It is

much less conspicuous south of this line and in the Meigs and Ella Belle districts. In the northern part of the county it is closely associated with the Portsmouth sandy loam, where it occurs as flat and gently undulating areas of longleaf-pine land. There are a great many small bodies of the type, mainly depressions and wet-weather ponds, throughout the county which were too small to show on the map. The more swampy of these are known as "black gum," "cypress," or "mayhaw" ponds, according to the timber growth.

The Portsmouth fine sandy loam is generally considered an unproductive soil, and for this reason only a small portion has ever been put under cultivation. It is believed, however, that the main bodies of the type could be drained readily by means of deep open ditches and put into a fairly productive condition. The chief trouble would come from caving and filling in of the sandy subsoil. Some of the narrow slope strips have a substratum of impervious clay, which would make drainage rather difficult, if not ineffective. At present, however, the question of drainage is not pressingly important because of the extensive areas of uncleared, well-drained lands that are available for cultivation.

This soil thoroughly drained would produce good corn, strawberries, onions, and probably sugar cane and celery. Some good crops of rice have been grown without ditching. A few areas that were brought under cultivation by ditching have, after several years' cultivation, become somewhat lighter in color as a result of the better aeration and organic matter decomposition.

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

Mechanical analyses of Portsmouth fine sandy loam.

No.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per ct.</i>
18558, 18561.....	Soil.....	0.4	3.0	4.1	60.6	23.2	6.6	2.5
18559, 18562.....	Subsoil .....	.1	2.5	3.5	63.8	19.8	5.9	4.9
18560, 18563.....	Lowersubsoil.	.2	2.3	3.5	58.1	21.9	6.4	7.6

PORTSMOUTH FINE SAND.

Only a small extent of the Portsmouth fine sand was mapped in Thomas County. The soil, to a depth of about 8 inches, is a black fine sand of high organic matter content. This is underlain at about 8 inches by either a gray or an iron-stained fine sand, which, at about 2 feet, passes into a compact gray or drab fine sand, usually saturated with water. This lower saturated portion caves and flows in exca-

vations in such a way as to make drainage of the type rather a serious problem. The largest area lies 2 miles east of Thomasville. Several areas had to be included with the Portsmouth fine sandy loam because of their small size and intricate association with this type.

The type is of little agricultural value. Rice, probably, could be grown with a fair degree of success, and corn and sugar cane probably would do fairly well with the establishment of good drainage.

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

Mechanical analyses of Portsmouth fine sand.

No.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
18554	Soil	0.9	6.3	6.0	62.8	13.7	7.2	2.3
18555	Subsoil .....	.7	4.9	5.3	58.9	21.4	6.7	1.4

SUSQUEHANNA FINE SANDY LOAM.

The Susquehanna fine sandy loam is a dark-gray fine sandy loam, underlain at a depth of from 6 to 20 inches by mottled pinkish-red and drab stiff impervious clay or by a yellow clay slightly mottled with red and drab. This subsoil material when wet is extremely plastic and adhesive and when dry becomes very hard. The mottled clay sometimes passes into a greenish-yellow or a white material free from grit which resembles fuller's earth. A piece of this impalpable material will stand for days in running water without showing signs of disintegration. In marginal strips along stream slopes the depth of soil is quite variable, increasing with the descent of slope, accordingly as material has accumulated from above by wash. Limestone fragments are sometimes seen in the subsoil, and there are some small strips along the steeper slopes where limestone comes quite near the surface. Here the subsoil color is usually a greenish yellow and it would seem that such areas have been at least partially derived from limestone. There are several small flat upland areas, like the one south of Ochlocknee.

The Susquehanna fine sandy loam is usually referred to as "pipe clay." Small upland areas where the subsoil is quite near the surface are sometimes called "cowhide land." The type is quite limited in extent. A number of areas were too small to be shown on the map. Practically none is under cultivation. The timber growth is mainly longleaf pine.

Cotton, peanuts, and forage crops would do fairly well. Sweet potatoes, vegetables, tobacco, and fruits would not succeed.

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

Mechanical analyses of Susquehanna fine sandy loam.

