

U. S. DEPARTMENT OF AGRICULTURE,

BUREAU OF SOILS—MILTON WHITNEY, Chief.

IN COOPERATION WITH THE WEST VIRGINIA GEOLOGICAL SURVEY;
I. C. WHITE, STATE GEOLOGIST.

SOIL SURVEY OF FAYETTE COUNTY,
WEST VIRGINIA.

BY

J. A. KERR.

HUGH H. BENNETT, INSPECTOR, SOUTHERN DIVISION.

[Advance Sheets—Field Operations of the Bureau of Soils, 1919.]



WASHINGTON:
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LETTER OF TRANSMITTAL.

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS,
Washington, D. C., September 7, 1920.

SIR: Under the cooperative agreement with the West Virginia Geological Survey, I. C. White, State geologist, a soil survey of Fayette County was carried to completion during the field season of 1919.

I have the honor to transmit herewith the manuscript and map covering this work, and to recommend their publication as advance sheets of Field Operations of the Bureau of Soils for 1919, as authorized by law.

Respectfully,

MILTON WHITNEY,
Chief of Bureau.

HON. E. T. MEREDITH,
Secretary of Agriculture.

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MAP.

Soil map, Fayette County sheet, West Virginia.

SOIL SURVEY OF FAYETTE COUNTY, WEST VIRGINIA.

By J. A. KERR.—Area Inspected by HUGH H. BENNETT.

DESCRIPTION OF THE AREA.

Fayette County, W. Va., is situated in the south-central part of the State. It is bounded on the north by Nicholas and Clay Counties, on the east by Greenbrier County, on the south by Summers and Raleigh Counties, and on the west by Kanawha County. The county has a length from east to west of approximately 36 miles and an average width from north to south of about 24 miles. The area included is 667 square miles, or 426,880 acres.

The country is rough and mountainous. It is an old plateau region, the Alleghany Plateau, deeply and thoroughly dissected by erosion. The former level is represented by the crests of the higher ridges, the elevations of which range from some 1,900 feet in the northwest part of the county to 3,000 feet or more in the southwest, south, and east. Myles Knob, in the extreme eastern part of the county, is something over 3,350 feet, and Potato Hill, in the southwestern part, 3,150 feet above sea level. The process of cutting down by rains and streams has been continuous, with very little development of secondary plains or grading of slopes. The valleys of even the largest streams are narrow. The deepest erosion in the area has taken place in the gorgelike valley of New River (lower down known as the Kanawha River), which flows northwest through the length of the county. This valley is from 1,300 to 1,700 feet deep, and has an average width of about a mile. Its slopes are very precipitous and rocky, with many high rock cliffs. The river enters the county at an elevation of 1,250 feet, and falls to 613 feet on the western border.



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

The western part of the county is thoroughly dissected. The stream beds are generally over 1,000 feet below the general ridge level. The ridges are mostly of a "hog-back" shape and the slopes

are very steep. To the east of the very broken country there is a belt which, while generally rough and steep-sloped, is marked by considerable local development of undulating to gently rolling areas, as in the vicinity of Oak Hill, Fayetteville, Divide, and Clifty. Such areas are the result of resistant sandstone beds, which have checked the erosive cutting of local streams. All through the eastern part of the county the streams have cut deep, steep-sided valleys for some distance back from the river gorge, but occupy much higher valleys toward the headwaters.

There are some areas of gently rolling topography, such as the bench areas in the vicinity of Danese, Pittman, and Crickmer, and the main ridge of Sewell Mountain. These are, however, rather local modifications of a generally mountainous topography, including a large proportion of land unsuited to tillage.

The topographic features of the county can be summed up as follows: Its surface has been so dissected by erosion that but few level areas are left, and these consist of rather small flats, or approximate flats, occupying the crests of some of the ridges which have not been eroded to hog-back shapes. Most of the county is deeply dissected, having a rough to very strongly rolling surface, with many extremely steep slopes, and including a very large proportion of land unsuited to tillage. The western part of the county is roughest on the average, but of the remainder much is too rough for cultivation. There are areas of considerable size, such as the belt through Fayetteville and Oak Hill, with relatively smooth surfaces where much of the land is now in cultivation. Even in these smoother sections, however, the surface is gently to strongly rolling, but the average topography is not so steep that cultivation can not be carried on over 75 per cent of its extent.

The principal streams of the area are New and Gauley Rivers, which, uniting in the northwest part of the county, form the Kanawha River. New River is the larger stream, having a drainage area of some 6,800 square miles above Fayette. The Kanawha-New River flows northwest through the county. Gauley River with its branch, Meadow River, parallels New River for some distance, forming the northern and eastern boundary of the county. The drainage of all the county is into these streams. Paint, Armstrong, and Loop Creeks are important branches draining the southwest part of the county.

Throughout the county the streams have a rapid fall, and formerly there were small gristmills on many of the smaller streams, but nearly all of these have been abandoned. There are many opportunities for development of water power on the rivers and larger creeks. One large hydroelectric plant is in operation on the Kanawha River at Kanawha Falls.

The county was organized in 1831. The earliest settlers, who came from Virginia, were mostly of English descent, and nearly all the present farming population consists of their descendants. With the construction of the Chesapeake & Ohio Railroad in 1873, coal mining and lumbering were developed and have become very large and important industries. A considerable increase of population accompanied this development. Thus in 1880 the population was 11,560 and in 1910, 51,903. The number of farms increased 48 per cent during this period, but by far the greater part of the increase in population has been due to the mining industry.

The population is classed as rural, there being no towns of over 2,500 population. Numerous small mining towns and farming communities are scattered throughout the county. The most thickly settled districts are along the Kanawha and the New Rivers and in the south-central part of the county. Fayetteville, the county seat, had a population of 671 in 1910. Montgomery, on the Kanawha River, is the largest town in the county, with a population of 1,888 in 1910.¹ The mining towns furnish good local markets for all farm products.

With the development of the coal industry numerous railroad lines have been constructed throughout the county. The main line of the Chesapeake & Ohio Railroad runs through the county along New River, and branches of this road reach into all parts of the county. The Kanawha & Michigan Railroad extends along the north side of the Kanawha River to Gauley Bridge, connecting there with the Chesapeake & Ohio. An extension of this line, the Gauley & Eastern, extends up Gauley River into Nicholas County. The main line of the Virginian Railroad passes through the southwestern part of the county, connecting with the Chesapeake & Ohio at Deepwater. In the southwestern part of the county the Kanawha, Glen Jean & Eastern extends from Glen Jean to Pax. It connects with the Virginian at Pax and with the Dunloup Creek branch of the Chesapeake & Ohio at Glen Jean. In the same district the White Oak Railway extends from Oak Hill to Glen Jean, connecting with a branch of the Virginian at Oak Hill and with the Dunloup Creek branch of the Chesapeake & Ohio at Whiteoak Junction, near Glen Jean. The Sewell Valley Railroad extends from Meadow Creek, Summers County, on the main line of the Chesapeake & Ohio, north along the eastern boundary of the county. A standard-gauge lumber road supplies an extension to Nallen, on the northeastern boundary of the county.

