

U. S. DEPARTMENT OF AGRICULTURE
BUREAU OF SOILS
IN COOPERATION WITH THE WEST VIRGINIA GEOLOGICAL SURVEY

SOIL SURVEY OF MERCER COUNTY WEST VIRGINIA

BY
A. W. GOKE

[Advance Sheets—Field Operations of the Bureau of Soils, 1923]



WASHINGTON
GOVERNMENT PRINTING OFFICE
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[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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MAP

Soil map, Mercer County sheet, West Virginia

SOIL SURVEY OF MERCER COUNTY, WEST VIRGINIA

By A. W. Goke

DESCRIPTION OF THE AREA

Mercer County is situated in the southern part of West Virginia, along the Virginia State line. It is irregular in outline and embraces an area of 424 square miles, or 271,360 acres.

The county lies in the Appalachian Plateau. Its upland surface elevation ranges from 3,566 feet on Huff Knob on Flattop Mountain in the northern part of the county, and 3,500 feet on East River Mountain in the southern part of the county, to about 2,000 feet or less in the northeastern part. A great part of the surface is very rough and mountainous, owing to the completeness and depth of dissection. The areas north of Bluestone River, along the East River Mountain and in the eastern part of the county, are in general most thoroughly dissected. The divides have been reduced to narrow ridges and the drainage ways have been formed into deep, narrow valleys with steep slopes. The area occupied by the Brush Creek drainage system, however, differs in general from the rougher parts of the county. The surface elevation and the depth of dissection are less, thus forming a smooth, gently rolling upland with broader stream bottoms.

A few flat upland areas of the county, located between Pride and Lerona, at Piney Flat, and north of Lashmeet, are not thoroughly dissected, as they lie near the headwaters of the streams and are underlain by resistant sandstone beds which retard active erosion. These areas lie at an average elevation of 2,556 feet above sea level.

A few areas of flat to undulating surface occur at Piney Flat, Gardner, Pride, southeast of Athens, and west of Nubbin Ridge, occupying benchlike positions, as along Bent Mountain, or flat divides. In these areas the stream valleys or channels are shallow and are underlain by sandstone.

The principal drainage system includes the Bluestone River and its tributaries. The river flows through the middle of the county and empties into the New River in Summers County. Its chief tributaries are Camp Creek, Rich Creek, Wolf Creek, and Widemouth Creek on the north and Brush Creek on the south. The East River parallels East River Mountain in the southern part of the county.

Mercer County was formed by an act of the General Assembly of Virginia, November 17, 1837, from parts of Giles and Tazewell Counties, and was named in honor of Gen. Hugh Mercer of Revolu-



FIG. 9.—Sketch map showing location of the Mercer County area, West Virginia

tionary fame. The county seat was named Princeton from the battle field on which General Mercer fell.

Princeton is located in the south-central part of the county on the main line of the Virginian Railway. Its population in 1923 was approximately 8,000. The shops of the Virginian Railway are located here. Bluefield, the largest city of the county, located in the southern part, had a population in 1923 of about 20,000. It is the shipping center of the Pocahontas coal fields, and the terminus of a division of the Norfolk & Western Railway. Athens, about 5 miles northeast of Princeton, has a population of about 1,200 and is the seat of the Concord State Normal College.

The first settlements of the county were made along the valleys and level uplands by hunters and trappers, who gradually engaged in farming and lumbering as game decreased. After the development of coal mining and the extension of the railroads into the county, many of the less productive farms were abandoned, the people migrating to the mining districts or railway centers, and only the more productive farms in the valleys and more level uplands were developed. The increase in population in the mining and railroad centers increased the demand for farm products, especially vegetables and truck crops. In recent years the trucking industry has made rapid development, resulting in quicker disposition of products at profitable prices, due in a large measure to the hard-surfaced roads and the use of motor trucks. Near the mines the farmers work in the coal mines after needed attention has been given to the farm crops.

The present inhabitants of the county are largely descendants of the early settlers, though the mining and railroad industries have attracted outside labor. Many negroes who have migrated from the Southern States are employed in the mines. The total population of the county, according to the 1920 census, is 49,558 of which 56.6 per cent is classed as rural. This classification includes many of the mining districts, as there are few towns which have more than 2,500 inhabitants.

The roads are generally rough and receive very little attention. They usually follow divides or creek bottoms. Hard-surfaced roads connect most of the mining towns with the larger cities of the county. During 1923 approximately 90 miles of hard-surfaced roads and about 30 miles of graded dirt roads were constructed in the county.

CLIMATE

The climate of Mercer County is comparatively mild throughout the year. The summers are pleasant, with cool nights and occasional short spells of hot weather. The winters are cold, but the temperature seldom falls much below zero. The mean temperature for the summer months is 70.4° F. and for the winter months 34.5°. The mean annual temperature is 53.3°. The average annual snowfall is 37.6 inches.

The climatic conditions are fairly uniform throughout the county, except on the higher ridges and in the deep, narrow valleys or hollows. The ridges during the winter months are usually colder owing to winter winds, but maintain a more uniform temperature

throughout the growing period. The hollows are warmer in the winter, but have a changeable temperature during the growing season, with comparatively cool nights. These climatic differences between elevations have a noticeable effect on orcharding.

The average date of the last killing frost in spring is April 30 and of the earliest killing frost in the fall is October 11, giving an average growing season of 164 days. The date of the latest recorded killing frost in spring is May 29 and of the earliest recorded in the fall September 21.

The average annual precipitation is 41.35 inches and is fairly evenly distributed throughout the year. The record at Bluefield for the driest year (1914) was 27.55 inches and for the wettest year (1901) it was 60.03 inches. The largest proportion of the rain falls during the growing season, thus affording moisture for growing crops. Short dry spells occur occasionally, but they usually come during the latter part of the growing season and cause only slight damage to growing crops.

The table below gives the normal monthly, seasonal, and annual temperature and precipitation as recorded by the Weather Bureau station at Bluefield:

Normal monthly, seasonal, and annual temperature and precipitation at Bluefield

[Elevation, 2,558 feet]

Month	Temperature			Precipitation			
	Mean	Absolute maximum	Absolute minimum	Mean	Total amount for the driest year (1914)	Total amount for the wettest year (1901)	Snow, average depth
	° F.	° F.	° F.	Inches	Inches	Inches	Inches
December.....	35.2	72	-25	2.91	2.73	7.77	7.4
January.....	34.5	79	-17	3.22	3.90	3.35	11.1
February.....	33.9	74	-14	3.05	2.10	1.03	8.0
Winter.....	34.5	79	-25	9.18	8.73	12.15	26.5
March.....	44.3	87	0	3.66	3.90	2.39	7.2
April.....	53.2	89	18	3.38	1.29	8.28	1.3
May.....	61.9	95	29	3.64	.70	8.86	.1
Spring.....	53.1	95	0	10.68	5.89	19.53	8.6
June.....	68.8	98	31	4.78	.62	10.87	.0
July.....	71.5	97	38	4.47	3.35	3.28	.0
August.....	70.9	98	44	4.42	3.62	9.92	.0
Summer.....	70.4	98	31	13.67	7.59	24.07	.0
September.....	65.7	96	30	2.66	1.46	1.68	.0
October.....	56.0	87	19	2.88	2.41	1.05	.5
November.....	44.4	82	9	2.28	1.47	1.55	2.0
Fall.....	55.4	96	9	7.82	5.34	4.28	2.5
Year.....	53.3	98	-25	41.35	27.55	60.03	37.6

AGRICULTURE

When the first settlements were made practically the entire county was covered with native forest, consisting of red and white oak,

chestnut, maple, some hickory, poplar, beech, honey locust, and pine. On favorable areas different species usually formed a pure growth; the pine usually occupied small flat areas throughout the county; the oaks the high ridges or sandy textured soils; the chestnut, speckled oak, and maple bordered the steep slopes or stream bluffs containing loamy soils; the hickory, dogwood, and poplar grew on alluvial terraces and at the foot of bluffs; the locust appeared in small patches at heads of drainage branches and on rather heavy soil types, especially the Upshur and Frederick silt loams; and the spruce, pine, beech, and sycamore prevailed on the first bottoms. Practically all of the merchantable timber has been cut in the county. One or two small sawmills are in operation, and some areas of small timber growth which would provide profitable returns later are now being cut on account of the entrance of destructive tree diseases. A successful method of growing locust trees for farm use has been in practice on one farm in the county. The trees are trimmed each year by cutting off the lower branches to encourage tall growth. This method makes it possible to use the land for pasture, as the trimmed tree permits sunlight to reach the ground beneath and encourage the growth of grasses.

