SOIL SURVEY OF CUMING COUNTY, NEBRASKA

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DESCRIPTION OF THE AREA

Cuming County is situated in the northeastern part of Nebraska, in the second tier of counties west of the Missouri River. Westpoint, in the southeastern part, is about 80 miles northwest of Omaha. The county is approximately square on a base of 24 miles. It comprises an area of 570 square miles, or 364,800 acres.

Cuming County lies in the hilly region of eastern Nebraska, in which a one-time smooth upland has been thoroughly dissected by the ramifying drainage system of the Elkhorn River. Remnants of the original smooth upland exist, if at all, in very small hilltop flats. The larger stream valleys are broad, flat alluvial plains, the breadth depending on the size of the streams. Along some of the streams there are belts of bench or terrace land consisting of old alluvial deposits.

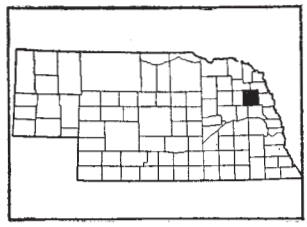

FIG. 22.—Sketch map showing location of the Cuming County area, Nebraska

The topography of the upland varies from steeply rolling along the more deeply intrenched drainage ways to nearly flat on the undissected remnants of the original loess mantle. With the exception of local areas along the Elkhorn River, where sandy material has been drifted into a hummocky relief, the topography of the uplands is the result of erosion. The major axes of the divides extend in a northwest-southeast direction. The land of nearly level topography occupies the highest positions on a few of the broader divides east of Cuming Creek, in T. 23 N., R. 7 E.

The more steeply rolling areas occur chiefly in the eastern and northeastern parts of the county bordering the valleys and tributaries of Cuming, Logan,[2] and Little Logan Creeks. The breaks to Plum Creek in the north-central part are also sharply rolling in places. The slopes in these localities are rather steep and the divides somewhat narrower than over most of the county.

The undulating to gently rolling land occupies small areas in the broader divides between major drainage ways in the southwestern and central parts of the county. In these localities the drainage pattern, although intricate, is shallow, consisting of numerous small perennial streams. The topographic features consist of a succession of low, rounded hills locally interrupted by areas of gently

[1] Report written by F. A. Hayes.
[2] Now diverted to a drainage ditch, but the old channel is named on map.

undulating country. The slopes leading to the drainage ways are long and gradual. The streams, however, in most places are intrenched in narrow steep-sided channels, from 4 to 15 feet deep.

A hummocky topography is developed locally in the southeastern part of the county between the Elkhorn River and Logan Creek in Burt County, and in the northwestern part on the south side of the river. In these localities the surface resembles that of the sand-hill region of western Nebraska, a succession of low, rounded ridges and knolls from 10 to 20 feet high.

The remainder of the upland is rolling. The crests of the well-rounded hills and divides lie from 80 to 100 feet above the alluvial lands bordering the major drainage ways. The slopes are moderate. The area of land topographically unsuited to cultivation, even in the more sharply rolling areas, is negligible.

Terrace or bench lands form a considerable part of Cuming County. These terraces occur at several distinct levels, the higher ones, standing 40 to 60 feet above the adjoining flood plains, lie along the Elkhorn River in the southeastern and northwestern parts of the county. The topography varies from flat to slightly hummocky, the latter the result of wind action.

In the vicinity of Beemer and west of Westpoint larger terrace remnants occur, the higher ones lying about 30 feet and the lower from 10 to 15 feet above the Elkhorn River bottom lands. The surface of the large terrace remnant north of Bancroft on Logan Creek is about 20 feet above the flood plain. The surface of these benches is prevailingly flat. Only a few streams have intrenched themselves into the loesslike material, causing minor variations in topography. The slopes between the several terrace levels and to the bottom land are usually gentle and tillable, but in a few places the drop, although short, is so abrupt as to unfit the land for agriculture.

First-bottom or flood-plain lands occur as continuous strips, varying in width from a few rods to about 1¼ miles, along all the larger streams and tributaries of the area. The widest developments are along the Elkhorn River, Logan Creek, and throughout the lower course of Plum Creek. The topography is prevailingly flat, though modified in places by present and former stream channels, cut-offs, shallow depressions, and slight elevations. The undulating relief is most extensively developed along the Elkhorn River, where, locally, wind action has built sandy materials into low, rounded knolls and ridges, from 2 to 6 feet high.

The upland parts of the county have an average altitude of about 1,425 feet above sea level and the bottom lands about 1,350 feet. The elevation of Wisner is 1,380[3] feet, Bancroft 1,318 feet, and Westpoint 1,313 feet above sea level. The general slope is to the south and east.

Cuming County is drained by the Elkhorn River and its tributaries, chief among which are Logan, Cuming, Plum, Rock, and Pebble Creeks. These creeks, in turn, are fed by an intricate system of smaller streams. In general the drainage is to the south and east. Logan, Cuming, and Pebble Creeks enter the main river outside the county.

[3] Gannett, Dictionary of Altitudes.

The boundaries of Cuming County were defined by an act of the territorial legislature in 1855. The county was established from unorganized territory, and the boundaries have remained unchanged. The first settlement was made along Plum Creek, about 5 miles northwest of Westpoint, in 1857. Later settlers came from Omaha and from eastern States.

According to the 1920 census the population of the county is 13,769, all of which is classed as rural, as there are no towns having 2,500 or more inhabitants. The density of the population is 23.9 persons per square mile, and with the exception of a greater density in the vicinity of the larger towns, the population is evenly distributed. The census shows that 84.1 per cent of the inhabitants of the county are native white persons and 15.9 are white persons of foreign birth.

Westpoint, the county seat and principal town, lies in the southeastern part and had a population of 2,002 in 1920. Beemer, with 548 inhabitants, is situated in the central part; Wisner, in the northwestern part, has 1,210 inhabitants; Bancroft, in the northeastern part, has a population of 673. These towns are important local distributing centers and markets for farm implements, supplies, and produce.

The transportation facilities of Cuming County are good. The main line of the Chicago & North Western Railway from Omaha, Nebr., to Lander, Wyo., follows the Elkhorn River valley, passing through Westpoint, Beemer, and Wisner. A branch of the Chicago, St. Paul, Minneapolis & Omaha Railway from Omaha to Emerson follows the Logan Creek valley, passing through Bancroft. A branch of the Chicago & North Western between Scribner and Oakdale extends along the southern county line, just outside the area. These roads furnish good connections with Omaha, Lincoln, and Sioux City.

Most of the public roads follow section lines or land lines. All of them are earth roads. The more important ones, including those between the several towns, are dragged as soon after each rain as the ground permits and are kept in good repair. Little attention is given the minor roads beyond grading them when necessary. There are three bridges across the Elkhorn River within the county, and cement culverts and bridges across the smaller drainage ways are quite common even on the minor roads. Telephone and rural-delivery routes reach all sections of the county.

The surplus products, consisting of wheat, corn, cattle, and hogs, are marketed outside the county, chiefly in Omaha. Most of the grain is handled in local elevators, where it may be sold at once or stored until the price is satisfactory. A local creamery at Westpoint handles part of the surplus dairy and poultry products.

CLIMATE

The climate of Cuming County is typical of northeastern Nebraska and is well suited to grain farming and stock raising. The long, warm summers are especially favorable to corn, while the low temperatures sometimes occurring in winter are not usually destructive to winter-grown crops, owing to the protection of snow. The springs are usually cool, with considerable rainy weather, and the autumns are long and pleasant, with only occasional periods of rainy weather.

There is not sufficient variation in surface characteristics to cause any appreciable differences in climate within the county.

The table below, compiled from the records of the Weather Bureau station at Westpoint, gives the normal monthly, seasonal, and annual temperature and precipitation:

Normal monthly, seasonal, and annual temperature and precipitation at Westpoint

(Elevation, 1,313 feet)

Month	Temperature			Precipitation			
	Mean	Absolute maximum	Absolute minimum	Mean	Total amount for the driest year (1898)	Total amount for the wettest year (1903)	Snow average depth
	° F.	° F.	° F.	Inches	Inches	Inches	Inches
December	24.4	66	−27	0.94	0.04	0.18	5.4
January	21.8	65	−38	.69	.32	T.	8.0
February	23.1	76	−33	.86	.70	1.31	7.1
Winter	23.1	76	−38	2.49	1.06	1.49	20.5
March	37.5	92	−20	1.30	1.07	1.01	5.2
April	50.1	100	10	2.85	1.79	1.68	3.4
May	61.1	102	20	4.15	4.08	10.08	T.
Spring	49.6	102	−20	8.30	6.94	12.77	8.6
June	70.4	105	38	5.18	6.24	2.28	.0
July	76.8	109	43	3.98	.80	4.48	.0
August	73.9	109	39	4.46	3.88	11.47	.0
Summer	73.7	109	38	13.62	10.92	18.23	.0
September	65.8	105	26	3.01	1.30	3.81	.0
October	53.8	92	12	2.01	.80	2.09	.8
November	39.1	82	−10	1.21	.74	1.03	3.3
Fall	52.9	105	−10	6.23	2.84	6.93	4.1
Year	49.8	109	−38	30.64	21.76	39.42	33.2

The mean annual temperature is 49.8° F. January is the coldest month with a mean of 21.8° F., and July is the warmest with a mean of 76.8° F. There is a range in temperature of 55° F. between the means of the coldest and warmest months. The absolute minimum temperature is −38° F., recorded in January, and the maximum 109° F., recorded in both July and August. The average date of the last killing frost in the spring is May 3, and that of the first in the fall, October 5. This gives an average growing season of 154 days, which is ample for the maturing of all farm crops common to the region. The latest recorded killing frost occurred on May 27, and the earliest on September 12.

The mean annual precipitation is 30.64 inches, of which 17.77 inches, or about 58 per cent, falls during the principal part of the growing season, May, June, July, and August. The total precipitation in the driest year on record (1898) was 21.76 inches, and in the wettest year (1903), 39.42 inches. The driest months are December, January, and February, the mean annual precipitation for each being less than an inch.

In summer the precipitation usually occurs as heavy thundershowers. Torrential rains, however, are rare. Severe droughts are almost unknown during May and June, but in the latter part of July and all of August the rainfall varies considerably and short dry spells may occur. Crops seldom suffer from lack of moisture, however, when proper cultural methods are followed, as most of the soils have a high water-retaining capacity. Serious droughts are practically unknown. The amount of snowfall varies annually from a few inches to several feet, the average depth, for a period of 23 years, being 33.2 inches. It sometimes snows as late in the spring as May and as early in the fall as October.

From November to April the prevailing wind is from the northwest, and during the rest of the year from a southerly direction. Strong winds are common though tornadoes are rare.

AGRICULTURE

Agriculture has been the chief interest in Cuming County since its earliest settlement, which took place in 1857. The land was all taken up under the homestead law, which allowed each settler a quarter section, or 160 acres. The first claims were established in the valleys of the Elkhorn River and Plum Creek. The smooth valley land was rapidly taken up, and later settlers were forced to homestead the more rolling and less desirable uplands. Sod corn was usually the first crop grown. Corn and wild game formed the chief food. As the settlers became better established and conditions became more stable, small grains and other subsistence crops were grown.

The early agricultural development was slow. The settlers were not familiar with local climatic and soil requirements. They had insufficient capital to cope with the reverses which usually beset the pioneers of a new territory. The prevalence of insect pests, prairie fires, and to a lesser extent Indian depredations, also checked agricultural progress. The early farming methods were crude and wasteful, and little attention was given to the preparation of the seed bed, to seed selection, rotation, and fertilization. At present there is a tendency to improve the crops by seed selection and to increase the productiveness of the soil by crop rotation, manuring, and the growing of leguminous crops, such as clover and alfalfa. There is, however, much room for improvement in farming methods even now.

The agriculture of Cuming County at present consists of diversified farming, including the production of grain and hay and the raising of livestock. According to the last Federal census, the principal crops are corn, oats, hay, and wheat. The following table, compiled from the reports of that office, shows the general trend of agriculture in Cuming County during the last 40 years.

