Issued October 19, 1907.

U. S. DEPARTMENT OF AGRICULTURE,

BUREAU OF SOILS—MILTON WHITNEY, Chief.

IN COOPERATION WITH THE INDIANA AGRICULTURAL EXPERIMENT STATION.
A. GOSS, DIRECTOR.

SOIL SURVEY OF GREENE COUNTY, INDIANA.

BY

W. E. THARP AND CHARLES J. MANN.

[Advance Sheets—Field Operations of the Bureau of Soils, 1906.]

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1907.

[PUBLIC RESOLUTION—No. 9.]

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

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

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

Approved March 14, 1904.

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

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LETTER OF TRANSMITTAL.

UNITED STATES DEPARTMENT OF AGRICULTURE,
BUREAU OF SOILS,
Washington, D. C., November 13, 1906.

SIR: In order that the study of the soils of southern Indiana in their relationship to the chief staple crops of the region might be continued a soil survey of Greene County, Indiana, was made during the summer of 1906. I transmit herewith the report on this survey and recommend that it be published as advance sheets of the Field Operations of the Bureau of Soils for 1906, as provided by law.

Respectfully,

MILTON WHITNEY,
Chief of Bureau.

Hon. JAMES WILSON,
Secretary of Agriculture.

CONTENTS.

	Page.
SOIL SURVEY OF GREENE COUNTY, INDIANA, BY W. E. THARP and CHARLES J. MANN	5
Description of the area	5
Climate	8
Agriculture	9
Soils	11
Miami sand	13
Bloomfield sandy loam	14
Sioux sandy loam	16
Marco fine sandy loam	16
Waverly fine sandy loam	18
Huntington fine sandy loam	18
Clyde sandy loam	20
Miami silt loam	23
Huntington silt loam	27
Marshall silt loam	28
Waverly silt loam	29
Marco clay loam	31
Clyde clay	33
Peat	35
Rough stony land	37
Riverwash	38
Summary	38

ILLUSTRATIONS.

FIGURE.

	Page.
FIG. 1.—Sketch map showing location of the Greene County area, Indiana	5

MAP.

Soil map, Greene County sheet, Indiana.

SOIL SURVEY OF GREENE COUNTY, INDIANA.

By W. E. THARP and CHARLES J. MANN.

DESCRIPTION OF THE AREA.

Greene County is located in the southwestern part of Indiana. It is bounded on the north by Clay and Owen counties; on the east by Monroe and Lawrence; on the south by Knox, Daviess, and Martin; and on the west by Sullivan County. The parallel of 39° north latitude and the meridian 87° west from Greenwich cross the county, in-

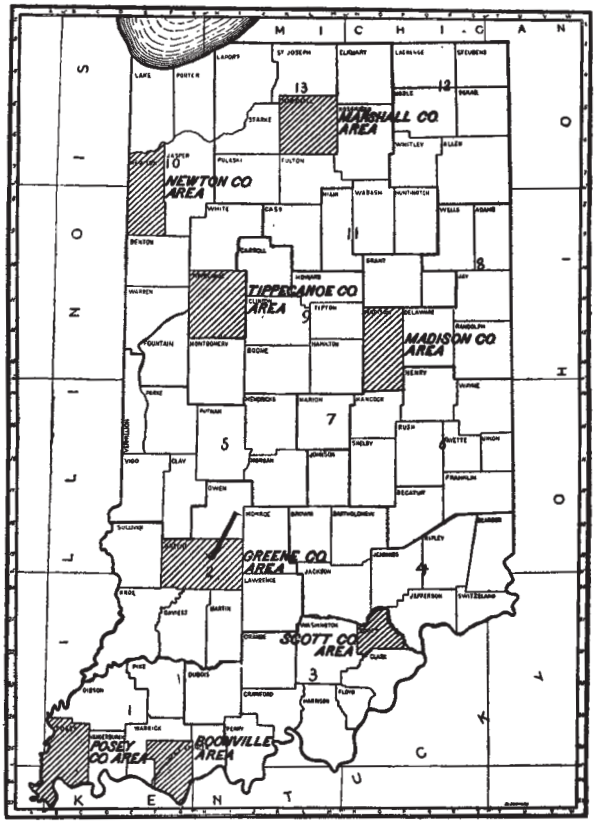

FIG. 1.—Sketch map showing location of the Greene County area, Indiana.

tersecting a few miles southwest of Bloomfield. The area is 342,400 acres, or 535 square miles.

All this area, excepting several sections of land in the southeastern corner which are tributary to Indian Creek, is drained by the West

Fork of White River. This stream crosses the northern boundary about 3 miles east of the middle and follows a southern and southwestern course, dividing the county into two nearly equal parts. Its valley varies in width from 1 mile to several miles. On the eastern side it is bounded by hills which rise abruptly from the flood plain. Most of them are steep, but generally admit of cultivation. From Worthington northward, and also opposite Bloomfield, the uplands decline rather sharply to the western side of the valley.

Between Worthington and the lower part of Lattas Creek there is a level area about 1 mile in width, formerly known as the Worthington Marsh. It is connected on the north with the valley of Eel River and also opens upon White River a short distance below Worthington. Its surface lies several feet above the high-water mark of these streams and it drains southward into Lattas Creek. It is bounded on the west by high hills—an old bluff—too steep in some places to be of much agricultural value. On the east, between it and the river, a ridge rises gradually from the marsh to a height of more than 100 feet and then drops abruptly to the flood plain of the river.

The level areas in the southern part of the county west of the river resemble the one just described, and have the same general relationship to the valley proper and to the higher land adjoining. While they may be considered an expansion of the valley of White River they are separated from it by irregular shaped areas of upland which rise nearly to the height of the land several miles back from the stream. The Goose Pond and Beehunter marshes are valleys of old tributaries now filled much above their former levels by comparatively recent sedimentation. The uplands rise more than 200 feet above the level of these areas.

The surface of the northwestern townships presents considerable variation and is characterized by long, gradual slopes and broad, evenly rounded ridges. Lattas Creek drains most of this section of the county. An area of about 40 square miles on the northern boundary is drained by the Howesville and Lemon Creek ditches, which empty into Eel River.

The eastern half of the county is rough and broken. Richland Creek, which is the largest eastern tributary, enters the county near the northeastern corner and empties into White River below Bloomfield. Plummer and Doans creeks lie south of Richland Creek, and are much inferior in size and length. Several small streams which empty into White River drain the northern part of this section.

The valleys of all these creeks are narrow. Along Richland and Plummer creeks they occasionally widen to one-half mile, but in general are less than a quarter of a mile in width. All of them—even the narrow ones—are characterized by low, flat-topped terraces conspicuous by reason of the whiteness of the soil—the Waverly silt loam.

The interstream areas in this part of the county are everywhere deeply dissected by secondary tributaries. The hillsides and ridges which lead up to the crests of the major divides present every degree of slope and variety of form. The relief is so varied that no general description will apply to all of it. Between the drift boundary and the river much of the surface is rolling, with the very rough land confined for the most part to the neighborhood of the creeks, but east of the limit of glaciation there are many bold outcrops of limestone and of the harder strata of the Mansfield sandstone. Some of the broader divides afford considerable arable land, but they invariably decline on each side to short, narrow ridges separated by deep ravines.

Greene County was organized in 1820, the year after the Indians vacated this part of the State. The first settlement was made in 1817 in Fairplay Township. In the next few years many immigrants arrived and settlements were made in other parts of the county. Only a few of these pioneers selected lands in the river bottoms, most of them preferring the uplands.

The majority of the early settlers came from the eastern counties of Indiana and from Ohio. Each of the older northern States seems to have been represented, but a considerable number of people from Kentucky, eastern Tennessee, and the Carolinas settled in the eastern townships. Very few foreigners have come to the county, and the present population is chiefly the descendants of many generations of native-born citizens.

Bloomfield, the county seat, and Worthington each have about 2,000 population. Linton and Jasonville are larger towns located in the coal fields and are good local markets for much of the farm produce grown in their vicinity.

The county roads radiating from these towns are well constructed and most of them graveled. The roads in the western townships are easily traveled. Those in the eastern part of the county are generally located on the ridges and thereby avoid many steep hills. Most of the county is well served by rural delivery of mails and local telephone lines.

The shipping facilities of the middle and western parts of the county are excellent. The Evansville and Terre Haute, the Indianapolis and Vincennes, and the Southern Indiana railroads cross this part from north to south. There is also a branch of the Chicago, Indianapolis and Louisville—the Monon route—extending from Switz City southeast to Bedford. The recently completed Indianapolis Southern, which crosses the county from east to west, will give the eastern townships much better shipping facilities than they have had heretofore.

CLIMATE.

The climate of this area presents no marked extremes in either temperature or precipitation. During the summer months there are many hot days, but there is usually a wind movement which tempers the heat and confines the oppressive effect to the narrow valleys or to locations to the leeward of high ridges.

The winters are usually mild and the snowfall light. The depth to which the ground freezes is variable. It seldom remains frozen longer than a few weeks, and a February thaw is always expected. The surface if unprotected invariably freezes and thaws to a depth of several inches a number of times during the latter part of the winter.

The following tables, compiled from the Weather Bureau records at Worthington, Greene County, and Washington, Daviess County, show the temperature and rainfall and the dates of killing frosts:

Normal monthly and annual temperature and precipitation.

