

U. S. DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS—MILTON WHITNEY, Chief.

SOIL SURVEY OF MASON COUNTY, KENTUCKY.

BY

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[Advance Sheets—Field Operations of the Bureau of Soils, 1903.]



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[PUBLIC RESOLUTION—No. 9.]

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

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

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

Approved, March 14, 1904.

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

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MAP.

Soil map, Mason County sheet, Kentucky.

SOIL SURVEY OF MASON COUNTY, KENTUCKY.

By R. T. AVON BURKE.

LOCATION AND BOUNDARIES OF THE AREA.

Mason County is one of the northern tier counties, lying on the Ohio River, in north latitude $38^{\circ} 40'$, and west longitude $83^{\circ} 40'$. It is bounded on the north by the Ohio River, on the east by Lewis and Fleming counties, on the south by Fleming and Robertson counties, and on the west by Robertson and Bracken counties. It has an area of about 225 square miles and includes the city of Maysville, the county seat, and a number of other flourishing towns and villages.

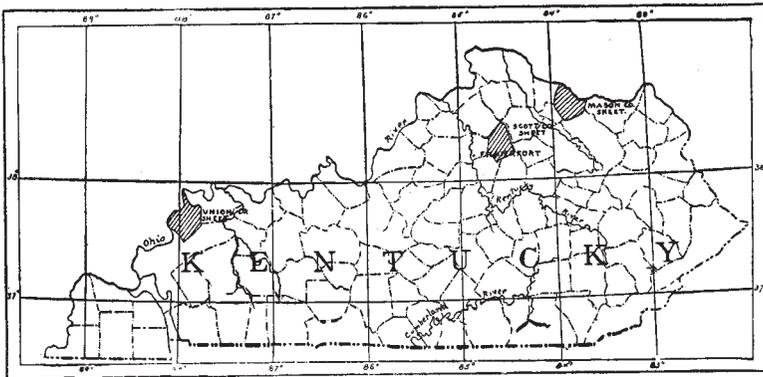


FIG. 1.—Sketch map showing position of the Mason County area, Kentucky.

The county is well watered by the Ohio River, the north fork or Licking River, and their tributaries. It is traversed east and west by the main division of the Chesapeake and Ohio, and north and south by the Louisville and Nashville railroads.

Some manufacturing is carried on in Maysville, but the chief industries of the county are agriculture and stock raising.

HISTORY OF SETTLEMENT AND AGRICULTURAL DEVELOPMENT.

As far as records show, the first white person to enter Mason County was Christopher Girt, who surveyed lands along the Ohio River. He was followed later, in 1775, by Simon Kenton and a party, who canoed down the Ohio, landed at the mouth of Limestone

Creek, the site of Maysville, and then proceeded south, exploring a portion of the river bluff, and penetrating the interior as far as the present site of Washington. Returning later, Kenton built a cabin, and raised a crop of corn, but this settlement was not permanent.

Settlers came into this part of the country very slowly, but in 1784 several settlements were founded. These were well fortified on account of the hostility of the Indians, the Shawnee and Wabash tribes giving the most trouble and waging constant warfare until 1800.

The crops of the early settlers, grown only in small patches, were corn, wheat, flax or hemp, and tobacco. They produced most of the necessaries of life. These pioneers took up the more lightly timbered lands of the rolling country, and it was some time before the blue-grass basin was cleared, on account of the difficulty of removing the heavier forest.

The original timber growth occupying this part of the country was walnut, butternut, sugar maple, ash, hickory, elm, and giant bur oaks.

New Orleans was the early market, the surplus products being floated down the Ohio and Mississippi on flatboats. The crews returned overland, bringing supplies of molasses, sugar, coffee, and other commodities which could not be produced in the area.

As first organized in 1788, Mason County included about one-fourth of the territory of Kentucky comprised in that part of the State east of the Licking River. It was the eighth county to be organized after Kentucky had been admitted to the Union in 1792. It has since been reduced to an area of 225 square miles.

The early settlers came from Pennsylvania, Virginia, and New Jersey, but since the civil war many Irish and German immigrants have come into the county. Maysville, at the mouth of Limestone Creek, was known as Limestone prior to 1793. It was made a town in 1787, and in 1833 became a city. Washington, the old county seat, was once a thriving town of the uplands, but its decline began in 1848, when the seat of county government was removed to Maysville.

