Issued May 29, 1911

U. S. DEPARTMENT OF AGRICULTURE,

BUREAU OF SOILS—MILTON WHITNEY, Chief.

SOIL SURVEY OF CAMPBELL COUNTY, VIRGINIA

BY

R. A. WINSTON

[Advance Sheets—Field Operations of the Bureau of Soils, 1909.]

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1911.

[PUBLIC RESOLUTION—No. 9.]

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

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

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

Approved, March 14, 1904.

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

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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS,
Washington, D. C., October 13, 1910.

SIR: A soil survey of Campbell County, Va., was completed during the field season of 1909. The selection of this county was made at the urgent request of the board of supervisors of the county.

I have the honor to transmit herewith the manuscript report and map covering this work, and to recommend their publication as advance sheets of Field Operations of the Bureau of Soils for 1909, as provided by law.

Respectfully,

MILTON WHITNEY,
Chief of Bureau.

Hon. JAMES WILSON,
Secretary of Agriculture.

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SOIL SURVEY OF CAMPBELL COUNTY, VIRGINIA.

By R. A. WINSTON.

DESCRIPTION OF THE AREA.

Campbell County is situated in the south-central part of the State, in the second tier of counties from the Carolina line. It is bounded on the north by the James River, separating it from Amherst County; on the northeast by Appomattox County; on the southeast by Charlotte County; on the south by the Staunton River, which here marks the northern boundary line of Pittsylvania and Halifax counties; and on the west and northwest by Bedford County. In outline the

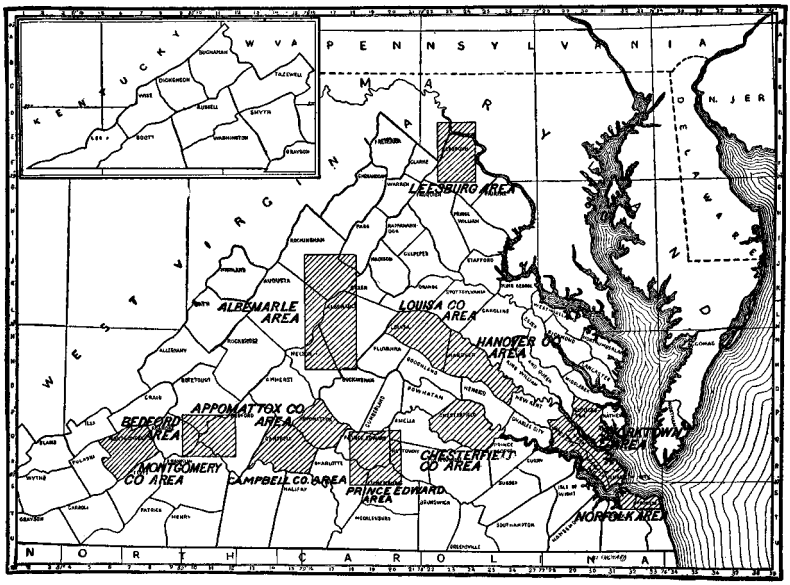

FIG. 1.—Sketch map showing location of the Campbell County area, Virginia.

county is very irregular. Its extreme length north and south is approximately 25 miles, while its east and west measurement is about 30 miles. The area included in the present survey comprises the entire county, covering approximately 550 square miles, or 352,000 acres.

The surface features of Campbell County are those of a rather high and rolling plateau deeply dissected by a complicated system of large and small streams, whose sloping valley walls have been largely

rounded by the agencies of erosion, and, in a great many cases, deeply gullied by surface waters. The topography varies from mountainous to very gently rolling, the broken mountainous areas being confined to a number of high ridges and series of hills in the northern and western portions. The very gently rolling to almost level areas occupy the usually narrow plateaulike elevations between the smaller stream valleys. The topography prevailing over most of the county, however, is rolling to very rolling. The northern, western, and southwestern parts of the county present a surface relief slightly more rolling than is found in the central, southern, and eastern portions, there being a tendency toward an easier topography with the general slope of the county from west to east. Flanking the courses of the larger drainage lines is usually a strip of country more or less broken and rolling.

The highest elevations are found in Long and Chandler mountains in the north-central part of the county, where a height of 1,400 feet is often reached. The average elevation along the divide that separates the waters of the James River from those of the Staunton River, and which passes across the county from east to west in a general line from Concord Depot to Rustburg to Bedford Springs, is about 850 to 900 feet. The northern slope to the James River level of 500 feet is about 10 miles, while the slope to the same level of the Staunton River covers a distance of about 25 miles. The elevation above sea level at Lynchburg is about 800 feet; at Rustburg 875; at Concord Depot 850; at Bedford Springs 800; at Lawyers 739; at Wyatt Shop 800; at Evington 724; at Lynch Station 730; at Leesville 620; at Altavista 560; at Gladys 785; at Naruna 667; at Marysville 525; at Brookneal 558; at Hat Creek 675. The valley walls of the James and Staunton rivers, while usually well rounded, are often quite steep and frequently intersected by an intricate system of narrow valleys fingering back into the uplands.

The two principal drainage systems of the area are the James River and the Staunton River. The divide separating the waters of these two systems passes across the county from east to west, giving to the James River drainage from the northern quarter of the county and to the Staunton River drainage from the southern three-fourths. The northern slope of the area is drained by Burton, Dreaming, and Black creeks, in the west; by Fishing and Opossum creeks, in the central portion; and by Beaver and Little Beaver creeks, in the east, all of these streams flowing in a general northward direction to the James River. The drainage south into the Staunton River is largely through three small drainage systems—Otter River and its tributaries, Buffalo, Flat, Troublesome, and Johnson creeks and Tardy Branch, in the southwest; Seneca River and tributaries and Whip-

ping and Hills creeks, in the central portion; and Falling River with its tributaries, Suck, Molley, Bear, Button, Entray, and Hat creeks, Plum, Burger, Pulliam, Rattlesnake, and Cane branches, and Little Falling River, in the east.

The original county of Campbell was formed from a part of Bedford County and named in honor of General Campbell, a Scotch-Irish patriot of Revolutionary fame. Its original outline was modified in 1845, when a part of its territory was cut off in the formation of Appomattox County. The establishment of the county dates from 1782, when a commission was issued by the governor authorizing a court. This early court was held over the county from house to house until the establishment of a county seat some years later, the place being designated as "Campbell Court House." In 1885 the name was changed to Rustburg.

The earliest settlement of the region antedates the Revolution, there having been a fair sprinkling of homesteads over the area as early as 1770. The original settlers were largely of Scotch-Irish extraction, coming from the Pennsylvania districts, with a sprinkling of Huguenots, Germans, and English colonists. A gradual settlement of the entire county has taken place; there has been no notable influx of settlers since its establishment. The advent of the negro dates from the earliest days of slavery, and the race has always represented, in point of numbers, a large proportion of the population. At present 40 per cent of the total population of 25,000 is colored.

New London, now called Bedford Springs, in the western edge of the area, the original county seat of the original "county of Bedford;" Campbell Court House, now known as Rustburg, in the north-central portion; and Hat Creek, in the southeastern portion of the area, were the earliest settlements in the county. Lynchs Ferry, where the city of Lynchburg now is, was an original line of travel across the James River. With the exception of Lynchs Ferry these old settlements as centers have lost prestige in the later development of the county. The building of railroads has resulted in the establishment of newer industrial and commercial centers, which have surpassed these older towns in everything except historic interest.

The intensity of settlement is controlled by the productivity of the soil, its ease of cultivation, its accessibility, and the conveniences of market facilities; hence the districts immediately surrounding the commercial centers represent the areas most thickly settled and most highly developed. However, the rural population is fairly well distributed throughout the area, except over the very hilly districts, where agriculture is hampered by surface conditions. No large section of the county is as yet supporting a settlement even approaching

its capacity, there being but a fractional part of the arable lands under cultivation, and the cultivated areas being handled in a manner that falls far short of bringing out their full producing capacity. The conveniences of telephone service, rural mail delivery, etc., are doing much to make the country districts attractive, and with the building of good permanent roads, from the abundance of road material at hand, much of the idle lands will be utilized and a more economic and progressive agriculture will develop.

While the area is largely an agricultural section and one of great possibilities, and while it must depend on its agriculture for any large measure of prosperity, there are other natural resources of importance. A number of lumber enterprises are found. Paving stones and rock material suitable for road building are valuable resources. Barite and manganese are mined commercially in the western part of the area just east of Evington. A manganese deposit in the eastern part of the county, which is also being successfully worked, is reputed to be of considerable magnitude.

The drinking water of the area is usually obtained from surface wells varying in depth from 10 to 75 feet. It is generally free from mineral impurities. There are some mineral springs of note in the county.

