SOIL SURVEY OF MONTGOMERY COUNTY, NEW YORK.

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DESCRIPTION OF THE AREA.

Montgomery County is situated in the eastern part of the State of New York, in the heart of the Mohawk Valley. It is included within meridians 74° 5′ and 74° 46′ west of Greenwich, and parallels 42° 46′ and 43° 3′ north latitude. The county is bounded on the north by Fulton County, on the east by Saratoga and Schenectady counties, on

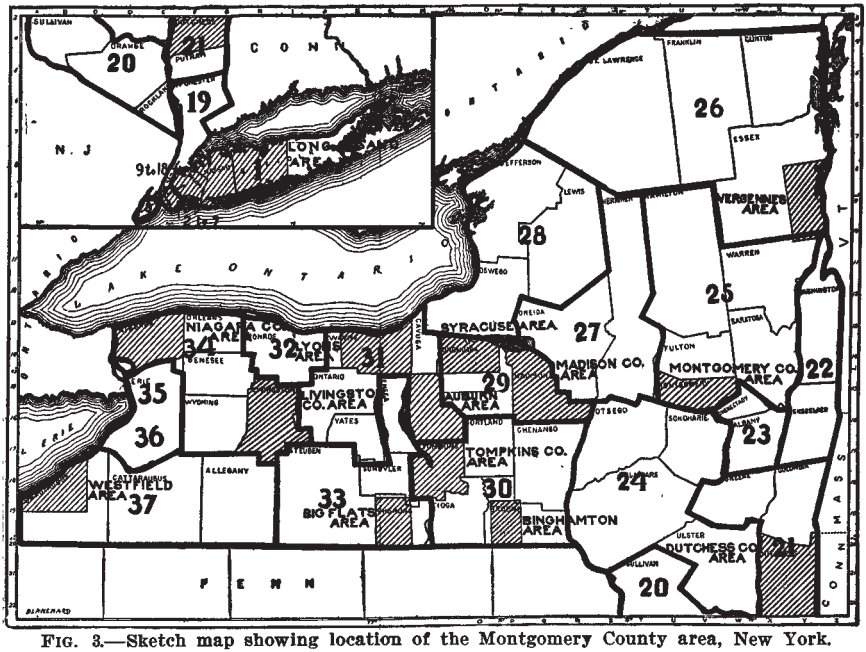

FIG. 3.—Sketch map showing location of the Montgomery County area, New York.

the south by Schenectady, Schoharie, and Otsego counties, and on the west by Herkimer County. It is somewhat irregular in outline, but is roughly rectangular in shape, being about twice as long as it is wide. The Mohawk River flows eastward in a more or less meandering course, dividing the county into two nearly equal parts. There are 259,200 acres, or 405 square miles in the county.

Practically the whole county belongs to the Mohawk Valley province, the northern boundary being approximately the line between the valley proper and the foothills of the Adirondack Mountains, while the southern limit of the county is the somewhat arbitrary line drawn between the valley and the foothills of the Catskill Mountains.

The channel of the Mohawk River averages about a half mile in width, but only during the spring months is it filled with water. During the summer and fall the stream is confined to a narrow passage from 100 to 200 feet wide, and in places the water is only a foot or so deep. The altitude of the river at the point where it leaves the county is about 250 feet, and where it enters the county about 300 feet. Back from the river the hills on each side rise to elevations varying from 200 to 400 feet in a distance of less than 1 mile, where they merge gradually into the gentle, though somewhat irregular, slopes which extend toward the mountain foothills along the county boundaries on the north and on the south. There are a few places, however, where there are precipitous walls 300 to 400 feet high along the river. The average altitude along the northern county boundary is about 750 feet, and along the southern boundary about 1,000 feet. Oak Ridge, elevation 1,450 feet, in the southeastern corner of the county, is the highest point in the area, so that within the county there is a range in elevation of about 1,200 feet.

The topography is in general sharply undulating, but with many gently rolling areas having just enough slope for good surface drainage. In the southwestern and southeastern corners of the area, for example, the surface consists of irregular rounded hills, while in the south-central part the surface features consist of parallel ridges of remarkable uniformity. These ridges extend in an east and west direction and are from one-half to 2 miles long, 20 to 75 feet high, and from a few yards to one-half mile wide. The northwestern corner of the county consists of an irregular slope extending gradually from the river to the county boundary, while the northeastern corner is composed largely of broad, plateaulike areas.

The Mohawk River, which flows eastward into the Hudson, is the main drainage outlet of the county and eventually receives the waters of all the other streams.

The first settlers, and for a long time the only settlers, in this region were the Dutch and the Germans, and to the present day their descendants are found here in large numbers. A few Scotch and Irish came in before the Revolution. After the Revolution large numbers of New Englanders were attracted by the confiscated land of Tories, though many of them took up and cleared new lands. In recent years a few Poles and other Europeans have entered the region and are engaged in agriculture.

In 1890 the population of Montgomery County was 45,699. The greatest increase has been in the towns along the river, where there are a number of manufacturing and industrial enterprises. The farming population, however, has made a healthy increase, except in the southern part of the county, in the vicinity of Charleston Township, where many abandoned farm buildings are seen, and field after field formerly cultivated now yields only a small cutting of hay or furnishes meager pasturage.

Amsterdam, with a population of 21,000 in 1900, is the only city in the county. Fort Hunter, Fonda, Fultonville, Canajoharie, Nelliston, Fort Plain, and St. Johnsville, with populations ranging from 500 to 2,000, are thriving towns situated along the river. Besides these there are many smaller towns along the river and smaller streams. Amsterdam is a thriving manufacturing city with carpet and knitting mills, broom factories, and a variety of other industries. Several of the smaller towns have knitting mills and factories. Milk stations and condenseries furnish employment to a good many people. Gloversville and Johnstown, just out of the county, furnish excellent local markets for all farm products. All produce not used in the county and near-by cities finds its way to New York and Hudson River cities by way of the New York Central and Hudson River Railroad, the West Shore Railroad, and the Erie Canal. Milk, the most important agricultural shipment, goes largely to New York, Albany, and Troy by rail. The railroads also carry a large quantity of hay, though a considerable part of this crop is shipped by canal.

CLIMATE.

There are no weather records available for any points within Montgomery County, but complete records have been kept at Albany and Cooperstown, not far distant, and from these the following tables have been compiled. The elevation of these two stations is such that Albany may be taken as representing the lower valley conditions and Cooperstown, which lies 1,200 feet above sea, as showing the conditions in the higher parts of the county.

Normal monthly, seasonal, and annual temperature and precipitation at Albany.

Month.	Temperature.			Precipitation.			
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for driest year.	Total amount for wettest year.	Snow, average depth.
	°F.	°F.	°F.	*Inches.*	*Inches.*	*Inches.*	*Inches.*
December	28	66	−17	2.7	1.0	6.2	10.0
January	23	62	−24	2.6	4.0	4.4	12.8
February	24	63	−18	2.6	4.7	4.1	14.0
Winter	25			7.9	9.7	14.7	36.8
March	33	75	− 8	2.8	1.0	2.2	11.1
April	46	88	13	2.4	1.6	4.0	1.2
May	59	92	29	3.0	2.5	3.6	Trace.
Spring	46			8.2	5.1	9.8	12.3
June	68	99	40	3.7	3.6	4.5	0.0
July	73	100	48	3.9	2.2	5.5	0.0
August	71	98	42	4.0	3.3	3.8	0.0
Summer	71			11.6	9.1	13.8	0.0
September	64	96	33	3.2	1.5	3.2	0.0
October	51	90	23	3.1	1.8	3.4	Trace.
November	39	71	−10	2.9	0.7	4.4	4.7
Fall	51			9.2	4.0	11.0	4.7
Year	48	100	−24	36.9	27.9	49.3	53.8

The average date of last killing frost in the spring is April 24, and of the first in the fall October 18.

Normal monthly, seasonal, and annual temperature and precipitation at Cooperstown.

Month.	Temperature.			Precipitation.			
	Mean.	Absolute maximum.	Absolute minimum.	Mean.	Total amount for driest year.	Total amount for wettest year.	Snow, average depth.
	°F.	°F.	°F.	*Inches.*	*Inches.*	*Inches.*	*Inches.*
December	25	62	−15	2.8	3.3	4.3	13.1
January	20	62	−21	2.6	1.7	4.4	14.0
February	21	57	−23	2.5	0.8	2.9	18.7
Winter	22			7.9	5.8	11.6	45.8
March	28	70	−15	2.8	2.3	4.2	12.8
April	41	82	14	2.7	2.2	2.9	2.4
May	54	87	24	3.6	3.4	8.8	0.1
Spring	41			9.1	7.9	15.9	15.3
June	64	90	35	4.2	1.0	4.9	0.0
July	68	92	40	4.5	1.8	3.4	0.0
August	66	90	38	4.4	5.8	6.0	0.0
Summer	66			13.1	8.6	14.3	0.0
September	58	87	29	3.4	2.9	7.2	0.0
October	47	80	20	3.3	2.4	5.9	0.7
November	35	70	0	3.1	2.4	3.2	5.2
Fall	47			9 8	7.7	16.3	5.9
Year	44	92	−23	39.9	30.0	58.1	67.0

The average date of last killing frost in the spring is May 7, and of the first in the fall October 1.

From these tables it is seen that the average annual rainfall ranges from 36.9 inches to 39.9 inches, the larger figure for the more elevated positions. Even in the driest year on record the rainfall was 27.9 inches at Albany and 30 inches at Cooperstown. As the distribution of precipitation through the seasons is relatively uniform, the region, so far as moisture supply is concerned, is favorable to agriculture.

As regards temperature there is a difference of 4° F. in the means for the two stations, Albany showing 48° F. and Cooperstown 44° F. There is but 1 degree difference in the absolute minimum temperature, —24° and —23° F., respectively, and 8° F. in the absolute maximum, 100° and 92° F., respectively.

Judging by these records, there is considerable local difference in the climate of Montgomery County, and observations on the farm practices tend to confirm this conclusion.