Month.	Worthington.		Washington.		Month.	Worthington.		Washington.	
	Temperature.	Precipitation.	Temperature.	Precipitation.		Temperature.	Precipitation.	Temperature.	Precipitation.
	° F.	Inches.	° F.	Inches.		° F.	Inches.	° F.	Inches.
January	.....	.....	34.2	3.29	August	73.3	3.68	77.0	3.51
February	31.6	3.61	30.6	2.19	September	66.6	3.14	70.1	3.77
March	41.2	3.76	47.4	5.28	October	55.3	2.59	59.6	2.65
April	54.3	3.52	53.5	2.76	November	42.2	4.15	47.2	3.98
May	62.8	3.78	66.0	3.43	December	33.0	3.07	34.0	3.14
June	72.4	4.58	74.1	4.90	Year	.....	.....	56.0	42.32
July	75.2	3.55	78.8	3.42					

Dates of first and last killing frost.

	Worthington.		Washington.			Worthington.		Washington.	
	Last in spring.	First in fall.	Last in spring.	First in fall.		Last in spring.	First in fall.	Last in spring.	First in fall.
1897	Apr. 10	Sept. 21	Apr. 21	Nov. 6	1902	Apr. 15	Sept. 14	Apr. 14	Oct. 14
1898	Apr. 7	Oct. 15	Apr. 7	Oct. 23	1903	May 4	Sept. 17	May 2	Oct. 18
1899	Apr. 16	Sept. 27	Apr. 9	Sept. 27	1904	Apr. 21	Oct. 23	Apr. 21	Oct. 26
1900	May 10	Oct. 18	Apr. 13	Nov. 8	Average.	Apr. 20	Sept. 30	Apr. 17	Oct. 20
1901	Apr. 21	Sept. 18	Apr. 21	Oct. 5					

The frost record at Worthington is not a correct indication of the range of temperature for the entire county. This station is located in a peculiar angle of the river valley, where the air drainage is poor. A record for the adjacent uplands would doubtless show a somewhat longer growing period for fruits and vegetables.

AGRICULTURE.

All the county, except the so-called marshes and Four-mile Prairie, was originally forested. During the four or five decades following the first settlements the agricultural development was slow. In 1850 not more than 10 per cent of the arable land was cleared. In the absence of a market the finest of walnut, yellow poplar, ash, and hard maple trees were felled and burned in heaps. Even so late as thirty years ago land was cleared of less valuable varieties in the same way.

The settlers produced most of the food they and their families consumed. Corn was usually the first and most important crop, and preceded the general cultivation of wheat. The clearings were protected by " stake-and-rider " fences, and the cattle and hogs supported themselves in the woods.

For many years Vincennes, Terre Haute, and Louisville, Ky., were the nearest trading points. Wheat and tobacco were hauled by ox teams and the live stock driven to those markets. The completion of the Wabash and Erie Canal, about 1849, provided other markets. The first railroad, the Indianapolis and Vincennes, was not in operation through the county until 1864.

Those settlers from the mountainous sections of the South influenced the character of the agriculture in the eastern part of the county. They were generally content with small farms and methods which required a rather limited use of labor-saving implements. They introduced the culture of tobacco, which about forty years ago was grown on more than 100 acres in the neighborhood of Solsberry and Newark. This industry, though never extensively developed, brought considerable money into the section, the cured product, which was of fine quality, finding ready sale at Louisville, Ky.

The usual farm crops have always received more attention than any special industries. Stock raising and fruit growing have not been of great importance, and dairying has been entirely neglected. During the last forty years agriculture in the three eastern townships has suffered a decline. A steadily increasing number of the younger men have been attracted to the better and more easily farmed lands elsewhere or have sought employment in the mines.

In the western half of the county corn, wheat, and oats have been the principal crops. For many years their acreage increased only as the uplands and the river bottom were cleared. About twenty-five years ago the drainage of the " marsh land " began, and the yields of grain, especially corn, from these fertile tracts have greatly increased the total production of the cereals in this county. In character of improvements and adaptability to economical methods of tillage the

reclaimed lands are superior to the uplands. During the last twenty-five years the acreage of oats has materially increased, being now in the neighborhood of 15,000 acres. The average yield is about 25 bushels per acre. During the same period the acreage devoted to wheat has varied greatly from year to year, but has suffered a decrease from a maximum of about 45,000 acres to 16,000 acres. The highest average yield recorded for the entire county is 16 bushels per acre, but in favorable seasons some types of soil have averaged twice this quantity. There has been a marked increase in the acreage of corn. In 1895 48,130 acres produced 1,748,720 bushels. In 1884 39,000 acres yielded 1,122,910 bushels. The returns from the two years selected are quite near the average for the group of five years preceding each. According to the census of 1900, the acreage in corn was 58,645 acres, and the total yield was 1,926,550 bushels. There has probably been a decline in two or three of the eastern townships. The reclaimed marsh land, which has been devoted almost exclusively to corn, accounts in large measure for the increase in the production for the county as a whole, but there has been a tendency everywhere to extend the area devoted to this cereal.

Some of the soils are persistently planted to corn, to the exclusion of other crops to which they are better adapted. This is especially the case with some of the peaty lands and the Waverly silt loam, which produce heavy crops of timothy and only occasionally good yields of corn. Orchards have generally been planted on the Miami soils. Tobacco and truck crops have been confined to the type most favorable to their production. The adaptability of certain soils to different crops is quite well recognized, but not generally practiced. The same is true in a large measure with regard to rotation. The change of crops on every type is governed more by the convenience of the farmer or probable future prices than by the requirements of the soil.

During the last five years the general high price of grain and the decline in profits derived from cattle feeding have stimulated the production of the cereals and discouraged the raising of cattle and, to some extent, all other live stock. The tame grasses therefore have not been particularly profitable crops, even with those farmers who live on their own land and keep some live stock, while offering very little inducement to tenant farmers, who have little stock except their work teams. Neither class think they can afford to grow clover to be turned under for the benefit of a succeeding crop of corn.

Neither oats nor wheat give large returns over the cost of production, but are indispensable in affording a change for the land and an opportunity for seeding to grass.

Such industries as dairying and fruit growing, or special crops, such as broom corn, potatoes, and truck, have not received the atten-

tion they might have, on account of the cost of farm labor. The farmers are almost in direct competition for labor with the coal mine and stone quarry companies of this and adjoining counties. The usual wages given for a farm hand are $20 a month and board. Many of the small landowners employ but little hired help, and many of the owners of large farms either rent the land they can not cultivate themselves or furnish a house and garden lot to married men, whom they employ at $1 or $1.25 a day.

The average size of farms is 94 acres. Those in the eastern part of the county are generally small, while the holdings in the river bottom and in the western section of the county are larger. There are a few estates containing more than 1,200 acres each.

The assessed value of farm lands in 1895 was $5,872,988, and of the improvements thereon $1,575,816. These figures represent about one-half the actual value of the farms in the county. The census of 1900 gives the value of the farm lands, including farm buildings, as $8,119,230. Land adapted to corn has advanced in value during the last few years, while that only suitable for grass or pasture has declined.

All the light-colored soils are in need of organic matter. Many old fields are in such bad physical condition that only by leaving them in grass for a number of years or by the application of large quantities of manure or by the use of green manuring crops can they be restored to their former state of productiveness. It would seem that stock raising or dairying, alone or combined with fruit growing offers the most practicable method for handling such lands.

In this connection due consideration is given the fact that the present high prices for corn, the cost of farm labor, and the uncertainty of profits which has attended the feeding of cattle have encouraged the production of grain, and that landlords invariably demand such terms of their tenants that the latter have no alternative, but must grow corn and keep but a few head of cattle or hogs.

SOILS.

The soils of Greene County have been formed from deposits of Pleistocene or later geological age. The underlying rocks belong to the Carboniferous, but these have contributed only indirectly to the formation of the soil, as they are covered almost everywhere by later deposits of Glacial age. The western two-thirds of Greene County was covered by the great continental ice sheet, whose eastern limit corresponds approximately with a line drawn through Newark and Scotland. Between this line and the White River the glaciation was apparently feeble, as the old topography has not been greatly changed, while west of this stream the inequalities of the

surface were greatly reduced. East of the White River the drift is thin, and is composed largely of sand and gravel. West of the river it is considerably thicker, and consists largely of silt and clay, with comparatively little sand and gravel and only a few small bowlders. On most of the long slopes and low divides of the northwestern townships the drift forms the deep subsoil overlain almost everywhere by the loess. Its direct influence upon the soils is therefore small, although it has doubtless contributed considerable material to the formation of some of the alluvial types.

The loess is the most important soil-forming deposit in the county. It forms a thin, but almost unbroken mantle, seldom exceeding 10 feet in thickness, over both the glaciated and unglaciated parts of the uplands. In general, it is thickest on the summits of the ridges, thinnest on the flanks, and seems to become thicker again near the foot of the slopes. This is probably due to the greater amount of erosion that has taken place on these slopes. In the hilly sections of the county its average depth is 5 feet. The loess consists very largely of silt, and represents material ground up by the ice, assorted by water, and distributed by the wind. The weathering of this silty layer has given rise to the most extensive soil type in the area—the Miami silt loam. The loess material, however, has entered more or less into the formation of nearly every type in the area.

Upon the uplands bordering the White River Valley, and usually overlying the loess, occur areas of sand which were probably deposited in the valleys by the river when swollen from the melting of the later advances of the ice and then drifted upon the adjoining hills by the wind. This sandy material has given rise to lighter textured soils.