The system of railroads in the county is comprehensive and adequate to meet the traffic demands of almost every part of the county. The chief railroad center is Lynchburg, a city of 29,494 population, situated on the James River, in the northern part of the area. The Southern Railway, the Chesapeake and Ohio Railway, and the Norfolk and Western Railway all enter Lynchburg. The Virginian Railway, recently constructed along the Staunton River level, is in the southern part of the county. The Chesapeake and Ohio Railway crosses the county along the James River level. The Southern Railway enters the county from the north a few miles above the city of Lynchburg and follows the river level to that place, when it runs in a general southward direction through Lawyers, Evington, Otter River, Clarion, and Altavista, intersecting the Virginian Railway at the last-named point. The Norfolk and Western main line crosses the county from east to west, with a branch line extending from Lynchburg to Durham, N. C., and passing across the county from north to south. Rustburg, the county seat, Windfall, Gladys, Naruna, and Brookneal are the principal points along this branch line. Concord Depot, on the main line in the eastern edge of the county, is the principal railroad point of that section. The Virginian Railway crosses the branch line of the Norfolk and Western Railway at Brookneal. Both Brookneal and Altavista are thriving towns. This network of railroads affords direct connections with the chief cities of the East, and marketing facilities for all produce are directly at hand.

CLIMATE.

The climate of Campbell County is typical of that obtaining in the higher Piedmont Plateau region of the Middle Atlantic States. The winters are moderately cold and the summers usually hot. December, January, and February have a mean temperature of 39°, and June, July, and August a mean temperature of 76°. There are frequent variations in temperature during the winter and spring seasons, many of which are very severe, under the conditions of a humid atmosphere. There are seldom, however, any continued seasons of extremely cold weather, although the temperature may fall occasionally to zero. The summer and fall months are usually equable and pleasant, though the heat of summer is likewise intensified by the humid conditions and is occasionally very oppressive. The elevation above sea level gives a slightly rarefied atmosphere, and the summer nights are for the most part cool and very pleasant.

The climate is favorable to the growing of the usual farm crops, such as tobacco, corn, wheat, oats, grasses, some fruits, and vegetables, there being an average growing season of nearly seven months.

The average date of the last killing frost in spring at Lynchburg is April 14, and of the first in the fall November 1. Killing frosts have occurred as late as May 7 and as early as October 4.

The climatic conditions are very favorable for stock raising, there being an open season of approximately nine months. The area, as a whole, is not exceptionally favorable for growing orchard fruits There are, however, certain varieties of apples that do very well, though the yields are uncertain from year to year. At this elevation the sudden changes in temperature, frequent late frosts in spring, and the cold, damp atmosphere during the nights of the spring months hamper the industry, the large part of the county being below the frost line. When orchard sites are selected they should be located upon the higher elevations away from the stream valleys, in order that the trees may not be subjected to the bad effects of the cold air that naturally drains into the lower lying areas. There are probably certain areas over the upper slopes of Long and Chandler mountains and the related hills and ridges that have sufficient elevation to escape the drain of cold air and many of the late frosts occurring at lower elevations, and these might be utilized very profitably in growing fruit.

The annual precipitation of the area varies from 35 to 60 inches, with a mean of 44 inches, and is quite evenly distributed throughout the year. There are slight monthly and seasonal variations from year to year, and an occasional summer drought of several weeks' duration, which, under the customary methods of soil management, have a rather disastrous effect on crops.

The following table, compiled from the records of the Weather Bureau station at Lynchburg, gives the normal monthly, seasonal, and annual temperature and precipitation of that section:

Normal monthly, seasonal, and annual temperature and precipitation at Lynchburg, Va.

Month.	Temperature.			Precipitation.			
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for dry year.	Total amount for wet year.	Snow, average depth.
	° *F.*	° *F.*	° *F.*	*Inches.*	*Inches.*	*Inches.*	*Inches.*
December	40	73	—5	3.1	0.5	6.2	2.5
January	37	77	—6	3.8	4.5	5.3	5.7
February	39	74	—3	3.8	2.4	3.1	4.3
Winter	39			10.7	7.4	14.6	12.5
March	46	86	14	4.0	2.4	2.6	3.3
April	56	95	25	3.2	2.1	3.1	.3
May	66	97	34	4.0	2.2	7.1	.0
Spring	56			11.2	6.7	12.8	3.6
June	74	98	45	3.7	1.7	1.8	.0
July	78	102	53	4.1	3.9	10.9	.0
August	77	100	47	4.2	.3	3.8	.0
Summer	76			12.0	5.9	18.5	.0
September	69	99	35	3.8	2.1	10.7	.0
October	58	92	28	3.4	4.1	4.9	.0
November	47	81	13	2.9	3.6	4.9	.6
Fall	58			10.1	9.8	20.5	.6
Year	57	102	—6	44.0	35.7	60.5	16.7

AGRICULTURE.

Campbell County is primarily an agricultural district, and while the commercial and industrial interests of Lynchburg are considerable, the chief resource of the county is the large acreage of soils capable of high development.

Agricultural development in the county, from its early settlement, has followed the general lines of progress so familiar to other sections of the East. In the beginning it was the crude cultivation of the same staple crops that are being grown to-day—tobacco, corn, wheat, oats, vegetables, and grass. The lighter soils were employed for growing crops because of the ease of cultivation, and the areas farmed were small. Sheep, hogs, and cattle were allowed to range at large over the surrounding country. Throughout the entire agricultural history of the area tobacco has been the important crop. It

was handled in the early days as a medium of exchange and has always been, as it is to-day, the money crop of the farmer. Corn and wheat have always been the chief food crops, supplemented with various truck and vegetable crops of the home garden. Many of the older homesteads, usually consisting of large plantations, raised sheep, hogs, cattle, and chickens in addition to the customary farm crops, and were independent of outside conditions. Much of the wool was spun, woven, and made into clothing at home.

Up to the time of the construction of the Norfolk and Western Railroad, about 1855, the James River was an important line of transportation. Tobacco and surplus supplies of wheat were either marketed in Lynchburg or taken to some landing on the river and shipped in flatboats to Richmond. Live stock was likewise driven to Lynchburg or Richmond and sold, purchases of necessary farm supplies being made on these trips. The advent of the railroad gave a great impetus to agriculture, and more lands were put under cultivation and a larger number of smaller farms resulted. However, the character of the agriculture has not materially changed at any time. Conditions have improved with settlement, development, and general advancement, but the area has always been given to tobacco, corn, wheat, and oats chiefly, with clovers, grasses, potatoes, peas, sorghum, melons, miscellaneous vegetables, and numerous small fruits and berries as supplementary crops to meet in part the demands of the community.

No complete system of growing crops in beneficial rotation is practiced over the country at large, and little attention is paid to the utilization of soils according to their crop adaptation. It is usually customary to seed wheat upon the tobacco land in order that the wheat crop may be benefited by the residue of fertilizers used with the tobacco, the only staple crop generally fertilized. Most of the fertilizers used are commercial mixtures, of which the usual application is about 200 pounds to the acre. Some farmers prefer to mix their own fertilizers and the custom will no doubt become quite general. The liberal use of commercial fertilizers in connection with other improved methods of soil management is necessary in the culture of tobacco. In the earlier days a bright-yellow variety of tobacco was produced, but its culture has been almost abandoned in favor of other sections where soil conditions are more favorable to the production of this type of leaf and the heavy shipping or black export leaf is now grown throughout the county. In a few instances fields of Burley tobacco were seen, and yields were stated to be fairly satisfactory. The yields in general are far below the producing capacity of the soil, on account of the lack of attention to building up the soils. Lynchburg in the north, Brookneal in the south, and Altavista in the southwest are convenient markets for the crop.

The production of corn in the area can be made exceedingly profitable. Much of the soil is distinctly adapted to corn, and under proper management heavy yields may be secured. The average yield is much lower than it should be considering the natural productiveness of the soils. Seed selection is an important factor in the production of this crop.

Cultivation in general is practically along the same lines as it was years ago. Some of the farmers are more progressive and make use of labor-saving machinery and practice more intensive methods of culture generally. In most cases the crop is planted and matured at a minimum of expense and little or no thought given to the improvement of the soil. One of the chief sources of injury to the soil is erosion, induced by the rolling surface of the fields. Methods of preventing this injury are badly needed. Deep plowing in the fall with a winter cover crop to hold the soil, a rotation of crops, including clovers or cowpeas to be plowed under, to increase the water-holding capacity of the soil, and a system of contour cultivation will control erosion satisfactorily and economically. Every farm should be made to grow crops of clovers and cowpeas in systems of rotation with the grain and tobacco crops. These legumes give excellent hay and leave the soil in a much improved condition. They are beneficial in supplying the soil with nitrogen, the most expensive ingredient of commercial fertilizers. Some difficulty may be experienced in securing a stand of clover the first seeding, but usually a second attempt on the same ground will prove successful. An application of 500 pounds of lime to the acre some time before seeding will be beneficial, especially in case of the heavier soils.

Much of the so-called "worn-out" soils are nothing more than areas in a poor physical condition, impoverished of their organic matter through clean-culture methods. They can be reclaimed and made highly productive by deeper plowing, the incorporation of an abundance of organic matter, and adequate protection against washing. Barnyard manures constitute the best form of organic matter, and this valuable farm product should be conserved more diligently; but since the supply is so utterly inadequate to meet the demands, the best substitute must be employed, namely, leguminous crops plowed under. There is a great need for more live stock on the farms generally. The grazing season is long and stock can be raised at a minimum of expense. Every farm should raise hogs, sheep, and cattle, not alone for the profit from the sale of wool, mutton, pork, and beef, but for the good results obtained through pasturing the lands and the production of stable manures.