Owing to the rough and steep topography of a large part of Mercer County, and also to the fact that a considerable part of the land is underlain by valuable coal beds, farming has been restricted largely to the bottom lands, the flat-topped ridges, and smoother slopes. The southern and southwestern parts of the county are underlain by deposits of coal, and when the coal fields were opened many thriving mining villages sprang up in the valleys, and the demand for truck crops and fruits was greatly increased.

The following table gives the acreage and production of the principal crops grown in Mercer County in the crop years reported by the census:

Acreage and production of leading crops in 1889, 1899, 1909, and 1919

Crop	1889		1899		1909		1919	
	Area	Production	Area	Production	Area	Production	Area	Production
Corn.....	9,605	166,104	12,780	192,350	11,885	214,075	10,392	219,699
Wheat.....	5,910	41,454	7,164	51,800	2,453	24,918	9,786	101,424
Oats.....	4,790	61,767	3,088	43,270	2,779	36,415	4,024	70,049
Buckwheat.....	136	1,098	232	2,080	625	6,984	779	8,363
Potatoes.....	246	17,015	377	26,882	699	64,128	743	56,604
All cultivated grasses.....		<i>Tons</i>	9,444	<i>Tons</i>	11,545	<i>Tons</i>	10,228	<i>Tons</i>
Timothy and clover.....				7,459	6,335	9,074	5,400	9,919
						4,906		5,350
Sorgo cane.....	130	<i>Gals. sirup</i> 9,502	132	<i>Gals. sirup</i> 9,449	297	<i>Gals. sirup</i> 12,656	267	<i>Gals. sirup</i> 13,832
Apples.....	<i>Trees</i> 38,010	<i>Bushels</i> 73,997	<i>Trees</i> 95,990	<i>Bushels</i> 90,886	<i>Trees</i> 93,306	<i>Bushels</i> 38,899	<i>Trees</i> 138,930	<i>Bushels</i> 54,515
Peaches.....	4,800	7,052	6,725	950	17,201	570	19,065	1,326

The agriculture in Mercer County at the present time consists of the production of corn, wheat, oats, buckwheat, and cultivated

grasses, together with the production of apples, peaches, potatoes, and sorgo cane (sweet sorghum).

Corn ranks highest in acreage. In 1920 it was grown on 10,392 acres, which yielded 219,699 bushels. The yield varies with the soil and location. The yields per acre on upland soils range from 10 to 15 bushels on the Dekalb soils and from 15 to 25 bushels on the Upshur soils, and on the bottom lands the yields range from 30 to 40 bushels. The crop on the bottom lands is sometimes in danger of early frost, as it matures comparatively late on account of the cool summer nights which retard the growth. Most of the crop is fed on the farms in the form of fodder or silage, or is sold as green corn for table use at local markets. The recognized varieties in use are Reid Yellow Dent and Hickory King, but the greater part of the corn raised is yellow and white dent of no special variety.

Wheat is the second crop of importance. In 1919 it occupied 9,786 acres, which produced 101,424 bushels. The best yields are obtained on limestone soils and heavy types of the Dekalb and Upshur series, as winterkilling often injures the crop on the lighter-textured soils and on higher ridges. The principal varieties grown are Prolific, Fulcaster, and Mediterranean. The common yield is 10 to 15 bushels per acre. Acid phosphate is the principal fertilizer used for wheat. On some soils the best yields are obtained with a combination of nitrate of soda, sulphate of potash, and acid phosphate.¹

Oats are raised chiefly as feed for stock. The crop is cut shortly before maturing and fed in the sheaf, very little being threshed. The yields range from 15 to 25 bushels per acre.

Buckwheat² is recommended as an excellent crop to seed in wet, sour land for a few years, to be followed by a crop of clover with an application of lime. The largest yields have been obtained by early seed-bed preparation, seeding at the rate of 4 pecks per acre, and an application of 200 to 300 pounds of acid phosphate. Japanese buckwheat is the popular variety in this region, as it can be sown as late as July 25, with assurance of a crop.

Timothy and clover are most extensively grown for hay. Clover is sown alone in some instances, but a combination of the two is preferable, as a larger hay crop is assured if the clover should produce a poor stand, and the mixed hay crop provides a more balanced feeding ration. Timothy alone affords easier handling and curing for a heavy yield. The common yield of hay on the upland soils is from one-half to three-fourths ton per acre, and on the more level areas of the Tilsit soils, from 1 to 1½ tons per acre. Liming or manuring is beneficial, as the yield is increased and a fair growth is maintained for a much longer period. As a rule the stand of tame grass remains for a couple of years and is succeeded by a sparse growth of wild grasses consisting of crab grass, carex, and sedge, poor in feeding quality.

Wild grasses consisting of carex, sedge, and meadow reed grass are cut for hay along stream bottoms and poorly drained upland areas of the Lickdale soils. The hay is of good quality during ordinary seasons but in wet seasons the rank growth makes a coarse hay

¹ W. Va. Exp. Sta. Cir. No. 87, BUYING AND USING FERTILIZERS.

² W. Va. Exp. Sta. Bull. No. 171.

of low feeding value. The ordinary yield of wild hay is from 1 to 1½ tons per acre.

Potatoes are grown for local markets and home use. They could be profitably grown on a large commercial scale, as the climatic conditions and the soils of lighter texture are favorable for the development of a good tuber and the production of heavy yields. Commercial fertilizer analyzing 8-5-5 or 8-5-7³ is applied at the rate of 500 pounds per acre for potatoes grown for market.

A small area of sorgo is grown on most farms to provide sirup for home use. Most of it is planted on terrace lands and first bottoms. In 1919, 267 acres were devoted to growing sorgo, and 13,832 gallons of sirup were made.

Mixed cattle of a poor grade are raised. A few purebred herds of the dairy type are maintained in connection with the dairying industry. No attempt is made to fatten cattle for market on a large scale. Only enough cattle are raised on individual farms for consumption of feed and roughage; these are marketed when 1 or 2 years old, being purchased by local buyers who ship to eastern markets. Nearly all farms have a few hogs, which are raised chiefly for home use. A few hogs are slaughtered, the meat being sold in bulk on the local markets. Poland-China and Berkshire are the favorite breeds. Poultry and eggs are sold on the local markets in conjunction with the truck crops and provide a considerable part of the farm income. Very little attention is given to raising horses or mules, although the local demand is large and many work animals are imported for the lumbering and mining industries.

The vegetables grown most extensively for local markets are carrots, turnips, parsnips, beets, onions, spinach, radishes, kale, cabbage, beans, peas, tomatoes, squash, and cucumbers. Some watermelons are grown on the light, sandy upland soils, but as a rule they do not make so successful a crop as in comparatively warmer climates. Sweet potatoes are grown on sandy soils, mostly for home use.

