SOIL SURVEY OF LOUISA COUNTY, VIRGINIA.

By HUGH H. BENNETT and W. E. McLENDON.

LOCATION AND BOUNDARIES OF THE AREA.

Louisa County, situated near the center of Virginia and in the region between the head of tidewater and the Blue Ridge, is included within parallels 38° 10′ and 37° 40′ north latitude, and meridians 77° 40′ and 78° 20′ west longitude. It has a mean length from the Albemarle line on the west to the Hanover line on the east of 30 miles and a mean breadth of about 16 miles, embracing an area of 323,008 acres, or a little less than 505 square miles.

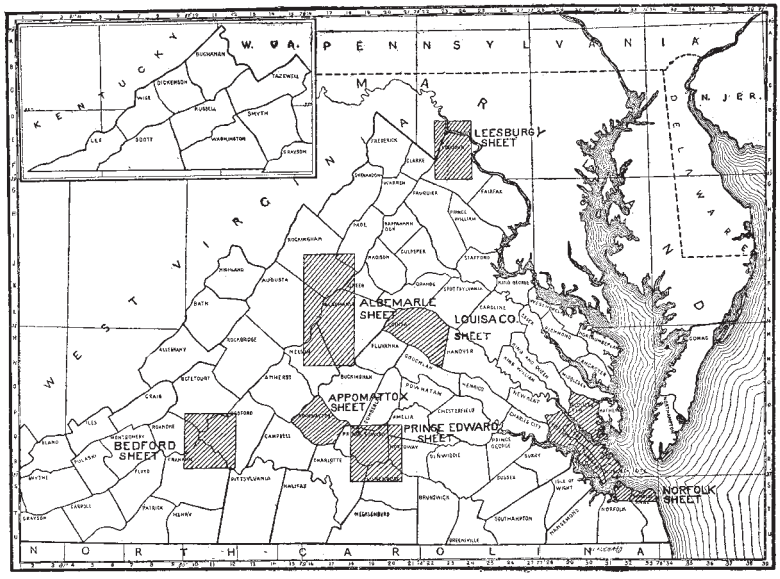

FIG. 6.—Sketch map showing location of the Louisa County area, Virginia.

Louisa, the county seat and largest town, is situated in the center of the county and is about 80 miles southwest of Washington and 45 miles northwest of Richmond. The South Anna River flows about 40 miles southwesterly through the county, parallel to and at an average distance of 4 miles from the southern boundary. The North Anna, flowing east and southeast, with Negro Run, constitutes the northern boundary. Fluvanna and Goochland counties touch the area on the south, Albemarle on the west, Spottsylvania and Orange border it on the north and northwest, respectively, and Hanover on the east.

HISTORY OF SETTLEMENT AND AGRICULTURAL DEVELOPMENT.

Louisa County was cut off from Hanover and organized by an act of the colonial legislature in 1742. At the time there were farms on several important streams, and in this year roads were laid out, supervisors appointed, and tavern rates fixed. The area was settled by expansion of the earlier Virginia settlements and by immigrants directly from England. The population in the main has been always of English descent.

The agricultural practices were similar to those of the early settlers of East Virginia. The cultivation of tobacco, almost exclusively, was deemed at first an economic necessity. An abundance of virgin soil admirably adapted to tobacco, coupled with rapid decline in productiveness of the soil caused by continuous cultivation without rotation or manuring, soon led to a wasteful mode of agriculture. After the land had been cultivated for three years, when the soil was considered exhausted, new fields were cleared for cultivation. Happily the colonial legislature restricted the acreage of tobacco and required the cultivation of specific areas to other crops. Thus the early farmers, in addition to the growing of tobacco, became familiar with the cultivation of wheat, corn, oats, flax, and other crops. The live stock running at large, all breeds being indiscriminately mixed, and having but scant subsistence in winter, resulted in a scrubby stock that has not entirely disappeared.

Each plantation was a community within itself, with a distinct round of occupations. During the interval between the Revolutionary and civil wars the farms were practically self-sustaining. Plows, except the moldboard, and cloth of wool and cotton were made on the farm. Thus originated a kind of rural gentry—an independent class, the owners of plantations—who intrusted the details of farm management to overseers, a contingency that had to do, perhaps, with the little soil improvement of this period.

Very little attention had been paid to crop rotation until the latter part of the eighteenth century. In 1794 Thomas Jefferson described a rotation he had decided upon for the recuperation of his land in Albemarle County, a plan that was very similar to the present general scheme of crop succession. After that time a very beneficial crop rotation was gradually worked out. About 1850 the old practice of continuously cropping land until "worn out" and then taking in "new ground" had begun to lose favor. The practice of fallowing also had weakened. Deep plowing was recognized as beneficial and had become popular. Considerable quantities of "Peruvian guano" and plaster were used about this period, particularly in the "Green Springs Neighborhood."

The Chesapeake and Ohio Railroad, built about 1846, while it gave no sudden or great impetus to agriculture, was the cause of a rapid depletion of the merchantable timber of the county.

Lack of capital and disorganization of labor, which followed as a result of the civil war, necessitated the abandonment of large areas of cleared land that since have grown up in old field pine.

In 1855, as a basis of taxation, land was valued at about $8 an acre for the county; but little was for sale.

CLIMATE.

The following tables, compiled from the records of the Weather Bureau, show the normal monthly and annual temperature and precipitation, and the dates of first and last killing frosts, as recorded at Barboursville, 5 miles west, and Ashland, 18 miles east of the area, and represent approximately the climatic conditions of the area:

Normal monthly and annual temperature and precipitation.

Month.	Barboursville.		Ashland.		Month.	Barboursville.		Ashland.	
	Temperature.	Precipitation.	Temperature.	Precipitation.		Temperature.	Precipitation.	Temperature.	Precipitation.
	°F.	*Inches.*	°F.	*Inches.*		°F.	*Inches.*	°F.	*Inches.*
January	37.5	3.63	36.0	2.85	August	75.5	4.33	76.0	3.92
February	35.1	4.16	36.5	3.48	September	70.9	3.40	69.5	5.15
March	47.6	3.70	48.2	3.41	October	59.2	3.06	57.8	3.84
April	54.5	3.38	56.0	3.67	November	48.6	2.53	48.0	2.49
May	65.4	4.83	66.1	4.78	December	37.5	3.41	38.9	2.97
June	71.9	5.62	73.0	3.53					
July	77.4	4.04	78.0	4.72	Year	56.8	46.09	57.0	44.81

Dates of first and last killing frosts.