The growing of fruits, particularly apples, has not reached the proportions attained in the near-by counties of Albemarle, Nelson, Amherst, and Bedford, and it is doubtful if this industry can be made to

reach such development in the county. The features of soil, climate, and elevation are not wholly favorable. The trees appear to make a satisfactory growth, but the fruit is uncertain as to quantity and quality, much loss being sustained from the late spring frosts. The larger proportion of the county is below the frost line. There are, however, a few commercial orchards in the western part of the county, and these have met with a fair degree of success. There are also many small orchards in all sections of the area. The popular varieties of apples are the York Imperial, the Winesap, and the Mammoth Black Twig. The Winesap variety generally gives the best grade of fruit. No San Jose scale has as yet been found, but some annoyance has been occasioned through bitter rot and the codling moth. Systematic spraying appears to control these pests in a very satisfactory manner, though only in one or two instances is it employed. The methods of handling the orchards are about the same in all parts of the county—early fall plowing to within 4½ to 5 feet of the trees, and seeding to a cover crop of rye. In the spring this is grazed and the land is given to peas, as a hay crop, and allowed to stand until fall. The trees are heavily mulched with grass through the winter, which, in the spring, is worked into the ground with a fork. The spraying consists of three or four applications of Bordeaux mixture. Peaches and pears do not make satisfactory growth, the trees seldom living over a few years. Plums, cherries, and berries generally do well.

According to the census of 1900, there were 271,135 acres in farm land, of which 126,999 were improved. The value of farm lands and improvements, farm buildings, implements and machinery, and live stock amounted to $2,718,753, the expenditures for labor and fertilizers $116,650, and the value of products not fed to live stock $935,262. Subtracting the expenditures for labor and fertilizers from the value of products not fed to live stock, there is shown a net surplus of $818,612, or 33⅓ per cent on the total capital invested.

The average size farm of the county is 136 acres, and 52 per cent of the farms are operated by owners. As a rule, the landowner practices better farming than does either the renter or the tenant. The tenant has only an immediate interest in the land and there is usually little incentive to improve the existing conditions, his one idea being to mature crops with a minimum of expense. The returns to the landowner where farms are operated by tenants usually represent fair rates of interest on the money invested.

Labor conditions, while not wholly satisfactory, have not reached a critical stage. A fair scale of wages is paid and the supply of labor is usually adequate. An increased wage to meet competitive industries would improve the conditions as regards supply during harvest seasons. In many cases the present labor is unskilled, but is fairly efficient under careful supervision. The attractions of near-by indus-

trial centers and the coal-mining districts in the west have operated to decrease the efficient working population of the rural districts, and a large percentage of the total land area is uncultivated. The county could easily support many times its present population and then not be taxed to its capacity. Possibly one of the greatest needs of the county is larger population—certainly the greatest need as far as utilizing the idle land is concerned.

SOILS.

Campbell County lies wholly within the broad physiographic division of the United States known as the Piedmont Plateau, which in Virginia includes the area stretching eastward from the Blue Ridge Mountains to the fall line or western border of the Coastal Plain. The rocks embrace a variety of crystalline metamorphic formations of Paleozoic age, consisting chiefly of gneisses and schists, with occasional intrusions of basic eruptive rocks, and a single occurrence of the shale-sandstone series of Triassic age, which occupies a long, narrow, basinlike depression in the southeastern part of the county. The degradation of these underlying rock formations, in connection with other factors influencing soil formation, has given the existing upland types of soil. There usually occurs along the rivers and their important tributaries narrow marginal strips of a Recent deposit, consisting of wash material from their respective drainage basins, reworked by surface waters and laid down through stream action during seasons of excessive rainfall and overflow. Thus the soils of the county fall naturally into two general groups, one comprising the upland or residual soils, and the other the reworked or alluvial soils.

The upland soils are all residual, having been derived in situ from the weathering of the underlying geological formations, and while local modifying agencies have operated to affect peculiar local differences and conditions, the general character of the soil material is determined in a great measure by the character of the parent rock. These residual soils have been thrown into five distinct groups or series, each series having characteristics conforming to a direct genesis from definite rock formations. These series are the Cecil, the Louisa, the York, and the Iredell, developed from the crystalline rocks of Paleozoic age, and the Penn, derived from the detached area of Triassic rocks. The soil material included in each distinct series will show, at intervals, differences in texture or in depth, and consequently each series is again divided into a number of separate classes, based on such differences, and known as soil types.

The alluvial soils are developed in limited areas and are classified into series according to the character of the original material and to fundamental peculiarities in their formation. The character of the

area drained determines the character of the deposits along the drainage line.

The county as a whole presents a uniformity of soil conditions that is exceptional. Gray to reddish surface soils underlain by stiff red clay subsoils occupy by far the larger proportion of the county. These form the Cecil and Louisa series, which are derived more largely from a variety of mica schists, talcose schists, and gneisses than from other sources, though there are interfoliations of quartzites and intrusions of diabasic and eruptive rocks that have contributed slightly to the soils in local areas. Minute mica flakes through the soil profile, angular quartz grains embedded in the red clay subsoil, and the greasy feel obtaining in the subsoil over broad areas are characteristic attributes of these soils. Included in the parent rocks are varying quantities of silica which where more prominent give the lighter types of soils. The angular quartz grains contained in the subsoil are derived from the same source. Numerous veins of white quartz give rise to the varying quantities of fragments of this rock scattered generally over the surface. The red color of the soil and subsoil is probably due to the decomposition of iron-bearing silicates.

Areas of the Cecil clay type are found in all parts of the county. On many of the slopes its development has been due to the action of surface waters in removing the lighter surface material and exposing the red clay subsoil, but in the west and southwest there appear areas which have been derived from the decay of rock, very probably a harder variety of gneiss.

The Louisa loam occupies the larger part of the entire county. It develops largely from micaceous and talcose schists, carrying less siliceous material than the formations in the eastern and southern portions of the county where the fine sandy loam type finds a more frequent occurrence. The fine sandy loam type, however, is found here and there throughout the county. The quantity of rock fragments upon the surface of the Louisa soils is usually insufficient to warrant the separation of such areas as stony types. Where the proportion of rock is large enough to affect the classification the areas are too small to be shown in the map.

Areas of gray to yellowish-gray surface soils, underlain by yellow to slightly reddish-yellow subsoils, have been derived from the degradation of certain crystalline metamorphic formations. These are included in the York series of soils, which here comprises two distinct types, the fine sandy loam and loam. The former, found over the county at irregular intervals but more largely and extensively in the southeastern part, is derived from the weathering of a siliceous, fine-grained mica schist and gneiss, and the latter, which occurs largely over a series of hills and ridges in the western part of the

area, between Evington and Lawyers, along the Southern Railway, is derived from impure mica and talcose schist formations. In some important instances these latter formations seemed to possess a shale-like structure.

In the eastern part of the county, at irregular intervals and over very limited areas, there occur detached areas of grayish or grayish-brown to yellowish-brown surface material underlain by a sticky, waxy, plastic yellow to yellowish-brown clay subsoil, derived from the weathering of a variety of gneisses, chiefly the horneblende and chlorite varieties. These soil products were included in the Iredell series under the clay loam and fine sandy loam types, the latter developing where the rock formation is of a very siliceous character.

Two types of the Penn series, the loam and the sandy loam members, are derived from the shale-sandstone horizon of the Triassic. The soils occur as a series of narrow detached areas following a general line across the south-central part of the county and passing into Pittsylvania County near Green Hill.

The Recent deposits give rise to all the types established along the drainage lines of the area. The Staunton River bottoms, consisting of narrow marginal strips occurring at intervals along the course of the stream, are not extensive nor are the soils complicated. The material is a wash from the uplands within the drainage basin and gives rise to the Congaree fine sandy loam. The James River Valley in this area contains even smaller areas of alluvial deposits than the Staunton River, the valley wall usually extending almost to the river channel.

Occurring as narrow marginal strips along the courses of the smaller streams of the area is an undifferentiated wash material from the slopes of the respective valley walls that it was impracticable to classify. Over some of the broader areas the material is quite uniform, but a clearly defined separation of this reworked material into distinct types as it occurred over the area was not attempted. The entire area of such material was mapped as Meadow (Congaree material).

Upon some of the slopes and higher elevations along the Staunton River are evidences of former river action, when the level of this stream was considerably higher than it is to-day. Areas of this character are shown in the map either as the Cecil clay or as Altavista sandy loam.

Twelve types of soil were established in the area. Of these nine are residual. The acreage extent of the residual soils—those distinctly derived from weathering of the underlying geological formations—is exceptionally large for a county possessing two drainage systems.

The following table gives the name and the actual and relative extent of each type:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Louisa loam	144,256	42.0	Congaree fine sandy loam	3,904	1.2
Steep rolling phase	3,456		Iredell fine sandy loam	3,840	1.1
Louisa fine sandy loam	120,960	34.3	York loam	2,624	.7
Meadow (Congaree material)	25,280	7.1	Penn sandy loam	1,408	.4
Cecil clay	22,912	6.7	Iredell clay loam	1,344	.4
Water-worked phase	768		Altavista sandy loam	1,088	.4
York fine sandy loam	14,464	4.1			
Penn loam	5,696	1.6	Total	352,000	

CECIL CLAY.

