

UNITED STATES DEPARTMENT OF AGRICULTURE

**Soil Survey**  
of  
**Hampshire County, West Virginia**

By  
**B. H. WILLIAMS**



**Bureau of Chemistry and Soils**  
In Cooperation with the West Virginia Geological Survey

# BUREAU OF CHEMISTRY AND SOILS

HENRY G. KNIGHT, *Chief*  
A. G. MCCALL, *Chief, Soil Investigations*  
SYDNEY FRISSELL, *Editor in Chief*

## SOIL SURVEY

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H. H. BENNETT, *Inspector, District 4*

## COOPERATION

### WEST VIRGINIA GEOLOGICAL SURVEY

JAMES D. SISLER, *State Geologist*

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# SOIL SURVEY OF HAMPSHIRE COUNTY, W. VA.

By B. H. WILLIAMS

## COUNTY SURVEYED

Hampshire County is in the northeastern part of West Virginia, adjoining the Virginia State line. Potomac River, together with its North Branch, separates the county from Allegany County, Md. The county, which is irregularly square in outline, averages about 30 miles from north to south and from east to west. It includes an area of 640 square miles or 409,600 acres.

Hampshire County lies in the eastern part of the Appalachian Mountain region where the relief ranges from rolling to mountainous. A series of approximately parallel mountain and secondary ridges having a northeast-southwest trend, with rolling and gently rolling valleys between, occupies the entire county. Locally the ridges are somewhat broken. In general the county comprises three approximately equal topographic divisions, the western mountain division, the central valley division, and the eastern mountain division.

The western mountain division is characterized by almost unbroken parallel mountain ridges, with intervening valleys. Patterson Creek Mountain, a continuous ridge forming the entire western boundary of the county, Mill Creek Mountain, River Mountain, and South Branch Mountain are the outstanding physiographic features of this division. On the crest of Mill Creek Mountain, just west of Sector, is a narrow elliptical limestone valley formed from an exposed anticlinal fold of limestone which underlies the mountain. Series of sandstone knobs or peaks occur along both sides of this mountain for a distance of about 6 miles.

The central valley division, which at one time was probably a high intermountain plateau, is characterized by rolling or steep hills and secondary ridges. Short Mountain, extending into this valley about 7 miles from the southern county boundary, is a high, rugged area which ranks with the most prominent mountains of the county. Two similar mountains, Spring Gap Mountain and Sideling Hill, project into the northern part of the central valley division.

The eastern mountain division includes all that part of the county lying east of North and Cacapon Rivers above their junction. This division is composed of a series of steep-sided, parallel mountain



FIGURE 1.—Sketch map showing location of Hampshire County, W. Va.

ridges, with narrow, deep valleys between. Spring-fed streams flow through these valleys. The more outstanding mountains of this eastern division are North River, Baker, Cooper, Dillons, Schaf-fenaker, Timber, Ice, Pine, Leith, Castle, Little, North, Cacapon, and Bear Garden. The crests of North and Cacapon Mountains each form about 6 miles of the eastern county boundary, and the crest of a belt of hills, known as Timber Ridge, lying east of Cacapon River south of Capon Bridge, forms the east-central county boundary.

The average elevation of the higher mountain ridges in the western part of the county is about 2,250 feet above sea level and of those in the eastern part is about 2,000 feet. The tops of most ridges are narrow and strewn with rocks and boulders. In many places cliffs of the hard underlying sandstone outcrop along the upper slopes. The steep slopes are cut by shallow drainage ways which converge at the foot of the hills to form deep, narrow, V-shaped, gorgelike valleys that bisect the secondary ridges along the foot of the mountains. All the higher ridges are steep sloped, rough, and rocky, especially at the higher altitudes. Most of the lower slopes become less steep, merging in many places with rounded hills that slope gently toward the valleys. A few mountains, however, have steep scarp-like slopes which drop abruptly to the valley floors or benches. Mill Creek Mountain, whose eastern slope drops precipitously from an elevation of 2,000 feet to about 750 feet, is an outstanding example of such relief. Parts of South Branch Mountain and River Mountain east of Springfield have similar, very steep slopes. On its western side North River Mountain slopes precipitously 600 or 800 feet to North River. Baker, Cacapon, and Dillons Mountains along Cacapon River are also very steep.

Between the saw-toothed ridges in the eastern part of the county are steep-sided narrow valleys, most of which are rough and rocky. The deep V-shaped gaps, where the streams cut through the ridges from one valley to another, reveal a veritable mass of rock fragments and semirounded boulders.

The floor of the central valley division of the county ranges from 1,200 to 1,400 feet above sea level. Short Mountain, at the southern end of the valley, rises to an elevation of more than 2,550 feet, and Spring Gap Mountain, at the northern end, to 2,235 feet. The hills of this central valley area are predominately rounded in outline, even those having steep slopes. Some are flattish on top. A few of the included lesser mountain ridges, as Little Cacapon, Stony Mountain, and Sideling Hill, have narrow, stony crests and steep slopes.

The highest point in the county, 3,060 feet above sea level, is on South Branch Mountain, 4 miles east of Sector, and the lowest point, 510 feet, is where Potomac River swings away from the north county boundary. The general slope of the county is north-eastward to Potomac River.

All drainage waters of Hampshire County eventually reach Potomac River. Tributaries of this stream ramify all parts of the county. The western third is drained by South Branch Potomac River and its tributaries. Cacapon River, together with its largest tributary, North River, drains the eastern half.

Power for electric light for Romney is developed from South Branch Potomac River. At present this is the only water-power

development in the county along this stream. Formerly a large number of flour, grist, woolen, and saw mills were operated by water power, but only a few are now in operation. The large spring-fed streams offer good opportunity for developing electric power for farm use.

Early settlers followed the valleys of the Potomac, South Branch Potomac, and Cacapon Rivers and their tributaries and cleared and opened up the smooth fertile bottoms and stream bench lands. Later clearings were made in the uplands. The original settlers came from Virginia and Maryland, seeking new homes and cheaper lands. The present population consists largely of descendants of the early settlers. Because there are no large towns and little industry other than farming, there has been no marked increase in population and no rapid increase in farm settlement.

Hampshire County, the oldest county in West Virginia, was formed in 1754, in pursuance to an act of the General Assembly of Virginia passed on December 13, 1753. It then contained all the land which is now included in Hardy, Grant, and Mineral Counties, and parts of Morgan and Pendleton Counties, and comprised an area of 2,800 square miles.

According to the 1920 census report Hampshire County has a population of 11,713, all of which is classed as rural. Most of the inhabitants are native whites. The stream-valley and rolling-hill sections of the county are the most densely populated. Romney, the county seat, with a population of 1,028 in 1920, is the largest town and the most important shipping point for farm, fruit, and forest products. Cumberland, Md., and Winchester, Va., are nearby markets. Baltimore, New York, Philadelphia, and Pittsburgh are the principal outside markets. Green Spring, Okonoko, Little Cacapon, and Paw Paw, Morgan County, afford shipping points for the northern part of the county. Other important local shipping points are along the Petersburg (south) branch of the Baltimore & Ohio Railroad, and local trading points are scattered throughout the farming section.

The main line of the Baltimore & Ohio Railroad from New York to Cincinnati and St. Louis parallels Potomac River just inside the county boundary. The Petersburg (south) branch of this road operates between Green Spring and Petersburg, Grant County, and is the only railroad in the South Branch Valley. The Winchester & Western Railroad, constructed for the purpose of hauling timber from eastern Hampshire and Hardy Counties, touches the southeastern corner of Hampshire County. Recently established freight and passenger service on this road affords an outlet for farm products of this section.

The public roads throughout the county are fairly good during most of the year. The ridge roads are excellent in dry weather but for the most part are not kept in repair. The mountain roads are generally rough but are usually passable. Abundance of excellent road-building material is available in the beds of shale and stream-gravel deposits. With proper grading and some care the roads could be maintained in good condition. Some roads have been graded and hard surfaced, and doubtless improvements will continue.

All parts of the county are reached by a very good rural telephone system. Rural free delivery of mail serves most sections.

## CLIMATE

Seasonal temperatures throughout Hampshire County are fairly uniform. The winters are milder and the summers warmer than in the Allegheny Mountains farther west. Hot periods during summer are of short duration. Below-zero temperatures frequently occur during winter. On the higher mountains the annual seasonal temperature averages only a very few degrees lower than in the surrounding lower country.

The rainfall is well distributed through the year, being heaviest in the hot summer months when needed by the growing crops and pastures and lightest in the winter and fall. The heaviest snowfall comes in January and February.

The average frost-free season for tender vegetation is a little more than five months, from April 30 to October 6. The latest killing frost reported at the Romney station of the United States Weather Bureau was on May 27 and the earliest was on September 11.

Table 1, compiled from the records of the United States Weather Bureau station at Romney, gives the more important climatic data for Hampshire County.

TABLE 1.—Normal monthly, seasonal, and annual temperature and precipitation at Romney, W. Va.

[Elevation, 824 feet]

Month	Temperature			Precipitation			
	Mean	Absolute maximum	Absolute minimum	Mean	Total amount for the driest year (1904)	Total amount for the wettest year (1918)	Snow, average depth
	° F.	° F.	° F.	Inches	Inches	Inches	Inches
December.....	32.4	72	-15	2.42	2.72	4.71	4.8
January.....	30.9	77	-20	2.73	1.90	3.30	9.1
February.....	32.2	74	-11	2.26	.52	1.79	9.4
Winter.....	31.8	77	-20	7.41	5.14	9.80	23.3
March.....	42.6	94	4	3.10	2.20	2.54	7.0
April.....	51.6	101	16	3.02	1.65	9.14	.6
May.....	63.0	98	28	3.63	2.38	2.77	( <sup>1</sup> )
Spring.....	52.4	101	4	9.77	6.23	14.45	7.6
June.....	69.9	100	37	4.12	4.13	4.19	.0
July.....	74.8	102	43	3.62	4.00	3.48	.0
August.....	72.9	109	42	3.96	2.20	3.51	.9
Summer.....	72.5	109	37	11.70	10.33	11.18	.0
September.....	66.1	100	31	2.76	2.58	3.88	.0
October.....	55.2	93	20	2.38	1.59	2.44	.3
November.....	42.7	83	6	1.96	.55	1.17	.9
Fall.....	54.7	100	6	7.10	4.72	7.49	1.2
Year.....	52.8	109	-20	35.96	26.42	42.92	32.1

<sup>1</sup> Trace.

AGRICULTURE

Agriculture was the chief pursuit of the earlier settlers in Hampshire County. Travel was difficult and transportation facilities were meager, so the settlers were compelled to be practically self-sustaining and independent. Corn, wheat, and rye were the principal crops, and a few cattle and sheep were raised. Hunting and trapping helped to supply the home with meat, and furs and skins of animals were traded for supplies which could not be produced at home. Potatoes, garden vegetables, and a little tobacco were grown. Clothing was made from home-grown wool which was carded and woven into cloth. The bottom lands were usually devoted to hay and grain, and the adjacent slopes were cleared for pasture. The land has always been cultivated chiefly in small tracts. As only a few slaves were owned in Hampshire County, their emancipation did not affect agriculture to a very great extent.