Acreage and production of crops in 1879, 1889, 1899, 1909, and 1919

Crop	1879		1889		1899		1909		1919	
	Area	Production	Area	Production	Area	Production	Area	Production	Area	Production
	Acres	*Bushels*	*Acres*	*Bushels*	*Acres*	*Bushels*	*Acres*	*Bushels*	*Acres*	*Bushels*
Corn	24,409	880,413	97,594	4,321,186	140,133	4,094,550	119,014	4,728,166	115,237	3,902,609
Oats	6,532	143,149	22,890	490,201	40,024	1,329,660	63,959	1,608,345	66,175	2,014,688
Wheat	25,143	214,991	23,723	312,712	50,475	632,240	12,630	184,994	13,577	101,425
Rye	1,161	14,018	1,076	15,048	17,360	50,475	453	6,397	1,155	10,583
Barley	628	7,494	724	13,619	2,209	72,560	1,757	35,600	911	18,875
Beans	------	102	------	415	10	96	1	9	------	------
Flaxseed	------	1,954	604	5,001	31	430	4	50	------	------
Potatoes	------	29,966	1,283	110,281	1,367	154,464	1,280	125,608	1,036	39,243
All other vegetables	------	------	------	------	------	------	461	------	11	------
Buckwheat	------	------	111	1,267	------	------	21	163	------	------
Emmer and spelt	------	------	------	------	------	------	148	3,400	------	------
		Tons		*Tons*		*Tons*		*Tons*		*Tons*
Timothy	------	------	------	------	------	------	2,457	4,788	665	928
Timothy and clover	------	------	------	------	------	------	11,331	21,895	3,709	5,665
Clover	------	------	------	------	416	646	759	1,427	3,077	5,012
Alfalfa	------	------	------	------	84	215	4,583	12,731	14,498	35,776
Millet and Hungarian grass	------	------	------	------	3,540	8,544	800	1,778	------	------
Wild hay	8,906	15,160	49,865	73,384	41,819	57,532	31,569	57,551	24,585	37,944
Coarse forage	------	------	------	------	5,493	6,489	156	581	884	2,400
	Trees	*Bushels*	*Trees*	*Bushels*	*Trees*	*Bushels*	*Trees*	*Bushels*	*Trees*	*Bushels*
Apples	------	------	6,246	3,165	42,526	10,045	47,188	69,622	12,965	5,881
Peaches	------	------	108	------	425	------	835	29	26	------
Pears	------	------	------	------	------	------	895	154	169	19
Plums	------	------	------	------	------	------	4,258	819	1,087	56
Cherries	------	------	------	------	------	------	7,569	1,613	2,866	537
	Vines	*Pounds*	*Vines*	*Pounds*	*Vines*	*Pounds*	*Vines*	*Pounds*	*Vines*	*Pounds*
Grapes	------	------	------	------	6,489	28,000	13,992	65,752	9,586	47,405
	Acres	*Quarts*	*Acres*	*Quarts*	*Acres*	*Quarts*	*Acres*	*Quarts*	*Acres*	*Quarts*
Strawberries	------	------	------	------	2	1,460	7	7,256	9	6,808
Raspberries	------	------	------	------	2	2,230	2	1,971	------	------
Blackberries	------	------	------	------	1	560	3	2,787	------	------

According to the Federal census, the value of all cereals produced in Cuming County in 1919 was $7,038,325. Dairy products were produced to the value of $272,910, and poultry and eggs to the value of $505,294. The total value of all domestic animals on farms was $6,837,782.

Corn is by far the leading crop, and on farms where it is not fed to livestock it is the chief cash crop. It occupies an acreage about equal to that of all other cultivated crops combined. The census reports 115,237 acres in corn in 1919 and a production of 3,902,609 bushels. The Nebraska Department of Agriculture reports 125,286 acres in corn in 1922 and a total yield of 4,886,154 bushels, an average of 39 bushels per acre. The yields vary considerably, depending upon the rainfall and upon the care taken in handling the crop. Yields of 50 to 60 bushels per acre are common on well-managed fields in favorable seasons. The principal varieties are Reid and Hogue Yellow Dent and Iowa Silvermine. On farms operated by owners most of the corn is fed to hogs, beef cattle, and work stock, but on tenant farms more of the corn is sold. There are 33 silos in the county, and on farms equipped with silos from 15 to 20 acres of corn are cut each year for silage. Most of the corn is husked from the standing stalks in the fall and the fields are pastured with cattle and horses during the winter. Many farmers fence off a few acres of unhusked corn for a hog range and a few husk only enough

to supply their work stock, allowing the cattle for market to feed in the fields until fattened. A small acreage is cut for forage. Some of the tenant farmers grow corn on the same land several consecutive years. Much better yields are obtained, however, where it is grown in rotation with small grains and alfalfa. In recent years considerable attention has been given to the selection of the seed corn and where this is done yields show a decided increase. The crop is grown on all the soils of the county, except the more poorly drained or sandy portions of the flood plain. The heavy-textured terrace soils and the more nearly level portions of the uplands are preferred on account of the higher yields.

Oats rank second to corn in acreage. The Federal census reports 66,175 acres in oats and a total yield of 2,014,688 bushels in 1919. In 1922, according to the Nebraska Department of Agriculture, there were 77,774 acres in oats yielding 2,255,446 bushels, or an average of 29 bushels per acre. Kherson, a short stiff-stemmed variety, is grown chiefly. This strain is better adapted to the moist bottom-land soils of the county than oats of the long-strawed type which have a tendency to grow rank and lodge. Some Swedish Select is raised throughout the uplands. Very little effort is made to control smut, although the disease sometimes lowers crop yields during wet seasons. Oats are usually cut with a binder and either shocked or stacked for threshing. The grain is used largely as feed for horses and other stock and some is sold. The straw is usually left in the field and stock given access to the stacks. Some farmers procure seed from other sections. Most of them, however, carefully clean a part of the previous crop for seed. Oats are grown on all but the sandier and the more poorly drained soils of the county. They do best on the more nearly level uplands and heavier textured terrace soils.

The Federal census reports 13,577 acres in wheat in 1919. In 1922, according to the Nebraska Department of Agriculture, the acreage had been reduced to 2,989, which more nearly represents the average acreage in Cuming County. The prevailing high prices and strong demand for wheat during the war had induced many farmers to grow more wheat than usual. Turkey, a hardy winter variety, is grown chiefly. The average yield of winter wheat in 1922 was 24 bushels per acre. The grain is grown locally upon the heavier terrace soils and more nearly level uplands. The crop usually is cut with a binder and shocked or stacked in the field for threshing. Most of the wheat is sold at the local elevators immediately after threshing.

Of the cultivated hay crops, alfalfa occupies the largest acreage. In 1919, 14,498 acres were devoted to alfalfa, but in 1922 the acreage had decreased to 12,706. The average yield during the latter year was 3.1 tons per acre. Alfalfa does well on all the soils of the county except those of the sandy Valentine series, where the lime content is insufficient for best results, and the more poorly drained soils of the first bottoms. It does especially well upon the well-drained heavy-textured terrace and flood-plain soils. Three cuttings usually are obtained and during exceptionally long seasons the crop is cut four times. Alfalfa usually is stacked in the field, hauled to the feed lots as needed, and used as feed for cattle and hogs. A few

farmers bale a part of the hay for shipment. Hogs are often allowed to run in the fields during the summer, but cattle are seldom grazed on green alfalfa on account of the danger of bloating. The crop is excellent for increasing the humus and nitrogen content of soils and for preventing erosion. It is often used in rotations, but is not in favor for short rotations, as most farmers prefer to keep the stand for several seasons before changing to other crops.

A considerable acreage in Cuming County is devoted to clover and timothy, either mixed or in pure stands. The Federal census reports 665 acres in timothy, 3,077 acres in clover, and 3,709 acres devoted to a mixture of the two crops in 1919. According to the Nebraska Department of Agriculture, the acreage in timothy alone had decreased to 149 and timothy and clover mixed to 1,619 acres in 1922. The acreage devoted to clover alone, however, had increased to 7,238 acres, all of which is reported in red clover. Clover yields 1½ to 2 tons of hay per acre from two cuttings. It is gradually increasing in acreage, as it is better adapted to short rotations than alfalfa. Most of the red clover is grown in the upland sections. Its beneficial effects upon the soil are fully appreciated. Timothy, and mixed clover and timothy are planted locally upon the moist bottom-land soils.

In 1919, 24,585 acres were devoted to wild hay in Cuming County, a decrease from 41,819 acres in 1899. State reports for 1922 show 24,847 acres in native hay, with an average yield of 1.5 tons per acre. The yields vary widely, depending upon the rainfall and topographic position; the highest yields are obtained upon the more poorly drained bottom land along the Elkhorn River, and most of the crop is confined to such areas. The upland hay, however, is of much better quality, as it grows less rank, making it more palatable, and has a higher feeding value. Many narrow strips of hay land remain along the smaller drainage ways throughout the uplands. The hay usually is stacked in the field with modern machinery and hauled to the barns or feed lots as needed. It is used largely as feed for work stock.

Among the minor crops, rye, millet, Sudan grass, the sorghums, and potatoes are the most important. These occupy small acreages on many farms and are grown for feed and home consumption.

There are several small orchards of fruits in the county. The demand for fruit is not supplied and it would seem that the production of both tree fruits and small fruits could profitably be extended. Apples, cherries, plums, peaches, and pears appear in these orchards. Grapes, strawberries, and raspberries also are grown for home consumption.

The income derived from the livestock industry in Cuming County is but slightly less than that from crops. Cattle feeding and hog raising are the leading branches of the industry. According to the census there were 55,341 cattle in the county in 1920, valued at $2,986,438. Of this number 45,470 were beef cattle. Most of the animals are shipped in from Omaha, Sioux City, or Norfolk for winter fattening, although some cattle are raised in the more poorly drained parts of the Elkhorn Valley and in parts of the uplands where much pasture land is available. The beef cattle are chiefly Hereford or Shorthorn grades. They are fattened on corn or alfalfa,

usually for three or four months, and shipped to the Omaha, Sioux City, or Chicago markets.

The dairy industry is not extensively developed in Cuming County, although a few milk cows, chiefly of the beef breeds, are kept on most farms. The Nebraska Department of Agriculture reports 7,133 milk cows in Cuming County in 1922. The surplus dairy products are sold in the local towns. A creamery in Westpoint supplies a ready market for butter, cream, and milk.

Hogs are raised on nearly every farm and some farmers have large herds. The leading breeds are Duroc-Jersey, Poland-China, Hampshire, and Chester White. There is an increasing tendency to keep the strains pure and many herds are purebred. It is a common practice to fatten hogs on corn, either in feed yards or by turning them into fields and allowing them to "hog down" the corn in the fall. Alfalfa is usually added to the ration, and during the summer months the pigs are often allowed to run in the alfalfa fields until time for the third crop. On farms where cattle feeding is practiced many hogs are fattened on the corn wasted by the steers. In 1920 there were 113,056 hogs in Cuming County, valued at $2,365,138. The fattened animals are sold to local buyers or shipped to the Omaha and Sioux City markets.

Sheep raising receives little attention, although increased interest is being shown in small breeding flocks. Some farmers import a carload or two of feeders each fall, fatten them on corn and alfalfa, and ship them to Omaha when the market is favorable. The Federal census reports 9,384 sheep in the county in January, 1920, of a value of $84,770.

Horse raising is for the most part confined to the breeding of the work mares. Much improvement has been made in horse breeding in the last 10 years and the quality of the horses is now high. Most of the stallions are purebred. The majority of the brood mares are good grades. The Percheron is the most popular breed. On some farms a few mules are raised. In 1920 there were 11,952 horses, valued at $1,236,381, and 1,186 mules, valued at $164,842, in Cuming County.

Poultry constitutes an important source of farm income, and small flocks of chickens are raised on all farms. The local demand for poultry products usually is good and the poultry industry is receiving increased attention. The Plymouth Rock, Rhode Island Red, and Leghorn are the principal breeds. Ducks, geese, and turkeys are raised to a small extent. The census reports 232,382 chickens and 7,046 other poultry in the county in 1920, and the total value of all poultry as $190,059.

The adaptation of certain soils to particular crops is observed to some extent by the farmers. It is recognized that most varieties of oats do better on the upland soils than on the heavy soils of the bottom land, where they are likely to grow rank and lodge; but Kherson oats, a very short, stiff-strawed variety, has given excellent results on the heavy soils. It is recognized that corn does best upon the heavier textured soils of the county and yields highest upon the Wabash silt loam and silty clay loam on account of the more favorable moisture conditions. It is also known that corn, on account of its larger and deeper root system, is better adapted to the sandy soils

than small grain. It is recognized that alfalfa does best upon the Marshall, Waukesha, and Wabash soils, and that the yields are lower upon the sandy terrace and bottom-land types, presumably on account of the low lime content in the soil. The wet bottom-land soils are used for pasture and hay land. Although the above crop adaptations are recognized, there is not sufficient variation in the yields in different parts of the county to have caused, up to this time, specialized farming.

Increased attention is being given to the rotation and proper cultivation of crops, and there is still room for much improvement. No established system of crop rotation is practiced, but the farmers have evolved various indefinite systems and change their crops with reasonable regularity. Land to be used for corn usually is plowed as early in the spring as the ground permits, although when corn follows small grain the land is often plowed in the fall. Most of the corn is check planted. In late seasons or exceptionally dry springs the corn is sometimes listed in, as this method requires less time and labor and the crop is thought to withstand drought better than where surface planted. When corn follows a crop of corn that was not cut for fodder or silage, the stalks are broken down with a stalk cutter and the field is disked before plowing. Wheat is planted in the fall with a press drill on plowed and disked corn or stubble ground. Some wheat is drilled between the corn rows in the fall. The oat crop is planted in the same manner as wheat, except that it is sown in the spring.

