

SOIL SURVEY OF THE BAINBRIDGE AREA, GEORGIA.

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LOCATION AND BOUNDARIES OF THE AREA.

Decatur County is situated in the extreme southwestern part of Georgia. It is separated from Alabama and Florida on the west by

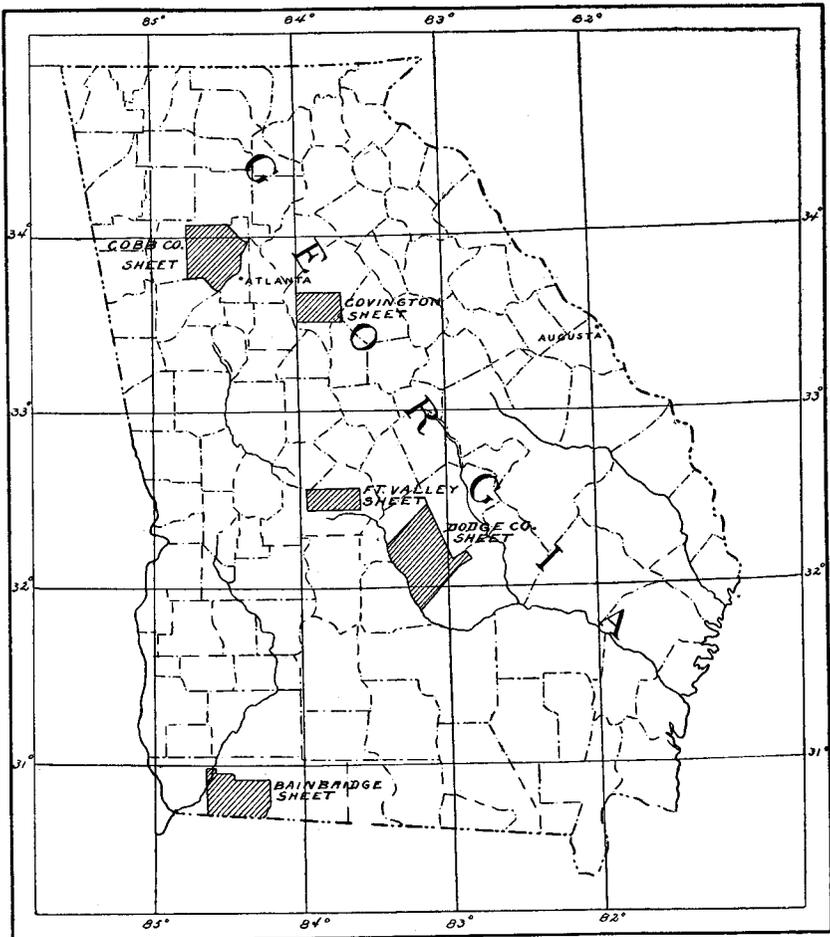


FIG. 9.—Sketch map showing location of the Bainbridge area, Georgia.

the Chattahoochee River, and borders the latter State on the south. The Flint River flows across the county from the northeastern part

to the southwest corner, where it joins the Chattahoochee River to form the Apalachicola, which empties into the Gulf of Mexico at Apalachicola, about 90 miles farther south. The Ocklocknee River forms about 6 miles of the southeastern boundary of the county, and empties into Apalachee Bay.

The area surveyed comprises 364 square miles in the southeastern part of Decatur County. It joins Thomas County on the east and Gadsden County, Fla., on the south.

Bainbridge, the largest town in the area, with a population of about 3,000 is located at the head of navigation on the Flint River, which flows a distance of 10 miles in the northwest corner of the area. Whigham and Climax are small towns on the railroad in the northern part of the area, and Cairo is an active business town of larger size a half mile east of the area, on the same line of railroad.

The present survey connects with the survey of Gadsden County, Fla., made in 1903, and includes the remainder of the lands in this region on which Sumatra tobacco has been successfully grown under shade. In physical features, soil conditions, climate, and agricultural development the two areas are very similar. For this reason, instead of restating the facts, and to assist in a clearer understanding of the conditions in the region as a whole, frequent reference will be made in this report to the earlier report, which forms a part of Field Operations of the Bureau of Soils, 1903.

HISTORY OF SETTLEMENT AND AGRICULTURAL DEVELOPMENT.

The cultivation of crops in this area has been in progress for a century. In common with a large part of the surrounding country, this region was settled by people who came mostly from Virginia and the Carolinas. The tracts along the streams, commonly known as "hammock land," of a distinctly sandy texture, with a large content of decaying organic matter, were the first to be cultivated, and continued to be used almost exclusively for farming purposes until 1865, or even later. In such areas the timber is a mixed growth of pine and hardwood. Shortleaf pine, oak, and hickory are the most common species, and longleaf pine and sweet gum are of frequent occurrence. The chief crops grown were cotton, tobacco, sugar cane, and corn. For the production of the best tobacco, which was a wrapper type, fresh hammock land was considered necessary. Hence the location of the crop was frequently changed to newly cleared lands. The open forests of longleaf pine that cover the low, flat divides between the streams remained uncleared, and were considered of no agricultural value.

Within the last forty years there has been a radical change in the treatment of these open forest lands, and they are now the most extensively cultivated and command the highest prices of any in the area. The "hammock land" has depreciated relatively in value. Much of it along the streams is still cultivated, but owing to the uneven surface and poor drainage of some areas, and to the fact that the soil is not very durable, its permanent improvement has not kept pace with that of other soil types.

As a result of the changed conditions after the civil war, the farms became smaller and consequently more numerous. There has been some change also in the kind of crops grown and their relative extent. Instead of making cotton the principal crop, such supply crops as corn, sugar cane, sweet and Irish potatoes, peanuts, and other legumes are grown. The farmers, by diversifying their crops, are enabled to produce more of the necessaries of life and buy less from abroad. Cotton and sugar cane are grown as money crops. Tobacco, after many fluctuations, is now the leading money crop on the larger and better managed farms. The history of the changes in tobacco production has been given somewhat fully in the Gadsden County report, and will not be repeated here. The Sumatra leaf, which was introduced twelve or fourteen years ago, and which began to be grown under artificial shade of cloth or slats in 1895, is increasing in production. In the Bainbridge area the lath construction has been substituted for nearly all of the cloth shade. The production of all crops except cotton is increasing, leguminous crops are receiving more attention, and their production is arousing more interest in the raising of live stock.