The advance in the ice caused some marked changes in the course of the streams. The Eel River and probably the White formerly flowed along the channel now occupied by Dead Creek Ditch. The White River also swung west almost to Switz City, Lyons, and Marco. These old valleys were partially filled with glacial material more or less reworked by water. The coarse water-laid sand and gravel underlying Worthington Marsh and Four-mile Prairie were deposited at this time. The character of the surface material also indicates that it is from the same source, but deposited in comparatively quiet water. In fact, it is very probable that the marsh areas represent former lake beds. The light-colored soils along the border of these old valleys are composed principally of recent sediments derived from the uplands to the north and west. This deposition of local material is still in progress. Its influence has not reached the dark-colored soils, and since the larger areas of these soils lie a little too high to be affected by the river, they remain very much the same in texture as when laid down. The poorly drained condition has re-

sulted in an accumulation of large amounts of organic matter in the soil, while in some places Peat has been formed. These dark-colored, reworked glacial soils have been included in the Clyde series.

Since the final retreat of the ice the streams have been lowering their channels, the energies of the White River being confined to the eastern side of the major valley. This stream has removed or greatly modified the older alluvium, and the present flood plain consists of reworked loess mingled with other material brought by the river from the upper parts of its course. The soils of recent alluvial origin may be divided into two series, according to differences in the character of the material. Where the material is entirely of local origin the soils are deficient in organic matter, very light in color, and low in productiveness, while those composed of material partly of foreign origin contain more organic matter, are yellowish-brown in color, and are quite productive. The former have been placed in the Waverly series and the latter in the Huntington series.

The soils of Greene County vary in texture from sand to clay, but the large predominance of silt and the finer grades of sand confine most of them to those classes designated as silt loams and fine sandy loams. While a rather close relationship exists in respect to texture, the soils differ widely in other respects. According to the similarity in other characteristics except texture, the soils have been arranged in four principal series—Miami, Waverly, Clyde, and Huntington—with single representatives of other series. The following table gives the name and area of each soil type found in Greene County:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Miami silt loam	224,512	65.6	Marco clay loam	3,200	0.9
Waverly silt loam	25,152	7.4	Marshall silt loam	2,688	.8
Rough stony land	18,432	5.4	Peat	2,624	.8
Huntington silt loam	16,512	4.8	Waverly fine sandy loam	2,560	.7
Huntington fine sandy loam	13,696	4.0	Miami sand	512	.1
Clyde sandy loam	11,712	3.4	Riverwash	192	.0
Bloomfield sandy loam	10,944	3.2	Sioux sandy loam	128	.0
Clyde clay	6,144	1.8	Total	342,400	.....
Marco fine sandy loam	3,392	1.0			

MIAMI SAND.

The texture of the Miami sand ranges from medium to coarse, with a small amount of fine gravel. The surface is a dull or dirty gray. The moist sand below is generally a dark reddish-brown changing to a lighter brown with depth. There is some fine material present, but seldom enough to cause the wet sand to cohere. At a

depth which varies greatly within very short distances a substratum of sticky clayey sand is found, similar to the subsoil of the Bloomfield sandy loam. This forms a moisture reservoir, but in most of the areas mapped as Miami sand it lies at a greater depth than 3 feet. In the depressions the soil is more loamy and darker colored.

Two small areas of Miami sand are found west of White River. The largest lies northwest of Bloomfield and the other is located about 1½ miles southeast of Worthington. The latter has a general north and south trend and is practically a low narrow sandhill lying between the river valley and the second bottom. The area north of Bloomfield occupies a rather high hill which overlooks the river valley. The irregularities of the surface are pronounced and several deep ravines intersect it.

Wheat and clover may be grown successfully on this type. In wet seasons corn will give a fair return. Melons, sweet potatoes, and other early garden truck do well. A small acreage of melons is grown near Bloomfield for the local markets.

The following table shows the composition of a sample of this soil:

Mechanical analyses of Miami sand.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
15375	Soil	0.6	22.0	35.2	24.9	1.4	11.7	4.2

BLOOMFIELD SANDY LOAM.

The soil of the Bloomfield sandy loam is a medium to fine reddish-brown sand, containing a small percentage of silt and clay. The texture becomes coarser to a depth of 15 to 20 inches where there is an appreciable increase in the silt and clay content, which continues to a depth of several feet. In cultivated fields the surface bleaches to a dull-gray or slightly reddish-gray, and while everywhere loose, and on some of the ridges quite incoherent, it maintains fair moisture conditions. In the northern part of the area the texture of the soil is somewhat finer than elsewhere.

The subsoil is a medium to coarse sand or sandy loam darker in color than the soil. At a depth usually less than 3 feet it grades into a stiff, compact, sandy, silty loam. This heavy substratum contains a sufficient quantity of clay to render it somewhat sticky when moist, and very hard and compact when brought to the surface and allowed to dry.

Sometimes the subsoil changes again to a loose light-gray sand, which is usually dry, much coarser than any of the material above

it, and presents a greater variety in the composition of its grains. This stratum is seldom present along the margins of the areas of Bloomfield sandy loam farthest from the river. In the latter places the finer grades of sand form the soil, which overlies the loess.

It is probable that the sand was derived from sediments laid down in the river valley and drifted to the present position by the wind. Some low areas which have much coarse material may be ascribed to the agency of water, but the variable depth, erratic distribution, and the great topographic range of most of the type indicate wind action as the chief formative agency.

Most of the surface material consists of iron-stained quartz sand, but the deeper strata exhibit considerable variety in the character of the grains, indicating a derivation from crystalline rocks rather than the local sandstone.

The largest areas of this type occur on the bluffs overlooking White River. A few of them extend back upon the upland and gradually pass into a closely associated type, the Miami silt loam. Some of them, however, end very abruptly and are separated from the Miami silt loam by a narrow ravine. Both slopes of the ravine invariably consist of typical loess, indicating that the heavier material was deposited first.

The topography varies from gently rolling hills to a "hummocky" surface consisting of small mounds and narrow ridges of low relief. The intervening depressions are very irregular in size and outline. Not many of them are entirely inclosed, but generally open upon the lower areas of the adjoining types. Several conspicuous elevations near Worthington are capped with sand which averages finer in texture than most of the type found between Bloomfield and Newberry.

All of this type was originally forested. Some of the low, dune-like areas in the marshes are yet covered with oak, and on the river bluffs ash, poplar, sugar maple, and even walnut attain a good size. Most of the timber, however, has been removed.

The crop value is determined largely by the character of the subsoil, which constitutes the moisture reservoir. Where it is deep good crops of corn and wheat may be secured. Clover is grown successfully and a few small fields of alfalfa have been sown. The limited acreage of rye in this county is almost entirely confined to the Bloomfield sandy loam. Melons and tomatoes, as well as early garden crops give good yields. All the varieties of fruit trees adapted to this section make a satisfactory growth. Cherries do especially well and some small orchards of apples and peaches present a promising appearance. On all the upland areas the air drainage is good. There is such a variety of slope and also of moisture conditions, due to the variable nature of the subsoil, that good sites for orchards abound. The annual crops are likely to suffer from

continued drought, and the yields depend largely on the rainfall during the growing season.

This type is easily cultivated and does not wash badly, except on the steepest slopes. By frequent changes to clover some farmers are maintaining a dark, loamy appearance of their fields, and they usually secure good returns of wheat and corn. The organic matter whether it consist of clover, stubble, or barnyard manure, soon burns out and a continuous supply is a matter of prime importance. The surface of this sand should be exposed to the direct rays of the sun as little as possible. A cover crop of some kind is especially beneficial during the fall. Early plowing for wheat, which leaves the soil exposed for a number of weeks, is believed to be detrimental in that it hastens the disappearance of the organic matter.

Much of this type is included in farms which have other types of soil, so that its value can hardly be stated. Most of it is devoted to the usual farm crops, and only where considerable areas of the deepest sand occur is it estimated at a lower value than adjoining areas of silt loam and fine sandy loam.

SIOUX SANDY LOAM.

The soil of the Sioux sandy loam consists of a dark reddish-brown sandy loam or heavy fine sandy loam about 1 foot in depth. It contains some small stones, but is easily cultivated. The subsoil contains so much gravel that it is well-nigh impenetrable with a spade or plow.

One area of this type lies on the north county line just east of White River in the form of a small gravelly terrace, 10 or 15 feet above the valley, and composed of glacial material brought down by Jacks Creek, which at this point flows northwest along the east side of this terrace. Another small area is found east of Worthington, where it occupies a low terrace between a ridge of Miami sand and an arm of the river valley. Here the soil is gray in color and coarser in texture than the soil of the area just described. It is also somewhat deeper and contains fewer stones. The organic content is low, but the presence of considerable fine material gives it a loamy character. The subsoil consists of a coarse reddish-brown sand with more or less gravel.

This type will not endure drought, but in seasons when the rainfall is well distributed it produces good crops of corn and wheat. Its very limited extent in this survey makes it of minor importance.

MARCO FINE SANDY LOAM.

