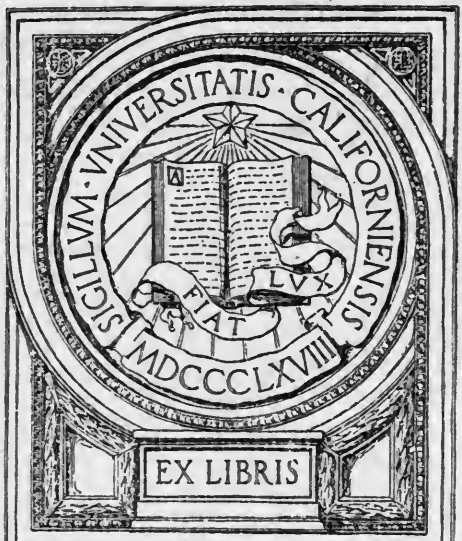

Issued February 12, 1912.

U. S. DEPARTMENT OF AGRICULTURE,

BUREAU OF SOILS—Circular No. 53.

MILTON WHITNEY, Chief of Bureau.

SOILS OF THE SHENANDOAH RIVER TERRACE:

A REVISION OF CERTAIN SOILS IN THE ALBEMARLE AREA, VIRGINIA.

BY

HUGH H. BENNETT,

Inspector in Charge Southern Division.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1912.

BUREAU OF SOILS.

MILTON WHITNEY, *Chief of Bureau.*
ALBERT G. RICE, *Chief Clerk.*

SOIL SURVEY.

CURTIS F. MARBUT, in Charge.
G. W. BAUMANN, Executive Assistant.

COMMITTEE ON THE CORRELATION AND CLASSIFICATION OF SOILS.

CURTIS F. MARBUT, Chairman.
H. H. BENNETT, Inspector, Southern Division.
J. E. LAPHAM, Inspector, Northern Division.
M. H. LAPHAM, Inspector, Western Division.
J. W. MCKERICHER, Secretary of Committee.

SOILS OF THE SHENANDOAH RIVER TERRACE: A REVISION OF CERTAIN SOILS IN THE ALBEMARLE AREA, VIRGINIA.

INTRODUCTION.

It has been found advisable to revise some of the soils of the Albemarle area, Virginia, particularly the Edgemont stony loam, to conform to more recent classifications, and some of the more important changes are given in this preliminary report pending the actual field revision of portions of the soil map. Some of the proposed changes will be merely touched upon, inasmuch as they do not affect present boundaries in the soil map, being only name changes. In other more important cases the changes are discussed in greater detail.

REVISION OF THE EDGEMONT STONY LOAM.

The type originally mapped as Edgemont stony loam in the Albemarle area is largely developed in a broad continuous belt crossing the area from the northeast corner, in the vicinity of Grindstone Mountain, to the vicinity of Torry Mountain, approximately 50 miles to the southwest. The average width of the belt is about 4 miles, the greatest width being about 7¾ miles, and the narrowest about 1 mile. This body of soil is roughly included between the bottom lands of the South and Shenandoah Rivers and the crest of the Blue Ridge Mountains, covering a range in elevation from about 950 to 3,100 feet. The greater part of the type lies between the 1,100 and 2,500 foot contour lines. That portion lying above the 1,500-foot contour line is mainly very stony and mountainous, while that below this level is mainly flat or undulating, with a gradual drop toward the bottom lands of the Shenandoah and South Rivers on the west. The line of division between these widely different topographic forms is not everywhere marked by the 1,500-foot contour line, as variations occur up and down both sides of the valley. In most places, however, this contour very closely marks the division.

There are many very stony areas throughout the smoother, lower division, and in many places the color of the subsoil is yellow, there being some resemblance in this respect between the soils of this division and those of the stony mountain slopes. These similarities in appearance of many of the soils of these two divisions was the basis upon which the different types were mapped together in the old

survey. At the present time, with a more carefully worked-out scheme of classification and correlation, a separation of these divisions would be made.

In the subsequent chapters the soils of the lower, smoother belt and those of the mountainous belt are described under the names Waynesboro and Holston in the former instance and Dekalb in the latter. In this preliminary report a complete discussion of the individual soils, such as would be given in case of a field revision, will not be undertaken.