No.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>	<i>Per cent.</i>
18598	Soil.....	0.7	2.9	1.2	26.7	43.7	14.5	10.1
18599	Subsoil .....	.0	.6	.2	7.7	16.2	10.4	64.1

CHASTAIN FINE SANDY LOAM.

The Chastain fine sandy loam comprises the more open, broad river and stream bottoms, which are fairly uniform in soil texture.

The bottom lands or "river flats" of the Ocklocknee River consist for the most part of grayish and dark-gray fine sandy loam to fine sand, underlain usually at from 2 to 4 or 5 feet by an impervious stiff fine sandy clay mottled drab, yellow, and red. This clay sometimes comes very near the surface, especially near the line of contact with the upland soils in which situations the soil is more soggy than where there is greater depth to the clayey material. In case of the typical or loamy phase the soil ordinarily is a light fine sandy loam, dark-gray at the surface and gray or drab below, while the subsoil is a yellow drab, or a mottled yellow and drab, clammy fine sandy loam to fine sandy clay. The lighter phase, occurring mainly as small erratic mounds, consist of a grayish fine sand, underlain by a drab or light-gray material of the same texture.

The surface of the Chastain fine sandy loam is quite flat except for occasional interruptions by sloughs, old stream channels, and small depressions, some of which contain water the year around. In some of the old stream channels and small depressions the soil is usually dark colored and mucky. The bottom lands of the Ocklocknee River vary in width from a quarter to three-quarters of a mile, and are so subject to overflow that none of the type is at present under cultivation.

The Chastain fine sandy loam is popularly considered very poor land. Much of the type could be improved by ditching and made to produce grass and forage crops; but with the large extent of available upland it is not likely that any attempt will be made to bring this soil under cultivation in the near future. At present it is covered with longleaf pine, which is valuable for the production of lumber and turpentine. Scattering gallberry bushes and palmettoes are common.

A considerable total area of the Chastain fine sandy loam is found along such streams as Aucilla, Big, Coon, Pine, Piscola and Wards

creeks, and here the impervious clay substratum is not so near the surface, and the soil proper is a uniform light fine sandy loam.

It is believed that with ditching much of this type, in particular that found in the southern part of the area along Wards, Pine, Aucilla, and Connell creeks, where overflows are less common and a considerable extent is not subject to overflow at all, could be brought into condition for growing good crops of corn.

MEADOW.

Broadly speaking, Meadow includes land which is too wet for cultivation, yet not so poorly drained as to be covered with water. For convenience and more specific treatment the type will be discussed under three heads or phases: Meadow of the poorly drained small stream bottoms; the quasi-bottom lands, and the Meadow found in upland depressions.

Adjoining nearly every small stream in the area are narrow strips of poorly drained, soggy bottom land of variable texture which receive much seepage water from adjacent slopes and rarely dry out to a good firm condition. They usually begin around the heads of streams, even of those which run only in wet seasons, and follow along as marginal strips to the more open bottom land of the larger streams. Such land, though quite variable in texture, is generally dark-colored and mucky in the upper portion and quite sandy below. Nearly white sand is found to a depth of 3 feet or more in places. Occasionally a stiff whitish or bluish-drab clay occurs at a depth of 3 feet, sometimes in the shape of lenses, the interstitial material being sandy. Again the soil may be a heavy loam or a silt loam. The timber growth consists mainly of magnolia, bay, maple, poplar, beech, longleaf and shortleaf pine. There is always a dense undergrowth of gallberry and other water-loving shrubbery. These wet bottom lands are popularly considered as worthless for agricultural purposes, and practically none is under cultivation. Corn would do well in many places, were the land thoroughly ditched and drained.

Another grade of Meadow, or quasi-bottom land, is found in the southern part of the county, where in some of the broad valleys and in the lower situations good soil has been brought down from the slope and deposited along the small streams and sloughlike waterways. Some of these waterways are merely sloughs, the water soaking in the ground or running only in protracted wet seasons and during heavy rainfalls. Such land is quite diverse in composition, but when ditched thoroughly produces good corn and oats. Live oak and pine constitute the common timber growth on this grade of Meadow.