The soil of the Cecil clay, to a depth of from 4 to 9 inches, consists usually of a reddish-brown to red clay loam; the subsoil is a very stiff, tenacious red clay which extends to depths of 36 inches or more. The surface few inches of the soil, over numerous small areas at irregular intervals, has a light reddish-brown color and a texture approaching a loam. Such areas are more frequently developed in the eastern part of the county, and are always underlain below 3 to 5 inches by a reddish clay loam or clay. Upon many of the steeper slopes, where erosion has removed much of the loose friable material, and in some areas where the material appears to be derived in situ, the surface soil is a red clay. A phase locally termed "push land," found in a few small areas, is of a brownish-red or chocolate color and has a decidedly loamy character. This phase results from the accumulation in lower positions of wash from more elevated surrounding areas, and has a deeper soil of less compact structure than the typical residual product. The surface material has, in all cases, a darker tint than the underlying clay subsoil, on account of oxidation processes and the presence of decayed organic matter. While the rocks giving this type of soil have often weathered deeply, the soil and subsoil usually contain fragments of the more resisting rocks, though in quantities too small to interfere seriously with cultivation. There is usually a quantity of minute mica flakes present in both the soil and the subsoil and occasionally the subsoil contains sufficient mica to give it a greasy feel. It also carries a noticeable proportion of coarse quartz grains. Outcrops of the harder rocks, "niggerheads" and biotite gneiss, are occasionally seen on the slopes of many of the hills and ridges. The soil becomes quite sticky when wet and care must be exercised in handling it under cultivation, especially when unimproved. Where proper methods of management have been followed the soil when plowed at the right moisture content gives a good friable tilth.

Areas of Cecil clay are scattered over the county and are especially numerous in the northern, western, and southwestern portions where the topography is very rolling to hilly and broken. The type usually occurs on the slopes, though several areas mapped occupy rolling uplands and plateaulike elevations. In the central and eastern portions of the county the type invariably occurs on the slopes where erosion has exposed the underlying clay. The topography insures at all times excellent natural drainage, and the slope of surface is sufficient to cause severe erosion, unless steps are taken to prevent it. The rapid run-off has a tendency to make the type droughty. A deep seed bed and the incorporation of an abundance of organic matter in the soil will do much to increase the moisture-holding capacity of the soil and at the same time render it more capable of absorbing the excess of rainfall, thereby reducing erosion. The productivity of the soil would also be greatly increased by such management. The "worn-out" areas of Cecil clay represent lands that are in poor physical condition rather than areas depleted of their mineral plant food constituents. Such areas can be reclaimed and made productive by deep plowing, incorporation of organic matter, and rotation of crops.

The Cecil clay is a residual soil derived from the disintegration of the underlying rock formations which consist principally of metamorphics, such as gneisses and mica and talcose schists. The fragments of white quartz so commonly found upon the surface come from included veins of quartz which have a greater resistance to weathering than the rest of the rock mass and therefore persist in the soil. These quartz veins vary in thickness from a fraction of an inch to several inches and are frequently seen in road cuts and deep gullies.

The Cecil clay is locally known as "red land" and is regarded as the strongest soil of the area for general farming. The stiff, heavy character of the soil necessitates the use of substantial teams and farming implements, if thorough cultivation is to be given it, and without this the natural productiveness of the land can not be maintained. The "worn-out" condition of much of the type is due to light, shallow tillage and an inconsiderate method of cropping, both practices conducive to certain deterioration. Improved areas of this soil return valuable yields of the general farm crops—tobacco, wheat, corn, clovers, and grasses.

The tobacco grown is largely a heavy dark shipping or export leaf, with smaller quantities of a black plug wrapper. In a few instances the Burley variety was planted the past season and with fair to good results. Liming is necessary where this type of tobacco is grown. The yields of tobacco vary from about 500 to 1,500 pounds per acre, with an average of about 750 pounds. The quality of the soil,

whether improved or not, the fertilizer practices and tillage methods, as well as climatic conditions, all affect the crop yields. Commercial fertilizers are used generally in growing tobacco and with good results. They give the best results when used in connection with barnyard manures on well-prepared land.

Wheat produces from 7 to 20 bushels an acre, with an average yield of 10 to 15 bushels under the usual methods of cultivation. When the crop follows tobacco, as is the general practice, a better yield is obtained than when seeded after corn, it being the custom to fertilize the tobacco crop much more heavily than the corn crop. Usually a light application of fertilizer is drilled in with the wheat as an immediate help to the young plants.

Corn averages about 25 bushels to the acre, with minimum and maximum extremes of 10 and 75 bushels, respectively. The type is a very desirable soil for corn and high yields can be consistently maintained. Oats do fairly well, though the crop is grown on a small scale and is usually cut and fed in the straw. Clovers do well, though it is not always easy to secure a good stand. A dressing of lime would no doubt improve the land selected for seeding to clover. Cowpeas do well almost invariably and they are grown quite generally as a green manuring crop and for forage. Lespedeza and redtop are valuable for grazing and the latter also for hay.

Throughout this type, as well as over the county at large, there is great need of a more general use of the leguminous crops, with a view to soil improvement. With clover and cowpeas as green manuring crops, at least where a sufficient supply of barnyard manure is not available, included in a crop rotation suited to the needs of the individual farmer, the Cecil clay can be economically supplied with all the organic matter necessary for its improvement. This system of cropping, in connection with an adequate system of tillage and cultivation, will make the type one of the strongest of the Piedmont soils for general farming.

Water-worked phase.—The water-worked phase of the Cecil clay consists of a dark-red clay, 6 inches deep, underlain by a very stiff clay of a lighter red color, extending to a depth of many feet. The material is very similar to that of the typical upland soil both in structure and in color. There occur in this phase, at a depth of from 4 to 15 feet or more, beds of rounded gravel and cobbles from a few inches to several feet in thickness, indicating former river action. In some instances the rounded cobbles are cemented together, and the beds run at different angles to one another and with differing declinations. Along the Staunton River, at intervals, more especially between Altavista and Leesville, the steeper slopes descending directly to the narrow alluvial bottoms show a sprinkling of rounded stones. These may be due to an exposure of the gravel beds or per-

haps to exposures of scattered stones formerly embedded in the soil material and later left on the surface through the removal of the surrounding soil by erosion. The cultivation of this soil is attended with the same difficulties as the typical soil.

The phase occurs along the Staunton River as very narrow strips or patches, always occupying the immediate slope of the uplands facing the river front. The areas have unquestionably been subjected to former river action as evidenced by the content of water-worn gravel and cobbles, but such action took place at so remote a time that in most cases little of the present soil is now other than residual material weathered from the underlying rock formations. Probably in the immediate vicinity of Altavista there is a considerable depth of the original alluvial material still remaining, but this is the exception rather than the rule.

The extent of this phase of the type is very limited, the town site of Altavista covering the largest single area mapped. From an agricultural standpoint it ranks in all essentials with the true Cecil clay.

The value of the typical Cecil clay is determined by its location and the conditions of improvement, varying from $10 to $50 an acre.

The following table gives the average results of mechanical analyses of typical samples of the soil and subsoil of the Cecil clay:

Mechanical analyses of Cecil clay.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
21984, 21986.....	Soil.....	1.1	3.6	3.0	12.6	14.1	28.9	36.4
21985, 21987.....	Subsoil.....	.6	2.1	1.7	6.6	6.7	19.9	62.2

LOUISA LOAM.

The soil of the Louisa loam consists of 5 to 9 inches of a grayish-brown to reddish-brown loam. The subsoil, to a depth of about 12 inches, is a brownish-red to deep-red clay loam, which is underlain to a depth of many feet by a stiff red clay. The surface material of this soil, which occurs in broad generally uniform areas over the entire county, presents some slight yet noticeable variations in certain sections, both as to color and texture. The general appearance when dry, however, is as stated above. When wet it has a decided reddish tinge. Areas with a natural grayish coloring are found in the more level stretches, and here the lighter textured phases occur. The slopes of the rolling uplands, over which the type occurs, usually have a redder soil and a heavier texture, or in these positions erosion has removed more of the loamy surface material and brought the heavy red clay subsoil near enough the surface to be mixed with the soil to

some extent in cultivation. In many areas the process has advanced so far that it was a question whether they should be mapped as a loam or a clay loam. There is usually present in the surface material varying quantities of siliceous rock fragments and small fragments of white quartz. More especially is this coarse gravel content noticeable over the wooded areas, where the fragments seem to be near or at the surface and in quantities sufficient to prevent boring, though they in no wise hinder cultivation once the land has been plowed. These rock fragments in the soil are due to the presence of resistant siliceous material in the parent schistose rock and to veins of white quartz so commonly seen in cuts. Almost invariably there is present in both the soil and the subsoil of the type varying quantities of minute mica flakes, and occasionally over local areas underlain by a very micaceous schist flakes from one-fourth inch to 2 inches in diameter are found.

A phase of the type occurring more conspicuously in the western half of the county is derived apparently from a schist considerably more micaceous than is general. The areas usually have a brownish color when dry and apparently contain less coarse material than much of the type farther east. The soil has a very sticky consistency when wet and contains very little coarse grit. The subsoil has also a more decided greasy feel than is general.