In addition to the area of Edgemont stony loam outlined above, an important body of the type is developed over the higher portions of Massanutten Mountain. Altogether 134,656 acres were included in this type in the Albemarle area. The revision here proposed will throw about two-fifths of this area into the better soils of the Holston series, which has been encountered and described in other reports of the soil survey, and of a new series which may be tentatively given the name Waynesboro series.

It is believed that this report will bring out the relationship of the soils of the two belts with sufficient clearness to answer, with a fair degree of satisfaction at least, the requirements of farmers, experiment-station workers, and prospective land buyers. The actual mapping of the several soils would of course be more satisfactory, but as this would entail some considerable delay, it seems advisable to issue this preliminary circular.

SOILS OF THE LOWER DIVISION OF THE EDGEMONT STONY LOAM.

The soils of the lower, smoother division of the original Edgemont stony loam referred to above will be discussed in this circular as two series—the Waynesboro and Holston. The first series includes those soils having red subsoils and the second those having yellow subsoils.

Topographic features and extent.—This lower division is really a second bottom or terrace of the South and Shenandoah Rivers. The terrace is most extensively developed on the east side of these streams, extending back from the present overflowed bottoms to the foot of the Blue Ridge Mountains, rising through a succession of benches or terraces having a very gradual slope toward the stream. From the 1,500-foot contour line as the approximate boundary, the mountains rise eastward with characteristically steep slopes to an elevation of about 2,500 to 3,100 feet above sea level.

The stream (the South River and Shenandoah River continuation) has cut its channel so deeply that the terrace (Shenandoah terrace) is no longer subject to overflow. There has been considerable erosion over the terrace since the cessation of overflow, but there are still many distinct bluff lines between the series of lower and upper benches

or levels, as illustrated in the abrupt rises to higher levels going from Crimora station to the Crimora mines. Originally the variation in level was not marked by bluff lines in all cases, for even now the terrace formation in places grades into the overflowed bottom lands through a gradual, unbroken slope (fig. 1), while in other places there is a distinct drop or bluff line between the first bottom level and terrace level. Nevertheless, erosion in places has considerably altered the surface configuration of the original terrace. Typically, the various levels range from flat to undulating, usually sloping gradually streamward. The slope is imperceptible in many places, as in the nearly level area to the south and southwest of Lyndhurst (see

FIG. 1.—Showing in distant background gentle slope of terrace from foot of the Blue Ridge to Shenandoah River. Looking north from west side of river in vicinity of Crimora station.

fig. 2) and the cultivated fields along the Norfolk & Western Railroad between Crimora station and Islandford. The slopes generally increase as the foot of the Blue Ridge is approached. The outer margin, representing the highest portion of the terrace, has a much more perceptible slope than the average of the terrace, a fact probably due to the accumulation of colluvial material from the adjacent mountain slopes. The mountains frequently rise abruptly from the almost level surface of the higher portion of the terrace. (See fig. 3.) Streams issuing from the mountain coves have cut through the higher portions of the terrace and their laterals have extended back on each side, giving rise to many gently rolling areas.

The surface configuration of the Shenandoah terrace as developed within the limits of the Albemarle area, from the vicinity of Lipscomb, in Augusta County, to the vicinity of Shenandoah, in Page County, is dominantly flat to undulating [1] and well suited to tillage operations. A panoramic view of the valley shows the surface of this terrace as a flat to gently undulating plain with a very gradual rise toward the foot of the Blue Ridge on the east.

The width of this terrace varies from very narrow at Basic City to about 4 miles at Port Republic, and about 6 miles across the valley between Elkton and Shenandoah, where the terrace is developed on both sides of the river, or from the foot of Massanutten Mountain on

FIG. 2.—Showing general level of terrace to the southwest of Lyndhurst.

the west to the foot of the Blue Ridge on the east.[2] The average width of the terrace, including that on the west side of the Shenandoah River in Rockingham County, is between 2 and 3 miles throughout its approximate length of 50 miles. Roughly estimated by this preliminary revision, about 90,000 acres is included in the terrace soils.

