Soil Survey of Blackford County.

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Blackford County, the fourth smallest county in Indiana, lies east of the north central part of the State, about 55 miles northeast of Indianapolis and 21 miles west of the Ohio state line. It is bounded on the north by Wells County, on the east by Jay County, on the west by Grant County, and on the south by Delaware County.

The county is approximately 13 miles square, making a total acreage of 107,520. There are four civil townships in the county —Washington, Licking, Harrison and Jackson.

Hartford City, with a population of over 6,000, is the county seat.

Montpelier, the next largest town in the county, with a population of 4,392, is situated near the north county line in Harrison Township. Roll, Mollie, Trenton and Millgrove are small villages found in the county.

The topography of the territory under consideration is quite uniformly level except in the southwest and northeast portions, where it becomes irregular and more undulating. There are no prominent hills or elevations. The general elevation is about 800 feet above sea level. From railroad profiles it is found that the elevation at the L. E. & W. depot at Hartford City is 895 feet, and at the same railroad depot at Montpelier, 869 feet.

The Salamonie River and Lick Creek are the principal drainage lines in the county. The water shed or divide between these two systems extends in a southeast-northwest direction through the central part of the county, dividing the portion drained by each about equally. The Salamonie, which rises in Jay County to the east, cuts the eastern line of Blackford about three miles south of the northeast corner and flows in a northwesterly direction, leaving the county north of the town of Montpelier. Big Lick Creek, which also has its head in Jay County, enters the county north of Dunkirk, and flowing northwest unites south of Hartford City with Little Lick Creek, a small stream heading in the low-lying areas in the northern part of Jackson Township. The stream from the

confluence of these two creeks is known as Lick Creek and flows southwest through Licking Township, leaving the township in Section 6, finally reaching the Mississinewa River in Delaware County.

There are a number of open ditches throughout the county which were constructed to drain the marsh land and low areas. Many of these ditches are now being tiled and covered, thus avoiding much waste which formerly prevailed, and allowing the land to be cultivated.

The roads of the county are well improved with gravel or limestone. Good gravel deposits extend from Hartford City southwest along Lick Creek, while other good pits are found near Montpelier. Limestone as a road metal is being used more extensively now than formerly, and great quantities are being quarried for this purpose from the deposit of Niagara limestone at Montpelier.

Educational facilities are excellent, the county being supplied with several good accredited high schools and consolidated grade schools. A means of conveyance is furnished to those children living at a distance from the school, the burden of the expense of the upkeep of such conveyance being borne by the township.

The county is traversed by two railroads and one interurban line. The L. E. & W. Railroad crosses the county from north to south and the C. C. C. & St. L. Railroad from east to west, both of these roads passing through Hartford City. The Ft. Wayne and Northern Indiana Traction line parallels the L. E. & W. through the county, passing through both Hartford City and Montpelier.

Blackford County was organized in 1839. The territory before this time was part of Jay and Delaware counties. The name Blackford was given in honor of Hon. Isaac Blackford, one of the first judges of the Supreme Court of the State of Indiana. The original settlers came principally from Pennsylvania, Ohio and New York. In 1840 the population was 1,226; in 1900, 17,213.

For a number of years gas and oil were a great source of income to this county, but of late the supply of these products has decreased and agriculture is once more the chief source from which the county derives its prosperity.

CLIMATE.

There is no Weather Bureau Station in this county, but the following data taken from the records of the Marion station in Grant nty answers for this area.

TOTAL MONTHLY PRECIPITATION FOR YEARS 1911, 1912 AND 1913.

YEAR.	*Jan.*	*Feb.*	*Mch.*	*Apr.*	*May*	*June*	*July*	*Aug.*	*Sept.*	*Oct.*	*Nov.*	*Dec.*
1911	3.87	1.55	1.83	4.16	.99	4.76	1.07	5.08	6.34	4.07	3.71	3.39
Annual for year 40.82.												
1912	2.19	2.43	4.09	4.66	3.84	1.45	3.26	4.88	4.37	2.02	1.80	1.09
Annual for year 36.08.												
1913	7.51	1.62	10.31	3.33	3.78	.88	5.75	3.27	2.03	2.92	2.59	.47
Annual for year 44.46.												