The surface soil of the Marco fine sandy loam is an incoherent sandy loam becoming heavier with depth. The dry surface is usually

of a dull gray color, but the body of the soil is yellow or yellowish brown. At a depth of from 12 to 15 inches the material is much more compact. Here it is a sandy clay loam, usually moist and plastic, but not very sticky. The sand is sometimes somewhat coarser than at the surface and the texture is not uniform. Thin streaks or pockets of medium to fine sand may occur at any depth. The color of the subsoil is a light yellow, streaked or mottled with light gray. The sand shows iron stains ranging from chocolate brown to buff.

The Marco fine sandy loam is represented by several small areas adjacent to areas of the Bloomfield sandy loam. It is usually developed along the border of the latter type farthest from the river. It is probable that the two soils have a similar origin and that the sandy loam represents the drift or wash of fine sand over the loess. The peculiar topography of some of the uplands on the west side of White River is favorable to such a distribution of the sand. The hills rise very abruptly from the valley, forming quite a high bluff, and then decline very gently toward the low ground which lies a mile or so back from the river.

There is an area of Marco fine sandy loam north of Bloomfield which consists for the most part of land which slopes gradually toward the west. There are areas southwest of Lyons which are nearly level. The one farthest east is bordered by dunelike ridges of Bloomfield sandy loam, and some of the interdune areas have been included in this type. They represent a transition between the Clyde sandy loam and the Marco fine sandy loam. Some of the type in this locality may be fluviatile in origin, but the surface resembles that of the higher ground and indicates more or less drift of its material by the wind.

This is a warm, early soil which stands drought much better than the Miami sand. It is deficient in humus, but the texture of both soil and subsoil and the favorable moisture conditions insure good yields of grain and clover. Some of the hillsides have been drained with tiles, and the level areas southeast of Lyons are greatly benefited by the large ditches which were made to drain the Clyde sandy loam. The slight elevations are very desirable sites for small fruit and truck gardens. Fruit trees do well on all except the lowest places. Wheat and corn are successfully grown, and clover does exceptionally well. Only a few fields of oats or timothy were seen on this type. The cultural methods are similar to those employed on the Clyde sandy loam and the Miami silt loam. All of the type is cultivated and has a higher value than the upland types of soil.

3508—07——3

The following table gives the mechanical composition of a typical sample of the soil and subsoil of this type:

Mechanical analyses of Marco fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
14866	Soil	0.6	5.7	8.3	30.2	10.3	30.9	13.2
14867	Subsoil	.3	2.5	6.8	30.1	7.8	26.9	26.2

WAVERLY FINE SANDY LOAM.

The soil of the Waverly fine sandy loam is a fine sandy loam resembling the Waverly silt loam in its general surface features. The first few inches contain a high percentage of light-gray silt. The color of the surface is always lightest where the silt content is highest and becomes a dark gray where the sand predominates. The surface, if uncultivated, is quite compact, but breaks into a loose, loamy condition when plowed.

At a depth of about 8 inches the subsoil is a friable silty loam, much lighter in texture and somewhat coarser than the soil. It becomes lighter with depth, and at 24 to 30 inches is usually a medium to coarse sand, only slightly coherent. It is more or less mottled, the color ranging from a light gray to a dark chocolate brown. Iron concretions are abundant, and along some of the small tributaries of the Goose Pond Marsh the lower subsoil is a sort of conglomerate of various sized iron nodules with the grayish silty sand as a matrix.

This is an alluvial type formed by the deposition of the heavier material as the gradient of the streams decreased. The surface seems to have received considerable silt, either very recently or during the latter part of the period when the type as a whole was being formed. The natural drainage is not good, but is being improved by the increase in the depth of the channels of the water courses which cut through the narrow areas of this type.

Most of this soil has a higher agricultural value than the Waverly silt loam. Its areal extent is so limited, and it is so frequently bordered by a hillside too steep to be cultivated, that much of it is used only for pasture. The cultivated valleys usually produce fair crops of corn, wheat, or potatoes.

HUNTINGTON FINE SANDY LOAM.

The Huntington fine sandy loam is an alluvial type consisting essentially of a fine sandy or silty loam, variable, but usually con-

taining a high percentage of very fine sand and silt overlying fine sand. The color is a yellowish brown, somewhat darker where the silt content is highest and approaching a light gray or yellowish gray where there is more than the average amount of sand. The surface is slightly compact, but the soil becomes lighter in texture and more open in structure with depth. At 12 inches the sand characteristics are usually well pronounced. There is very little coarse sand and a comparatively small amount of clay, with a consequent marked absence of the qualities which these materials impart. The soil is a soft, fine-grained alluvium, with very little tendency to become hard or form clods. The organic matter content is low and practically no dark-colored sediment is being added to the surface. The soil is easily plowed and will remain in good tilth the entire season. The upper part of the subsoil contains considerable fine material, but this rapidly decreases with depth, and at from 25 to 30 inches it becomes a fine sand of loose and incoherent structure.

In Greene County this type is confined to the valleys of White River and its eastern tributaries. The largest areas are found on the inner curves of the river. Along the small creeks its distribution is somewhat irregular. On Richland and Plummer creeks it usually lies between the stream channel and the terraces of Waverly silt loam that so frequently skirt the foot of the hills. On the smaller creeks the narrow strip of alluvium, if of sufficient width to be shown on a map of the scale used, has been classed with this type. These small, irregular areas are generally cultivated, and while they contain more coarse material in both soil and subsoil, they resemble the normal phase of this type in color, structure, and crop value. The surface is a silt or silty loam grading into sand. There are frequently additions of shale fragments and other débris washed from the hills.

The White River does not deposit permanently much fine sediment below the level of its present banks. Such old channels or other depressions as exist near the stream are filled with relatively coarse material until built up to about the height reached by the overflows. Then the fine sand and silt are assorted and spread over the surface, thus forming the Huntington fine sandy loam and the closely related Huntington silt loam. No well defined boundary can be drawn between these two soils.

The chief sources of the alluvium along the small streams in the eastern part of the county, as well as of a large part of the sediment carried by the river, are the Mansfield sandstone, certain associated shales, and the loess. The sandstone consists largely of medium to fine siliceous sand carrying a good deal of iron. The shales are arenaceous and do not contain much clay. It is probable that both of these alluvial types owe most of their productiveness to the material derived from the loess.

All this type was originally timbered, but is now cleared. Corn is the chief crop. Some of the heaviest phases produce good winter wheat, but there is considerable danger of damage by spring floods. It is not a typical grass soil, but clover and timothy generally do well, because of the good supply of moisture. No definite statement as to the average yield of grain can be made, but on some of the small irregular fields on the creeks and some larger areas of this type along the river excellent yields of corn of good quality are secured. The methods are similar to those practiced on the Huntington silt loam. Some of the sandy strips along the stream banks require very little cultivation to keep them in good tilth.

No commercial fertilizer and very little barnyard manure is used on this soil. Its general value, as well as adaptability to crops, is dependent upon the elevation above the usual level of the stream. Areas subject to very frequent overflow are generally very sandy. It constitutes the most valuable land for agricultural purposes on many of the small farms in the eastern part of the county.

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

Mechanical analyses of Huntington fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
15392, 15394	Soil	0.0	0.7	1.6	18.5	22.7	48.2	7.9
15393, 15395	Subsoil	.0	.4	2.2	39.5	23.6	28.3	5.5

CLYDE SANDY LOAM.

The soil of the Clyde sandy loam is a black sandy loam, medium to fine in texture, characterized by a friability very apparent in all cultivated fields. There is a small amount of coarse sand present, the angular grains being easily seen on the surface. The clay and silt content is sufficiently high to give a considerable degree of firmness and coherency to the soil, but it is seldom so compact as to form clods or necessitate more than a minimum amount of labor to reduce it to good tilth. This loamy nature of the surface is due in some measure to the comparatively high organic content as well as to the presence of so much fine sand. There is some variation in texture in the large areas of this type. Near the low ridges of Miami sand there is more than the average amount of coarse to medium sand both in the soil and subsoil, while in the central parts of the areas the finer grades of sand predominate.

The subsoil is usually a sandy loam a little coarser in texture than the soil and distinguished by its plasticity and rather open structure. At a depth of about 4 feet it is a very sandy loam or sometimes a

yellowish or brown sticky sand which grades rapidly into a coarser, water-bearing sand and gravel. This stratum lies between 5 and 6 feet below the surface, and usually there is good capillary movement between it and the soil. The color of the subsoil is variable and is generally some shade of gray, darker where the organic matter in the soil is abundant and lightest in those sandy phases of the type near the Miami sand.

In both the area adjoining Worthington and in the one east of Lyons—called the Four-mile Marsh—there is no line of demarcation between the soil and subsoil. In color and texture there is a gradation from the very dark surface to the gray or sometimes yellowish subsoil 24 to 36 inches below. Near the drainage lines the subsoil is frequently a heavy sandy loam of a dark-brown or slightly reddish-brown color with numerous yellow iron stains.

This soil is easily cultivated. If plowed deep, an excellent seed bed for corn may be prepared. By plowing shallow, or even by the use of the disk harrow followed by a drag and roller, a firm condition of the soil suitable for small grain is obtained.

In each of the largest areas there are occasional small mounds rising only a few feet above the general level. Otherwise the surface of all this type is flat, with a very slight inclination toward the south. Artificial drainage is necessary. Very few tile drains have been laid, large open ditches being depended upon to remove the surplus water.