The Louisa loam seems to occupy a gradation zone between the heavy clay soils to the west, occurring extensively in Bedford County, and the sandier soils to the east, mapped extensively in Appomattox County. The gradation is so gradual that differences can be seen only by comparing the type at widely separated points. It has, however, a heavier texture in the west and lighter texture in the east. Many boundaries between the type and the sandy loam soils in the eastern portion of the county were arbitrary, and the same is true in the west between the type and the Cecil clay.

There are occasional small areas where rock fragments as quartz and schists are so numerous over the surface that cultivation can be accomplished only with difficulty. Such local spots are in their present condition necessarily of low agricultural value except for grazing. One of the most conspicuous of these is the area lying about 3 miles in a northwesterly direction from Lynch Station.

The topography of the Louisa loam is largely rolling and the drainage is usually excellent. Over the more rolling to hilly areas, the relief is sufficient to cause severe erosion under natural conditions. Few areas are encountered where drainage was deficient, and these seldom contained more than an acre or two. Such local conditions could be relieved by open ditches.

The Louisa loam is a residual soil derived in this area largely from the degradation of a variety of mica and talcose schists and to a small extent from gneiss and other metamorphosed rocks. The type

is considered one of the best of the upland soils for general farming. It is utilized in the cultivation of all the usual farm crops, but chiefly tobacco, corn, wheat, oats, and clovers. The tobacco grown is largely the dark export, the same as is grown on the Cecil clay. The lighter phases of this type do not produce as heavy-bodied a leaf, however, as is produced upon the heavier soils, though the quality is usually very satisfactory. The yield ranges from 600 to 1,500 pounds to the acre, depending upon the season, the quality of the soil, and the quantity of fertilizers used. The largest yields are secured from land that has received the most liberal fertilizer treatment.

Corn yields from 10 to 60 bushels, according to conditions of soil and distribution of rainfall during the growing season, with an average of approximately 15 bushels to the acre. Wheat, usually following tobacco, a well-fertilized crop, produces from 6 to 30 bushels, with a probable average of 10 to 15 bushels per acre. Clovers and cowpeas do well generally, though these crops are too often omitted from the usual cropping system. Melons and other garden truck which give good results are grown only for home and local consumption.

The Louisa loam is susceptible of comparatively easy improvement, and when once brought into good condition can be maintained at a productive point by careful management, especially by practicing those rotations that include the legumes. It possesses a loamy character that renders it amenable to cultivation over a rather wide range of moisture conditions without impairment of its physical condition. In the absence of stable manures for increasing the productiveness of the soil, the process of green manuring is desirable. Clovers and cowpeas in a rotation suitable to the needs of the individual farmer will be found very beneficial. The legumes do well and too much consideration can not be paid to this method of making more productive the low-yielding acres of this naturally productive type. A few fields of alfalfa were noted upon the Louisa loam, and considering the soil and section were giving fair results. The expense of preparing the land and securing a stand and the rapid deterioration of the fields even when plants are established seem to indicate that the crop can not be grown commercially or even economically for home use. It is very probable that the crop can be grown without loss and with great benefit to the soil, but clovers and cowpeas are better leguminous hay crops for this soil, for they give good returns at less expense and effect as great improvement in soil conditions.

The typical Louisa loam has a value of $8 to $50 an acre, according to location and character of improvements.

Steep rolling phase.—Over the higher elevations of the county, including the mountainous ridges and hills covered by the Louisa loam, a silty phase is found. The surface material has usually a brownish

to light reddish brown or light yellowish brown color, and is appreciably more silty than the soil of typical areas. It contains fragments of the parent rock and small fragments of white quartz, and in this respect does not depart from type characteristics. The subsoil is usually a slightly yellowish red clay loam to clay extending to a depth of 18 to 24 inches, where a partially decomposed mica schist may be encountered. The red clay may extend to a depth of 34 to 36 inches, though usually the decomposed rock is encountered within 36 inches. Only the larger areas of the rolling phase of the Louisa loam are shown. Other smaller areas of similar rough country are not separated because of their small size and intricate association with better soils. The phase is meant to include more strictly those areas which have such rough topography that little agricultural use can ever be made of them.

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

Mechanical analyses of Louisa loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
21972, 21974, 21978, 21980.	Soil.....	3.2	5.2	4.0	13.5	13.4	38.9	21.6
21973, 21975, 21979, 21981.	Subsoil.....	1.1	3.5	2.1	7.2	6.6	26.8	52.5

LOUISA FINE SANDY LOAM.

The soil of the Louisa fine sandy loam, with a depth of 5 to 18 inches, varies from a gray or yellowish-gray to brownish-gray color and has a moderately heavy texture. The sand content is of all grades, the fine sand largely predominating. The upper part of the subsoil is usually a reddish-yellow clay loam or sandy clay quickly passing into a stiff tenacious red clay which extends to a depth of 36 inches or more, and which becomes very stiff and compact at lower depths. There is usually a sufficient quantity of pulverized mica and talcose material to impart to the subsoil a slick, greasy feel, and there is always present a quantity of angular quartz grains. The surface material carries usually a moderate quantity of angular quartz and other rock fragments. In some instances over small areas occurring on the crests or slopes of the hills and ridges the rock fragments are numerous enough to interfere seriously with cultivation. Such areas are too small to show in the map. As in case of the soils already described, the quartz fragments so generally found in connection with the stony areas and in smaller sizes over the surface

of the type generally are derived from veins intersecting the parent rocks.

The areas with brownish-gray surface have usually a rather shallow soil, while the areas of deeper surface material present the gray to yellowish-gray color. The former phase occurs more extensively in the central and northern portions of the county and has a very loamy character, almost approaching a loam type, while the latter occurs largely in the southern and eastern portions of the area and often has a very light texture, more especially where the surface material is over 10 inches deep.

The Louisa fine sandy loam, with its rolling to hilly topography, has excellent natural drainage; in fact, the ready percolation of water through the open porous soil material tends to make drainage excessive and often results in droughty conditions. The water-holding capacity of the soil should be improved by the incorporation of organic matter.

The Louisa fine sandy loam is a residual soil derived in situ from the disintegration and weathering of micaceous and talcose schists. Weathering has extended to considerable depth and the consolidated rock material is seldom seen except on some of the steeper slopes where erosion has removed the weathered material or in the deeper road cuts and along steep valley walls.

The Louisa fine sandy loam is considered a light "thin" soil and is locally termed "gray land" in contradistinction to the heavier members of the series. It is not held in as high esteem as the loam type for general farming purposes, on account of low producing capacity. Little of the type, as it occurs on the rolling to hilly country, is under cultivation, or ever has been, and it is still covered with native timber. The surface soil is thin, leaching is rapid, and the soil little retentive of moisture. Much of it is too rough for easy tillage, and cultivation, when practiced, has been confined to the more level, plateaulike elevations between the stream valleys and the more level areas along the lower slopes contiguous to the stream channels. In such positions the type is fairly well supplied with moisture at all times and injury from drought is less imminent.

This soil is more readily "exhausted" than the heavier types, but it is early, warm, and easily handled, responds readily to fertilizers, and is susceptible to much improvement.

The principal crops on the Louisa fine sandy loam are corn, tobacco, wheat, oats, peas, and some clover. The tobacco grown is largely the heavy black export, and about 500 pounds to the acre is an average yield. Favorable climatic conditions, heavy fertilization, and careful cultivation often result in a yield of 1,000 to 1,200 pounds to the acre, and the soil is capable of a much larger yield than is generally secured. Small areas of a bright yellow tobacco are grown.

This type of tobacco can not be produced on the heavier soils, and the production in the county is small. The results obtained are satisfactory, though it is known that the eastern part of the State produces a better grade of leaf.

Wheat, usually seeded after tobacco, yields from 8 to 20 bushels per acre, the yield being greater following tobacco than following corn, the latter crop not being fertilized as heavily nor cultivated as thoroughly as tobacco. Corn is more generally planted upon the low areas next to the streams. It yields from 10 to 40 bushels, with an average of perhaps 12 bushels per acre for the type as a whole. Much larger yields could be produced under a proper system of soil management. Oats, cowpeas, melons, and the usual vegetables do well.

Nothing would increase the productivity of this type more than heavy applications of stable manures. This treatment, however, is usually out of the question for any extensive areas on account of the scarcity of live stock. The next most efficient and the most economic plan would be the introduction into the rotations of leguminous crops, chiefly cowpeas, and the use of catch crops for winter to be plowed under as a green manure. In other words, the chief need of the soil is a supply of organic matter. Aside from the question of the nitrogen added, the organic matter has other important though indirect functions. It increases the capacity of the soil to hold water and tends to prevent erosion, limits the injury from drought, and improves the tilth of the soil generally.

The Louisa fine sandy loam has a value of $4 to $30 an acre, according to location and character of the improvements.

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

Mechanical analyses of Louisa fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
21968	Soil	1.0	4.4	8.9	34.1	14.7	26.2	10.8
21969	Subsoil	.4	2.6	5.1	22.6	10.0	18.4	40.7

YORK FINE SANDY LOAM.