Every farm has a small orchard, and there are some commercial orchards in the county. The commercial orchards are mostly located on the limestone soil areas of the high sloping uplands in the southern part of the county, where the air drainage is good and there is comparative freedom from destructive late spring frosts.

During normal seasons the greatest quantity of fruit is produced on the higher slopes, probably owing to the comparatively lower temperature prevailing during the winter months, which retards formation of fruit buds. Occasionally, however, as occurred in 1923, a cold wave with rain and frost in the late spring kills the buds, and the apple crop is a failure on the higher land, while along stream bottoms and lower elevations a fair crop is obtained. The principal apple varieties grown are Rome Beauty, Grimes Golden, Ben Davis, Yellow Transparent, Fallawater, and Maiden Blush. Peach trees are short lived in this region. A few unsuccessful attempts have been made to establish commercial peach orchards. On some farms a small orchard for home use is maintained by a yearly planting of young trees. Cherries do well, but only a few are grown. Strawberries do exceptionally well and are grown successfully as a

³ Percentages, respectively, of phosphoric acid, ammonia, and potash.

truck crop. Wild huckleberries and blackberries are found in abundance on the mountains.

Farms on the smoother areas of DeKalb, Upshur, and Frederick soils, and also upon the Pope silt loam and Holston loam types have the greatest percentage of tillable land. These farms are devoted to raising grain, livestock, fruit, and vegetables. Near local markets and on good roads they are used for truck gardening, orcharding, and some dairying. The Dekalb silt loam, steep phase, Dekalb stony loam, Dekalb fine sandy loam, and Dekalb loam have the largest proportions of untillable land per farm. Considering the comparatively low value of these soils, the grazing of sheep and cattle should prove profitable in connection with the farming operations on the areas of tillable land. These types are generally considered non-agricultural lands, and practically all of the areas are undeveloped.

Methods for protecting the soil from the deteriorating influences of weathering and leaching by winter rains are not commonly practiced. However, winter cover crops of oats and rye are grown on a few farms to protect the soil and to provide pasture for stock in late fall and early spring. These crops are plowed under in the spring as green manure, but difficulty is sometimes experienced in a dry spring season in obtaining a good spring crop on account of lack of soil moisture. Legumes are good soil builders, but tend to winterkill in this region on the higher elevations. The application of 1 to 3 tons of lime per acre, a well-prepared firm seed bed, and plenty of soil moisture will assure a better stand.

No definite crop rotations are followed, but the land is seeded to different crops to suit labor and market conditions. The common practice is to seed oats or wheat after a crop of corn. Clover is sometimes seeded in the fall between corn rows on the heavier soil types of the Dekalb series; on the lighter, acid soils it is seeded with buckwheat following a crop of wheat.

Approximately 38 per cent of the area of the county is in cultivation. The 1920 census report shows that there were 1,927 farms; 70 per cent of the area of the county was in farms, and 53.3 per cent of the land in farms was classed as improved. With the vast tracts of rough and undeveloped land in the county, sheep raising should be a profitable industry. It had received considerable attention before the advent of miners, but since then it has been made unprofitable by the presence of many worthless dogs. Attempts have been made to eradicate this evil, but at present no remedy has been found, and according to the estimates of farmers the number of sheep in the county has rapidly decreased during the last few years. The Shropshire, Southdown, and Hampshire are the popular breeds raised. The grade sheep from the Southdown and Hampshire breeds are considered excellent feeders by many of the farmers.

Since 1890 the average size of farms has decreased from 170 acres to 97.5 acres, and the number of farms has increased from 1,261 to 1,927. The acreage of improved land per farm remains the same, with an average of 52 acres per farm in 1920. The 1920 census reports the average value of all farm property as \$5,180 per farm, of which 62 per cent represents the value of the land, 22.2 per cent the buildings, 2.9 per cent the implements, and 12.9 per cent the domestic animals. The average value of the farm land without improvements

is given as \$32.74 an acre. Farm expenses reported by the 1920 census include \$78,538 spent for labor, \$124,609 for feed, and \$35,814 for fertilizer. Most of the farms—84.7 per cent—are operated by owners of the land, 15 per cent by tenants, and 0.3 per cent by managers. The usual rental on tenant farms is one-half of the crop, or a cash rental averaging \$1 per acre.

SOILS

The soils of Mercer County are light colored, ranging from gray, grayish yellow, and brown to purplish red in the surface portion. The county lies in the hardwood forest region, and was entirely covered by a growth of oaks, chestnut, and other hardwoods, and a few pine, before the advent of the settlers. Since this area was forested until reclaimed for agriculture, there has been no opportunity for the accumulation of organic matter in the soils, as in the prairie regions of the Middle West; consequently all the soils of the county are prevailingly low in organic matter. From 60 to 70 per cent of the area is still in forest or cut-over land, and even in this part there is only a superficial covering of vegetable mold, and very little of this organic matter is incorporated in the soil under natural conditions, below a depth of 1 or 2 inches. In some of the first-bottom areas there are spots of grayish-brown soil which contain, perhaps, more organic matter than any of the upland types.

No free carbonate of lime is present in any of the soils that have become fully developed or deeply weathered, although many of the rocks from which they are derived contain lime carbonate. The heavy rainfall, under conditions of excellent drainage due to rough topography, has leached out practically all of the soluble materials formed in the disintegration and decomposition of the original rocks. All of the soils are acid or slightly acid, and would respond readily to application of lime. The soils which indicate the greatest acidity are the Lickdale, Atkins, and Tyler, which comprise the poorly drained soils of the county. The leaching out of the soluble elements has left many of these soils low in plant food, but they compare favorably with the soils throughout the State.

The soils of Mercer County as a whole are comparatively immature in their development, and they bear a close relationship to the parent materials or underlying rocks from which they are derived. Owing to the steepness of the topography and the angle at which many of these rocks now stand, the accumulation of any great depth of soil material has been practically impossible, hence most of the soils have no well-developed profile layer in which there is any considerable accumulation of the finer materials. In general, the soils are friable and gradually grade into slightly heavier but friable materials, and these pass, usually at depths ranging from 20 to 40 inches, into the disintegrated rock.

In the Dekalb loam, silt loam, and fine sandy loam, Upshur silt loam, and Holston loam, there is a slight accumulation of the finer material in the subsoil or horizon B, and such soils in a few places appear to have reached a stage of maturity in their development in which they have distinctive layers or horizons in the soil profile.

The upland soils of the county have been derived through the disintegration and weathering of the underlying rocks, which are prin-

cially sandstone, shale, limestone, and cherty limestone. The terrace and first-bottom soils have been formed by the deposition of materials which have been washed from the adjacent uplands or from similar soils in the locality. They occur in narrow strips along some of the larger streams.

The dominant soils in this county have in their natural state a surface layer of an inch or two of leaf mold or brown loam which is usually high in organic matter. Immediately below this is a horizon consisting of light-brown or yellowish-brown loam or silt loam, which extends to depths of about 6 to 10 inches. A third horizon consists of yellow or yellowish-brown friable clay or silty clay loam, which grades at depths ranging from 24 to 40 inches into the disintegrated and partially decomposed sandstone or shale rock. The soils of this group are classed in the Dekalb series and have been mapped as Dekalb fine sandy loam, stony loam, loam, silt loam, and silt loam, steep phase.