CLIMATE.

The normal annual temperature of the region is about 66.5° F., and the annual precipitation averages 54 inches. Freezing temperatures occasionally occur during the winter months, and sometimes there are light snowfalls, but neither of these conditions is of long duration and is soon followed by mild temperatures and light frosts at night. Fogs frequently occur in the morning, but generally disappear by 9 or 10 o'clock, and the proportion of days with cloudy or overcast sky is relatively small. The precipitation during the growing season of seven months—from March to September, inclusive—is 37 inches.

More detailed information is afforded by the following table, taken from the records of the Weather Bureau stations at Bainbridge and Thomasville.

Normal monthly and annual temperature and precipitation.

Month.	Bainbridge.		Thomasville.		Month.	Bainbridge.		Thomasville.	
	Tem- pera- ture.	Precip- itation.	Tem- pera- ture.	Precip- itation.		Tem- pera- ture.	Precip- itation.	Tem- pera- ture.	Precip- itation.
	° F.	Inches.	° F.	Inches.		° F.	Inches.	° F.	Inches.
January	49.2	0.87	51.9	3.64	August	81.1	6.12	80.7	6.33
February	49.6	7.57	52.5	4.88	September ..	77.1	3.16	77.1	4.44
March	60.8	11.85	60.6	4.51	October	66.9	1.96	68.2	3.41
April	65.1	1.01	67.5	3.74	November ..	56.9	1.55	58.9	2.73
May	74.4	3.40	74.1	3.92	December ..	52.0	4.44	52.3	4.26
June	81.2	4.85	79.7	5.40	Year..	66.4	53.42	67.1	54.15
July	82.0	6.64	81.5	6.89					

PHYSIOGRAPHY AND GEOLOGY.

The area surveyed is divided into two parts by a low, broad, flat watershed, the crest of which extends from southwest to northeast through Fowlstown and Climax and separates the waters of the Ocklocknee River and its tributaries from the basin of the Flint River.

About one-third of the area is north of this divide. The surface there is usually very gently rolling or flat, but in a few places the elevations are greater and the slope more abrupt. From 2 to 4 miles north of the crest of the divide the surface descends by a rather steep slope a distance of from 20 to 50 feet, below which begins a region with a somewhat billowy surface that broadens toward the north and extends beyond the Flint River. The Flint River in this part of the area is peculiar in that it does not receive any surface tributaries of any kind and has no border of low wet land to mark its flood level. In the adjacent country occur many small depressions, into which short, broad ravines lead, and during rains the water runs to these depressions, where it sinks into the sandy bottom or disappears in a crevice. The movement of the water is not usually sufficiently rapid to erode a channel. The country where this peculiar drainage system is found has an extent of about 35 square miles.

The region between the country just described and the escarpment already mentioned has another distinctive system of drainage. A number of small streams begin on the divide, where for a short distance they have rather steep walls, but soon pass out on a flat sand plain, over which they wander and finally flow into small lakes or ponds from which the water is drained below the surface. Several of these lakes are connected by streams, and in times of much rainfall the level of the water may be raised so that the direction of flow is reversed. The lakes are shallow and flat and may increase greatly in extent in times of heavy rainfall. The final outlet of these "sinks" is not known.

South of the divide there are a half dozen large creeks that have a southerly course. Three of these pass into the eastern part of

Gadsden County, Fla., where they form the Little River. Many smaller streams empty into these creeks, and narrow areas of low, wet, swampy land border all their channels. The slope usually descends sharply from the upland to the swamp, and thus forms a rolling and hilly surface. This feature is most accentuated in the southern part of the area along the Florida line. The slopes become more gentle toward the north and the minor divides finally unite around the heads of the streams to form the flat, open country of the main watershed. The largest creeks in the southern part of the county are Willocoochee, Attapulcus, Swamp, Bryants Mill, and Tired creeks. They are of the dendric type, and divide and subdivide until they are mere threads of water with a series of small springs as their source.

The largest timber, as well as the greatest variety of species, is found along these streams and in the swampy bottoms. It consists of both pine and hardwood. Oak, hickory, walnut, sweet and sour gum, magnolia, bay, dogwood, and liveoak are the principal hardwood species. In the most swampy places in the stream bottoms and on the divides the cypress occurs. Away from the streams the timber is almost exclusively longleaf pine on the heavier soils and a species of scrub oak on very sandy soils. These forests are open and the trees branch high. They cover a large part of the surface of the county.

The material forming the surface of the country to depths of several hundred feet consists of marine sediments, and belongs to the Eocene geological period, formerly known in part as the Lafayette. It is composed of sands and clays forming strata varying in thickness and unevenly stained red, orange, or yellow by compounds of iron. In the northern part of the area, particularly on the west side of the Flint River, a ledge of limestone is exposed. The clay, with few exceptions, contains a very large proportion of sand of medium and fine grades. Along the creeks in the southwestern part of the area deposits of fuller's earth outcrop frequently, and deposits containing phosphate are reported in one or two places.

The materials forming the present soil covering of the region appear to be shore and shallow sea deposits (McGee).

SOILS.

The Ocklocknee River and the large creeks in the southern part of the area are bordered by deep sand. North of the sand and extending about 3 miles north of the crest of the main watershed a sandy clay occurs within 2 or 3 feet of the surface. This broad area has a northeast and southwest trend. On the southern side the color is chiefly red, and a similar color prevails in smaller areas on the northern side, but the broad central divide is composed mainly of yellow sandy clay. Northwest of this broad tract of sandy clay subsoil the deep sand again occurs, extending over the remainder of the

area, its continuity broken only by limited tracts of heavier soils. All the types have a very sandy top soil. The extent of the different types is given in the following table:

Areas of different soils.