In general the summers, though warm, have few extremely hot days, and the nights are usually cool. The winters are in many years severe, though being accompanied by heavy snowfall (the mean for Albany is 53.8 inches and for Cooperstown 67 inches), fall-sown crops are well protected, and damage from freezing or heaving is minimized.

The first snows may come in October, though winter seldom sets in until the latter part of November. Sometimes the spring season does not open until the first of April, but as a rule the frost is out of the ground and well-drained land may be worked in the early part of March.

AGRICULTURE.

The Indians practiced agriculture in the Mohawk Valley before the arrival of the white man. Squaws cultivated corn, beans, squash, and pumpkins to a limited extent in the neighborhood of their villages along the river. The cultivated fields are said to have been located on the river flats, and there were also a few Indian apple orchards on the uplands.

As early as 1711 a few white men came to this region to locate, and the first permanent settlement was made at Stone Arabia in 1723. These people were Germans and were bent on establishing homes where they would be free from religious persecution. Each family took up a piece of land and began at once to clear it for the purpose of growing corn, wheat, potatoes, flax, and such other crops as were necessary for food and clothing. The land was mostly forested. In order to clear it the trees were felled, and a few of them utilized in building log houses and stockades. The others were rolled together in piles and burned. The agriculture was crude; crops were planted among the stumps for a few years until these decayed so that they could be more easily removed. Most of the

work was done by hand. Grain was thrashed with a flail or by horses tramping over it. At first it was either ground at home with a wooden pestle or taken on horseback or by boats to the flour mills at Schenectady. A little later gristmills were built along the larger streams in the county. Each family attempted to produce just enough of everything for its own consumption. The women spun the yarn from the flax, wove the cloth, and made the clothing. The first settlers brought with them a few cattle, and thus began the dairy industry which at present holds such an important place in the agriculture of the county. Sheep were introduced almost as soon as cattle, and the wool was carded and spun and made into clothing. Sheep raising attained its greatest importance about 1860, since which time it has steadily declined. Horse breeding received some attention, and early writers refer to the many fine horses seen in the Mohawk Valley in pioneer days. There are now several large farms devoted to the breeding of fine stock.

Oats, corn, rye, buckwheat, and barley were all important crops in 1850. Wheat was grown to some extent and reached its maximum production about 1880, but the acreage has since decreased rapidly. Oats have always led in production and are still the most important grain crop, though the largest yield was in 1860. Corn has always held second place, and while at present it probably equals oats in acreage, so much is used as ensilage that the production of grain as returned by the census is not a true measure of its importance. Buckwheat still holds an important place on certain classes of soils, but barley and rye have ceased to be important crops. A few hops have been grown in the western part of the county from the earliest days, reaching their maximum production in 1900. For the last few years the low price has discouraged their production, and they have come to be considered such an unprofitable crop that the yards are being abandoned.

Prior to the civil war the only marketable dairy products were butter and cheese, which were made on the farm and the surplus sold in local markets or shipped in small quantities. About this time the improvement of transportation facilities and the advent of butter and cheese factories gave an impetus to the dairy industry. The greatest number of milch cows, over 26,000, is reported in the census of 1870, about which time milk was first sold extensively. The sale of milk in that year amounted to 5,000,000 gallons. Much of it at first went to butter and cheese factories, but as the demands from New York and other cities increased more and more of the milk was shipped and at present most of it is disposed of in that way. Of the 10,500,000 gallons produced in 1900 nearly 7,000,000 gallons were sold. The demand is increasing faster than the supply and competitive buyers are reaching out beyond ship-

ping points by means of collecting wagons, so that farmers are saved the expense of delivering milk. In places distant from the railroad the milk is skimmed and only the cream sold. Cheese factories and condenseries consume a small proportion of the supply, while most of it goes to New York, Albany, and other cities by special milk trains. When most of the milk was used for making butter and cheese it was produced during the summer season and the cows were allowed to go dry in winter, but later the higher prices paid in winter warranted a change in management so as to prolong the milking throughout the year. This necessitated a change in the feeding system. Silos were built to store ensilage for winter use, more attention was paid to the production of hay and fodder, and the grain ration was increased. Cattle were more carefully housed and the recent restrictions of boards of health as to the sanitation of the stables have done much to improve the quality of the milk supply which goes into the large cities. Increased attention to the quality of milk has also necessitated more careful breeding. Holsteins prevail and many herds include registered stock. It is not unusual to include in the herds a few well-bred Jerseys to increase the butterfat content of the milk.

The general type of farming in the county to-day is dairying, with the production of hay, grain, and special crops, such as market-garden produce, near some of the larger towns, a little fruit in the eastern part of the county, and a few hops in the extreme western part.

In 1900 more than one-third of the area in farms was in grass and grains cut for hay, giving an average yield of 1¼ tons per acre. Of this acreage 2,558 acres were in clover and over 81,000 acres in other tame grasses, mostly timothy. Next in acreage were oats, 26,640 acres yielding 829,000 bushels, a little over 30 bushels to the acre. Corn occupied 11,449 acres and yielded 373,500 bushels, less than 33 bushels to the acre. A little over 5,000 acres of buckwheat, largely on the Volusia silt loam and adjoining areas of the Mohawk silt loam, gave an average yield of 16 bushels. Wheat and rye were each credited with a little more than 1,000 acres and an average yield of 18 bushels. The acreage has declined since that time. The 620 acres of barley produced 14,200 bushels, or 23 bushels per acre. The production of potatoes was 199,738 bushels, grown on 2,483 acres—hardly enough to supply the home and local market demand. There were 1,425 acres in hop yards yielding less than 465 pounds to the acre. The value of orchard products was given as $48,834. As a rule the orchards are small and poorly cared for, and little attention is paid to packing the fruit.

The total area in farms in 1900 was 236,934 acres, of which 202,394 acres were improved. The average size of farms was 98.4 acres. The

total value of farm lands was $5,941,600, an average of $25 an acre, and the total value of buildings, improvements, and machinery amounted to nearly the same figure. The capital in live stock was $1,608,651. The value of products not fed to live stock was $2,064,886. Deducting from this $358,780 expended for labor and $17,810 for fertilizers, leaves a net return of $1,688,296 upon a total investment of nearly $13,000,000 and the labor of farmers and their families. Reducing these figures to an individual basis shows a net return per farm of about $700 on an average investment of $5,400 and the farmer's labor.

The adaptation of soils to crops is well recognized by the farmers. The Mohawk series, especially the clay loam, is considered the best dairy soil because of its adaptation to corn and grass. The Palatine soils are even more highly esteemed, returning larger yields and bearing a higher valuation, but their limited area renders them a less important factor in the local agriculture. Both of these groups of soils are well suited to clover, especially the darker colored types, which are underlain by the black Utica and Hudson River shales. Corn is also grown extensively on the more loamy phases of the Dunkirk gravelly loam, and a larger proportion of the Genesee fine sandy loam than of any other type is devoted to this crop, with the possible exception of Palatine silt loam. Buckwheat is grown extensively on the Volusia silt loam, which is probably better adapted to it than to any other crop. A little is grown on the lighter phases of the Mohawk silt loam where it approaches the Volusia soil. Oats are grown on all types. The Genesee fine sandy loam returns good yields. The Volusia silt loam and the lighter textured Dunkirk types bear a large acreage. This grain is also grown extensively on all types of the Mohawk series, the silt loam perhaps being preferred over the other members. Grass occupies the largest acreage of any crop in the county and is grown on all soils. Dunkirk clay is esteemed for timothy hay for market, because of the bright color of the product. Onions, berries, sweet corn, and market-garden crops occupy a large proportion of the Dunkirk coarse sand. Hops are grown in the southwestern part of the county on Dunkirk gravelly loam, Mohawk clay loam, Mohawk silt loam, and Volusia silt loam, the average yield on these soils decreasing, but the quality of the product improving, in the order named.

Rotation of crops is often practiced more because of convenience in management than because of its beneficial effects upon the soils and the increase in crop yields. The usual practice is corn one or two years, oats one or two years, after which the land is seeded down to remain in meadow for several seasons, until the sod runs out and requires renewing. The system is often varied with other crops in place of corn or oats. On the river flats grass is seldom allowed to

remain more than one season, as the Genesee fine sandy loam is in great demand for corn and oats. Notably on the Volusia silt loam, but to some extent on other types, mowing lands are allowed to stand for ten or fifteen years, until there is hardly enough grass to pay for cutting, and are then plowed one year for oats and reseeded.

Agricultural methods on the better soil types are well adapted to present conditions. The dairy industry creates a great demand for hay, corn, and grain, and rotations are planned to supply these crops. Labor-saving farm machinery, including manure spreaders, is used extensively. Deep plowing and thorough cultivation are usually practiced.

In the poorer parts of the county, however, there is a pronounced lack of intelligent management. More manure is allowed to waste in regions occupied by soils most in need of it than in those sections where the soils are naturally more productive. Plowing here is universally shallow, cultivation is neglected, and crop rotation receives little or no attention. It is also a significant fact that from the poor lands most in need of organic matter and careful conservation of farm resources the selling of a large proportion of the hay is a common practice.

The farm-labor problem is critical and one of the most difficult things which the farmers have to face. The increased demand of factories and shops for labor throughout the year has attracted many from the farms, where employment is usually furnished for only seven or eight months, leaving an enforced idleness for the remainder of the season. High wages are offered for a few weeks during harvest time, but it is difficult to get sufficient help at any price. As a result many farmers must depend upon the efforts of themselves and the members of their families. A few foreigners, chiefly Poles, are employed on farms at $24 to $30 a month for eight months and retained at a nominal figure during the winter season. Native labor is very scarce and demands higher wages.

Less than 60 per cent of the farms are operated by the owners. The usual tenant system is on a share basis. The owner furnishes, besides the land and permanent improvements, one-half of all seed and commercial fertilizers and a part or all of the dairy stock. The tenant provides horses, tools, and working equipment and one-half of the seed and fertilizers. The gross receipts are divided equally. The agreement is varied occasionally, but this outline forms the basis of practically all share systems. Cash rent is seldom paid.