This terrace formation extends along South River in a southwesterly direction beyond the limits of the Albemarle area, and similarly along the Shenandoah River northeasterly from Shenandoah. Some bottom lands and a few small areas of limestone soil occur within the

[1] See topographic sheets.

[2] That portion of the terrace occupying the west side of the Shenandoah River from the vicinity of Port Republic to Shenandoah was mostly mapped as Hagerstown shale loam in the Albemarle area.

terrace area. Shaly limestone outcrops occur on several high places to the south of Waynesboro on both sides of the river where the terrace material apparently has been washed off. In such situations relatively small areas of Hagerstown shale loam are developed. Between Waynesboro and Port Republic there is very little terrace material on the west side of the river.

Origin of material.—The soils of the Shenandoah terrace consist of water-worked material deposited by the river when its overflow waters reached higher levels. This material was derived largely from the rocks of the Blue Ridge Mountains, including, possibly, some little material from the Shenandoah Valley limestones. A consid-

FIG. 3.—High, flat portion of Shenandoah terrace (Holston sandy loam) at foot of the Blue Ridge Mountains east of Crimora station. Land freshly prepared for small grain.

erable proportion of the soil undoubtedly comes from the extensive belt of the quartzite following the western side of the Blue Ridge across the Albemarle area. Water-rounded quartzite stones and bowlders are everywhere in evidence, being particularly abundant near the outer margin, especially in the vicinity of those points where the streams issue from the mountains. These quartzite bowlders are locally called "river jacks," "river rocks," and "sheep heads." Many of these are almost round, but the greater proportion simply have well-rounded edges, some having a flat shape.

Other rocks than quartzite are present, but in much smaller numbers, except over occasional areas. In the vicinity of Elkton, par-

ticularly along the streams coming out from the mountains, numbers of rounded bowlders of a dark greenish rock, such as is encountered in the higher portions of the Blue Ridge Mountains in association with the red Porters soils, are encountered. Sandstone bowlders are also seen in places.

Along those portions of the outer margin of the terrace referred to above as having a steeper slope than is characteristic of the terrace as a whole, much of the surface material represents colluvial accumulation from the adjacent stony Dekalb soils (originally Edgemont stony loam).

Occasional exposures of the yellowish to reddish shaly rock are seen, possibly a shaly limestone originally, in which decomposition has proceeded to an advanced stage. The soil derived from these rocks is mainly a reddish clay. It has always a rather plastic structure, lacking the friability of the associated old alluvial soils—the terrace soils proper—to such a degree that it generally can be distinguished readily from the latter. In a few places this residual material is reached within 3 feet of the surface, but over a very large part of the terrace it does not come within the 3-foot soil section; in other words, the alluvial material is 3 feet or more in depth nearly everywhere, and consequently the residual soil can here be left out of consideration as having no importance, and not influencing either the soil or subsoil of the terrace lands to any considerable extent. Those isolated patches of residual limestone soil previously mentioned as occurring within the limits of the terrace would, of course, be separated in case of a revision of the soil map as distinct soils, being entirely unlike those derived from the old alluvial material both in character and agricultural value.

WAYNESBORO SOILS.

The soils provisionally classified as the Waynesboro series are characterized by the light-brown color of the surface soils, by the yellowish-red to red color and friable structure of the subsoils, and by the presence of varying quantities of water-rounded stones and bowlders on the surface and throughout the soil section. There are several distinct types in this series, which differ from one another in textural composition and in the amount of rock present. The most important are the sandy loam, stony sandy loam, loam, and stony loam.

WAYNESBORO SANDY LOAM.

The Waynesboro sandy loam is a light-brown to grayish-brown sandy loam, underlain in most instances at about 8 to 10 inches by a yellowish-brown sandy loam, which grades quickly into red friable sandy clay. The soil frequently extends to a depth of 15 to 20

inches. In some of the lower situations fine material is washed down from adjacent higher land, giving the surface soil the texture of a heavy sandy loam.