Alfalfa and red-clover crops require a smooth mellow seed bed and usually follow small grain. The seed in most cases is sown broadcast and harrowed in, though a few farmers prefer planting with a press drill, which ordinarily gives a more uniform stand. Alfalfa is allowed to occupy the land four to six years or as long as it remains profitable. Red-clover sod is plowed after two years. Clover usually is followed by corn.

A common practice is to plant potatoes on corn land, but sometimes grain stubble land, after it has been plowed deeply and well pulverized, is used for this crop. The seed usually is dropped by hand in hills about 3 feet apart in every third plow furrow.

Commercial fertilizers are not used in growing the staple farm crops. Barnyard manure is applied when available, but the supply usually is not sufficient to produce any appreciable increase in total crop yields. On farms operated by owners the manure is applied where most needed, as on the more eroded and sandier parts of the land, whereas on tenant farms the fields in the immediate vicinity of the barnyards receive most of the manure.

As a rule the farms are well improved. The houses and barns usually are painted and kept in good repair and have a general appearance of prosperity. The farms are fenced and cross-fenced, mostly with barbed wire, and considerable woven-wire fencing is used around the feed lots and alfalfa fields.

The Nebraska Department of Agriculture reports modern heating systems on 226 farms, modern lighting systems on 247, and modern water systems on 264 in 1922; also 1,042 gasoline engines, 255 gasoline tractors, 193 trucks, and 1,676 automobiles on farms. The tractors are used on the more level lands. Modern labor-saving

implements are in general use, most farms being equipped with grain drills, planters, listers, mowers, rakes, binders, riding cultivators, and disk harrows. A few also have corn binders and hay balers. The more expensive farm machinery is sheltered.

Farm labor is scarce. Wages range from $35 to $50 a month with board and room, day labor commands $1.75 to $2.50 a day, and harvest hands sometimes receive $4 a day with board. Corn shuckers are paid 3 to 5 cents a bushel. The farm laborers are all white. Many farmers hire help by the year and in this way insure against lack of labor at critical periods.

The census reports 359,527 acres, or 97.4 per cent, of the county in farms in 1920. The average size of the farms at that time was 193.4 acres, and an average of 171.2 acres, or 88.5 per cent of the farm land was improved. The average value of all farm property per farm, including land, buildings, machinery, and domestic animals, was $49,639 in 1920, and the average value of the land is given as $206.90 an acre.

In the last 40 years the proportion of the farm land operated by owners has greatly decreased. In 1880, 78.5 per cent of the total number of farms were operated by the owners; in 1920 this percentage had decreased to 58. The owners occupied 870 and tenants 769 farms in 1922.

According to the report of the Nebraska Department of Agriculture, 514, or 66.9 per cent, of the tenant farms were rented for cash; 184, or 23.9 per cent, on shares; and 71, or 9.2 per cent, both share and cash. The cash rent varies from $5 to $7 an acre. On the share basis the owner receives one-third to one-half the crop, usually delivered to the nearest elevator, the renter furnishing all seed, labor, and equipment. On a few farms the owner furnishes the breeding stock and receives one-half the increase.

In 1922 the price of farm land ranged from about $75 to $300 an acre. The lower price applies to the more sandy or poorly drained portions of the county and the higher to choice upland, terrace, or bottom-land farms having good improvements, drainage, and location.

SOILS [4]

Cuming County lies in the prairie region of the United States where the topography and rather high moisture supply favored a heavy grass vegetation over the greater part of the area. It is not necessary to discuss here the agencies which brought about the prairie condition; it is sufficient to state that at the time of the first settlement by white men practically the only timber in the area occurred along the streams and the bottom lands. Every soil type in the county with the exception of the recent sands, therefore, shows the influence of grass vegetation. The most striking characteristic and one which prevails over a wider area than any other single soil feature is the dark color of the surface soils. This color is imparted by

[4] Cuming County, Nebr., adjoins Dodge County on the south. A small area of Sarpy sand in Cuming County joins Sarpy fine sandy loam in Dodge County. As this area of very fine sandy loam was very small and the type was not found elsewhere in Cuming County, it was mapped as Sarpy sand. No attempt was made to join closely the survey of the Stanton area on the west, which was made in 1903, as the increasing knowledge of the soils of the State has necessitated many subdivisions of the types mapped at that time.

finely divided carbonaceous material derived from the decay of vegetation and intimately mixed with the mineral constituents of the soil.

The mantle rock or parent material from which the mineral portions of most of the soils are derived is known in the Nebraska surveys as loess. This was deposited over the entire region, according to the State geologists, during glacial times as a layer of silty material, varying in thickness from a mere veneer to more than 100 feet. In places the loess deposit has been entirely removed, exposing material identified by State geologists as Kansan drift. This consists of a loose incoherent mass of rock, coarse gravel, and sand, silt, and clay. The loess in its unweathered condition consists very largely of silt with a small percentage of very fine sand and some clay. It is loose and floury in character and varies in color from pale yellow to yellow or light gray. Lime carbonate is abundant and a scattering of iron-oxide stains is present.

Parts of the terraces throughout the Elkhorn River valley are in places greatly modified or entirely covered by stream and wind transported sands coming from the sand underlying the loess on the benches.

Soil variations in the county are dependent on differences in texture of the parent material and the varying stages of weathering to which this material has been subject in different parts of the county.

The upland soils of the county have developed under conditions which have favored the accumulation of large quantities of organic matter in the surface layers, and the soils are dark brown to black in color.

The soils on the uplands and terraces of the county, with the exception of small areas lying on exceptionally steep slopes, consist of three layers or horizons varying in texture, color, chemical composition, and physical characteristics. Considering texture only, one finds a relatively light textured layer at the surface, a relatively heavy textured layer below this, and a layer lighter in texture than the second, and usually, though not always, lighter than the first below this.

In color the surface layer is very dark brown to black at top, becoming lighter downward. The second or heavier textured horizon is brown darkened by organic matter at top and becoming progressively lighter in color downward. The organic matter in this horizon does not permeate the material uniformly but coats the surface of the parts or structure units of the horizon or of cracks which cross it, usually vertically, though not always. The quantity of organic matter decreases downward. The third layer is typically gray, but its top has become stained yellowish or brownish through the oxidation of some of the iron it contains.

In structure the dark-colored part of the upper layer is granular, varying somewhat in the degree of development of the granules. They are more definitely developed in proportion to the percentage of organic matter present, and therefore to the intensity of the dark color.

The second horizon breaks into small fragments, usually angular in shape and varying in size from somewhat less than a pea at top to approximately an inch at bottom. The darker color of the upper

part of this horizon is due in part to the smaller size of these particles, and therefore the greater surface, within any unit volume of material, coated with a film of dark-colored organic matter. The third layer or horizon has no very marked grouping of the particles, being floury, except in the upper part, where the arrangement of the material is similar to that of the layer above it, but this soon disappears downward. In the soils on the river bottoms, consisting of recently deposited alluvium, this arrangement into layers is lacking, with the exception, as a rule, of the darker color of a layer or horizon, varying in thickness on the surface. The soils on steep slopes have this arrangement developed to a less pronounced degree than on the smoother areas.

The soils characterized by this profile are represented by the soils of the Marshall and Waukesha series, while those of the O'Neill, Judson, and Knox are marked by an imperfect development of these features.

Upon the upland slopes and terraces of the Elkhorn River valley are small areas of soils which have weathered from wind-blown sands of recent origin. The profile is imperfectly developed. Conditions have been unfavorable for the accumulation of organic matter and the surface soil is only slightly darker than the subsoil. The material is not calcareous, as any carbonate originally present in the sand has been completely removed. The Valentine soils cover this condition.

The soils of the well-drained terraces have been developed under conditions especially favorable for deep soil weathering and the accumulation of large quantities of organic matter in their surface layers. Most of the carbonates have been leached to below the 3-foot depth and the soils are not calcareous. Those derived from silty materials have dark grayish brown to black surface horizons, underlain by brown to light-brown compact subsoils. They are included with the Waukesha series. The terrace soils, which have weathered upon sandy deposits, are of a coarser and more porous nature and are represented by the O'Neill series.

The soils that occupy first-bottom positions have been developed under conditions of restricted drainage and present a variety of characteristics. They have weathered from both sandy and loessial deposits which have been carried down by the streams from the adjoining uplands and terraces and from regions to the west and deposited upon the present flood plains. The more sandy deposits have been included with the Cass and Sarpy series. The former has accumulated large quantities of organic matter in the surface layer, but the latter is not so well supplied. The heavier textured deposits are classed with the Lamoure and Wabash series. They consist largely of reworked silts from the Marshall and Knox soils. The Lamoure series is characterized by light-gray, highly calcareous subsoils, while the Wabash soils have largely been leached of their carbonates to below the 3-foot depth.

The soils of the county have been differentiated into soil series on the basis of similarity in color, subsoil, topography, drainage, and the character of the underlying material. A further separation of each series into types is made on the basis of texture of the

surface soil. Ten soil series are represented in the county by 17 types.

The Marshall series includes types having dark-brown to black surface soils and a brown to yellow subsoil slightly heavier than the surface layer. The structure is loose and friable. The lower subsoil is usually highly calcareous except in the flatter areas, where undisturbed weathering has removed the lime to below the 3-foot depth. The series is of residual origin, having weathered upon the surface of the loessial deposit. The topography varies from flat to sharply rolling. Drainage is usually good and in the rougher sections sometimes excessive. Two types, the Marshall silt loam and fine sandy loam, are recognized in Cuming County.

The Knox series consists of light-colored calcareous soils derived from loess. The surface layers are brown to grayish brown and the subsoil is light brown to yellow. The subsoil is silty and friable, consisting of loess in only a slightly weathered condition. The material is calcareous throughout the 3-foot section. The topography ranges from gently to sharply rolling. Drainage is usually excessive and erosion severe. One type, the Knox silt loam, is mapped.

The Valentine series consists of types with brown to grayish-brown surface soils containing small quantities of organic matter and clay, which give some of them a loamy texture. The subsoil is a light-brown to gray loose sand. Both soil and subsoil are low in lime. These types are developed on wind-blown sands which have become stable. The topography varies from dunelike to almost level. The series usually occupies the lower situations, including the dry valleys within the sand-hill region. In this county, however, it is represented by wind-blown materials derived from the sandy deposits within the loess and partly from sands carried down by the Elkhorn River from regions to the west. Drainage is usually excessive. Surface channels are not developed but moisture seeps away through the loose, porous subsoil. In Cuming County the series is represented by a single type, the Valentine loamy fine sand.

The Waukesha series is characterized by dark-brown to black surface soils, underlain by a brown to yellow subsoil, which is heavier in texture than the surface layer. The series is only moderately calcareous, as the lime has generally been leached to below the 3-foot depth. The soils are derived from transported and reworked loessial material, carried by the streams from the loessial uplands and deposited upon the valley terraces. The topography is flat to very gently undulating. Drainage is good, though not excessive. The members of this series differ from those of the Marshall series chiefly in the mode of their formation, more generally level topography, and lower position. The subsoil is also slightly more compact and has a lower lime content, due to more thorough leaching. The Waukesha silt loam, very fine sandy loam, and fine sandy loam are recognized in Cuming County.

The soils of the O'Neill series consist essentially of dark grayish brown to nearly black surface soils underlain by a light-brown sandy subsoil resting upon a substratum of gray sand and gravel. The series occupies terrace positions and the topography varies from nearly level to gently undulating. The soils are derived by weathering from sandy alluvial deposits. Drainage is good and in places excessive, and is usually subterranean, the soils being somewhat

droughty in places owing to excessive underdrainage. Neither the soils nor subsoil contain sufficient lime to effervesce with dilute hydrochloric acid. In Cuming County the O'Neill loamy fine sand is recognized.

The Judson series comprises soils of alluvial and colluvial origin. The surface soils are dark grayish brown to almost black in color and the subsoil is a lighter brown. The types occupy terraces above overflow and colluvial slopes along the base of the uplands. The material is mainly wash from loess or silty drift soils. The topography is flat, sloping gently toward the stream channels. Drainage is good, though not excessive. Neither the soil nor subsoil is highly calcareous. One type, the Judson silt loam, is mapped.