The Worthington Marsh is drained by a dredged ditch about 6 feet deep and twice as wide. The Four Mile Prairie is intersected by a number of somewhat smaller ditches. These artificial drainage lines frequently overflow, but serious damage is done only occasionally. Both Four-mile Prairie and Worthington Marsh are practically a part of the White River Valley. The surface of each is only a few feet above that of the highest parts of the present flood plain of the river.

A small area of Clyde sandy loam northwest of Marco is entirely surrounded by ridges of Bloomfield sandy loam, and probably represents some local variation in origin. It is finer in texture and also higher in its organic matter content than the average and forms an especially valuable land for general farming. The area south of it is practically a part of the flood plain of White River. The surface is characterized by numerous broad, shallow depressions quite variable in texture, while the minor elevations are usually sandy. Along the lower part of the Goose Pond Ditch these slight elevations on the east side are quite silty and grade into the Huntington silt loam.

The material which constitutes the water-bearing stratum below the subsoil is plainly of glacial origin, and doubtless was deposited in its present position when Eel River and White River were lines of

discharge for the last ice sheet, which reached their upper tributaries. The finer material which now forms the soil is largely of foreign origin, for mica, hornblende, and feldspar may be detected among its sand grains. These surface materials probably represent the closing part of this stage of the river's history when it selected its present course and Eel River permanently abandoned a line of discharge for its surplus water to the north and west of Worthington. At this time the southern outlets for this part of the valley were obstructed, thus ponding the waters between the uplands on the north and west and the high land near the river. The Clyde sandy loam areas were the more shallow or transient part of this lake, while the heavier materials of the Clyde clay represent the deeper and more permanent part near the bluffs.

Before artificial drainage was introduced the surface of these areas was more or less flooded during the spring months, but usually dry during the summer and fall. Bluestem and other varieties of prairie grass, as well as those peculiar to wet locations, grew luxuriantly and for many years furnished excellent grazing. The surrounding uplands and the low sandy mounds were timbered, but the marshy tracts, though open, long remained uncultivated. On account of their slow natural drainage they were generally considered as little better than the true marshes on the small creeks north and west of them.

Corn is now the principal crop grown upon this soil. Small grains, timothy, and clover do well. A few small fields of alfalfa have proved successful. The yield of corn in favorable years has frequently exceeded 80 bushels per acre. The presence of the so-called "alkali spots," which seem to affect this crop only, reduces the average production to some extent. While this yield is much above the average, the soil with its abundant supply of water beneath, which amounts to subirrigation, gives sure and large returns of all the ordinary crops.

Tomatoes are now being grown quite successfully on this type near Worthington. It is well adapted to any crop which requires a sure and abundant supply of moisture and is not too susceptible to frosts. Its topographic position does not especially commend it for general trucking. Fruit trees grow well, but the yields are somewhat uncertain.

For many years the natural productiveness of this soil seemed to render crop rotation or fertilization unnecessary, but now many farmers assert that the yield of corn averages less than formerly and advocate clover growing. Very few have any regular rotation. Oats usually follow corn, the seed being sown broadcast and a disk used to pulverize the surface, which afterwards is harrowed. Winter wheat conveniently follows oats. The stubble is plowed shallow and well harrowed, and the seed is always drilled. The wheat also serves as a

nurse crop for clover, which is sown in the early spring. A good deal of the land planted to corn is necessarily plowed in the spring. Various means are used in getting rid of the stalks, but not much consideration is given their possible value in adding organic matter to the soil. Many farmers burn them. The disk and slant-tooth harrow are found very effective in preparing the seed bed in this soil. Much of the corn is drilled and shallow cultivation is practiced. No commercial fertilizer is used with the ordinary crops, and the limited number of cattle and other stock which most farms support preclude the possibility of applying much manure, although it is found that the soil very readily responds to its application.

Some of the best improved farms in the county are located on this type. The value has steadily risen during the last decade, and now $100 an acre is about the average price which the land commands.

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

Mechanical analyses of Clyde sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
14690, 14700, 15398	Soil	0.4	4.8	13.9	42.4	7.9	18.9	11.5
14691, 14701, 15399	Subsoil	.2	4.6	13.2	39.2	6.1	20.5	15.8

MIAMI SILT LOAM.

The Miami silt loam is the most extensive type in Greene County. It is the familiar "yellow clay" seen in the hillside ditches and gives the characteristic color to the surface of all the upland fields. The soil is a silt loam, high in silt, and usually containing very little sand, even of the fine and very fine grades. When moist, a sample taken in the hand is soft and readily molded, while on drying the material crumbles into fragments that may be easily pulverized. Much of the surface of a well-tilled field is frequently a loose, floury dust, and the small clods are light and porous. On the hillsides the color is yellow or light reddish yellow, but where the surface has little slope it is usually some shade of light gray. In both instances the addition of organic matter causes the soil to become much darker.

The subsoil usually contains a little more clay than the soil, but otherwise they resemble each other in texture. The subsoil is slightly plastic, but crumbles on drying. At a depth of 12 to 18 inches the light-yellow material is more or less streaked with gray. This mottled appearance increases with depth, although in some places where this underlying formation contains much iron the deep subsoil is a dark reddish yellow.

Along the streams, and also near areas of Miami sand, the first few inches of the soil may contain a considerable amount of sand. Along the glacial boundary there are areas which have some small stones and gravel mixed with the soil, and in a few localities this coarse material occurs in the subsoil. Such phases have been indicated by the gravel symbol.

The Miami silt loam is derived from the loess, and, with the exceptions mentioned, practically no other materials enter into its composition. It is easily cultivated. If plowed when slightly moist, the surface is crumbly and may be worked to a loose friable condition. This is especially true if there is a little more than the average amount of organic matter present. Old land is sometimes very cloddy, and if plowed when too wet it gets into poor physical condition.

Excepting some small areas of Bloomfield sandy loam and the Rough stony land, this type occupies all the uplands. The minor differences in depth of soil, texture, and color observable are due chiefly to topographic influences. The yellow color is most pronounced on the steepest slopes, and the color invariably becomes lighter where the surface is nearly level. Where the gradient is highest, the loess is generally thin, seldom exceeding a depth of 4 or 5 feet, and is in contact with the ferruginous rock or sand. On the more level areas the silt is thicker, and frequently overlies glacial material which evidently had undergone considerable leaching and oxidation prior to the deposition of the loess.

There are areas of this type where the surface soil is light in color and contains abundance of small, soft, iron concretions. These are associated with slow, imperfect drainage, but in only a few places on the upland does this obtain to an objectionable degree. Wherever a slight depression, other than a limestone sink, exists, the soil is white, becomes very hard when dry, and at a depth of 18 or 20 inches is so compact that it is frequently termed "hardpan." Beneath this stratum the subsoil presents the usual silty, mottled appearance. In secs. 6 and 19, Twp. 8 N., R. 7 W., and in secs. 18 and 22, Twp. 8 N., R. 6 W., small areas of this phase of the Miami silt loam are found. In general, the lighter colored phases are not quite so easily managed, nor as satisfactory in their crop yields as the yellower areas on the hillsides.

There is a marked deficiency of organic matter in the virgin soil. This may be ascribed to the original forest, a heavy timber growth not being conducive to the accumulation of humus in the soil. Most of the vegetable debris oxidized upon the surface and did not become incorporated with the soil. The large and permanent roots of trees do not add so much fertility to the earth in which they grow as the roots of grasses which are annually renewed.

Corn, wheat, oats, clover, and timothy are the leading crops grown

on the Miami silt loam. The rougher parts along the streams are used for pasture, and some limited areas yet remain uncleared. During recent years there has been an increase in the acreage sown to tame grass.

On many farms the rotation followed consists of two or more crops of corn, one of oats, and then wheat, the latter serving as a nurse crop for clover, which is sown in the spring. Some farmers when seeding land to clover also sow timothy, while others prefer to keep them separate. On many of the rented farms, however, none of the fields are seeded to clover, except possibly at long intervals. In seeding for winter wheat the oat stubble is plowed in August, or sometimes earlier, and in making the seed bed the roller is freely used. The seed is always sown with a drill. The time of sowing depends somewhat upon the season, but usually between the 10th and 30th of September. As long as winter wheat continues to be grown, it does not seem practicable to avoid exposing the bare surface of the land to the hot summer sun for several weeks. But the practice certainly tends to hasten the oxidation of the organic matter in a soil which has none of that essential element to spare.

In preparing land for corn the plowing is deeper than for wheat. Both the disk and the roller are generally used. Some farmers check their corn, but many of them prefer to plant it in a drill. Surface cultivation is practiced by many farmers, but there are some who continue to use large cultivator shovels which stir the soil to a depth of 5 or 6 inches. Practically all the corn grown is husked in the field, very little of it being cut and shocked or used as silage. The quality is good and crops are seldom injured by frost.

This soil is well adapted to oats, but the crop is not always a successful one. The quality and yield of this grain is probably more dependent upon the season than either wheat or corn. The yield of corn varies greatly even on adjoining farms. As already indicated, the soil may be kept in fair physical condition even where the humus content is apparently very low. Other conditions being equal, the organic content is of greatest importance and largely determines the crop yield. The average yield of corn is less than 40 bushels. The present average yield of wheat on this soil is about 15 bushels in favorable years, and is very often much less.