Closely associated with the Dekalb soils is another important group, the Upshur soils, which are derived from the purplish-red or Indian-red sandstone and shale. Only one type, the Upshur silt loam, was mapped in this county. In the forested areas the immediate surface layer consists of a very dark brown or reddish-brown loam, passing into an Indian-red or purplish-red silt loam of a mellow, single-grained structure. At about 6 or 8 inches a purplish-red, heavy silty clay loam or silty loam is encountered, which may extend down to the bedrock or may show mottlings of gray just before the bedrock is reached. The broken Indian-red shale or sandstone is usually reached at depths of 30 to 50 inches, but in many places, particularly on the steep slopes, it comes within 15 to 20 inches of the surface.

Associated with the Dekalb and Upshur soils are the soils of the Meigs series. The Meigs soils really represent a soil condition rather than a definite series. They consist of Upshur and Dekalb materials which have been so intricately intermixed as to preclude separation. The color ranges from the Indian red of the Upshur to the gray or pale yellow of the Dekalb. The Meigs soils are derived from red fine-grained sandstone and shale and from grayish sandstone and shale. The Meigs silt loam has been mapped in Mercer County.

The soils of the Frederick series are developed in the extreme southern part of the county, largely in the valley east of Bluefield. These soils are derived from light-gray limestone and cherty limestone. Small particles of these rocks and numerous large bowlders and rock outcrops are common throughout this area. The Frederick stony silt loam and gravelly silt loam were mapped. The surface soils consist of brown or grayish-brown loam, from 1 to 2 inches deep, passing into a brownish-yellow silt loam which extends to depths of 6 to 10 inches. The typical subsoil, or horizon B, is a brownish-yellow to reddish-brown heavy silt loam to silty clay loam, having a mellow, friable structure. At about 12 or 15 inches a reddish-brown rather heavy clay is encountered, which continues downward to the weathered limestone, usually lying about 30 to 40 inches below the surface.

In addition to the groups described above, there are areas of comparatively flat and poorly drained land, which have been mapped as Tilsit silt loam and Lickdale loam. The Tilsit silt loam has a gray

to yellowish-gray surface soil of a single-grained structure, underlain at 6 or 8 inches by pale-yellow friable silt loam, which extends to depths of 20 to 30 inches. Beneath this is a mottled rusty-brown and gray, rather heavy, slightly compact, friable loam or silt loam containing fragments of shale and sandstone, from which the soil is derived. The Lickdale loam has not developed a definite profile and consists of a gray surface soil and a gray and yellow subsoil mottled with rusty brown or bluish gray.

The alluvial soils developed on the second bottoms or terraces include the Holston loam and Tyler silt loam. In a few places the Holston loam has developed a rather definite profile consisting of a brown surface soil of mellow structure and a rather firm to compact subsoil which continues downward to a depth of several feet, where it passes into heavy material, or, in places, decidedly lighter material. The Holston loam is generally well drained. The Tyler silt loam differs from the Holston loam in that it is poorly drained for the most part and has a surface soil of a gray color and a mottled subsoil.

In the first bottoms the Pope silt loam and Atkins silt loam were mapped. These soils represent recent-alluvial material and are being modified from time to time by deposition of material when overflowed by the streams. No soil profile has been developed. The Pope silt loam is a brown soil with a brownish-yellow subsoil, and is fairly well drained. The Atkins silt loam has a gray surface soil and a mottled gray and rusty-brown subsoil, and is poorly drained.

Rough stony land includes areas that are so steep and rough in topography and contain rock outcrop and boulders to such an extent that they are unfit for agriculture.

In Mercer County there were recognized 10 soil series, represented by 14 soil types and 1 phase. A soil series includes those soils which are similar in color, structure, drainage conditions, and origin, and have developed a somewhat similar profile. The types composing a series differ from each other mainly in texture. The type is the unit of classification.

The following table gives the names, acreage, and proportionate extent of the various soil types mapped:

Areas of different soils

Soil	Acres	Per cent	Soil	Acres	Per cent
Dekalb silt loam.....	78,592	} 44.5	Pope silt loam.....	4,800	1.8
Steep phase.....	42,112		Frederick gravelly silt loam.....	4,800	1.8
Dekalb stony loam.....	41,856	15.4	Lickdale loam.....	3,200	1.2
Dekalb loam.....	34,176	12.6	Meigs silt loam.....	2,368	.9
Upshur silt loam.....	20,160	7.4	Atkins silt loam.....	1,920	.7
Frederick stony silt loam.....	14,592	5.4	Tyler silt loam.....	640	.2
Rough stony land.....	8,192	3.0	Holston loam.....	576	.2
Dekalb fine sandy loam.....	7,908	2.9			
Tiisit silt loam.....	5,568	2.0	Total.....	271,360	-----

DEKALB STONY LOAM

The surface soil of the Dekalb stony loam is a gray to yellowish-gray mellow loam, which passes at about 6 or 8 inches into a yellow

to yellowish-brown slightly compact loam. The stony material is composed of sandstone fragments ranging in size from a few inches to several feet in diameter, and is distributed over the surface and through the soil section in quantities sufficient to interfere seriously with cultivation. Bedrock occurs at depths of 20 to 40 inches below the surface. Where the sandstone consists of loosely cemented sand, the texture of the surface soil is affected considerably, forming local areas of stony sandy loam. Where the type is developed in association with the Frederick stony silt loam it consists of a brown, mellow loam underlain by a reddish-brown silt loam to silty clay loam.

The topography of this type is steep to mountainous. The steep surface occurs locally where there has been deep stream dissection, as along the Bluestone River and its tributaries. Drainage is excessive.

The areas of this type are developed along the bluffs of stream valleys, and tops of ridges, where the sandstone formation outcrops sufficiently to interfere with cultivation. They form belts bordering the major streams and their tributaries and vary in width in proportion to the steepness of the topography, the areas of moderate slope being more extensive. The more important areas occur along Crane and Camp Creeks, on Stony Ridge, and on East River Mountain.

Practically none of the Dekalb stony loam is cultivated, except in small areas along the East River Mountain where the stone content is small. Some of it is used as open range, but as a native growth of grasses does not exist in forested areas no attempt is made to use the type for pasture.

The forest growth consists of pine and broad-leaved trees with an undergrowth of briars and ferns. Spruce pine, white pine, and sycamore border the narrow stream bottoms, and beech, oak, and poplar prevail along the steep slopes. The Dekalb stony loam should be devoted to forestry.

DEKALB FINE SANDY LOAM

The surface soil of the Dekalb fine sandy loam is a grayish-yellow or gray fine sandy loam about 6 inches deep, underlain by a pale-yellow and in places brownish-yellow heavy fine sandy loam subsoil. The lower subsoil, from 18 to 40 inches, is a brownish-yellow loamy sand, with spots of white sand. The loose-textured subsoil and coarse-grained sandstone beds outcropping on the surface are characteristic features which differentiate this type from the loam. Isolated areas of stony sandy loam, too small to map, occur around drainage heads and along the streams. This type is closely associated with the Dekalb stony loam and Dekalb loam.

The topography is level to gently rolling, and drainage is good to excessive, owing to the porous nature of the subsoil.

The total area of this type in the county is small. The most extensive areas are located west of Pride and south of Elgood. Isolated areas of this type too small to map are included with the Dekalb loam.

The farmers speak of this type of land as having no subsoil or "bottom" on account of its inability to retain fertilizers for any appreciable length of time. Most of this soil is undeveloped, but a few cleared areas are used for light grazing.

The native vegetation consists of a sparse growth, principally of blackjack oak and other varieties of scrubby growing oaks. The cleared areas are covered with a sparse growth of broom sedge, sand reed grass, needle grass, carex, and other varieties of short, tough herbs. This land is best suited to light farming and trucking.