Year.	Barboursville.		Ashland.		Year.	Barboursville.		Ashland.	
	Last in spring.	First in fall.	Last in spring.	First in fall.		Last in spring.	First in fall.	Last in spring.	First in fall.
1897	Apr. 21	Oct. 31	Apr. 21	Oct. 31	1902	Mar. 26	Oct. 15	Apr. 14	Oct. 15
1898	May 9	.....	Apr. 7	Oct. 24	1903	Apr. 5	Oct. 27	Apr. 6	Oct. 19
1899	Apr. 17	Oct. 1	May 17	Oct. 6	1904	Apr. 22	Oct. 16	Apr. 22	Oct. 16
1900	May 10	Oct. 18	Apr. 10	Nov.10					
1901	Mar. 18	Oct. 26	Mar. 29	Oct. 26	Average.	Apr. 16	Oct. 19	Apr. 16	Oct. 22

The climate is markedly uniform and favorable both to health and agriculture. The range of temperature between normals for February and July, the coldest and the warmest months, respectively, is about 42° F., while the absolute maximum range is about 113° F. The ground in exceptional cases freezes about 15 inches deep, the normal range being from 2 to 7 inches. The heaving of heavy soils frequently damages wheat by lifting it out of the ground, and young

clover is winter-killed badly where sown late, damage from this cause being more prevalent on the lighter-colored soils. Alternate cold and warm spells in early spring make some of the early blooming fruits, as the peach, problematical crops. Rainfall is heaviest during the growing season. The least precipitation occurs in the fall, which is quite favorable to tobacco curing. Heavy dews, which begin to appear the latter part of August, are said to be beneficial for maturing tobacco, especially in the thickening of filler leaf.

PHYSIOGRAPHY AND GEOLOGY.

Louisa County, as seen from the Southwest Mountains, which rise almost abruptly to an elevation of 1,100 feet just west of the county line, has the appearance of a plain. There are no pronounced elevations above the general upland level, a characteristic of the eastern part of the Piedmont, known as "Middle Virginia" and roughly included between a line passing through nearly the center of Fairfax County in a southwesterly direction to the North Carolina line, and the low, broken range of mountains which parallel the Blue Ridge, distant about 20 miles farther west.

The western half of the county, beginning at Louisa, is essentially a plain with an altitude of 500 feet above sea level. East of the town of Louisa the general surface slopes gradually toward the eastern boundary, where the altitude is about 300 feet. The greatest altitudes are reached in a ridge crossing the county in a southeasterly direction from Gordonsville through Bumpass, and in a similar parallel ridge along the southern boundary of the county. Along these drainage divides rise many streams that flow almost at right angles into the North Anna and South Anna rivers, draining, respectively, the northern and southern parts of the area. There is a gradual, although almost imperceptible, slope toward these rivers. Stream erosion has produced a decided disfiguration of the once more level surface. Beds of streams, merely spring branches along the divides, deepen rapidly as they near the rivers, where the valleys are from 150 to 250 feet deep. Thus have been formed many secondary ridges or drainage divides, the slopes of which become more abrupt toward the rivers and at the confluence of smaller streams. In general the surface features consist of an intricate system of valley slopes and rounded ridges. The river valley slopes are generally gentle enough to prevent excessive erosion, though the surface soil has been shallowed and in places removed, thus leaving the subsoil clays exposed.

On the whole, there has not been the excessive washing and deep gullying characteristic of the Piedmont, a condition in part the result of the extensive forested areas, which liberate the heavier rains much more gradually than otherwise would be the case.

In the southeastern part of the county the creeks and smaller streams have a tendency to flow easterly and diagonally into Little and South Anna rivers, and the surface is more gently rolling, but even here it is deeply cut by small streams. Along Negro Run, the northwest boundary of the county, there are fewer streams, and consequently the surface is less broken. Owing to a failure to keep the lower courses of many of the streams open, coupled with a neglect of the adjacent slope soils, streams are building up and broadening their flood plains, and as a result considerable areas of former good cultivable lands are now in a marshy, untillable condition.

The rivers are meandering in their courses and are generally bordered by strips of bottomland, which occurs most extensively in the concaves of bends and is frequently interrupted by precipitous bluffs. The smaller streams also have narrow strips of wet lands along their courses.

Geologically the area consists of a well-defined series of igneous and highly metamorphosed rocks of the same era, crossing the county in a general northeast and southwest direction in almost uninterrupted parallel belts. The dominant rocks bear directly upon the character and properties of the overlying soils, while the few unimportant rock variations have no influence on them further than to cause local and slight nonconformities.

The eastern third of the county is underlain by a hard, banded gneiss, composed in the main of feldspar, quartz, hornblende, and mica. The apparent durability of this rock, suggested by its toughness in outcrops along streams, is contradicted by the depth and uniformity of its weathering, there being very few surface outcrops and only occasional fragments at a depth of less than 10 to 30 feet.

Immediately west of the gneiss area the county is crossed by a belt of talcose schist of a brownish or gray color and very soft. In many of the road cuts the unweathered rock is exposed; but on the whole the weathering extends to 10 or 20 feet below the surface. The average width of this belt is about 4 miles. These schists are traversed in all directions by many quartz veins, some of which carry minute quantities of gold, while along Contrary Creek are some of the largest iron-pyrites mines in the country.

North of Louisa is a wedge-shaped area of granite reaching a maximum width of 8 miles along the North Anna River and narrowing down to about 1 mile just south of Louisa, which width it retains in a strip extending beyond the southern edge of the county. This granite is of a coarse-grained porphyritic variety, high in quartz and feldspar. It weathers readily, though not deeply, and has a tendency to hold its original structure even when thoroughly decomposed, a characteristic probably due to a kind of clinging skeleton of the constituent quartz. Occasional orbiculate granite bowlders are found on the

surface. Other areas of granite are found in what is known as the "Green Springs Neighborhood," 10 miles west of Louisa. Here the range in the rocks is from a very highly siliceous granite, with very little mica and hornblende, to a dark heavy hornblende granite, which gives rise to the heaviest soils in the county. The more siliceous areas give rise to the Cecil sand, a large area of which occurs just north of Lasley. The heavy red clay areas south of Lasley seem to be derived from a very compact, fine-grained hornblende granite.