¹ Since this report was written the preliminary announcement of the population of Fayette County and its civil divisions in 1920 has been issued by the Bureau of the Census, as follows: Fayette County, 60,377; rural, 60,377; Montgomery, 2,130; Ansted, 1,178; Fayetteville, 659; Mount Hope, 1,989; Scarbro, 1,015; Thurmond, 285.

The Kanawha River is navigable as far as Mount Carbon, the highest lock on the river being near Montgomery. The construction of a lock above this point is projected.

The early development of the county was marked by the building of turnpikes through to the east. These old roads are yet the most important thoroughfares. The Giles, Fayette, and Kanawha road, passing through Fayette, Fayetteville, Oak Hill, and Mount Hope to Beckley, in Raleigh County, and continuing east, is graded and surfaced through the county. The old James River and Kanawha road, traversing the county by way of Montgomery, Gauley Bridge, Ansted, Mountain Cove, Clifftop, to Rainelle, Greenbrier County, and so east, is being graded and surfaced, as is also the Cotton Hill road from Fayetteville to Kanawha Falls and Montgomery, and the Dunloup Creek road from Glen Jean to Thurmond. Large sums have been voted and bonds issued for such work. The grading is very heavy and surfacing material must be shipped in from outside sources. The main country roads follow well-chosen routes, and are fair to good.

CLIMATE.

The climate of Fayette County is temperate and healthful. Periods of hot summer weather are of short duration and the winters are comparatively open, the temperature seldom falling much below zero. The mean annual temperature is 52.9° F; that of summer is 70.5° F. and that of winter 31.6° F.

The rainfall of this region is not only sufficient, but is very favorably distributed for agriculture. The mean annual precipitation is 38.84 inches. The rainfall is heaviest during the growing season, the mean of the three spring months being 11.19 inches and that of the three summer months 11.51 inches. Crops rarely suffer for lack of moisture. Precipitation is mostly in the form of rain. The snowfall for the whole winter averages 40 inches, but usually snow remains on the ground for only a short period.

The average date of last killing frost in spring at Nuttallburg is May 1, and of the first frost in fall October 10, giving a growing season of approximately 5 months. The latest recorded killing frost in the spring is May 22, and the earliest in the fall September 20. The average date of the last killing frost in the spring at Powellton is April 25, and the average earliest in the fall October 21, with the latest and earliest recorded at this station as May 15 and October 10, respectively. There is some variation in the season at different altitudes, as shown by comparison of the records at Nuttallburg and Powellton. At the highest altitudes it was observed that flint corn or a mixture of flint and dent corn is grown to some extent, and it is

stated that oats are more productive at the higher elevations. Corn is planted about Fayetteville from May 1 to 15; oats April 15 to 30; wheat, September 20 to November 1.

The following tables are from the records of the Weather Bureau station at Nuttallburg, elevation of 2,252 feet, and at Powellton, elevation of 904 feet:

Normal monthly, seasonal, and annual temperature and precipitation at Nuttallburg and Powellton.

NUTTALLBURG.

Month.	Temperature.			Precipitation.			
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year (1904).	Total amount for the wettest year (1901).	Snow, average depth.
	° F.	° F.	° F.	Inches.	Inches.	Inches.	Inches.
December.....	34.6	77	-10	2.92	0.87	7.05	6.2
January.....	31.2	70	-21	3.10	3.80	2.68	3.8
February.....	31.6	76	-21	3.15	1.40	.20	11.2
Winter.....	32.5	77	-21	9.17	6.07	9.93	31.2
March.....	43.4	85	1	4.18	3.60	4.40	6.1
April.....	52.4	94	11	3.33	1.80	6.77	2.7
May.....	62.4	105	21	3.68	2.35	7.98	.....
Spring.....	52.7	105	1	11.19	7.75	19.15	8.8
June.....	68.6	98	34	4.29	3.40	7.68	.....
July.....	72.1	99	35	4.00	1.05	3.70	.....
August.....	70.9	104	40	3.22	3.25	4.54	.....
Summer.....	70.5	104	34	11.51	7.70	15.92	.....
September.....	67.2	107	27	2.19	.65	3.27	.....
October.....	55.6	95	8	2.20	.85	.25	.2
November.....	44.8	87	9	2.58	.26	2.23	3.1
Fall.....	55.9	107	8	6.97	1.76	5.75	3.3
Year.....	52.9	107	-21	38.84	23.28	50.75	43.3

Normal monthly, seasonal, and annual temperature and precipitation at Nuttallburg and Powellton—Continued.

POWELLTON.

Month.	Temperature.			Precipitation.			
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for the driest year (1903).	Total amount for the wettest year (1898).	Snow, average depth.
	° F.	° F.	° F.	Inches.	Inches.	Inches.	Inches.
December.....	36.0	72	— 5	2.94	0.89	2.99	4.0
January.....	35.7	83	— 7	3.68	1.79	4.45	9.1
February.....	34.7	76	—20	3.01	5.20	2.07	10.7
Winter.....	35.5	83	—20	9.63	7.88	9.51	23.8
March.....	43.6	89	1	4.68	4.91	5.21	5.4
April.....	54.0	93	12	3.79	5.24	2.68	1.1
May.....	64.0	97	25	4.04	2.89	3.85	.....
Spring.....	53.9	97	1	12.51	13.04	11.74	6.5
June.....	70.5	102	38	4.77	5.24	2.76	.....
July.....	74.1	101	46	4.57	4.65	7.58	.....
August.....	72.6	101	42	3.67	1.91	9.55	.....
Summer.....	72.4	102	38	13.01	11.80	19.89	.....
September.....	67.3	99	28	2.78	1.34	1.77	.....
October.....	54.8	92	16	1.86	1.10	3.59	T.
November.....	44.2	80	0	2.48	1.67	3.41	1.2
Fall.....	55.4	99	0	7.12	4.11	8.77	1.2
Year.....	54.3	102	—20	42.27	36.83	49.91	31.5

AGRICULTURE.

The early settlers of the county were pioneers and hunters rather than farmers. Game was abundant, which with small patches of corn and vegetables supplied much of the food requirements. Hill-side locations, even on steep slopes, were generally preferred, it is said, as affording better shelter for homes and for stock in winter. The stock lived on the range through most of the year, cattle and sheep thriving on the native grasses and browse, and hogs on mast and roots. For a time live stock constituted the only source of income. Sheep raising, mainly for the wool, later received considerable attention and continued as an industry of some importance for many years. Tobacco early became a cash crop. A variety known as dark tobacco—not the burley of the limestone regions—was raised. It was almost always grown on newly cleared land, and the first crop was of the best quality, that of subsequent years being heavier and coarser. The brightest of the first year's crop, after "fire cur-

ing," was suitable for cigarettes; the larger and heavier leaves for chewing tobacco. From 500 to 800 pounds per acre were produced. The bulk of the crop is said to have been sold in the Cincinnati markets or later shipped by rail to Richmond. With the development of the coal industry, work in and about the mines attracted many of the farmers and the tobacco industry was abandoned.

Seventy-five per cent of the county is still in forest range. There were only 1,672 farms in the county at the time of the 1910 census, and most of these were convenient to large tracts of open range. Grazing on this range is still an important feature of the farm practice in most communities. Cattle, hogs, and sheep are marked and turned out on the range during the spring, summer, and fall. The range is not overstocked, and stock is in good condition in the late fall. In seasons of abundant mast (mainly acorns) hogs fatten without grain.