DEKALB LOAM

The surface soil of the Dekalb loam is a gray to brown mellow loam about 6 inches deep, grading into a yellow, compact, but very friable loam extending to a depth of 18 inches. The subsoil is a yellow, friable loam, mottled with streaks of gray sand and rusty-brown silt loam, and passes into the rotten sandstone at about 20 to 36 inches. White or gray mottlings are abundant in the lower subsoil on gently sloping areas where the bedrock sandstone or shale occurs at shallow depths. In the vicinity of Princeton and on areas of similar topography the soil consists of a gray loam, underlain at 6 inches by a pale-yellow loam which extends to a depth of 24 inches. The lower horizon, from 24 to 36 inches, consists of a distinct layer of grayish-yellow loam, underlain by disintegrated but bedded sandstone. In places both soil and subsoil contain small fragments of partly decomposed sandstone and shale.

The Dekalb loam is derived principally from sandstone weathered in place. Its profile is generally free from shale, except in small areas adjoining other types of the Dekalb or Upshur series. Sandstone frequently occurs in the 3-foot section and develops the stony loam type in places along the bluffs and high knobs.

This type occurs in broad, gently sloping areas bordering sides of high ridges south of the Bluestone River. North of the river the type occupies positions capping the higher ridges, which are surrounded by lower areas of Dekalb or Upshur soils, as found north and west of Matoaka, south of Elgood, and at Athens. The topography is steep to gently rolling and the drainage is good.

The Dekalb loam ranks among the important upland soil types in regard to total acreage in cultivation in the county. The most extensive cultivated areas are in the northern part of the county and along Blackoak Mountain.

The soil is fairly retentive of moisture, is easily tilled, and can be plowed under a wide range of moisture conditions. The topography of over 50 per cent of the cleared areas is favorable to the use of modern machinery.

Comparatively good yields of corn are obtained, ranging from 15 to 20 bushels per acre. The crop usually escapes frost, as the soil warms up early in the spring, promoting rapid growth and early maturity. Oats ordinarily yield 10 to 15 bushels per acre. Potatoes are especially adapted to this soil, ordinarily yielding from 50 to 100 bushels per acre. They are grown for home use, and the surplus is sold on the local markets. Timothy and clover mixed and redtop produce yields ranging from 1 to 1¼ tons of hay per acre. Orchard grass is well adapted to the soil and provides abundant pasturage during the early spring and late fall.

The forest growth consists of black oak, red oak, chestnut, hickory, and some pine and poplar, with an undergrowth of raspberries, blackberries, dogwood, and buckeye. The cleared areas devoted to

pasture are covered with broom grass, wire grass, various sedges, and carex, in addition to a sparse growth of small white clover, which is characteristic of this type but is not so abundant as on the Upshur soils.

DEKALB SILT LOAM

The surface soil of the Dekalb silt loam is a grayish-brown to yellowish-brown silt loam, 5 to 8 inches deep, underlain by a golden-yellow to yellowish-brown silt loam. Usually the subsoil from 20 to 50 inches deep is a yellowish-brown to reddish-brown silty clay loam, grading into the dark-colored broken shale or parent material. On the more level areas the subsoil is deeper, while on the ridges and slopes the shale rock comes nearer the surface. The surface soil contains small quantities of thin platy shale, the subsoil contains larger quantities, and in many places outcrops of this platy shale are noticeable. Wherever large quantities occur the color of the soil is influenced by the brownish color of the shale, as noted in the soils north of Lashmeet. The surface soil here consists of about 6 inches of yellow to yellowish-brown silt loam, underlain by a subsoil of reddish-brown silt loam to a depth of 18 inches, and the lower subsoil is a yellow, compact silty clay loam with bluish-gray and rusty-brown mottlings.

This soil type has a rolling to hilly topography. South of the Bluestone River, where the shale beds dip, the type occupies steep to gently sloping ridges which are occupied by Dekalb loam on the opposite position. North of the Bluestone River, where the beds of shale have a horizontal position, this type occupies high knobs, gently sloping ridges, and plateaus bordered by areas of the steep phase of the silt loam and by areas of the stony loam type.

Surface drainage of this type is good. The surface is well dissected with many stream branches and has slope enough to afford rapid run-off of the surface waters. On the very gently sloping areas in close association with the Upshur and Meigs soils or underlain by a red shale formation the internal drainage is poor.

The position of the Dekalb silt loam is favorable for orchards and small-grain crops which need protection in spring. Its high elevation affords protection from injury by late spring frosts. Small grains are apt to winterkill on unprotected ridge tops where wind removes the protective snow covering, and such areas are usually reserved for buckwheat or for pasture.

The native forest growth consists of red oak, chestnut oak, chestnut, maple, some hickory, beech, and poplar. Honey locust may be found around the drainage heads on this type. Blue grass does not flourish on this soil except in moist forested areas and where lime has been incorporated in the soil. Broom sedge, crab grass, wire grass, and dog grass are the dominant species of grasses.

The Dekalb silt loam is deficient in organic matter and slightly acid. The growing of green-manure crops and the application of crushed limestone at the rate of 2 tons per acre will improve the soil condition and insure a successful stand of clover. Increases in crop yields result from the use of stable manure, but this method of soil improvement is not commonly practiced, as very little manure is accumulated on farms in this county owing to lack of stock. Sowing clover between corn rows and using the land for hay or pasture

is the general method of soil improvement followed. Wheat, corn, and clover constitute the common crop rotation. Some soy beans are grown and are recognized as a valuable crop for this type, as they yield better than clover where the soil is deficient in lime.

Corn, wheat, buckwheat, and hay crops of timothy and clover are the crops best adapted to this soil type. The ordinary yields are 10 to 15 bushels of wheat, 15 bushels of buckwheat, 15 to 20 bushels of corn, and one-half to three-fourths ton of hay per acre. In the heavier-textured variations with compact subsoil wheat has proved to be a favorable crop, whereas in lighter-textured areas with a friable subsoil corn, hay, and vegetables are more suitable. Buckwheat is usually grown in the higher areas with heavy subsoil and poor underdrainage.

Peaches do not seem well adapted to the soils of this region, as the trees are short lived, but apples do particularly well, and a few small commercial orchards produce fruit of excellent quality. Cherries rank next to apples.

Dekalb silt loam, steep phase.—The surface soil of the Dekalb silt loam, steep phase, is a brown to grayish-brown silt loam 6 inches deep, underlain by a reddish-brown silty clay loam, which passes at a depth of 18 inches into a brownish-yellow clay mottled with bluish gray and rusty brown. At depths ranging from 20 to 36 inches below the surface a very fine brown shale occurs. The soil contains varying quantities of shale fragments. The subsoil is friable, with a cubical structure, and has a greasy feel when rubbed between the fingers.

This phase occupies the steep slopes of deeply dissected drainage ways. Narrow strips of this phase lying below the stony loam type of the series, but too small to show on the map, occur along Laurel Creek north of Athens. North of Spanishburg it occurs on steep hill crests above gentle talus slopes occupied by the Dekalb silt loam. The largest area of this phase is in the northwestern part of the county.

Some of the land affords fair grazing when cleared; otherwise very few native grasses grow on account of the heavy forest growth prevailing on this type. It is subject to erosion after a slight disturbance of the soil, and care should be taken to prevent close grazing or the use of the very steep areas.

The forest growth consists of the larger growing trees and is usually free from underbrush and scrubby growth. The principal trees are red oak, white oak, and chestnut, with some poplar, hickory, beech, and honey locust.