Hemp was formerly the staple crop of the area, reaching its highest yield in 1847. From that time the acreage gradually declined, and to-day the cultivation of this crop has ceased.

CLIMATE.

The table given below is compiled from the records of the Weather Bureau. It shows the normal monthly and annual temperature and precipitation at Maysville, the only station in the area surveyed for which data were obtainable. This station is located on the Ohio River, and lies between 200 and 400 feet below the level of the greater part of the county. From local observation the temperatures range about 1° higher on the uplands. The local showers generally follow the

Ohio River, and the precipitation is probably greater on the lowlands and the bordering uplands than in the interior of the county.

Normal monthly and annual temperature and precipitation.

Month.	Maysville.		Month.	Maysville.	
	Tempera- ture.	Precipi- tation.		Tempera- ture.	Precipi- tation.
	° F.	Inches.		° F.	Inches.
January	32.3	3.19	August.....	77.2	3.86
February	29.9	2.12	September	70.2	3.04
March	43.9	4.33	October	58.7	1.99
April	54.3	2.70	November	46.2	3.78
May	66.2	3.86	December	34.7	3.76
June.....	74.0	4.07	Year	55.5	40.54
July	78.2	3.84			

The normal temperatures range from 32° F. for January to 78° F. for July, and the precipitation, which ranges from 2 to 4 inches monthly, is rather evenly distributed throughout the year. The occurrence of killing frosts in spring and fall, based on the records of the last seven years, is as follows: Last in spring, May 4; average, April 22; first in fall, September 3; average, October 17.

PHYSIOGRAPHY AND GEOLOGY.^a

The Ohio River, which forms the northern boundary of Mason County, has built up a flood plain of varying width in three distinct localities along its course. Very few marshy areas are found, even in the lowest portions of these bottom lands. The surface is nearly level, sloping gently toward the river. South of these first bottom lands, over the easy grade of the second bottoms, which are marked by a more rolling surface, the river bluffs rise boldly. These have an elevation of from 300 to 500 feet, with steep or almost precipitous sides, and gradually decrease in altitude toward the west. In outline these bluffs are more or less rounded, with deeply notched ravines, through which many small streams flow into the Ohio River. Back of the bluffs occurs an upland plain. This has a rolling surface, becoming more rolling and broken in the southwestern part of the county, where the north fork of Licking River leaves the county. In the middle southern part of the area the elevation becomes less, and there is a troughlike depression with gently rolling surface features.

Mason County is well watered by the many streams tributary to the Ohio River. There are also many springs which are important as sources of water supply for domestic use. Cabin Creek rises in Lewis

^aThe statements regarding the geology of Mason County are based largely on W. M. Linney's report on the Geology of Mason County, Kentucky Geological Survey, 1885.

County, and with its tributaries drains the northeastern part of Mason County. Lees, Beasley, Kennedy, and Bull creeks rise in the uplands and flow north into the Ohio River.

The north fork of Licking River enters the county at the southeastern corner, flowing slightly north by west into Bracken County. Within Mason County it is fed by a number of small streams, among which are Mill, Wells, and Shannon creeks.

The underlying rocks of the area surveyed are made up of the Lower, Middle, and Upper Hudson divisions of the Lower Silurian era, and the Medina, Clinton, and Niagara formations of the Upper Silurian.

The only outcrop of the Lower Hudson of any considerable depth occurs at the mouth of Lees Creek, where 165 feet of the formation is exposed. It dips gradually and is lost below the Ohio River as it approaches the Lewis County line. This formation consists of thin strata of limestone interbedded with shale. The limestones are of a blue color and very resistant to the agencies of decomposition.

A rough, rugged rock of concretionary structure marks the transition between the Lower and the Middle Hudson, and again between the Middle and the Upper Hudson strata. This rock is made up of very finely divided sand.

The Middle Hudson plays a more important part in the formation of the soils of Mason County than the Lower Hudson. It outcrops along the river bluffs, and also along the north fork of Licking River, and occupies most of the middle western part of the county. Like the Lower Hudson, it dips toward the northeast, and part of it goes below the river near the Lewis County line. The greater part of this formation consists of shales and limestones. The limestones are readily decomposed, and the streams have eroded deep, narrow gorges through them. Occasionally layers of sandy shale and dense, hard limestone make up part of this formation.