The remainder of the western half of the county is underlain by a talcose schist about the same as that previously described, except along the western boundary, where is found a hard slatelike variety in which the quartz assumes a flinty character. Going west the depth of weathering diminishes and the magnesian silicate content increases. Throughout the overlying soil mass, particularly on ridges, are scattering quartz fragments and outcrops of quartz veins still partially intact.

SOILS.

The different types of soils have distinct and easily-determined boundaries, with the exception of the Cecil fine sandy loam, the sand of which frequently is so fine as to make the type resemble the Cecil loam. All the types, except the Iredell clay loam, have nonconformities, in the shape of small poorly-drained areas about the heads of streams, such places being locally designated as "crawfish land."

The soils of the area differ from the general run of Piedmont soils in the low percentage of rock fragments and in the extreme poverty of their organic content. Another distinguishing feature is the unhealthiness of the soils, a condition evidenced by the prevalence of clover sickness and by the marked beneficial results of liming. The subsoils are generally distinctly acid to litmus paper.

During periods of drought the cultivated soils are apt to assume a whitish, bleached appearance. They are put into good tilth easily, but their tendency when wet is to revert to a close, compact structure.

Seven types were recognized and mapped. Their names and extent are shown in the following table:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Cecil sandy loam	150,400	46.4	Cecil sand	8,192	2.6
Cecil loam	108,992	33.8	Cecil clay	7,168	2.2
Cecil fine sandy loam	26,432	8.2	Total	323,008	
Meadow	11,520	3.6			
Iredell clay loam	10,304	3.2			

IREDELL CLAY LOAM.

The soil of Iredell clay loam consists of a dark-brown loam, frequently having almost the texture of a sandy loam, and grading at about 7 inches into a yellowish clay loam. The depth of soil varies from 6 to 16 inches, the average depth being about 9 inches.

The subsoil consists of a yellowish heavy clay, often grading into disintegrated rock at a depth of 26 inches. The subsoil of more nearly level areas, reached at a depth of 6 to 8 inches, is to 36 inches extremely heavy and impervious to water and air. Many small iron concretions are mingled with the soil on poorly-drained springy slopes. Occasionally the soil covering of slopes has been washed off, leaving exposed the subsoil, so as to preclude cultivation except for grass.

Practically all of the type is confined to a nearly oval-shaped area along the South Anna River, 8 miles west of Louisa. Several lesser detached areas lie to the southeast of the main body.

The type is more nearly level than adjacent soils and occupies a slight depression. As a whole it presents a gently undulating topography. The South Anna River, with several small tributaries, affords a good drainage system. Between the small streams are flat table-land areas, poorly drained and extremely heavy, locally called "slash land." Along the streams the soil is very fertile, being composed of a heterogeneous mixture of the type and material washed down from surrounding types.

Very little open ditch or tile drainage has been practiced. The latter system would be the only feasible plan for draining, and with the heavier phases the great number of drains necessary would entail an expense that might not be justified even by the resultant soil improvement.

The soil is formed by the weathering of a hard hornblendic granite. A close examination of this rock reveals, at the contact of its constituent feldspar and hornblende, serpentine as a probable alteration product of the hornblende. Weathering has been very uniform, but not deep, evidently because of the exclusion of air and water by the imperviousness of the overlying soil. Small veins of a quartz-feldspar granite cut through the main body of the parent rock, but have little effect on the soil beyond leaving a few rock fragments on the surface. This body of soil, known as the "Green Springs Neighborhood," was considered before the civil war one of the most fertile spots in Virginia. Considerable heavy shipping tobacco was produced before 1870, and yields of 1,000 pounds per acre were secured. A yield of 40 bushels of wheat per acre was secured on this land at intervals until about thirty years ago, since which time agriculture has declined, and now most of the type is sown to grass. Only very poor yields of wheat are secured. Some fair crops of corn are made.

Before the introduction of Peruvian guano, which was extensively used after 1850, the only fertilizers used were barnyard manure and plaster. Imported rock gypsum was ground in mills on the farm and applied as a top dressing to clover in the spring. Since the civil war commercial fertilizers have been about the only manures applied to the soil. A lack of labor and capital has had much to do with the decadence of agriculture.

The soil is decidedly acid to litmus and is benefited by lime and thorough cultivation.

As the type is now devoted mostly to grass, it would seem that the cattle industry might be extended with profit.

The following table gives the average results of mechanical analyses of the Iredell clay loam:

Mechanical analyses of Iredell clay loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Pr. ct.	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*
13534, 13536	Soil	4.0	7.8	3.8	10.6	9.8	43.7	20.8
13535, 13537	Subsoil	1.1	3.1	1.8	6.6	7.5	24.3	55.6

CECIL LOAM.

The Cecil loam, to a depth of 6 to 8 inches, consists of a yellowish-gray to brownish friable loam of a silty character. Below this occurs a gradation through a clay loam into a heavy red or yellow clay at an average depth of about 12 inches.

Below 18 to 26 inches the subsoil becomes more friable and has a greasy feel, and occasionally represents little else than an incoherent mass of soft, partially-decomposed rock. The red subsoil predominates and may be considered typical of the type.

Varying amounts of quartz fragments from the size of small gravel to 2 inches in diameter occur scattered over the surface and to a less extent through soil and subsoil, but rarely in sufficient quantities to interfere seriously with cultivation. The humus content of the soil is low, especially in older fields, where the soil has a tendency also to become more sandy on account of the finer material being removed by surface wash.

The Cecil loam is an easily-tilled soil and can be kept in excellent tilth if due attention is paid to moisture conditions. If plowed too wet, subsequent dry weather is apt to harden it into a rather refractory structure and cause it to clod badly with later cultivation. These clods differ from those of a true puddled soil in the comparative ease with which they disintegrate. Heavy rains form a crust 1 to 2 inches thick on the surface of the cultivated soil, which favors capillary loss of moisture if not broken up or mulched.