Soil.	Acres.	Percent.	Soil.	Acres.	Percent.
Norfolk fine sandy loam	93,248	40.1	Meadow	14,336	6.2
Orangeburg fine sandy loam.	36,480	15.7	Gadsden sand	7,488	3.2
Norfolk sand	29,696	12.8	Portsmouth sand	3,456	1.4
Norfolk sandy loam	24,576	10.6	Ocklocknee clay	832	.3
Orangeburg sand	22,592	9.7	Total	232,704	-----

ORANGEBURG FINE SANDY LOAM.^a

The soil of the Orangeburg fine sandy loam is a brown fine sandy loam or fine sand, or a somewhat lighter-textured gray fine sandy loam. The sand is largely of fine and very fine grades, except in the northwestern part of the area around Bainbridge, where it is coarser. The average depth is about 10 inches. The subsoil is a dark-red sandy clay, the sand here also being of the fine and very fine grades. The type is developed chiefly in the southern part of the area along Attapulcus Creek and on the bluffs a few miles back from Ocklocknee River. Other important bodies occur from 4 to 6 miles south of Bainbridge and a few miles east of Whigham along Tired Creek in the eastern part of the area. A few smaller bodies are found at other points.

The Orangeburg fine sandy loam forms the most hilly portion of the area and sometimes has rather steep slopes. The hills are comparatively high, with rounded outlines, and are so situated that good drainage is established. The type never occurs in very wet or springy places. The most hilly portions are along Attapulcus Creek and its tributaries.

The slope of the surface usually insures good drainage. The soil absorbs water quickly, but does not permit it to pass quickly into the subsoil. The latter also holds moisture well, and yet does not become very wet. Where the slope is such that the surface water drains off rapidly both the soil and subsoil are quickly eroded away, and when a considerable depth is attained the process of erosion is difficult to stop, because the seepage of water from the soil at the base renders the material loose and caving rapidly enlarges the channel. Brush affords one of the most effective means of stopping this washing. The surface washing is commonly kept in check by contour cultivation and by sidehill ditches.

^a The same soil in the Gadsden County survey across the line in Florida was mapped as Orangeburg sandy loam.

The materials making up this soil are of sedimentary origin, and form a stratum from 5 to 30 feet in thickness that usually rests on sand. The dark-red color is due to the presence of iron, which has been concentrated in some parts of the soil to such an extent as to form dark-brown concretionary pebbles. These are unevenly distributed, but are very abundant over limited areas of the type.

This soil type is the best in the area for the production of cotton and filler tobacco. The yield of cotton without fertilizer is about one-half bale per acre, and with moderate fertilization 700 pounds of tobacco per acre can be produced. It is not considered a good soil for the growing of Sumatra leaf under shade, because the product is heavy and dark colored and the burn is often inferior.

Sugar cane on this soil type produces from 12 to 23 barrels of sirup per acre, but the quality and flavor are not the best. The yield of corn is from 8 to 12 bushels per acre, and of oats about the same.

The heavier areas of the type constitute the best cotton land, and the lighter portions are the best for producing filler tobacco. The Orangeburg fine sandy loam has a good basis for increasing its productivity, and only needs to be enriched in organic matter.

The following table shows the mechanical analyses of typical samples of this soil:

Mechanical analyses of Orangeburg fine sandy loam.

No.	Locality.	Description.	Gravel, 2 to 1	Coarse sand, 1	Medium sand,	Fine sand, 0.25	Very fine sand,	Silt, 0.05 to 0.005	Clay, 0.005 to
			mm.	to 0.5 mm.	0.5 to 0.25 mm.	to 0.1 mm.	0.1 to 0.05 mm.	mm.	0.001 mm.
			<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>
10721	7 miles SE. of Whigham.	Brown sandy loam, 0 to 10 inches.	0.8	3.7	8.3	45.2	24.9	7.6	9.5
10719	3 miles SE. of Attapulgus.	Medium sandy loam, 0 to 10 inches.	1.9	7.9	10.6	37.2	25.3	7.1	9.9
10723	4½ miles S. of Bainbridge.	Brown sandy loam, 0 to 9 inches.	1.7	5.5	6.9	37.0	33.3	4.6	11.0
10722	Subsoil of 10721	Red sandy clay, 10 to 36 inches.	1.0	2.6	5.8	35.8	20.5	5.8	28.5
10720	Subsoil of 10719	Sticky, red sandy clay, 10 to 36 inches.	.3	2.0	3.3	37.6	18.4	6.1	32.2
10724	Subsoil of 10723	Red sandy clay, 9 to 36 inches.	1.3	4.2	5.2	25.7	24.1	4.7	34.8

ORANGEBURG SAND.

The Orangeburg sand is a dark-gray loamy sand, having a depth of 7 inches, underlain by a rust-colored sand, about 13 inches in thickness, which grades into a dark-red sandy clay. The distinction between this type and the Orangeburg fine sandy loam is in the greater depth to the red clay. In the southern and eastern parts of the county the fine and very fine grades of sand predominate, but

to the northwest the proportion of medium and coarse grades is greater. Where this type occurs along the Flint River above Bainbridge the subsoil is heavy, impervious light-orange clay, with a small content of sand, and distinctly heavier than the normal subsoil of this type.

The largest bodies of the Orangeburg sand occur around Bainbridge. Tracts less than a square mile in extent are found frequently on the main divide and in the southern part, where the red clay is most prominent. The surface is rolling, but less hilly than that of the Orangeburg fine sandy loam. Many of the areas have an even, moderately sloping surface. This type of soil does not occur in wet positions and the drainage is good. The rapid movement of water over the surface causes serious erosion, but the considerable depth of sand tends to check the damage by quickly absorbing the water.

The material composing this soil type is of marine sedimentary origin. Concretionary pebbles of a dark-brown or yellowish color occur in this material, but are unevenly distributed and not usually very numerous.