The larger part of the area rests upon the Upper Hudson. This formation has a depth of about 300 feet. Only the basal members occur to the south of Dover, and the formation gradually thins out as it approaches the Ohio River.

The Upper Hudson is made up of crumbly limestones and shales of a blue color, containing many fossils.

The strata of the Upper Silurian occur in only a few small areas near the Lewis County line. There are about 20 feet of the Medina and 35 feet of the Clinton. The upper member—the Niagara—has a depth of 100 feet. The strata of this formation are made up of blue shales.

The river bottoms belong to the Quaternary period. The second bottoms, representing an earlier flood plain, were formed long ago when the river was much higher than at present. The river has since

cut down through this plain and has built up the first bottom, still subject to overflow and in process of formation.

SOILS.

There are in Mason County seven types of soil, including Meadow. The greater part of the area is occupied by clays, and the lighter soils, sands, and sandy loams are scarcely represented, together forming less than 2 per cent of the total area of the county. The extent of each of the established types is given in the appended table:

Areas of different soils.

Soil.	Acres.	Per cent.
Hagerstown clay	115,648	80.4
Hagerstown loam.....	24,384	17.0
Elkton clay	896	.6
Norfolk loam	896	.6
Norfolk fine sandy loam.....	832	.6
Meadow	832	.6
Leonardtown loam	320	.2
Total.....	143,808

NORFOLK FINE SANDY LOAM.

The Norfolk fine sandy loam consists of a fine sandy loam of yellow or brownish-yellow color, with a depth of 10 inches, underlain by a sand or loamy sand of similar texture. Throughout the soil and sub-soil there is a scattering of well-rounded pebbles.

In Mason County this type covers but a small area. It is found in two localities—in the Charlestown bottoms, about 2 miles north of Moranburg, and in the Dover bottoms, west and southwest of Dover. It occupies remnants of the second bottoms, which have the appearance of a ridge of moderate elevation. The surface is somewhat hummocky where erosion has been most active, while bald spots occur on some of the knobs where the soil has been washed away.

This soil was formed by the deposition of materials carried by the Ohio River when it stood much higher than at present. The terrace occupied by this type represents the flood plain of that period. Both the texture and position of the soil tend to give the areas of this type good drainage.

The Norfolk fine sandy loam is generally in a low state of productiveness, which is attributed largely to the lack of organic matter. It has been under cultivation over 100 years, and was at one time very much more productive than at present.

This soil is now used for the production of early truck, chiefly melons and sweet potatoes, to which it is well adapted. Of somewhat

less importance are sweet corn, asparagus, and berries. It is also well adapted to peaches and other stone fruits. Corn, rye, wheat, tobacco, and hay are grown to some extent. The type of tobacco grown is commonly known as the "stand up" burley. The "Rainbow," another type of burley tobacco, so generally grown on the uplands, is not adapted to the bottom soils. The yields of tobacco are very light, seldom exceeding 500 pounds to the acre.

The original timber growth of this type was beech, white oak, walnut, and yellow poplar.

The following table gives mechanical analyses of samples of the fine earth of the soil and subsoil of this type:

Mechanical analyses of Norfolk fine sandy loam.

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>
9031	Dover Bottoms ...	Sandy loam, 0 to 10 inches.	0.67	Tr.	0.26	5.18	50.84	23.82	13.38	6.50
9027	Charlestown Bottoms.	Sandy loam, 0 to 15 inches.	1.26	0.00	.50	.70	12.50	39.32	33.60	12.96
9029	Dover Bottoms ...	Sandy loam, 0 to 12 inches.	1.11	.22	1.36	1.36	15.20	29.12	35.44	16.60
9032	Subsoil of 9031....	Medium and fine sand, 10 to 36 inches.	.32	.32	5.32	13.08	32.72	16.86	19.90	11.60
9028	Subsoil of 9027....	Sandy clay, 15 to 36 inches.	.16	Tr.	.40	.48	11.20	31.02	37.20	19.70
9030	Subsoil of 9029....	Sandy clay, 12 to 36 inches.	.77	Tr.	1.12	1.06	12.26	31.26	32.60	21.48

NORFOLK LOAM.