The loamy texture of the Cecil loam would indicate a productive soil, but like that encountered in other sections it is recognized as being naturally poor, though susceptible of improvement by judicious management.

The Cecil loam occupies the greater part of the county west of Louisa. About 3 miles east of Louisa is a very uniform belt, about 4 miles wide, crossing the area in a northeast and southwest direction. There are several detached areas closely associated with the Cecil fine sandy loam.

Many streams through the type flow into the North Anna and South Anna rivers. Thus have been formed a series of nearly parallel interstream ridges that have in turn been cut into by lesser streams, forming a secondary series of ridges. The slopes are usually rounded and are under cultivation to a much greater degree than the summits. Drainage is excellent, except in depressions and in small areas near stream courses.

The soil is residual in origin and is derived entirely from a talcose schist, having a soft to compact slaty structure, varying but slightly in composition. The magnesium-silicate content is probably higher, texture finer, structure more compact, and weathering shallower as the western boundary is approached. There are occasionally small areas near the Albemarle line, where resistant phases, containing from 5 to 20 per cent of flintlike quartz, have not weathered more than a foot or two below the surface. Quartz veins occurring through the entire area have left many small rock fragments on the surface. The parent rock has weathered generally uniformly to a depth of about 6 to 20 feet. Weathering has been particularly thorough on the higher ridges, where the soil seems more silty and the subsoil is redder and heavier.

Most of the upland is forested with a stunted growth of white, red, post, and chestnut oak, hickory, and old field pine. An original heavier growth of pine and oak has been removed. West of Greensprings Depot the type is termed "piney woods" land, though there is practically no pine left.

Of the crops grown on the Cecil loam tobacco receives most attention and makes the best comparative yields. Wheat does fairly well on the slopes, where the soil is heavier. Corn receives too little attention and the yields are very poor and uncertain. Clover catches poorly because of soil acidity, it is believed, and imperfect methods of seeding. Hay yields about one-half ton, corn 10 to 12 bushels, and tobacco 300 to 700 pounds per acre. Vegetables do well. Barnyard manure and cowpeas with lime give immediate and permanent benefit, as does plowing in the fall, especially where portions of the subsoil are turned to the surface. Subsoiling should be tried, and in general the plowing should be much deeper.

The crop yields obtained on the present small farms can not be taken as a just measurement of the real worth of this type of soil, inasmuch as they do not indicate the greatly increased yields to be had by small applications of lime and organic manures coupled with a better system of tillage.

Some careful attention is paid to crop rotation, but cowpeas should be included more frequently in the scheme of rotation.

The following table shows the average results of mechanical analyses of the fine earth of the Cecil loam.

Mechanical analyses of Cecil loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Pr. ct.	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*
13530, 13532	Soil	1.0	4.9	3.6	14.8	16.1	38.9	19.4
13531, 13533	Subsoil	1.1	2.4	1.6	6.6	7.7	21.4	58.9

The manurial requirements of this soil were studied, using a large sample collected from a field near Greensprings Depot. This field has been in cultivation for thirty years or more, being planted a larger part of the time to corn, wheat, or oats. For the three years preceding 1905 no crops were grown, but during the summer of this year (1905) the land was plowed to a depth of about 6 inches and sowed to cowpeas.

The results obtained from the examination by the wire-basket method indicate that this soil will respond to a remarkable degree to all forms of fertilizers which were tried. Excellent results were obtained from cowpeas and lime; from a combination of nitrate of soda, sulphate of potash, and acid phosphate, with lime; from the complete fertilizer alone; from nitrate of soda alone or in combination with sulphate of potash or acid phosphate; from lime alone, and from manure alone. Sulphate of potash alone gave good results, while acid phosphate alone or in combination with sulphate of potash gave medium results.

In these tests wheat plants were used as an indicator. To what extent the tests are applicable to tobacco, corn, and other crops of this region is subject for further investigation. They are held also to be applicable only to the field from which the sample was taken. They are in accord, however, with the experience and practice of the community, and show the great value of lime and any nitrogen-producing fertilizer.

CECIL SANDY LOAM.

The soil of the Cecil sandy loam consists of a gray sandy loam from 6 to 12 inches deep. The sand varies from fine to coarse and sharp. In that part of the type lying north of Louisa there is a small percent-

age of angular fragments—mineral aggregates of resistant constituents of the parent rock—that impart to the soil the feel of a loose sand with considerable interstitial loam. The subsoil is a stiff red clay, fairly free from rock fragments, except some small quartz particles. Below 26 inches it often has a greasy feel, due to particles of mica.

There are occasionally poorly-drained areas of "crawfish land" near the heads of small streams that have a yellow or bluish-white impervious subsoil. In such places the saturation of the soil has retarded or prevented aeration and subsequent oxidation, and the conditions are not at all favorable for plant growth.

The Cecil sandy loam occupies 46.4 per cent of the area. It occurs in two belts crossing the county, one occupying practically the eastern third of the county, and the other a triangular area with a basal extension of about 8 miles along North Anna River, narrowing southward to a width of 1½ miles at Louisa, where it extends southwesterly along Roundabout Creek.

The topography is about the same as that of the Cecil loam—a series of ridges and counter ridges—interstream intervals that narrow and slope toward confluences of water courses. The area north of Louisa is the more rolling and eroded. A gradual surface descent toward the eastern boundary has so moderated the slopes that erosion is a less serious problem with the large area of the type here than with the remaining soils. Surface drainage and that of the soil to a depth of 10 inches is excellent.