The river and creek bottoms and smoother uplands brought into cultivation by the earlier settlers have continued to be the most fertile and profitable farm areas. The steeper slopes and the more broken, hilly areas brought into cultivation later proved too steep and erosive for continual cultivation and are now largely devoted to grazing or have been allowed to revert to forest. A large number of small farms in the hilly and rough sections of the county have been abandoned. Many of the abandoned farms were bought by near-by landowners for the purpose of extending their grazing land.

Since 1880 the area devoted to the various cereal crops has varied greatly. The acre yields appear to have increased, particularly during the last 10 or 20 years. Since 1900 apple and peach production has increased, as has the income from livestock, dairy products, poultry, and eggs. The agriculture of the county consists chiefly of general farming, including the raising of livestock and the production of hay, grain, fruit, and some vegetables. There are a few large commercial orchards.

The acreage and production of the principal field crops in census years are given in Table 2.

TABLE 2.—Acreage and production of the principal crops in Hampshire County, W. Va., in stated years

Crop	1879		1889		1899		1909		1919		1924	
	<i>Acres</i>	<i>Bush.</i>										
Corn.....	12,898	287,228	11,755	192,153	13,110	196,140	13,134	204,229	11,991	309,010	8,143	93,703
Wheat.....	11,821	102,931	8,914	79,906	12,285	97,680	6,725	72,608	8,650	96,743	6,120	63,075
Rye.....	2,681	14,349	3,885	29,989	4,332	37,040	4,213	37,127	4,842	42,774	2,211	18,237
Buckwheat....	2,790	25,482	2,228	14,796	2,215	19,020	3,682	47,314	3,784	55,584	3,556	40,048
Oats.....	4,446	58,783	5,631	78,649	2,511	37,750	2,436	38,317	3,451	68,002	2,871	54,449
Potatoes.....		29,927		32,787		471		728		952		663
Hay.....	7,867	5,981	10,561	12,446							14,929	14,359
Tame hay.....					10,808	9,813	10,005	9,619	11,993	12,112	14,501	
Wild hay.....						5		485		67		338
Coarse forage.....								90		67		
									2,931	2,824		

Corn, hay, and forage crops together occupy more than 50 per cent of the land in cultivation. Mixed timothy and clover is the principal hay crop. The acreage devoted to soybeans on the bottom

lands for seed and hay, and on the valley shale lands for hay and green-manure crops, has about trebled since 1920. Production of certified soybean seed for local and outside sale is gaining rapidly.

Corn is the principal crop on the bottom lands and holds about equal place on the higher valley soils with oats, rye, wheat, and buckwheat. Wheat holds an important place in the crop-rotation system on the stream-bottom soils. Barley, grown for feed, is finding favor locally in the valley of South Branch Potomac River as a variation in the crop rotation. Practically all grain crops are consumed on the farm, only a small amount being sold on the local market. Potatoes and other vegetables are grown both for home use and for sale locally.

Fruit growing has become the leading interest in a large part of Hampshire County, and fruit is relied on as the principal cash crop. Apples and peaches are the important commercial fruits. The adaptation of the soils of this section to fruit growing has long been recognized. In 1889 there were 67,192 apple and 13,513 peach trees in the county, and by 1924 the number had increased to 419,439 and 138,523, respectively. At present the production of apples is increasing and that of peaches is decreasing. Fruit growing is carried on to about the same extent on the high mountain lands and the higher valley areas; that is, on the sandstone and shale soils of the valleys. The principal large orchards are on the east slope of Patterson Creek Mountain, the crests of Mill Creek, River, and Valley Mountains, and the crest and short eastern slope of South Branch Mountain. The ridges in the vicinity of Augusta, Levels, Hoy, and Slanesville, and at the foot of Short Mountain and the lower slopes of each side of Spring Gap Mountain and Timber Ridge east of Capon Bridge, are the heaviest-producing areas in the red and gray shale and fine-grained sandstone valley soils.

The principal varieties of apples are York Imperial, Grimes Golden, Ben Davis, Winesap, Jonathan, Delicious, and Rome Beauty, and of peaches are Elberta, Carman, Belle (Belle of Georgia), and Shippers Late Red. Peach trees are generally set as fillers in young apple orchards and removed after their period of heaviest bearing, which is usually about 10 years. A large part of the apple crop is shipped to New York, whence much of it, especially of the earlier and more hardy varieties, is exported to Germany, England, Holland, and South American countries. Other markets for peaches and apples are Pittsburgh, Philadelphia, Baltimore, and other eastern cities.

Cherries, which are grown on a small scale commercially, are marketed in near-by West Virginia, Maryland, and Pennsylvania towns. Pears, plums, grapes, strawberries, and raspberries are grown for local use. Huckleberries and blackberries grow wild in abundance in the hilly and mountainous sections.

A few small areas are planted to sorghum cane for the production of a home supply of sirup.

A few beef cattle and hogs are raised on almost every small farm in the county to supply meat for home needs. The cattle are mostly a good grade of Angus, with some Herefords and Shorthorns. The custom of the corn farmers on bottom lands is to buy 2 and 3 year old steers, as feeders, from the small farms in the county and near-by

counties. Good pasturage and corn in the form of silage produce a good gain in weight and also provide the farmer with a market for his corn. The finished cattle are shipped to Baltimore.

Dairying is carried on principally for the local trade. Some cream is shipped to Cumberland, Md., and Winchester, Va. Sheep are raised in large numbers, distributed well over the county on the hill and mountain farms. The sale of lambs and wool is an important source of income. Barely sufficient farm horses are raised for local needs. Poultry and eggs are generally produced as an adjunct to the more important farm projects.

Table 3 gives the value of all agricultural products of Hampshire County in 1919.

TABLE 3.—*Value of agricultural products, by classes, in Hampshire County, W. Va., in 1919*

Crop	Value	Livestock products	Value
Cereals.....	\$991, 894	Animals sold and slaughtered <sup>1</sup> .....	\$370, 113
Other grains and seeds.....	618	Dairy products, excluding home use.....	98, 566
Hay and forage.....	388, 767	Poultry and eggs.....	270, 056
Vegetables.....	277, 596	Wool.....	25, 936
Fruits and nuts.....	915, 195		
All other crops.....	714	Total.....	764, 671
Total.....	2, 574, 784	Total agricultural products.....	3, 339, 455

<sup>1</sup> Estimated.

In the mountainous and hilly sections, which are still forested to some extent, the cutting of chestnut-oak bark, mine props, and pulpwood furnishes the small farmers with employment and a small income during slack periods of the year, some farmers depending almost wholly on this source for cash income. Local buyers collect these products at convenient railroad points for shipment out of the county. In sections where the timber is of sufficient size, small sawmills cut it into railroad ties and bridge timber, most of which is bought by the Baltimore & Ohio Railroad and shipped to their creosoting plant at Green Spring.

The character of the soil is the principal factor influencing crop production. Climatic conditions on the mountain tops are just as favorable for the production of corn as on the bottom lands. Corn, hay, and small grains are grown principally in the more gently rolling hill valleys and on bottom lands. Both the higher mountain and the valley soils produce heavy crops of good quality fruit. The small areas of stony limestone land occurring on Mill Creek, Cooper, Schaffemaker, Timber, Pine, and Leith Mountains produce good bluegrass and are used principally for pasture, though some fields devoted to corn give excellent returns.

Farming methods are governed largely by the steepness of the slopes and the size of the farm. Some tractors are used on the larger bottom-land farms and gently rolling valley areas. On the smaller farms of equally smooth relief only horse-drawn machinery is used. On many of the steeper and more stony lands much of the planting and harvesting is done by hand.

No definite system of crop rotation is practiced, but many farmers grow corn, wheat, and grass in succession. Corn usually follows

hay or grass that has been used for grazing, but on the bottom lands it is sometimes grown for three or four years in succession. Timothy seed is usually mixed with wheat at the time of sowing. Where clover is to follow, lime is frequently applied and harrowed in before the land is seeded to wheat. If a good stand of clover and timothy is obtained, the grass is left two or three years for hay and pasture, after which the land is returned to corn. Buckwheat often replaces corn on shallow droughty soils. When grown, oats usually follow wheat or grass. Most of the oat crop is fed in the sheaf to the work animals. Buckwheat is usually sown on newly broken land or land considered too droughty for corn. Soybeans are sometimes sown as a cover crop after wheat, and a few farmers follow the grass crop with soybeans, either for seed or hay. Most of the alfalfa is grown on high well-drained first-bottom or river-terrace soils.

Apple and peach orchards have been set out on practically every well-drained upland soil in the county. Peaches are said to be injured considerably by borers, brown rot, and the "yellows." All fruit growers spray for insect pests and fungous diseases. Many of them apply nitrate of soda to the trees in the spring. This is especially beneficial in orchards on thin shale and sandstone soils. In the larger orchards grading machines, through which the fruit is run, are in use; in some of the smaller orchards the fruit is graded and packed in the orchards; and in others the crop is sold in bulk to grading and packing companies in Romney, where the fruit is wrapped and packed in boxes. The best mountain orchard sites seem to be on the eastern slopes. In the valleys the deeper, well-drained, rolling, red and gray shale and fine-grained sandstone soils are considered better for orchards.

In the valleys farm buildings are generally substantial and of modern construction, some being of brick. The barns are sufficiently large to store the grain crops, machinery and implements, and part of the hay and to furnish shelter for the work animals. Large barns with silos attached form a part of the farm equipment on the river farms where a considerable number of cattle are winter fed. Many of the farms are equipped with running water which is usually piped directly from mountain springs, and many of them have acetylene or electric lighting systems. The farm implements are generally adequate for the needs. In the mountain sections houses and barns are smaller and not so well equipped, and the work animals are lighter.

The use of commercial fertilizer has become general within the last 15 years and is reported by more than 75 per cent of the farmers, being used mainly for wheat, potatoes, and fruit. In 1919, 1,177 farms, or 70.8 per cent of the total number in the county, reported a total expenditure of \$69,553 for fertilizer, or an average of \$59.09 to each farm reporting. The most commonly used commercial fertilizer is one containing 16 per cent superphosphate (acid phosphate). This is applied at a rate ranging from 150 to 400 pounds to the acre for wheat. A complete fertilizer is generally applied to potatoes. Nitrate of soda is applied to trees at the rate of 2½ to 5 pounds to the tree, depending on the age of the tree. Barnyard manure is applied to hay meadows or is used in connection with lime and phosphate for wheat which is to be followed by clover. The use of lime

is becoming more common but is not general, owing to the scarcity of limestone for local crushing or burning and the high cost of shipping lime into the county. Near Cold Stream and Millbrook some deposits of soft marl cover about 1 acre and are from 4 to 6 feet deep. These deposits could be advantageously used in the neighboring fields, but so far little effort has been made to develop them.

Most of the farm labor consists of native-born whites, but a few negroes and foreigners are employed. The average farm wage is \$30 or \$35 a month, together with board and lodging. During the fruit-harvesting period, pickers and packers are paid from \$2.50 to \$5 a day. Many of the apple pickers receive pay at the rate of 10 or 12 cents a barrel. On the 660 farms, or 39.7 per cent of the farms in the county, reporting an expenditure for labor in 1919, \$186,364, or \$282.37 a farm, was spent.