The Norfolk loam is a fine brown or yellow sandy loam, from 10 to 24 inches deep, grading into a fine sandy clay or loam extending to a depth of 3 feet or more.

This soil covers a very small part of the county. It occurs in the vicinity of Maysville and Dover. There is also a small area at the mouth of Cabin Creek, and another along the south bank of Lawrence Creek, as it nears the Ohio River. An isolated area is to be found in the Charlestown bottoms. In general this type extends in narrow bands between the escarpment and the river. The surface is level to gently rolling, sloping toward the river. It owes its origin to the reworking of the materials forming the Norfolk fine sandy loam and the Elkton and Hagerstown clays. The deposition, it is supposed, took place in shallow water and when the Ohio River flowed at a much higher level than at present.

The Norfolk loam is used for light farming and the production of truck and tobacco. It is a more productive soil than the Norfolk fine sandy loam, but like that type is deficient in organic matter. The yield of tobacco is somewhat greater on this type than on the Norfolk fine sandy loam, but the quality, even of the best, is not very good.

This type is peculiarly adapted to light farming and the production of the root crops and fruits.

ELKTON CLAY.

The Elkton clay is a gray or brown clay loam, with a depth of 10 inches, grading into a stiff, peculiarly mottled clay, the base color being drab or blue, and the markings streaks of different shades of blue or gray. This material extends to a depth of 3 feet or more, and at about 10 feet assumes a uniform, deep blue color.

This soil type has a very limited distribution within Mason County. It is found in narrow bands bordering the Ohio River, in the vicinity of Maysville, in the Charlestown bottoms, and in the bottoms east of Dover.

The Elkton clay is of alluvial origin, probably derived from the transported shale and limestone clays of the escarpment deposited in the Ohio River when it stood much higher than at present. To some extent the material of this type has been reworked with the Norfolk fine sandy loam, the surface soil of the latter, when reworked as stated, forming the subsoil of the Norfolk loam.

The Elkton clay is used at present for the production of corn, wheat, and grass. The yields are variable. As a general rule the soil is poorly drained, but some areas occur where the drainage conditions are fairly good. As a rule, the yields in a wet season are very poor, and are very much better in a dry season. The areas of this soil are occasionally subjected to overflow, and for this reason, as well as its inadequate drainage, the soil is somewhat cold, and inclined to be acid. With better drainage established this type of soil would give more uniform yields. Its condition, as regards acidity and texture, could be improved by the application of lime. The best cultivated areas of this soil are admirably adapted to grass and grain, and in some ways better adapted to these crops than the Hagerstown loam.

The table on the following page shows the texture of samples of the soil and subsoil of this type.

Mechanical analyses of Elkton clay.

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>
9019	Charlestown Bottoms.	Loam, 0 to 10 inches.	0.56	0.70	1.84	1.30	5.50	22.26	43.00	24.90
9017	1 mile E. of Dover..	Heavy loam, 0 to 10 inches.	1.31	.72	2.60	2.12	5.10	6.96	52.78	29.70
9020	Subsoil of 9019	Mottled clay, 10 to 36 inches.	.54	.60	2.80	1.58	4.48	19.12	40.70	30.70
9018	Subsoil of 9017.....	Mottled clay, 10 to 36 inches.	.78	.38	2.50	1.68	3.50	7.84	50.80	32.92

LEONARDTOWN LOAM.

The Leonardtown loam consists of a reddish-yellow compact silt loam, with a depth of 3 feet or more. Throughout the type occur occasional pockets of well-rounded cherty gravel.

The type occurs in the Charlestown bottoms, lying between the Mason sand and the Elkton clay. The soil is of alluvial origin, being the remains of an old river terrace. The surface features are those of a ridge dissected by furrows and gullies, resulting from general erosion.

Very little of this type is under cultivation, owing to the uneven surface, but where it is cropped it is used for light farming and the production of orchard and small fruits, to which it is well adapted.

The following table gives an analysis of a typical sample of this soil:

Mechanical analysis of Leonardtown loam.