The farm lands of Montgomery County have a wide range of valuation. The river flats occupied by Genesee fine sandy loam are often held at more than $100 an acre, and there are a few well-developed farms on the adjoining uplands closely approaching this valuation. In Charleston Township and vicinity and parts of Florida there are

extensive areas of Volusia silt loam which can be purchased for $7 to $10 an acre.

In considering the agricultural conditions of Montgomery County with a view to their improvement, the region occupied by Volusia silt loam claims first attention. Its present value and productivity are far below normal, owing in a large measure to poor management and excessive waste of natural farm resources. Systems copied from other sections, but not well adapted to this soil, have resulted in poor success, which naturally led to neglect. A revised system of management is necessary in order to use all of the hay and roughage on the farms and return to the land a large part of the organic matter, of which it is greatly in need, but is now being deprived by the extensive sale of hay. Distance from shipping points minimizes its utility for dairying, but it is admirably adapted to the production of beef cattle and sheep. Deeper plowing is necessary. Instead of being left in sod for a long period of years the fields should be broken as often as possible and more thoroughly tilled. A systematic rotation of crops should be introduced. The maximum use of both stable and green manures can not be too strongly urged. This last suggestion also applies to nearly all parts of the county.

The problem of underdrainage is little understood and seldom considered seriously, though a matter of great importance on all soils in the county, except a limited area of loose sandy and gravelly loams. The removal of surplus water from depressions is all that is usually considered necessary, but there are many level areas and even hillsides where a thorough system of underdrainage is desirable, especially where there are heavy subsoils, as it not only provides for the removal of excess water but improves the structure of the soil mass and renders it capable of retaining a sufficient moisture supply in times of drought. Clovers and other legumes are well adapted to the Palatine soils and also to the darker members of the Mohawk series. These crops are not only excellent feeds, but are also of great value in building up the soil. Deep plowing, thorough tillage, and a systematic rotation of crops should have careful attention throughout the county, and the rotation should include clover or some other legume.

SOILS.

The soils of Montgomery County fall naturally into four groups—glacial soils, or those derived from glacial debris; glacial lake sediments, or the glacial debris reworked and deposited in ancient lakes now drained; residual soils, or those formed through the breaking down of rocks in place; and alluvial soils, or those resulting from stream sediments.

During the Glacial period the whole region was covered by the ice sheet, the movement of which was from west to east through the Mohawk Valley. About four-fifths of the surface of Montgomery County and much of the region to the westward is immediately underlain by soft, thin-bedded, black, easily eroded shales of the Utica and Hudson River formations. When the ice sheet moved through the valley large quantities of these soft rocks were eroded, ground up, and mixed with the other glacial material, and when the ice sheet melted or passed away it left a mantle of variable thickness over practically the whole surface of the county.

The residual soil areas represent locations where there is no glacial material upon the surface and the underlying rocks have weathered so as to form the soil. In the northeastern part of the county, for example, there are several areas where the hard, gray, Lower Silurian limestones, coming close to the surface, have weathered into the residual soil type mapped as Nellis loam. Along the river bluffs and along the northern boundary of the county there are a few outcrops of Archean rocks, but these are so hard and resistant to the agencies of weathering that they have not formed soils. These outcrops give rise to small areas of Rough stony land.

The glacial mantle is in many places so thin that the underlying rocks enter largely into the soil formation, giving the soils some of the characteristics of both residual and glacial types of soils. There are large areas in the county for instance where the soft dark-colored shales of the Utica and Hudson River formations lie so close to the surface that fragments and finer material derived from them have been incorporated with the glacial material brought from a greater or less distance. These conditions have given rise to the dark-colored soils of the Palatine series. In the southern part of the county also there are areas where the light-colored shales and fine-grained sandstones, which here lie close to the surface, have weathered and become mixed to some extent with the glacial material, derived largely from the same formations, thus giving rise to the light-colored soil mapped as Volusia silt loam. Over a large part of the county the glacial mantle is so thick that the underlying rocks have had no influence upon the soil formation.

The soil types which owe their origin solely to the weathering of the glacial mantle belong to the Mohawk series. The materials are derived from a wide range of rocks, but the black shales of the Utica and Hudson River formations have contributed so largely to the materials that the black color of some of the types is directly attributable to the influence of these shales. Where the glacial material has been reworked by stream and lake action and redeposited as glacial lake sediments the Dunkirk and Clyde soils are found. With the melting of the glacier temporary lakes were formed in the de-

pressions at the front of the ice sheet and the volume of water issuing from the ice front carried along rock debris and rock fragments of all sorts and sizes and deposited much of the material in these lakes. The texture of the lake deposits depends upon the rapidity and volume of the streams and the depth and size of the lake. The coarser material, however, like gravel and sand, was usually deposited in shallow water or near shore, while the finer material, like silt and clay, was carried in suspension and deposited in quieter and deeper water. The beds of many of these glacial lakes are at present well drained and weathering has proceeded to a considerable depth. Where such is the case they give rise to the soils of the Dunkirk series. Where they are still swampy and poorly drained the soils have been classed with the Clyde series.

The alluvial soils are of recent origin and represent depositions which are taking place at every overflow along the bottoms of all of the present streams. The largest areas of soils of this group occur along the Mohawk River, and the material in this case represents a wash from and an admixture of material from practically all the soil types of the upland portion of the county.

The following table gives the name and actual and relative extent of each of the several types of soil mapped in the area:

Areas of different soils.

Soil.	Acres.	Per cent.	Soil.	Acres.	Per cent.
Mohawk clay loam	67,200	25.9	Mohawk loam	7,680	3.0
Mohawk silt loam	45,440	17.6	Dunkirk gravelly loam	7,040	2.7
Volusia silt loam	30,720	11.9	Clyde clay loam	4,480	1.7
Dunkirk fine sandy loam	20,480	7.9	Palatine silt loam	3,840	1.5
Dunkirk clay	17,920	6.9	Dunkirk coarse sand	3,200	1.2
Genesee fine sandy loam	11,520	4.5	Clyde loam	3,200	1.2
Dunkirk loam	8,320	3.2	Muck	1,920	.7
Dunkirk sandy loam	8,320	3.2	Palatine fine sandy loam	1,280	.5
Nellis loam	8,320	3.2	Total	259,200	.....
Rough stony land	8,320	3.2			

PALATINE FINE SANDY LOAM.

The soil of the Palatine fine sandy loam to a depth of 8 inches is a dark-brown to black fine sandy loam, below which, to a depth of about 3 feet, is found a heavy silty loam or a sticky sandy clay of the same color as the soil. Bed rock is usually encountered at a depth of 3 or 4 feet. Sometimes, instead of being underlain by bed rock, there are small areas of the type a few acres in extent where the underlying material is glacial gravel, and when such is the case the type is a little lighter colored than usual. The soil is loose and friable and easily tilled.

The type is limited in area to about 2 square miles in the northern part of Palatine Township and one or two very small areas farther east. Its surface features vary from rolling to hilly and the natural drainage is good. In times of drought it retains moisture well.

The Palatine fine sandy loam is chiefly a residual soil derived from the Utica and Hudson River shales, broken up somewhat by the ice and mixed with a small proportion of foreign material, but moved only a very short distance or not at all. While feebly glaciated, it is in its most essential respects a residual soil. It is very calcareous and supports a good growth of clover and grasses. Alfalfa can be successfully grown, corn does well, and oats yield a fair crop. Potatoes and root crops do better upon this soil than upon some of the heavier soils of the region. The farms of which it forms a part are in a prosperous condition and the cultural methods are among the best in the county. Dairying is the chief interest. Very little commercial fertilizer is used, but stable manure is regularly applied. Seventy dollars an acre is probably a fair estimate of the average selling price of this soil type.

The following table shows the texture of soil and subsoil of representative samples of Palatine fine sandy loam, as determined by mechanical analyses:

Mechanical analyses of Palatine fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
19545	Soil	2.2	7.1	8.0	22.3	15.1	32.1	12.6
19546	Subsoil	.8	6.2	7.4	21.7	12.3	34.9	16.4

PALATINE SILT LOAM.

The soil of the Palatine silt loam, to a depth varying from 12 to 18 inches, consists of a very dark brown heavy silt loam which becomes jet black when wet. Below this and to an average depth of 30 inches the subsoil is composed of a dark-colored slightly heavier silt loam, which becomes a light-textured clay loam in the lower depths. The subsoil rests directly upon the black, thin-bedded, calcareous shales of the underlying formations, and in the lower few inches of the subsoil there are sometimes present a good many soft shale fragments. There are occasionally locations where the underlying rocks come nearly to the surface, and where such is the case the percentage of shale fragments on the surface and throughout the soil is often considerable.

Even where quite heavy the soil is well granulated and is thoroughly drained and easily tilled. Its origin is indirectly due to the absence

of glacial till, since it overlies the Utica and Hudson River shales, from which it is derived, in all places left exposed after the retreat of the glacier.

The Palatine silt loam is found in relatively small areas throughout the town of Palatine. There are a few very small areas in Mohawk Township and several at different points immediately south of the river throughout the length of the county.

The topography is rolling to somewhat hilly, extensive rock faulting having in some cases made the surface uneven and resulted in considerable range of elevation. Surface drainage is well established and the loose, porous nature of the underlying formation usually provides ample underdrainage.

This type is a residual soil derived from the Utica and Hudson River shales, and not enough glacial material was left to influence materially the characteristics of the soil. The black shales weather rapidly, as is seen in exposed cuts, where a layer of considerable thickness of well-developed soil material is often formed from virgin rock in one or two seasons. A high lime content doubtless aids in this rapid slaking. The influence of the calcareous rock in this soil is indicated by its uniformly dark color and perfect granulation. Some areas of the Palatine silt loam are so shallow that they are seriously affected by drought, but where the soil and subsoil are more than 2 feet deep—even less during a fairly wet season—it is the best corn soil in the county. One hundred bushels of corn is not an unusual yield. The dark color of the soil makes the type warm earlier in the spring than other types, and very likely keeps the soil temperature higher throughout the growing season, a factor that may well account for its special value as a corn soil. Grasses do well and clover gives heavy yields. Alfalfa can be grown successfully. Oats yield fairly well, but this is not a favorite crop for this soil, as it grows too much straw. Potatoes yield well.