Generally the first aim of the farmer in this region is the supplying of his home needs. A few dairy cattle, a few hogs, and poultry are kept on all farms. Wheat can scarcely be grown for market, but many produce enough for domestic uses. These, with the produce of a garden, orchard, and in many cases a small patch of sorghum, furnish a comfortable living on soil of moderate fertility, and the typical farm of the county has the appearance of comfort and prosperity.

In 1910 the average size of farms was 65.9 acres, of which 32.1 acres was classed as improved. This average well represents the ordinary farm, as there are few large farms in the county.

The main farm crops are corn and hay. In 1909, according to the census reports, there were 9,038 acres in corn and 9,445 in hay. The average yields for the last four census years were 18 bushels of shelled corn and something less than 1 ton of hay per acre. In 1909, on the average farm, about $5\frac{1}{2}$ acres of corn was grown, producing 98 bushels of grain, and 6 acres of hay yielding $5\frac{1}{2}$ tons. For winter feeding these are supplemented by smaller amounts of oats, fed usually in the sheaf, and corn fodder. Oats is a fair crop. The average yield for the last four census years is 13 bushels per acre, but when fertilized the yield is larger. In 1909 the acreage in oats was 2,144, but before that year the acreage was larger, and it seems probable that at present it is considerably larger.

The acreage in wheat and buckwheat is comparatively small. That in wheat decreased from 4,289 acres in 1879 to 230 acres in 1909. With increased prices it is now grown by many farmers in sufficient amounts for home use. The yields are low and there is little profit in its production. Buckwheat is grown on much the same scale, and when fertilized is a fairly profitable crop.

Millet or Hungarian grass is grown to some extent to supplement the hay crop. In 1903, 823 acres produced 851 tons. But the crop is not grown regularly, and during the course of the survey few fields were seen.

The hay crop consists mainly of timothy and clover. In 1909, 67 acres of clover produced 85 tons; 3,526 acres of clover and timothy mixed produced 2,841 tons, and 3,503 acres of timothy produced 3,764 tons. Other tame or cultivated grasses, mostly redtop, occupied 1,526 acres, with a production of 1,233 tons of hay. Clover and timothy are commonly sown together, the first year's crop being largely clover and the second year mostly timothy. Grass lands are usually not productive of hay for more than three years without reseeding.

Both red clover and "sapling" or mammoth clover are commonly used. The sapling clover matures later, thus giving better results when mixed with timothy, and it also endures a greater degree of acidity in the soil.

As clover and timothy thin out, redtop, oat grass, orchard grass, and other native grasses give a fairly productive and permanent pasture. In places there is some bluegrass, as in barnyards and well-fertilized fields, but it is not a common grass in this county. In old worn fields broom sedge may come in. Ordinarily 3 acres of pasture will support one steer, or the equivalent in smaller animals, through the grazing season.

Truck and fruit crops are grown to a considerable extent as cash crops, especially in the more thickly settled central and southern parts of the county. In some cases truck and fruit farms are operated very profitably on the ordinary farm lands of the county, and quite commonly such crops are produced in a small way in connection with general farming or with other occupations.

In 1909, 1,136 acres of potatoes were grown, yielding an average of 100 bushels per acre, and 1,067 acres were used for all other vegetables, such as cabbage, peas, beans, tomatoes, sweet corn, sweet potatoes, beets, onions, and strawberries. In all, the production of these crops amounted in value to \$204,738, a return of nearly \$100 per acre. The soils of the county are naturally well adapted to truck crops, and the relatively large value per acre of such crops make the expense of building up the fertility of the land a profitable investment. There are good markets, and production is limited mainly by the acreage of clover sod and the quantity of stable manure available.

There are small apple orchards on all farms. In most cases they appear healthy and vigorous. Many consist of young trees. The soil, topography, and climate are well adapted to this fruit. In

1909 there were 84,776 apple trees in the county, producing 105,187 bushels of fruit. The more carefully managed orchards produce a good quality of fruit, and are profitable, but on many of the smaller farms no provision has been made for spraying and the crop is smaller and of poorer quality. Among the varieties of apples grown are the Rome Beauty, Ben Davis, Milam, Winesap, Yellow Transparent, Grimes, Delicious, and Wolf River. While there are a few peach trees on most farms, it is commonly stated that they seldom bear well, being subject to winterkilling. Cherries and plums produce well and are commonly planted. Grapes do well, but are rather uncertain, owing to the likelihood of injury by late spring frost. Cultivated raspberries and blackberries succeed, but wild berries are abundant, and as there is little profit in growing the cultivated varieties, few plantings have been made.

A few dairy cattle are kept on all farms, usually from 3 to 5, and in only a few cases is this number exceeded. Some of the cattle are of good dairy type, while many are of mixed breeding. Butter is the principal market product. In 1909 the value of dairy products, excluding home use, was \$83,237, an average of about \$50 per farm. Poultry and eggs were produced to about the same amount.

Calves are usually kept till 2 years old and sold at local markets or to local buyers. In 1909, 1,040 calves and 2,555 head of other cattle were sold or slaughtered.

A small number of hogs are kept on almost all farms. They are usually of good type. As they are largely kept on the open range, cholera and other infectious diseases at times cause considerable losses, as it is hard to control disease under these conditions; but as a general thing they thrive well. In 1909, 5,291 head were sold or slaughtered.

Sheep are quite commonly kept in the northeastern part of the county, in some cases in inclosed hill pastures, but usually on the forest range. They are of various mutton types, no one breed being predominant. Spring lambs ordinarily reach a weight of 70 to 80 pounds by fall. They are sold to local buyers and slaughtered at local or city markets. In 1909, 2,541 head were marketed.

A good many farmers keep a few hives of bees. The value of honey and wax produced in 1909 was \$4,390. Sorghum cane is also quite commonly grown in small patches for sirup. In 1909, 174 acres of sorghum produced 1,429 tons of cane, yielding 12,644 gallons of sirup.

In general the investment in farm equipment through the county is comparatively small. Barns are usually large enough to house the stock comfortably, but afford little mow space. Horses of general-purpose type are commonly used for farm work. Brood mares are

kept on some farms, but breeding is not generally of importance. The more costly farm tools, such as grain drills and mowing machines, are frequently owned cooperatively or their use rented. It is stated that there are not a dozen binders in the county, the small scale of farming not justifying the general use of large machinery. Grain is usually cradled.

No systematic plan of crop rotation is followed. Ordinarily corn is followed by oats, in which grass is seeded. Corn is not often grown two years in succession on the same land. Wheat or buckwheat may follow corn or oats. Potatoes are generally grown on clover sod, in garden spots manured each year, or on new cleared land.

In 1909 the use of commercial fertilizer was reported on half the farms of the county, but only to an average amount of \$13.63. It seems probable that a considerably larger quantity is used at present. Acid phosphate is a common form of application. In communities where large sawmills are operated a considerable supply of hardwood ashes is available at moderate or low prices. These form a valuable lime and potash fertilizer. Otherwise, lime is practically untried in the county.

The average expenditure for labor in 1909 was \$63.33 per farm. Very little labor is hired, except in busy seasons, and such seasonal labor is often difficult to obtain. Wages are based on those obtained in public works and mines.