The type occupies flat, gently rolling, and undulating areas throughout the terrace belt. It occurs at all levels from just above the overflow bottoms to the foot of the mountain slopes, but seems to be most extensive on the lower levels. It has good surface and under drainage, yet conserves moisture in favorable amounts for good plant growth. Typical areas occur just north of Lyndhurst, in the vicinity of Islandford and about Yancey.

Corn, rye, and cowpeas do especially well on this soil and acreage yields of 50 to 75 bushels of corn are not infrequent under good management. Oats, cowpeas, wheat, grass, and clover give fair to good returns, particularly on the heavier phases. Sweet and Irish potatoes, cantaloupes, watermelons, and a number of vegetables could be successfully grown. In locations having good air drainage it is believed apples would succeed. Some thrifty trees were seen on the type.

The soil needs organic matter, such as could be easily supplied by growing cowpeas and clover, and occasionally turning under a crop. Rye is also a good source of organic matter, but the cowpeas and clover, in addition to supplying needed vegetable matter, add nitrogen through their root nodules. Commercial fertilizers give good results. A brand analyzing about 8 per cent phosphoric acid, 3 per cent nitrogen, and 4 per cent potash has been quite successfully used on somewhat similar soils in other sections, when applied in moderate amounts, both for corn and grain.

WAYNESBORO STONY SANDY LOAM.

The Waynesboro stony sandy loam differs essentially from the sandy loam in the much greater abundance of rounded rock. A typical area in the vicinity of Lyndhurst (see fig. 4) consists of a light-brown to yellowish-brown sandy loam. The subsoil proper, beginning at about 12 to 20 inches, is a red friable sandy clay. The surface of the type is thickly strewn with rounded rocks, mostly quartzite cobbles less than 10 inches in diameter. These rocks are also disseminated throughout the soil mass. The type occurs in close association with the other terrace soils throughout the valley and, like them, has a flat to gently rolling topography. It is most extensive on the higher levels near the foot of the mountain slopes. It embraces a larger area than the sandy loam type

The Waynesboro stony sandy loam is adapted to about the same crops as the Waynesboro sandy loam, but it does not give as good average yields, as the stones interfere with cultivation where they have not been picked off. Much of the type is covered with different

varieties of oak, which is often of scrubby growth. Chinquapin, witch hazel, and some pine are also encountered. The suggestions for improving the sandy loam type are applicable to this soil.

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

Mechanical analyses of Waynesboro stony sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
25720	Soil	0.6	6.4	7.8	22.3	13.9	38.6	10.1
25721	Subsoil	.6	4.0	5.2	15.7	9.8	22.7	42.1

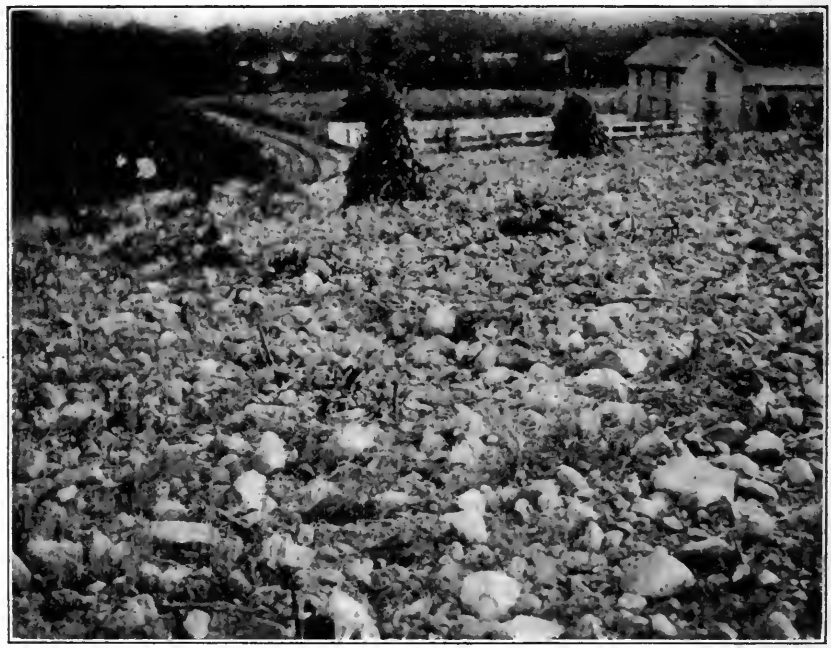

FIG. 4.—A field of typical Waynesboro stony sandy loam northwest of Sherando. This field produced this year (1911) about 20 bushels of corn per acre.