All the crops commonly grown in the region are produced on this type of soil. Corn yields from 10 to 12 bushels per acre; sugar cane, from 8 to 15 barrels of sirup per acre, and cotton an average of one-third bale per acre. Not much tobacco is grown on this soil, its cultivation being confined to the southern part of the area, where, under shade and with heavy applications of fertilizer, about 1,000 pounds of wrapper leaf are produced per acre. The quality is good and the color light, but the burn is not as good as in tobacco grown on some of the other soils. The type is regarded as a fairly good tobacco soil in the southern part of the area, while in the northern part its adaptability to tobacco growing has not as yet been demonstrated.

The following table gives the mechanical analyses of typical samples of this soil:

Mechanical analyses of Orangeburg sand.

No.	Locality.	Description.	Gravel, 2 to 1	Coarse sand, 1	Medium sand,	Fine sand, 0.25	Very fine sand,	Silt, 0.05 to 0.005	Clay, 0.005 to
			mm.	to 0.5 mm.	0.5 to 0.25 mm.	to 0.1 mm.	0.1 to 0.05 mm.	mm.	0.001 mm.
			<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>
10717	5½ miles SE. of Attapulugus.	Brown sand, 0 to 20 inches.	0.4	4.8	7.3	41.8	29.7	6.9	9.2
10715	1½ miles S. of Bainbridge.	Brown sand, 0 to 18 inches.	4.5	18.5	17.0	28.2	12.6	7.3	11.9
10716	Subsoil of 10715	Red sandy clay, 18 to 36 inches.	7.0	19.1	13.2	21.8	8.7	6.0	24.1
10718	Subsoil of 10717	Dark-red sandy clay, 20 to 36 inches.	.5	3.7	5.4	32.2	25.0	4.7	28.1

NORFOLK FINE SANDY LOAM.

The Norfolk fine sandy loam to a depth of 7 inches is a gray fine sandy loam, usually darkened by the presence of organic matter. To a depth of 15 or 18 inches occurs a gray or yellow light sandy loam, which grades into a lemon-yellow sandy clay, becoming somewhat heavier as the depth increases. The sand is coarser in the northwestern part of the area than in the southern part, where it consists of fine grades. North of Bainbridge and for several miles north along the Flint River the subsoil clay is much heavier than in the true type, and of an orange or red mottled shade. It is quite impervious to water, and is closely related to the modification of the Orangeburg sand already discussed.

The Norfolk fine sandy loam is the most extensively developed type in the area, and occupies a strip from 6 to 10 miles in width on the main divide. It surrounds small bodies of other types, and detached bodies of it occur along the Flint River. The largest areas have an even surface, with a slight slope. Adjacent to streams the surface is more broken. Open forests of longleaf pine cover a large part of this type in the central part of the area, while in small shallow depressions, in which the accumulation of water forms permanent swamps, a growth of sour gum and cypress is found.

The material composing this type is of marine sedimentary origin and forms a stratum from 6 to 30 feet in thickness.

The yellow clay frequently appears as a narrow border along creeks and branches where the upland type is a red clay. The iron, which forms so prominent a mineral constituent of the material in general, has accumulated locally and formed yellow pebbles, which are unevenly distributed through the soil mass and in different parts of the area. They are very abundant around Climax for a distance of 2 or 3 miles, where the clay subsoil comes rather near the surface, and they are more common in the flat pine woods than in the more rolling region adjacent to the larger streams. They are frequently abundant over small areas in all parts of the type.

The crops grown and average yields per acre are about as follows: Cotton, one-third of a bale; corn and oats, from 12 to 20 bushels; sugar cane, from 12 to 20 barrels of sirup, and tobacco, from 600 to 800 pounds of filler leaf in the open and from 1,000 to 1,300 pounds of wrapper leaf under shade. These yields are secured by the use of fertilizer in varying quantities. The application in the case of sugar cane is from 800 to 2,000 pounds, and where tobacco is the crop, from 1,000 to 3,000 pounds per acre. From 100 to 400 pounds are used in growing the other crops. On this soil tobacco is grown only in the southern part of the area, where the streams are numerous, the pro-

duction being limited almost entirely to areas along the creeks, which unite in Florida to form the Little River.

The Norfolk fine sandy loam more uniformly produces the best grades of wrapper-leaf tobacco than any other soil type in the area. There is seldom any defect in quality, color, or burn where the clay subsoil is a bright yellow, the sand from 12 to 18 inches deep, and iron pebbles are not abundant. It is the opinion of leaf buyers in the region that first-grade wrappers can not be produced on the large bodies of this type in the northern and central parts of the area, which are covered with open forests of pine. Whether this is so, however, has not been proved by actual tests under the best conditions. On the other hand, some fairly good crops have been obtained from small plots of this soil, as it occurs in those parts of the area.

The Norfolk fine sandy loam is also well adapted to sugar cane, and a uniformly good quality of sirup is produced. The yield is a little lower than on the red clay types, but the flavor and color of the sirup are better. This crop may be grown in any part of the type, although the moist areas are best. Peanuts, velvet beans, and other leguminous forage crops may be grown, and add greatly to the productivity of the land, especially if corn or oats is the crop to follow.

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

Mechanical analyses of Norfolk fine sandy loam.

No.	Locality.	Description.	Gravel, $\frac{2}{3}$ to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			<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>
10707	3 miles NE. of Attapulgus.	Dark gray sand, 0 to 16 inches.	2.7	8.2	9.0	39.4	26.5	5.9	8.3
10711	2 miles W. of Whigham.	Light sandy loam, 0 to 20 inches.	1.3	8.8	10.5	37.2	25.1	7.0	10.2
10709	$\frac{1}{2}$ mile N. of Calvary.	Fine loamy sand, 0 to 15 inches.	.2	1.8	2.3	34.1	44.3	6.3	11.0
10712	Subsoil of 10711	Yellow sandy clay, 20 to 36 inches.	1.7	7.9	8.5	31.2	22.8	6.3	21.6
10710	Subsoil of 10709	Yellow sandy clay, 15 to 36 inches.	.1	1.1	1.5	26.2	34.7	5.9	30.6
10708	Subsoil of 10707	Yellow sandy clay, 16 to 36 inches.	1.7	5.8	5.9	29.1	19.9	5.5	31.9

NORFOLK SANDY LOAM.