The value of farm lands is not greatly affected by coal values, as the title to available coal is now generally held separately. Values generally range from \$30 to \$75 an acre, depending on location, topography, and the condition of improvements. Timber is generally valued at \$30 to \$50 an acre, not including the value of the land, much of which is of little value except for forestry.

SOILS.

Fayette County lies wholly within the Appalachian Plateau, which extends from Pennsylvania to Alabama and includes nearly all the State of West Virginia. The upland soils of this province are of residual origin, formed by weathering of the local rock formations. These formations include rocks of the Pennsylvanian and Mississippian periods of the Carboniferous era. The Pennsylvanian occupies almost all the county. It consists of thick alternating beds of sandstone and shale, with many beds of coal and some of fire clay, clay stone, and impure limestone. The whole formation here produces soils of remarkably uniform type. There has been considerable local modification in the soil by material fallen or washed down from higher slopes. Much of the soil of some areas appears to owe its textural com-

position largely to rocks that have disappeared rather than to those immediately underlying the soil, as, for example, in many places loam soil overlies pure sandstone, which in itself could scarcely contribute material containing so much silt. In any given part of the regional formation there is a large proportion of sandstone; in many places it is predominant. But soils of sandy or sandy loam texture seldom occur, for there is a constant tendency for the heavier material derived from shale to overrun, modify, or partly obscure that from the sandstone. The thinner beds of coal, clay, and limestone are of little effect in soil formation. There are several thin beds of impure limestone, usually less than 2 feet thick. They occur at wide intervals on steep slopes and have very little effect on the soils of the county. Thus the entire area of uplands derived from the Pennsylvanian has remarkably uniform soil conditions. Aside from local occurrences of a rather dark phase of soil, they consist of light-brown to yellow soils underlain by pale-yellow to yellow sandy clay and silty clay subsoils. These soils range in texture from silty clay loam to fine sandy loam, with many stony areas. The shales give rise to the heavier textured soils, the sandstones give the sandy soils, while material coming from both shales and sandstone forms the loam or silt loam soil. These upland soils belong in the Dekalb series.

The strata rise gradually to the south and east, so that they are successively exposed. The mountainous region of the two western districts is occupied by the Kanawha group, the lower Allegheny capping the ridges near the border. These formations include a number of thick beds of massive resistant sandstone, which largely determine the topography. But there is a large proportion of shale present, which on these steep slopes dominates the soil, which is classified as the Dekalb stony silt loam.

The central and eastern part of the county is largely occupied by the New River group. The topography is greatly influenced by two massive, resistant sandstones, the Nuttall and Raleigh formations, their resistance to erosion causing the formation of a number of plateau and gently rolling bench areas and a generally less rugged topography than prevails in the Kanawha. The agricultural soils here are mostly classified as the loam and silt loam of the Dekalb series. The steeper slopes are occupied by the Dekalb stony loam and stony fine sandy loam.

The lower division of the Pennsylvanian, the Pocahontas, is a smaller section, having a maximum thickness of some 500 feet in the county. It is of little extent, occurring principally on steep slopes of the gorge of New River and on Meadow River and Sewell Creek, in the eastern part of the county. It consists of sandstone

and shale, and gives rise chiefly to the Dekalb stony loam, or Rough stony land.

Finally the formations of the Mississippian appear below the Pocahontas. A maximum thickness of about 1,250 feet is exposed on New River at the southeastern boundary. The formation rises almost to the crest of the hill at the extreme eastern point of the county. The formation is of shale, of various colors, usually red or Indian red, with interbedded sandstone and some limestone. The derived soils are classified as the clay loam and stony clay loam of the Meigs series.

The soils of the area have been classified in series or groups possessing similar features of color, structure, origin, and drainage.

The Dekalb soils are well-drained upland soils derived from non-calcareous shales and sandstones, having light-brown to grayish surface soils and yellow moderately friable subsoils.

The Meigs soils represent material derived from strata of red shale and of sandstone so alternating that in places the derivative soils are distinct and in places mixed, but altogether so intermingled that separation is impracticable. The red shales are somewhat calcareous and in themselves give rise to soils which in uniform bodies are classified as Upshur. These soils have reddish-brown or Indian-red surface soils, and heavy, somewhat plastic Indian-red subsoils. The sandstones give rise chiefly to Dekalb soils—that is, light-colored soils with yellow subsoils.

The alluvial soils consist of the well-drained brown soils of the Huntington series, and the gray and mottled poorly drained soils of the Holly series. The material consists of alluvium washed from the regional uplands.

In the following chapters the soil types are described in detail and their relation to agriculture discussed. The distribution of the soils are shown in the accompanying map, and the following table gives the name and the actual and relative extent of each type mapped:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Dekalb stony silt loam.....	117,184	27.4	Huntington fine sandy loam....	4,608	1.1
Dekalb stony loam.....	103,168	24.2	Huntington gravelly fine sandy loam.....	2,816	.7
Dekalb loam.....	59,840	14.0	Meigs clay loam.....	2,240	.5
Dekalb silty clay loam.....	39,680	9.3	Holly silty clay loam.....	1,408	.3
Rough stony land.....	31,104	7.3	Riverwash.....	512	.1
Dekalb silt loam.....	30,144	7.1			
Dekalb stony fine sandy loam..	23,040	5.4			
Meigs stony clay loam.....	6,016	1.4			
Dekalb fine sandy loam.....	5,120	1.2			
			Total.....	426,880	.....

DEKALB STONY FINE SANDY LOAM.

The Dekalb stony fine sandy loam is composed of a layer of yellowish-brown to yellow fine sandy loam, 6 to 10 inches thick, passing into a subsoil of yellow friable heavy fine sandy loam to fine sandy clay. The lower subsoil in many places contains partly disintegrated sandstone material of reddish-yellow or bright-yellow and reddish colors. The type is underlain by thick beds of massive to cross-bedded sandstone, and shale. The sandstone is predominant, and occurring as it usually does on the upper part of the slopes, the lower formations, especially in the ravines, are more or less obscured by an admixture or covering of sandy materials.

The topography is for the most part steep, the type occurring mostly in ravines and small deep valleys where the Dekalb loam forms the soil of the ridges.

The stone content is variable, but is high in most of the type, small and large fragments of sandstone being scattered plentifully over the surface and mingled in the soil mass. Bedrock is in many places encountered within the 3-foot section, and small outcrops are common.

The Dekalb stony fine sandy loam is extensively developed in the north-central and south-central parts of the county. In the extreme south-central part of the county, where the soil is somewhat less stony the type is farmed to some extent, and includes areas approaching in character and value the Dekalb fine sandy loam. But throughout the county nearly all the type is in forest, of oak, chestnut, hemlock, and pine, with magnolia and laurel growing abundantly near the streams.

DEKALB STONY LOAM.

The fine earth of the Dekalb stony loam consists of a surface layer of yellowish-brown to brown mellow loam which grades at about 6 to 8 inches into a subsoil of yellow to yellowish-brown silty clay loam to silty clay, somewhat compact in places. The stony material consists of sandstone fragments and outcrops, the content varying a great deal from place to place. Bedrock in many places lies within the 3-foot section.

The topography is generally quite steeply sloping, but is seldom as steep as in the typical Dekalb stony silt loam. Under natural conditions drainage is good without being excessive, but in cultivated land the surface soil is frequently quite shallow, showing the effects of surface wash and erosion.