The type is mostly included as parts of successful dairy farms, and the methods of cultivation in vogue are those used on the surrounding soils. In most cases they are up to date and progressive. Deep plowing is the rule, and as it is usually considered the best land on a farm careful attention is given to its tillage. Little commercial fertilizer is used and it requires less manure than associated types.

Buildings and fences are mostly in good repair and the farms containing a liberal proportion of this soil are usually in good condition. While there are limited areas too shallow to be of high value at present, they could nearly all be deepened and improved by deep plowing to loosen the surface and expose the rock to weathering. Clovers and some other plants will also assist in the process, as may be seen by the investigation of deep cuts, where various root systems

are seen in the rock crevices several feet below the surface. Most of the type is valued at $60 to $80 an acre.

The following table shows the average results of mechanical analyses of fine-earth samples of soil and subsoil of the Palatine silt loam:

Mechanical analyses of Palatine silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
19541, 19543	Soil	0.9	4.2	2.8	8.2	4.3	61.8	17.0
19542, 19544	Subsoil	.4	5.3	4.4	10.1	6.0	48.3	25.4

The following samples contained more than one-half of 1 per cent of calcium carbonate ($CaCO_3$) : No. 541, 2.62 per cent; No. 19542, 2.39 per cent; No. 19544, 1.04 per cent.

NELLIS LOAM.

The Nellis loam is a reddish-brown, loose, friable silty loam to a depth varying from 6 to 12 inches, and rests directly upon a hard gray limestone. In small areas the soil covering is so thin that the rock is exposed here and there at the surface, and occasionally such rock exposures were large enough to be shown and in such cases they were mapped as Rough stony land.

With the exception of a very few small areas just above the river bed on the north side, most of the areas are too small to show in the map. A long, narrow strip extends from Palatine Bridge west beyond Nelliston and a small area at the same level is found west of Palatine Church. A broader area is developed at Yosts, on the upland northwest of "The Noses."

The topography is usually flat and level, conforming to the surface of the underlying formation, but often there is a sharp drop or perpendicular ledge of rock separating two levels. Owing to the shallowness of the soil and the nearness of the underlying rocks to the surface, it is a droughty type and crops usually suffer from lack of moisture.

The type is purely residual in origin, being derived from the hard limestones of Lower Silurian age. Occasionally, however, there are local areas where there is a small quantity of glacial material mixed with the type, and in such cases the soil is lighter colored, somewhat deeper, and crops are less liable to be affected by drought. That this soil is still in process of formation, though very slowly, is shown by the rounded, weathered edges of fissures in the exposed rock and by its pitted surface.

The type is not considered a valuable one for general farming purposes, but when the soil is not too shallow it produces a fair pasturage of Canada bluegrass and white clover. There are sometimes very

small patches where the underlying rocks are 2 feet or so below the surface, and where such is the case grass, corn, oats, and general farm crops do fairly well. The type is devoted almost entirely to pasturage.

The following table shows the average texture of the surface soil of Nellis loam, as determined by mechanical analyses, the subsoil being bed rock:

Mechanical analyses of Nellis loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
19537, 19539	Soil	1.0	4.5	3.8	10.2	16.2	48.8	15.6

MOHAWK LOAM.

The Mohawk loam to a depth of 10 inches is a brown to brownish-gray loam, below which to a depth of about 36 inches the subsoil consists of a heavy brown loam which sometimes becomes heavy enough in the lower few inches to resemble a clay loam. Both soil and subsoil contain some glacial stones and gravel, and there are a few on the surface, though seldom enough to interfere with cultivation.

This type is found in small areas on both sides of the river, seldom above the 800-foot contour. It usually has a hilly topography, many of the hills being parallel ridges with the Mohawk loam on the crests and other types along the lower slopes and intervening depressions. In the northern part of the county there are two areas which are comparatively level, and here the soil is often too wet for best results. With the exception of these the type is not in need of artificial drainage.

The Mohawk loam is derived from the weathering of glacial debris which was reworked to some extent at the melting ice front by comparatively rapid currents. This resulted in sorting out and carrying away much of the silt that would have made it Mohawk silt loam. This same glacial material where unassorted weathers into the latter type.

In general the Mohawk loam is adapted to general farming crops and to dairying. Corn gives a good yield and 1½ tons of hay are often cut from an acre. Alfalfa can be grown on carefully prepared land. Oats yield 30 to 35 bushels per acre. A few small but thrifty apple orchards were seen. Potatoes yield about 150 bushels per acre. The type is closely associated with the Mohawk clay loam, and the methods of cultivation followed are the same on the two types. Dairying is the chief industry, and the manure is nearly all used to

advantage. The plowing is fairly deep, and the tillage is usually thorough. In some places commercial fertilizers are being used. Buildings and fences are kept in good repair, and the land as a rule is in good condition.

Most of the type is convenient to the railroad and is traversed by comparatively good roads. The value of farm land varies with the condition of the individual farm, but $45 or $50 is probably a fair estimate of its average selling price.

The following table shows the texture of the fine earth of soil and subsoil of Mohawk loam, as determined by mechanical analyses:

Mechanical analyses of Mohawk loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
19519, 19523.....	Soil.....	0.7	5.3	4.7	21.0	18.3	34.0	16.1
19520, 19524.....	Subsoil	1.8	7.2	7.9	15.7	12.8	30.9	24.5

MOHAWK CLAY LOAM.

The Mohawk clay loam, to an average depth of 9 inches, is usually a rather heavy silty clay loam having a dark-brown or grayish-brown color. Sometimes, however, there is enough fine sand to make it a sandy silt loam. The subsoil is slightly lighter colored, but has the usual texture of the surface soil to a depth of 24 or 30 inches, below which it becomes heavier and often darker colored. The latter feature usually occurs where the type directly overlies the soft black Utica and Hudson River shales.

This soil is of glacial origin. Strewn upon the surface and disseminated through both soil and subsoil are varying quantities of subangular and rounded fragments of quartz, granite, and gneiss, with some sandstone and occasionally gray limestone. These stones, which vary in size from small fragments to huge bowlders, are seldom numerous enough to interfere seriously with cultivation. There are some instances, however, where the removal of the larger stones was necessary before the land could be broken, and such fields are inclosed by stone fences. A few soft, black, calcareous shale fragments are found near outcrops and in the soil overlying that rock, but these weather rapidly and do not accumulate in large quantities.

Underlying the type in many places at from 3 to 10 feet is a heavy, plastic, massive blue clay, sometimes nearly 100 feet deep, known as bowlder clay. It is occasionally quite free from stones, but usually contains from 1 to 10 per cent of rounded stones of all sizes, which often show glacial scratches. Most of them are hard blue limestone, foreign to this territory. A few of them are found in the

immediate subsoil. The greater part of the type, however, overlies bed rock at from 3 to 6 feet.

The Mohawk clay loam is the main type of the western-central part of the county. It occupies the broad slope south of the river to an average distance of about 5 miles, where at about the 800-foot contour it forms an irregular, disconnected boundary with the Mohawk silt loam. North of the river it is also the main type, but is less regular in development and occupies a smaller proportion of the territory.

In topography the type varies from rolling to hilly, and much of it consists of a series of parallel ridges varying greatly in width and length. These ridges are due to the erosional influences of the ice sheet during the Glacial period, and are composed largely of a rock core of shales. The veneering of glacial material varies in depth from a few inches at the crest of the ridges to several feet in the depressions between them.

Owing to the usual rolling surface features, the surface drainage is good. The uniformly heavy subsoil, however, is not favorable to good natural subdrainage, and over most of the type moisture conditions would be greatly improved by artificial drainage. The crests of the hills, where the soil is naturally thin and somewhat mixed with shale, are about the only locations where the drainage conditions are naturally adequate.

The Mohawk clay loam is derived from the weathering of glacial débris deposited as an uneven mantle over the underlying rocks.

It is believed that the material was reworked to some extent by the outflowing currents from the melting ice, but not under a body of water. The dark-colored calcareous shales of the Utica and Hudson River formations to the westward have entered largely into the composition of this glacial material, and fragments of these rocks are found in the soil. It is these dark-colored shales, together with their calcareous nature, which have given the soil its dark color.

The conditions found upon this soil are especially favorable for the dairy industry, and most of it is devoted to that purpose. It is an excellent grass soil, and clovers almost always thrive. Timothy is not always of the best quality, but it yields well. Mixed clover and timothy meadows often produce $1\frac{1}{2}$ to 2 tons the first year, after which the yield gradually decreases until at the end of about four or five years the field needs to be reseeded. This soil produces excellent yields of fodder for ensilage, and when native corn is planted a yield of 60 to 80 bushels is sometimes obtained. Judging from the experiments which have been tried with alfalfa, it is believed that that crop can be grown successfully. It is not particularly an oat soil, but fair yields of that crop may be produced. Buckwheat is seldom sown, except as a secondary or catch crop, to recover the use

of poorly drained fields after a wet spring has destroyed the corn. A few tomatoes have been grown on the type, and in the vicinity of Fort Plain cucumbers have succeeded. Cabbage can be grown. Wheat was at one time produced extensively, but its production is now practically abandoned in the region. Some hops are still raised in the western part of the area, and they yield well. The soil is not well adapted to potatoes and root crops.

The farmers who live upon this type are usually progressive. The stable manure is carefully saved and applied, and on many farms a manure spreader is used. Deep plowing, careful cultivation, and crop rotation are usually practiced and commercial fertilizer is not generally used. Meadows are sometimes allowed to stand three or four years, then plowed for corn (occasionally two years), sown to oats, and reseeded. A liberal proportion of clover should be seeded in all grass land, seeding especially where the fields are well drained. Most of this type is in good condition and yields profitable returns. The farm buildings are good and fences well cared for.

The value of land varies with its location and condition and the character of the buildings. Farms may be bought for $30 an acre, while others in better condition and near the railroad are sometimes valued at more than $75. A fair average for the type seems to be about $45 an acre.