The Wabash series includes soils of dark-brown to black color with a high content of organic matter. The subsoil is dark drab to gray or light brown and somewhat heavier in texture than the surface layers. Both soil and subsoil have a low lime content. The series is of alluvial origin and occupies first-bottom or flood-plain positions along the larger streams throughout the loessial uplands. The material is composed largely of loess washed from the Marshall soils. The surface is flat and is subject to overflow during high water. The Wabash types have a finer textured and more compact subsoil than the Cass and Sarpy series, and they differ from the Lamoure soils chiefly in their lower lime content. Three types—the Wabash silt loam, silty clay loam, and very fine sandy loam—are mapped.

The soils of the types included in the Lamoure series are dark brown to black. The subsoil varies from yellowish brown or gray to dark drab and is frequently mottled gray and brown. It is usually heavier in texture than the soil, though both may have about the same texture. The series is derived through the weathering of calcareous alluvium. The soils occupy poorly drained flood-plain positions and are subject to overflow. Local accumulations of alkali may occur on the surface. The types resemble those of the Wabash series except for their high lime content. The Lamoure silt loam and silty clay loam are mapped in this county.

The Cass series includes types with dark-brown to black soils and lighter colored sandy subsoils which locally pass within the 3-foot section into coarse sand and gravel of light-gray color. Both the soil and subsoil are generally calcareous. The series occupies first-bottom or flood-plain positions along the Elkhorn River. Much of the soil is subject to overflow during periods of high water, but the surplus moisture drains off rapidly when the floods have subsided. The Cass very fine sandy loam and loamy fine sand are mapped.

The types of the Sarpy series have brown to light-brown soils underlain by a light-colored sandy subsoil, the lower strata in places including coarse sand and gravel. The series occupies flood-plain positions along the Elkhorn River. The topography is flat. The soils lie but a few feet above the normal flow of the stream and are subject to overflow during high water. The soils are usually calcareous, though not necessarily so. They represent a less mature stage of weathering than the Cass soils and have not accumulated such large amounts of organic matter in their surface layers. One type, the Sarpy sand, is mapped.

Riverwash, as mapped in this county, belongs to no soil series, but is included as miscellaneous material. It consists of sand bars, islands, and sand flats along the channel of the Elkhorn River.

In the following pages of this report the soils of the county are described in detail and their relation to agriculture discussed. Their location is shown on the accompanying soil map. The following table gives the actual and relative extent of each soil type:

Areas of different soils

Soil	Acres	Per cent	Soil	Acres	Per cent
Marshall silt loam	251,776	69.0	Lamoure silt loam	3,392	0.9
Wabash silt loam	31,936	8.8	Lamoure silty clay loam	3,392	.9
Waukesha silt loam	11,840	3.2	Sarpy sand	2,752	.8
Marshall fine sandy loam	11,840	3.2	Wabash very fine sandy loam	2,176	.6
Judson silt loam	10,496	2.9	Cass loamy fine sand	1,088	.3
Cass very fine sandy loam	10,048	2.8	Waukesha very fine sandy loam	896	.2
Wabash silty clay loam	6,784	1.9	Knox silt loam	448	.1
O'Neill loamy fine sand	5,504	1.5	Riverwash	192	.1
Valentine loamy fine sand	5,184	1.4			
Waukesha fine sandy loam	5,056	1.4	Total	364,800	

MARSHALL FINE SANDY LOAM

The soil of the Marshall fine sandy loam is a friable dark-brown to very dark grayish brown fine sandy loam, 10 to 12 inches deep, which contains sufficient silt and clay to give it a slightly compact structure when dry. The upper subsoil is a light-brown moderately compact very fine sandy clay which continues to an average depth of 20 inches. The lower subsoil is a yellowish-brown silt to silty clay, slightly less compact than the upper subsoil. Locally it grades at about 30 inches into the loose, floury, light-gray silt of the parent loess. The surface soil is rich in organic matter, which gradually decreases with depth and is usually deficient below 30 inches. The transition between the different soil layers is very gradual both in color and texture. The carbonates have been leached from the soil and upper subsoil, though traces of lime are usually present below 30 inches, and lime is abundant in the substratum. The structure of the soil and upper subsoil is granular, while that of the lower subsoil and substratum is columnar.

On the more level areas, where conditions have especially favored extensive weathering and the accumulation of organic matter, the surface soil is often 15 to 20 inches deep and of a darker color than usual. In the more eroded situations, such as ridge crests, hilltops, and steep slopes, the weathered surface material has been removed almost as fast as formed, and the surface soil in places is very thin and of much lighter color than typical, although in a few places it has been entirely removed, exposing the light-gray silty material of the parent loess. Locally the surface soil contains very little organic matter and is rather incoherent, and in such localities the material sometimes drifts slightly during dry windy seasons. Included with this soil are a few small areas of Scott silt loam; such areas seldom exceed 3 or 4 acres in size and are not shown on the soil map on account of their small extent and local occurrence. The soil profile

is the same as that of the larger body of Scott silt loam which is included with the Marshall silt loam.

The Marshall fine sandy loam occupies a total area of about 18 square miles in Cuming County. It is confined chiefly to a few large bodies upon the upland slopes bordering the Elkhorn River valley in the southeastern and northwestern parts of the area. The type has been derived from weathered loessial material. It is in reality Marshall silt loam, the surface of which has been greatly modified by the addition of wind-blown sand from the near-by Valentine soils.

The topography ranges from almost flat to sharply rolling, but the greater part has a gently rolling relief. The surface is characterized by wide shallow valleys separated by broad well-rounded divides, and the valley slopes are usually gradual. The sharply rolling areas occur around the heads of a few of the intermittent drainage ways and seldom exceed 160 acres in extent. In these localities the valleys are steep sided, though shallow, and are separated by low, narrow divides.

The type is well drained. Surface channels are not well established in the more nearly level areas, but there is usually sufficient slope to carry off all surplus moisture. In the sharply rolling areas run-off is excessive in places and erosion is active.

The Marshall fine sandy loam is naturally strong and fertile, retentive of moisture, and yields almost as well as the Marshall silt loam. Practically all of it is under cultivation, with the exception of a few small areas in the rougher sections which are used for pasture. Corn, oats, and alfalfa are the leading crops. Wheat does not do so well on this type as on the silt loam on account of the less compact seed bed. The raising of hogs and the winter fattening of cattle is practiced extensively. Corn and alfalfa are used to feed and fatten livestock and oats are fed chiefly to the work animals.

Crop yields vary widely, depending upon the rainfall and the care taken in managing the land. The average yield of corn is about 35 bushels per acre, oats 25 to 30 bushels, and alfalfa 3 to 4 tons from three cuttings. The land is handled in about the same manner as the silt loam type. More of the corn, however, is listed in, as the ridges tend to prevent soil blowing. The type can be cultivated under almost any moisture conditions without injury. Less power and lighter machinery are required than upon the heavier soils of the county. No systematic crop rotation is practiced. Barnyard manure is applied to the land when available, but the supply is seldom sufficient materially to increase the total crop yields.

Land of the Marshall fine sandy loam sells for $150 to $225 an acre, depending upon improvements and location.

The methods suggested for maintaining and increasing the organic content and preventing erosion of the Marshall silt loam will also apply to this soil.

MARSHALL SILT LOAM

The surface soil of the Marshall silt loam is a dark grayish brown moderately heavy silt loam, 8 to 14 inches deep. The soil contains considerable clay and practically no material coarser than very fine sand. It is rich in organic matter and has a smooth, velvety feel. The subsoil is a brown to light-brown silty clay of slightly more

compact nature than the surface soil. This material either continues throughout the 3-foot section without change or becomes heavier with depth until at 30 inches it consists of a compact brownish-yellow silty clay. Below 30 inches the lower subsoil frequently grades into a light-yellow floury silt, locally mottled with light-gray and rusty-brown stains. The boundary line between the soil and subsoil is marked by a gradual change both in color and texture. The structure of the soil and upper subsoil is granular, and that of the lower subsoil and of the parent material is columnar. The material below 30 to 36 inches is usually highly calcareous, the lime being present chiefly in the form of concretions.

The type includes a few variations. On the flat divides the dark-brown to black surface soil is usually 15 to 20 inches deep, underlain by a heavy rather compact silty clay loam of brown to light-brown color which continues to below 36 inches. The subsoil in these localities is usually not calcareous within the 3-foot depth, although lime is abundant below 4 feet. On the sharp divides and shoulders of hills, where erosion has been severe, the brownish-yellow highly calcareous subsoil is frequently encountered at a depth of 12 to 18 inches, and in a few places the surface soil has been entirely removed, exposing the unweathered parent loess. These shallow areas really represent extreme variations toward the Knox silt loam, which are not mapped separately on account of their patchy nature. The progress of erosion tends to increase the extent of the Knox silt loam at the expense of the Marshall silt loam. In places within the areas of Marshall silt loam, small bodies containing an appreciable quantity of sand and gravel occur, but these were so scattered and of such small extent that they could not be shown satisfactorily on the map. Included with the Marshall silt loam are narrow strips of colluvial material along the smaller intermittent streams.

A small area of Scott silt loam, occupying a depression containing about 15 acres, lies along the line between sections 19 and 24, T. 23 N., Rs. 5 and 6 E. This is included with the Marshall silt loam on account of its small extent and local occurrence. The surface soil is a dark-brown to black heavy silt loam, 8 to 12 inches deep. The subsoil, which continues to below the 3-foot depth, is a dark-gray to drab, heavy and compact clay to silty clay. Rusty-brown mottlings are often encountered below 30 inches. The material is not calcareous within the 3-foot depth. The soil has been formed by wash from the surrounding higher land, deposited over older material which now constitutes the subsoil. The lower subsoil, which is high in organic matter, apparently is a very old soil formed by the deposition of silt and clay in standing water. Drainage is poor in this area, and in the spring, after heavy rains, water stands on the surface for periods of a few days to several weeks. The area is included in cultivated fields and produces fair yields in favorable seasons. In wet years it is too moist for cultivation and during dry seasons the surface cracks badly, causing crops to suffer from lack of moisture.

The Marshall silt loam is the most extensive soil type in Cuming County and is the dominant soil of the uplands throughout the area.

The topography varies from flat to steeply rolling, but in general the surface is gently rolling to rolling. The greatest relief occurs along the edge of the uplands bordering both sides of Logan Creek

in the northeastern part of the county, along Plum Creek in the north-central part, and throughout portions of the uplands bordering the Elkhorn River. In these areas the slopes are generally steep and the divides narrow, though well rounded. The flat areas are few and usually small. They occupy the highest positions in the county and represent uneroded remnants of the original loess plain. The largest remnant, including about 320 acres, occurs east of the Liberty Store in T. 22 N., R. 7 E. Areas of gently undulating topography occupy the broader divides between major drainage ways. Elsewhere the relief is gently rolling to rolling.

Drainage of the Marshall silt loam is everywhere adequate and in many places excessive. Erosion is a serious factor on many farms of this type. The soil retains moisture well, owing to its high organic-matter content, friable structure, and silty nature. Little moisture is lost through subterranean drainage, so that the type withstands drought over prolonged periods.

The Marshall silt loam is the most important agricultural soil of Cuming County. It does not produce quite as high yields as some of the terrace and bottom-land types and is more subject to injury by erosion, but its larger acreage makes it the leading farming soil. The type originally supported a thick sod of prairie grasses and was used extensively for grazing. All of it is now under cultivation except small areas of the rougher land which are used for farm pastures. Corn is by far the leading crop, followed by oats, alfalfa, red clover, and wheat, ranking in acreage in the order named. The area devoted to corn is greater than that of all other crops combined. Timothy and clover mixed were formerly grown extensively, but have been largely replaced by alfalfa during recent years. The chief objection to alfalfa is that it does not fit in a rotation as well as clover, but its higher yield has tended to offset this objection, and it is now the principal tame-hay crop on the type. Some potatoes and other vegetables are grown on every farm, and there are many small apple, peach, and cherry orchards, but no special crops are grown commercially on this type. On the few farms where wheat is grown it is the chief cash crop, as most of the corn is used to feed stock, except that on many tenant farms most of the corn is sold.

The livestock industry is extensively developed on this type. It consists of the raising of hogs principally and the fattening of beef cattle for market, while a few sheep are raised and some are annually shipped in for feeding. Dairying is not extensively developed, although every farmer has a few milk cows and sells his surplus dairy products in the near-by towns. The cattle are mostly of Shorthorn and Hereford breeding. Duroc-Jersey, Hampshire, and Poland-China are the leading breeds of hogs.

The average yield of corn is about 35 bushels per acre, the yield ranging from 25 to 50 bushels, while in exceptional years as high as 80 bushels have been obtained. When corn is planted more than two years in succession on the same land without applying manure the yield falls off appreciably. Oats return 30 to 40 bushels per acre. This crop, as a rule, does better on the Marshall silt loam than on the heavy bottom-land soils where it is likely to grow rank and lodge. Winter wheat is grown almost exclusively, the aver-

age yield being about 20 bushels per acre. Alfalfa does exceedingly well on this type, three cuttings and occasionally four being obtained, with a total yield of 3 to 4 tons per acre. The stand is usually maintained from five to seven years or as long as it remains profitable. It usually begins to deteriorate about the seventh year, and the land should then be plowed for other crops. Red clover yields 1½ to 2 tons per acre from two cuttings. It is somewhat more difficult to obtain a good stand of this crop than of alfalfa, and the yields are lower, but the plant is a biennial and better adapted to short rotations.