A very small acreage of this phase is under cultivation. Only the smoother areas in small patches, as found on benches and in coves, are used in growing crops, principally corn, wheat, and oats. On account of the steepness of topography, the land is considered unsuited for cultivation, and most of it is in forest, or in pasture where cleared. It should remain forested, or the smoother portions seeded to pasture grasses. It can not, under present conditions, be economically cultivated.

UPSHUR SILT LOAM

The surface soil of the Upshur silt loam is a reddish-brown to purplish-red, mellow, friable silt loam, underlain at about 4 to 6

inches by a purplish-red silty clay loam, of a firm but friable structure. At a depth of 12 to 15 inches is a dark reddish-brown or purplish silty clay loam or silty clay, hard but brittle when dry and plastic when wet. This passes at about 20 inches into a compact, heavy, purplish-red or reddish-brown silty clay containing slight mottlings of rusty brown or gray and fragments of reddish-brown and black shale. The shallower areas of this type occur on narrow ridges and steep slopes and contain varying quantities of purplish shale on the surface, with broken to bedded shale prevailing at about 15 to 24 inches deep.

This soil is derived from the weathered Indian-red shale found in the lower soil horizons and in outcrops of shale formations on steep slopes within the soil areas. Wherever red shale is thinly capped with other material a variation of this type occurs, forming small areas with a surface soil of Dekalb silt loam over the heavy subsoil typical of the Upshur soils.

The Upshur silt loam occurs on steep to gentle slopes. Along Lick Creek and at the heads of Island and Little Island Creeks in the northeastern part of the county it occupies steep areas. The most extensive areas of broadly rolling topography are on the divides of the above-named creeks. The more gently sloping areas occur in the southern part of the county on Redoak Ridge and south of Littlesburg.

The type ranks first among the upland soils of the county in productiveness. Corn, wheat, oats, and clover, the principal crops grown, produce good yields. Corn yields from 20 to 40 bushels, wheat 15 to 20 bushels, oats 20 to 30 bushels, and clover and timothy mixed 1 to 1½ tons per acre. Vegetables and fruit are grown for home use.

Legumes appear to be better adapted to this soil type than to others, as a volunteer growth of white clover in pastures and hay meadows is characteristic. A good growth of red clover is easily obtained, but liming would be beneficial, as the soil is neutral to slightly acid, according to tests with thiocyanate solution.

A considerable part of this soil type is pastured, as it supports a comparatively liberal quantity of feed of good quality per acre. The native grasses are principally crab grass, broom sedge, and some blue grass and clover. The first two are dominant on narrow ridges or shallow soils and the last two prevail on nearly level to gently sloping talus slopes and in swales. Timothy, clover, and orchard grass make a good combination for pastures on this type, with lime application, as they provide the maximum amount of forage well distributed during the grazing season. The orchard grass attains its best growth during the early spring, with additional thrifty growth late in the fall, while timothy and clover produce their largest growth during the warm summer months when orchard grass remains in a dormant stage.

The native forest growth consists principally of chestnut and maple, with some red oak and honey locust, but practically all of it has been removed and the land is used for pasture or cultivation.

MEIGS SILT LOAM

The type mapped as Meigs silt loam represents a condition rather than a definite soil type. It consists of small areas of Dekalb silt

loam and Upshur silt loam so intricately mixed that a separation of them could not be made. Small patches of Upshur clay and Dekalb loam are also included.

The type is not extensive. It occurs in association with the Upshur soils and along the steep slopes and knobs where the red shale outcrops and is capped with Dekalb soils. Methods and crops on this type are similar to those on the Upshur silt loam, but yields are slightly lower. About 50 per cent of the type is cultivated. The forest growth on this soil is similar to that on the Dekalb silt loam and Upshur silt loam.

FREDERICK STONY SILT LOAM

The surface soil of the Frederick stony silt loam is a gray to grayish-brown silt loam, passing at a depth of a few inches into a yellow friable silt loam, extending to about 12 inches, where it is underlain by a brownish-yellow silty clay loam extending to depths of 18 to 24 inches. The material above 24 inches breaks up into cubical aggregates, which crush easily into fine powder. Below an average depth of 24 inches the material consists of reddish-brown, heavy and slightly sticky clay, which breaks up into a granular block structure when dry and exposed to the weather.

Local variations in the soil profile occur on colluvial slopes and between exposed beds of limestone. In such places the surface soil has a darker-brown color and a higher content of organic matter and passes directly into the typical clay subsoil, the intermediate horizons not being developed. Near Nemours the soil is a brown to yellowish silt loam, underlain by a tough, plastic, reddish-brown clay, which in places rests upon a bed of limestone at depths of 24 to 40 inches or more. On sloping cultivated areas the surface soil has a dark reddish-yellow color owing to the incorporation of some subsoil material in plowing.

So far as topography is concerned, no difficulty would be experienced in the use of tractors and modern machinery, but the numerous exposures of limestone beds and boulders make plowing and cultivation rather difficult. Local areas of about 5 to 15 acres are the largest that can be cultivated. Most of the sowing and harvesting of small grain is performed by hand labor.

The sloping topography of this type favors good soil drainage and the granular structure provides good aeration, making favorable conditions for soil bacterial activities necessary for plant growth. Early fall plowing of small-grain stubble and hay meadows promotes quicker growth of crops and increases the yields of grain crops. Fertilizers are used for corn and wheat. Clover and other legumes are grown with comparative ease, providing nitrogen and organic matter for the soil and palatable feed for stock. Dairying is being encouraged on farms accessible to good roads and markets.

The type ranks highest in content of organic matter among the soils in the county. The thiocyanate-solution test gives no indication of acidity, and tests with hydrochloric acid give no indication of lime, but there seems to be sufficient lime for crop needs. It is known as "limestone land" and is commonly called the "blue-grass region" of Mercer County.

The Frederick stony silt loam has a steep to gently rolling topography in areas of limerock outcrops. It occurs in broken belts paralleling East River Mountain and East River, varying in width from one-fourth to one-half mile or more. The narrower belts occupy sides of small drainage branches of East River and parallel the steeper sides of East River Mountain, and in places they are broken by areas of Dekalb stony loam derived from the overlapping sandstone formation.

Most of the land has been cleared of its original forest, which consisted chiefly of hard maple, chestnut, oak, honey locust, walnut, and some cedar. Of the cleared land probably 75 per cent is in pasture or orchards and the remainder in cultivation. It supports a comparatively heavy growth of blue grass. With the addition of timothy and orchard grass, much of this type under present conditions could be used most economically for pasture. The soil is well adapted to orcharding, producing an excellent quality of apples. The principal varieties grown are York Imperial (Johnson's Fine Winter), Ben Davis, Fallwater, Rome Beauty, and Yellow Transparent.

FREDERICK GRAVELLY SILT LOAM

The Frederick gravelly silt loam consists of a gray to grayish-brown surface soil to a depth of about 8 or 10 inches. The subsoil is a reddish-brown silty clay or clay loam. The surface soil contains varying quantities of gravel, consisting of black and white chert, ranging in size from a quarter of an inch to 12 inches in diameter.

This type is closely associated with the Frederick stony silt loam. It occupies the hills and ridges of gently sloping topography. The natural surface drainage is good.

Only a small part of this type is under cultivation, as most of it contains enough gravel to interfere seriously with cultivation. The smoother areas are devoted to corn, wheat, and oats, yielding ordinarily 25 bushels, 20 bushels, and 35 bushels per acre, respectively. The type is a strong soil for wheat, which is grown on the more gravelly areas, while the smoother areas are devoted to corn. Fertilizers are used extensively on this soil in growing corn and wheat, acid phosphate being the chief element.

Every farm has an orchard, consisting chiefly of apples, with some cherries and peaches, the varieties grown being the same as those on the stony silt loam. The orchards of commercial size are located on the higher slopes, where orcharding has been most successful.