The soil is derived from granite and gneiss. The area farther west is the weathered product of a coarse-grained, porphyritic granite, carrying a high content of quartz and feldspathic material, mainly orthoclase, and very little muscovite mica. This disintegrates readily, but not deeply, and frequently holds its original structure to within a few inches of the surface. Erratic rounded bowlders of granite, numerous quartz fragments, and small mineral aggregates occur on the surface and mingled with the soil. South of the drainage divide the granite has a finer texture and weathers more thoroughly. The soil of the extensive area in the eastern part of the survey is derived from a uniform banded gneiss, differing essentially from the granite only in a higher percentage of mica. This rock has been tilted until the bands stand almost perpendicular. Crossing this area occur narrow interrupted belts of a rotten stone, a light, porous rock apparently a residuum of the finer insoluble materials of the original rock, cemented with iron oxide and retaining the original structure. The porosity of this rock tends to deplete the overlying 8 to 24 inches of soil of its moisture by too complete drainage.

The Cecil sandy loam, locally termed "granite land" or "gray land," taken as a whole, is the most productive type of the area. It is the easiest soil to till under a wide range of moisture conditions, and is

susceptible of improvement. A deficiency in organic matter makes it apt to assume a bleached, hardened appearance in times of drought. Its original forest growth was pine, oak, and hickory. Much old field pine now stands on former cultivated fields. It is the best tobacco soil in the county, the yields ranging from 400 to 1,000 pounds per acre of a good-textured leaf. Wheat on the heavier phases of the type yields from 7 to 25 bushels, corn 15 to 40 bushels, and hay 1 ton per acre.

Cowpeas are entering into and altering a long-practiced rotation of following corn with wheat, then clover and grass from one to three years, and then tobacco. Farmers have recognized the value of this crop in improving this soil and are taking hold of it rapidly. The value of lime, used as a complement to green cowpeas plowed in, as a means of improving the soil texture and as a remedy to correct clover-sick soils is generally admitted, but this approved method is practiced as yet to a very little extent. Commercial fertilizers are used too indiscriminately and with too little forethought as to their profitableness.

Deeper plowing and subsoiling are recommended in order to reach the best results with this type.

The following table gives the average results of mechanical analyses of the fine earth of the Cecil sandy loam:

Mechanical analyses of Cecil sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Pr. ct.	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*
13516, 13518	Soil	3.2	15.4	10.7	26.1	13.1	17.9	13.6
13517, 13519	Subsoil	2.8	10.7	6.5	13.7	6.1	13.3	46.9

In order to obtain information regarding the manurial requirements of this soil a large sample was collected near Frederick Hall. The sample is fairly typical, but contains slightly more organic matter and has been better fertilized than the most of the land in the county. The field from which the sample was taken was cultivated prior to the war, but afterwards abandoned and allowed to lie fallow for many years. For the five years prior to 1903 it had been in grass, but was then plowed and planted to corn. It was again planted to corn in 1904, and in the fall of the same year plowed and sowed to wheat. During 1904 it received about 200 pounds of complete commercial fertilizer, a light dressing of barnyard manure, and 250 pounds of lime per acre. During the fall of the same year 250 pounds more of lime per acre was applied.

The results obtained on this soil by the wire-basket method indicate that to secure good crop yields green manures, such as cowpeas, should

be plowed under and that lime should be applied. Good increases in plant growth were also secured by the use of lime and of nitrate of soda, sulphate of potash, and acid phosphate in combination. Even the use of a complete fertilizer or of stable manure without lime produced satisfactory increases in yield. The use of single constituents, like nitrate of soda, sulphate of potash, etc., did not greatly change the capacity of the soil.

CECIL SAND.

The Cecil sand consists of 12 to 18 inches of a light to medium sandy loam underlain by a yellow sandy clay or a sticky heavy sandy loam to a depth of 3 or more feet. In some of the small poorly-drained areas, approaching a "crawfishy" state, the subsoil may be of a whitish or bluish color and of a clammy, puttylike consistency. As a rule these "crawfishy" spots overlie the partially decomposed parent rock at a depth of only a few feet, while in the better drained areas the depth to rock is rarely ever less than 8 to 10 feet. The surface 6 or 8 inches of the soil is rather compact, of a light-gray color, and deficient in organic matter. Both soil and subsoil are practically free from rock fragments.

The Cecil sand is associated with the Cecil sandy loam, except in the case of the largest area of the type found around Lasley. Considerable areas occur immediately south of Centerville and Louisa, around Bumpass, and at the headwaters of Roundabout Creek. There are a number of smaller areas in the eastern third of the county.

This type occupies level areas in the higher ridges and small stream slopes which are rarely ever steep enough to cause excessive erosion. Nearly all of the smaller areas are found around the head of small streams, and in places they are poorly drained on account of seepage from higher lying areas. The wetter of these seepage areas constitute the "crawfishy" lands referred to above, and as they occur only in small spots they are not shown on the accompanying soil map. In the larger areas the drainage is good, but it is a noticeable characteristic of the type that the average depth to standing water is much less than in the Cecil sandy loam and other types at the same elevation. This may be due to the position of the folds in the underlying rock, being such as not to allow the water to pass to lower depths, or it may be due to a less thoroughly decomposed state of the underlying rock.

The Cecil sand is a residual soil, derived from granites and gneisses. The area around Lasley is derived from a coarse-grained siliceous granite, carrying very little else than quartz and white feldspar. This rock at first breaks down into a mass of quartz and feldspar aggregates, which retain the color of the original rock. These in turn break down into clay and sand with a comparatively low silt content—a characteristic of all Cecil soils derived from granites. The areas to the north and south of Louisa are of the same origin as the adjoining

Cecil sandy loam, and farther east it is of gneissic origin. Being of the same origin as the Cecil sandy loam, its difference from that type seems to be the result of poorer drainage conditions, which have retarded aeration and oxidation and the consequent decomposition of the rock constituents.

The original timber growth consisted principally of oak, pine, and hickory. Most of the merchantable timber has been cut.

The Cecil sand is a less productive soil than the Cecil sandy loam and is less easily improved. The effects of the applications of manures are not lasting, being scarcely observable after the second year.

More than one-half of the type is under cultivation and is used for the production of all general crops of the area, including corn, wheat, grass, clover, and tobacco. Being a sandy and leachy soil, it is not very well adapted to wheat, grass, and clover. The stands are often poor and the yields are light and uncertain. By following a proper rotation fair crops of corn are produced. A fine-textured tobacco is grown, and the yields are fairly good. Hay yields about one-half ton, wheat from 7 to 10 bushels, corn anywhere from 5 to 25 bushels, and tobacco from 500 to 800 pounds per acre. Instead of growing poor crops of wheat, hay, and corn on this soil, it is suggested that more attention be given to tobacco, peaches, garden vegetables, and potatoes. It is an excellent peach soil.