Maximum temperature for year 1911 was 102° on July 2.
Maximum temperature for year 1912 was 96° on September 2.
Minimum temperature for year 1911 was 0° on January 5.
Minimum temperature for year 1912 was 18° on January 13.
The last killing frost in spring 1911 was May 5.
The last killing frost in spring 1912 was April 23.
The first killing frost in fall 1911 was October 24.
The first killing frost in fall 1912 was September 27.

HISTORY OF SETTLEMENT AND AGRICULTURAL DEVELOPMENT.

The first settlements to be made in this county were in the southwestern part of Licking Township, along Lick Creek. The first entry of lands was made by Benj. Reasoner in the year 1831. The northern part of the county was not so readily settled because of the wet and marshy lands. The greater part of the southern half of the county was heavily timbered, and in order to quickly clear the land huge piles of fine black walnut, white, red and burr oak and shellbark hickory were rolled together and burned.

The agricultural history of Blackford is similar to that of other counties in the State. Primitive culture with rude, home-made tools and implements was carried on for years, to be replaced with the advent of the railroad and the introduction of machinery by more modern methods. Large tracts of good land went for years without any attempt being made to drain them of the standing water with which they were covered. With the introduction of better drainage conditions, the low marsh lands of Polk's Prairie, Petit Prairie and the Cranberry Marsh were reclaimed and put under cultivation. Thousands of acres of the best land in this county have been thus reclaimed within only comparatively recent years.

The crops grown are the same that were produced in the early days of the county, although the acreage and yield have changed considerably. In the year 1900, the acreage of corn in the county was 26,153 with a production of 1,137,950 bushels, or an average of 43.5 bushels per acre; in 1911 the number of acres devoted to the

crop was 22,345 with a yield of 895,090 bushels, or an average of 40.06 bushels per acre. In 1900 the acreage of wheat was 14,040, with a yield of 183,330 bushels, or 13.05 bushels per acre; in 1911 there was 3,882 acres with an average of 14.42 bushels per acre. The acreage of oats has increased in the last few years; only 3,873 acres were given to oats in 1900, with an average yield of 31.04 bushels, compared with an acreage of 11,635 and an average yield of 30.14 bushels per acre in 1911. The average yield of hay per acre is about 1¼ tons. Alfalfa is being grown to some extent, about 42 acres being devoted to this hay crop in 1911. Clover does fairly well in this county; over 8,000 tons of clover hay were produced in 1910; in 1911 the yield was a little over 2,000 tons.

Commercial fertilizers are used to some extent, especially for wheat on the lighter colored soils. Without doubt the thing to be recommended for the Miami series in this county is ground limestone, as much of these lighter colored soils are sour and acid. The darker colored soils of the Clyde series frequently show an acid reaction, but lime concretions and nodules are found in the subsoil and can often be reached by deep plowing. It has been found that fertilizers containing phosphoric acid and potash give best results on the Clyde silty clay loam, while a complete fertilizer gives best returns on the Miami silt loam. Good management in regard to rotation of crops, the turning under of green manurial crops in order to maintain sufficient organic matter, and a liberal application of ground limestone once every five or six years should be sufficient to keep up the fertility of any of the land found in the county.

Blackford County is among the most prosperous counties in the State. There is practically no waste land and the soils, which are all of glacial origin, are inherently fertile. The farms are well fenced and improved, with the farm buildings in good condition. Rural free delivery and telephone communication reach every part of the county.

The average size of farms is 98.5 acres. The valuation of farm lands in the county is $3,196,950. Land sells at from $125 to $250 an acre, depending on the improvements, nearness to the towns, and amount of black land.

SOILS.

The soils of Blackford County are all of glacial origin and were transported here during the Wisconsin stage of glaciation.