The soil of the Marshall silt loam is easily handled and can be cultivated under a wide range of moisture conditions. When properly tilled it resists drought for long periods. The land to be used for corn is usually plowed as early in the spring as possible, harrowed, and the corn planted in checkrows. Wheat ground is plowed in late summer or early fall and the grain planted with a press drill between the first and middle of September. Oats land is usually plowed in the spring and the seed planted as soon as the frost is out of the ground. Alfalfa and red clover are sown broadcast on well-prepared stubble ground and the seed harrowed in. No commercial fertilizers are used in growing the staple crops. The more progressive farmers usually apply barnyard manure before plowing the land.

Crop rotation is not systematically practiced on this soil, although the better farmers have evolved systems which they use on their land. The most common rotation consists of corn one or two years, followed by oats or wheat one year, and back to corn. This is varied by growing clover or alfalfa frequently. On many tenant farms corn is grown year after year on the same land.

Land of the Marshall silt loam sells for $150 to $275 an acre, depending upon topography, improvements, and location with respect to markets.

Under the present system of grain farming, without adequate provision for maintaining the organic content of the soil, the productiveness is gradually decreasing. This is especially true on farms operated by tenants. The soil is ideally adapted to clover and alfalfa and these crops should be grown more extensively, as they not only supply the needed organic matter but also add nitrogen to the soil. Fall plowing for corn and oats should be more generally practiced where there is little danger of erosion. Where the soil is likely to wash, steps to prevent it should be taken. Deeper plowing and keeping the steeper slopes in cover crops are means to this end. After gullies have been formed the prevention of erosion becomes more difficult, and low dams made of stone, earth, or weighted brush or rubbish should be placed at intervals along the gully to impede the flow of water and collect its load of sediment.

KNOX SILT LOAM

The surface soil of the Knox silt loam is a yellowish-brown or light-brown heavy silt loam, 6 to 10 inches deep. Below this is a yellow, heavy silt loam or silty clay loam extending to an average depth of 24 inches. The lower subsoil is a light-yellow floury silt loam

extending to great depths. Reddish-yellow iron stains and white lime concretions are encountered below 15 inches. The depth and color of the surface soil varies with its topographic position. On the more level areas the soil sometimes extends to a depth of 12 inches and is brown in color, while on the narrower ridges and along gullies, where erosion is especially severe, the surface material is light gray in color and extremely shallow. The soil has a smooth floury feel and as the color indicates is very low in organic matter. The material in general has a pronounced open and columnar structure. The entire 3-foot section is high in lime, and where erosion has been severe lime concretions are plentiful on the surface.

The type is derived from loessial material. It occurs wherever the dark-colored surface soil of the Marshall silt loam has been removed, exposing the less weathered loess. Slight accumulations of organic matter have given the immediate surface of the material a darker shade than the lower horizons.

Locally within the type coarse sand and gravel are abundant. These represent exposures of the glacial material which underlies the loessial deposit. These spots occur only where erosion is especially severe and are indicated on the map by the conventional gravel symbol.

The Knox silt loam has a total area of less than a square mile. It is confined to a few small patches around the heads of drainage ways in the southwestern part and to a narrow strip along the bluff line on the south side of the Elkhorn River south of Beemer. The topography is rough. Most of the type occupies steep and in places gullied slopes. The drainage is excessive and erosion severe.

Owing to its small extent and unfavorable topography, the soil is of no great importance in the agriculture of the county. Practically all of it is used for pasture. The smaller bodies are often included in cultivated fields, but have little influence on the total crop yields. The soil is quite productive when carefully managed to conserve and increase the organic-matter content. In other counties where it is more extensive it is used largely for the production of alfalfa and small fruits. It is recognized as one of the best fruit soils in Nebraska, and it would seem that fruit growing could be profitably practiced, as very little fruit is grown in the county and the market facilities are good.

This type occupies a small part only of the farms on which it occurs and has a tendencey to lower the general value of the land on account of its unfavorable topography.

The chief need of this soil is organic matter. The supply could be increased by checking erosion and applying large quantities of manure. Alfalfa is an excellent crop for this soil, as it yields well, adds both humus and nitrogen, and retards excessive washing.

VALENTINE LOAMY FINE SAND

The surface soil of the Valentine loamy fine sand consists of a loose, incoherent, brown to dark grayish brown fine sand to medium sand, 8 to 12 inches deep. The surface 6 inches is usually somewhat darker than the lower portion on account of some organic matter, but this material is never present in sufficient quantity to prevent

the soil from drifting when the native sod is destroyed. The subsoil is a loose, incoherent sand which is very low in organic matter and extends below the 3-foot depth. It is usually gray in color, although locally it may be tinted light brown or pale yellowish brown. Neither the soil nor subsoil is noticeably calcareous. The sand of which the type is so largely composed consists of the medium, fine, and very fine grades, with the fine sand predominating.

The surface soil varies somewhat in color and depth with its topographic position. In the shallow depressions where conditions have been most favorable for the growth and decay of plants the soil is somewhat deeper and darker, while on the crests of the low, rounded knolls and ridges the organic matter has been largely removed by the wind, leaving the soil very shallow and prevailingly light in color.

The type is not extensively developed in Cuming County, being confined chiefly to a few small bodies upon the divide between the Elkhorn River and Willow Creek in the southeastern part, and to a large body west of the Elkhorn River in the northwestern part. A small, though very typical body, is located southeast of the Westpoint Cemetery in T. 21 N., R. 6 E.

The Valentine loamy fine sand has been formed by the partial weathering of wind-blown sands. The original material has been reworked and reassorted to such an extent that it is difficult to make any positive statement in regard to its origin, but it was probably derived in part from sandy strata within or under the loess and in part from sands carried down in the channel of the Elkhorn River from regions to the west and blown out over the adjoining uplands.

The topography of the type varies from almost flat to gently rolling, the greater part presenting a hummocky to billowy relief. The flatter areas are usually modified by scattering low rounded knolls and ridges. Drainage is everywhere good and in many places excessive. There is very little surface run-off, as the porous sands absorb and carry off the moisture as fast as it accumulates.

The Valentine loamy fine sand is of little importance in the agriculture of the county on account of its small extent and unstable nature. Probably not over 30 per cent of it, including the more protected situations, is under cultivation, and the remainder is used for pasture and hay land. The native grasses consist largely of sand grass, needle grass, and bluestem, with small amounts of grama. The grazing of beef cattle is the principal industry on the virgin areas. Most of the stock is native raised and chiefly of Hereford and Shorthorn breeding. Of the cultivated crops corn occupies by far the largest acreage. Some oats are grown, but the soil is not well adapted to small grain on account of its loose, unstable nature and the danger of blowing, thereby exposing the shallow root system. Alfalfa is grown in a few of the lower lying situations, but the stand seldom lasts longer than three or four years on account of the low lime content of the soil.

The average yield of corn is about 25 bushels, oats 20 bushels, and alfalfa 2 to 2½ tons per acre from three cuttings. The native grasses on this type will support 80 to 100 head of cattle per quarter section, or when cut for hay will yield one-half to three-fourths ton per acre, depending upon the rainfall.

The land is handled in about the same manner as the heavier textured upland and terrace soils, but corn is usually listed in, because the ridges tend to check soil drifting. The land can be cultivated under any moisture conditions without injury if carefully managed to prevent blowing.

Land of the Valentine loamy fine sand sells for $50 to $150 an acre, depending upon topography, location, and its adaptability to crop production.

Coarse manure and straw spread over the land have proved beneficial in preventing excessive drifting. In listing corn, the furrows should be run at right angles to the prevailing northwest winds when possible. It is desirable to keep the ground protected at all times and not to stir the soil until ready to plant the grain.

WAUKESHA FINE SANDY LOAM

The surface soil of the Waukesha fine sandy loam is a brown to dark-brown, loose, friable fine sandy loam, 8 to 12 inches deep. The sand content is very high and in places the soil approaches a loamy sand in texture. The upper subsoil to a depth of about 20 inches is a fine sandy loam usually of slightly lighter color than the surface soil, although it may be about the same shade. It contains a large percentage of silt and clay and is slightly compact in structure. The lower subsoil is a light-brown to yellowish-brown, friable silt loam which extends below the 3-foot depth. The carbonates have been leached from the soil and subsoil to a depth of more than 3 feet though they are abundant below 4 feet. The soil profile is characterized by a gradual change in color, structure, and texture throughout the 3-foot section. The structure of the soil and subsoil is granular while that of the substratum is columnar.

Around the margin of the type, where it borders areas of Waukesha very fine sandy loam, the soils merge gradually into each other and it is often difficult to locate their boundaries. It is possible that small patches of very fine sandy loam are included with this type.

The type does not have a large total area in Cuming County. It is most extensively developed in the southeastern part on the broad terraces between Cuming Creek and the Elkhorn River. A few rather large areas lie west of Wisner on the south side of the river. The remaining areas are few and small, occurring upon the terraces chiefly in the southeastern and northwestern parts of the county.

The type has been derived in the same manner as the Waukesha silt loam and very fine sandy loam types except that it has accumulated a larger proportion of wind and water transported sand in the surface and upper subsoil layers.

The topography varies from flat to gently undulating. Around the margin of the type where it borders areas of O'Neill soils the material is of such a loose incoherent structure that wind erosion has created a gently undulating relief. Drainage is everywhere good. There is sufficient slope even on the flatter areas to carry off all surplus moisture and none of the type is subject to destructive washing.

The Waukesha fine sandy loam has only local agricultural importance in Cuming County on account of its small extent. It is a good corn and alfalfa soil, and the yield of these crops will average almost as high as on the heavier textured terrace soils. Small grain

does not appear to do so well as upon the Waukesha silt loam, probably because of the less compact seed bed. The more sandy parts of this type sometimes drift slightly during dry windy seasons, exposing the shallow root system of small grain and causing the crops to suffer from lack of moisture. Oats are grown more extensively than wheat. The average yield of corn is about 30 bushels per acre, oats 25 bushels, and alfalfa 3 to 3½ tons from three cuttings. Cattle feeding is practiced by many farmers and hogs are raised in large numbers.

The soil is handled in the same manner as the heavier textured upland and terrace soils. It can be cultivated under a wider range of moisture conditions than the silt loam types and with lighter machinery and draft animals on account of its more sandy nature. Barnyard manure is applied to the land when available, although the supply is usually insufficient to produce any noticeable increase in the total crop yields. Crop rotation is not systematically practiced, although alfalfa is grown extensively and tends to maintain the high producing power of the soil.

Land of the Waukesha fine sandy loam sells for $150 to $250 an acre, depending upon improvements and location.

WAUKESHA VERY FINE SANDY LOAM

The soil of the Waukesha very fine sandy loam is a dark-brown to black very fine sandy loam, 10 to 14 inches deep, loose and friable in structure, and containing a high percentage of organic matter which imparts the dark color. The upper subsoil to an average depth of 24 inches is a brown, slightly compact silt loam, containing considerable fine and very fine sand. Below this depth the material is of lighter color and looser structure, consisting of a yellowish-brown, loose floury silt to silty clay, often slightly mottled with light-gray splotches and scattering iron stains which continue to below the 3-foot section. When wet the material of both upper and lower subsoil is slightly plastic, but becomes hard and brittle upon drying. The organic content of the type gradually decreases with depth and is deficient below 30 inches. The structure of the soil and upper subsoil is granular and that of the lower part is columnar. The transition between the different soil layers is very gradual in color, texture, and structure. The type is seldom calcareous within the 3-foot section, although the lime becomes abundant below 4 feet, existing in both the powdered form and in numerous small angular concretions.

The principal variation in surface texture is toward a fine sandy loam, and it is possible that small patches of Waukesha fine sandy loam are included with this type. The two soils merge gradually into each other in many places, and boundary lines are arbitrarily located.

The Waukesha very fine sandy loam in Cuming County covers a total area not exceeding 1½ square miles, and is confined to a few small bodies in the southeastern part of the county. The largest area, comprising about 400 acres, lies near the southern county line, on the broad terrace between the Elkhorn River and Cuming Creek. A smaller body occurs on the west side of Cuming Creek, in T. 21 N., R. 7 E.

The soil has developed over alluvial materials of loessial origin deposited by the streams when they were flowing at higher levels. Subsequent deepening of the channels has left the deposits as terraces or benches considerably above the present flood plains. The sandy texture of the surface soil is due largely to the incorporation of wind-blown material from the sandy terrace and bottom-land soils.