While lime and cowpeas do not improve this soil as noticeably as they do some other soils of the county, good results have been obtained particularly by the plowing under of matured pea vines. Crimson clover does fairly well and should be grown to a larger extent.

The following table gives the average results of mechanical analyses of the fine earth of the Cecil sand:

Mechanical analyses of Cecil sand.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Pr. ct.	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*
13512, 13514	Soil	1.3	9.4	12.1	34.9	13.9	18.3	9.9
13513, 13515	Subsoil	1.9	9.9	10.0	23.0	9.9	18.7	26.4

CECIL CLAY.

The Cecil clay, to an average depth of 6 inches, consists of a heavy red clay loam or clay of a loamy character. There is no very distinct line of demarcation between soil and subsoil, which is a heavy red clay, occasionally loamy below 24 inches on account of the presence of partially decomposed rock.

This type is not an extensive one and is confined mainly to stream slopes. Many areas too small and irregular to appear upon the map

occur throughout the county, representing severely eroded phases of other types and known locally as "gall spots." The most extensive areas are those associated with the Iredell clay loam in the southwestern part of the county, and the principal area lies along Roundabout Creek.

The sloping topography is conducive of excellent surface drainage. The subsoil is too close to admit of good underdrainage, but could be improved by tile drains or most practically by subsoiling and growing deep-rooted crops to open up its structure.

The Cecil clay is a residual soil derived from granite, gneiss, and schist. Two phases were recognized, differing in the main in their origin. That in the vicinity of Poindexter and several small upland areas represent the original weathered products of the parent rock. This phase has a deeper red color and a higher crop value. The other phase represents the subsoil from which the original soil covering has been removed by wash.

The original vegetation consisted of several species of oak, pine, and hickory. The greater part of the type is under cultivation. It is considered the most difficult soil of the area to cultivate, becoming very hard and compact if allowed to remain uncultivated for any considerable period. If plowed too wet it puddles and later breaks into refractory, resistant clods.

With proper regard for its restriction of cultivation to a narrow range of moisture conditions and with thorough, deep plowing, this soil gives better yields of wheat and corn than any other type. Wheat yields from 12 to 28 bushels, corn 20 to 40 bushels, and tobacco 700 to 1,000 pounds per acre. The tobacco produced is a heavy leaf and is used for a plug filler. Orchard grass is well adapted to this type and should be grown to protect those steeper areas most inclined to washing. Subsoiling the slopes in the early fall when heavy rains are less prevalent and seeding them to winter crops is also advised.

Organic manures and lime are of the greatest use in improving the texture of this refractory type, while cowpeas and the other deep-rooted plants open up and improve the subsoil.

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.
		Pr. ct.	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*
13508, 13510	Soil	2.6	7.9	5.8	15.9	12.2	23.1	32.4
13509, 13511	Subsoil	1.5	5.5	3.6	11.4	9.4	20.3	47.9

CECIL FINE SANDY LOAM.

The Cecil fine sandy loam consists of a grayish fine sandy loam, from 6 to 14 inches deep, the average depth being about 9 inches. Generally the soil seems to become heavier with depth, coincident with an increased content of very fine sand and silt. The subsoil is a heavy red clay, generally compact and uniform to a depth of 36 inches. Occasional poorly-drained areas have a yellow subsoil.

Through cultivation and washing the surface material on hillsides is removed so rapidly that the soil soon assumes a loamy character, and in a few years may lose almost entirely its original characteristics. It was quite difficult on some of these slopes to draw a distinct boundary between this type and the Cecil loam.

Deep plowing without the formation of clods can be done over a wider range of moisture conditions than general appearances would indicate. The soil is very deficient in humus, but with careful tillage, applications of barnyard manure, and plowing under clover and cowpeas it is the most easily and quickly improved type of soil in the county.

Most of the Cecil fine sandy loam occurs in irregular areas in the southwestern part of the county and is confined principally to slopes. Numerous streams have cut through it, leaving the backbones of interstream ridges narrow. The rolling surface affords good natural drainage. While the greater part of the type on immediate stream slopes is under cultivation, very little erosion has taken place.

The Cecil fine sandy loam is a residual soil derived from schist which weathers similarly to that giving rise to the Cecil loam, though more uniformly and deeper. This schist, however, has a higher content of siliceous material and feldspar with a probable corresponding lesser content of magnesia.

The range of usefulness of this soil covers the production of all crops grown in the area. The yields obtained, as it is cultivated ordinarily, are poor, but with proper treatment of the soil the crop yields equal those of the Cecil sandy loam. Tobacco of excellent texture yields 500 to 1,000 pounds, wheat 15 to 25 bushels, corn as much as 45 bushels, and hay 1 ton or more per acre.

A rather compact subsoil suggests the need of subsoiling. Deep fall plowing is practiced by those most successful in cultivating this soil. Good stands of clover are secured with applications of barnyard manure and seeding alone. The good remedial effects of cowpeas and lime are recognized and their use is being extended.

The following table shows the average results of mechanical analyses of typical samples of the soil and subsoil of the Cecil fine sandy loam:

Mechanical analyses of Cecil fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Pr. ct.	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*
13522, 13526	Soil	0.8	2.0	1.6	11.3	38.3	33.1	12.6
13523, 13527	Subsoil	.4	1.2	.8	5.7	18.7	27.5	45.2

MEADOW.

The Meadow is composed of alluvial and colluvial areas along streams, subject to frequent overflows and to seepage from higher lands. The soil is naturally wet to marshy and consists of 3 feet or more of dark sandy loam, silty loam, and sand, frequently interstratified. As a natural consequence of variation in the rate of flow this soil is inclined to be silty along rivers, while along smaller streams it tends to become more and more sandy toward their sources.