WAYNESBORO LOAM.

The Waynesboro loam is a light-brown light loam to silty loam, underlain at an average depth of about 6 inches by a yellowish friable sandy loam. At 15 to 20 inches the subsoil proper is reached, consisting of a yellowish-red to red friable sandy loam to silty clay.

The type is developed throughout the extent of the terrace formation. It is most extensive near the streams and its topography averages more nearly level than that of the other types. Typical

areas are seen between Basic City and Lyndhurst on the south and between Yancey and Islandford on the north. The drainage of the soil is very good. Where properly supplied with organic matter the soil works up into a good tilth, but with a low humus content it is inclined to bake in dry weather, especially the silty or heavy phase.

Much of this land is under cultivation, mostly to corn, grass, clover, and wheat. Acreage yields under ordinary treatment range from about 30 to 50 bushels of corn, 1 to 1½ tons of hay (clover and timothy, mixed), and 15 to 20 bushels of wheat. Commercial fertilizer is sometimes used in light applications, usually about 300 pounds per acre for wheat. Other crops seldom receive fertilizer on this or the other soils of the region. Complete mixtures give very good results. A brand analyzing 10 per cent phosphoric acid, 2 per cent nitrogen, and 3 per cent potash would likely prove profitable in the case of the general farm crops in acreage applications of 300 to 500 pounds, especially where the soil is liberally supplied with vegetable matter. Lighter applications would be needed following a legume crop, such as clover or cowpeas. Acreage applications of 1,500 to 2,000 pounds of burned lime following the turning under of vegetable matter would benefit the land.

Irish potatoes should give very good results on the Waynesboro loam, particularly with moderate applications of fertilizers containing a relatively high percentage of potash. Cabbage, cantaloupes, spinach, lima beans, and a number of other vegetables could be successfully grown.

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

Mechanical analyses of Waynesboro loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
25718	Soil	2.9	7.7	6.6	17.6	11.3	39.9	13.8
25719	Subsoil	2.1	10.6	11.2	15.4	8.2	24.8	27.3

WAYNESBORO STONY LOAM.

The Waynesboro stony loam is practically the same as the Waynesboro loam except in the greater abundance of stone. Water-rounded rock is present on the surface and throughout the soil in amounts sufficient to interfere with cultivation. Nevertheless, many of the terrace fields include this soil. From some the stone has been picked off and worked into fences or thrown aside. A typical boring near Lyndhurst revealed a pale-yellow loam overlying a yellow friable heavy loam to silt loam at a depth of about 6 inches, which in turn rests upon a red friable sandy clay to silty clay at about 22 inches.

Like the Waynesboro sandy loam, this type is most extensively developed over the higher elevations. Uncleared areas support a growth consisting principally of oak, dogwood, hickory, and chinquapin.

This soil is adapted to the same crops as the Waynesboro loam, but the yields average a little lower. It needs about the same treatment as that suggested for the loam, though most fields would be improved by picking off the stones.

HOLSTON SOILS.

The Holston soils apparently are more frequently associated with the Shenandoah soils than with the Waynesboro soils, from which they differ most strikingly in the yellow color of their subsoils. It is believed that the absence of red in the Holston soils is due to the less-advanced stage in the oxidation of the material. The subsoils of this series seem to average a little more dense than those of the Waynesboro, and it would seem that this structural feature has had some bearing on the retarded oxidation and consequent reddening of the subsoils, possibly by limiting subsoil aeration. The Holston soils are generally a little less rolling than those of the Waynesboro series and therefore are not quite so well drained, particularly in the subsoil portions.

As in the case of the Waynesboro series, four important types are developed—the sandy loam, stony sandy loam, loam, and sandy loam.

HOLSTON SANDY LOAM.