According to the 1920 census 77.7 per cent of the land in the county was included in farms. The size of farm holdings ranges from a few acres to 1,000 or more acres. A few farms include 2,000 acres, but the average size is 193.9 acres. The large size of some farms is due mainly to the fact that so much of the land is too rough and steep for farming and can be used only for the scant grazing it affords. The average acreage of improved land in 1920 was 81 acres a farm.

Most of the farms are operated by owners. In 1920 the census report shows 83.6 per cent of the farms operated by owners, 12.6 per cent by tenants, and 3.8 per cent by managers. Leases are generally on the share basis, the landowner and tenant each furnishing half the fertilizer and seed and receiving half the crops. Under this system the tenant supplies the labor and work animals and usually the machinery. There has been a slight decrease in the number of tenant farms since 1880.

The selling price of farm land ranges widely, depending on productivity, surface features, accessibility, and proximity to towns, railroads, and schools. Mountain lands are priced according to the value of their standing timber, less the cost at which it can be removed. These rough areas command from \$2 to \$10 an acre. Hill land, unimproved and suitable only for grazing, sells at prices ranging from \$5 to \$15 an acre. The farm lands through the shale and fine-grained sandstone valleys range in price from \$15 to \$50 an acre, depending on the state of cultivation and condition of the buildings. Farms containing a large proportion of bottom land bring from \$50 to \$150 an acre. The best bottom-land farms are rarely offered for sale. Bearing fruit orchards sell at prices ranging from \$150 to \$300 an acre. The average assessed value of farm land in 1920 was \$15.28 an acre.

#### SOIL SERIES AND TYPES

The surface soils of the upland soils of Hampshire County are mainly light colored, ranging from gray or grayish yellow to light brown, and Indian red or chocolate red. All the soils are low in organic matter, owing primarily to the fact that the area was for-

ested until reclaimed for agricultural use. About 65 per cent of the county is still in forest or is cut-over land. A thin layer of forest litter covers the surface in many places, but in wooded areas probably little of this has been incorporated with the soil below a depth of 1 or 2 inches.

Some of the first-bottom soils are rich in organic matter and are almost black in color. No free carbonate of lime has accumulated in any of the soils, although some are derived from limestone. Soluble materials, formed during decomposition of the rocks, have largely passed off in the drainage waters, and severe erosion of both fields and pastures has occurred. All the soils are acid or slightly acid, and crops respond readily to applications of lime.

The soils of Hampshire County are comparatively young and accordingly bear a close relation to the parent material or underlying rock formation. Owing to the prevailing steepness of the upland slopes deep layers of soil have not developed, even in forested areas, thus the upland soils have no well-developed profile or succession of definite layers. In general the soils have friable surface layers, grading at a comparatively slight depth into slightly heavier, though still friable, material, which in most places gives way, at a depth ranging from about 10 to 36 inches, into disintegrated rock or bedrock.

Dekalb silt loam in nearly level areas, Dekalb stony loam on rounded hilltops and gentle slopes, and Holston fine sandy loam, Monongahela silt loam, and Monongahela fine sandy loam on the river terraces, are the only soils to have reached that stage of development or maturity which has allowed the formation of definite layers or horizons. These soils in their virgin state have a surface layer or  $A_0$  horizon, which to a depth of 1 or 2 inches consists of soft brown leaf mold. In the Dekalb soils the organic layer is underlain by loose grayish-brown loam or silt loam from about 3 to 5 inches thick, designated as the  $A_1$  horizon. This is underlain by slightly granular, friable, pale-yellow silt loam, the  $A_2$  horizon. Below this and extending to bedrock, which lies at a depth ranging from about 10 to 36 inches, is the B horizon of yellow or yellow-brown slightly compact silty clay, faintly mottled with pale yellow in places or even with a little gray and rust brown. The parent material, or C horizon, consists of partly disintegrated and bedded shale and sandstones. In the Holston and Monongahela soils the  $A_1$  horizon consists of grayish-yellow or pale-yellow friable fine sandy loam or silt loam, extending to a depth of 10 inches. This, in turn, is underlain by yellow slightly compact but friable loam or silt loam, the  $A_2$  horizon, which extends to a depth of 18 or 20 inches. Underlying this layer, to a depth of 36 or 40 inches, is the slightly compact or very compact mottled gray, pale-yellow, and rust-brown B horizon. The C horizon, or parent material, consisting of water-deposited material, varies considerably from place to place.

The large variety of soils in Hampshire County is due to the varied geologic formations and to the wide range in topographic conditions. The soils have been grouped in series on the basis of similarity in color, structure, origin, and drainage. The series is divided into soil types, according to the texture of the surface soil. The type is the unit of soil classification and mapping.

The upland soils have been derived largely from the underlying formations. Locally there has been some modification by colluvial wash.

Forested areas of the Dekalb soils have, beneath the shallow covering of leaf mold, grayish-brown, light-brown, or yellowish-brown friable surface soils overlying pale-yellow friable fine sandy loam or silt loam upper subsoil layers which grade into slightly compact silt loam, silty clay loam, or silty clay. They have been formed from grayish and brownish shales and sandstones of low lime content. Fragments of these rocks are commonly present on the surface, through the surface soil, and in the subsoil. In most places bedded rock occurs at a depth of less than 3 feet. Dekalb silt loam and Dekalb gravelly silt loam are derived largely from the finer-grained shales, whereas the lighter-textured members of the series come from arenaceous shales and sandstones. Fragments of shale are very abundant over and through most of the silty areas.

The soils of the Lelew series have grayish-brown, dark-brown, or reddish-brown surface soils, overlying chocolate-red, purplish-red, or Indian-red friable subsoils. They are derived from noncalcareous red shales and sandstones. Most of these soils contain numerous fragments of the parent material.

The Meigs soils represent undifferentiated Dekalb, Upshur, and Lelew soils, together with some intermediate materials which have been produced by overwash of red Lelew material over yellowish Dekalb material and vice versa.

The Hagerstown soils are brown or reddish brown in the surface layer, buff or reddish yellow in the subsurface layer, and reddish brown or red in the friable clay subsoil. They are derived from several varieties of comparatively pure thin-bedded and massive limestone. Platy fragments of limestone and some small angular chert gravel are scattered over the surface and disseminated through the soil. Ledges of the parent rock crop out in many places. Fragments of sandstone, which have rolled down from higher Dekalb areas, occur here and there.

The Westmoreland series includes soils having light-brown surface soils and brownish-yellow silty clay subsoils. They are derived from impure or siliceous limestone interbedded with fine-grained sandstones and calcareous shales. Part of the soil is derived from lime-free rocks, such as give rise to the Dekalb soils.

The soils of the Elliber series have gray to grayish-yellow surface soils, darkened in the surface few inches by organic matter, and pale-yellow to pinkish-yellow subsoils. The entire profile is porous in structure owing to the large proportion of gravel, amounting to 40 to 60 per cent of the entire soil mass. They are derived from cherty and siliceous limestones and fine-grained gray sandstone.

The alluvial soils of Hampshire County consist of material washed from all the soils of the drainage basins in which they occur. The terrace or second-bottom soils, although at one time subject to inundation, now stand above overflow as a result of the lowering of the stream channels. The first-bottom soils are subject to overflow.

The Monongahela and Holston soils occur on the terraces. The Monongahela soils have light-brown or grayish-brown surface soils overlying pale-yellow loam or silt loam upper subsoil layers which grade into yellowish-brown mottled with gray and rust-brown silty

clay loam lower subsoil layers. This material extends in most places to a depth of 36 or 40 inches, where it is underlain by the parent material consisting of wash from uplands occupied by the Dekalb soils.

The Holston series includes soils having light-brown or grayish-brown surface soils overlying yellow or pale-yellow friable fine sandy loam or loam upper subsoil layers which grade into yellowish-brown friable loamy material containing some grayish and rust-brown mottles at a depth ranging from 30 to 36 inches. The parent material is reached in most places at a depth of about 40 inches. These soil are composed of wash from the Dekalb soils.

In the first bottoms, soils of the Huntington, Pope, Atkins, and Moshannon series have been mapped.

The Huntington soils are characterized by brown surface soils overlying brown mellow friable subsoils, which vary little in texture or color downward to a depth of about 30 or 40 inches. These soils consist of wash from limestone, shale, and sandstone soils, chiefly of the Hagerstown, Westmoreland, and Dekalb series.

The Pope soils occur in bottoms of streams rising and flowing through areas occupied chiefly by Dekalb soils. They have brown or light-brown surface soils and brown or brownish-yellow subsoils. The fine sandy loam differs little in appearance from Huntington fine sandy loam. The other members of the Pope series, the silt loam and the gravelly loam, have lighter-brown surface soils.

The Moshannon soils occur along streams receiving a considerable part of their wash from areas of Lebew and Meigs soils. They are chocolate reddish brown in color and are friable and well drained.

The Atkins series includes soils having dark-gray or gray surface soils with steel-gray or bluish-gray upper subsoil layers and mottled light-gray, bluish-gray, yellowish, and rust-brown plastic clay lower subsoil layers. These soils occur principally on first bottoms of streams which drain the heavier Dekalb soils.

The various soils of Hampshire County are described in detail in the following pages of this report, and their relation to agriculture is discussed; their distribution is shown on the accompanying soil map; and their acreage and proportionate extent are given in Table 4.

TABLE 4.—*Acreage and proportionate extent of the soils mapped in Hampshire County, W. Va.*

Type of soil	Acres	Per cent	Type of soil	Acres	Per cent
Dekalb gravelly silt loam.....	61,312	15.0	Hagerstown silty clay loam.....	192	0.1
Dekalb shaly silt loam.....	65,344	15.9	Westmoreland silt loam.....	6,144	1.5
Dekalb stony fine sandy loam.....	58,560	15.0	Westmoreland gravelly silt loam.....	3,968	1.0
Colluvial phase.....	2,816		Monongahela silt loam.....	10,240	2.5
Dekalb stony loam.....	21,632	5.3	Monongahela fine sandy loam.....	2,176	.5
Dekalb silt loam.....	9,856	2.4	Holston fine sandy loam.....	896	.2
Dekalb gravelly fine sandy loam.....	11,136	2.7	Huntington fine sandy loam.....	5,696	1.4
Dekalb gravelly loam, colluvial			Pope fine sandy loam.....	3,200	.8
phase.....	2,496	.6	Pope silt loam.....	2,752	.7
Lebew gravelly fine sandy loam.....	15,168	6.4	Pope gravelly loam.....	2,688	.6
Smooth phase.....	10,944		Moshannon fine sandy loam.....	4,736	1.2
Meigs gravelly fine sandy loam.....	30,528	11.2	Moshannon gravelly fine sandy		
Smooth phase.....	15,424		loam.....	2,112	.5
Meigs stony fine sandy loam.....	4,544	1.1	Atkins silty clay loam.....	2,176	.5
Elliber gravelly loam.....	4,928	1.4	Rough stony land.....	41,728	10.2
Colluvial phase.....	1,024				
Hagerstown stony silty clay loam...	5,184	1.3	Total.....	409,600	

DEKALB GRAVELLY SILT LOAM<sup>1</sup>

In forested areas Dekalb gravelly silt loam consists of a 1-inch surface layer of dark-brown or grayish-brown gravelly silt loam, overlying pale-yellow gravelly silt loam which at a depth of 5 or 6 inches grades into yellow or brownish-yellow gravelly heavy silt loam or silty clay loam, giving way, at a depth ranging from about 16 to 20 inches, to pale-yellow partly decomposed shale fragments showing considerable gray and some reddish-yellow coloring.