The depth of the drift varies from 10 to 150 feet, the greater depth being found in the southern part of the county.

Five different types of soil were recognized in the area, these types being determined by their origin, texture, color and structure. The higher uplands and morainic hills consist mostly of the Miami series, while the soils of the depressions and black lands along the small creeks are included in the Clyde series. Alluvium is a name given to those varied deposits along Lick Creek and the Salamonie River. Muck is another type, and comprises the peaty deposits formed by the accumulation of organic remains.

Excepting the areas mapped as Miami loam, the Muck areas and the sandy portion of the alluvium, the soils of the county are heavy and contain high percentages of silt and clay. There are no stones of any size to interfere with cultivation, and very little surface gravel except on the morainic hills along Lick Creek.

Miami Silt Loam.

The surface soil of the Miami silt loam consists of a grayish to yellowish silt loam, 8 to 12 inches deep, underlain with a darker, more granular and crumbly material having a higher percentage of clay. At 24 inches to 26 inches the sand and gravel become more abundant and the material assumes a gritty clay loam texture. The depth of the surface soil is variable, as erosion often thins out the silty covering of the more prominent ridges and elevations, while the material thus eroded is in time transported and deposited in the valleys and on the more gradual slopes, making the accumulation in such places much heavier and the subsoil considerably deeper than is ordinarily found on the more level lands.

The material which goes to make up the type has been derived from the glacial till of the Wisconsin drift. The thin covering of fine silty material which has been deposited over the coarser soil, although primarily of glacial origin, is believed to be an aeolian deposit, or what is commonly known in geology as loess. It is this thin covering, averaging 8 to 12 inches in depth, that is usually considered as the surface soil. The line of demarcation between the surface and subsoil is well marked, the characteristic color and texture being well defined.

The topography of the type varies from gently rolling to level. Because of the slight relief and the close and heavy nature of the soil, natural drainage is not well established. Tile drainage has been found very beneficial and much of this is being done. Many

of the large open ditches which were constructed to drain the black lands furnish a good outlet for laterals in the surrounding uplands.

Although crop yields are often not as high as on other types of soil found in the county, with proper management the average yields amount to about the same. Corn on an average produces about 30 to 40 bushels per acre; wheat 15 to 20 bushels, and oats 20 to 30 bushels. Where the land is fertilized, greater returns than these are secured. Wheat seems to respond more readily to commercial fertilizers than any of the other crops. On account of the lack of organic matter, large quantities of manure should be applied and green manurial crops turned under. Lime should be added to counteract the acidity, as well as to improve the mechanical condition of those parts of the type which are flat and poorly drained.

The rotation usually followed is corn, wheat and clover. Timothy is grown to some extent, and is of good quality. A few patches of alfalfa are to be seen on the type, and where careful preparation of the soil had been made before seeding, good stands were secured. This soil is well adapted to fruit, especially to small fruits such as berries, etc. Although the type was formerly covered with a growth of hardwood, such as maple, white oak, etc., very little standing timber now remains.

This land sells at $125 to $200 per acre. The cash rent usually asked is $6 to $8 per acre but much of the land is leased on the share basis. The rental terms are usually that the tenant furnish the seed grain, except clover seed, and deliver one-half of the products to granary, mow or market.

MECHANICAL ANALYSIS OF MIAMI SILT LOAM.

Location.	Description.	Fine Gravel, Per Cent.	Coarse Sand, Per Cent.	Medium Sand, Per Cent.	Fine Sand, Per Cent.	Very Fine Sand, Per Cent.	Silt and Clay, Per Cent.
S. E. ¼, S. W. ¼ Sec. 14, Washington Township	Soil	2.36	1.86	7.03	7.33	10.06	71.33
	Subsoil	1.86	2.70	13.60	14.70	9.00	58.13

Miami Loam.

This type of soil is not very extensive. The largest area is found bordering Lick Creek in Licking Township. The surface soil is generally a brownish loam or sandy loam 8 to 10 inches deep, grading into a heavier material at 15 to 36 inches. The subsoil often contains considerable gravel and small stones. Gravel pits are frequently found within the boundaries of the type.