The topography is flat, usually with a gentle slope down the valleys and toward the stream channels, and there is sufficient slope to carry off all surplus moisture. Drainage is good. The surface lies 15 to 35 feet above the stream channels and is not subject to overflow.

Owing to its small extent, the type is of little agricultural importance in Cuming County, but it is naturally a strong and fertile soil and is considered equal to the Waukesha silt loam for general farming purposes. All of it is under cultivation, corn, oats, and alfalfa being the leading crops.

The general farming methods are the same as on the Marshall silt loam and crop yields differ little from those obtained on the Waukesha silt loam.

Land of this type sells for $200 to $275 an acre, depending largely upon improvements.

WAUKESHA SILT LOAM

The surface soil of the Waukesha silt loam is a dark grayish brown heavy silt loam, 8 to 10 inches deep, containing a relatively large proportion of clay, which gives it a slightly heavier structure than the average silt loam type. It is rich in organic matter and in a moist condition appears black in color. The upper subsoil is a brown, heavy, compact clay to silty clay which continues to about 24 inches. Below this depth the material gradually becomes lighter in color and texture until, at 30 to 36 inches, it consists of a light-brown friable silt or silty clay. The organic content gradually decreases with depth and is deficient below 30 inches. The transition between the different soil layers is very gradual both in color and structure. The carbonates have been leached below the 3-foot depth, although lime concretions occur abundantly below 4 feet.

The soil profile of this type resembles that of the Marshall silt loam, except that the subsoil is usually more compact, especially in the upper part. The deeper cuts along streams show a profile similar to that of the loess underlying the uplands.

There are a few local variations from the typical soil, which on account of their small extent are not shown on the soil map. On the west side of the Elkhorn River, in sections 28 and 33, T. 22 N., R. 6 E., is a small body of about 300 acres in which the subsoil below 24 inches is a light-gray, loose, floury silt. This material is highly calcareous, the lime existing chiefly in finely divided form, though concretions frequently occur below 30 inches. The soil and upper subsoil resemble the typical soil in texture and structure, except that the latter is slightly less compact. The soil profile throughout the 3-foot section is very similar to that of the Hancock series.

Locally the surface soil of the Waukesha silt loam contains so much very fine sand as to approach a very fine sandy loam in texture. The two types merge gradually into each other and boundary lines in places were arbitrarily placed.

Around the outer margins of the terraces, where they border the uplands, the dark-colored surface soil has been greatly thickened in places by the addition of colluvial wash from the higher slopes, and in these localities it is often 24 inches thick. It is underlain by the brown heavy and compact silty clay to clay of the typical soil, and the friable light-brown silt is usually not encountered above 36 inches.

The Waukesha silt loam is the most extensive terrace soil in Cuming County. It occurs in numerous areas and strips upon the terraces along the Elkhorn River, Cuming, Logan, Plum, and Pebble Creeks, and a few of their major tributaries. The most extensive developments are along the Elkhorn River and Logan Creek. The largest area, including about 6½ square miles, lies north of Beemer. Another large area lies north of Logan Creek in the northeastern part. A smaller typical area occurs near Westpoint, on the west side of the Elkhorn River. The remaining areas, though numerous, are small, seldom exceeding 320 acres in size.

The type is derived from alluvial sediments deposited by the streams when they were flowing at higher levels. Surface wash from the uplands has also contributed largely to the material, especially near the foot of the steeper slopes. Prolonged weathering and the accumulation of organic matter has changed the original deposits into the present soil.

The topography over the greater part of the type is almost level to very gently undulating, modified in places by shallow stream channels issuing from the uplands. The soil lies at two distinct terrace levels, the higher and older benches occurring west of Westpoint and north of Beemer. The area near Westpoint is somewhat eroded along Fisher Creek by small intermittent streams, creating a strongly undulating relief, but the crests of the low rounded divides lie at a uniform level. The high terraces lie 20 to 30 feet above the first bottoms and from 10 to 15 feet above the lower benches. The transition between the two levels is usually short, though not so abrupt as to be uncultivable.

The type is well drained as none of it is subject to overflow from the main streams, and there is usually sufficient slope down the valleys and toward the stream channels to carry off all surplus moisture. After heavy rains water sometimes collects in isolated shallow depressions, but the total extent of poorly drained land is almost negligible.

The Waukesha silt loam is an important agricultural soil in Cuming County and constitutes some of the most valuable farm land. It is naturally strong and fertile and well suited to all crops common to the region. Practically all of it is under cultivation or included in farm sites and feed lots. Cattle feeding and hog raising are practiced extensively, most of the cattle being shipped in from Omaha or Norfolk for winter fattening. The principal breeds are grade Hereford and Shorthorn. The hogs are all native stock and of good breeding. Many farmers have purebred herds. The livestock is fattened on corn and alfalfa and usually shipped to the Omaha market. Dairying is not practiced extensively, although every farmer has a few milk cows, chiefly of beef breeds.

Corn, oats, and alfalfa are the leading crops. The yields are usually slightly higher than those obtained on the Marshall silt loam on account of the more favorable moisture conditions on this type. Corn yields 45 to 60 bushels per acre, oats 40 to 50 bushels, and alfalfa 3 to 4½ tons from three cuttings. Wheat is grown by a few farmers, but is less profitable than corn or alfalfa. It usually yields 15 to 25 bushels per acre, depending upon the season. Some corn is shipped outside the county, although the corn, oats, and alfalfa are fed mostly on the farms where produced or are sold to local feeders. Wheat is sold in the local elevators soon after threshing.

The soil of this type is handled in the same manner as the Marshall silt loam. Cultivation is somewhat easier on account of the generally level topography and absence of erosion. Barnyard manure is applied when available. The fertility of the soil is not being noticeably impaired by cropping, as the type receives considerable organic matter as surface wash from the higher levels.

The selling price of the Waukesha silt loam ranges from $200 to $275 an acre, depending upon the location and improvements.

O'NEILL LOAMY FINE SAND

The surface soil of the O'Neill loamy fine sand is a dark grayish brown, loose, incoherent sand, 8 to 10 inches deep, composed largely of the medium, fine and very fine grades, with the fine sand predominating. The upper layer of 6 inches is considerably darker than the lower part, owing to a slightly higher content of organic matter, which usually is present in sufficient quantities to give the surface soil a loamy character, but not sufficient to prevent slight drifting when cultivated, especially during dry, windy seasons. The subsoil is a brown to gray, loose, incoherent sand, which continues below the 3-foot depth. Small rounded gravel is encountered locally below 30 inches. The content of organic matter gradually decreases with depth and is very deficient in the lower subsoil. The change in color between the soil and subsoil is usually gradual. The type is not calcareous.

In a few places the soil profile varies from the typical in that there is an abrupt change in color between the soil and subsoil. In these localities the surface material differs little from the typical, but the subsoil is a light-gray, loose sand, often containing considerable gravel. Around the margins of the type where it borders areas of Waukesha soils the subsoil often contains considerable silt and clay and is of a slightly more coherent structure than the average. Areas in which these variations occur are small and scattered and are not shown on the soil map.

The O'Neill loamy fine sand is confined chiefly to two large bodies on the Elkhorn River terraces in the southeastern and northwestern parts of the county. The largest of these, including about 5½ square miles, lies south of Westpoint on the east side of the river. A somewhat smaller body occurs a few miles west of Wisner on the south side of the stream. The remaining areas are few and small.

The type is formed from sandy terrace material deposited when the streams were flowing at higher levels. The topography in general is flat to slightly undulating. Over considerable areas the surface has been modified by wind action and is somewhat hummocky.

This condition often prevails in those portions of the type lying adjacent to areas of Valentine soils. Drainage is usually subterranean. It is everywhere good and in a few places excessive, owing to the open structure of the subsoil.

About 85 per cent of the type is in cultivation, and the rest is used for grazing and hay land. The native vegetation consists of a great variety of nutritious grasses, chief among which are big bluestem, little bluestem, sand grass, stipa, and grama grass. Of the cultivated crops, corn, oats, and alfalfa rank in acreage in the order named. The land is not so well suited to small grains as some of the heavier soils, on account of its loose sandy texture. The raising of hogs and the winter fattening of cattle are practiced by most farmers, but the latter industry is not so extensively developed as upon the heavier terrace soils.

The yields of corn range from 20 to 30 bushels, with an average of about 25 bushels, oats yield about 20 bushels, and alfalfa 2½ to 3 tons per acre. Alfalfa makes a good growth, but the stand is rarely as thick as upon the Waukesha soils. The type is not as durable and productive as the heavier soils of the terraces, but it is easily tilled, has adequate drainage even in wet years, and withstands drought almost as well as the heavier types. It is subject to slight shifting by wind, with consequent injury to young plants.

The soil can be cultivated under any moisture conditions without injury providing care is taken to prevent drifting. The land is plowed less frequently than the heavier textured soils. Corn is usually listed in, as it is thought to withstand drought better than when surface planted and the young plants are not so subject to injury by the wind. Oats are drilled in on double-disked corn or stubble ground. Alfalfa is sown broadcast on a well-prepared seed bed and the seed worked in with a harrow. Manure and straw are applied to the land when available, as they increase the fertility of the soil and tend to make it more stable.

The price of the O'Neill loamy fine sand ranges from $75 to $150 an acre, depending largely upon its adaptability to grain crops.

JUDSON SILT LOAM

The Judson silt loam consists of 10 to 12 inches of dark grayish brown, loose, friable silt loam, rich in organic matter, which imparts the dark color. The subsoil is of about the same texture, but of variable color to below the 3-foot depth. Over most of the type it is slightly lighter colored than the surface material, probably owing to a lower content of organic matter. In many places the subsoil is dark brown to almost black and slightly heavier than the surface soil.

Included with this type are small areas in which the material contains so much sand as to approach a very fine or a fine sandy loam in texture. These bodies usually occur in the more sandy sections of the county, where the type lies within or adjacent to bodies of Valentine loamy fine sand or Marshall fine sandy loam soils. The surface material in these localities is a dark-brown, friable fine to very fine sandy loam, 8 to 14 inches deep, and the subsoil to below the 3-foot section usually consists of a fine sandy loam differing little in color or structure from the surface material.

The Judson silt loam does not have a large total area in Cuming County. It occupies numerous broken strips and small, usually elongated, bodies along the valley slopes throughout the uplands. The strips vary in width from a few rods to about one-fourth mile, and many extend for several miles along the larger streams. The largest and most continuous development is along Rock Creek in the west-central part of the county. A long narrow strip occupies the slope between the uplands and first bottoms on the north side of the Elkhorn River in the vicinity of Wisner. Numerous broken linear developments border the edge of the first bottoms and stream channels throughout the county.

The soil is mainly the result of colluvial action, although in many places it has been considerably modified by alluvial deposits and resembles terrace or bench land. It consists largely of surface wash carried down from the Marshall soils and deposited near the base of the upland slopes. It is of comparatively recent origin and sufficient time has not elapsed for the development of zonal differences in the material.

The topography is smooth, generally with a decided slope toward the streams and down the valley. Drainage is usually thorough though not excessive. Most of the type lies 10 to 25 feet above the stream channels and is not subject to inundation. Along a few of the minor tributaries small patches are overflowed during periods of high water, but the surplus moisture quickly drains off when the streams subside.

The soil is unimportant in Cuming County owing to its small extent, but where it is more extensive, it is a very valuable soil, being equally as productive as the Marshall silt loam. About 70 per cent of the type is under cultivation in this county, and the remainder is used for farm pastures. The native vegetation consists of a thickly matted growth of nutritious prairie grasses. There is practically no forest growth.

Corn, oats, and alfalfa are the most important crops, ranking in acreage in the order named. Potatoes and other vegetables are grown to supply the home demand. Corn gives an average yield of about 35 bushels per acre, oats 25 to 40 bushels, and alfalfa 3 to 4 tons from three cuttings. All vegetables do well. Potatoes yield 75 to 150 bushels per acre.

The fattening of steers is engaged in rather extensively, and hogs are raised on every farm. All farmers have some dairy and poultry products for sale.

The Judson silt loam is somewhat easier to handle than the Marshall silt loam on account of its more nearly level topography and consequent freedom from erosion. Barnyard manure is applied when available. The soil is considered somewhat stronger than the Marshall silt loam, as it receives organic matter from that type through surface wash and the more nearly level topography prevents the removal of this material through erosion.

The average selling price of the Judson silt loam is difficult to determine, since it usually occupies only a small percentage of the farms on which it occurs, but it has a tendency to increase the general value of the farms where it is extensive enough for cultivation.