The following table shows the texture of soil and subsoil of representative samples of Mohawk clay loam, as determined by mechanical analyses:

Mechanical analyses of Mohawk clay loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
19531,19533,19535.	Soil.....	0.8	2.9	2.6	9.1	9.4	49.0	29.9
19532,19534,19536.	Subsoil	.7	2.8	2.9	10.0	10.0	42.9	30.9

MOHAWK SILT LOAM.

The soil of the Mohawk silt loam to a depth of 8 inches is a light-brown silt loam, below which to a depth of about 36 inches the subsoil is a heavy silt loam which passes gradually into a clay loam and is often slightly mottled with yellow, brown, and gray in the lower depths. This type lies between the Mohawk clay loam and the Volusia silt loam in texture, and it grades into one or the other along its margins.

Scattered upon the surface and disseminated throughout the soil and subsoil are found a good many rounded and subangular glacial rocks. These are seldom in sufficient numbers to prevent cultivation,

though in places they do interfere seriously with tillage. Such areas were indicated upon the map by symbols.

This type of soil is confined to the region south of the Mohawk River and occurs mainly as an irregular broken strip from 2 to 4 miles wide lying on the valley slope between the Mohawk clay loam and the Volusia silt loam. It extends the entire length of the county from east to west. Northeast of Amsterdam there are small spots of soil—too small to be shown in the map—which bear some resemblance to this type.

The topography is rolling to hilly, and sometimes the surface is made up of a series of parallel ridges. In general it has good surface drainage, but owing to the clayey nature of the subsoil there is a large proportion of the type greatly in need of artificial underdrainage. The compact clayey nature of the subsoil causes it to retain too much water during a wet time, while during a dry season the water which should have been carried off earlier by subdrainage finds its way too rapidly to the surface and by excessive evaporation causes deep sun-cracks which aid in baking and drying the soil.

The Mohawk silt loam is derived from the weathering of the thin glacial till deposited as a mantle over the rock formation of the region. It was slightly reworked by outflowing currents from melting ice and differs very little from the Mohawk clay loam in mode of formation, but is generally not as deep and is seldom or never underlain by bowlder clay. The lighter color and slightly lower productive capacity are due to the absence of material derived from the black calcareous shale which influences the darker type. Light-colored shales and sandstones characterize the lighter phase, but where typically developed the soil is composed very largely of foreign material.

Dairy farming is the leading industry upon the type. Clover and timothy give a good yield, mixed meadows of these crops returning from 1½ to 2 tons per acre. Alfalfa requires careful treatment to secure a good stand, but can be grown on parts of the type if properly handled. Oats yield 30 to 50 bushels. Fodder corn does well and native corn yields 50 to 60 bushels. Buckwheat is grown to some extent and yields 30 to 40 bushels per acre; it is an excellent crop for the type, as the extensive root system loosens the compact soil and aids in fitting it for the next crop. Hops are produced successfully in the western part of the county, the soil giving a fair yield of very good quality. Wheat was formerly a successful crop. On a limited area of the lighter textured phase potatoes can be grown if underdrainage is well established and the soil well supplied with organic matter either by stable or green manuring. Buckwheat is of great value in preparing the soil for potatoes. The soil is better for apples

than the Mohawk clay loam, though not considered a first-class apple soil.

As a rule the Mohawk silt loam is fairly well farmed and the rotation of crops is practiced. Farm manures are made use of in most instances, though on some farms they are allowed to go to waste. Green manuring, which would be an excellent practice on this soil, is seldom resorted to. A few farmers plow deep, but many of them turn only 6 or 7 inches, and some even less. Where shallow plowing is now practiced the depth should be increased about an inch at each plowing until at least 10 inches of the soil is turned. The usual crop rotation is corn, oats, then grass three to five years. A little commercial fertilizer is used on corn and less on oats. It is often found beneficial, but can not take the place of manure. Both stable and green manure are strongly urged for the improvement of this soil.

Most of the type is in good condition. Buildings and fences are in good repair and the farmers are generally prosperous. It has the disadvantage of being farther from market than the Mohawk clay loam, though most of the area is within a convenient distance from the railroad for marketing dairy products. It is not naturally as strong a soil as the darker type, but is adapted to a somewhat greater variety of crops. The average value of the land is placed at $35 to $40 an acre. There are individual farms valued much higher than this and others that can be secured at a much lower figure, the valuation depending largely upon the improvements and state of cultivation.

The following table shows the texture of soil and subsoil of representative samples of Mohawk silt loam, as determined by mechanical analyses:

Mechanical analyses of Mohawk silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
19527, 19529	Soil	1.0	3.1	2.2	7.6	8.6	53.8	24.6
19528, 19530	Subsoil	1.4	4.8	3.7	11.4	10.6	40.5	27.5

VOLUSIA SILT LOAM.

The Volusia silt loam consists of 6 to 8 inches of a yellowish-brown or pale-yellow silt loam, underlain to depths ranging from 1 to 3 feet by a subsoil of yellowish compact silt loam. The subsoil rests directly upon the bed rocks, and where the depth of the soil mantle is as great as 3 feet the lower depths of the subsoil are often mottled with yellowish, brown, and gray colors. Scattered upon the surface and disseminated through both soil and subsoil are found from 20 to 50 per cent of sandstone and shale fragments, ranging in

size from small chips to pieces 1 foot in diameter. Occasionally a few rounded stones and gravel of glacial origin are found throughout the type. There are also numerous outcrops of the underlying sandstones and shales. In places the road bed is solid rock showing well-defined glacial scratches. Except for the interference of stone the soil is easily tilled. Where loose stones are so numerous that they seriously interfere with cultivation the condition is indicated on the map by symbol.

Areas of this soil type are found only in the southern portion of the county and at altitudes seldom less than 1,000 feet. A few small isolated areas occupy the tops of the higher hills toward the west. The surface features are hilly, the soil usually occurring on the crests of hills whose lower slopes give rise to other types. It also occurs as distinct, nearly level erosion terraces, sometimes in series, on the sides of hills. The topography affords good surface drainage, but as a whole the soil is springy and wet, so that it is considered a late soil. Crops suffer from an excess of moisture during abnormally wet seasons, and the entire area of the type would be greatly improved by thorough underdrainage.

The Volusia silt loam is largely a residual soil derived from the weathering of the underlying rock formations, whose surface layers were shattered by the passage of the ice sheet over them and the fragments in many cases were pushed along a short distance, but there is a slight admixture of foreign glacial material, as is shown by the presence of the few scattering glacial gravels and bowlders. The relatively high sand content in spots is due to the direct influence of a coarse-grained shaly sandstone, which underlies much of the type and of which fragments are sometimes seen in large quantities in stone fences and in the fields.

Locally the Volusia silt loam is called " yellow loam " and it is generally regarded as a rather poor soil. Golden-rod and daisies are common in pastures and in the fence corners of cultivated fields. Owing to the distance from markets this soil is better suited to stock raising, combined with some grain crops, than to the production of general farm crops. Springs are common in the pastures, so that cattle and sheep can be grazed with very little expense. Stock raising would have an important effect upon the region, as it would require the feeding of all fodder, hay, and other roughage upon the farms and the return of nearly all their fertilizing value to the land in the form of manure. This would greatly increase the producing capacity of the farms for all crops and make possible the profitable growing of grain, potatoes, and other crops in connection with the live-stock industry. Many steep and stony areas, some of which are too shallow or hilly and others too stony to cultivate, it would be better to reforest with trees most valuable for lumber, fence posts, etc.

At present timothy hay is the most important crop. It is baled and hauled to the nearest railroad or canal point for shipment. Many of the mowing lands have been allowed to stand so long that they have run out, and while some fields yield 1 ton to the acre, the average is much lower. Very little clover is grown. Some dairying is carried on and the milk made into cheese or delivered at skimming stations and only the cream marketed. The skim milk is used for hogs and young stock or made into sizing curd. A few beef cattle, usually of indifferent breeding, are raised, and there is an occasional small flock of sheep. Buckwheat is an important crop and yields 25 to 35 bushels per acre. It is well adapted to the soil and the yields compare favorably with those on other soils in the county. The production of oats is considerable, the yields ranging from 20 to 30 bushels. Hops give light yields, but are of good quality. A little corn is grown, but both climate and soil are unfavorable for the best results. Potatoes are grown only for home consumption, and 75 bushels is considered a large yield.

The agricultural methods on Volusia silt loam are the poorest in the county. The common practice of renting the land to careless tenants and then selling off practically all of the hay and straw instead of keeping stock and feeding these products on the farm has resulted in reducing the yields so low that it is often unprofitable to farm the land at all. Mowing lands are allowed to stand until the growth is too light to cut, and then the depleted soil is plowed only 4 or 5 inches deep, without even spreading on it the manure which has stood behind the barns for an indefinite period. Buckwheat or corn is grown one year, and then oats and grass are sown. An occasional farm is securing good results with more careful tillage, rotation of crops, and better care of manure. But it is a noticeable fact that on this type of soil, which is in greatest need of careful handling and conservation of the manure, there is less attention given to tillage and more manure piles are seen going to waste than in any other part of the area. Commercial fertilizers are used to stimulate the land, but their effect is short lived and often partially destroyed because of poor drainage and lack of cultivation.

It is not naturally as strong a soil as many others in the county. More stock is needed to use the farm products at home. This will increase the amount of manure, which should be spread as thin as convenient, so as to cover a large area and distribute its influence over the farm. Frequent light applications are better for the soil than heavier applications at greater intervals. It should be spread while fresh and not allowed to accumulate in piles where it will either burn out or leach away. A liberal dressing of manure upon sod should be plowed under deep as soon as possible after spreading so that it

will rot to form humus in the soil. Deep tillage is then necessary to incorporate it thoroughly with the soil.