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>	<i>P. ct.</i>
9026	Mason County.....	Silt, 0 to 36 inches.	0.34	0.00	0.32	0.32	0.68	13.68	65.80	18.90

HAGERSTOWN CLAY.

The typical Hagerstown clay consists of a heavy brown or yellow loam, varying in depth from 1 to 12 inches, and resting on a stiff yellow clay.

An important phase of this soil consists of a brown clay loam, with a depth of 7 inches, resting upon a stiff, plastic yellow clay. The soil proper in this phase has been found only upon the tops of some of the ridges or in woodland areas not subjected to washing. Occasionally the subsoil reaches a greater depth than 24 inches, but the average depth is 15 inches, the material resting on bed rock. The surface is broken by many outcrops of limestone and shale and by the presence of quantities of rock fragments, the proportion gradually growing less as the Bracken County line is approached. This stony condition is also prominent in the middle western part of the county. This phase constitutes about one-fourth of the area of the soil type.

The Hagerstown clay covers about 80 per cent of the entire area of the county, embracing the towns of Rectorville, Mount Gilead, Lewisburg, Washington, Sardis, and Minerva. It occupies the more rolling parts of the uplands. The stony phase occupies the northern slopes of the river bluffs from the Lewis County to the Bracken County line and extends back into the uplands bordering the valley slopes of the streams tributary to the Ohio River. A large irregular area of broken and hilly topography is also found in the middle western part of the county and isolated areas occur along the north fork of Licking River. The Hagerstown clay is a residual soil, owing its origin to the decomposition of a limestone correlated with the Upper Hudson of the Lower Silurian era.

At one time the Hagerstown loam undoubtedly covered the greater part of the area now occupied by the Hagerstown clay, but the more resistant character of the underlying rock has resulted in a more broken surface, with consequent rapid drainage and severe erosion, and the soil is shallow. In many places where erosion is extreme the bed rock is exposed.

The principal crops grown on the Hagerstown clay are tobacco, corn, wheat, and grass. The rotation practiced is tobacco followed by corn and then by wheat, which is in turn followed by grass for two years. The plan of rotation varies much in different parts of the area. Tobacco and corn are often grown for two or more years in succession, and the fields remain in grass for indefinite periods.

As regards the quality of the leaf, the Hagerstown clay is a better soil for the production of tobacco than the Hagerstown loam, and best of all is the stony phase of the type. The yields of tobacco range from 800 to 1,200 pounds to the acre—on the stony phase from 500 to 800 pounds.

Corn yields from 25 to 45 bushels, and hay averages about 1½ tons to the acre, which is above the average of the Hagerstown loam. The yield of wheat does not fairly represent the natural productiveness of this type of soil. It ranges from 15 to 25 bushels, although fields well cared for give much better returns than the Hagerstown loam.

The yields on stony areas are somewhat lower—corn from 15 to 25 bushels, and wheat less than 15 bushels per acre.

With the exception of some areas in the northeastern and southwestern parts of the county, the soil is well supplied with organic matter. In typical areas it is well drained, but not droughty—in fact, it suffers much less from this condition than any of the other types of the area. In the stony phase the precipitous features of the escarpment and valley slopes and the generally rough, hilly country afford the most favorable conditions for destructive washing. The surface of such areas is so furrowed and rough in most places as practically to unfit it for the production of cultivated crops. The areas are rapidly becoming barren wastes, and bold outcrops of rock are now seen where once the soil was deep and productive. The type might have been used indefinitely for pasture and for some field crops by confining cultivation to the more gentle slopes. It is remarkable that the destruction of the soil is allowed to continue unchecked.

The Hagerstown clay is adapted to grass and grain, and where stony to grazing and forestry. It is believed that the production of apples, pears, and grapes might be developed on the stony areas of deeper soil found on the tops of the ridges.

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

Mechanical analyses of Hagerstown clay.