Nearly all the commercial fertilizer used in this county is applied to the Miami silt loam of the eastern section. An increasing number of farmers are depending upon it to maintain the yield of wheat. The brands generally used have a guaranteed analysis of 2 to 4 per cent of potash and 8 or 9 per cent of phosphoric acid. They are applied at the rate of about 150 pounds to the acre. A good deal of raw bone meal and untreated phosphate rock are also used, either sepa-

rately or in some combination. Except that very little nitrogen is purchased no common practice is followed. The use of commercial fertilizer is steadily increasing.

The present condition of much of this type in the three eastern townships deserves special consideration. There is a great deal of once cultivated land now abandoned or used only for the scanty pasturage it affords. From hundreds of acres of the steepest hillsides the virgin soil has been washed away. There now remains only the former subsoil, from which has long since disappeared the last trace of the tree roots which penetrated it in every direction and extended downward into the broken rock beneath. Deprived of all this woody material, which constituted no small part of the total mass, the silt has assumed the properties of clay. It is so close in structure that during a brief drought its moisture is largely lost by evaporation. When saturated it washes badly. On scores of hillsides V-shaped gullies extend from the foot of the slope to the top. Their depth is determined by the thickness of the silt, which may be only a few inches or several feet. When the rock is reached vertical cutting ceases and the wash begins to widen. The upper extremities soon coalesce and then the damage is irreparable. In many old fields so completely has the loess been removed that the underlying rock is more or less exposed over many acres. Such places can never be restored to their original productiveness. The sandstone and shales consist largely of quartz sand, with little of the finer grades of material.

The three eastern townships are better adapted to dairying and fruit growing than to general farming. The silt loam is a good grass soil and there is abundance of water, fine springs being of common occurrence. Fruit trees of all kinds and nursery stock make a good growth on this land. It is well adapted to orchards, for the high ridges insure excellent air drainage and the character of the rocks immediately underlying the loess favors the maintenance of the proper moisture condition and admits of a deep root development. The transportation facilities, however, have not been favorable for the development of the fruit-growing industry.

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

Mchanical analyses of Miami silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
14696, 15382, 15384	Soil	0.3	1.6	0.9	2.3	2.8	73.3	18.3
14697, 15383, 15385	Subsoil	.2	.8	.6	1.3	1.9	68.1	26.3

HUNTINGTON SILT LOAM.

The Huntington silt loam is the characteristic soil of the White River Valley. The soil is a yellowish-brown silt loam, usually containing from 15 to 20 per cent of sand of the finer grades. The surface is sufficiently friable to yield readily to cultivation and, except in some of the heavier phases, is seldom cloddy. The soft, fine-grained quality which the soil possesses is due to the predominance of very fine sand and silt to the exclusion of coarser material. It contains very little organic matter, and consequently lacks the dark color and the open or mellow structure which this material would contribute. Even the heavier phases have little or no tendency to become granular.

There is no line of demarcation between the soil and subsoil. The latter resembles the surface, with perhaps the exception that it is a little brighter in color. The deep subsoil is a fine sand or fine sandy loam grading into a coarse water-bearing material which is said to lie from 10 to 15 feet below the surface.

In common with all alluvial types the texture of both soil and subsoil varies considerably. Near the present river channel or in the neighborhood of former channels portions of this type are underlain by a fine sandy loam, which may be much lighter at a depth of a few feet. Practically all of this soil has excellent capillary connection with the saturated stratum below, so that crops seldom suffer from drought.

With the exception of a few small areas on Richland, Plummer, and Indian creeks, this type is confined to the flood plain of White River. It is strictly an alluvial soil of recent origin. All of it is subject to overflow, with a consequent deposition of much fine sediment. The most of the material now brought down during floods is the light yellow silt from the cultivated uplands. In the earlier days of the agricultural development of the county the sediment left after each inundation was much darker in color, and doubtless consisted of the humus-bearing material from the virgin soils then in process of being cleared.

All this type was originally forested. Walnut, sycamore, elm, ash, yellow poplar, and many varieties of trees of less value attained a magnificent size. All the valley has long since been cleared excepting a fringe of timber along the river channel. Nearly all of this soil, as well as the adjoining areas of Huntington fine sandy loam, is annually planted to corn. Some wheat is grown on the high levels where there is little risk of damage by flood. There are very few clover or timothy meadows on this type.

Under favorable circumstances the yield of corn is seldom less than 40 or 50 bushels per acre, and twice this quantity is frequently pro-

duced. The quality is exceptionally good. Serious damage has been done several times by high water in June or even later, but the floods usually occur in the early spring and the land becomes dry enough to be prepared for corn.

The improvements on this type are of the poorest character, some areas not even being fenced. The greater part is devoted to corn year after year. Much of this acreage is planted by tenants who give from two-fifths to one-half of the grain for rent. Crop rotation and fertilization are given no consideration whatever. In many instances the land is plowed while wet, and were it not for the property this soil possesses of maintaining an almost constant moisture content it would not, with the poor preparation some of it receives, give such good yields. All of this type is valued highly for the production of corn, and ranges in price from $40 to $80 an acre.

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

Mechanical analyses of Huntington silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
14698, 15390	Soil	0.1	0.4	0.3	4.2	12.9	67.1	15.0
14699, 15391	Subsoil	Tr.	.3	.2	4.4	14.4	66.3	14.0

MARSHALL SILT LOAM.

The soil of the Marshall silt loam is a very dark brown or nearly black silt loam. The surface is loose and porous, slightly granular, and is easily pulverized. In a well-tilled field it is a soft, silty loam that absorbs moisture readily and has only a slight tendency to crack or become compact. There is a good deal of organic matter present, and the dark color extends to a depth of 12 or 14 inches. The subsoil is lighter in color. From 14 to 24 inches it is usually a dull gray somewhat mottled by yellowish-gray streaks, but grades below into a yellow plastic silt loam, usually very moist and containing a few small iron concretions.

In some of the slight depressions and bordering areas of the Clyde clay the soil has a tendency to break into cubical fragments when dry and is rather sticky and tenacious when wet. Both the soil and upper part of the subsoil are apparently heavier and closer in structure than the average of this type elsewhere, but the clay of the surface is slightly lower. The greater part of the areas of this soil, however, have a very silty surface, and the clay content is highest from a depth of 3 or 4 inches to about 14 inches.

The few small areas of the Marshall silt loam found in this county

lie along the margins of the marshes and at an elevation only slightly higher. All of them have been improved by artificial drainage. Tile drains have been found especially satisfactory, and the level fields are intersected by very few open ditches.

The soil was originally covered with prairie grass, and to the presence of this kind of vegetation may be attributed the high organic content which it has as compared with the adjoining Miami silt loam. Low mounds of the latter type are associated with the areas of the Marshall silt loam, and while the textural differences are slight, the color and crop value of the two soils present a marked contrast.

Practically all this type is cultivated and included in exceptionally well managed farms. The average yield of corn is about 50 bushels per acre, and in favorable seasons 75 bushels is not unusual. It is probable that the average yield of oats exceeds that of most other soils in the county, yields of 40 to 60 bushels being made very frequently. The acreage sowed to wheat is not large, and the yield per acre is hardly in proportion to that of corn. It is an excellent clover and timothy soil, and heavy crops are usually secured. The second crop of clover is generally cut for seed.

No commercial fertilizer is used, and, in common with most of the black land, it receives but little barnyard manure. It is largely devoted to corn, and changes to wheat or oats, followed by one or two years of clover, are considered sufficient rotation to maintain the productiveness of this soil.

Well-improved farms on the Marshall silt loam are worth from $100 to $125 an acre. It is considered more desirable for general farming than the soils which have a slightly lower topographic position and therefore are more dependent upon artificial drainage.

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

Mechanical analyses of Marshall silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
15371	Soil	0.0	0.3	0.5	6.3	9.7	70.7	12.8
15372	Subsoil	.0	.6	.3	2.5	11.5	72.8	12.6

WAVERLY SILT LOAM.

The soil of the Waverly silt loam is a light-gray silt loam containing a moderate quantity of fine sand. When dry and in good tilth, the surface is loose and floury, but when wet it is very soft, inclined to be miry, and on drying becomes compact and bleaches almost white,

The subsoil is a plastic gray silt loam, similar in texture to the soil. It is very retentive of moisture and is usually wet and cold. It generally contains numerous small iron concretions, which in some locations are so abundant at a depth of 2 or 3 feet that the subsoil is termed gravelly.

There is no distinct line of separation between the soil and subsoil. At a depth of 10 to 12 inches iron stains give a more or less mottled appearance, gray and light yellow being the prevailing shades of color, with some of the small iron stains a deep brown.

There is generally little organic matter in the soil, but where there is more than the usual amount present it gives a dark-gray color, contrasting strongly with the very light surface of most of the type. The narrow strips along the small streams have better natural drainage than the large areas. They also contain a little higher percentage of sand, evidently through loss of the finer materials by erosion.

There are sandy phases of the type in the American Bottoms and in some of the small areas in the southern part of the county. Here the soil, if it has been cultivated a long time, has an ashy gray color and a peculiar, inert appearance in the field, differing in this respect from the other silt and sandy loams of this area.

When in the proper condition with regard to moisture, the soil yields readily to cultivation. It is friable and often will be quite pulverulent to a depth of 2 or 3 inches, though deeper the soil is very moist.

This type is developed on the borders of the marshes. It is the alluvium of many of the small creeks in the western townships, and forms most of the second bottom land in the eastern half of the county. Several small areas are found on Eel River, but there is none of it in the valley of White River.