Buckwheat is an excellent crop to precede potatoes, and if the ground for this has been liberally manured and plowed under deep in the fall, it should produce a good yield of potatoes the next year. Cover crops, like vetch, soy beans, and rye, sown in the fall are excellent to plow under the next spring. Rotation of crops is important. Any convenient system adapted to the desires of the individual farmer may be practiced so long as one crop does not succeed itself too soon. Mowing lands may be left in sod two or three years if the soil is in good condition and a light top dressing of fine manure applied after the second crop is cut, but until the lands have been brought up to a good state of productivity they should not be left more than one or two years without reseeding. The second cutting is often of more value to turn under for green manure than for pasture or hay, especially if it contains much clover. Soiling crops should be introduced to give fresh feed for stock during late summer and to avoid the necessity of pasturing the fields too closely. The soil is supposed by many to be exhausted of its native fertility, but its present condition is due to poor management rather than to actual depletion of mineral plant food.

Buildings and fences are in a tumble-down condition, many buildings being unused and beyond repair. Numerous fields are allowed to grow up to weeds and brush. In some of the abandoned fields hay is still cut in patches where there is growth enough to warrant the trouble.

Land prices run the lowest of any in the county for soils adapted to cultivation. Farms can be bought for $10 or $15 an acre, but few are changing hands. There are probably farms that can be secured for $7 or $8 an acre, and some might bring $30 or $35 an acre. The average value is estimated at $15.

The following table shows the texture of soil and subsoil of fine-earth samples of Volusia silt loam, as determined by mechanical analyses:

Mechanical analyses of Volusia silt loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
19547, 19549.....	Soil.....	1.5	4.4	2.6	9.7	11.3	54.0	16.2
19548, 19550.....	Subsoil	1.6	4.7	3.2	10.1	9.4	54.4	16.8

DUNKIRK GRAVELLY LOAM.

The prevailing characteristic of the Dunkirk gravelly loam is its high gravel content. This varies from 10 to 65 or 70 per cent. The

fine earth portion of the mass to a depth of 6 or 8 inches varies from a sand to a mellow loam, the color of which is usually brownish or grayish. The subsoil to a depth of 3 feet or more is usually similar in texture to the soil, but the color is a little lighter. Coarse gravels and cross-bedded sands, however, may be encountered at any depth below 1 foot. There are occasionally enough large, rounded, water-worn stones on the surface and in the soil to interfere seriously with cultivation, but most of the type is readily tilled because of its loose texture. A bed of gravel near Yosts included in this type is so loose and droughty that it does not support enough vegetation to warrant cultivation. All along the river the underlying gravel is extensively used for road material and railroad ballast, and just at present there are several large sifting plants where the various grades of sand and gravel are separated for use in concrete work on the barge canal.

The type is confined to the larger stream valleys, and especially that of the Mohawk River, where it occurs principally as a strip less than one-third of a mile in width and adjoins the Genesee fine sandy loam throughout the length of the county on both sides of the river. The surface, with few exceptions, is level or nearly so, but the loose, porous nature of the underlying gravel provides ample and sometimes excessive drainage.

The material of Dunkirk gravelly loam is glacial debris reworked by rapid currents and deposited as marginal drift or alluvial aprons where the streams entered larger bodies of water.

Where the more loamy and deeper soil is of sufficient water-holding capacity to protect it from excessive drought, it is an excellent soil for general farming. Such is the case in the vicinity of St. Johnsville, Fort Plain, Stone Ridge, and on some other river benches, and in most of the upland areas. Corn yields 75 bushels per acre, oats 30 or 40 bushels, timothy and clover hay 1½ tons, and other general crops do well. It returns a good yield of hops. Where the soil is especially shallow, coarse textured, and droughty, the land is used only for pasture. An area of this kind occurs near Yosts.

The portion of this soil under cultivation is well farmed; plowing is fairly deep and tillage thorough, and though a little commercial fertilizer is used, stable manure is depended upon as the chief source of fertility. The increased use of the latter can not be too strongly urged, especially upon loose, coarse-textured fields where its decay to make humus also greatly increases the water-holding capacity of the soil.

The value varies from a few dollars an acre for the coarse-textured droughty areas to $75 for some of the better farming lands.

A mechanical analysis was not made on account of the extremely variable texture of the soil, which makes it impossible to secure a representative sample.

DUNKIRK COARSE SAND.

The Dunkirk coarse sand is a loose, friable, yellowish or brownish sand with a depth of 3 feet or more. The sand is of all grades, from very fine to coarse, and occasionally there is present a small quantity of rounded gravel. The surface 10 inches is slightly more loamy and darker colored than the material below, owing to the incorporation of organic matter by tillage. In cuts this material is seen to extend to a depth of 5 feet, and it is probable that as a rule it is much deeper than this. It usually rests upon a heavy stratified chocolate clay, but often there are thin strata of gravel above the clay. It is an easy type to cultivate and it is almost entirely under the plow.

The largest area of the type occurs west of Fonda and extends westward, thence to within 1 mile of Yosts. Another area is found at Tribes Hill and a very small area at Port Jackson. The surface features are level, and owing to the loose, open nature of the soil and subsoil the drainage is excellent.

The Dunkirk coarse sand owes its origin to reworked glacial debris deposited in lacustrine expansions of the river when its waters were held above the present level by glacial or postglacial dams. It was afterwards exposed to weathering by the receding of the water, and has been modified through the ages to its present condition.

Land of this type of soil is peculiarly adapted to the growing of truck crops, early potatoes, onions, berries, and other crops demanding earliness in spring and thorough drainage, but it is not a good soil for producing such crops as are required on a dairy farm. Clover and grasses do not thrive, and corn and oats return light yields. Onions, berries, and general gardening are the present special interests, though only on a small scale and in connection with general farming. Commercial fertilizer is used and stable manure is cared for and used to the best advantage. More of such manure is needed to add humus to the soil and to aid in making it more retentive of moisture. Buildings and fences are in excellent repair and the farms have an appearance of prosperity. This is due in a large measure to its location with respect to markets. It has an estimated value of $50 or $60 an acre, though few farms are for sale at this price.

The following table shows the texture of soil and subsoil of representative samples of Dunkirk coarse sand, as determined by mechanical analyses:

Mechanical analyses of Dunkirk coarse sand.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
19497, 19499.....	Soil.....	4.7	38.2	18.5	14.2	5.0	13.5	6.6
19498, 19500.....	Subsoil	4.8	35.7	21.6	16.8	3.5	11.9	6.9

DUNKIRK SANDY LOAM.

The Dunkirk sandy loam consists of 10 inches of brown sandy loam, underlain to depths varying from 2 to 3 feet by gray or yellowish-brown material of about the same texture as the surface soil. Thin strata of cross-bedded sand are often found in the subsoil and stratified clay underlies much of the type at depths varying from 2 to 10 feet. A few rounded stones are found, but they are seldom numerous enough to affect cultivation. Owing to the sandy nature of the soil it is an easy and agreeable one to plow and cultivate.

The largest area of the type is found in the northwest corner of the county, in the vicinity of East Canada Creek. Another large area occurs on the eastern slope of the Garoga Creek Valley, and there are several other detached areas east of that place. East of "The Noses" escarpment there are several small areas on both sides of the river, but the only large one occupies the east slope of the Cayadutta Valley, extending northwest from Fonda to the county line.

Irregular slopes and small conical hills form the greater part of the areas of this soil, though there are areas, like the East Canada Creek delta, which are rolling to level. Drainage is often excessive, though there are shallow areas overlying clay or rock that carry an excess of water in wet seasons.

The Dunkirk sandy loam owes its origin to reworked glacial debris deposited in lacustrine expansions of large glacial streams when the waters were held above the present stream levels by glacial dams.

Fair yields of hay and corn can be raised with careful management, but the soil is not well adapted to these crops. The average yield of hay is less than 1 ton per acre, and 50 bushels of corn is considered a good yield. Oats yield 25 bushels per acre. General farming is not as successful upon this soil as upon some others in the county. The soil, however, is a good type for potatoes, of which it should yield 100 to 150 bushels with reasonable care, and their quality should be high. Root crops, gardening and truck crops, and small fruits and berries can be grown successively. Some stock, however, should be kept on every farm. Cover crops and green manures, particularly legumes, are of great value to soils of this character. In all farm operations the aim should be to return to the soil all possible organic matter. Considerable commercial fertilizer is used, and the crops respond readily to its use. It is believed, however, that greater benefits would follow if this were used in connection with green and stable manures.

Where this type of soil prevails the region is not settled as thickly as in other places and the condition of buildings and fences, as well as the general appearance of farms, indicates a lack of prosperity. Land located conveniently to markets and shipping points can be

secured for $15 or $20 an acre, but the average valuation of land of this character should be about $25 an acre.

The following table shows the texture of soil and subsoil of a fine-earth sample of Dunkirk sandy loam, as determined by mechanical analyses:

Mechanical analyses of Dunkirk sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
19501	Soil	2.7	15.3	10.2	26.0	13.4	23.3	9.1
19502	Subsoil	3.6	12.4	6.5	23.3	11.4	35.9	7.0

DUNKIRK CLAY.

The surface soil of the Dunkirk clay is a light-brown loamy clay varying in depth from 4 to 12 inches, but with an average depth of about 7 inches. In places it has a slight chocolate color, and in poorly drained depressions it is of a dark-brown color. The subsoil to a depth of 36 inches or more consists of a reddish-brown or chocolate-colored heavy plastic clay occasionally showing thin-bedded stratification. Stones, gravel, and coarse sand are very seldom found. The soil is very compact and sun-cracks readily. Owing to its compact nature and its tendency to bake upon drying it is a very difficult soil to till and must be carefully handled, for if plowed either too wet or too dry it may be so packed and clodded that several seasons are required to restore good tilth.

The Dunkirk clay is found in small areas in all parts of the county except in the region of Charleston. Its usual topography is level to gently rolling. Sometimes, however, it occupies slight, well-drained depressions. It is also sometimes found as the remnants of a series of terraces on the slope of a hill and not infrequently it extends from a higher terrace up over the crest of the hill. The surface drainage of the soil is usually good. Subdrainage, however, is almost lacking because of the impervious nature of the subsoil. Tile drainage is necessary in order to secure the best results. Tiling the land would not only remove the excess moisture but would improve the texture of the soil, and thus in dry seasons crops would be less likely to suffer so much from drought. The loamy character is also increased and the structure improved by cultivation and the incorporation of organic matter.