The Norfolk sandy loam consists of 7 inches of a light-textured dark-gray sand, or sandy loam, underlain by a white or yellow sand, or light sandy loam, that grades into a yellow clayey sand, which at a

depth of 30 inches passes into a yellow sandy clay. The type differs from the Norfolk fine sandy loam in its greater depth of sand.

The Norfolk sandy loam does not occupy large areas. Its main bodies are found 2 miles north of Climax and between that town and Whigham. Smaller tracts occur in the areas of yellow clay subsoil where the depth of sand is greater than 28 inches. The surface slopes gently or is almost flat. The areas north of Climax and one a few miles below Bainbridge are low and poorly drained. A number of small areas adjacent to streams are due to the accumulation of sand by erosion. These are usually well supplied with water, and crops may be grown on almost any of them during the greater part of the year.

Some tobacco of fair quality is produced, and good yields of corn are obtained from this type of soil, but it is too light for the successful growing of cotton or sugar cane, and is easily affected by drought. It is not naturally a productive soil, but being favorably situated with respect to moisture conditions some areas give very satisfactory yields of the crops grown.

The following table gives mechanical analyses of this soil:

Mechanical analyses of Norfolk sandy loam.

No.	Locality.	Description.	Gravel, 2 to 1	Coarse sand, 1	Medium sand,	Fine sand, 0.25	Very fine sand,	Silt, 0.05 to 0.005	Clay, 0.005 to
			mm.	to 0.5 mm.	0.5 to 0.25 mm.	to 0.1 mm.	0.1 to 0.05 mm.	mm.	0.001 mm.
			<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>
10701	4 miles N. of Climax.	Sandy loam, 0 to 28 inches.	2.1	9.1	10.3	37.7	30.5	6.0	4.1
10699	4½ miles SE. of Attapulcus.	Gray to yellow sand, 0 to 32 inches.	3.3	8.9	7.6	38.0	29.4	6.4	6.2
10702	Subsoil of 10701	Yellow clayey sand, 28 to 36 inches.	2.7	9.0	9.9	37.1	27.6	4.7	8.9
10700	Subsoil of 10699	Yellow sandy clay	4.6	8.9	6.1	33.7	26.4	5.9	14.2

NORFOLK SAND.

The Norfolk sand is a loose dark-gray sand, 6 inches deep, underlain by 3 feet or more of loose white or rusty-yellow sand. Within 2 miles of Bainbridge the sand is coarse in texture and contains a very noticeable amount of fine gravel. In the southern part of the area the finer grades of sand are more prominent.

The largest body of the Norfolk sand occurs in the northwestern part of the area north and east of Bainbridge, where it forms broad stretches of country. The sand here is very loose and clean, and the timber consists of pine and oak. The two species usually occur in different positions, and much of the pine is large and thrifty. This is probably due to the presence of clay within from 4 to 6 feet of the surface. The oak growth is small and stunted, which indicates a

soil of very deep sand. These relations between the vegetation and the depth to subsoil also hold where the type occurs in other parts of the area. Areas of the Norfolk sand of considerable extent are also found on the lower slopes along the Ocklocknee River, Swamp Creek, and the smaller streams, and small bodies are scattered through other parts of the area.

In general the surface of the Norfolk sand is gently rolling, or billowy, although there are some small tracts where the surface has a uniform, moderate slope. The loose, open character of the soil insures good drainage, except in a few small areas where it is surrounded by a rim of clay or where it receives the drainage from clay slopes at a higher level. The sand forming this type was laid down in shallow water over an uneven surface of clay, which explains its greatly varying thickness.

About one-third of the small bodies in the southern part of the area and along the Ocklocknee River, the most productive part of the type, is under cultivation. A smaller proportion of the large area in the northwestern part of the survey is cultivated. The crop yields are uniformly low and all crops are quickly affected by periods of drought. Along the streams corn yields from 10 to 15 bushels per acre, but on some of the upland areas only from 5 to 7 bushels are obtained. Cotton and sugar cane can not be profitably grown because of the low yields, although the quality of the sirup is very good. From 700 to 900 pounds of very good wrapper leaf is the usual yield of tobacco in a season of abundant rainfall, and with the application of the average quantity of fertilizer. The productivity of the virgin soil decreases rapidly under cultivation, and the type is so loose and porous that its crop-producing power can not be greatly increased. In crop adaptation this type is an early truck soil, for which purpose it is much used along the Atlantic seaboard.

The following table gives the mechanical analyses of typical samples of this soil:

Mechanical analyses of Norfolk sand.

No.	Locality.	Description.	Gravel, 2 to 1	Coarse sand, 1 to	Medium sand,	Fine sand, 0.25	Very fine sand,	Silt, 0.05 to 0.005	Clay, 0.005 to
			mm.	0.5 mm.	0.5 to 0.25 mm.	to 0.1 mm.	0.1 to 0.05 mm.	mm.	0.001 mm.
			<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>
10695	4½ miles SE. of Attapulcus.	Dark sand, 0 to 6 inches.	1.8	8.3	9.1	44.5	29.9	3.8	2.4
10697	3 miles S. of Bainbridge.	Brown sand, 0 to 12 inches.	2.8	11.1	10.8	36.2	32.1	4.0	2.7
10696	Subsoil of 10695	White sand, 6 to 36 inches.	1.2	7.2	8.1	43.4	33.2	4.5	2.1
10698	Subsoil of 10697	Medium to fine sand, 12 to 36 inches.	1.7	9.8	10.8	31.1	34.3	4.5	2.4

GADSDEN SAND.

The Gadsden sand is a dark sand 8 inches deep, underlain by a dark or orange sand of the finer grades. In the southern part of the area fine grades predominate.

The type is of limited extent and is distributed in small bodies throughout the area. It is distinguished from the Norfolk sand by its darker color, more loamy character, and by a less depth to the clay. The surface is gently rolling on the upland and more level and flat along streams. The lower areas have been formed largely from material washed down from the heavier types.