WABASH VERY FINE SANDY LOAM

The surface soil of the Wabash very fine sandy loam is a dark grayish brown to black very fine sandy loam, 8 to 12 inches deep, which contains a large amount of organic matter and has a loose friable structure. The upper subsoil is a black, heavy silty clay containing small amounts of very fine sand, and being much more compact than the surface horizon. Below an average depth of 30 inches it is underlain by a black waxy clay, which continues below the 3-foot depth, and is usually more compact than the upper subsoil, though it may have about the same structure. The transition between the several soil horizons is very gradual in color, structure, and texture. The type has a high organic matter content but is not calcareous within the 3-foot depth.

In many small areas the subsoil is a dark-brown to black friable silt loam only slightly more compact than the surface layer. Locally the subsoil is much lighter in color than usual, being a gray to light-brown friable silt below an average depth of 20 inches. The principal variation in surface texture is toward a silt loam, and a few small patches of Wabash silt loam are included with this type.

The total area of the Wabash very fine sandy loam in Cuming County does not exceed 4 square miles. The largest development, including about 1½ square miles, occupies a narrow strip along the north side of the Elkhorn River in the extreme western part of the county. Two small areas lie west of Beemer on each side of the river and another lies north of Logan Creek in the northeastern part of the county.

The type has been derived in the same manner and largely from the same materials as the Wabash silt loam. The more sandy nature of its surface soil is due in part to the coarser nature of the most recent stream deposits and in part to wind-blown materials from the more sandy bottom-land soils.

The topography is prevailingly flat, modified in a few places by old stream channels, cut-offs, and shallow depressions. Drainage over most of the type is good. The surface lies 5 to 15 feet above the normal flow of the streams and is seldom subject to overflow. A few of the lower lying depressions are poorly drained on account of the compact subsoil layer which prevents free underdrainage.

The type is of little agricultural importance in Cuming County on account of its small extent, but it is a very productive soil and ranks equally with the Wabash silt loam in crop yields. About 90 per cent of it is under cultivation and the remainder, including the poorly drained areas, is used for pasture. Corn, oats, and alfalfa are the leading crops.

The land is easily handled and can be cultivated under a wide range of moisture conditions without injury. Barnyard manure is applied when available. The soil is very strong and fertile and withstands continued cropping with little decrease in yield even under rather careless management. The addition of silt and organic matter washed from the higher upland soils tends to maintain its fertility.

The selling price of the Wabash very fine sandy loam ranges from $150 to $275 an acre, depending upon drainage, location, and improvements.

WABASH SILT LOAM

The Wabash silt loam to a depth of 8 to 12 inches is a dark-brown to black, smooth, friable silt loam carrying a high percentage of organic matter. The upper subsoil is a compact dark-brown silty clay, which continues to about 24 inches. The lower subsoil is a gray to dark-gray, heavy, compact clay extending below 3 feet. The organic content decreases slightly with depth, although it is rather plentiful even in the lower subsoil. The transition between the different soil horizons is very gradual in color, texture, and structure. Faint mottlings of brown and gray often appear in the lower part of the subsoil. The type is not calcareous within the 3-foot depth.

There are several variations from the typical soil. Over local areas there is no marked difference in color or texture within the 3-foot section, but the subsoil is usually more compact than the surface horizon. On a few of the narrow first bottoms bordering the smaller drainage ways the soil is an almost black silt loam, 12 to 18 inches deep, underlain by a gray, slightly more compact silt loam, which continues to below 36 inches. Where the Wabash silt loam is associated with sandy types of the Marshall, Wabash, and Cass series the surface material has been considerably modified by wind and water transported sands, so that in places it approaches a very fine sandy loam in texture. These variations, although numerous throughout the county, are of such patchy occurrence that it is not practicable to show them on a map of the scale used in this survey.

The Wabash silt loam is extensively developed in the first bottoms along most of the upland streams throughout the county. It is the dominant flood-plain soil along Cuming, Plum, Weisel, Fisher, and Pebble Creeks and their larger tributaries. The type is also developed extensively along the Elkhorn River and Logan Creek. The strips vary in width from a few rods along the smaller tributaries to about 1 mile in places along Plum Creek and the Elkhorn River. The areas along the river are often large though not continuous.

The material composing this type is of alluvial origin, having been washed from the adjoining uplands, carried by the streams, and deposited upon their flood plains. The decay of the rank vegetation developed under the moist conditions accounts for the dark color and high organic matter content of the type.

The surface is generally flat, but broken in places by old cut-offs, stream channels, and shallow depressions. The type lies 5 to 10 feet above the normal flow of the streams and is subject to flooding only during periods of excessive rainfall. The greater part has adequate drainage. Even during high stages of the streams the water seldom remains over the land longer than a few hours. The poorly drained portions occupy the local depressions, where water sometimes stands for considerable time because the compact subsoil affords slow underdrainage.

About 85 per cent of the Wabash silt loam is under cultivation. The remainder, including the narrower strips along the smaller drainage ways and local depressional areas where drainage is poor,

is included in farm pastures and hay land. The native vegetation consists of a luxuriant growth of prairie and marsh grasses, with narrow strips of timber along the larger stream channels. The tree growth is composed largely of oak, elm, ash, cottonwood, hackberry, and some walnut. The livestock industry is as well developed on this type as on any other soil in the county and consists chiefly of cattle feeding and hog raising. Many feed lots are located along the streams on account of the favorable water supply. Dairying is not practiced extensively, although every farmer milks a few cows, chiefly of the beef breeds, and sells his surplus dairy products in the local markets.

Corn, alfalfa, and oats are the leading cultivated crops. Some wheat is grown, chiefly of the spring varieties. The corn and alfalfa are used to feed and fatten livestock, and oats are fed to work stock, while most of the wheat is sold in the local elevators.

The Wabash silt loam is considered one of the strongest agricultural soils of the county, and as a rule the crop yields are 15 to 20 per cent higher on this type than on the upland soils. Corn ordinarily yields 40 to 60 bushels per acre. Kherson oats do well on this type, yielding 35 to 45 bushels per acre, but the long-strawed varieties of oats are likely to lodge on account of their rank growth. Wheat yields 20 to 25 bushels. Except in some poorly drained areas, alfalfa does very well and in normal seasons gives three or four cuttings with a total yield of 3 to 4½ tons per acre. This legume makes a more luxuriant growth on this soil than on any other type in the county. Occasionally the second growth is used for seed, yields of 2½ to 3 bushels per acre being obtained. The native grasses on this type will support a cow or steer per acre during the summer grazing season or when cut for hay will yield 1 to 1½ tons. Timothy and clover do well in wet seasons, yielding from 1½ to 2 tons of hay per acre. Red clover is planted to a small extent; it is usually cut twice, and yields about 3 tons of hay per acre.

Owing to its flat topography, silty texture, and friable structure, this soil is quite easy to handle. Clods are formed if plowed when wet, but the lumps are easily reduced. Crops seldom suffer from lack of moisture even during protracted droughts. The fertility of the type is not being noticeably impaired, as the surface wash from the higher lying soils tends to maintain its productiveness.

The value of farm land on this type ranges from $150 to $300 an acre, depending upon improvements, drainage, and location. The higher price applies to land in the immediate vicinity of the towns.

WABASH SILTY CLAY LOAM

The Wabash silty clay loam consists of a dark-brown to black heavy silty clay loam, 6 to 12 inches deep, underlain by a heavy, dark-bluish to black, compact clay subsoil, which extends below 3 feet. The transition in structure and texture between the two soil horizons is very gradual. Both soil and subsoil are rich in organic matter. They have a sticky plastic structure when wet but become hard and brittle upon drying. The type is not noticeably calcareous throughout the 3-foot section. It differs from the Judson soil chiefly in the heavier and more compact nature of its subsoil and in its lower lying position.

There are a few variations. In places the subsoil is slightly lighter in both color and texture than the typical material, being a dark-gray, heavy silty clay. Over small areas where the surface material consists of recent wash the subsoil is darker in color than the soil. Near the margins of this type, where it borders the uplands or areas of Wabash silt loam, the surface soil contains so much silt as to approach a silt loam in texture.

The Wabash silty clay loam is confined largely to the bottom lands along Logan Creek in the northeastern part of the county, where it is the dominant flood-plain soil. A small area lies along Plum Creek near its mouth in T. 22 N., R. 6 E., and another between Beemer and Wisner on the north side of the Elkhorn River. The type represents reworked loessial material carried down from the uplands and deposited by the streams upon their present flood plains.

The topography is prevailingly flat, modified in places by old stream channels, cut-offs, and shallow depressions. Drainage is usually adequate for crop production. The large development along Logan Creek was formerly subject to overflow from the main channel and used largely for grazing and hay land, but during recent years the creek channel has been straightened and deepened, reclaiming all the soil for cultivation. In a few places along Plum Creek high water covers the land but causes no serious damage as it seldom remains more than a few hours. A few small depressional areas having insufficient drainage for crop production remain throughout the type, but the land is being rapidly reclaimed by drainage ditches.

The Wabash silty clay loam is a rather important agricultural soil. It is one of the strongest and most productive types in the county. About 90 per cent of it is under cultivation, and the remainder, including the poorly drained portions, is included in pasture and wood lots. The native vegetation consists of a luxuriant growth of prairie and marsh grasses, with narrow strips of timber along the stream channels. The principal trees are oak, elm, ash, boxelder, cottonwood, hackberry, and some walnut. Of the cultivated crops, corn, oats, and alfalfa rank in acreage in the order named. The livestock industry is well developed, and consists largely in the raising of hogs and the winter fattening of steers.

All crops do exceptionally well on this soil. Corn yields 40 to 60 bushels, depending upon the season. Average yields of 40 bushels of oats and 3½ tons of alfalfa are obtained in favorable years. Wheat is grown occasionally with an average yield of about 25 bushels. The short-strawed varieties of oats are grown chiefly as they are less likely to lodge. The type is the strongest corn soil and withstands continued cropping better than any other soil in the county.

Crop rotation is given little attention and commercial fertilizers are not used. Barnyard manure is applied when available, but the supply is seldom sufficient to produce any noticeable increase in the total crop yields. With proper management, fertilizer is seldom needed, as the addition of silts washed down from the adjoining uplands tends to maintain the soil in a productive condition.

On account of its high clay content, the Wabash silty clay loam can not be cultivated under a very wide range of moisture condi-

tions. It puddles if plowed when wet and remains in this impaired condition until freezing and thawing or subsequent wetting and drying of the soil restores granulation. Cracks sometimes form during long droughts causing much loss of moisture from both surface and subsurface soil, but in general the type is retentive of moisture and crops seldom suffer from drought.

The selling price of the Wabash silty clay loam ranges from $175 to $300 an acre, depending upon location, drainage, and improvements.

LAMOURE SILT LOAM

The surface soil of the Lamoure silt loam is a very dark brown to almost black mellow silt loam, 8 to 12 inches deep, containing considerable very fine sand but practically no material of a coarser nature. The soil is rich in organic matter and appears black when wet. The upper subsoil is a very dark gray heavy clay, underlain at about 24 inches by a mottled gray and white compact clay which extends more than 3 feet in depth. The subsoil material is stiff and plastic when wet, but becomes hard and tough upon drying. The surface and upper subsoil are usually slightly calcareous, and lime is abundant below 24 inches, where it occurs in both the powdered form and as numerous angular concretions from one-sixteenth to one-eighth inch in diameter. The lower subsoil is frequently mottled with dark-gray splotches and rusty-iron stains. The type differs from the Wabash silt loam chiefly in the highly calcareous nature and consequent lighter color of its lower subsoil.

The type is confined to scattering bodies varying in size from a few acres to about 2½ square miles within the flood plains bordering the Elkhorn River. The largest development borders the north side of the river southeast of Beemer; a large and fairly uniform body occurs on the east side of the stream in the southeastern part of the county, and a narrow strip lies south of Wisner. The remaining areas are small, seldom exceeding 160 acres in size. The type has been derived through weathering from loessial material deposited upon the flood plains during periods of high water.

The topography is prevailingly flat with an almost imperceptible slope down the valley and toward the stream channel. Locally the surface is modified by old stream channels, cut-offs, and shallow depressions. Drainage over most of the type is good. The surface lies 8 to 10 feet above the stream channel, and is seldom subject to overflow. The underdrainage is slow, and the poorly drained areas consist of a few depressions having no surface outlet.

About 85 per cent of the type is under cultivation and the remainder, including the poorly drained portions, is used for pasture and hay land. The native vegetation consists of a heavy growth of prairie and marsh grasses, with marginal strips of timber along the stream channels. Corn is the chief cultivated crop, and oats and alfalfa are grown to a small extent. The winter fattening of cattle and the raising of hogs is practiced quite extensively. The average yield of corn is about 40 bushels per acre, oats 30 to 40 bushels, and alfalfa 3 to 4 tons from three cuttings. During favorable seasons a fourth cutting of alfalfa is obtained. The type is exceptionally well adapted to alfalfa on account of its high lime content, and it would seem that the land devoted to this crop could be profitably extended.