The type occurs extensively throughout the Sewell Mountain and Quinnimont Districts, in the eastern part of the county, and to some extent in the central part of the county. It lies in narrow belts along small streams, normally where they cut the sandstone formations, and

is very stony. As the belts widen they take the form of breaks, as on Glade Creek at Landisburg, with very steep and stony land at the upper boundary, from which rocks and soil material have unevenly washed and fallen down over soils which would otherwise be less stony. In the largest areas occupied by the type there are alternate belts of typical stony loam and of stony silt loam, and patches of shale soils containing little stony material occur on the more gently sloping shoulders. Along the numerous ravines there are large quantities of stone, spreading over both sandstone and shale beds, and the gentle slopes at the mouths of ravines are often covered deeply with this out-washed material. The type associated with the Rough stony land near New River approaches the condition of the latter; elsewhere only a small part is extremely stony.

The type has a relatively low value as farming land. Most of it is forested with a good growth of oak, poplar, chestnut oak, chestnut, and buckeye, with some hemlock and pine on the stonier and steeper places, and an undergrowth of laurel, sassafras, dogwood, and briers. Much of the land has been cut over, but a large part of the younger growth is left. Occasionally fields or small farms have been cleared in cutover land, or in places selected on account of their being less stony or less broken. In some cases the larger stones have been carried from the fields or gathered into piles, but usually the land is planted to corn or used for pasture without removing the stones. The soil is fairly productive, yielding 20 to 40 bushels of corn per acre, the yields being higher on newly cleared land. Small grains are not easily produced, as the work must be done mostly by hand, and the stones make it difficult. Yields have decreased in old fields with loss of organic matter and soil by washing. On pasture land, redtop, orchard grass, oat grass, and other native grasses give a fairly permanent sod, but it is usually difficult to keep the land free of brush and briers. Most of the type is of greater value as forest land than as farm land. An ordinary stand of timber is worth \$30 to \$45 an acre. Most of the type is underlain by workable coal seams, and is held in large tracts by coal and lumber companies.

DEKALB STONY SILT LOAM.

The fine earth of the Dekalb stony silt loam typically consists of grayish-brown to yellowish-brown mellow silt loam which grades at about 6 to 8 inches into yellow silty clay loam to silty clay. Scattered over the surface and disseminated through the soil and subsoil are varying quantities of sandstone fragments and shale. In many places bedrock is encountered within the 3-foot section and outcropping ledges are common. As mapped the type includes many strips and patches of Dekalb stony loam, silt loam, silty clay loam, stony silty clay loam, and Rough stony land, these soils occurring on steep

broken slopes and sharp ridges in an irregular and patchy way. It is, however, predominantly a silt loam or a mellow silty loam, remarkably deep for such steep slopes, but generally carrying enough rather small sandstone fragments to interfere seriously with cultivation. In places very large stones lie on the surface or embedded in the soil mass.

The type is extensively developed in the western part of the county, occupying roughly the districts of Kanawha and Falls. The topography is very steep and mountainous, this condition alone making the type nearly useless for practical agriculture.

The Rough stony land included occurs principally on the higher parts of the slopes, on the ridges and hogbacks, and in the points and narrow buttresses between ravines. These patches are usually narrow. They consist of solid cliff and ledge outcrops, below which there is a surprisingly small amount of rock débris. The sandstone of this formation is very resistant to weathering. The formations outcropping include a few beds of siliceous limestone, so thin and occurring at such wide intervals that they have little effect on the soil as a whole. Occasional narrow belts of a dark variation of soil, consisting of a dark-brown to brown, mellow loam to silt loam, grading at 10 to 18 inches into light-brown or yellowish-brown silt loam occur, apparently in the outcrop of these limestones. Such an area occurs about 3 miles south of Kincaid. If more extensive these belts would have been mapped separately as the Berks stony loam. The Berks soils occur elsewhere in the Appalachian Province. They resemble the Dekalb soils, but have browner soils and are more productive. Black locust, butternut, basswood, ash, dogwood, tulip poplar, chestnut, beech, hemlock, mountain laurel, and pawpaw were seen on these brown strips.

Almost all the type is forested with poplar, chestnut, white oak, red oak, chestnut oak, beech, hickory, and dogwood. Much of it has been cut over, but usually only the best timber has been taken. The original growth was quite heavy. Poplar and white oak was the principal timber cut on the lower slopes, and chestnut and chestnut oak on the upper slopes and ridges.

Small areas are cultivated, usually on the lower slopes near towns, or at the heads of streams, where the topography is not so steep. The land is quite productive, especially for the first few years after clearing. It is stated that as much as 60 bushels of corn per acre has been obtained. Where only small patches are cleared, erosion is not serious for some time. But, aside from forestry, the type in general could best be used as pasture land. Clearings in sheltered situations sodded with the native grasses, such as redtop, oat grass, or orchard grass, should give permanent pasture.

Most of the type is held by coal and lumber companies. Some sales of large tracts at \$100 to \$200 an acre indicate the general value of these lands.

DEKALB FINE SANDY LOAM.

The soil of the Dekalb fine sandy loam in timbered areas consists of yellowish-brown to yellow, light to heavy fine sandy loam, which passes at 6 to 10 inches into yellow friable heavy fine sandy loam to fine sandy clay. On cultivated fields the color of the surface soil is light brown, or even brown, where much clover and timothy have been grown. The lower subsoil in many places contains partly disintegrated sandstone rock of reddish-yellow and bright-yellow color. The type is mostly underlain by massive to cross-bedded rather coarse grained sandstone, with some shale. On slopes small quantities of sandstone shale or fragments are often present.

The type is not very extensive. Small areas occur in the south-central and north-central parts of the county, both on narrow ridge areas and on moderate slopes. The type is well drained, and in some places the run-off is excessive. About one-third of the type is cleared and under cultivation. Most of it is forested with chestnut, chestnut oak, white oak, red oak, poplar, hickory, and dogwood, and locally with hemlock and pine. This is not a strong soil, not being as productive, especially of the hay crops, as the heavier soils, but it is well adapted to trucking and orcharding. Corn yields 15 to 30 bushels per acre, oats 15 to 25 bushels, buckwheat 10 to 20 bushels, wheat 10 to 12 bushels, and potatoes 75 to 150 bushels per acre. The value of farm lands of this type ordinarily ranges from \$25 to \$45 an acre.

DEKALB LOAM.

The Dekalb loam is a light-brown to yellowish-brown mellow loam 6 to 12 inches deep, grading into yellow friable fine sandy clay or silty clay, containing, usually, enough silt or sand to have a friable nature. Most of the type is underlain by sandstone which may occur in somewhat distintegrated form within the 3-foot section, but not often at such shallow depths as seriously to affect moisture conditions. In many places on slopes the texture of the soil is lighter, and here and there approaches a fine sandy loam. But quite uniformly the soil material is heavier, apparently derived in part from shale formations which have disappeared through weathering. In cultivated fields, particularly where clover and timothy have been grown, the soil color is more brownish. In places the lower subsoil is of a reddish cast and of a more dense structure. Such represent an approach toward characteristics of the Hanceville soils which have been extensively mapped in other parts of the Appalachian region.