In cultivated areas the brown surface layer has been destroyed by mixing with the yellow material beneath. In many places the cultivated soil shows the following profile: A 4 or 6 inch surface layer of grayish-brown or light-brown gravelly silt loam, grading into pale-yellow material of the same texture, which passes at a depth ranging from 14 to 18 inches into pale-yellow partly decomposed shale and fine-grained sandstone, mottled yellow, buff, or reddish yellow.

Numerous eroded spots occur throughout the cultivated areas and, to greater extent, in areas formerly tilled but now abandoned. It is estimated that about 15 or 20 per cent of the cleared areas have been abandoned because of severe erosion. In many places none of the topsoil is left, and in numerous gullies the bedrock is exposed. Some of the less eroded areas, however, retain some of their original soil. The best of this eroded land shows approximately the following profile: Light-brown gravelly silt loam about 1 or 2 inches deep overlying brownish-yellow gravelly silt loam which at a depth of 6 or 8 inches passes into pale-yellow silt loam extending to rotten bedrock which lies at a depth ranging from 10 to 14 inches. In places the subsoil, or layer overlying the partly decomposed rock, ranges in texture to silty clay loam or even to silty clay.

On some of the narrow ridge crests, small areas of Dekalb silt loam were included in mapping, and on the steep slopes adjacent to the main drainage ways small included areas are of Dekalb stony silt loam.

The principal development of Dekalb gravelly silt loam is on the valley ridges and hills east of South Branch Mountain in the vicinity of Augusta, southward from Augusta to the Hardy County line, and northward from Frenchburg along the crest of Town Hill. Other areas are east of Capon Bridge on Timber Ridge and on the western watershed of North River, southward from Hanging Rock to Rio. Tracts range from rolling to hilly, and drainage is good.

This is an extensive soil and is agriculturally important. From about 40 to 45 per cent has been cleared. Most of the forested areas support a small second growth of the original heavy stand of chestnut oak, white oak, and hickory, some pine and dogwood, and an undergrowth of laurel, brambles, and huckleberry.

General farming is practiced on this soil. Development for orchards has not been so extensive as on some of the associated soils. Corn yields from about 15 to 25 bushels to the acre, oats from 20 to 30 bushels, buckwheat from 20 to 35 bushels, wheat from 8 to 15 bushels, hay from 1 to 1½ tons, and potatoes from 50 to 125 bushels.

<sup>1</sup>The Dekalb soils in West Virginia are the same as the Muskingum soils in Ohio. All were formerly called Dekalb, but it was finally shown by field studies that they belonged to two series, Muskingum in part and Dekalb in part. Most of the soils mapped as Dekalb in West Virginia are in fact Muskingum soils.

Use of lime and the growing of legumes for hay and soil improvement materially increase yields of most crops. Probably an application of about 1,000 pounds of burnt lime or from 1 to 2 tons of ground limestone to the acre, used at intervals of about eight years, would prove profitable. Deeper plowing and the growing of winter cover crops would tend to conserve soil moisture and prevent erosion. Pasture values on the steeper slopes would be greatly increased by applications of lime and phosphatic fertilizers.

#### DEKALB SHALY SILT LOAM

Dekalb shaly silt loam consists of a layer of light-brown silt loam from about 3 to 5 inches deep overlying a layer of pale-yellow silt loam or silty clay loam, which extends to a depth ranging from about 12 to 18 inches below the surface, and this, in turn, is underlain to a depth of about 24 inches by partly decomposed yellowish-brown shale, showing some gray, red, and rust-brown mottling.

Wooded areas which have not been frequently burned over have an accumulation of about 1 inch of dark-brown leaf mold on the surface. The soil throughout contains numerous shale chips, many of which lie on the surface. Indiscriminate clearing of steep hill slopes and subsequent erosion have resulted in the formation of numerous gullied and bare shale areas.

Small areas on some of the more rounded hill crests are comparatively free of the characteristically abundant shale fragments and would have been mapped as Dekalb silt loam had they been of sufficient extent. In some places sandstone fragments have fallen from higher areas of stony Dekalb soils.

This soil occurs extensively over the rolling or hilly valley lands between Patterson Creek Mountain and Mill Creek Mountain and well up the mountain slopes. Bordering the bottoms and benches on the east side of South Branch Potomac River, throughout the entire length of the county, and paralleling Little Cacapon River from Frenchburg to its junction with the Potomac are series of shale hills occupied by Dekalb shaly silt loam. Smaller areas of the soil occur above the bluffs of Cacapon River, from Forks of Cacapon to the Morgan County line, and extend for a short distance south of this point along North River. Other small areas are associated with Dekalb silt loam and Dekalb gravelly silt loam.

This soil occupies rolling hills and lower mountain slopes. Internal drainage is good, and surface drainage is excessive on cleared lands and cultivated fields, causing damaging erosion. Closely grazed or thinly sodded pastures are badly eroded and gullied by the quick run-off of rainfall.

This is the most extensive soil in the county. Its agricultural importance depends largely on its proximity to the better-producing soils of the stream bottoms and terraces. Only about 35 per cent of this kind of land is cleared, but about 50 per cent of that part lying in Mill Creek Valley is cleared. The soil originally supported a fair growth of hardwood, principally chestnut oak, with considerable shortleaf pine. Sassafras, blackberry, huckleberry, and wild grapevines constituted the principal undergrowth. At present second-growth timber and bushes occupy the former wooded areas. Timber for crossties, mine props, and pulpwood are cut in some

places. Although the land is not used extensively for the production of farm crops, it is utilized as grazing land, particularly in conjunction with farming operations on near-by bottom and bench lands. On many of the farms corn, wheat, hay, and buckwheat are produced in small fields, but a large part of the cleared area is devoted to pasture principally for beef cattle, together with some sheep and dairy cattle. Small areas near Romney, lying in the higher situations, are planted to small fruits and berries for local or near-by markets. Crop yields, as a rule, are low and the pastures are poor. Corn yields from about 10 to 20 bushels to the acre, wheat from 5 to 15 bushels, buckwheat from 15 to 25 bushels, and hay, 1 ton.

This soil deteriorates rapidly under cultivation, and not much is done to restore productivity. In Mineral County, similar soils which have been improved include some good farms and orchards. Applications of lime, phosphatic fertilizer, and barnyard manure, together with the turning under of soybeans and clover, deep plowing, and rotation of crops, will go far toward bringing this soil into good tilth.

#### DEKALB STONY FINE SANDY LOAM

To a depth of 2 inches Dekalb stony fine sandy loam consists of gray loose fine sand or loamy fine sand. This layer is underlain by pale-yellow loamy fine sand or fine sandy loam which continues to a depth ranging from 12 to 16 inches. Underlying this layer is yellow friable heavy fine sandy loam, in places grading to fine sandy clay, which extends to bedrock lying at a depth ranging from 30 to 40 inches. Forested areas which have been protected from fires are covered by a 1 or 2 inch layer of leaf mold. An abundance of small and large sandstone fragments are scattered over the surface and disseminated through the soil and subsoil. In areas adjoining the higher-lying Elliber soils, some of the whitish chert gravel, characteristic of the Elliber soils, are scattered among the sandstone fragments. On Schaffenaker Mountain west of Capon Bridge a few small areas of limestone soil have been included in mapping. Small areas of rough stony land, some almost stone-free land, and some patches of colluvial material are also included. An area of Dekalb stony sandy loam, along the base of Short Mountain, and a small area near the crest of North River Mountain are mapped as Dekalb stony fine sandy loam.

The greatest development of this soil is in the rough broken mountain area between North and Cacapon Rivers. Among other important areas are those on Valley and River Mountains north of Springfield, and on Mill Creek Mountain west of Romney.

The soil occurs on the crests or upper slopes of the higher mountains. Drainage is excellent throughout. Percolating rain water reappears in the numerous cold, clear mountain springs along the base of the mountains.

Although widely distributed over the eastern third of the county and locally on all the higher mountains, this soil is of little agricultural importance, except where it occurs near good highways and along railroads, in which locations some excellent orchards have been developed. Small patches of the less stony soil and some areas from which the larger stones have been removed since clearing are planted to corn.

Probably less than 10 per cent of the land is cleared; the remainder supports a forest of oak, hickory, pine, chestnut (sprouts of blight-killed trees), with some black walnut, black locust, butternut, tulip tree, and dogwood. The undergrowth consists mostly of brambles, huckleberry, laurel, and wild grapevines. In easily accessible sections most of the large timber has been removed, and the rest is being rapidly taken out. The second growth and young timber left when the land was first cut over is now furnishing crossties, mine props, and tanbark.

Apples are by far the most important farm crops grown on this soil, and good yields of excellent quality are obtained. From the small acreage planted to corn very good yields, from about 25 to 35 bushels to the acre, are obtained. This soil warms up early in the spring, making it desirable for early vegetables.

*Dekalb stony fine sandy loam, colluvial phase.*—The colluvial phase of Dekalb stony fine sandy loam consists of a mixture of talus material fallen or washed down from higher land. It generally contains so many rounded or semirounded sandstone fragments and boulders that the soil is unsuited to agriculture.

In most places the surface soil is light-brown or grayish-brown fine sandy loam from 4 to 8 inches deep, and the subsoil ranges from pale-yellow fine sandy loam to brownish-yellow silty clay. The colluvial phase closely resembles typical Dekalb stony fine sandy loam. It occurs as patches or narrow strips along the bases of the higher mountain slopes. The largest areas are those at Yellow Spring, at the base of Short Mountain near Mount Zion Church, and at the base of Cooper Mountain west of Capon Bridge.

Practically all the land remains in forest. A few areas are cleared for pasture. A small, though good, orchard is established in part on the area mapped near Mount Zion Church.

#### DEKALB STONY LOAM

In wooded areas Dekalb stony loam, to a depth of 1 or 2 inches consists of forest litter. This is underlain by yellowish-brown silt loam which extends to a depth ranging from 4 to 6 inches. The upper subsoil layer, extending to a depth of 12 or 14 inches, is brownish-yellow or pale-yellow slightly granular silt loam. Below this layer and continuing to a depth ranging from 20 to 24 inches is slightly compact yellowish-brown silty clay which on pressure breaks into irregular fragments 1 inch or less in diameter. Below this layer and extending to bedrock, which lies at a depth of about 30 inches, is the yellow, partly disintegrated shale and sandstone of the parent material, containing gray, red, and rust-brown mottles. Strewn over the surface and throughout the soil are fragments of the more resistant sandstone, ranging in diameter from 1 to 6 inches. These rocks prevent the cultivation of most of the soil.

Areas of this soil, which are fairly uniform throughout Hampshire County, occupy the middle mountain slopes and in many places occur between the higher rough stony land or stony fine sandy loam soils and the lower heavier valley soils. The soil also occurs on the secondary mountain ridges and hilltops of the intermountain valleys. The most typical development is on the slopes of Patterson Creek Mountain and South Branch Mountain and on the crests of Stony and Timber Mountains and Chestnut Oak and Mouser Ridges.

The land ranges from steeply sloping to hilly, with some narrow and slightly rounded ridge crests included. Surface drainage is good or excessive, and underdrainage is good.