Some small areas of soils formed more or less *in situ*, kept wet and marshy by seepage, have been included in the Meadow. At least small strips are found along all branches and creeks, but these are frequently too narrow to be represented on the soil map. The most extensive areas occur in the concaves of bends of the North Anna and South Anna rivers. Frequent bluffs, sometimes 50 feet or more high, occurring on the convex side of bends, have forced the overflow to the opposite side, thereby widening the flood plain there.

All streams overflow during the year and deposit each time a layer of material derived from the various soils in their drainage basins. Where the current of smaller streams has been retarded by crooks or an obstructed channel, Meadow areas are being built up and widened. Considerable areas of formerly well-drained and productive bottom land have been rendered marshy and unfit for other purposes than pasturage through failure to keep the channels cleared of obstructions.

While much of the Meadow is under cultivation, the greater part is forested with water-loving trees and shrubs. By ditching against seepage water and straightening channels practically all this land could be brought under cultivation and made the best corn land in the area. It is well adapted to certain varieties of hay, sorghum, and oats. Good tobacco crops are made on the higher lying and more sandy phases. It is the only land of the area on which crops can be grown continuously with success. The likelihood of overflow, however, makes crops more or less uncertain on this type.

AGRICULTURAL METHODS.

The present methods of agriculture in Louisa County have been evolved from practices of many years, and while perhaps adhered to too closely they are to a certain degree suited to and enforced by existing conditions.

As a natural sequence to the little variety of soils and topography and the homogeneity of population the methods are strikingly similar over the entire area. Cultivation is never interfered with seriously by the occurrence of stones or intractableness of soils and can be carried on with facility over a wide range of moisture conditions, except upon the heavy types—the Iredell clay loam and Cecil clay—and the "crawfishy" phases of the other types.

The prevailing rotation, the result of more than a hundred years of experience, has been invaluable in preventing deterioration of the land, but lacks in not rapidly improving the soil—a defect which is probably in part due to the fact that in the crop rotation the grass and clover are too frequently cut for hay and the stock allowed to graze down the sod. Primarily the soil needs organic matter and not enough is incorporated with the rotation practiced, the general plan of which is to follow corn with wheat, sown with clover and grass, superseded by tobacco after the removal of two or three crops of hay. Organic matter can be supplied by the introduction of frequent crops of cowpeas, which not only afford a ready means of increasing the humus content of the soil, but also improve the structure of the soil and subsoil of every type of the area. Barnyard manure is excellent in its immediate and lasting effects. While the available supply of it is inadequate an increased production would entail an extension of the stock industry. Increased stock raising, coupled with improvement of the grass lands, could not be otherwise than profitable, as has been proved in a few instances where farmers have bought up cattle and fattened them for market.

The land receives an initial preparation with one, two, and occasionally three horse plows, to a depth of 4 to 9 inches, or an average of about 5 inches. It is harrowed once or twice, listed for ridge-grown crops, or seeded to grain. Wherever the subsoil is within 9 to 11 inches of the surface, except with the Cecil sand, plowing should be deep enough to turn a portion of the underlying clay to the surface so as to get the benefit of the pulverizing action of frost. Fall plowing is practiced extensively, and if done deep enough with shallower early spring plowing to reduce clods and retain moisture the land can be put into a very favorable textural condition. Subsoiling the heavier types is manifestly advisable on account of their compact nature. The extreme plasticity and unyielding nature of the Iredell clay loam practically forbids subsoiling. An old and popular practice of "laying by" corn and tobacco by turning, with deep furrows,

the soil from the center of the rows, leaves the plants on ridges 6 to 8 inches high, with deep, interridge, gutterlike furrows. This ridge not only increases the surface exposed to evaporation and the baking effects of the sun, but breaks numerous lateral roots and brings the root system nearer to the heat of the sun. Scarcity of labor is said to retard the extension of the better plan of more nearly level cultivation, particularly with corn, it being necessary at times to check the growth of weeds and grass by turning them under, which can be accomplished easier with ridge cultivation.

The difficulty experienced in recent years in getting a good stand of clover, apart from the good effects of liming, could be remedied by putting the soil into a more pulverulent state and seeding alone rather than with wheat, as is the common practice. The available water supply for the young plants in the spring thus would be increased in the absence of wheat which makes its greatest growth at this season and deprives the young plants of their due proportion of water. Farmers adhere to the fallacy that they are forced by the scarcity and uncertainty of labor to secure in this way the greatest possible acreage returns, overlooking the probable greater returns to be had through the permanent benefit that good crops of clover bring to the soil.

Tobacco generally is planted from the 15th of May to the 20th of June on land plowed in the fall. However, considerable setting is done late in July, but good mature crops are more certain with the earlier setting. Probably more than half the crop is cut and immediately hung to air cure in barns. The remainder is allowed to wilt in the sun from a few days to a week or more, in some instances, according to the state of weather. Ordinarily tobacco grown on similar soils has about the same quality at the time of maturity, the great range in prices obtained for the cured leaf having to do with the farmer's individual ability to handle properly the matured crop.

Very little ditching or terracing is done. Land can be kept from washing by deep cultivation and growing grass and winter cover crops. Poorly-drained "crawfishy" areas can be cultivated profitably only by extensive ditching and by plowing the land into high beds with deep water furrows.

Improved farm machinery is coming into use among the successful farmers about as extensively as the soil conditions warrant.

AGRICULTURAL CONDITIONS.

Though the soils of the county as a whole are rather less productive than the average for Piedmont soils, the farmers generally get a good price for their principal product, tobacco, make a comfortable living, and have generally substantial houses. The stock industry is very limited and the average area under cultivation small; consequently

only small barns are needed for the few cattle and necessary working stock. In the "Green Springs Neighborhood," in the vicinity of Poindexter, there are a number of large and rather imposing dwellings, built in antebellum days, but here the progress of agriculture since the war has been less marked than elsewhere in the county. Rail fences have been replaced largely by wire. The farm machinery as a rule is modern, but too often is left out of doors when not in use. Frequently reapers and mowers are left for months exposed to all sorts of weather.

During the past ten years the unfortunate system whereby merchants furnish supplies in advance at necessarily exorbitant prices has declined greatly, and this in itself is indicative of a general betterment of the farmer's condition. Probably more than three-fourths of the farms are free from incumbrance.