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.		Coarse sand, 1 to 0.5 mm.		Medium sand, 0.5 to 0.25 mm.		Fine sand, 0.25 to 0.1 mm.		Very fine sand, 0.1 to 0.05 mm.		Silt, 0.05 to 0.005 mm.		Clay, 0.005 to 0.0001 mm.	
				P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.				
9035	3 miles NE. of Helena Station.	Heavy loam, 0 to 10 inches.	0.72	0.78	5.28	11.24	27.20	18.80	26.10	10.60							
9039	¼ mile NE. of Shannon.	Heavy clay, 0 to 10 inches.	1.43	.62	1.70	1.00	2.20	3.78	66.80	23.90							
9037	1 mile S. of Minerva.	Heavy loam, 0 to 10 inches.	1.15	.80	1.80	1.08	2.50	4.12	54.90	34.78							
9040	Subsoil of 9039.....	Stiff heavy clay, 10 to 36 inches.	.77	.58	2.20	1.20	1.82	3.00	64.10	27.10							
9038	Subsoil of 9037.....	Stiff heavy clay, 10 to 36 inches.	.67	1.00	2.60	1.82	1.70	5.78	54.40	32.70							
9036	Subsoil of 9035.....	Heavy yellow clay, 10 to 36 inches.	.60	1.24	2.14	1.08	2.74	4.70	40.42	46.80							

HAGERSTOWN LOAM.

The Hagerstown loam, commonly known as the "bluegrass land," consists of a productive reddish-brown loam, from 8 to 12 inches deep, grading into a heavy loam of lighter color, which at 24 inches rests upon a stiff, heavy clay.

This type covers 17 per cent of the entire area of the county, and lies in the south-central part in three large, detached areas, surrounded by Hagerstown clay. The continuity of these areas has been broken by erosion, due to the building of the drainage systems of the north fork of Licking River with its tributaries. These areas are very irregular in outline. They include the towns of Helena Station and Mays Lick, and approach the towns of Washington and Lewisburg. A small area lies at the base of the escarpments south and southeast of Maysville. Here the soil is formed of the accumulated wash from the clays of the escarpment.

The Hagerstown loam occurs in troughlike depressions, as related to the general topography of the uplands, but locally it has a gently rolling surface. It is derived from the decay in place of the underlying limestone, which belongs to the Upper Hudson division of the Lower Silurian age. The depth of the decomposed product varies from 3 to 20 feet, becoming more shallow as the type approaches the water courses. The Hagerstown loam is well drained, but is not subjected to the severe wash affecting the Hagerstown clay.

At present the Hagerstown loam is used for the production of tobacco, corn, wheat, and grass. The yields of tobacco range from 1,500 to 2,000 pounds to the acre; of corn, from 50 to 75 bushels; of wheat, from 15 to 20 bushels, and of hay, from 1 to 1½ tons to the acre. A five-year rotation is the common practice on this type of soil. The usual scheme consists of tobacco, followed by corn; then wheat, followed by two years in grass.

This type is esteemed the most productive soil in the area for general farming. Its especial adaptations are the production of corn and white burley tobacco.

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

Mechanical analyses of Hagerstown loam.

No.	Locality.	Description.	Organic matter.	Gravel, 2 to 1 mm.	Coarse sand, 1 to 0.5 mm.	Medium sand, 0.5 to 0.25 mm.	Fine sand, 0.25 to 0.1 mm.	Very fine sand, 0.1 to 0.05 mm.	Silt, 0.05 to 0.005 mm.	Clay, 0.005 to 0.0001 mm.
			P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.	P. ct.
9045	Mays Lick.....	Loam, 0 to 14 inches.	2.69	2.40	2.80	1.20	2.40	5.10	62.76	23.80
9043	2 miles S. of Washington.	Brown loam, 0 to 12 inches.	1.69	.38	1.20	.60	1.36	3.26	68.30	24.78
9041	2 miles N. of Helena Station.	Brown loam, 0 to 18 inches.	1.57	1.52	2.80	1.50	2.54	4.48	59.40	28.06
9044	Subsoil of 9043.....	Yellow clay, 12 to 36 inches.	1.21	.80	1.20	.56	.92	2.16	65.36	29.00
9042	Subsoil of 9041.....	Yellow clay, 18 to 36 inches.	1.28	1.52	3.72	2.40	3.68	5.04	52.62	30.90
9046	Subsoil of 9045.....	Loam, 14 to 36 inches	.92	1.00	.80	.48	1.20	7.30	47.76	41.30

MEADOW.

The term Meadow as used in this report is not to be taken in its usual meaning, "grass land." It signifies here the wet and poorly drained lands adjacent to water courses, and at present unsuited to the cultivation of crops. It implies a soil condition rather than a soil type, the texture varying widely.