This is not an extensive soil, and little of it has been developed for agricultural purposes. Locally, a few acres are included in orchards and pastures, but about 98 per cent of the land remains in forest or cut-over land, from which some crossties, mine props, and tanbark are cut.

#### DEKALB SILT LOAM

To a depth ranging from 4 to 6 inches Dekalb silt loam consists of grayish-brown friable silt loam. Virgin areas are covered by a 1 or 2 inch layer of dark-brown loamy leaf mold. The upper subsoil layer between depths of 6 and 12 inches is pale-yellow slightly granular friable silt loam or silty clay loam. This is underlain to a depth of 18 inches by pale-yellow slightly compact silty clay which breaks in fragments about one-fourth inch in diameter. Bedrock or partly decomposed rock is reached at a depth of less than 30 inches. A few small rock fragments are scattered over the surface but are not abundant within the soil to a depth of 15 inches.

Areas mapped along North River on sloping benchlike positions well above the river resemble stream-bench soils but have the characteristic Dekalb features. Similar areas occur along South Branch Potomac River between Pancake School and Glebe.

This soil occurs only in small bodies, widely distributed over the county. The largest area, which occurs on a nearly level hill crest, is at and just south of Augusta. The soil characteristically occurs on nearly flat areas, rounded hilltops, and gentle lower slopes. It is well drained.

About 90 per cent of the land is in use for general farm crops. The original forest growth was oak, hickory, dogwood, gum, and pine. Much of the land along North River and South Branch Potomac River is used for pasture, principally for beef cattle and for some sheep. Corn yields from about 20 to 30 bushels to the acre, wheat from 10 to 15 bushels, buckwheat from 20 to 35 bushels, oats from 25 to 35 bushels, rye from 5 to 15 bushels, timothy hay, 1½ tons, and mixed clover and timothy hay, 2 tons. Soybeans are grown on a small scale for hay, yielding from 1 to 2 tons to the acre, and as a soil-improvement crop.

The use of more legumes and lime and deeper plowing are recommended to increase yields.

#### DEKALB GRAVELLY FINE SANDY LOAM

The surface soil of Dekalb gravelly fine sandy loam is yellowish-brown friable fine sandy loam from 6 to 8 inches deep. The subsoil is pale-yellow friable loam or silt loam, which is underlain by bedrock or disintegrated rock at a depth ranging from about 20 to 24 inches. Numerous rock fragments from 1 to 3 inches in diameter are disseminated through the soil and scattered over the surface. Under forest conditions the 2-inch surface layer is grayish-brown or light-brown material having a shallow covering of dark-brown loamy leaf mold. Some small isolated very gravelly areas of this soil are associated with the Lehew and Meigs soils near Three Churches and north of Ebenezer Church 3 miles east of Romney.

The only important areas of this soil are in the southeast corner of the county near Capon Springs. It occurs on the lower slope of North Mountain and on the adjacent ridges extending toward Capon River. The only other areas of consequence are just west and 2 miles north of Capon Bridge.

This soil occurs on the lower more gentle mountain slopes and the adjoining rolling or hilly areas of the sandstone and shale valleys. Surface drainage ranges from good to excessive, and underdrainage is good.

Although the total area is not large, the soil is locally important as a possible area for future agricultural development. Owing to the distance from railroads only about 15 per cent of the land has been cleared for agricultural purposes. The original heavy hardwood forest growth has been removed in recent years, since the building of the Winchester & Western Railroad. Much of the cleared land is used for pasture, principally for beef cattle and for some sheep. Some corn, oats, wheat, buckwheat, and hay are grown and are fed on the farm. Crop yields are low owing to poor cultural methods and the almost total lack of the use of commercial fertilizers. The use of commercial fertilizers, lime, and green-manure crops and deeper plowing would greatly increase crop returns.

#### DEKALB GRAVELLY LOAM, COLLUVIAL PHASE

Dekalb gravelly loam is represented in Hampshire County only by a colluvial phase. It consists of a loose mixture of Dekalb material, washed down or fallen from higher positions, and some local soil material, chiefly silt and shale. It is a comparatively deep soil. Sandstone and, in places, chert fragments are abundant. The color of the surface soil is light brown, and of the subsoil is yellowish.

The principal areas are at the base of Mill Creek Mountain southeast of Junction and at West Romney, and along Ivy Run north of Furnace School.

The land ranges from gently to steeply sloping. Surface drainage is good, and underdrainage is fair or poor, owing to seepage from higher areas.

This is one of the minor soils of Hampshire County, and is of little agricultural importance. About 50 per cent of the land is cleared, but only about 10 per cent is in cultivation. The remaining forest supports a good growth of hardwood timber, principally oak and hickory. Most of the large timber has been removed.

Corn yields are generally good, ranging from about 15 to 30 bushels to the acre, wheat yields from 10 to 15 bushels, and buckwheat from 15 to 30 bushels. As the water table lies near the surface throughout the summer, pastures are generally very good.

#### LEHEW GRAVELLY FINE SANDY LOAM

Lehew gravelly fine sandy loam consists of a 4 to 7 inch layer of dark chocolate-brown or chocolate reddish-brown (Indian-red) gravelly fine sandy loam, underlain by chocolate-red loam or silt loam, which extends downward to partly decomposed sandstone or shale lying at a depth ranging from about 18 to 24 inches. Large amounts of chocolate-red shale and sandstone fragments are distrib-

uted over the surface and disseminated through the soil. Bedrock is reached at a depth of 30 inches or less. Small included areas of stony soil occur here and there. In areas lying below stony Dekalb soils fragments of sandstone are scattered over the surface.

This soil is most extensive in the northeast part of the county in the narrow valley formed by Sideling Hill and Spring Gap Mountain, and at the foot of the east and west slopes, respectively, of these elevations. Irregular areas occur from 2 to 5 miles southeast of Romney and just below the crest along the slopes of Timber Ridge west and south, respectively, of High View and Lehew on the Virginia line. An area including about 1 square mile lies just south of Okonoko. Areas of this soil occupy the gently rolling or steeply sloping hills of the valleys. Drainage ranges from good to excessive. The rapid run-off causes considerable erosion of the surface soil. Cultivated steep slopes are quickly ruined by erosion.

This is not an extensive soil, but it is locally important. About 65 per cent of the land is cleared. The original forest consisted of oak, chestnut, hickory, pine, maple, cherry, dogwood, black locust, and black walnut. About half of the cultivated area is planted to orchards, principally apples, with some peaches. It is one of the best-producing orchard soils of the county.

Crop yields average slightly higher than on the Dekalb and Meigs soils. Corn yields from about 20 to 25 bushels to the acre, oats 30 bushels, wheat from 10 to 15 bushels, buckwheat from 25 to 35 bushels, timothy hay from 1 to 1½ tons, soybeans about the same as timothy, and mixed clover and timothy, 2 tons.

Deeper plowing and increased use of lime and legumes and other green-manure crops will increase the yields. Although only slightly acid, soil of this kind responds readily to application of lime. Superphosphate also gives good returns. Many of the steeper fields now in cultivation should be devoted to pasture or forest in order to save them from destructive erosion.

*Lehew gravelly fine sandy loam, smooth phase.*—The smooth phase of Lehew gravelly fine sandy loam occurs on the more rounded hilltops and gentle slopes of rolling and hilly valley areas. It differs little from the typical soil in texture and depth to bedrock. The quantity of gravel over the surface and through the soil is slightly less than in the typical soil, and they average considerably smaller, most of them being not much more than an inch in diameter. On the steepest slopes cultivated fields erode rapidly. In many places the surface soil and much of the subsoil have been swept away, and in a few spots bedrock is exposed.

About 70 per cent of this smoother land has been cleared and is used for crops, pasture, and orchards. It is handled in much the same manner as typical Lehew gravelly fine sandy loam and is considered one of the better upland soils.

Areas of this soil occur in an irregular broken belt between South Branch Mountain and Town Hill, extending from Levels to the Northwestern Turnpike, 3 miles east of Romney. Another similar but somewhat wider belt occurs in the rolling valley between the southern extremity of Spring Gap Mountain and the northern extremity of Short Mountain, with its greatest development just west of Slanesville. An area, about 1 square mile in extent, lies on the upper slope of Timber Ridge, one-half mile west of Lehew.

## MEIGS GRAVELLY FINE SANDY LOAM

Meigs gravelly fine sandy loam consists of small areas of Dekalb gravelly fine sandy loam, Dekalb gravelly loam, and Lebew gravelly fine sandy loam so intimately associated that satisfactory separation is impracticable. Lebew material constitutes about 60 per cent of the Meigs soil. Many small areas of Dekalb loam and some of Dekalb silt loam are included. Fragments of red and gray sandstone and chips of shale are scattered over the surface of the areas. The surface soil ranges from about 4 to 6 inches in depth, and bedrock usually occurs at a depth ranging from about 18 to 24 inches. Many of the steeper cleared slopes have been badly dissected by erosion. In many places the subsoil material, weathered rock, or even bedrock is exposed. Such areas consist of overwash of Dekalb material on Lebew material and vice versa.

Meigs gravelly fine sandy loam is rather extensive and is widely distributed over the county. The principal areas are 3 miles east of Romney, extending southward along the eastern slope of South Branch Mountain, just below its crest, for a distance of 4 or 5 miles and along the lower slopes of Short Mountain in an unbroken band around the mountain. Large areas lie north of Short Mountain. A disconnected belt, from 3 to 5 miles wide, lies between the north end of Short Mountain and the south ends of Spring Gap Mountain and Sideling Hill, including the lower slopes of the southern ends of both. Other areas are on the hills southeast of Okonoko, west of Levels, and near Points and Three Churches.

The soil occupies the higher and steeper hills of the central valley section and the gentle lower slopes of the higher elevations. The highest position occupied by this soil, nearly 2,000 feet above sea level, is 1 mile south of Ebenezer Church. Drainage ranges from good to excessive.

About 50 per cent of the land is cleared, and about half of the cleared land is used for pasture. Cultivation is avoided because of extreme susceptibility of this soil to ruinous erosion. Corn yields from about 15 to 25 bushels to the acre, oats from 20 to 30 bushels, wheat from 8 to 15 bushels, buckwheat from 20 to 30 bushels, and hay from 1 to 1½ tons.

Deeper plowing, increased use of lime, winter cover crops, soil-improving legumes, and heavier applications of superphosphate are recommended as admirable methods of increasing crop yields. Disking and the application of 1 ton of ground limestone to the acre are recommended for improving pasture sod.

*Meigs gravelly fine sandy loam, smooth phase.*—The smooth phase of Meigs gravelly fine sandy loam occurs on the more rounded hill-tops and gentle slopes of the central part of the county. It is most extensive over the rolling and hilly areas west of Town Hill and east of South Branch Mountain, where it occurs as an almost unbroken strip from 1 to 2 miles wide, extending from Ebenezer Church northeasterly nearly to Potomac River. A small area of about 2 square miles lies south of Pleasant Dale and another is at High View on the Virginia line. Smaller isolated areas occur in the vicinity of Hoy, Hopewell School, Haines's store, and near the south end of Spring Gap Mountain.