Corn yields from 10 to 20 bushels, and wrapper tobacco about 900 pounds per acre. The quality, color, and burn of the leaf are good. The yield of sirup ranges from 8 to 12 barrels per acre, and the quality is good. The cotton yields from one-half to 1 bale per acre. The type is well adapted to early truck, melons, and small fruits, and to light wrapper tobacco if the moisture supply is insured by irrigation. It is the best corn soil in the area.

The mechanical analyses of typical samples of the Gadsden sand are given in the following table:

Mechanical analyses of Gadsden sand.

No.	Locality.	Description.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.
10703	2 miles SE. of Calvary.	Dark sand, 0 to 16 inches.	0.9	5.2	7.7	48.6	28.8	4.1	4.7
10705	3 miles S. of Bainbridge.	Dark-brown sand, 0 to 14 inches.	3.3	17.6	18.5	32.8	17.5	4.3	5.8
10704	Subsoil of 10703	Brown sand, 16 to 36 inches.	.8	4.6	7.1	50.3	29.4	3.7	4.0
10706	Subsoil of 10705	Brown sand, 14 to 36 inches.	2.9	17.2	17.1	33.0	18.3	4.5	6.8

PORTSMOUTH SAND.

The Portsmouth sand is a dark or black sand, from 8 to 20 inches deep, underlain by a white sand saturated with water. The color of the top soil is due to the presence of a large amount of organic matter.

A few small bodies of this soil type occur at various points in the area, in low places along streams and around lakes or ponds, where the surface is flat and the drainage poor.

Probably all this type could be drained and cultivated. In a few places crops of sugar cane and corn are grown and the yields are large. The soil is too wet for peanuts, potatoes, or tobacco, but with

proper drainage good crops of sugar cane, corn, and cotton can be grown.

The following table gives the mechanical analyses of this type:

Mechanical analyses of Portsmouth sand.

No.	Locality.	Description.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.
10693	2 miles SE. of Bainbridge.	Black sand, 0 to 10 inches.	7.2	27.2	23.8	29.6	6.8	3.0	2.4
10694	Subsoil of 10693	White sand, 10 to 36 inches	2.2	13.2	19.7	55.7	6.5	1.0	1.5

OCKLOCKNEE CLAY.

The soil of the Ocklocknee clay varies from a dark sandy loam to a heavy clay, from 5 to 12 inches deep, resting on a black or mottled red, stiff, plastic clay. The largest area of this soil lies 4 miles east of Bainbridge, and other small bodies occur in that vicinity and along the Flint River.

The surface is low, flat, and poorly drained, and this condition has probably assisted in the formation of the type. A stratum of fine-grained stiff clay outcrops at various points near the Flint River, and modifications of this material by water and plant remains have given it the characteristics of the type recognized. It is not cultivated, but if drained it would produce good cotton crops. Near Bainbridge the soil is used in the manufacture of brick.

The following table gives the mechanical analyses of this type:

Mechanical analyses of Ocklocknee clay.

No.	Locality.	Description.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.
10713	3½ miles NE. of Bainbridge.	Clay, 0 to 10 inches	0.3	0.8	0.5	1.1	1.6	15.3	80.3
10714	Subsoil of 10713	Drab, stiff, impervious clay, 10 to 36 inches.	.5	1.5	1.2	4.2	4.2	14.1	73.6

MEADOW.

The streams in the area, except the Flint River, are fringed by low, wet, swampy soils of a variable character. The material consists of

deposits from flood waters mixed with organic remains, and is usually a medium black sandy loam. It is cut by abandoned channels of the streams, in which are occasional pools of water. This land is so near the present level of the streams that it could not be permanently drained, but if it were cleared, and open ditches cut, grass might be grown with success on portions of it. None of this Meadow soil is at present under cultivation. The timber is a mixed growth of shortleaf pine, elm, magnolia, dogwood, bay, cypress, sweet and sour gum, and a few other species.

AGRICULTURAL METHODS.

The crops grown are cotton, corn, sugar cane, oats, tobacco (both wrapper and filler), Irish and sweet potatoes, velvet beans, cowpeas, peanuts, and small quantities of melons, small fruits, and truck. No systematic method of cropping is practiced. The land is plowed from 3 to 6 inches deep with a small, one-horse turning plow. Harrows, surface packers, or small-shovel cultivators are not used in the preparation of the seed bed. Most of the crops are planted in furrows made with the turning plow.

Fertilizers are applied to practically all crops, and the amounts used per acre range from 100 to 400 pounds for corn and cotton, from 1,000 to 2,000 pounds for sugar cane, and from 2,000 to 3,000 pounds for tobacco. The fertilizers consist of vegetable products like cotton-seed meal and hulls and mineral compounds. In addition to these some barnyard manure is used. The fertilizer or manure is generally applied in the spring before seeding, but for sugar cane and tobacco later applications are made during the growth of the crop. All fertilizers are distributed by hand or by means of a small tin tube $3\frac{1}{2}$ feet in length.

Corn is dropped by hand, one grain at a time, from 4 to 6 feet apart in the row. Some farmers alternate the rows of corn with rows of peanuts, claiming that the same quantity of corn is produced by this method and that the peanut crop is a clear gain. The peanuts are not harvested in the usual way, but are left to be rooted out by hogs. This is a popular method of fattening hogs.

In the fall the leaves or blades of the corn while still green are gathered from the stalks, the ears of corn being left to mature. These are gathered with the shuck on. The stalks are not cut.

A one-horse seeder is sometimes used in planting cotton. About 2 bushels of seed are planted to the acre, and the plants are thinned to a distance of about 8 inches apart in the row. A little Sea Island cotton is grown in addition to the short staple variety.

Sugar cane is propagated by means of buds from the nodes of the stalks, which are preserved through the winter in windrows lightly

covered with earth. In the spring the stalks are cut into 18-inch lengths and distributed along the furrow.