In its typical development the Holston sandy loam is a pale-yellow rather heavy sandy loam, underlain at about 10 to 15 inches by a yellow, moderately friable sandy loam. Water-rounded rocks are scattered over the surface and throughout the soil section.

This type usually occupies higher levels than the heavier members of the series. It is quite extensively developed near Basic City. Although apparently not so well drained in the subsoil as the Waynesboro sandy loam, its drainage is nevertheless quite sufficient for agricultural purposes. A considerable proportion of this land is under cultivation to general farm crops. Corn, rye, and cowpeas give very good yields with good soil treatment. Some wheat is grown, but moderate yields are the rule. The organic matter supply should be maintained by turning under occasional green crops, e. g., cowpeas or rye. Sweet potatoes, Irish potatoes, melons, and a number of other vegetables do well. Thrifty apple trees were seen in several places.

Where the soil is well supplied with organic matter applications of complete commercial fertilizers are quite effective. Less nitrogen, of course, would be needed following the legumes.

Uncleared areas support a growth of oak, including blackjack and other scrubby varieties, dogwood, chinquapin, fox grape, and witch-hazel.

HOLSTON STONY SANDY LOAM.

The Holston stony sandy loam is the most extensive type of the Shenandoah terrace. It is confined largely to the higher levels and is the dominant soil near the base of the Blue Ridge. In its most typical development it consists of a gray to grayish-yellow sandy loam, underlain at about 10 to 24 inches by yellow heavy sandy loam to sandy clay. Occasionally the deep subsoil has a decidedly reddish cast, such areas representing a gradation toward the Waynesboro soils, probably showing the influence of better drainage. Rounded stones are everywhere abundant on the surface and throughout the soil section. It was difficult to bore to the depth of 3 feet on account of these stones. In some places the type grades into stony loamy sand, as in the case of Chinquapin Flats just south of Lyndhurst.

The type has good drainage but retains moisture fairly well, especially where the organic matter supply is not too badly depleted. The greater proportion is timbered chiefly with several varieties of oak, including chestnut oak and several species of scrubby oak. Hickory, dogwood, chinquapin, witch hazel, and some pine are also seen in places.

Corn, rye, and cowpeas give satisfactory yields. Such crops as lima beans, Irish potatoes, and cantaloupes could be successfully grown, possibly on a commercial scale. In several places Winesap apple trees were apparently making a good healthful growth. Many areas could be improved by picking off the stones. Like the sandy loam members of the series, the soil needs vegetable matter in liberal amounts. Commercial fertilizers would also effect a decided improvement in the yields.

HOLSTON LOAM.

The Holston loam is a light-brown loam to silty loam, underlain by fairly friable yellow silty clay. It is most typically and extensively developed over the nearly flat areas in the lower levels of the Shenandoah terrace. Representative areas occur in the vicinity of Yancey.

It is a good general farm crop soil, especially for wheat, timothy, clover, and corn. Irish potatoes, lima beans, and a number of other vegetables find this soil well suited to their requirements. Rotations should be practiced which include such legumes as cowpeas and clover, particularly since the soil is somewhat inclined to run together and bake in dry weather where the organic matter supply is low. Acreage applications of 1 ton of burned lime would undoubtedly prove beneficial. Fertilizers relatively high in phos-

phoric acid are frequently used on soils of this character with profitable results.

HOLSTON STONY LOAM.

This soil is essentially the same as the Holston loam, except in the greater abundance of rounded rocks. It is adapted to the same crops and requires about the same treatment. Most of this type could be more easily handled if the stones were removed.

DEKALB SOILS.

According to the recent standards of soil correlation, that portion of the original Edgemont stony loam of the Albemarle survey lying above the 1,500-foot contour line, as the approximate boundary between the mountains and the Shenandoah terrace, belongs in the Dekalb series.

There is some variation in the characteristics of these soils as here developed, but the prevailingly rough topography and the intricate association of the different types precluded separation in the original map, with the exception of a portion derived from shales.

The Dekalb soils included in the old Edgemont stony loam are mountainous with many steep, precipitous slopes and sharp ridges. They are very stony, in some places representing the type that is being mapped as Rough stony land.