The surface is nearly level, and therefore the larger areas have poor drainage. They remain cold and wet in the spring when the surface of the darker soils is warm and mellow. Tile drains are said to be almost useless unless they are laid quite close together. Practically all the Waverly silt loam is included in the flat areas lying at the foot of the slopes covered with loess. In most instances the areas are underlain at a depth of 6 to 10 feet by an impervious silty clay. The excess of water from the higher levels must necessarily traverse the Waverly soil before it escapes into the natural or artificial drainage ways. The latter have invariably been constructed through the central parts of the low ground instead of at the margin. In some places the location of a ditch at the foot of a hill would intercept the ground water which follows the surface of the underlying rock. It is probable that the difficulty experienced with the tile drains is due to the very fine rounded sand or coarser grades of silt which this soil

contains. These constituents are abundant enough in some places to give the soil a yielding quality something like that of quicksand.

The narrow areas of white soil on the creeks are said to be difficult to manage in wet seasons. Some of them are underlain by sand, and the poor drainage may be due to textural peculiarities. There are a few of these bench lands, however, which are underlain by rock.

All of this type was originally forested, the predominant varieties being beech and white and post oak. Much of it is now cleared. It is an excellent soil for timothy, and very heavy yields of a fine quality of hay are secured. Redtop and bluegrass do well, and in a few years supplant the timothy in mowing lands. Well-drained fields will produce clover, but not all of the soil is now suited to this legume. The same may be said with regard to the cereals, the adaptability of a field to any one of them and the probable yield depending almost entirely upon the moisture conditions. If well drained, the returns are reasonably sure. If not ditched or tiled, the ground has little capacity to equalize any seasonal extremes, and the growing season must have frequent light showers to produce good yields of corn. Therefore no definite statement can be made with regard to the average yields of corn, wheat, or oats. All of the type is well adapted to grass, and many fine fields are found on the larger areas in the western section of the county.

This soil is greatly in need of humus. Applications of manure are apparent in change of color in the soil and a marked improvement in the growth of corn. The farmers state that no other kind of land responds so promptly to barnyard manure. It effectually changes the physical condition, rendering the soil more easily cultivated and greatly decreasing the tendency to bake at the surface.

This type is not valued so highly as the best Miami silt loam, but if well drained it may command $20 to $30 an acre.

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

Mechanical analyses of Waverly silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
14692, 15361, 15363	Soil	0.3	1.1	0.7	3.7	5.8	68.5	19.2
14693, 15362, 15364	Subsoil	.3	1.1	.8	3.8	7.3	64.1	22.1

MARCO CLAY LOAM.

The soil of the Marco clay loam is a light-colored silty clay loam. The surface varies from a very light gray to a dull yellowish gray. The

soil is distinguished by its tendency to break into cubical fragments on drying. These particles are not generally as fine as the granules of Clyde clay. When wet the soil is very soft and plastic rather than sticky. It carries but little sand, and in its typical development the organic content is low. In some places a few inches of the surface is quite dark, but this color seldom extends much below the plow line.

The subsoil is usually a stiff silty clay containing no coarse sand and very little fine sand. It is lighter in color than the soil, grading downward into a plastic yellow silt or silty clay. It has the properties of a silt loam rather than a clay. The underdrainage is poor, due principally to the low topographic position, but in some places the subsoil at a depth of 5 or 6 feet is a light bluish, tenacious clay identical with that which underlies so much of the Clyde clay.

This soil is distinguished from the Waverly silt loam by its somewhat darker color, its property of granulation, and the absence of small iron concretions. It is much lighter in color than the Clyde clay and lacks its high organic matter content. While not so strong a soil as the latter, it is very productive when well drained and cultivated. The largest body of this type lies in the south end of the Goose Pond Marsh. It is also typically developed in the Cane Marsh and in a small area west of Marco. The Marco clay loam which is found along some of the ditches west of Worthington has considerable organic matter in the first few inches of soil, but otherwise it resembles the typical soil as developed in the larger depressions.

All of the areas of this type are intersected by open ditches, for most of them are subject to overflow. Tile drains work well and render the land much more satisfactory in respect to drainage than the adjoining areas of Waverly silt loam.

The degree of success with all the cereals is determined by the efficiency of the drainage. Where the water table is constantly maintained at a depth of 3 or 4 feet, as it may be by tile drains, a loose granular condition of the soil is secured, very much in contrast with the surface of undrained fields. A yield of 75 bushels of corn per acre is said to be obtained upon one farm where a very efficient drainage system is in operation.

No very accurate statement can be made with regard to the yields of wheat and oats. The frequency with which some of the lower parts of the type are flooded, especially in the early spring, render these crops rather uncertain. The type is well adapted to grass, and heavy crops of clover and timothy are grown. Most of it is cultivated, however, and only a small percentage is used for pasture.

Aside from fences and drains, this type has very few improvements. It is usually included in farms which have other kinds of land upon which the buildings are located. The cultural methods are similar

to those practiced on the adjoining Clyde clay. Much of it has been under cultivation for such a short period that the necessity for rotation has not become apparent. Fall plowing for corn is considered desirable on account of the loose, crumbly condition of the surface which is thus secured.

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

Mechanical analyses of Marco clay loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
14864, 15369	Soil	0.3	2.0	2.5	15.9	11.9	38.4	29.5
14865, 15370	Subsoil	.1	.3	.9	5.1	2.8	57.7	32.9

CLYDE CLAY.

The soil of the Clyde clay is a black silty clay or clay loam containing a high percentage of organic matter. When dry, the surface is very granular, breaking into small cubical fragments to a depth of 2 or 3 inches, thus forming a sort of mulch. When moist, the soil is soft and yielding to the touch, but if saturated it becomes very sticky. There is usually less than 15 per cent of sand present and the loamy character of the surface is due principally to the large amount of organic matter and the consequent property of granulation.

There is no line of demarcation between the soil and subsoil. From the plow line to a depth of 20 or 30 inches the subsoil resembles the surface in color and texture. Below this depth it is a bluish-gray silty clay very compact and exceedingly adhesive and tenacious.

In the Four-mile Marsh the subsoil of this type has strata of mucky material in some places near the drainage ditch. It usually becomes quite silty a few feet below the surface. At 8 to 10 feet a bed of very fine silty sand is found which possesses the properties of quicksand. In the Goose Pond Marsh the deep subsoil is a light bluish-gray clay almost destitute of even the finest grade of sand and so compact and tenacious that it is practically impervious.

Where the organic content of the soil is above the average there is usually some peaty material present which imparts a somewhat more open structure to the surface than other parts of the same field may possess. Such places are quite easily plowed and reduced to a good state of tilth. This is especially the case if the moisture content is low and granulation has taken place. If, however, the surface has been trampled when wet, or if for some reason the tendency to granulation is lacking, the soil is exceedingly refractory. A heavy plow

can with difficulty be held in the furrow, and the irregular clods into which the ground breaks can not be pulverized until subjected to considerable weathering. In most cultivated fields, however, the surface is in a loose granular condition, favorable in every respect for plant growth, and presents no difficulty in its cultivation if work is not attempted too soon after a rain.

The soil of the Goose Pond Marsh has been modified and improved in texture during recent years by the deposition of material from the uplands. The northern and western tributaries of the Goose Pond Ditch drain more than 30 square miles of land. Most of this is cultivated, or at least cleared, and the storm waters are rapidly discharged into the main ditch. The marsh is frequently flooded, and the sediment, derived principally from the Miami silt loam, has affected the surface to a marked degree. The light-colored loess has been mixed with the original black soil as deep as the ground has been plowed. The silt forms a matrix, in which the black granules of clay and bits of peaty materials remain more or less distinct. The resulting soil, however, is easily tilled, and is in this respect superior to certain other areas of the type.

This soil is found in a few other locations besides the ones just mentioned. They are all low, level tracts, with poor natural drainage, and evidently were never timbered. Both of the larger areas—in the Four-mile and Goose Pond marshes—are level and drained by dredged ditches which have but slight fall. Crops on the Four-mile Marsh area are seldom injured by floods, but serious damage is of frequent occurrence on the Goose Pond area. A high ridge of upland, on the north and west, overlooks the Four-mile Marsh and has a decided tendency to check air drainage and to induce early frost.

Corn is the principal crop grown on this type. The average yields are high, and in favorable years 80 to 90 bushels per acre have been produced. Wheat and oats do not do so well. The latter crop is liable to lodge and the grain is of poor quality. Timothy and clover make excellent yields, but at present are not extensively grown.

The cultural methods generally employed on this type do not differ materially from those practiced on the Clyde sandy loam. Whenever practicable most farmers plow the corn ground in the fall in order to get the benefit of the granulation effected by alternate freezing and thawing. More care has to be exercised with regard to working the land when wet than is necessary on any other type in the county.

Notwithstanding its high organic matter content, this soil is said to respond to applications of barnyard manure and be benefited by clover. It is probable that as long as the present profitable returns can be secured without rotation or use of manure corn will continue to be almost the only crop grown. The productiveness of this soil is

of remarkable permanency, but continued grain growing will at length get the land in such a condition that change to other crops will be necessary. Clover and timothy can be introduced into a rotation for this soil, as it is well adapted to both.

In value this type ranks well with the Clyde sandy loam. Its areal extent is limited and of such irregular distribution that only a few farms consist entirely of this kind of land.