Still another class of Meadow is found in the shallow sink-hole depressions which contain water during a part of the year. Such land

embraces those shallow ponds that are usually dry in summer. Some of these depressions hold water the year around and are called "may-haw," "cypress," or "black gum" ponds, according to the growth. Many of the areas were too small to be shown on the map. Certain areas could be drained and utilized for the production of rice.

Not much of the Meadow type will be put under cultivation until the country is much more thickly settled and the well-drained uplands more generally utilized.

SWAMP.

The areas mapped as Swamp embrace the excessively wet stream bottoms, as for example such as are found bordering the lower courses of Aucilla and Pine creeks.

The soil is a dark-colored material with a wide range of texture and is more or less commingled with decaying vegetation. These Swamp areas gradually blend with the somewhat better drained meadow land. Along the eastern end of Lake Linton in the southeastern part of the county is a body of Swamp about 1 square mile in extent which consists of a marshlike flat nearly always covered with water. This phase of swamp known as "prairie land" supports a luxuriant growth of water-loving grasses (mainly reeds) very valuable for pasturage.

SUMMARY.

Thomas County, situated in southwest Georgia, on the Florida line, has an extent of 345,728 acres or about 540 square miles. The topography varies from flat to gently rolling. There are broad stretches of interstream country in which the drainage systems are so immature that considerable bodies of land are too wet for agriculture in their natural state. The Big and Little Ocklocknee rivers and the larger creeks like the Aucilla, Pine, Wards, Big Piscola have broad bottoms which are in whole or in part subject to annual overflow. These streams have cut comparatively deep valleys.

The summers are long and hot, though not as hot as would be expected in this latitude on account of moderating breezes from the Gulf. The mean temperature of the three hottest months, June, July, and August, is 81° F.; the mean temperature for the coldest months, December, January, and February, being 53° F. Snow seldom falls, but heavy frosts may be expected at any time from the middle of November to the first of March.

Transportation facilities are very good for the larger part of the county. Railroads radiate in 6 directions from Thomasville. The dirt roads are straight and are kept in remarkably good condition throughout the year.

It also lies in the best part of the sugar-cane sirup region. A large quantity of sirup is made, and the industry is gradually being extended upon a profitable basis.

Cotton, both, the long and short staple varieties, is produced throughout the area. Corn, oats, velvet beans, cowpeas, sorghum, and other forage crops, sweet potatoes, and peanuts (for hogs) are grown extensively throughout the area. Watermelons are an important specialty.

Pears, figs, grapes, and plums do well on the better drained soils. There are unlimited opportunities for the development of the trucking industry.

There is a considerable acreage of land which will produce good yields of the very best quality of the Sumatra wrapper type of tobacco. There is also an extensive area of land highly adapted to the Cuban filler tobacco.

More barn manure should be produced and larger quantities of "compost" used. Home mixing of fertilizers is profitable. Both cotton-seed meal and cotton seed are excellent fertilizing materials.

Too little attention is paid to rotation. The same crop should not be grown continuously on the same land, but the crop should be changed from year to year.

The soils of Thomas County vary from moderately heavy fine sandy loam to gravelly or "pimply" sandy loam. Besides the miscellaneous soils there are representatives of three important series—the Norfolk, Orangeburg, and Portsmouth series.

The Norfolk fine sandy loam has been divided into three phases, according to variation in depth to the yellow clayey subsoil. The shallow phase (with a soil depth of a few inches to 10 inches) is well suited to cotton, oats, forage crops, and peanuts, but is a little too heavy for best results with corn, tobacco, sugar cane, watermelons, potatoes, and truck generally; the medium deep phase (10 to 20 inches to the subsoil) is the best sugar cane and Sumatra wrapper tobacco soil of the region and produces good corn, potatoes, forage crops of all kinds, vegetables, and fair cotton. Pecans, pears, plums, and grapes do well. The deep phase (20 to 30 inches to the subsoil) produces very fair corn, an excellent quality of sugar-cane sirup, and various vegetables, but is too droughty for tobacco without irrigation. Cotton is inclined to go too much to weed in wet seasons. All crops require extra heavy applications of fertilizer and manure on this last phase.