As a whole this smooth soil is somewhat more deeply weathered than typical Meigs gravelly fine sandy loam. The surface soil averages from 5 to 7 inches deep, and bedrock lies at a depth ranging from about 20 to 30 inches. The deepest soil is in the vicinity of Central School on flat or gently sloping ridge tops. Drainage is good. Only a few of the steeper slopes are subject to serious erosion.

Although not extensive this soil is locally rather important as a general farming and orchard soil. About 80 per cent of the land has been cleared, most of which is utilized for tilled crops. It is easily worked as there are no large stones, and erosion is not generally serious. Farming methods are the same as on the typical soil, but crop yields run slightly higher. Land values are slightly higher.

#### MEIGS STONY FINE SANDY LOAM

Meigs stony fine sandy loam consists of undifferentiated Lehew stony fine sandy loam and Dekalb stony fine sandy loam, the Lehew soil predominating in most places. Locally overwash has modified both soils. Most of the land is forested with hardwoods and scattered pines. In most places an inch or two of brown leaf mold covers the surface. The larger angular stones scattered over the surface are predominately light-colored sandstone. Bedrock lies at a depth of about 24 inches or less. Owing to steepness of the land drainage is excessive.

This soil is developed in only two localities, on rather steep upper and middle mountain slopes. It occupies the steep slopes of Nathaniel and Piney Mountains 5 miles south of Romney, just below their crest. The other areas mapped are in the gap through Sideling Hill along Crooked Run, on the slope of Sideling Hill, and on the eastern slope of Spring Gap Mountain.

Less than 20 per cent of the land is cleared, and this is used for pasture which supports a very good grass growth. The land is valued principally for its standing timber.

#### ELLIBER GRAVELLY LOAM

Elliber gravelly loam consists of about 4 inches of dark grayish-brown friable gravelly loam, overlying gray or yellowish-gray gravelly loam which extends to a depth of about 16 inches, at which depth it is underlain by pale-yellow very gravelly loam or silt loam, this extending to bedrock which lies at a depth ranging from about 24 to 36 inches. Both surface soil and subsoil contain large quantities of angular light-grayish or whitish and reddish chert and sandstone, together with yellow rotten rock of light weight. The gravel constitutes from 20 to 40 per cent of the soil mass. The knobs northwest of Glebe consist of light-gray gravelly loam underlain at a depth of 6 or 7 inches by pale-yellow gravelly loam, with bedrock lying at a depth ranging from 20 to 24 inches.

Only a few square miles of this soil are mapped. They occur on Mill Creek Mountain at an elevation ranging from 1,400 to 2,600 feet, extending from just north of Romney southward to the Hardy County line; west of Glebe on either side of a valley area in the crest of the mountain, capping a series of parallel knobs; and in the extreme southwest corner of the county.

The land ranges from nearly flat on the crests of the hills and mountains to more rounded on the steeper slopes below. Practically all the rainfall is absorbed by the soil, and some of it, which reappears as clear springs at the base of the mountains, is used for drinking purposes. The soil, as a whole, is retentive of moisture.

Although inextensive this soil is valued highly on account of its excellent adaptation to fruit production. About 75 or 80 per cent of it is in orchards. Some corn, oats, and buckwheat are grown between the orchard rows, and vegetable gardens do exceptionally well. Corn yields from 40 to 60 bushels to the acre in some well-tended small fields, oats and buckwheat from 30 to 40 bushels, and garden vegetables yield very satisfactorily. Owing to the good air drainage on this soil crops are seldom killed by frost. This land when first cleared supports a good sod of bluegrass. After repeated cultivations the surface soil loses its dark color and considerable difficulty is experienced in growing bluegrass.

*Elliber gravelly loam, colluvial phase.*—The colluvial phase of Elliber gravelly loam consists of talus material derived from higher areas of Elliber and Dekalb soils and accumulated along lower slopes. The soil consists of a 6-inch layer of light yellowish-brown loam overlying pale-yellow friable gravelly loam which extends to bedrock lying at a depth ranging from about 20 to 30 inches. In most places the gravel content is not so high as in typical Elliber gravelly loam. In some places the yellowish-brown subsoil of Dekalb material is present. In other places the surface soil is light brown and overlies a reddish-brown or almost red subsoil of somewhat plastic silty clay loam. The gravel are like those of the typical soil, except that the proportion of yellowish sandstone fragments is larger.

This soil is found only at the foot of Patterson Creek Mountain in the extreme southwest corner of the county. The areas are moderately steep, with some rounded shoulderlike ridges where drainage lines have cut into the foot of the mountain. Drainage ranges from good to excessive.

Less than 2 square miles of the soil is mapped, and about 30 per cent of it is cleared. One fairly large orchard is located on the soil, but most of the cleared land is devoted to pasture, producing good grass which is used principally for grazing sheep.

#### HAGERSTOWN STONY SILTY CLAY LOAM

Hagerstown stony silty clay loam consists of a 1 to 4 inch layer of light-brown or reddish-brown friable heavy silt loam or silty clay loam overlying buff or reddish-yellow friable silty clay loam, which extends to a depth of 10 or 12 inches, below which depth is moderately friable or somewhat plastic reddish-yellow or light-red silty clay. The clay continues to the limestone bedrock which lies at a depth ranging from about 16 to 24 inches. In some spots the surface soil has been washed away, leaving only a few inches of clay over the bedrock. Many rock outcrops and ledges occur over most of the soil. The surface is littered with platy limestone fragments, and locally small amounts of whitish chert fragments occur on the surface and through the soil. Numerous sandstone boulders and fragments are scattered over the surface of areas adjacent to the higher-lying stony Dekalb soils.

The soil occupies narrow ridges and saddlelike gaps on the tops and steep slopes of mountains and occurs as narrow bands either near the foot or well up on the slopes. Drainage is excessive, and considerable damage is caused by erosion. Numerous sink holes, occurring in many of the areas, receive drainage water that gives rise to numerous large springs below.

The largest areas of this soil are west of Glebe and at Hanging Rock. Other bodies are south of the junction of Cacapon and North Rivers, and near Bloomery.

This is not an extensive soil, and it occurs principally in patchy areas. Most of the land is cleared and used for pasture. Mountain farmers depend largely on soil of this kind for pasture for their sheep and beef cattle. Livestock is the main source of income on farms composed of this soil. Some small patches of deeper and more stone-free soil are planted to corn, wheat, and hay for winter feed for sheep and cattle.

#### HAGERSTOWN SILTY CLAY LOAM

Hagerstown silty clay loam, which has a total area of less than one-half square mile, is mapped in three areas only. Two of them occur on mountain tops west of Cold Stream and Capon Bridge, and the other is 2 miles north of Loom on the lower slope of a valleylike lime sink with a subterranean drainage passage.

The soil consists of a 2 to 4 inch layer of dark reddish-brown friable silty clay loam overlying reddish-brown moderately friable silty clay, which at a depth of 10 inches passes into reddish-yellow slightly plastic clay. Bedrock is reached at a depth ranging from 18 to 24 inches. In some places erosion has exposed the silty clay and clay subsoil. Small platy limestone fragments occur rather abundantly in some areas, and on some of the steeper slopes limestone outcrops. The larger limestone fragments have been removed to facilitate cultivation.

All of the land of this kind is cleared and most of it is used for cultivated crops or hay. Corn produces from about 30 to 35 bushels to the acre, wheat from 10 to 20 bushels, and hay 2 tons. All the feed grown is used on the farm for wintering livestock. Livestock raising is the principal industry on this and surrounding soils.

This is considered one of the best mountain soils.

#### WESTMORELAND SILT LOAM

Westmoreland silt loam consists of a 4 to 6 inch layer of light-brown or yellowish-brown friable silt loam overlying yellow friable heavy silt loam which continues to a depth of about 12 or 14 inches, at which depth it passes into brownish-yellow heavy silt loam or silty clay loam. Bedrock is usually reached at a depth ranging from about 16 to 22 inches. The area lying between Springfield and Green Spring is shallower than typical, and here bedrock is reached at an average depth of about 16 inches. The subsoil in this area ranges from the typical yellow or yellowish-brown silt loam or silty clay loam to pinkish or reddish-brown clay. On some of the steeper slopes erosion has carried away most of the surface soil, and in places the subsoil has been removed down to bedrock. A few patches are stony.

Westmoreland silt loam is derived from thin bedded impure limestone and calcareous shale. Some shale chips and fine gravel are distributed over the surface and through the surface soil and subsoil but not in sufficient quantities to markedly change the structure of the soil or to interfere with cultivation.

The soil occurs in rather steeply sloping areas in the intermountain valleys. The largest areas mapped are near Springfield and in the southwestern part of the county at the foot of Patterson Creek Mountain. Others areas are north and south of Timber Mountain.

Drainage on most of the soil is excessive and causes considerable erosion on the steeper slopes, even those used only for pasture.

About 75 per cent of the land has been cleared. Less than one-third of the cleared land is used for cultivated crops, the remainder being used for pasture, which produces fair bluegrass. Wheat yields from 10 to 12 bushels to the acre, buckwheat from 15 to 25 bushels, corn from 15 to 20 bushels, potatoes from 50 to 125 bushels, and hay from 1 to 1½ tons.

The soil is only locally important. Most of the cleared land is kept in permanent pasture because it produces a better quality of grass than do the surrounding soils.

#### WESTMORELAND GRAVELLY SILT LOAM

Westmoreland gravelly silt loam occupies narrow ridges and lower mountain slopes, and is usually associated with Hagerstown stony silty clay loam. It is derived from interstratified limy shales and fine-grained sandstone, together with some thin strata of impure limestone. The soil is yellowish-brown silt loam underlain at a depth of 5 or 6 inches by pale-yellow silty clay loam, which continues to a depth of 12 or 14 inches, at which depth it passes into brownish-yellow or yellow silty clay, which is underlain by bedrock at a depth ranging from 20 to 30 inches. An abundance of fine shale, angular sandstone, and platy limestone fragments are strewn over the surface. In an area west of Glebe the surface soil is brown, the subsoil is reddish-yellow silty clay, and bedrock is reached at a depth ranging from 12 to 20 inches. Erosion in many places has exposed the reddish-yellow subsoil. Outcropping ledges of shale and limestone occur in many places.

The principal areas are those west of Glebe, on the slopes of Sandy Ridge and Timber Mountain, near Millbrook, and south of Bloomery.

Drainage is excessive in most places, much damage being done by erosion on the steeper cleared areas.

About 70 per cent of the land is cleared, most of which is in permanent pasture. Some of the smoother slopes are planted to corn, wheat, buckwheat, and grass for hay. The land in forest supports a good growth of oak, hickory, black walnut, and other hardwoods. This soil, though inextensive, is locally important. The crops grown are planted on the deeper, less gravelly areas, and, as a rule, good yields are obtained.

#### MONONGAHELA SILT LOAM

Monongahela silt loam consists of light-brown friable silt loam, underlain at a depth ranging from 6 to 10 inches by pale-yellow friable slightly granular silt loam which passes at a depth of about

18 or 20 inches into yellow or yellowish-brown compact silty clay loam mottled with pale yellow, gray, and rust brown. The material of this layer breaks with slight pressure. The soil is of alluvial origin, occurring on old stream benches which have imperfect underdrainage. Some patches of Monongahela loam having a silt loam subsoil, which contains some fine rounded gravel and thin platy shale chips, are included with mapped areas of Monongahela silt loam. The largest area of this included soil is 5 miles south of Romney. Some narrow areas, occurring along Little Cacapon River at Frenchburg, include patches of Holston silt loam which has a yellow friable silty clay loam subsoil free of mottling but containing considerable rounded gravel below a depth of 2 feet.