The drainage of Goose Pond Marsh has not yet been as successful as could be desired, the main ditch being inadequate to carry all the water its several branches and natural tributaries discharge into it. Improvements now in course of construction will probably prevent such damaging floods as have occurred in the last few years.

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

Mechanical analyses of Clyde clay.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per ct.	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*	*Per ct.*
14694, 15388	Soil	0.1	2.5	1.9	4.7	2.3	38.2	50.0
14695, 15389	Subsoil	.0	1.5	1.3	6.4	3.1	41.9	45.8

PEAT.

Several areas of Peat are found in this county. The largest one lies in the southern part of the Beehunter Marsh and has an area of 2 square miles. Beginning about one-half mile north of Bushrod, this type occupies the greater part of the valley for a distance of 2½ miles and then gives place to the Waverly silt loam. The Peat to a depth of 6 inches is a loose fibrous or chaffy material containing a relatively large amount of silt and clay. Beneath this is a layer of true Peat, a coarse brown mass of vegetable fiber resembling old sawdust in color, but more or less stratified in its arrangement. There is very little earthy matter in it, and when dry it burns readily. This stratum grades downward into a black, sticky, water-logged layer of mucky material, soft and rather spongy and light in structure, but containing a relatively high percentage of mineral matter derived from the clay upon which it rests. The underlying clay is quite black where it is in contact with the muck, but changes with depth to a light bluish silty clay, very close grained and tenacious. In some places it is slightly marly.

The thickness of the Peat varies from a few inches at the margin to several feet along the main ditch. The central ditch frequently overflows, and much silty sediment is dropped upon the surface and

subsequently mixed with the vegetable matter through cultivation. This process, however, has been effective only during recent years, or since the surrounding uplands have been under cultivation and so many road ditches and other drains have been constructed.

Throughout the entire depth of this soil there are bits of decayed wood and other forest debris. Before it was drained there was considerable growth of bushes, besides grasses and other aquatic plants.

The Peat bed on Lattas Creek is not quite so large as the one just described. It consists essentially of the same kind of material, excepting that the soil does not contain so much mineral matter. Some parts of it are often overflowed, but the upper layer is very loose and chaffy and is almost a true peat. The entire formation rests upon clay or silty clay, and there is an intermediate layer of muck identical with that of the Beehunter Marsh. The eastern and some of the northern margin of the Lattas Creek bed is a shallow layer of chaffy, partially decayed vegetable matter, with a subsoil of black, compact clay. The central portion, however, contains the two quite distinct materials, peat overlying muck.

A few other small areas occur, all similar to the one just described. The small development in the Four-mile Marsh is, for the most part, a black muck.

The two larger areas of Peat have been under cultivation about fifteen years. They were planted to corn as soon as cleared and drained, and for the first few years the crops averaged about 80 bushels per acre. In common with all such soils, this land does not produce a first-class quality of grain. The ears are large, but shrink on drying, and the grain does not possess as high feeding value as that grown on the heavier soils. During the last few years, owing to the danger from floods, these areas have been unsatisfactory for corn growing.

On most of this soil it has become difficult to secure a stand of corn on account of the cutworms and wireworms which infest it. Many fields have been planted to corn ever since they were drained, and the pests have thus been furnished with food and hiding places for years in succession. A change to other crops is usually the most effective method of ridding the land of these insects, though in the present case the selection of a suitable crop is difficult. Neither oats nor wheat are available, and timothy is the only common crop to which this peculiar soil is well adapted. It makes an exceedingly heavy growth and is profitable for either hay or pasture, but since both of the injurious insects thrive in sod, a change to grass will not prove effectual in exterminating them. Similar soils in other areas are devoted to the production of onions and celery, but under present conditions it does not seem probable that these crops could be grown except in a limited way for the home markets. The larvæ of both

insects pass the winter in the ground, and therefore deep plowing in the fall might prove helpful in some instances.

When these areas of Peat were drained, they gave great promise of being very valuable corn lands, and were rated accordingly. During late years they have declined in price to about one-half of what they were formerly considered worth. It seems probable that their true value lies between these extremes and should be determined by their adaptability to timothy, millet, and other forage or pasture crops, with the additional consideration that occasional heavy crops of corn of somewhat inferior feeding value can be grown.

ROUGH STONY LAND.

The Rough stony land embraces all those areas so rough or stony as to be of little agricultural value. It includes the rock outcrop along the streams, the steep, stony hillsides, and the land which is intersected by numerous deep ravines so close together that the narrow intervening ridges are worthless for general farming.

On Beech Creek, both branches of Clifty, and along the middle part of Richland Creek there are bold outcrops of limestone. In many places the loess extends quite to the crest of the bluff. There is generally more waste land along the short tributaries which cut back into the upland than on the immediate borders of the creeks.

The limestone and the more resistant strata of the sandstone frequently outcrop well up toward the top of the divides, and the slope below, while strewn with numerous fragments, has a depth of yellow silt over most of its surface. In general the crests of all the ridges, however narrow, are covered with loess, seldom less than 2 or 3 feet deep. This thins out on the steepest parts of their flanks and on their truncated extremities which overlook the deep valleys.

In the absence of a topographic sheet it is not possible to show the exceedingly irregular and branching outlines of these areas. There are many hillsides of high gradient, which, on account of the sandy nature of the underlying formations, have retained their loess covering better than those which consist of harder material. Wherever the average depth of silt exceeds 12 to 18 inches these have been mapped as Miami silt loam. Much of the gravelly, sandy material along the glacial border is thus obscured by a mantle of silt which covers all except the very steepest parts, usually too narrow to be shown on a map of the scale used.

The value of this land ranges from $5 to $10 an acre. Most of it is used for pasture. There is very little of it which has not enough interstitial soil to support a fair growth of bluegrass. Much of the timber that remains in the county stands upon the least valuable portion of this type.

RIVERWASH.

Riverwash consists of coarse sand and gravel deposited on the inner side of some of the curves and in the abandoned channels of the river. The largest areas have been indicated on the map. These areas have no agricultural value.

SUMMARY.

This survey embraces all of Greene County, Ind. The county consists of four main physiographic divisions—the valley of the White River; the level, prairielike bodies of land west of the valley; the undulatory highlands of the west and northwest townships, and the rough rolling uplands of the eastern half of the county. It is in the latter section that all the Rough stony land occurs.

The climate is favorable for all agricultural pursuits common to the central part of the Mississippi Valley. The rainfall is very evenly distributed, and the period between killing frosts is about twenty-four weeks.

Each of the central and western townships has a larger population than the eastern ones. The western section is more generally productive, and there is a smaller percentage of waste or useless land. Very little arable land yet remains uncleared. The river valley is all under cultivation, but no farm residences are located in it. The reclaimed marsh land includes the largest and most productive farms.

Corn, wheat, oats, clover, and timothy are the chief crops. Stock raising receives comparatively little attention. While some live stock is kept on each farm operated by the owner, the greater part of all the grain produced is sold at the local markets.

The soils of this county embrace fourteen distinct types. These range in texture from medium sand to a heavy clay, but the majority of them are silts and fine sandy loams. The upland soils are very deficient in organic matter, and this is also true of several of the bottomland soils. Some of the alluvial types which carry a high percentage of humus are remarkably fertile.

The light-yellow silt loam of the Miami series—the Miami silt loam—is the dominant type. It occupies nearly all the upland and constitutes more than three-fourths of all the arable land in the county. It is a good grass land, and on account of its deficiency in humus its value as a grain soil depends very much upon the organic matter added through the application of barnyard manure or changes to grass. The roughest areas of this type frequently sell as low as $6 an acre, while the best of it, if well improved, commands $50 to $60.

The Miami sand and the Bloomfield sandy loam give good returns, except in unusually dry seasons. Their crop value is determined by

the presence of a silty, clayey substratum that arrests the percolation of the rainwater and holds it within reach of growing crops.

The Marco fine sandy loam has a higher agricultural value than the Miami silt loam. The silty subsoil is a good moisture reservoir, and the type in general is very reliable for most farm crops.

The Marshall silt loam is one of the best soils in the county. It ranges in value from $100 to $125 an acre, a valuation based upon its worth for agricultural purposes.

The Clyde sandy loam is one of the best corn soils of the area and is well adapted to small grains and grasses.

The Clyde clay is a strong soil and has produced some very heavy yields of corn.

The Huntington silt loam and the Huntington fine sandy loam are the heavy and light soils, respectively, of the White River and its eastern tributaries. They are almost exclusively devoted to the culture of corn. They stand less in need of change to other crops than any of the other soils, for they are subject to floods that carry a great deal of sediment.

The Waverly silt loam is a very light-colored soil and is locally termed "crawfish land." Its natural drainage is poor, and it is deficient in humus. Such areas as have been drained produce fine crops of corn and wheat, but most of the type is better adapted to timothy.

The Peat has been drained and is devoted to the production of corn and timothy. The average yields of the former have declined during recent years, but good crops are frequently secured.

The main county roads are well constructed, and many of them are graveled. Those in the eastern section are generally located on the crests of the divides, but necessarily have many steep grades. The eastern townships have practically no local markets, and the difficulty of transporting farm products to the larger towns or to other shipping points has retarded the development of this part of the county along those lines of agriculture to which it is best adapted.

The greater part of the area is well served by numerous local telephone lines and has rural free delivery of mails. Five railway lines afford good shipping facilities to outside markets, especially to Chicago, Indianapolis, and Evansville.

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