A considerable part of the cleared land is devoted to pasture. The native grasses produce a rather poor quality of feed, except on the bottom slopes, where blue grass prevails. The sowing of a combination of grasses is recommended, as it improves the quality and quantity of the pasturage. The native forest growth consists of red oak, white oak, chestnut, hickory, poplar, and beech along the slopes, and sycamore and pine on the stream bottoms.

TILSIT SILT LOAM

The surface soil of the Tilsit silt loam is a gray silt loam about 6 inches deep, underlain by a pale-yellow or grayish-yellow silt loam subsurface. The subsoil below 18 inches consists of a rather compact

layer of pale-yellow silt loam, mottled with rusty brown and gray, passing at 24 inches into a yellow, compact, heavy clay mottled with rusty brown and red and containing fragments of shale. The compactness of the subsoil is due to the weathered shale, which forms a fine-textured, heavy material. The parent material, consisting of shale and sandstone, is reached at varying depths below 30 inches.

All cultivated areas of this type maintain a grayish or grayish-white cast on the surface, being especially noticeable on the road surfaces and on recently plowed fields. Where the type borders well-drained slopes of drainage ways there is a yellowish-brown surface soil over a golden-yellow to brownish-yellow subsoil, but this variation occurs in areas too small to warrant separation. In a level area about 3 miles west of Elgood the weathered shale has formed a very compact subsoil. The soil here is a gray silt loam about 6 inches deep, underlain by a friable yellow silt loam extending to about 20 inches, and the subsoil is a brownish-yellow compact clay underlain at 28 inches by a compact yellow clay containing rusty-brown, bluish-gray, and red mottlings.

The Tilsit silt loam is developed on level to undulating areas or plateaus, closely associated with the Dekalb silt loam and the Upshur silt loam. It occupies positions along the heads of stream branches or on flat knobs. The largest area borders the Bent Mountain north of Athens, forming a benchlike plateau. About 3 miles west of Elgood an area of this type is bordered by the deeply dissected heads of Spruce Fork and Payne Branch, forming steep bluffs, which are occupied by types of the Upshur series, developed from the red shale underlying the Tilsit silt loam.

The light color, moisture content of the surface soil, and the prevailing vegetation indicate poor drainage, which can be improved by artificial drainage. The poor drainage is not due to topography alone, but to some extent to the slightly impervious substratum formed by shale, silty clay, or sand rock. The downward seepage of water is hindered, causing it to move along the impervious beds to the soil surface of lower-lying areas.

This type, according to the thiocyanate-solution test, has the highest degree of acidity of any of the upland soils of the county. To a depth of 6 inches the reaction formed a very red precipitate and the subsoil produced a flesh-colored precipitate. Where an application of lime at the rate of 3 tons per acre had been made, no coloring of the solution was noted.

The soil provides good pastures and hay meadows where lime and plenty of organic matter have been added; otherwise, if left in its natural state, the quantity and quality of forage rapidly decreases. A common practice is to reseed with redtop, timothy, and clover every few years on pastures or hay meadows. The dominant grasses on this type in virgin condition are crab grass, white clover, broom sedge, and some bluegrass. The average yield of hay is from 1 to 1½ tons per acre. Good yields of clover and timothy have been obtained where lime has been applied.

The Tilsit silt loam is a late soil, as compared with other soils of the county, owing to its poor drainage and consequent wet condition. Late fall or early spring plowing tends to remedy this defect. No definite system of crop rotation is followed, but the land is seeded to corn, wheat, or clover, according to farming or market conditions.

Some commercial fertilizer is used for wheat at the rate of 200 pounds of acid phosphate per acre. Lime is occasionally used with the clover crop. The land is seeded to buckwheat, with an application of lime at the rate of 3 tons per acre, and during the fall the crop is plowed under and the land seeded to wheat and clover. Some farmers prefer to seed the clover in the spring and work the seed in the soil with a harrow, as it is claimed a better stand is obtained than from clover seeded in the fall.

LICKDALE LOAM

The surface of the Lickdale loam is a gray, pale-yellow to brownish-yellow loam, 6 to 12 inches deep, containing slight mottlings of rusty brown. It is underlain by a friable loam of a bluish-gray to pale-yellow color, mottled with rusty brown and white. Usually at 20 to 30 inches a rather heavy and somewhat plastic bluish to grayish clay, mottled with rusty brown, is encountered.

The Lickdale loam occupies a small total acreage, the largest areas being developed at Lerona, near Flattop, and north of Pride. It occurs around the heads of streams, in slight depressions and sloping areas, and also in flat to gently rolling areas at lower elevations than the surrounding soils. The natural surface drainage is poor, and in many places this soil receives the seepage water from higher-lying soils. Near the heads of the streams much of this type is permanently wet.

Most of the Lickdale loam has been cleared and is either cultivated or devoted to pasture. The forest growth consists of white oak, red oak, chestnut, and some hickory. The poorly drained areas support a growth of coarse grasses, and these furnish fair grazing for cattle. Some of this land has been seeded to timothy, redtop, and clover and yields about 1 to 1½ tons of hay per acre. The cultivated areas are used for corn, wheat, and oats, and fair yields are obtained where the soil has been manured and limed.

One of the essential requirements of this soil is adequate drainage. This can be accomplished by open ditches or tile drains; the former would be cheaper and probably as effective. Liberal applications of lime would also prove beneficial on this soil.

HOLSTON LOAM

The surface soil of the Holston loam is a grayish-brown mellow loam about 8 inches deep, passing into a yellow or brownish-yellow, firm but friable loam to an average depth of 18 inches. The subsoil is a yellow, friable sandy loam or loam mottled with rusty brown and gray. The surface soil ranks first in content of organic matter, as compared with other terrace soils. A neutral to slightly acid condition is indicated by test with thiocyanate solution. Below the horizon of firm material at about 18 or 20 inches the degree of acidity appears to be greater.

The type occurs on terraces or second bottoms along the larger streams, the largest areas being found along the Bluestone River at the junctions of tributary streams. It occupies positions above overflow. The topography is characteristically nearly level, with sufficient slope to give good drainage.

Practically all of the Holston loam is under cultivation or is used for pastures and hay meadows. Corn and hay (timothy, clover, and cowpeas) are the important crops grown, and in addition, garden truck for home consumption or for market, such as sorgo for sirup, sweet potatoes, potatoes, and other vegetables. Corn yields 30 to 40 bushels, potatoes 100 to 150 bushels, oats 20 to 30 bushels, wheat 10 to 15 bushels, and hay 1 to 1½ tons per acre.

The soil is easy to cultivate, requiring only light-draft animals and light implements. More favorable conditions can be maintained during the farming season than on heavier soils, as it permits cultivation immediately after heavy rains with no danger of soil puddling and is not much subject to drought because of its moisture-holding capacity. It is among the best of the terrace soils for truck crops.

Commercial fertilizers are not used, but some stable manure is applied. On similar soils used for truck crops in other areas an application of 200 to 400 pounds per acre of fertilizer analyzing 8-5-5 or 8-5-7 has given favorable results. Lime is necessary to insure good growth of clover. The growing of cowpeas, clover, or other legumes and turning under an occasional crop is recommended for building up soil fertility and maintaining soil productivity.

This land is valued at \$50 to \$100 an acre, depending upon the distance to market and good roads.

TYLER SILT LOAM

The surface soil of the Tyler silt loam is a gray to grayish-brown silt loam, passing into a yellowish-brown, mottled, friable silt loam from 6 to 18 inches deep. The subsoil is a mottled rusty-brown and bluish-gray silty clay loam. The rusty-brown mottlings contain sand particles and the bluish-gray mottlings consist principally of plastic clay.