The soil of the York fine sandy loam, to a depth of from 8 to 15 inches, is a light-gray to dull yellowish gray rather silty fine sandy loam, the sand content being of the finer grades. There is present in varying quantities small partially decomposed fragments of the parent rock and small fragments of white quartz. The presence of a very noticeable percentage of silt gives to the soil a somewhat

heavy texture, which in a few cases approaches that of a loam. This is especially true in areas having a shallow surface soil. Where the surface material is deeper the percentage of sand is high and the texture of the soil very light, though still a sandy loam. The subsoil is a yellowish clay loam to sandy clay, passing at 18 to 30 inches into a clay or silty clay of a yellowish color, tinged with red or brown and extending to a depth of 36 inches or more. Frequently the lower subsoil shows a mottling of red or brownish-red and has a texture ranging from clay loam to clay. Where the type appears to have been derived from a fine-textured schist the subsoil is somewhat silty even at lower depths. Upon the lower slopes of the hills and ridges the subsoil has less of the reddish cast and red mottling and assumes a grayish mottling probably as a result of different moisture conditions and less aeration.

The type has no regularly defined position, but develops at times and quite extensively over the more level plateaulike elevations between the stream valleys, and again, though probably to a less extent, in the lower lying areas of the stream valleys. In many instances the transition from the red Louisa material to the yellow York material is insensible over broad stretches, and the mapping of such areas is more or less arbitrary. In some instances the subsoil of this type has a distinct reddish to reddish-brown tinge, and similarly some of the Louisa fine sandy loam subsoil has a decided yellowish-red tinge.

The York fine sandy loam occurs most extensively in the southeastern part of the county, though there are many detached areas in the central and western parts, such areas usually appearing upon the lower slopes or in more level areas of low elevation. The type is found always closely associated with the Louisa fine sandy loam.

The topography is less rolling than is typical of the large areas of Louisa soils. In the southeastern part of the county the type develops quite extensively throughout the gently rolling interstream elevations, though very often it occurs on the slopes of the valley walls, while the Louisa soils occupy the ridges. Drainage over most of the type is good, especially in case of the areas at higher elevations. Such areas are also less liable to severe erosion, and when precautions are taken to prevent it wash is easily controlled. In the low-lying areas drainage conditions are not always so favorable, though deficient drainage is the exception. Much of the rainfall from the adjacent elevations finds its way through the areas, and during seasons of much rainfall they are usually very wet. Under normal moisture conditions, however, these areas are naturally well provided for.

The York fine sandy loam is a residual soil derived from the degradation of metamorphosed rocks, chief of which is a siliceous fine-

grained mica schist. The sand content of the surface material comes from the siliceous component of the schist formation, and the small quartz fragments, so commonly found in the weathered material, are from included veins. Considerable areas of the type are under cultivation, some of them having been among the first lands settled. The greater proportion of the type, however, is still wooded.

This soil is locally termed "gray land" and is generally held in less esteem for general farming than the "red lands," although it gives fair to good returns when used for the staple crops of the county. It is probably slightly less productive than the Louisa fine sandy loam. Though it is considered a "thin" soil, it responds readily to fertilization, and is easily handled. On the other hand it deteriorates rapidly unless properly managed. Yearly applications of commercial fertilizers are given the fields. Tobacco, wheat, corn, and oats are the principal crops, with smaller quantities of peas, potatoes, melons, and the various vegetables for individual needs. Tobacco is not grown quite so extensively as on the "red lands," though a satisfactory grade of the dark export variety is produced. More largely over this type than any other in the county, the culture of a bright yellow tobacco is followed and with satisfactory results. The crop is grown, however, by comparatively few farmers, and the total production is small. The crop is always fertilized. The yields vary from 300 to 900 pounds per acre, with an average of probably 400 to 500 pounds, which is slightly less than is secured on the Louisa soils. Wheat usually follows tobacco, as is the custom over the county. The yields of this crop range from 6 to 20 bushels, with an average of perhaps 8 to 10 bushels to the acre. Corn produces from 10 to 40 bushels, with an average of about 15 to the acre. Peas, potatoes, melons, and vegetables do well.

The recommendations for improvement of this soil are the same as suggested in connection with the Louisa fine sandy loam.

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

Mechanical analyses of York fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
22003, 22005, 22007.	Soil.....	1.4	3.8	4.2	23.0	26.3	32.9	8.3
22004, 22006, 22008.	Subsoil.....	1.3	2.5	3.0	16.2	17.8	21.5	37.5

YORK LOAM.

The soil of the York loam, which has a depth of from 5 to 10 inches, is a yellow to grayish-yellow loam or silty loam of compact

structure. The subsoil is a yellow heavy loam to silty clay loam, 18 inches deep, quickly passing into partially decomposed mica schist. This rock has a shalelike structure, a dull yellowish to slightly brownish yellow color, and a very fine grain, the latter peculiarity being responsible for the relatively high silt content of both soil and subsoil. Numerous small fragments of the rock are disseminated through the soil, and a moderate percentage of very small quartz fragments occur on the surface. On some of the slopes and crests of the hills and ridges the undecomposed schist formation outcrops; upon the lower slopes of most of the elevation, as well as over the lower rises and gently sloping hills, the weathered soil material often extends to a depth of 3 feet or more. In some of the deeper areas the subsoil possesses a slight reddish tinge. Along the cut of the Southern Railroad may be seen at intervals, from 4 to 10 feet below the surface, beds of a bluish-black, residual, clayey material. This clay formation may develop nearer the surface in very small spots, though no such occurrences were encountered in boring.

Small areas of the York loam occur northeast of Evington along the Southern Railroad to Lawyers. It is found largely upon a series of hills and ridges and is almost entirely forested. The usually shallow depth of the soil material, together with the broken topography and, in some instances, the high rock content, combine to unfit the type for agriculture.

The soil is derived largely from mica and talcose schist formations, portions of which have a shaly structure. These rocks are more or less siliceous, and, being more resistant to the agencies of weathering, stand at higher elevations than the surrounding country.

The type is unimportant in the agriculture of the county. A few small patches of tobacco, corn, and wheat are seen. The yields are stated to be about the same as those of the fine sandy loam type of the series. Land of this type ranges in value from $5 to $20 an acre.

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

Mechanical analyses of York loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
22009	Soil	2.0	3.5	2.5	6.8	12.6	48.3	23.8
22010	Subsoil	3.7	6.2	3.0	6.7	9.1	32.3	38.9

PENN LOAM.

The soil of the Penn loam, to a depth of from 6 to 12 inches, consists of a dark Indian red or purplish red loam, carrying a very

noticeable silt content and containing a fair percentage of fine-textured Indian-red sandstone fragments of a somewhat shalelike structure. The subsoil is an Indian red clay loam to silty clay loam considerably lighter in color than the surface material and in some instances possessing a yellowish tinge. Many areas show the undecomposed rock formation below 15 inches, and over the larger portion of the type the consolidated rock material appears within 36 inches. Rock outcrops were often in evidence. Small fragments of the parent rock are disseminated through the entire soil profile. The type possesses a friable loamy structure and responds to cultivation in an excellent tilth, but care should be exercised to plow it under proper moisture conditions.

The Penn loam occurs in connection with the sandy loam member of the series in isolated areas over a narrow outcrop of Triassic material across the southeastern portion of the county. The surface features of the type vary from almost level to rolling, and the drainage is usually fair. The run-off on the more level areas is not very rapid, though crops are seldom seriously flooded. The phases of the type having a shallow seed bed, 15 to 24 inches deep, are quickly saturated during rainfalls, but the soil dries quickly, owing to its limited capacity for storing moisture, and crops suffer severely during summer droughts. Such areas produce best during a wet growing season. Ordinarily over the deeper phases of the type occupying a more or less level topography, the land is bedded for seeding as a safeguard against excessive moisture conditions.

The type is a residual soil, derived in situ from the weathering of Indian-red shales and fine-grained sandstones of Triassic age. The red sandstone, which seems to be very siliceous, appears to break down completely finally weathering into a smooth loam. The shales give a very perceptible silt content to the soil material.

The Penn loam is considered a very desirable soil and yields are usually very satisfactory, more especially when climatic conditions are favorable. The soil appears to be naturally very productive, and responds readily to methods of improvement. The usual farm crops—corn, wheat, tobacco, and oats—are grown. The tobacco is of the dark export variety, the same that is grown generally over the entire county, and yields vary from 500 to 1,100 pounds, with an average of perhaps 600 to 700 pounds under a fair application of commercial fertilizers. Wheat, usually seeded after tobacco, as is the general custom, yields from 8 to 20 bushels, with an average of about 10 bushels to the acre. Corn yields an average of 15 to 25 bushels. Peas, grasses, and various vegetables and melons do well. A fair percentage of the type is utilized as pasture. The suggestions for improving the Louisa loam will apply also to this type.

The Penn loam, on account of its limited occurrence, is not a very important soil. It has a value of $8 to $30 an acre, according to improvements and agricultural possibilities.

The following table gives the results of a mechanical analysis of a sample of soil of this type:

Mechanical analysis of Penn loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
22019.....	Soil.....	8.2	11.1	5.0	6.0	8.1	45.9	15.9

PENN SANDY LOAM.

The soil of the Penn sandy loam, to a depth of from 6 to 12 inches, is a brownish-red to Indian-red sandy loam, with the sand content varying from medium to fine. There is usually present a fair percentage of small sandstone fragments. The subsoil is a reddish-brown to Indian-red clay loam to clay, sometimes having a slightly yellowish tinge. This type of soil, on account of its open structure, is easily handled under a rather wide range of moisture conditions.