The Norfolk fine sand is very similar in its crop adaptations to the deep phase of the Norfolk fine sandy loam, but is more droughty and requires heavier manurial applications. It is an excellent vegetable, but a poor cotton soil.

The Norfolk sandy loam produces good crops of all kinds of vegetables, forage crops, and such fruits as are adapted to the climate. Cotton does very well when the depth of the surface soil is not over 15 inches, as do also peanuts and oats. Sugar cane, corn, and sweet potatoes require a soil depth of from 10 to 20 inches for best results. Strawberries, though not extensively grown, would do well on the shallow phase of this soil. The type is not quite as productive as the Norfolk fine sandy loam. The fruit crops adapted to this latitude do well on this type.

The Norfolk sand is a loose, droughty soil which requires large manurial applications, particularly of organic manures, for profitable returns. Green crops should be plowed under in the half-matured stage occasionally. It is a warm-natured soil well suited to extra early truck.

The Tifton sandy loam is the best cotton soil of the area. It makes heavy yields of sirup, but the quality is somewhat inferior. Oats, corn, and forage crops do well. The type is generally not so well suited to truck crops as the lighter soils. It produces extra early vegetables. Cotton, with fair treatment, produces a bale to the acre. The long staple finds its requirements more nearly met than on other soils except some of the shallow "pimply" phases of the Norfolk sandy loam and fine sandy loam, which give about the same results.

The Orangeburg fine sandy loam is admirably adapted to the production of the Cuban filler type of tobacco. It also produces excellent crops of cotton, oats, and forage crops. Corn does fairly well, as do also peanuts, sweet potatoes, Irish potatoes, and watermelons. Good yields of sirup are made, but sometimes the color is quite dark, especially where the subsoil comes near the surface. Vegetables generally are only moderately successful. Pecans, pears, and plums do well.

The Orangeburg fine sand produces good corn, forage, and truck crops, as in case of the other deep sandy soils. Cotton is apt to weed out badly in wet seasons and rust in dry seasons. Sweet potatoes, Irish potatoes, and watermelons do well. Sumatra wrapper tobacco does fairly well on this soil, where the underlying clay is not nearer the surface than 22 inches.

The Orangeburg sandy loam is suited to about the same crops as the Orangeburg fine sandy loam, the essential difference between the types being that the latter is a little more productive and requires lighter manurial applications.

The Portsmouth soils, on account of their poor drainage conditions, are not cultivated except to a very small extent. When the sand persists to greater depths than 15 or 20 inches the type is rather unproductive even when well drained. It is believed that rice, cotton, and

sugar cane would do fairly well on the fine sandy loam. Very little use can be made of the Portsmouth soils without extensive ditching.

The Susquehanna fine sandy loam is an unimportant type and owing to its unfavorable topographic position and poor subsoil aeration quite unproductive. Very little is under cultivation.

The Meadow is predominantly sandy and unproductive on account of poor drainage conditions. None of this type is under cultivation, but a considerable proportion could be brought into fair condition of productiveness by artificial drainage.

The methods of cultivation in general are suited to the soils and conditions, especially in the production of sugar cane, cotton, melons, and peanuts. Some improvement, however, might well be made in the culture of corn, potatoes, and vegetables. The preparation of land for oats generally is too meager. The heavier soil should be plowed deeper and earlier. The well-drained soils that have been under cultivation for any considerable time are generally in need of organic matter, such as can be supplied to best advantage by growing cowpeas, velvet beans, vetch, etc., to be grazed, mowed, or turned under in the green or half matured stage. Commercial fertilizers when used should be applied generally in conjunction with some form of vegetable manure, as barnyard or stable manure, or vegetable matter plowed under.

Inasmuch as stock can be grazed the year round on vetch, rape, rye, oats, Bermuda grass, cowpeas, sorghum, and velvet beans, it would seem that the raising of more live stock would be profitable, particularly when the value of the increased supply of manure is considered.

There are good opportunities for agriculturists in Thomas County. The soils are adapted to a wide range of crops, and good land can be bought at moderate prices. Few sections offer more attractive inducements to the man of small means or to the capitalist desiring to engage in either specialized or general farming.

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