The terraces occupied by Monongahela silt loam are from about 50 to 150 feet above the present flood plain of South Branch Potomac River along which most of the soil occurs, whereas areas along Little Cacapon and North Rivers stand at 50 feet or less above the flood plain. In places along Little Cacapon River bedded shale rock is reached at a depth ranging from 30 to 40 inches. Areas of this soil are scattered. Drainage ways have cut deep narrow passages through the old terraces, and much of the surrounding alluvial deposit has been removed by erosion. In many places only a shallow covering of alluvial material over the underlying gray shale has been left. Such areas are included with Dekalb silt loam. In many places along South Branch Potomac River the terrace deposits are from 10 to 40 feet thick, the material below a depth ranging from 6 to 20 feet consisting of a mass of water-rounded gravel, cobbles, sand, silt, and clay. Romney and Green Spring are built on the largest areas of this soil. Other large areas are at Vance, Ridgedale, and just south of the junction of North and South Branches of the Potomac. A few small areas lie along Cacapon River and are associated with Monongahela fine sandy loam. One small area occurs along Tearcoat Creek at Pleasant Dale.

Areas range from nearly level to gently rolling or sloping. Surface drainage is good on much of the soil, but underdrainage is poor, owing to the compactness and imperviousness of the subsoil.

Practically all the land is cleared, and about 75 per cent of this is kept in permanent pasture. The soil was selected by the early settler as home sites because of its smooth surface and elevation. It is rather extensive and is of local agricultural importance. General farming is practiced.

Corn yields range from 15 to 25 bushels to the acre, wheat from 10 to 15 bushels, oats from 25 to 30 bushels, buckwheat from 25 to 30 bushels, and soybean and timothy and redbay hay from 1 to 2 tons. In some seasons alfalfa is cut three or four times, and yields range from 2 to 3 tons a year. Soybeans, when left to mature for seed, yield from 10 to 15 bushels. A very good bluegrass sod is established on much of the soil. Crops suffer from wet or dry extremes more than on most of the upland soils, and pasturage becomes scarce during long summer droughts.

#### MONONGAHELA FINE SANDY LOAM

Monongahela fine sandy loam consists of 6 or 8 inches of grayish-brown or light-brown friable fine sandy loam underlain by yellow or light yellowish-brown slightly laminated and very slightly compact

but friable fine sandy loam that extends to a depth of about 18 inches below the surface, this layer, in turn, being underlain by pale-yellow very compact and mottled gray and rust-brown loam or silt loam. This material continues to a depth ranging from 30 to 40 inches below the surface. In some places the subsoil below a depth of 30 inches contains equal amounts of gray, yellow, and buff mottles. Some flat areas have light grayish-brown surface soils, the mottles in the subsoil occur at a depth of 12 or 15 inches, and some soft, brown iron concretions occur through the subsoil. The nearly flat area at Capon Bridge has the mottlings of the typical soil, but the subsoil is less compact.

Monongahela fine sandy loam occupies high benches representing old alluvial deposits, and it lies from a few feet to more than 50 feet above the present river flood bottoms. The soil is mapped only along Cacapon River. In many places the covering of alluvial material has been eroded, exposing the bedded shale. The surface is flat or gently rolling, and surface drainage is fair or good in most places. Underdrainage is poor owing to the presence of a compact hardpan layer.

Practically all the land has been cleared for pasture and general farming. Home sites of most of the river bottom farms are located on this soil because of its smooth relief and its position well above the flood bottoms.

On account of the presence of the hardpan layer, which prevents the free movement of soil moisture, crop yields are rather variable. Extremely wet or dry seasons cause almost total crop failures. Average crop yields are very good, corn producing from 25 to 30 bushels to the acre, wheat from 10 to 15 bushels, oats from 25 to 35 bushels, buckwheat from 25 to 35 bushels, and hay from 1 to 1½ tons.

The plowing under of more organic matter in this soil would increase the water-holding capacity and insure better crops in dry years and induce warming up of the soil in the spring, thereby providing a longer growing period for summer crops. As most of the soil ranges from slightly acid to very acid, heavy applications of ground limestone or burnt lime would be very beneficial. Limestone outcrops occurring at Cold Stream, at Bloomery, and west of Yellow Spring could be used as a near-by source of lime.

#### HOLSTON FINE SANDY LOAM

Holston fine sandy loam consists of an 8 or 10 inch layer of grayish-brown or light-brown friable fine sandy loam overlying yellow slightly compact friable fine sandy loam which extends to a depth ranging from 20 to 24 inches, beneath which depth is brownish-yellow or light-brown friable fine sandy loam containing faint mottles of rust brown in the lower few inches. This lower subsoil layer extends to a depth ranging from 36 to 40 inches. The area mapped at Rio is a little darker brown in the surface soil than typical and has considerable gravel scattered over the surface and through the soil and an abundance of gravel below a depth ranging from 24 to 30 inches. Two small areas occurring on the benches of North River north of Hanging Rock consist of loam in the surface soil and silt loam in the subsoil.

The soil occurs only in a few small areas along North River, between Rio and Northriver Mills. It occupies stream benches and consists of old alluvial material lying from 25 to 50 feet above the present flood plain. The surface is nearly flat or very gently rolling or sloping. Drainage is well established.

This soil, though inextensive, is locally important. Practically all of it has been cleared and is now used in the production of corn, wheat, oats, hay, and some buckwheat. Corn yields from about 30 to 40 bushels to the acre, wheat from 10 to 20 bushels, oats and buckwheat from 30 to 40 bushels, and hay from 1½ to 2 tons.

#### HUNTINGTON FINE SANDY LOAM

Huntington fine sandy loam consists of 8 or 10 inches of brown friable fine sandy loam grading into similar-colored or darker-brown friable loam or fine sandy loam which extends to a depth of 3 or more feet. In places the surface soil and subsoil are remarkably uniform in both color and texture. The soil typically occurs in first bottoms of South Branch Potomac River which receives its drainage from uplands occupied by limestone, sandstone, and shale soils. Most of the land is subject to overflow, and a deposit of fresh alluvium tends to maintain its fertility. Some of it, however, is subject to overflow only at extremely high water stages.

Next to the stream occur narrow strips of sandy, gravelly material and small areas of fine sand or loamy fine sand that are lighter in color than the typical soil. Some of the broader areas, such as the one lying across the river from Vance, are somewhat hummocky. The mounds are lighter in color and less productive than the surrounding soil. Toward the outer edge of the wider bottoms the soil grades into loam with occasional areas of silt loam.

Huntington fine sandy loam is the principal soil in the bottoms along South Branch Potomac River. Owing to its good porosity this soil, though subject to overflow, is well drained between flood periods.

Practically all the land is cleared and used for crops and as pasture. Corn ordinarily yields from 40 to 50 bushels to the acre, but yields of 60 or more bushels have been obtained. Wheat produces from 15 to 20 bushels to the acre, oats from 25 to 40 bushels, mixed timothy and clover and soybean hay 2 or more tons, and alfalfa about 3 tons from four cuttings. Pasture lands support excellent bluegrass and timothy sod. A number of pastures on this soil, observed during the survey, afforded sufficient grass on an acre to support one 3-year-old steer without additional feed. Livestock raising is practiced to a considerable extent, principally for beef production. Dairying is conducted on a small scale.

#### POPE FINE SANDY LOAM

Pope fine sandy loam occurs on first bottoms along streams that receive most of their drainage from upland soils derived from sandstone and shale. The surface soil is dark-brown friable fine sandy loam which, at a depth of about 8 inches, passes into slightly lighter-brown friable fine sandy loam or loam, some of which is very slightly compact. Below a depth of 30 inches this material, in most places,

grades into friable silt loam, which on most of the higher-lying areas is dark brown. Next to the stream banks the soil is more sandy, in many places approaching fine sand or loamy fine sand to a depth of 3 feet, and is lighter in color throughout. On the broader areas toward the outer edge of the bottoms, the surface soil is loam and in some places silt loam. Here the subsoils are correspondingly heavier. Patches of Atkins silt loam, too small to separate on a small-scale map, are included with Pope fine sandy loam.

Areas of this soil are, in general, nearly level, with here and there a shallow swalelike depression that serves to facilitate surface drainage. Though subject to overflow at high-water stages, the land is well drained between flood periods, owing to the open friable subsoil.

Pope fine sandy loam is developed as a comparatively narrow flood bottom along the entire length of Cacapon River through the county and on Dillons Run at Capon Bridge. The largest areas are at Forks of Cacapon, north of Yellow Spring, and at Intermont near the Hardy County line.

Though not extensive in Hampshire County, Pope fine sandy loam is locally important. Only about 10 per cent of the original forest growth of hickory, oak, maple, sycamore, and other hardwoods remains standing, most of the land having been cleared for crops and pasture.

Corn yields from 30 to 40 bushels to the acre, wheat from 10 to 15 bushels, hay, principally timothy, from 1 to 1½ tons, and mixed timothy and clover hay slightly higher than timothy alone. Soybeans which are grown only for hay yield about 2 tons to the acre.

Owing to the great distance of most areas of this soil from railroads, little or no commercial fertilizer or lime is used. A local supply of lime could be obtained from outcropping limestone at Bloomery, Cold Stream, and west of Yellow Spring, if this source were developed. Continued heavy cropping on most of this soil has naturally reduced crop yields. This condition could be corrected by the use of lime, barnyard manure, or green-manure crops and the application of commercial fertilizer.

#### POPE SILT LOAM

Pope silt loam is a first-bottom soil occurring along streams which rise and receive most of their drainage from fine-grained sandstone and shale uplands. It consists of a 6 to 10 inch layer of brown, light-brown, or grayish-brown friable silt loam underlain by light-brown or brownish-yellow silt loam or silty clay loam which extends to a depth ranging from 36 to 40 inches. Some small rounded gravel and fine shale chips occur on the surface and throughout the soil in most areas. North of Junction on Mill Creek the soil is uniform brown silt loam to a depth of 24 inches, below which depth is an abundance of shale chips and fine gravel. East of Capon Bridge on Mill Branch the subsoil is pale-yellow silty clay loam or silty clay which at a depth of about 20 inches grades into mottled yellow and bluish-gray plastic silty clay. In the smaller drainage ways, where the soil wash comes principally from shale uplands, the surface soil is grayish-brown or light-brown heavy silt loam, and the subsoil is yellowish-brown silty clay which in most places becomes mottled

with pale yellow and rust brown below a depth of 24 inches. On Mill Creek near the stream banks small areas of loam or fine sandy loam occur locally but were too small to separate on the map. Some small areas of poorly drained Atkins silty clay are included.

Pope silt loam occurs along the small creeks and runs that drain the rolling or hilly valleys composed of Dekalb soils. In the western part of the county the soil is mapped along Mill Creek and its small tributaries and Greenspring Creek. The largest area in the eastern part of the county occurs along Mill Branch. Small areas are 2 miles northeast of Yellow Spring and 1 mile east of Bloomery.