The type occurs in small areas at irregular intervals in connection with the loam member of the series overlying the red sandstone horizon of Triassic age, which crosses the southeastern portion of the area in a general northeast and southwest direction.

The topography varies from gently rolling to very rolling, and the drainage is good. The soil is residual in origin, being derived from the weathering of Triassic red sandstones. At times these sandstones seem to break down into a very fine textured soil product, and areas of the type show a perceptible silt content. This is especially true where intrusions of a fine-textured shaly sandstone material occur. Over some local spots there is found a yellowish surface material underlain by the Indian-red sandstones. This material would probably be classified with the York soils but for the underlying conditions. A portion of this type is quite level, and in some instances shows a considerable rock content just beneath the surface edge.

Much of the Penn sandy loam is in timber, but when cultivated it is considered a desirable light soil for the general farm crops—tobacco, wheat, corn, and oats—and fair to good yields are obtained. Commercial fertilizers increase crop returns, and they are generally used for tobacco. The tobacco grown is largely the black export variety, and yields range from 500 to 1,000 pounds to the acre, with an average of perhaps 500 or 600 pounds. Wheat, usually seeded

after tobacco, yields from 8 to 20 bushels. Corn and oats give average returns. Peas, beans, melons, and vegetables do well.

On account of its limited development the type is an unimportant one agriculturally. It is valued at $8 to $20 an acre.

IREDELL CLAY LOAM.

The soil of the Iredell clay loam is a grayish-brown to yellowish-brown clay loam with an average depth of about 9 inches. The subsoil is a very sticky, heavy, plastic yellowish-brown clay, usually free from rock fragments to a depth of about 30 inches, where a partially decomposed chloritic gneiss is encountered. Occasionally the rock formation does not appear within 3 feet. The surface soil usually carries a small percentage of iron concretions, and varying quantities of rock fragments, chiefly gneiss and quartz, may occur, sometimes in sufficient quantities to interfere seriously with cultivation. The surface soil, in some instances, shows a decided greenish tinge and the yellow, waxy subsoil passes at 28 to 32 inches into a greenish colored gneiss, or schist, very probably a chloritic gneiss. A lighter phase of the type has a yellowish-gray to slightly brownish loam surface material extending to a depth of about 10 inches, where a yellowish clay loam containing small partially decomposed fragments and extending to a depth of 15 to 18 inches is encountered. From 18 to 30 inches the typical plastic yellow clay develops, passing at that depth into the partially decomposed gneiss. Especially over the lighter phases of the type there is a distinct line of demarcation between the soil and the subsoil.

The Iredell clay loam has a rolling to comparatively level topography and generally the drainage is poor, owing to the impervious character of the subsoil and the lack of surface relief. Artificial drainage would undoubtedly prove beneficial. The type usually occurs in small areas along the lower slopes of the valley walls, though a few stretches include portions of interstream elevations of easy surface features. The type is a late, cold soil and inclined to droughtiness during the summer months.

The type is residual, derived from the weathering of a variety of gneisses, chiefly hornblende and chlorite, and fragments of the parent rock formations are generally found over the weathered material. The partially decomposed formation is often encountered at a depth of about 30 inches.

In its natural condition this type has a very low agricultural value and yields over the unimproved areas are generally small. The soil is difficult to cultivate, being exceedingly sticky when wet and baking quite hard when dry. Through a system of soil improvement, including deep plowing and the incorporation of organic mat-

ter, permitting better aeration and oxidation, and by proper cultural methods areas of the type that are favorably located can be made very productive. In exceptional cases tobacco of the dark export variety does well, yielding from 1,000 to 1,400 pounds to the acre. Commercial fertilizers are used plentifully and applications have to be made yearly. Corn, oats, and grasses do fairly well under favorable conditions. The larger proportion of the type is uncultivated and, considering the large extent of the Louisa soils that have better natural advantages, much of the type will find its most economic utilization for years to come as timber land and as pasturage for stock.

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

Mechanical analyses of Iredell clay loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
22015	Soil	6.0	9.6	3.7	10.5	26.0	27.0	17.1
22016	Subsoil	.9	1.9	2.2	22.8	8.3	21.0	42.8

IREDELL FINE SANDY LOAM.

The Iredell fine sandy loam is a gray rather silty fine sandy loam, 10 inches deep, underlain by a heavy plastic drab to yellow clay, 20 to 36 inches deep, which passes into a partially decomposed greenish rock. The sand content varies from medium to fine, the finer textures predominating. Small fragments of the parent rock are usually present in the surface material and large fragments of gneiss are found over most of the slopes and some of the more level areas, sometimes in sufficient quantities to interfere more or less with cultivation, if not entirely to preclude it in some instances. The clay subsoil is generally very compact, carrying little if any gravel and rock fragments. Because of the plastic impervious character of the underlying subsoil the surface material, while light and friable in itself, can be plowed with impunity only under a limited range of moisture conditions. Over a large proportion of the type the drainage conditions are not the best and artificial methods of removing the excess water are found beneficial.

The type is residual, being derived from the weathering of chloritic gneisses and other rocks, mainly intrusives. The greenish formation underlying the weathered soil product is a variety of gneiss containing much chlorite, similar to that found beneath the clay loam member of the series. Fragments of the parent rock formations are usually in evidence.

Much of the type is uncultivated, and, as a whole, it does not appear to be exceptionally suited to any special crop. Improved areas favorably located and under good management will give fair to good returns of the general farm crops. Good systems of drainage permitting a better aeration of the subsoil, the application of organic matter in the shape of stable manure or green manure, and the discriminate use of commercial fertilizers will do much toward obtaining the best possible returns. The type supports an average growth of native grasses and much of it is utilized as pasturage for stock. The type is an unimportant one agriculturally.

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

Mechanical analyses of Iredell fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
22011	Soil	5.7	5.7	4.8	18.1	28.5	27.6	9.1
22012	Subsoil	2.8	6.2	5.1	14.6	21.4	21.3	28.4

CONGAREE FINE SANDY LOAM.

The Congaree fine sandy loam, to a depth of from 10 to 30 inches, is a grayish-brown to dark-brown heavy fine sandy loam underlain to a depth of 36 inches or more by a dark grayish brown to brown heavy fine sandy loam to light clay loam of a rather sticky character at lower depths. The color of the soil becomes slightly lighter with depth. The sand content of both the soil and subsoil is largely of the finer grades, though medium-sized grains may be found at irregular intervals in varying quantities throughout the occurrence of the type, but more largely in the immediate vicinity of the river channel where the coarser particles are deposited immediately the velocity of the current is checked by an overflow of its banks. Over the rather poorly drained depressions of this type the subsoil at lower depths may present a drab-colored material mottled with brownish yellow and possessing a somewhat heavier structure than the typical soil, possibly approaching that of a clay loam. The entire soil section of 3 feet shows the presence of numerous minute mica flakes. Principally on Long Island, but elsewhere in minor ways, the type presents several noticeable phases. The surface material may vary from a very light to a heavy sandy loam, the sand content being largely of the finer grades. The color varies largely with the structure of the soil body and the topography, the depressions having the darker color and usually the heavier structure. Moisture conditions over the poorly drained depressions give the

lower subsoil a drab to mottled appearance. Along the northern edge of Long Island the soil is a light-brown loamy fine sand to a darker brown very light fine sandy loam 24 to 36 inches deep, and there is present throughout the entire soil profile of 3 feet a very noticeable percentage of minute mica flakes. Along the southern border of Long Island the material has a very decided loamy character and the subsoil a slight reddish tinge.

The light character of this soil renders cultivation easy. The topography is comparatively level or undulating and the drainage is usually very favorable, the light porous character of the soil permitting ready absorption and free movement of excess moisture. Open ditches could be successfully employed in the lower depressions where drainage is inadequate.

The Congaree fine sandy loam is found at intervals along the Staunton River, usually as marginal strips varying in width from 50 to several hundred feet. It seldom occurs continuously along the river for any distance, as the hills and bluffs often rise directly from the waters edge. The largest single area is found over the extent of Long Island. The type occurs to a small extent along James River, principally in the vicinity of Deacon, just above and below the Six-Mile Bridge. Here it is a dark-gray to reddish-brown fine sandy loam to loam containing a fair percentage of rounded gravel and a few angular fragments of mica schists.

The type is alluvial in origin, and represents a weathered material from the various crystalline formations of the drainage basin, reworked by water action and deposited along the course of the rivers during seasons of excessive rainfall and overflow. Like all soils lying below the level of high water, the processes of formation are active during every season of inundation.

The Congaree fine sandy loam is a very desirable and productive soil and is devoted largely to the production of corn. Even on the lightest phases corn makes a very satisfactory growth and returns good yields. In general, 35 to 60 bushels to the acre are produced without fertilizers. The uncultivated areas furnish good pasturage for stock and a fair percentage of the type is utilized for this purpose. Melons and quick-maturing vegetables should produce well. The type is valued at $15 to $40 an acre.

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

Mechanical analyses of Congaree fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
22020, 22022, 22024.	Soil.....	0.2	2.3	6.9	36.1	25.6	18.3	10.2
22021, 22023, 22025.	Subsoil.....	3.4	3.7	3.3	22.3	26.3	21.9	18.9

MEADOW (CONGAREE MATERIAL).