Oats are planted both in November and the latter part of January. The relative advantages of the two times of seeding are dependent upon the climatic conditions, which vary from season to season. The crop is cut and bundled, but not thrashed to any great extent. The crop is sometimes used for spring pasture, and should find greater favor for this purpose.

Tobacco is grown both in the open and under artificial shade. The former is chiefly a Havana filler, while the latter is exclusively a wrapper. The seed is sown in early spring—the last of February—in freshly cleared, moist land, rich in organic matter, and is covered with a loose meshed cloth. The plants are transplanted to the field by hand about the 1st of May, when from four to five leaves have developed. From forty-five to sixty days are required for the plants to mature. During this time constant care and cultivation are given. The leaves are primed separately and cured on lath stringers in specially constructed and well-ventilated barns. Following the curing process the leaves are fermented (“sweated”) in large piles in a moderately heated warehouse in a moist atmosphere. The temperature of the bulk is limited to 140° F., and is controlled by reconstructing the piles (“rebulking”). The number of rebulkings is governed by the character of the crop.

The methods used in growing the other crops are less well defined. All crop rows are run on contours, and sidehill ridges are generally constructed on steep slopes. Both methods check erosion.

Very few cattle are fed for beef or dairy purposes. Inclosed pastures of cultivated grasses are not maintained, but the stock are permitted to graze in the forests and unplowed fields, where they feed on wild bunch grasses. The pasture range is burned over each spring to destroy the dry stems of the preceding year's growth, so as to render the young blades of grass accessible.

The soils generally are deficient in organic matter and in water-holding power. The depth of plowing should be gradually increased to 8 inches, especially on the heavier types of soil, and plant remains incorporated as rapidly as conditions will permit. It is the opinion of many farmers in the region that the plowing under of green-manuring crops in any considerable amount is injurious to and lessens the productivity of the soil for several seasons. Opposed to this idea is the practice of some of the most successful farmers in the same region, who have gradually deepened their soil and have found that the amount of plant remains that may be safely covered is increased proportionately. The presence of organic remains increases the water-holding power of the soil and hinders erosion. The light sandy soils should be packed by rolling and the surface made

loose by shallow cultivating. On one or two farms the modern weeder is in use. This is an effective implement for creating a shallow surface mulch.

It is believed that the raising of live stock on a more extended scale would be practicable and profitable. The lack of forage and pasture may be largely supplied by legumes preserved in silos, and cultivated pastures of such crops as oats and rye, two or three crops of which might be grown each year, would also serve this purpose. The large amount of cotton-seed meal used as fertilizer would be little reduced in fertilizing value if passed through good dairy or beef cattle before being applied to the land, provided the manure were carefully preserved.

It seems probable that by careful management in the early stages alfalfa may be grown successfully on most of the well-drained areas of several of the finer textured soil types. Recently the Egyptian legume berseem has been recommended to the farmers in this region. Both of these crops produce hay of fine quality, and are of thrifty growth in semiarid regions, yielding three or four good cuttings each season.

AGRICULTURAL CONDITIONS.

The farmers in this area can not be described as either wealthy or prosperous, but in financial condition and home comforts they will compare favorably with the farming classes of other regions in the Southern States. Improvement is taking place along many lines, and old ideas and methods are being abandoned for a more modern and progressive system. The good price of farm products during the last few years has been a large contributing factor in this progress. In addition the farmers have lately begun to diversify their crops and to raise the various products needed for home consumption. The acreage of cotton has been relatively reduced and that of other crops extended. Many farmers have abandoned cotton entirely. Free rural mail delivery has assisted in creating an interest in affairs beyond the limits of the county, and the farmers are learning more of the needs of the region as compared with other sections of the country. The attention of men of means in Northern States is being directed to the possibilities which this region offers. The result of all these factors has been a rapid increase in the price of farm lands in every part of the area. Not many years ago the maximum price of average farming land was not over \$10 an acre, with the minimum below \$3. Now good farming land several miles distant from a railroad or town will bring \$5, while land favorably situated is valued at from \$15 to \$25 an acre, and in some instances even higher prices are demanded.

The farm buildings are usually small and cheaply constructed. Small one-room log cabins are common, and many of the better dwellings are two or three roomed structures of logs. Distributed throughout the area are a number of large dwellings of the style of forty years ago. Large, well-constructed buildings for live stock are not essential because of the mild winter climate, and the few crops stored require only a small space. The tobacco barns are well built, and the packing houses and warehouses of the large tobacco concerns are modern structures of brick and wood.

The live stock consists of horses, cattle, mules, sheep, hogs, and goats. All of these are of mixed strains and are small in size. Near Bainbridge several herds of cows are kept for dairying purposes. Besides the common mongrel cattle generally seen, some Jerseys are maintained by a few farmers who sell butter to the local markets. But the butter thus produced could not compete in the markets of the large cities, because it is deficient in quality and flavor as compared with the northern product. This is probably due in a great measure to the character of the feed. The hogs are the small, slender rangers of no, or at best a slight, admixture of blood of established breeds. They live chiefly by foraging, except in the fall, when they are fed on peanuts. A few sheep are pastured in the pine woods, and common goats are kept to furnish fresh meat for the home table. According to the census of 1900 the average value of live stock per farm in Decatur County was \$173.

Very little machinery is used. The plows are small and require only one horse. The seeding is mostly done by hand, and the sweep style of cultivator is generally used. A very few disk plows have been introduced, and on the largest tobacco plantations disk harrows and other modern implements may be found. The horsepower sugar-cane press is a common piece of equipment on the average farm. The average value of farm machinery per farm is \$42.

According to the last census returns 51.3 per cent of the farms in the county are operated by the owners, and probably nearly all of those classed as owners are white. The tenants are chiefly negroes. Both the cash and crop-rent systems are practiced.

The size of farms varies from less than 100 acres to several thousand, and farms of several hundred acres are numerous. The area of cultivated land on each farm is relatively small, and ranges from about 30 to 250 acres. A large part of the area is occupied by forests. The census returns give the average size of farms as 134.4 acres, of which about one-third is improved. A large tobacco corporation owns a tract of many thousand acres in the south central part of the area, on which the chief products are tobacco and sugar cane. The cultivated land of this immense tract is divided into about 25 farms,

and each is superintended by a foreman, under the direction of the plantation manager.