The topography is rolling and undulating. In Section 6 of Licking Township a small level terrace has been included in this type although the material is much coarser than the typical Miami loam. There are also places along Lick Creek where the slopes of the uplands are quite steep and where erosion has carried the greater part of the light silt and clay away and left the coarser material exposed. Such places are too small in extent to map and have been included in the general type.

This soil is used for the growing of all general crops. Corn, wheat, oats, alfalfa and timothy all make fair yields, but the average is not as high as for that of the black lands or the Miami silt loam. Because of the comparatively light structure and coarse texture, crops mature several days sooner on this land than on the heavier types. On the more sandy areas, especially where deposits of gravel underlie the type, crops often suffer from drought.

Few farms are made up of this type alone. The price of such land would average about the same as that of the Miami silt loam.

MECHANICAL ANALYSIS OF MIAMI LOAM.

Location.	Description.	Fine Gravel, Per Cent.	Coarse Sand, Per Cent.	Medium Sand, Per Cent.	Fine Sand, Per Cent.	Very Fine Sand, Per Cent.	Silt and Clay, Per Cent.
S. E. ¼, N. W. ¼, Sec. 22 Licking Township	Soil	1.20	.80	6.60	2.66	9.66	80.00
	Subsoil	11.40	4.33	22.50	22.96	9.10	29.69

Clyde Silty Clay Loam.

The Clyde silty clay loam consists of a silty clay loam, black in color and containing a high percentage of organic matter. The first 10 inches, which is the average depth of the surface soil, contains less clay than the subsoil and is much darker in color. From

10 to 30 inches the material is a stiff, dark gray mottled clay loam. The soil is heavy, and when wet is stiff and plastic and difficult to work. Very few stones or pebbles are found on the surface or in the subsoil. Lime nodules are frequently encountered below 6 or 8 inches.

The surface of the type is level and represents low flat areas that were formerly poorly drained.

The type occurs in all parts of the county. The larger areas, however, are found in Harrison and Washington Townships and along Big Lick Creek in Jackson Township. Numerous irregular strips that were too small to indicate on the soil map have been ignored and included in the type with which they were associated.

The Clyde silty clay loam is the best agricultural land in the county, and is especially adapted to corn. Corn yields 40 to 80 bushels per acre. Oats and wheat do well and alfalfa has been found to make an excellent growth where the land was well drained.

Very little fertilizer is used. With good management the fertility of the soil can be easily maintained. Probably no other soil in the county will stand the continual cropping and still produce such good yields. Corn has been grown for six or eight years without any rotation and fair yields still obtain.

As has been mentioned elsewhere, the subsoil often contains lime which can be reached by deep plowing, but where this is not the case an application of this amendment will be necessary. From 10 to 20 bushels per acre every few years should correct the trouble.

The price of this type of soil ranges from $125 to $250 an acre, depending upon location and improvements.

MECHANICAL ANALYSIS OF CLYDE SILTY CLAY LOAM.

Location.	Description.	Fine Gravel, Per Cent.	Coarse Sand, Per Cent.	Medium Sand, Per Cent.	Fine Sand, Per Cent.	Very Fine Sand, Per Cent.	Silt and Clay, Per Cent.
S. W. ¼, S. W. ¼, Sec. 30 Harrison Township	Soil	.00	.00	.30	.31	1.50	94.93
	Subsoil	.00	.00	.13	.20	2.30	96.70

Alluvium.

This type of soil is so variable in structure and texture that no definite description can be given of the type as a whole. Ordinarily, however, the surface and subsoil to at least 36 inches consist of a dark brown loam or sandy loam containing a high percentage of organic matter. In the immediate vicinity of the uplands where the silt and clay have been washed from the slopes and deposited in the lower levels, the material is much heavier, approaching a silt loam.