The land is prevailingly flat, and drainage is fair or good in most places. Seepage from the adjacent hills along the smaller drainage ways, where the soil occurs as narrow strips, causes a poorly drained condition in the subsoil. Such patches occur locally at the foot of hill slopes on the larger areas.

This is not an extensive soil, but it is important locally for agricultural purposes as it occurs in sections where much of the upland soils are unsuited to cultivation. Practically all of it is cleared. The broader areas are used for general farm crops, and the narrow ones principally for pasture and hay meadows.

Corn, wheat, and hay are the principal crops. Yields are somewhat lower than on Pope fine sandy loam, corn yielding from 20 to 35 bushels to the acre, wheat from 10 to 12 bushels, and hay from 1 to 1½ tons. Sheep and beef cattle are the principal livestock raised.

This soil is generally low in organic matter and ranges from slightly acid to very acid. Applications of lime and the turning under of green-manure crops would go far toward building up the soil. Thorough disking of the pasture land would greatly increase its value.

#### POPE GRAVELLY LOAM

Pope gravelly loam is a first-bottom soil which occurs along the smaller and swift-flowing streams rising in and receiving most of their wash from sandstone and shale upland soils. The surface soil consists of an 8 or 10 inch layer of light-brown loam or fine sandy loam and overlies a light-brown or yellowish-brown loam or silt loam subsoil which extends to bedded gravel lying at a depth ranging from 20 to 40 inches below the surface. An abundance of rounded waterworn cobbles and gravel are strewn over the surface and mixed with the soil. The soil is very variable and much of it is subject to almost complete change with each successive overflow. Within a short distance along most of the small streams sandy gravelly areas alternate with loam and silt loam areas. The predominating soil material is loam.

The soil is widely distributed over the county and occurs along all the small streams flowing from the steep, hilly, and mountainous areas that have developed definite bottoms along their courses. The most important areas are along South Fork Little Cacapon River at Frenchburg, along Bloomery Run, and at the headwaters of Dillons and Capon Springs Runs.

Owing to the swift swirling waters by which the soil is laid down, the land is rough and hummocky. Drainage ranges from fair to good between flood periods. Water-soaked spots, caused by the

choking up of the stream by débris and in places by seepage, occur in much of this soil.

The total acreage of this soil is not large, but areas are widely scattered over the county. About 50 per cent of the land remains in original hardwood forest. The cleared part is used principally for pasture which produces a fair amount of timothy and native grasses. Some small patches of the smoother and less gravelly soil are planted to corn, and a small acreage is used for hay meadows. Corn yields from 15 to 25 bushels to the acre and hay about 1 ton. Excellent yields are obtained when applications of barnyard manure are used.

#### MOSHANNON FINE SANDY LOAM

Moshannon fine sandy loam is a first-bottom soil occurring along streams which receive much of their drainage waters from areas of Indian-red shales and sandstones giving rise to the Lehew soils. It consists of an 8 or 10 inch layer of dark chocolate-brown or Indian-red friable fine sandy loam underlain by reddish-brown loam or heavy fine sandy loam which, in most places, extends to a depth of 3 or more feet below the surface. Much of the land is subject to overflow, but some of it has not been flooded for many years. In places, the higher-lying areas have a slightly compact though friable layer in the upper part of the subsoil.

Included in mapped areas of this soil occurring at the outer edge of the wider bottoms are narrow strips of light-brown silt loam soils which are derived principally from wash from the surrounding gray shale soils. These areas contain considerable quantities of fine shale fragments throughout. Adjacent to the stream beds are narrow strips of gravelly and fine sandy soil that were too small to separate on a small-scale map. North of Frenchburg along Little Cacapon River much of the soil is derived from gray sandstone and shale which have produced a light reddish-brown surface soil and a reddish-yellow subsoil, with stratified sand and gravel below a depth of 30 inches.

Moshannon fine sandy loam occurs in the first bottoms of North River and Little Cacapon River and on Tearcoat Creek, where it has reached temporary base level. The largest area is north of Rio.

The land is generally flat with long narrow depressions, old stream channels which have not been completely filled, extending through the larger areas. Between overflow periods drainage is good, owing to the porosity of the subsoil.

Moshannon fine sandy loam is inextensive in Hampshire County, but it is locally an important agricultural soil, most of the land being cleared for cultivation and pasture. Corn yields from 25 to 40 bushels to the acre, wheat from 10 to 12 bushels, and hay about 1½ tons. The beef cattle and sheep pastured on the near-by hill lands consume all the crops produced.

The turning under of green-manure crops, the application of lime, and the more frequent use of superphosphate will increase crop yields on this kind of land.

#### MOSHANNON GRAVELLY FINE SANDY LOAM

Moshannon gravelly fine sandy loam occurs on the first bottoms of the smaller swift-flowing streams that receive most of their drainage water from the Indian-red shales and sandstone which

give rise to the Lebew soils. It consists of an 8 or 10 inch layer of dark chocolate-brown or reddish-brown friable fine sandy loam, underlain by an Indian-red or reddish-brown friable loam or fine sandy loam subsoil which extends to bedded gravel lying at a depth ranging from 20 to 40 inches. Abundant rounded gravel and cobbles are scattered over the surface and throughout the soil. In places where the streams have cut deep channels the land is subject to very infrequent overflows. Such areas have developed a slight compactness in the upper part of the subsoil. One such area occurs on Buffalo Creek southeast of Vance.

The more important areas mapped are on Buffalo Creek, North Fork Little Cacapon River, at the headwaters of Tearcoat Creek, and on Grassy Lick Run.

The land is, in general, flat but rough and hummocky, owing to the constant shifting and changing of the stream currents. Owing to the openness of both soil and subsoil, drainage is good.

The soil is of little agricultural importance because of the destructive action of water when the land is plowed. About 50 per cent of the land remains in original hardwood forest. The cleared land is used principally for sheep pasture. Some small patches of corn are grown on the smoother areas, and a few small meadows are maintained for hay. Corn produces from 20 to 30 bushels to the acre and hay about 1 ton.

#### ATKINS SILTY CLAY LOAM

Atkins silty clay loam consists of a drab grayish-brown slightly granular silty clay loam layer, from 4 to 6 inches deep, underlain by steel-gray cloddy silty clay, which at a depth of 18 inches passes into steel-gray plastic clay, mottled with dull yellow and rust brown. Below a depth of 30 inches the mottles increase considerably. This is a first-bottom soil, much of it being subject to overflow. In places where it is associated with the Huntington and Pope soils it consists of dark-brown silt loam passing at a depth of 8 or 10 inches into brown silty clay loam which, below a depth of 18 or 20 inches, grades into brown plastic silty clay or clay, mottled with rust brown, gray, and yellow and containing some soft iron concretions. Areas along the smaller streams are affected by seepage from the surrounding hills, and the surface soil is light-brown silt loam to a depth of 5 or 6 inches and the subsoil, gray silty clay loam mottled with yellow and rust brown.

The largest areas mapped are near Cold Stream School. Most of the soil occurs along the smaller streams, south of Capon Bridge, that drain the area between Cacapon and North Rivers. Much of it forms catch basins in the narrow valleys and is subject to almost continuous seepage. Small areas occur near Romney in the South Branch Potomac River bottoms, where it is associated with Huntington fine sandy loam, and in Mill Creek bottoms 1 mile south of Mechanicsburg. As most areas of this soil are flat or occupy slight basinlike areas in the better-drained bottoms, both surface soil and subsoil drainage are very poor.

This is one of the less extensive soils mapped in Hampshire County. About 50 per cent of the land is cleared and in pasture, except one area including about 15 acres near Cold Stream School.

This has been drained by open ditches and is now used as a hay meadow. It produces about 1 ton of mixed timothy and wild-grass hay to the acre.

Ditching for better drainage and applications of lime at the rate of 1,500 pounds of burnt lime or 2 tons of finely ground limestone to the acre would improve the pastures.

#### ROUGH STONY LAND

Rough stony land includes rough, stony, and broken areas that are unsuited to farming. Steep precipitous areas occur in the trough of South Branch Potomac River, south of Glebe, along the bluffs and immediate mountain slopes of the river east of Springfield and Green Spring, and along the entire length of Cacapon River through the county. Areas on North, Short, South Branch, and Cacapon Mountains are characteristic developments of this material as it occurs on the crests and steep upper mountain slopes. Numerous areas throughout the broken eastern mountain section of the county occupy steep-sided narrow valleys, narrow mountain crests, and V-shaped gaps cut by streams.

Practically all the material consists of blocks, boulders, and ledges of hard sandstones with some fine sand or fine sandy loam occurring between the rocks. Areas occurring in the northern part of the county along Potomac River and a few of the areas along Cacapon and South Branch Potomac Rivers differ somewhat from typical in that the underlying limestone and shale formations are exposed in some of the stream-cut gaps.

All the rough stony land remains in forest. Many of the higher and steep upper slopes support only a growth of scrubby trees, together with wild grapevine, huckleberry, and jack oak. Some sheep and cattle are ranged on this land through the summer. The land is valued only for its standing timber.

#### SUMMARY

Hampshire County is in the eastern part of West Virginia and includes an area of 640 square miles or 409,600 acres. It lies in the Appalachian Mountain region. The relief ranges from rolling to mountainous. The mountains and ridges extend in a northeast-southwest direction. The county is drained by Potomac River and its tributaries. The general flow of the streams is to the northeast, following the general slope of the region. The bottoms are narrow, except in places along the larger streams. Old alluvial terraces are developed along the larger streams and at the junction of their tributaries. The average elevation of the western mountain division of the county is about 2,250 feet above sea level, that of the eastern mountain division about 2,000 feet, and of the central valley hills from about 1,200 to 1,400 feet.

In 1920 the population of Hampshire County was 11,713, all classed as rural. Romney, the county seat, is the largest town. The Baltimore & Ohio Railroad and branch lines afford good shipping facilities for most of the county. The sale of timber and timber products is important in the mountain sections. Baltimore, New York, Philadelphia, and Pittsburgh are the principal outside markets.

Climatic conditions and seasonal changes are fairly uniform throughout the area. In general the summers are warm, with brief hot spells, and the winters are cold. The average annual rainfall is 35.96 inches and the snowfall, 32.1 inches. The average length of the frost-free season is a little more than five months.

The type of agriculture practiced is general farming, livestock raising, and orcharding. Large commercial apple orchards occur throughout the county, principally on the gravelly fine sandy loam soils of the mountains and higher valley ridges. Hay, forage, and corn are the principal field crops. Wheat, oats, buckwheat, and soybeans are minor crops. Some trucking is done for local markets. Beef cattle and sheep are the principal livestock raised. Some dairying is conducted on a few river-bottom farms. The use of commercial fertilizer is general. Some farmers apply lime to land that is seeded to legume crops, but this is not common practice.

For agricultural purposes the soils of Hampshire County may be grouped into three classes: The first group comprises the smoother upland soils having a rolling or hilly relief. Such soils are adapted to general farm crops, orchards, and pasture. The second group includes the first-bottom and second-bottom soils which are, as a rule, very productive. These soils are suited to corn, wheat, and hay crops and pasture grasses. The third group of soils occupies the rough mountainous areas which are generally more or less stony and too steep for cultivation. Such areas are best suited to forestry but some of the land is cleared for orchards and pastures.





[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, and on July 1, 1927, the Bureau of Soils became a unit of the Bureau of Chemistry and Soils]



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