This soil owes its origin to reworked glacial debris deposited in the deep, quiet water of lakes, which were held at various high levels by glacial ice dams.

Timothy hay, the crop to which this soil is best adapted, yields from 1½ to 2 tons per acre. Clover does not do especially well, but is of great value in improving the texture of the soil when a good stand can be secured. The soil is not naturally well adapted to corn, but an attempt is made to grow the crop because of the demands of the dairy interests. Where well tiled, well manured, and thoroughly tilled it can be made to produce from 50 to 60 bushels of corn per acre. Oats will yield about 30 bushels per acre. Some buckwheat is grown, of which the average yield is about 25 bushels per acre. This crop is of considerable value in improving the mechanical condition of the soil. The soil is not adapted to potatoes, root crops, and fruits, being too stiff and refractory.

In general the agricultural methods followed upon this type are good. But little commercial fertilizer is used and stable manure is employed extensively. The soil is strong and productive, but because of its heavy texture and compact structure, which make tillage difficult and exaggerate both wet and dry conditions, it is not adapted to a wide variety of crops. This defect, however, can be remedied by underdrainage, deeper plowing, and the liberal use of manure and other coarse organic material. The plowing should be deep in order to secure a deep loose surface. Where shallow plowing has been practiced the depth should be increased about 1 inch each time, until 10 inches is reached, and even a greater depth of soil will not be injurious. A fair estimate of the average value of land of this type is about $25 or $30 an acre.

The following table shows the texture of soil and subsoil of fine-earth samples of Dunkirk clay, as determined by mechanical analyses:

Mechanical analyses of Dunkirk clay.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
19505,19507	Soil	0.8	4.2	2.8	7.9	5.6	37.3	41.6
19506,19508	Subsoil	.7	2.2	2.0	6.7	6.1	29.5	52.9

The following sample contained more than one-half of 1 per cent of calcium carbonate ($CaCO_3$) : No. 19508, 2.68 per cent.

DUNKIRK FINE SANDY LOAM.

The soil of the Dunkirk fine sandy loam is a brown or grayish-brown fine sandy loam 10 inches deep. The texture of the soil, however, sometimes varies from a silty loam to a sandy clay loam. The subsoil is usually a fine sandy loam or heavy sandy loam of brownish-gray color to a depth of 3 feet or more. There is likewise considerable variation in the texture and color of the subsoil material. Parts of the type are underlain at some depth by a brown, gray, or chocolate-

colored clay. Where the subdrainage is poorly established the lower part of the 3-foot section is often mottled yellowish and drab or gray. Where the type is immediately underlain by the black shales of the Utica and Hudson River formations the black color of these shales modifies the color of the subsoil. Very often lenses of fine sand and clay are found at different depths in the subsoil. The type is easily tilled. Waterworn stones, ranging in size from small particles to 6 or 8 inches in diameter, are usually present on the surface and throughout the soil and sometimes in the subsoil, but seldom is the quantity of these sufficient to impede cultivation.

Areas of Dunkirk fine sandy loam occur only in the eastern part of the county. The main body begins at the escarpment north of "The Noses" and extends eastward. It is also found south of the river in the vicinity of Auriesville and Amsterdam, and there is a small area at the extreme eastern end of the county.

The surface features of the type vary from level to rolling. Surface drainage is adequate over most of the type. Where the subsoil is open to a good depth there is also good natural underdrainage, but in places where a heavy subsoil is found at shallow depths artificial drainage is necessary. Three miles north of Amsterdam is an area where an unusually level topography and heavy impervious subsoil combine to make artificial drainage desirable. Over most of the soil, however, favorable moisture conditions are easily maintained throughout the growing season.

Dunkirk fine sandy loam owes its origin to reworked glacial débris which was deposited in temporary shallow glacial lakes. The spots of heavy clay subsoil represent depositions in quiet water, while the coarser materials represent the work of shifting currents during more active periods.

The Dunkirk fine sandy loam is adapted to the general farm crops of the region. Hay yields from 1 ton to 1½ tons per acre, oats 30 to 50 bushels, and corn 50 to 70 bushels. Potatoes can be grown successfully on the lighter phase of the soil and cabbage and other heavy truck crops do well. It is the best apple soil in the county, but care should be taken to insure good underdrainage before setting out orchards on the more level areas.

The region occupied by this type of soil is in a prosperous condition. The farms are convenient to markets and are generally in a good state of cultivation. Deep plowing and thorough cultivation are practiced and the importance of crop rotation is recognized. Some commercial fertilizers are used, but stable manure is depended on as the chief means of maintaining fertility. Buildings and fences are in good repair. Farm values range from $30 an acre in the northeast to $60 or $75 for some of the better farms farther west.

The following table shows the texture of representative samples of soil and subsoil of Dunkirk fine sandy loam, as determined by mechanical analyses.

Mechanical analyses of Dunkirk fine sandy loam.

[Fine earth.]

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
19485, 19487	Soil	1.8	10.5	7.1	20.3	14.9	33.9	11.3
19486, 19488	Subsoil	2.7	8.8	6.9	18.5	18.7	18.8	10.9

DUNKIRK LOAM.

The Dunkirk loam consists of 8 inches of light-brown silty loam, underlain to a depth of 36 inches by a lighter colored material similar in texture to the soil. Sometimes, however, the lower depths of the subsoil become drab or yellowish brown in color. A few stones are usually found on the surface and through the soil mass to a depth of 3 feet. This soil is quite loose and friable and easily tilled.

Important areas of the type occur in the vicinity of Amsterdam, and other smaller areas are associated with the Dunkirk fine sandy loam on both sides of the river east of "The Noses" escarpment. The areas consist of rolling lands with an occasional sharp slope. Drainage is usually well established and artificial drainage would be beneficial only where the soil overlies a heavy subsoil or in small local depressions.

The Dunkirk loam and Dunkirk fine sandy loam are so closely associated in every way that only by careful examination of the texture can they be distinguished. The origin of both types is the same.

Hay, oats, and corn return good yields and in general the soil is adapted to the general farm crops of the region. Dairying is the chief interest. The methods and conditions are similar to those upon the Dunkirk fine sandy loam. The average value of the type is about $35 an acre.

The following table shows the texture of fine-earth samples of soil and subsoil of Dunkirk loam, as determined by mechanical analyses:

Mechanical analyses of Dunkirk loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
19493, 19495	Soil	0.3	2.2	1.6	12.2	20.2	39.9	23.6
19494, 19496	Subsoil	2.2	7.1	6.4	19.9	13.4	36.9	13.5

CLYDE LOAM.

The soil of the Clyde loam varies in texture from a heavy sandy loam to silty loam, is nearly black in color, and ranges in depth from 12 to 18 inches. This material is underlain to a depth of 3 feet or more by a stiff, plastic, impervious blue or gray clay loam, often mottled with brown or yellow.

Areas of this type of soil are found in all parts of the county. They are flat or depressed and poorly drained. There is no natural underdrainage and the surface is in places under water throughout the wet season of the year, except where artificial underdrainage has been provided.

The surface soil is the partially weathered product of an accumulation of glacial, alluvial, and colluvial material, often increased by organic matter from the decay of vegetation. The dark color is due to partly decayed organic matter under wet conditions. The subsoil is lacustrine in origin, and represents the finer particles of the glacial debris deposited in glacial lakes.

Most areas of the type are undrained and are included in pastures. A few of the larger areas have been drained by surface ditches and made to produce fair yields of corn, oats, and hay. If thoroughly tile drained the yields of these crops could be greatly increased in both wet and dry seasons. Where the surface soil is more than 1 foot deep it is of sufficient value to warrant thorough tile drainage, which would fit it for the production of most of the general farm crops of the region and make it compare favorably in value with the associated soils. At present it ranges in price from $5 to $14 an acre, with an occasional area which has been artificially drained valued at $30 or more.

The following table shows the texture of a fine-earth sample of soil and subsoil of Clyde loam, as determined by mechanical analyses:

Mechanical analyses of Clyde loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
19479	Soil	0.2	3.9	6.9	25.1	15.5	39.0	10.1
19480	Subsoil	.0	1.7	2.8	9.8	9.2	45.7	30.9

CLYDE CLAY LOAM.

The soil of Clyde clay loam varies in texture from a heavy sandy loam to a clay, and ranges in depth from 2 to 6 inches. It is high in organic matter and is usually dark colored. The subsoil to a depth of 36 inches or more is composed of a bluish clay loam. Where the

subsoil has had some chance to weather it is sometimes slightly mottled with light-brown and yellowish spots. The type is difficult to till even when drained, and must be worked at just the right time to prevent the soil running together.

The Clyde clay loam is found in poorly drained depressions in all parts of the county. Its surface is flat or slightly lower than surrounding areas. The soil is the partially weathered product of an accumulation of glacial, alluvial, and colluvial material, to which is added the accumulated organic matter resulting from decaying vegetation. The subsoil is lacustrine in origin and represents the finer particles of the glacial debris deposited in glacial lakes. The land is usually wet and unsuited to cultivation. When drained, however, it is a fair grass and small-grain soil, though too heavy for corn or vegetables. Buckwheat is of great value to the soil in improving its structure, and the straw should be plowed under, together with all other coarse material available. It usually affords good pasturage, and most of the type is best adapted to this purpose. Alone its value is very low, but for pasturage in association with other types it is very conveniently used, and such areas, unless of considerable extent, do not materially influence the selling price of a farm.

The following table shows the texture of soil and subsoil of a fine-earth sample of Clyde clay loam, as determined by mechanical analyses:

Mechanical analyses of Clyde clay loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
19483	Soil	0.2	6.6	3.8	12.08	5.6	47.5	23.6
19484	Subsoil	.2	1.6	2.3	9.5	8.5	42.3	35.6

MUCK.