With some mention of the important variations, it seems best to classify these soils as the Dekalb stony sandy loam.

DEKALB STONY SANDY LOAM.

The Dekalb stony sandy loam is a residual soil derived from quartzite rock. Typically it is a gray loamy sand, grading with depth into a pale yellow sticky sand to light sandy loam, excessively stony from the surface downward. The stone consists very largely of angular quartzite fragments.

The soil is so open in character that water rapidly percolates downward, yet it supports a dense growth of oak, scrubby oak, jack pine, chestnut, and some pine and witch hazel. Huckleberries are a characteristic plant on cleared or burned-over areas. Forest fires have prevented the accumulation of a thick leaf mold over considerable areas.

Along some of the lower slopes and in saddlelike situations between the ridges some fine colluvial material has accumulated from above, giving this soil a more loamy character than in the case of the typical stony sandy loam. Also some of the smoother situations do not carry so much stone. Such areas were noticed a short distance to the east and northeast of Basic City. The Dekalb stony sandy loam has not

been used to any important extent for agricultural purposes. Most of it is too steep and stony to admit of profitable utilization. Some of the smoother slopes may, however, prove profitable for the production of certain varieties of fruit, but no data could be secured upon which to base positive statements in this connection. Recently some of the less precipitous slopes to the south of Basic City have been cleared, the stumps removed, and the land broken for orchard purposes. Some trees have been set out and it is proposed to extend the planting.

In any attempt at agricultural utilization crops such as cowpeas and rye should be plowed under frequently in order to build up the organic matter content. Any leaf mold present should be incorporated with the soil. Liberal additions of complete fertilizers would be found decidedly beneficial to fruit trees, as would also barnyard or stable manure.

DEKALB SHALE LOAM.

The Hagerstown shale loam of the Albemarle area under the present scheme of soil classification would be divided as follows: That portion mapped in the Shenandoah Valley region where the soil is derived from shaly limestone would be classed as Hagerstown shale loam; that in the Blue Ridge Mountains which is derived from shaly or slaty rocks would be classed as Dekalb shale loam; and that in the Piedmont region, which seems to be derived from Triassic rocks, would possibly be classed as a new type.

The Dekalb shale loam is developed in those belts of the Blue Ridge Mountains occupied by shaly or slaty rocks. In Jarmans Gap the type consists of a grayish-yellow silty loam with an appreciable sand content. This is underlain at a depth of about 10 inches by yellow silty clay loam having a greasy feel. In some places the subsoil has a reddish cast. The unaltered rocks consist of thin-bedded to thick-bedded rocks predominantly of a greenish cast, which weather into yellowish and reddish colors. Fragments of the weathered rock are everywhere abundant.

Most of this type is forested with oak, chestnut, and jack pine. It probably could be successfully used for apples, Irish potatoes, wheat, and grass, although it is not nearly so productive or valuable as the very good general farm crop and fruit soil, the Hagerstown shale loam of the Limestone Valley region. The latter soil is being used successfully along with other limestone soils in the vicinity of Waynesboro for the production of wheat, corn, clover, timothy, and apples.[1]

[1] Profitable returns are being had with several varieties of apples on the Hagerstown soils in the vicinity of Waynesboro. Some of the most successful varieties are the Stayman Winesap, York Imperial, Rome Beauty, Lowery, Rambo, Grimes Golden, Ben Davis, Rebel, Fall Cheese, Smokehouse, Northern Spy, Delicious, Bonum, Arkansas Black, Red Astrachan, Fallawater, Shockley, Wealthy, and Maiden Blush.

Considerable basic slag is being used in some of the orchards at the rate of about 200 pounds per acre. Cowpeas and clover are commonly grown in the best orchards. Cultivation is continued up to the end of the tree-growing season by some orchardists, the peas following some time between July 1 and the middle of August. Some plow the cowpeas under and then seed to clover. The results of frequent shallow cultivation during the very dry season of 1911 appeared to be highly satisfactory.

THIS PUBLICATION may be procured from the Superintendent of Documents, Government Printing Office Washington, D. C., at 5 cents per copy