In Mason County Meadow has a very limited distribution. It occurs along Cabin Creek, at the mouths of Bull and Limestone creeks, and lies along Lawrence Creek from Moranburg north to its mouth. The streams in the uplands have no Meadow along their courses, flowing, as they do, through deeply cut, narrow channels.

The Meadow forms a part of the permanent pastures of the area, and this is about the only use made of this type at present.

AGRICULTURAL CONDITIONS.

The chief interests of Mason County are agricultural and consist of the production of tobacco, grass, and grain. Stock raising, which was formerly a prominent industry, is for some reason declining, to judge from statistics published by the State in 1878 and 1902. In the former year there were 6,000 horses and mules in the county, while in 1902 there were only 3,000. During the same period the number of hogs decreased from 11,000 to 5,333. The number of cattle remained about the same, while it is probable that the number of sheep increased somewhat during the intervening period. The decrease in stock raising is attributed partly to the low prices which followed the panic of 1893.

Formerly there were many fine thoroughbred and trotting horses in the county, but their production has almost ceased. At present the draft horse is the type usually raised, and some fine animals, the progeny of common mares and imported sires of Percheron, Clydesdale, and English Shire breeds, are seen on the best farms of the county. Only enough mules are raised in the county to supply the local demand for work animals.

The beef cattle were formerly of Shorthorn grades, but at present, with the exception of a few Aberdeen-Angus and one herd of Red Polled cattle, the stock is a mixture of many bloods. There is very little dairying in the area. Cattle of the dairy type consist of Jersey and Jersey grades, which are kept mainly for the domestic milk supply. The sheep are usually Shropshires and Southdown and Merino grades, or crosses of the mountain sheep (which are also grades) and the Southdowns, or of the latter and the Cotswold breed. Sheep are raised chiefly for mutton, although the wool clip is one source of income, and nearly every farmer has at least a small flock.

There are four breeds of hogs—Berkshires, Poland-China, Jersey Reds and Chester Whites, but by far the greater number are grades

of these bloods, crosses between the Berkshires, Poland-China, and the Jersey Reds. The Berkshires and Jersey Reds are most common.

A few herds of cattle are kept on the pastures and fattened in the fall on corn and corn fodder. These "feeders" are largely prepared for the local markets, a much larger proportion of the cattle being sold as "stockers" for other sections to feed and fatten.

Hogs are usually fattened for the market. They are made to weigh 200 pounds or more, and are driven to the county seat, and there loaded and shipped to nearby and eastern markets. On the whole the grade stock is fairly good, but the lack of pure breeds is remarkable for a county with so many highly improved farms.

The most prosperous part of Mason County, as indicated by the character of the farm buildings, is the central-southern section, where the soil type is the Hagerstown loam, while the poorest conditions are found in the central-western part, occupied mainly by the stony phase of the Hagerstown clay. The worst conditions are thus seen to occur in areas where tobacco is grown most frequently on the same fields.

The farm buildings range from the cramped, one-story quarters of the tenants along the highways to the colonial mansions of the owners of large tracts of rich lands, with their beautiful approaches, groves, winding driveways, and walks. The average dwelling consists of a two-story structure of great variety of material and design. The out-buildings are usually more uniform, consisting of a large tobacco barn, in which wagons and carriages are often stored, as well as the tobacco; while the basement accommodates the live stock. There is also a building for the milch cattle and work stock, the loft of which is used for hay and forage. In addition to the stable there is generally a crib for the storage of surplus corn. The fields are inclosed by rail or wire fences, while along the highways hedges and stone walls frequently take the place of the more unsightly fences.

The size of the farms varies greatly. There are only nine in the county containing more than 500 acres. About one-fourth of the 1,572 farms reported by the Twelfth Census contain between 50 and 100 acres, and the average size of all farms is 90.8 acres. The valuation for the entire county in 1902 gave an average value of \$37 an acre. In the same year there were only 224 farms in the county against which there were mortgages outstanding.