The type is extensively developed through the central and eastern parts of the county. It occurs most extensively in the south-central and northeastern parts, where it occupies undulating to gently sloping ridge areas, separated usually by small but rather deep and stony stream valleys. In the southeastern part of the county it occurs in many small areas both in the larger ridge areas and on benches, but only occasionally on the steeper slopes. The surface drainage and underdrainage of the type are everywhere good.

The soil is naturally fairly productive and, as the topography is favorable, most of it is in farms, with probably 70 per cent of the included area under cultivation. In forested tracts the main growth is white, red, and chestnut oak, hickory, chestnut, poplar, and dogwood. In a few old fields pine thickets were observed. The important field crops are corn and hay, both clover and timothy, with somewhat smaller acreage in oats. Small patches are in potatoes, wheat, buckwheat, and sorghum. Corn usually yields 18 to 36 bushels; oats, 15 to 30 bushels; buckwheat, 15 to 20 bushels; potatoes, 75 to 150 bushels; wheat, 10 to 20 bushels; and hay, three-fourths to 1½ tons per acre. In the vicinity of the coal mines truck and fruit crops are grown to a considerable extent. The soil is well adapted to these crops, and in a few cases farms thus operated intensively are very profitable. Tomatoes, cabbage, peas, bunch beans, onions, beets, and other vegetables are commonly grown and produce well. But usually trucking is done in a small way in connection with general farming or work of other kinds. Some of the miners rent or own small areas of land, on which they grow potatoes and other garden crops.

Small apple orchards are on every farm, a great many of them of young trees. They come into bearing early and produce well, but in most cases are not properly cared for. Spraying is not thoroughly and repeatedly done, and the fruit is not of as good quality as is desirable for marketing. A good many cherries have been set out, and this fruit apparently thrives. Few peach trees were seen. They are said to winterkill badly. On most farms there are few grape vines. The grape is productive in this region, but there are no commercial vineyards.

Pasture sods consist of redtop, oat grass, orchard grass, and other native grasses, with little or no blue grass except in patches. Some white clover volunteers in the pasture areas. These pastures are fairly permanent when kept clear of brush and briars. In many cases enough pasture is afforded by the open range to reduce the need for farm pastures. Tobacco apparently was grown to a greater extent on this type than on any other in the county. The crop has been abandoned in this and the adjoining counties as far as commercial production is concerned.

Small amounts of commercial fertilizer are used on potatoes and truck crops, and a good many farmers apply it on corn, buckwheat, and oats land. At present acid phosphate is largely used, in quantities up to 200 to 400 pounds per acre. Phosphorus seems to be generally regarded as the most beneficial element.

The general range of land values is from \$35 to \$85 an acre, the price depending to a great extent on the location and the condition of improvements. The underlying coal is mostly owned separately.

The Dekalb loam is only fairly productive, not enduring so well as the heavier soils. It is said that the effects of both manure and commercial fertilizer disappear in one or two seasons. As only small quantities of manure are available, a short rotation, with frequent crops of legumes, is especially advisable. The texture of the soil and subsoil is favorable to the maintenance of productiveness by the practice of good farm methods. Ordinarily the type is not as good grass land as the heavier soils. The lighter texture makes it especially suitable for truck crops.

DEKALB SILT LOAM.

The surface soil of the Dekalb silt loam consists typically of grayish-brown to yellowish-brown or, in forested areas, yellow silt loam, which grades at 6 to 10 inches into yellow silty clay loam, and this quickly into moderately friable yellow silty clay. Some yellow or brownish fragments of shale may occur in the subsoil, almost always in very small amounts, as weathering of the parent shale generally has extended to a depth of at least 4 feet. The underlying parent shale is interbedded to some extent with sandstone, which may be reached locally within the 3-foot section, giving rise on some slopes to somewhat stony patches, though normally the type is comparatively free of stone.

The Dekalb silt loam occurs extensively throughout the southeastern part of the county, and in smaller areas elsewhere. In the southeastern part it occupies gently sloping to hilly country, with some rather steep slopes. Where the topography is comparatively smooth patches of Dekalb silty clay loam occur. These are apparently due to the longer cultivation of farms here, with some loss of the surface soil through washing. On the slopes the soil is uniformly deeper, and there are patchy areas with a content of small fragments of sandstone. The soil texture varies in places to a loam of relatively high silt content. The drainage of the type is good. The soil is naturally fairly productive, and where the topography is favorable is well suited to farming. As roughly estimated, a fifth of the type is under cultivation. The forest growth, which is fairly heavy, consists chiefly of white, red, and chestnut oak, poplar, beech, and chestnut.

Corn, oats, buckwheat, potatoes, and hay (clover, timothy, and redbud) are the principal crops. Corn yields 20 to 40 bushels per acre, and is planted on a larger acreage than any other crop. Oats yield 20 to 30 bushels per acre; buckwheat, 10 to 20 bushels; wheat, 10 to 20 bushels; potatoes, 75 to 150 bushels; and hay, three-fourths to $1\frac{1}{2}$ tons per acre. A fair and comparatively durable sod of redbud, oat grass, orchard grass, and other native grasses, with a little bluegrass, grows on this type. There are, however, only a few large clearings in grass, as the forest range is extensive.

Apples, cherries, and plums do well on this type, and there are small orchards on almost all farms. Truck crops are grown to some extent on many farms in connection with general farming. These gardens are productive. Fertilizers are used by many farmers on this type, acid phosphate being often applied at the rate of 200 to 400 pounds per acre on potatoes and buckwheat and less commonly on corn and oats.

Farm lands on this type generally sell at \$25 to \$50 an acre, depending on location and the condition of improvements.

Many of the farms on the Dekalb silt loam have been under cultivation for a long time, and have had the organic content of the soil materially reduced. With increased supplies of humus through applications of stable manure and the plowing under of vegetation, the land can be kept in good tilth and quite easily cultivated. The soil is capable of being improved, as it responds readily to applications of fertilizers and is sufficiently retentive to make the effects lasting. The forest, both in its good growth and in the varieties of trees, would indicate a fairly productive soil. But the cultivated crops do better where the supply of plant food is increased, and most field crops, especially the legumes, thrive better when the acidity of the soil is corrected. Analyses of various samples of the Dekalb soils in this county and through the State indicate that a ton or more of crushed limestone per acre is required to completely correct acidity. Where clover does not thrive the application of lime is especially advisable. On a few farms lime or hardwood ashes have been used with very good success in increasing the growth of clover and farm crops in general. Soy beans are coming to be recognized as a valuable crop for these farms, as they grow better than clover on soils deficient in lime. Several small patches of soy beans on this type showed good growth. It has been advised that this crop be used to displace in part oats, buckwheat, or other crops planted at about the same time. To supplement these in many cases a winter cover crop, or pasture crop, or rye, to be turned under in the spring, would be profitable.

DEKALB SILTY CLAY LOAM.

The Dekalb silty clay loam typically is a yellow to yellowish-brown silt loam which grades at a depth of a few inches into yellow, compact but friable yellow silty clay. Plowing to a depth of 6 to 8 inches brings to the surface enough of the more clayey material to produce a soil of silty clay loam texture. Shale fragments are ordinarily present in small amounts, and in places are abundant. Weathering of the shale has extended over most of the type to a depth of 3 to 5 feet. It is characteristically free of fragments of rock other than shale, but there is some sandstone interbedded with the shale, and this here and there gives rise to strips of stony soil. The subsoil in places is reddish, but this is not typical.