Most of the farm work is performed by colored labor, except on the small farms, where the white owner and his family do most of the work. Where a large number of hands are employed they are usually under the direction of a white overseer. The wages range from 30 cents a day for women and children to 75 cents for men, and this does not include board.

Cotton has long been a staple crop and is produced widely throughout the area, but to a less extent at present than formerly. It grows best on the heavy red clay and the low rich sandy soils along the streams. The Sea Island cotton, of which only small quantities are produced, yields only about half as much lint as the short-staple variety, and is more expensive to cultivate. The wilt disease and black rot affect the crop in a small way. The former is said to be most injurious on very heavy soils. Injury by insects is not serious.

Corn has a large acreage, but the yield is rather small, the average for the county being about 8 bushels per acre. The white dent strain is generally grown. It is all used for local consumption.

Sugar cane has increased in prominence as a money crop within the last few years, and is very generally grown. A large number of barrels of sirup are shipped from the area annually, and Cairo, a town just east of the area, is the largest shipping point for this product in the Southeast. At Amsterdam, on a branch railroad from Climax, is located a mill equipped for manufacturing sugar. Part of the product of this mill also is sold as sirup. Sugar cane does best on the Norfolk fine sandy loam, and well on the Portsmouth sand if the soil is sufficiently drained. It is produced on other types, and on the Orangeburg fine sandy loam the yield is large, though the sirup is inferior in quality and color.

Oats are grown in a limited way for pasture and feed. Peanuts, cowpeas, and velvet beans are grown for feed, but the acreage of the last two is quite small.

Truck crops, melons, and small fruits are only produced for the small local markets. Around Calvary collards are grown in considerable quantity for seed, which is shipped to northern seedsmen. Two miles northwest of Bainbridge a vineyard covering 100 acres is being established this season, and melons and truck are being grown for the northern markets. The grapevines are planted on soil composed of from 7 to 20 inches of dark-gray sandy loam, underlain by a heavy reddish-yellow clay of a rather impervious character. The surface is undulating and has good natural drainage, except in limited areas.

Tobacco is the most prominent crop in the area, both the Havana filler and the Sumatra wrapper being grown. The former type is

the less important, and is grown in the open field. The present low price of the product limits the extent of its cultivation. The Sumatra is grown under expensive shades of lath and boards, and is heavily fertilized. The construction of the shade costs from \$200 to \$300 an acre, and the annual outlay for fertilizers ranges from \$50 to \$75 an acre. One company has about 550 acres of tobacco shade, and the numerous small growers will increase the total amount to probably 800 acres. In 1900 the acreage of both types of tobacco in Decatur County was 1,261 acres, and the yield 681,160 pounds. Practically all of this acreage was in the area surveyed. The final price (price to the manufacturers) of the wrappers ranges from \$1 to \$4 a pound. The acreage in this crop was considerably increased during the last year. Thus far its cultivation in the county has been confined to the southern part of the area surveyed. The filler leaf is most successfully grown on the Orangeburg fine sandy loam, and the wrapper does best on the Norfolk fine sandy loam and the Gadsden sand. The Norfolk sandy loam and the Norfolk sand produce a fine leaf, but in smaller quantities, and the crop on these types is more affected by summer droughts, since irrigation is not practiced in this county as it is in Gadsden County, Fla. The most satisfactory soil for the Sumatra leaf is a lemon-yellow sandy clay, containing few iron pebbles and overlain by about 18 inches of dark-gray sandy loam. Other types of soil in Gadsden County produce Sumatra tobacco, but in a less degree of perfection. On those soils having a red clay subsoil the burn and color of the wrapper leaf are sometimes inferior. The tobacco industry gives employment to hundreds of men, women, and children.

The same types of soil on which tobacco is grown successfully in the southern part of the area occur also in the northern and central parts, but the belief is prevalent among the tobacco buyers that a good leaf can not be grown in these latter positions. The impossibility of growing a fine tobacco in the open pine forests in the central and northern parts of the area remains yet to be demonstrated by a careful trial under favorable conditions. Records have been obtained of good crops in such positions.

The naval stores industry is an important one, and a number of turpentine stills are operated in the area. The longleaf pine in nearly every part of the region has been tapped by the boxing system. In one instance the new cup method is in operation. Turpentine orcharding and lumbering are rapidly depleting the forests, which were once very extensive. The longleaf pine thrives naturally on the soils of this region, and a cleared field, if left untilled, is soon covered with a thick growth of young pine.

Two main lines of railroad pass through the area, intersecting at Bainbridge. The Atlantic Coast Line runs east and west from Mont-

gomery, Ala., to Savannah, Ga. Branch lines connect Climax with the Louisville and Nashville Railroad at Chattahoochee, Fla., and with Amsterdam, in the center of the tobacco and cane growing district. The Georgia, Florida, and Alabama Railroad extends from Tallahassee, Fla., to Cuthbert, Ga., and is a direct line to northern cities. The Flint River is navigable for small steamers as far up as Bainbridge.

The country roads are constructed from the natural soil; hence many long stretches of road are very sandy. Only a few steep slopes occur, and these are chiefly in the southern part of the area. The sandy character of the roads materially reduces the rate of travel and the loads that may be drawn.

The crops marketed outside of the area are tobacco, cotton, and sugar cane sirup. Tobacco is handled chiefly by a few large local corporations. The crop of the small farmer is sold to the large packers and by them fermented, packed, and placed on the market.

The cane sirup is shipped to the large southern cities, very little being marketed in northern cities. Cotton, being a staple product, always has a definite market, and the direct lines of railroad traversing the area place it in easy connection with distributive exchanges on the coast. The local market is limited and easily supplied. All the crops not mentioned above are consumed at home. The lack of a sufficient home market and the distance to large markets have limited the production of melons, small fruits, and truck crops, to which large bodies of soil in the area are naturally adapted.

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