About 1,000 of the farms in the county are operated by the owners. Five hundred are farmed by tenants on a share basis, and only 83 are rented for cash. On the share basis the landlord receives one-half the crops. The tenant usually provides the labor and work stock. The landlord specifies the crops to be given, and indicates the fields and acreage to be used for each crop. Over 75 per cent of the owners live upon their farms, even where rented. To the careful supervision

which they are thus able to give is to be attributed the high state of productiveness of the soil, much of which has been under cultivation for more than 100 years.

Little trouble is experienced in securing tenants for the more productive soils of the county. Labor is generally much above the average in efficiency. Field hands, when employed by the year, are paid from \$8 to \$20 a month. Transients, used chiefly in the harvest season, get from \$1 to \$2 a day.

The leading crops of the county are wheat, corn, grass for hay and pasturage, and tobacco. The preparation of the soil is generally thorough, and many modern implements, such as horsepower drills, corn planters, mowers, rakes, etc., are seen throughout the area, especially in the important and productive region of the Hagerstown loam, already referred to. The corn, corn fodder, and hay are largely consumed within the county. There has been a decrease in the production of wheat, hay, and corn during the last ten years. The yield of corn has apparently dropped off more, proportionately, than that of the other crops. Although the yield of tobacco was 1,000,000 pounds less in 1902 than in 1893, it is at the present time the principal money crop of the area, and brings an average price of about 6 cents a pound, ranging from 4 to 12 cents, according to quality. Upon the uplands the "Rainbow" variety of burley is the favorite with the planters. This is a drooping plant, while upon the lowlands the erect burley is more highly esteemed. Both of these belong to the white burley type of tobacco.

This tobacco is used for manufacturing purposes, and is largely exported to foreign countries. Certain leaves are selected for cigarette wrappers and fillers. These are usually found between the ground leaves and the lugs. The price paid for cigarette tobacco ranges from 15 to 40 cents a pound. It would seem that since some of the soils produce more of these leaves than others, these types could be profitably used to increase the supply of this desirable grade of leaf. At present the proportion of cigarette tobacco is very small, only a few pounds being secured, ordinarily, from a large crop. From conversations with many tobacco growers, it would seem that these leaves are the result of local soil conditions and uneven curing. At the present time an experiment is being tried to produce a tough and bright leaf for this purpose by growing burley under shade.

To repeat, for the sake of emphasis, some of the more salient characteristics and adaptations of the soils of the area, the Hagerstown clay has the largest distribution, and is used for general farming purposes. Although it is not so easily cultivated as the Hagerstown loam it is much better adapted to the production of grass and grain. It yields much less tobacco than the Hagerstown loam, but the quality of leaf is decidedly better. The severe washing now taking place in some parts of the Hagerstown clay ought to be checked. The slopes should

be utilized as permanent pastures, or for timber growth. In general, this type is deficient in organic matter, which should be incorporated wherever practicable, while the practice of deeper plowing would do much to improve the tilth of the soil.

The Hagerstown loam is generally considered the most productive soil of the area for general farming purposes. Upon this type is found the greater number of improved farms. It is valued at from \$100 to \$150 an acre. The yields of corn and tobacco are very heavy. The experiment in growing burley under shade is being tried on this soil, which, if successful, will develop an important industry.

The stony phase of the Hagerstown clay, owing to its rough and broken surface features, is not adapted to intensive agriculture. Its topography and continual cropping have allowed the surface waters to denude the rocks of their soil covering in many places, and have resulted in entirely unfitting the land for agricultural use. It is the only land which is kept permanently in pastures, for which it is well adapted. The upland ridges could be utilized to advantage in the production of apples, peaches, and grapes. No further reference need be made to the foreland soils, which are relatively of little importance.

The transportation facilities of the county are fairly good. The main division of the Chesapeake and Ohio Railroad runs east and west through Maysville, while a branch of the Louisville and Nashville Railroad runs north and south through the area, terminating at Maysville. The freight rates on the Louisville and Nashville are reported to be very high, and most of the freight is hauled to Maysville and shipped from that place. Mason County has a fine system of public roads, which are generally in good condition.

The markets of the area are Cincinnati and the larger eastern cities. Most of the wheat is sold for shipment out of the county, only enough being retained to supply the needs of the stock. There is practically no competition in the local tobacco market, the Continental, American, and Imperial tobacco companies being the only buyers in the field.

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