The type is rather extensively developed through the central and eastern parts of the county. The topography varies from gently rolling to steep and is typically hilly. To some extent the type represents washed fields or steep slopes originally of the silt loam or loam types, and, aside from the shallower depth of surface soil, it is very similar to the silt loam. The type is well suited to agriculture where the slope is not too steep, and about 50 per cent is farmed, the remainder being forested. The principal forest growth is oak, beech, hickory, dogwood, chestnut oak, and chestnut.

Corn and hay are the principal crops. Oats, potatoes, and buckwheat are also commonly grown, and small amounts of wheat. Corn yields 30 to 40 bushels per acre, oats 20 to 30 bushels, buckwheat 12 to 20 bushels, wheat 10 to 20 bushels, potatoes 75 to 150 bushels, and hay three-fourths to 1½ tons per acre. The truck crops do very well on this type, and it is also good grass land.

Small applications of fertilizer, usually acid phosphate, are commonly applied to potatoes, and in some cases to the grain crops.

The value of farm lands ranges from \$25 to \$60 an acre, depending on location and condition of improvements.

MEIGS STONY CLAY LOAM.

The Meigs stony clay loam consists of undifferentiated and intermixed Upshur and Dekalb material. The soil ranges from Upshur clay or clay loam to Dekalb loam. The type occurs principally in the extreme southeastern part of the county and in the eastern part of the deep valley of New River, above Thayer.

On the river the type occupies a strip of steep to rather moderate slopes along the stream. The underlying formation is calcareous red shale, but the material from this rock is greatly modified or obscured by material from sandstone fallen and washed from above. Most of this strip is so steep and stony that it is of little agricultural value,

except for pasture. Near the county line, however, the Upshur material is not so obscured, except along ravines, and some of this is suitable for cultivation. The area mapped on the upper part of the slope to Meadow Creek approaches the condition of Rough stony land. Here and on Sewell and Buffalo Creeks the soil material is mostly Upshur, but rather large sandstone fragments are scattered over the surface. The topography is hilly and rather steep. Very little of it is cultivated. Almost all of it is forested with oak, hickory, and beech.

MEIGS CLAY LOAM.

The Meigs clay loam represents areas formed of patches of Dekalb loam and the Upshur clay loam so intimately associated as to make separate mapping of the types impracticable, and including places where the materials are mixed. The Dekalb loam has already been described. The Upshur clay loam typically is a dark reddish brown or Indian-red clay loam about 6 to 8 inches deep, grading into a subsoil of heavy Indian-red clay, rather stiff or compact in places. The material is friable when moderately moist and plastic when wet. A very pronounced characteristic of the soil is its tendency to bake and crack upon drying rapidly. Both soil and subsoil contain small quantities of sandstone and red shale fragments which are more or less decomposed.

The Meigs clay loam occurs inextensively in the extreme southeastern part of the county, occupying the lower slopes of hills. The topography is rolling to steep, and the soil is in many places shallow as the result of erosion.

Material from the red shale predominates. On the steeper slopes the red clay covers almost all the surface; the subsoil is alternately red and yellow. On gentler slopes the Dekalb loam is predominant. The greater part of the type is under cultivation, some is forested with oak, hickory, and maple, while a large part of the steeper land is in pasture. It is regarded as good pasture land, bluegrass doing well. Corn, the principal grain crop, yields 20 to 40 bushels per acre, oats 15 to 30 bushels, wheat 12 to 15 bushels, and buckwheat 10 to 20 bushels. The soil is naturally strong, and even steep slopes are occasionally cultivated, but such areas are kept in grass most of the time to prevent washing. Land values range from \$30 to \$60 an acre.

HUNTINGTON GRAVELLY FINE SANDY LOAM.

The Huntington gravelly fine sandy loam is a light to heavy, yellowish-brown to brown fine sandy loam, underlain at 6 to 10 inches by yellow to yellowish-brown fine sandy loam, loamy fine sand, or fine sandy clay. Subsoil material of various textures may occur in patches or may be interbedded. Scattered over the surface and

through the soil section are varying quantities of gravel and small cobbles of sandstone and shale. The material, both fine earth and gravel, is irregularly deposited by rapid currents. The type is in-extensive, occurring in narrow strips along the streams of the western part of the county.

Much of the type is overflowed annually. These overflows are of short duration, as the run-off is rapid. The deposit from these overflows is usually of little consequence. In some cases fields on the larger streams have been sanded and stream channels shifted by heavy floods, but the surface is generally uniform and stable. At the mouths of ravines there are frequently hummocks or fans of sloping or terrace topography. The drainage of the type is good throughout, and in part rather excessive. Very often the soil is lighter and rather droughty near the stream, while moisture conditions are good next the upland. On the smaller streams the type is quite uniformly heavy enough to have fair to good moisture conditions.

Nearly all the type is cleared and under cultivation, and most of it is productive. Corn and hay are the principal crops, corn yielding 20 to 50 bushels, and hay from 1 to 2 tons per acre. Oats are grown to some extent, yielding 15 to 30 bushels per acre. Truck crops are commonly grown in small patches, and produce well. The soil is in part suited to continuous cropping to corn or truck crops, with applications of manure, but generally it is necessary to grow clover in a short rotation to maintain yields. The value of lands on this type ranges from \$30 to \$60 an acre.

HUNTINGTON FINE SANDY LOAM.

The Huntington fine sandy loam typically consists of a light-brown to brown, or yellowish-brown, fine sandy loam underlain at 10 to 15 inches by light-brown, yellowish-brown, or yellow friable fine sandy loam to fine sandy clay. The type is developed both along the river and the small streams. In the latter positions it occurs in narrow strips and patches and lacks the uniformity of the larger areas as the streams are swift. In most places the texture is somewhat lighter than in the areas along the river, and may be underlain by yellow fine sandy loam or loamy sand. There are also included patches of gravelly fine sandy loam and of loamy fine sand.

The type occurs quite inextensively in the county. The largest bodies are on the Kanawha River, where the type occupies rather high positions lying 25 to 50 feet above the stream bed, most of it being above ordinary overflow. Some areas representing second bottom, which were not separated owing to small extent, are safe from overflow. The surface features are somewhat irregular, and the surface in

many places slopes toward the river. There are usually no definite benches, but in places there is a very narrow strip of low bottom along the river, especially at the mouths of streams. There is practically no development of swale strips next the hill, and drainage is well established throughout. The texture is somewhat irregular, patches of loam occurring in the body of the type and of loamy fine sand near the river, while at the mouths of ravines there are scattered gravelly patches. The soil material in part is reworked alluvium from the red shale of the Mississippian, in places having a reddish cast.

The Huntington fine sandy loam is a valuable agricultural soil. Much of the type is thickly settled and is used for truck crops in gardens and small fields. Potatoes, cabbage, tomatoes, corn, peas, beans, and onions produce well. It is a good soil for sweet potatoes and melons. Away from the towns the type is used for the production of the general farm crops of the area. Corn and hay are the principal crops. Corn yields 40 to 60 bushels per acre, clover and timothy from 1 to 2 tons. Oats are grown to some extent, yielding 20 to 30 bushels per acre. Being rarely overflowed, the type can not be cropped continuously without applications of manure or fertilizers, or seeding clover. By plowing under clover sod in a short rotation the soil can be kept in a good state of productiveness. The value of farm lands of this type varies from \$50 to \$100 an acre.