The type Muck consists of an accumulation of dark-brown or black decayed organic matter intimately mixed with fine particles of soil washed from higher lying areas. It ranges in depth from 1 foot to 3 feet or more, but the usual depth is about 18 to 24 inches. The subsoil to a depth of several feet consists of a blue or a mottled gray and yellow, plastic, impervious clay or sandy clay, in many respects identical with the subsoil found under some of the Clyde soils.

Muck is found in all parts of the county in depressions where surface drainage is inadequate to remove the water at any season of the year and the subsoil so impervious as to form a basin where water can collect. Some ferns, mosses, water grasses, and certain varieties

of trees thrive in such places and their dead parts mingle with the soil and partly decay to form the black, spongy, organic mass. So long as it remains wet there is a continual addition from year to year, but when drained and allowed to dry out the volume greatly decreases by the loss of moisture and by the rapid oxidation of the organic matter. A few of the larger areas if thoroughly drained and put under cultivation would produce excellent celery, onions, potatoes, cabbage, and root crops. With a few exceptions, however, the areas are too small to warrant reclamation. Muck areas are mostly wooded or included in pastures and should remain so. Some areas could be partially drained with profit to insure the better growth of pasture grasses. Very little, if any, of it is under cultivation and its value is very low. Few areas are large enough to affect the value of the farm in which they are included.

GENESEE FINE SANDY LOAM.

The Genesee fine sandy loam consists of a loose, friable dark-brown fine sandy loam with a depth of 3 feet or more. The surface 10 inches of the material is somewhat more loamy than that immediately below, owing to additions of manure and the effects of cultivation. Adjacent to the banks of the streams the type in small areas is sometimes somewhat more sandy than is typical, owing to depositions left during overflows. Farther away from the stream banks in slight depressions or old sloughs the type sometimes approaches a clay loam in texture.

The largest areas of the Genesee fine sandy loam occur as bottoms along the Mohawk River. Smaller areas of less typical material border the Garoga, Otsquaga, Canajoharie, Flat, and Schoharie creeks. Some of these bottom areas, notably along the Schoharie Creek, have been long free from overflow and are much lighter in color, occasionally a dark yellow or very light brown. In places along these smaller streams the areas are narrow and badly cut by erosion, and the soil is shallower than usual. Such eroded areas are sometimes stony and gravelly.

Though usually flat, the Genesee fine sandy loam is well drained and the moisture conditions are for the most part favorable for crops throughout the growing season. The type is derived from the weathering of alluvial deposits laid down at times of overflow. There are a few areas which have not been covered with water for many years, but the greater part is subjected to annual inundation. Higher lying places are only reached by an occasional flood. Each flood leaves a thin deposit upon the surface and adds to the organic content of the soil.

The soil is naturally a productive one and its fertility is maintained by the periodical additions of organic matter from overflow. It is an excellent corn soil and used largely for that crop. Yields of 100 bushels are common. The annual overflows prevent the use of fall-sown crops on much of the type, but grass makes an early start and good yields of hay are secured. Oats often yield 50 to 60 bushels and seldom prove a failure. Buckwheat is occasionally grown, but is not needed as a soil renovator and its use is seldom advisable, except as a catch crop in case of a late flood. Potatoes are not produced extensively, but with proper care should yield 150 to 200 bushels per acre. Cabbage, tomatoes, and garden truck can be made profitable crops near the larger towns and shipping points. The smaller areas in upland valleys have similar adaptations where large enough and so situated as to be easily accessible, but many of them are so small and irregular in shape that they are adapted only to pasturage.

Some of the best-managed farms in the county are situated partly upon this type and in general the cultural methods are good. Deep plowing and thorough cultivation are the rule. Crops are rotated and the mowing lands seldom left long enough to deteriorate. The type is mostly under cultivation—even small islands in the center of the river—and fields are rarely left in permanent pasture. Very little commercial fertilizer is used. Some stable manure is spread upon the fields in the spring, or, if spread in the fall, plowed under before the water rises. Fall cover crops are of value in that they hold sediment from the overflow water, thus adding to the organic content of the soil.

Few farms are located entirely upon the Genesee fine sandy loam, but most of it is included in farms occupying mainly the adjacent slopes, which are often steep and best suited to pasturage. It is recognized throughout the county as one of the strongest soil types.

Many areas of Genesee fine sandy loam are valued at more than $100 an acre, though the average should probably be placed a little below that figure. The value of upland valley areas varies from $25 to $50 an acre, according to the location, extent, and improvements.

The following table shows the texture of soil and subsoil of a representative sample of Genesee fine sandy loam as determined by mechanical analyses:

Mechanical analyses of Genesee fine sandy loam.

Number.	Description.	Fine gravel.	Coarse sand.	Medium sand.	Fine sand.	Very fine sand.	Silt.	Clay.
		Per cent.	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*	*Per cent.*
19515, 19517	Soil	0.9	4.3	4.0	26.7	18.8	34.4	11.0
19516, 19518	Subsoil	.1	.8	.8	28.7	30.7	28.2	10.1

ROUGH STONY LAND.

Rough stony land includes areas not adapted to cultivation or any farming utility other than pasture. It includes steep, rocky hillsides, rocky slopes, stony bottoms, bare rock surfaces, and other areas upon which it is impossible to plow and plant crops. There are small patches included in the type which could be cultivated, but they are limited in extent and surrounded by nonarable land and could not be shown in the map. Most of the Rough stony land occurs as the bluffs and steeper slopes along the river, on the west side of Schoharie Creek, and the gorges of smaller streams. Some of it furnishes a little pasturage, but the type is of very low agricultural value, and in the sale of farms it is not rated with the arable land. Some of it is wooded, however, and the value of such areas depends entirely upon the quality and quantity of the growth.

SUMMARY.

Montgomery County is situated in the heart of the Mohawk Valley, in the eastern-central part of New York State, and doubtless represents better than any other one county the soil and agricultural conditions of this region. The Mohawk River crosses it from west to east, and the easy grade of its valley bottom has been taken advantage of in the construction of two great transportation systems, the Erie Canal and the New York Central Railroad, which reach across the State.

The topography is, in general, very rolling to hilly, but with many local level areas of considerable extent. A series of ridges of remarkable uniformity in shape and position is most briefly described by the term "corrugated" applied to the section occupied by them. It is most pronounced south of Canajoharie and around Charleston Four Corners, but is noticeable to some extent throughout the county.

The drainage waters all enter the Mohawk River either directly or through tributary streams and are carried by it to the Hudson, through which they reach the Atlantic Ocean.

The climate is typical of a large part of central New York. The summers are normally mild, with an occasional one remarkable for excessive heat or abnormally cold nights. There are usually from one to three months of severe winter weather.

The first white settlement was made early in the eighteenth century. The early agriculture was very crude. As greater areas were cleared and transportation facilities increased, the county became an important grain region for a short time. Dairying was one of the early interests and has come to be the most important industry. A large production of hay, grain, and other crops, however, serves to balance the agriculture and relieve it from the danger of over-

specialization. In 1900 a net return of $1,688,296 was realized upon a total investment of nearly $13;000,000 in land and equipments, or in rough numbers $700 per farm with an average investment of $5,400.

In general, the agricultural conditions in the county are progressive. Crop rotation is practiced, manure is carefully used, and deep plowing and thorough tillage prevail. The slack methods and lack of intelligent management in some sections and on individual farms in all sections lowers the average returns, but, on the other hand, the success of individual farms in those regions generally considered poor is ample evidence of the possibilities of the county.

The farm lands range in value from $7 to $100 an acre, with an average of about $25 for the county, not including improvements.

All stages of glacial-soil formation are represented in the county. The Palatine and Nellis soils are residual from the underlying formations, very slightly influenced by glacial material. The Volusia silt loam is the feebly glaciated product of the underlying rock. The Mohawk soils are glacial till, containing varying amounts of transported material from rocks found within the county. The Dunkirk and Clyde soils are derived from glacial outwash material deposited in former temporary bodies of water.

The Palatine fine sandy loam is very limited in extent, but is well adapted to alfalfa, corn, and general farm crops.

The Palatine silt loam is one of the best corn soils in the area where not so shallow as to be droughty. It is also excellent for alfalfa and clover.

The Nellis loam is thin and droughty, but supports a remarkable pasture considering its shallow depth. The deeper phase when more than 2 feet deep is a fair general farming soil.

The Mohawk loam is mostly used for dairying but is a good general farming soil.

The Mohawk clay loam is an excellent dairy soil and is mostly devoted to that interest. Corn yields 50 to 75 bushels, hay 1½ to 2 tons, oats 30 bushels. Alfalfa can be grown and all clovers thrive.

The Mohawk silt loam is composed more largely of foreign material than any other type of glacial origin. It is a good dairy and general farming soil, and has a slight preference over other types for oats.

The Volusia silt loam is considered the poorest farming land in the county. It is in poor condition, due to improper management, but can be restored to a much higher state of productivity by improved cultural methods and the institution of agricultural methods and interests better adapted to the region.

The Dunkirk gravelly loam is variable in texture and adaptations, but the better areas not droughty by reason of coarse underlying

beds of gravel are adapted to the crops of the region and are highly valued for general farming.

The Dunkirk coarse sand is a poor dairy and general farming soil, but is well adapted to special truck crops and market gardening, for which it is used to a large extent.

The Dunkirk sandy loam is a good late potato soil, and if properly handled should return good yields of excellent quality.

The Dunkirk clay requires careful handling for corn and general farm crops, but is an excellent soil for timothy hay, which normally has a brighter color than that grown on other soils.

The Dunkirk fine sandy loam is adapted to the general crops of the region and is the best apple soil in the county.

The Dunkirk loam differs very little from the fine sandy loam type in adaptation and interests.

The Clyde loam and lay loam and Muck are all of limited extent and of little importance. Some areas could be profitably drained and put under cultivation, but in their present condition they are adapted to little but pasturage.

The Genese fine sandy loam is considered the best soil in the county. It returns excellent yields of all spring-sown crops, but is mostly used for corn and oats.

Some of the territory mapped as Rough stony land is conveniently used for pasturage, while a portion of it can be best utilized for forestry.

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