The soil of Meadow (Congaree material) to an average depth of about 12 inches is usually a brown to reddish-brown heavy sandy loam to loam, invariably containing perceptible quantities of minute mica flakes. The subsoil, to a depth of 36 inches, is a reddish-brown heavy sandy loam becoming quite sticky at lower depths and containing throughout numerous mica flakes. This type, as mapped over the area, is by no means uniform in texture or structure, being designed to comprehend the alluvial deposits along the smaller streams of the area. While the larger occurrence of the type would be included in the above description, the areas in general are composed of such a variety of materials in such a mixed condition that a definite and succinct description to cover the entire type is impracticable; in fact, so changeable was the material even over very small areas and so liable to change by reason of frequent inundations that a separation of them into very definite classes was impossible. The narrow marginal strips along the smaller stream courses are made up of a wash material from the surrounding elevations and may have a texture varying from a light sandy loam to a heavy loam, the lighter texture occurring more largely along the narrower valleys in the lighter types of the upland soils. The broader bottoms show more typically the development of the type, with the outer edges usually quite sandy on account of direct wash from the adjacent slopes. Over many of these broader bottoms the soil shows a perceptible silt content. It is not uncommon to find a fair percentage of rock fragments strewn over the narrow valleys, and in some instances the type includes low, wet depressions apparently due to an underlying impervious clay subsoil. Over the latter areas, when a few acres in extent, the surface material has usually a whitish appearance. Most of these areas, however, are exceedingly small.

The type occurs along practically all of the smaller streams of the area, and while the bottoms are often quite narrow and could well be omitted from the map, narrow occurrences are shown in many instances very much exaggerated but withal indicative of a generally existing condition.

All the type is reworked material, having been brought down by the rain waters from the adjacent elevations or taken into suspension by the drainage waters and deposited along the stream courses during seasons of overflow. The processes that operated in the formation of this soil are still active and additions are made whenever an overflow occurs. The narrower valleys with their rapidly flowing streams usually show the sandier deposits and a good natural drainage, while the broader valleys with slower moving overflow waters and more finely textured deposits may require artificial drainage. This is

usually accomplished by open ditches. Even adequate attention to plowing the ground in narrow land will suffice.

During seasons of favorable rainfall this soil is easily cultivated and is considered very desirable for the production of corn. Tobacco is sometimes planted along the narrow valleys and the yields are quite satisfactory. While most of the type is given to corn, which yields from 30 to 55 bushels per acre, it affords excellent pasturage and is occasionally utilized for this purpose. An extent of bottom land enhances the value of a farm.

ALTAVISTA SANDY LOAM.

The soil of the Altavista sandy loam is a gray sandy loam, 10 inches deep, having a fair percentage of rounded pebbles and cobbles scattered over the surface and disseminated through the soil. The subsoil, to a depth of 36 inches or more, is a mottled yellow and red clay loam passing into a red clay at lower depths, which at times may be slightly mottled. This soil is light in structure and is easily tilled.

The type is very similar in character to the Louisa fine sandy loam. It occupies the more gradual slopes of the valley walls directly adjacent to the river bottom and is a fairly productive soil. The type develops at intervals along the Staunton River and has an origin similar to the Cecil clay. Former river action contributed a portion of the material while some of it was no doubt washed from the higher elevations and a portion of it is residual, the residual component including most of the subsoil.

A phase lying to the east of Altavista and occupying level topography is a light-gray sandy loam, 12 inches deep, with the sand content largely of the finer grades. The subsoil is a mottled yellow, red, and gray sandy clay. The topography here influences poor drainage, which in turn through poor areation and oxidation gives the mottled appearance to the subsoil. The area is covered with native grasses and affords good pasturage.

The Altavista sandy loam gives fair to good yields of the general farm crops—tobacco, corn, wheat, oats, and grasses—but the very limited occurrence of the type renders it of little importance.

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

Mechanical analyses of Altavista sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
21964	Soil	4.5	8.9	10.3	27.6	20.6	19.0	8.4
21965	Subsoil	3.9	8.3	7.1	22.2	10.8	20.1	27.5

SUMMARY.

Campbell County, comprising an area of 550 square miles, or 352,000 acres, lies in the south-central part of the State of Virginia in the second tier of counties from the Carolina line. The topographic features range from mountainous to gently rolling, with the rolling portion predominating. The two principal drainage lines are the James River, forming the northern boundary of the area, and the Staunton River, forming the southern boundary line.

Lynchburg, with 29,494 inhabitants, situated in the northern part of the county, on the James River, is a railroad center, the largest town, and of much industrial and commercial importance. Rustburg, near the center of the county, is the county seat. Altavista, in the southwest, and Brookneal, in the southeast, are thriving business places of about 1,000 inhabitants each.

Four systems of railroads operate in the county—the Southern, from north to south in the western portion; the Chesapeake and Ohio, along the James River level; the Virginian, in the south along the Staunton River level; and the Norfolk and Western, from east to west across the northern half of the county, with a branch line extending from Lynchburg to Durham, N. C., running from north to south across the central portion. Ample facilities for transportation are convenient to all sections. Rural telephones and mail delivery routes are practically universal. Improved roads are being constructed.

Climatic conditions are favorable for general diversified farming. The winters are moderately cold and the summers usually hot. The mean annual rainfall of 44 inches is well distributed throughout the year.

The area is primarily an agricultural district. Tobacco, corn, wheat, and oats are the staple crops grown, with clovers, grasses, potatoes, peas, sorghum, melons, miscellaneous vegetables, and numerous small fruits and berries as supplementary crops to meet in part the local needs. Tobacco is the money crop, and the black export or heavy shipping variety is grown. No comprehensive system of growing crops in beneficial rotation is generally practiced, and little attention is given to the fitness of soils for crops. Commercial fertilizers are used extensively, particularly for tobacco. Certain varieties of apples do well. Conditions are favorable for raising live stock, and the industry should be developed. Hired labor is largely colored and reasonably efficient under supervision.

Twelve types of soil were established in the area, varying from heavy red clays to light sandy loams. A large percentage of the area is uncultivated.

The Cecil clay occurs extensively in the northern, western, and southwestern portions of the area, and when improved is a strong soil for the production of tobacco, corn, wheat, oats, and clovers. It washes badly and must be cultivated with care. Substantial work stock and machinery are demanded in its cultivation. Tobacco yields from 600 to 1,500 pounds, wheat from 10 to 30 bushels, and corn from 15 to 75 bushels to the acre. This type of soil is valued at $10 to $50 an acre.

The Louisa loam is the predominating type of the area and is a very desirable soil for general farming purposes. It can be handled under a broader range of moisture conditions than the Cecil clay and responds to improvement with increased yields. Drainage is excellent, though the rolling areas are subject to erosion. Yields vary according to conditions of improvement. Tobacco produces from 500 to 1,500 pounds, wheat from 8 to 30 bushels, and corn from 10 to 70 bushels to the acre. Land of this type has a value of from $8 to $50 an acre.

The Louisa fine sandy loam is considered a "thin" soil, easily exhausted of its fertility, and requires fertilizers in the production of crops. It is a light warm soil, can be handled with ease, and responds readily to good treatment. Much of it is uncultivated. Drainage is generally good, though sometimes excessive. The type can be made very productive.

The York fine sandy loam is a light warm soil, requiring the addition of organic matter for any lasting improvement. Leaching of mineral plant foods is rapid, and crop returns range from fair to good. The type is slightly less productive than the Louisa fine sandy loam, but can be made a good soil for the general farm crops. Drainage is generally satisfactory.

The York loam in its natural condition has a low agricultural value, due largely to unfavorable topographic features. It is an unimportant soil, owing to its limited extent, and little of it is under cultivation. Yields obtained are usually fairly good.

The Iredell clay loam is naturally an intractible soil, but can be reduced to a good state of cultivation and made very productive. It produces good yields of tobacco and is a desirable soil for grasses. The impervious character of the subsoil inclines the type to deficient drainage conditions.

The Iredell fine sandy loam is utilized largely as pasturage for stock. Fair crop yields are obtained over small areas under cultivation. It is an unimportant soil.

The Penn loam is a very productive soil for the general farm crops. The depth of soil is often less than 18 inches and crops over such areas suffer from drought during dry summer seasons. The type responds readily to methods of improvement.

The Penn sandy loam is naturally less productive than the loam type, although it is capable of permanent improvement. The addition of organic matter to increase loaminess over the rolling areas is imperative. Yields are satisfactory under improved conditions.

The Congaree fine sandy loam represents the alluvial deposits of the Staunton River, also to a small extent of the James River. The type while a very light soil gives excellent yields of corn, to which crop it is devoted almost exclusively. Sorghum and melons do well. Most of the type is subject to overflow during seasons of very high water.

The Meadow (Congaree material) includes the alluvial deposits along the smaller streams of the area. Much of the material is undifferentiated and impossible of classification into types. The areas are largely devoted to corn, the yields ranging from 20 to 75 bushels to the acre. Drainage is occasionally deficient, but is relieved by open ditches.

The Altavista sandy loam produces fairly good yields of the general farm crops, but its quite limited occurrence on the valley slopes renders it of little importance.

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