The condition of agriculture on the Cecil loam where farms are generally small and confined to slopes indicates less prosperity on this type of soil. The unfavorable crop yields, with the general indifferent treatment of the type, combined with its reputed unproductiveness, have discouraged development. From the fact that mining has been and is still the main occupation of the inhabitants, a considerable area north of Mineral, along Contrary Creek, might be classed as nonagricultural. The greatest general prosperity is shown on the Cecil sandy loam.

The 71.5 per cent of farms operated by owners constitute the most profitably managed soils. Renters have shown such little regard for soil improvement that land cultivated by them is ordinarily considered less desirable and has a lower market value.

There are two general systems of farm tenancy. In one the renter gives the landlord one-half the crop for the use of land, tools, stock, and feed for stock. In the other he gives one-fourth of the crops for the use of land alone. Firewood and houses are furnished without charge.

The price of land, except that in the vicinity of the pyrites mines on Contrary Creek, has never been inflated by booms. The Cecil sandy loam can be bought for from $2.50 to $15 an acre, and the other types generally for from $2 to $10 an acre. Acreage valuation has been fixed at these apparent low figures by a custom of selling as a whole farms that contain generally more or less unimproved or deteriorated land.

Farms vary in size from about 25 to 1,000 acres, the average being 105.9 acres. Formerly the farms were much larger. The antebellum plantations not infrequently contained 5,000 or more acres. The larger farms at present are found in the western part of the county. Real estate agents are having much to do with reducing the size of farms by dividing up tracts of land and selling small areas to immigrants.

The supply of labor is far below the demand. Here, as in some other agricultural regions, the tendency among young men seems to be to take up other occupations or professions rather than agriculture. Most of the able-bodied colored labor has drifted to the cities or is employed on public works, railroad building, and in the mines.

Wages are too far below market value to attract even a small migratory class. An adult farm hand commands $8 to $16, with board and lodging, a month. The introduction of a wage scale approximating market prices has failed so far because of the lack of a few progressive or experimentative farmers willing to take the initiative. At present the alternative seems to rest in the sale of small farms to immigrants who do their own work.

A significant result of this labor problem has been the enforced intensive treatment of a relatively restricted acreage with subsequent increased crop yields. Farmers relying upon the aid of their immediate families find it difficult to manage, on an average, more than 5 acres of tobacco, 10 to 30 acres of corn, and perhaps a similar acreage of grains, grass, and other crops.

Virginia sun-cured tobacco, a popular chewing type, produced in Louisa and several neighboring counties, is a light-brown, moderately oily and gummy leaf of medium size. "Sun-cured," applied to the crop as a whole, is rather a misnomer, in that the former practice of curing in the sun has been supplanted largely by curing in well-ventilated barns, by which process the cured leaf is only a little darker. The demand is for a darker leaf than formerly was produced.

Ordinarily not enough corn and hay are grown to supply the needs of farmers, many having to purchase to supplement the shortage. The wheat crop falls far short of what is needed for home use. Considering the fact that some of the farmers ship it at a profit, together with its importance in the most successful crop-rotation scheme, it would seem to merit more recognition than it now receives, and certainly the production should be increased to the extent of supplying the local demands.

While excellent vegetables are grown easily, some farmers buy considerable quantities of cabbage, potatoes, etc. Violets are grown and shipped at a profit. Nearly enough pork is produced to supply local consumption. In the fall many hogs are fattened on acorns.

The rotation practiced tends to lessen the attention paid to the adaptability of soils to crops. Upon every soil type, except the Iredell clay loam, which is too heavy for tobacco, are grown about the same crops with but little specialization on account of soil variation. The sandier soils make a finer-textured tobacco, and it is the rule to select them for "tobacco lots." Careful management narrows the range of prices obtained for the leaf, and a larger yield on the heavier soils and

phases balances differences in quality, thus preventing the restriction of the crop to sandy soils.

The superior quality of the leaf grown along Roundabout Creek has given the soils of that neighborhood a reputation for being particularly adapted to tobacco. It is ventured that a great deal more here depends upon the management of soils and manipulation of the matured leaf than popular opinion concedes.

The Cecil clay, Cecil sandy loam, and the Meadow are best suited to corn with present methods. By force of habit a certain acreage is put in corn from year to year, with little regard sometimes as to the suitableness of the soil. It is generally recognized that the heavier soils are best for wheat and grass, but the practice of growing these crops only as necessary crops to precede tobacco is not an observance of this adaptation.

The Iredell clay loam, at one time considered the best wheat soil in the State of Virginia, through scarcity of labor and capital, has had its acreage yield reduced from 40 to about 15 bushels.

Apples, particularly the winesap, flourish on most of the soils, but do best in slight southern-exposed depressions. It is claimed that peaches are short lived and unproductive. Poorly-drained areas are best adapted to sorghum, millet, and herd's-grass.

The Chesapeake and Ohio Railroad, crossing the county near its center, affords good transportation facilities for the greater part of the county. In the southeastern part there are shipping points on the James River Division of the Chesapeake and Ohio Railroad. Most of the tobacco from this section is hauled unprized to Richmond.

Nearly all roads have cut into the clay subsoil and have a compact, smooth surface in summer, while in winter they are quickly cut and rutted, becoming almost impassable in many places. Vehicles of a broader tread have been advocated, but are not likely to come into general use without legislative action. They undoubtedly would prevent to some extent the rutting of the highways.

There are no towns of importance in the area. Louisa, the county seat and largest town, has a population of about 500. However, there are convenient shipping points along the railroad. Richmond, the general market for the area, is about 50 miles by railway from Louisa. Flowers gathered in the afternoon are placed in northern markets the following day.

NRCS Accessibility Statement

This document is not accessible by screen-reader software. The Natural Resources Conservation Service (NRCS) is committed to making its information accessible to all of its customers and employees. If you are experiencing accessibility issues and need assistance, please contact our Helpdesk by phone at 1-800-457-3642 or by e-mail at ServiceDesk-FTC@ftc.usda.gov. For assistance with publications that include maps, graphs, or similar forms of information, you may also wish to contact our State or local office. You can locate the correct office and phone number at http://offices.sc.egov.usda.gov/locator/app.

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or a part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410 or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.