Corn is the principal crop grown on the alluvial soil of the county. The yield on this soil is often as high as 60 or 70 bushels. Some portions of this type are poorly drained, and of little agricultural value at present, except for pasture land.

This type is of such limited extent that no great importance is placed on it.

MECHANICAL ANALYSIS OF ALLUVIUM.

Location.	Description.	Fine Gravel, Per Cent.	Coarse Sand, Per Cent.	Medium Sand, Per Cent.	Fine Sand, Per Cent.	Very Fine Sand, Per Cent.	Silt and Clay, Per Cent.
N. E. ¼, S. W. ¼, Harrison Township	Soil	.56	.43	3.76	20.05	33.56	40.16
	Subsoil	3.50	2.33	12.50	22.33	33.89	23.33

Muck.

The Muck soils of Blackford County consist of black or dark brown decayed organic matter mixed with more or less mineral material such as clay, silt and fine sand. The type occurs in basin-like depressions, somewhat lower than the surrounding upland, and represents the remains of decayed pond vegetation. For years such localities were covered with stagnant water in which reeds, rushes and wild grasses thrived. Where complete decomposition has taken place the plant forms are entirely destroyed, but often peaty deposits are found where the fibrous character is yet discernible.

The depth of this soil is usually more than 36 inches, or greater than the length of the soil auger. In the larger areas or toward the center of the smaller ones, the material is often a number of

feet in depth. The underlying material consists of a bluish or grayish clay, often times containing considerable marl or carbonate of lime.

The county contains numerous tracts of this kind of soil, ranging in size from a few acres to hundreds of acres in extent. The largest areas are to be found northeast of Hartford City, in Sections 2, 3, 4, 7, etc., Jackson Township, and five miles north of this city in Sections 17 and 24 Washington Township. Smaller areas are found in all parts of the county closely associated with the Clyde silty clay loam.

The surface features of the Muck are practically level. When well drained, as most of the areas are, the type is devoted to corn, grass, potatoes and truck. Good yields are usually obtained except in a very dry year when the light material is quite susceptible to drought.

The price asked for the Muck land is about the same as that for the heavier types in the county.

SUMMARY.

Blackford County comprises 168 square miles. It is situated east of the north central part of the State. The county is one of the smallest in Indiana. The topography varies from level to undulating. There is practically no waste land in the county and except for a few small tracts of timber land and a small area of poorly drained land along the creeks, all is under cultivation.

The climatic conditions are favorable for growing all the crops of this latitude. The principal crops grown are corn, wheat, oats, hay and potatoes. Special crops, such as tomatoes, cabbage, onions, etc., are grown for the local market.

Transportation facilities are good. There are two railroads and one interurban line passing through the county. The wagon roads are in good condition, many of them being graded with crushed stone.

Besides being a good agricultural county, there are several industries in the territory. Hartford City, the county seat, and Montpelier, the next largest town, support numerous factories, among which the most important are glass factories, paper mills, a steel plant, brick and tile works, etc.

There are five types of soil found in the county. The Miami silt loam and the Clyde silty clay loam occupy the most extensive areas. Hundreds of acres of Muck are also found. The Miami

loam is small in extent and represents the eroded land along the streams and a few morainic hills south of Hartford City. The Alluvium is a minor type found bordering Lick Creek and the Salamonie River. The soils of this county are fertile, and with proper management and care their fertility can be maintained. With adequate drainage, attention to rotation of crops, and, in certain cases, fertilization, there is no question as to the carrying on of permanent agriculture in all parts of the area.

It is very hard to suggest just what fertilizers are required for any type of soil described in this report. Even a chemical analysis will not answer fully for a given type as a whole. Careful study and experiments carried on by the farmer himself should disclose whether his particular soil is deficient in any of the elements required for plant growth. It might be said, however, that all the land in Blackford County would be greatly benefited by an application of slaked lime or ground limestone. Numerous tests made both on the light colored clay lands and the black lands of the depressions and bottoms show that the soil is oftentimes decidedly acid and sour.