HOLLY SILTY CLAY LOAM.

The soil of the Holly silty clay loam, to a depth of 8 to 12 inches, is a pale-yellow to bluish-gray silt or silty clay loam, grading into bluish-gray or yellowish-gray silty clay mottled with yellow, drab, and brown. The subsoil is usually plastic, and there is frequently an impervious silty clay of bluish-gray color often mottled with yellow in the lower subsoil. The outer edges of wider strips are usually a little higher and lighter textured, the immediate surface or subsurface layer consisting of loam, fine sandy loam, or sandy clay loam. The type represents poorly drained first bottom soil. It is locally known as crawfish land.

The type, which is inextensive, occurs in small areas through the central and eastern parts of the county, usually near the heads of small streams. The natural growth consists largely of alder, with some sycamore, beech, and birch.

Nearly all of the type is cleared. Most of it is in permanent pasture, the more poorly drained parts in wild grasses, and the higher parts in timothy and redbud. Very little of it is sufficiently well drained to grow the grain crops successfully.

On well-drained areas of this type in other parts of the State, cabbage, onions, and celery are successfully grown. In the production of such crops, and probably in the production of timothy, applications of lime are beneficial.

ROUGH STONY LAND.

Rough stony land includes areas of steep land so thickly covered with stones or including so much rock outcrop that it is essentially nonagricultural.

The gorge of New River is the most extensive area of this kind in the county. It occupies a belt one-half to 1 mile or more in width from the mouth of Gauley River to the southeastern boundary. Great sandstone cliffs alternate with rocky soils. In places in curves of the river the longer slopes are not so broken, and included areas could be classed as Dekalb stony loam, although there are cliffs above from which some huge boulders have fallen. The soil material in the central part of the county is of the Dekalb; above Thayer an increasingly large part is of Meigs or Upshur clay loam. The latter does not have such massive rocks, but is so broken and precipitous, with many small cliffs and rock outcrops, that it is of little or no agricultural use, even for grazing. Some parts of the gorge have been cut over, but most of it has a considerable growth of oak, chestnut, hemlock, and other trees.

A similar, but much narrower strip, extends along the upper part of Gauley River, on the northern boundary of the county, and many small areas of Rough stony land occur on the peaks, shoulders, and hogbacks of the mountainous country in the western part of the county.

RIVERWASH.

Riverwash includes mixed deposits of water-rounded cobbles, gravel of sandstone and shale, and soil material, mostly of coarse texture, deposited by the rapid currents of flooded streams. It occurs inextensively, mostly in the valleys of the western part of the county, and in bars and small islands in the rivers. There are some included patches of Huntington gravelly fine sandy loam. Aside from these, it is of no agricultural value.

SUMMARY.

Fayette County is located in the south-central part of West Virginia. The area of the county is 667 square miles. The topography is quite rough and mountainous, the elevation of the ridges ranging from 1,900 to over 3,000 feet above sea level. The depth of dissection reaches a maximum along the gorge of New River, where it is

1,300 to 1,700 feet. The western part of the county is thoroughly dissected. The central and eastern parts of the county are in general not so rough, and there is some development of undulating or rolling ridge areas, but throughout the county there is a large proportion of the land unsuited to tillage. The immediate valleys of the principal streams of the county, the Kanawha River, New River, Gauley River, and Meadow River, are the steepest and roughest lands of the county.

The population of the county in 1910 was 51,903. There are large deposits of coal throughout the county, and mining is the principal industry. Lumbering is also of considerable importance. The county is well supplied with railroads. The public-road system is good, considering the character of the topography.

The climate is temperate and healthful. The mean summer temperature is 70.5° ; that of the winter 31.6° . The mean annual precipitation of 38.84 inches is distributed through the seasons in such a way as to favor agriculture. The length of the growing season is about five months.

Only about 12 per cent of the county is classed as improved land, this including farmed land and cleared pasture. Agriculture consists of general farming and stock raising, with truck and fruit the important money crops. Farming and trucking are generally on a small scale, the average size of farms being 65.9 acres, of which 32.1 acres is improved land. The principal crops are corn and clover and timothy hay. The average yield of corn in the county is about 18 bushels of shelled corn per acre and of hay a little less than 1 ton per acre. Oats occupy a somewhat smaller acreage. The average yield is about 13 bushels per acre. Potatoes, buckwheat, and wheat are minor crops. The yields of wheat are low, and it is scarcely a profitable crop. Truck crops of potatoes, tomatoes, cabbage, peas and beans, onions, and beets do well and are a source of considerable income on many farms. The average yield of potatoes is 100 bushels per acre. Apples are the principal fruit crop; the orchards bear well and produce fruit of good quality. Dairying and poultry raising are practiced on a small scale and a few hogs are kept on most farms. Sheep raising is of some importance in the eastern part of the county. A large part of the stock is kept on the open range through the grazing season.

The upland soils of the county are in the main derived from the sandstones and shales of the Pennsylvanian system. These soils are of the Dekalb series. In the eastern part of the county there is some development of soils from the red shales, sandstones, and limestones of the Mississippian. They are classified in the Meigs series.

The Dekalb soil series is characterized by grayish-brown to yellowish-brown surface soils and yellow to yellowish-brown subsoils.

The stony silt loam, stony loam, and stony fine sandy loam comprise the greater part of the area. They are nearly all in forest and are not well adapted to cultivation.

The Dekalb silt loam occupies gently rolling to hilly topography and is suited to general farming, stock raising, trucking, and fruit growing.

The Dekalb loam occupies undulating to gently sloping country and is similarly well suited to general farming, stock raising, trucking, and fruit growing. It is especially well adapted to trucking, the topography and texture of the soil being favorable and the areas in general lying convenient to good local markets.

The Dekalb fine sandy loam and silty clay loam are not extensive. They are in general quite similar in topography and adaptation to the silt loam of the series.

The Meigs series represents undifferentiated Dekalb and Upshur materials. The Upshur soils prevail in this area. They are characterized by Indian-red or reddish-brown soils and subsoils.

The Meigs clay loam is a durable soil. The topography is rolling to steep. The type is comparatively well suited to general farming and stock raising. It makes good pasture land, bluegrass being indigenous. The Meigs stony clay loam is hilly to steep, and is nearly all in forest.

The alluvial soils form but a small part of the area of the county. They are classified in the Huntington and Holly series. The Huntington soils are characterized by yellowish-brown to brown surface soils and yellow to yellowish-brown subsoils. The Huntington fine sandy loam and gravelly fine sandy loam, the only types of the series mapped in the county, are productive and well suited both to general farming and trucking. The Holly silty clay loam is a poorly drained soil, principally used for hay land or pasture, to both of which uses it is well adapted.

There are considerable areas of Rough stony land occupying the gorge of New River and occurring in small areas on other streams and on the mountains of the western part of the county. These areas and also small amounts of the incoherent type, Riverwash, in the western part of the county, are essentially nonagricultural.

[PUBLIC RESOLUTION--No. 9.]

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

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

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

Approved, March 14, 1904.

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

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