This type occupies small stream terraces and is occasionally overflowed during very heavy rains. The largest areas occur along the Bluestone River northwest of Kegley and surrounding Gardner. It is poorly drained near the bluffs and in swales on account of the impervious subsoil.

Practically all of the Tyler silt loam is under cultivation. Corn, wheat, and hay are the principal crops grown. Corn yields 30 bushels per acre and wheat 15 to 20 bushels. The hay crop consists principally of timothy and clover, producing ordinarily 1 to 1½ tons per acre. The soil is low in organic matter and very acid, as indicated by the thiocyanate test. Good drainage and liming are necessary for best results.

POPE SILT LOAM

The surface soil of the Pope silt loam is a dark-brown mellow silt loam, 8 inches deep, underlain by a brownish-yellow friable silty clay loam, which continues downward to depths of 30 to 40 inches. This soil is an alluvial deposit of material washed from the Dekalb silt loam and may be considered a recent or immature soil, as it has no compactness and in many places no change in texture or color in the entire soil profile. In places adjoining the bluffs or depressions the

subsoil is somewhat plastic and shows slight rusty-brown or gray mottlings. Near the stream channels the surface soil grades into a loam or sandy loam texture. Small patches of Atkins silt loam and some areas of Holston loam too small to map are included in the type.

The Pope silt loam occupies first-bottom land and is subject to overflow. Its total acreage is small. The largest areas occur near Spanishburg along the Bluestone River. The productiveness of this soil is maintained largely by the deposition of fresh material at times of overflow by the streams.

The greater part of this type is used for hay or pasture and some for growing of corn. Hay yields 1 to 2 tons per acre and corn from 20 to 40 bushels. Pastures consisting of blue grass, clover, redtop, with carex, and water reed grass bordering the stream channels in swampy areas provide abundant grazing for stock.

ATKINS SILT LOAM

The surface soil of the Atkins silt loam is a rusty-brown and bluish-gray mottled silt loam 18 inches deep. The subsoil is a heavy, tough clay, mottled bluish gray and rusty brown. This grades at 40 inches into plastic bluish-gray clay containing streaks of brown clay.

The soil is very low in organic matter and the entire profile to a depth of 36 inches, as indicated by the thiocyanate test, is very acid. It is commonly known as crawfish land, and in many places it remains wet and swampy throughout the summer. By straightening main stream channels and constructing deep lateral ditches the physical condition of the soil could perhaps be improved.

This type occupies poorly drained first-bottom areas around heads of small sluggish streams. The stream beds are very shallow, and in broad valleys near forks of the streams the channels are winding and subject to frequent overflow. South of Princeton, where a number of branches flow into Brush Creek, overflows occur two or three times a year.

The total acreage of this type is small, the largest area in the county being south of Princeton. Practically all of it is used for pasture or hay meadow. Growing of crops is considered unprofitable where the soil remains in its natural state, but with proper drainage and the incorporation of green manure and lime better yields of clover and tame grasses could be produced. A few farmers have obtained favorable results with clover and tame grasses by plowing under two or more successive crops of buckwheat for green manure, followed by wheat with an application of some fertilizer and 3 tons of lime per acre, the clover and timothy being seeded in the wheat during the spring or fall.

The native grasses on this type consist mainly of carexes and sedges. These become fibrous and unpalatable to cattle in low wet areas after a short growing period. In overgrazed areas ironweed, goldenrod, and other woody perennials invade the pastures and reduce the feeding value of forage. In the wet areas considerable difficulty is experienced in cutting the hay with a mowing machine, as the thick, wiry growth of sedges chokes the sickle. Where drainage is improved the pasture grasses consist principally of crab grass and small patches of white clover and blue grass.

ROUGH STONY LAND

The land mapped as Rough stony land consists of high, narrow ridges and steep slopes or precipices which border the deeply dissected stream valleys with numerous rock outcrops and large boulders on the surface.

The principal areas of this material are along the Bluestone River in the northern part of the county and on the top of East River Mountain. The land has no agricultural value except for forestry and possibly grazing in very small spots. The forest growth consists of oak, hemlock, chestnut, pine, beech, and birch.

SUMMARY

Mercer County is situated in the southern part of West Virginia. It comprises an area of 424 square miles, or 271,360 acres.

The county lies within the Appalachian Plateau. The topography is rough to gently rolling. The elevation ranges from 3,566 feet in the rougher part to about 2,000 feet or less along the Bluestone River in the northeastern part of the county.

The principal drainage system of the county consists of the Bluestone River and its tributaries. The tributaries north of the river have cut deep valleys in the land surface, while the southern tributaries drain areas of smoother topography.

The principal cities of the county are Bluefield, Princeton, and Athens. They are connected by hard-surfaced roads, with branches to all of the mining centers of the county. Bus lines operate between the towns of the county, and an electric railway connects Bluefield and Princeton.

The climate is characterized by pleasant summers and mild, open winters, the temperature seldom falling below zero. The mean annual rainfall is 41.35 inches and is well distributed throughout the year. The average frost-free season is 164 days.

The greater part of the land in the county is undeveloped, approximately 38 per cent or less being under cultivation. According to the 1920 census there are 1,927 farms in the county of an average size of 97.5 acres, of which 52 acres is classed as improved. Very little labor-saving machinery is used on the farms on account of the roughness of the land.

The principal grain crops grown are corn, wheat, oats, and some buckwheat; the hay crops consist of timothy and clover mixed, and some redbud; the common fruit crops are apples, peaches, cherries, plums, and strawberries. The vegetable crops grown most extensively are potatoes, cabbage, lettuce, parsnips, radishes, squashes, beets, beans, peas, and turnips. The grain and hay crops are fed on the farms to livestock. The fruits and vegetables are grown for home use, and the surplus is sold on the local markets. The orchards are located mainly on the higher slopes, where there is better air drainage and less danger of damage by frost in the spring.

The soils have been developed under forest conditions. Those of the uplands are residual in origin and those occupying the flood plains are alluvial deposits washed from the surrounding uplands. The upland soil types are derived from the weathered alternated beds

of shale and sandstone, except the Frederick soils, which are derived from the weathered limestone.

Fourteen soil types and one phase, representing 10 series, in addition to Rough stony land, are mapped. The soils may be divided into two groups on the basis of the local conditions affecting their development. The soils of one group were developed under conditions of poor drainage and are characterized by pale-gray or mottled subsurface layers. These soils are included in the Lickdale series of the uplands and the Atkins and Tyler series of the flood plains. The soils of the other group were developed under better drainage, favorable to accumulation of organic matter and the oxidation of the subsoil. They are characterized by darker-colored soils and brown to reddish-yellow subsurface layers. These soils are included in the Dekalb, Upshur, Meigs, and Frederick series of the uplands and the Holston and Pope series of the stream bottoms.

The darker-colored soils, except the Dekalb stony loam and the steep phase of the silt loam, are probably the most important soils. They have good drainage and are productive and durable soils, giving good yields of corn and hay. They usually have a greater proportion of improved land per farm than the other soils. The Dekalb loam is especially well adapted to potatoes and corn. The Dekalb stony loam and the steep phase of the silt loam are considered unsuitable for cultivation and are practically undeveloped.

The lighter-colored soils are less productive and durable. They are the most acid and most poorly drained soils of the uplands. They show a remarkable improvement in yields of clover and timothy hay through application of lime. The Tilsit silt loam is adapted to wheat and hay. The Lickdale and Atkins soils are devoted to hay and pasture. The Tyler silt loam is well adapted to the production of wheat, corn, and hay.

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