The soil is handled in the same manner as the heavier textured upland and terrace soils. It is naturally strong and fertile and withstands continued cropping almost as well as the Wabash silty clay loam. Fertilizers are seldom used, as with good management they are not needed, the productiveness being largely maintained by surface wash from the higher lying soils. The Lamoure silt loam sells for $150 to $275 an acre, depending upon improvements, drainage, and location.

LAMOURE SILTY CLAY LOAM

The surface soil of the Lamoure silty clay loam is a very dark gray or black silty clay loam to an average depth of about 10 inches, usually containing a considerable quantity of very fine sand, but little material of a coarser nature. The upper subsoil differs little in color or texture from the surface layer, contains practically no sand, has a more compact structure, and continues to about 24 inches, where it is underlain by a gray to dark-gray, heavy, compact clay mottled with rusty-brown and white splotches. The type has a high organic-matter content throughout the 3-foot section. The surface and upper subsoil are low in lime, but the lower subsoil is highly calcareous, and lime concretions are abundant below 20 inches. The material throughout the profile is sticky and plastic when wet but becomes hard and tough upon drying.

Around the margins of the type, where it borders soils of the Wabash series, the lime content of the subsoil gradually decreases, and in places it was necessary to draw arbitrary lines separating the Wabash and Lamoure silty clay loams. The Wabash differs from the Lamoure type only in the lower lime content and consequent darker color of its subsoil. The principal surface variation is toward a silt loam, and it is possible that small patches of Lamoure silt loam are included with this soil.

The type has a total area in Cuming County of about 5 square miles. It is confined to a few small bodies within the flood plains of Logan Creek and Elkhorn River. One of the largest areas, including about 1¼ square miles, occurs as a linear development southeast of Beemer, on the north side of the Elkhorn River; a smaller area lies southwest of Westpoint, on the west side of the river; and a typical and uniform area occurs along the Logan Creek ditch north of Bancroft, in the northeastern part of the county.

The Lamoure silty clay loam is derived through weathering from recent-alluvial material deposited by the streams during periods of high water. The topography is flat. The surface lies 8 to 10 feet above the stream channels and is seldom subject to overflow. Those areas lying within the Logan Creek bottoms were formerly poorly drained, but have all been reclaimed for crop production through the construction of the Logan Creek drainage ditch.

The type is of little agricultural importance in Cuming County on account of its small extent, but it is naturally strong and fertile and well adapted to general farming. About 90 per cent of it is under cultivation, and the remainder is used for pasture and hay land. Corn, oats, and alfalfa are the principal cultivated crops, and the yields are about the same as those obtained on the Lamoure silt loam type.

The soil is somewhat more difficult to handle than the more silty upland and terrace soils and can not be cultivated under as wide a range of moisture conditions on account of its high clay content. If plowed when wet, the soil puddles and the lumps are difficult to reduce, and it is almost impossible to plow the land when extremely dry, but under average moisture conditions the soil works well and is easily maintained in good tilth. During dry seasons there is some danger of soil cracking, with subsequent injury to plant roots.

Land of the Lamoure silty clay loam sells for $175 to $250 an acre, depending upon drainage, location, and improvements.

CASS LOAMY FINE SAND

The surface soil of the Cass loamy fine sand is a dark-brown, loose fine sand, 8 to 12 inches deep. It contains enough well-decomposed organic matter to impart the dark color and loamy character but not enough to prevent soil blowing during dry windy seasons if the native vegetation is destroyed. The subsoil is a gray, loose, incoherent fine to medium sand, very deficient in organic matter. The transition in color between the soil and subsoil is usually rather abrupt. The entire soil section is low in lime.

Over considerable areas the surface layer of 6 inches contains so much organic matter as to approach a fine sandy loam in texture, and in a few of the lower lying depressions, where conditions have been especially favorable for the growth and decay of plants, the surface material is a typical fine sandy loam. In the poorly drained areas rusty-brown mottlings are encountered throughout the subsoil and the material in these localities is in places quite coherent owing to a small amount of clay mixed with the sand. Locally the subsoil below 30 inches is coarse sand and fine gravel of light-gray color. The above variations are of such local occurrence and small extent as not to warrant their separation on the soil map.

The total area of the type in Cuming County does not exceed 2 square miles, being confined to a few isolated bodies upon the first bottoms along the Elkhorn River. The largest developments are south and west of Wisner on the west side of the stream. A small though typical area lies about 1½ miles north of Westpoint. The type usually occurs in close association with areas of Sarpy sand.

The material is a sandy alluvium of recent origin, deposited by the river upon its flood plain. Wind-blown sands from the stream channel and from the more sandy flood-plain soils have also contributed to its formation. Subsequent to its deposition, weathering and the accumulation of organic matter have produced the present soil.

The topography is flat to gently undulating, modified by numerous depressions, dry channels, and slight elevations. The surface is somewhat more uneven than that of the Cass very fine sandy loam, owing to its less coherent structure, which permits the wind to whip the loose sand into low, rounded ridges and knolls. Drainage is usually variable. In wet seasons the underlying water table rises too near the surface over local areas for profitable farming, and in dry years the underdrainage is excessive, causing crops to suffer from lack of moisture. In normal seasons the drainage is adequate for most crops.

The type is of little agricultural importance on account of its small extent, variable drainage, and the danger of wind erosion when not carefully managed. About 40 per cent of it is under cultivation and the remainder is included in pasture and hay land. Corn, the chief crop, yields 20 to 30 bushels per acre during normal seasons. The native grasses will support a cow or steer per acre during the summer months, or, when cut for hay, will yield three-fourths to 1 ton, depending upon the rainfall.

The soil of this type is very easy to handle and can be cultivated under any moisture conditions without injury, providing care is taken to prevent drifting. It responds well to heavy applications of barnyard manure, and this material is especially valuable, as it increases the content of organic matter and tends to make the soil more stable. This type usually occupies but a small part of the farms on which it occurs, but it has a tendency to lower the general value of the land.

CASS VERY FINE SANDY LOAM

The surface soil of the Cass very fine sandy loam is a dark grayish brown, friable very fine sandy loam, 8 to 12 inches deep, rich in organic matter, which imparts the dark color, and containing considerable silt. The subsoil is a grayish-brown to gray fine sand of loose incoherent structure, becoming gradually lighter in color with depth until at 30 inches the material is often light gray to yellowish gray. In texture and structure the subsoil generally remains constant to below 36 inches, but locally it becomes coarser in the lower part and consists of light-gray coarse sand and fine gravel below 30 inches. The change in color between the soil and subsoil is rather abrupt. The subsoil is deficient in organic matter, especially in the lower part. The type is seldom calcareous within the 3-foot depth.

In a few places the soil and subsoil are separated by a thin intermediate layer, 4 to 6 inches thick, in which the material is a brown very fine sand containing sufficient organic matter to give it a loamy character. This layer has a loose friable structure and represents a gradation, both in color and texture, between the soil and subsoil. Around the margins of the type, where it borders areas of Lamoure and Wabash soils, the subsoil contains considerable silt and clay, which binds the sand particles together. The subsoils of these types in such localities merge gradually into one another, and boundary lines in places are arbitrarily drawn. The principal variation in surface texture is toward a fine sandy loam, and it is possible that small areas of Cass fine sandy loam are included with this type. The variations are of such small extent and local importance that it was not deemed advisable to separate them on the soil map.

The Cass very fine sandy loam is not extensively developed in Cuming County. It is all confined to the bottom lands or flood plains along the Elkhorn River, where it occurs as an almost continuous strip, having an average width of about three-fourths of a mile throughout its distance across the county. The type is fairly uniform except where small scattering bodies of other bottom-land soils occur. The type has weathered from sandy alluvial materials deposited by the river during periods of high water. The dark color of its surface layers is due to subsequent growth and decay of plant life.

The topography is generally flat, modified in places by old stream channels, cut-offs, shallow depressions, and low rounded knolls and ridges from 1 to 3 feet high. The knolls and ridges prevail only in the more exposed situations where wind action has modified the original constructional surface. Drainage is variable. Most of the type lies 6 to 10 feet above the normal flow of the river and is not subject to inundation from the main channel. The water table, however, lies but a few feet below the surface, and during wet seasons rises sufficiently to produce marshy conditions in the lower depressions, and even during normal years small areas remain too moist for crop production. In dry seasons the underdrainage is excessive in places, causing crops to suffer from lack of moisture. During average seasons drainage is adequate over most of the type.

The Cass very fine sandy loam is not an important agricultural soil in Cuming County, chiefly on account of its variable drainage. About half of it is under cultivation, and the remainder is included in wood lots and grazing or hay land. The native vegetation includes a great variety of prairie and marsh grasses, together with considerable forest and brushy undergrowth. The forest consists of a fairly dense growth of elm, ash, boxelder, cottonwood, willow, and scattering trees of walnut and hackberry, while the undergrowth is largely sumac, which in a few localities is so dense as to greatly reduce the value of the land for pasture. Corn is the leading cultivated crop; oats and alfalfa are grown to a small extent. Truck crops, such as melons and potatoes, do well. More cattle are grazed on this type in proportion to its area than on any other soil in the county. They are chiefly of Hereford and Shorthorn breeding, and most of them are native stock, though a few farmers ship in cattle for summer grazing. They are sold either to the Omaha market or to local feeders when 2 or 3 years old.

The average yield of corn is about 25 bushels per acre, but during favorable seasons 40 to 50 bushels are obtained. Oats yield 20 to 30 bushels, with an average of about 25 bushels per acre. Oats do not do as well as upon the heavier textured terrace and first-bottom soils, on account of the less compact nature of the seed bed. The average yield of alfalfa is about 3 tons per acre from three cuttings. The native grasses will support a cow or horse per acre during the grazing season, or when cut for hay will yield 1 to 1¼ tons. The hay is usually coarser and of slightly lower feeding value than that obtained on the better drained soils of the county.

The soil of this type is easy to handle and can be cultivated under any moisture conditions without injury. Because of the high sand content there is no tendency to clod if plowed when wet. The surface soil is slightly subject to wind erosion during dry seasons, but the injury to growing crops is usually small. During normal seasons most of the corn is check planted, but in dry years more of it is listed in, as the crop is thought to withstand drought better and there is less danger of soil blowing than where surface planted. Barnyard manure is applied when available, and when used in sufficient quantity usually increases the corn yield from 10 to 15 per cent.

The selling price of the Cass very fine sandy loam ranges from about $80 to $200 an acre, depending upon drainage and location.

SARPY SAND

The surface soil of the Sarpy sand consists of 6 to 8 inches of light-brown to grayish-brown, loose, fine to medium sand of incoherent structure, the immediate surface containing enough organic matter to give it a slightly darker shade than the lower part. Below 10 inches the material gradually becomes lighter in color and the remainder of the 3-foot section is a gray to light-gray, incoherent, medium sand containing little or no organic matter. The lower part is occasionally mottled with rusty iron stains due to poor drainage. Locally the material below 24 inches is light-gray coarse sand and fine gravel. The type differs from the Cass soils in the lower organic-matter content and lighter color of the surface horizon.

There are a few variations. South of Wisner in T. 23 N., R. 5 E., there are two small bodies in which the subsoil between 12 and 18 inches consists of a dark-brown to almost black very fine sandy loam of more compact structure than the surface horizon. This layer is rich in organic matter and appears to represent an old weathered soil which has been recently covered by stream-deposited sand. These bodies lie along the river channel chiefly in sections 18, 19, and 30. The principal variation in surface texture throughout the type is toward a loamy sand, especially in the lower lying situations, where conditions have favored the growth and decay of vegetation.

The Sarpy sand occurs in a few bodies scattered along the Elkhorn River channel throughout its course across the county. The bodies are usually small, ranging in size from about 10 to 160 acres. One of the largest developments is west of Wisner, on the west side of the river, a smaller though quite typical area lies southwest of Beemer, on the east side of the stream, and other areas occur along the river between Westpoint and the southern county line.

The soil is derived from sandy alluvium recently deposited in the stream bottoms during periods of high water. It has not yet weathered sufficiently to have developed the dark-colored surface layer characteristic of the Cass soils. In many places the material resembles Riverwash as mapped in this county, but it is more stable and not so greatly influenced by each slight rise of the stream.

The topography of the type ranges from flat to slightly hummocky, the greater part being characterized by shallow depressions dotted with low, rounded sand hummocks and ridges 2 to 4 feet high. Drainage is generally good, as the uneven surface favors ready run-off and the porous soil and subsoil permit free underdrainage. This type is subject to occasional flooding from the stream channel, but water seldom remains on the surface longer than a few hours.

Owing to its small extent, low organic-matter content, and incoherent structure, the soil is of little agricultural importance in this county. It is all included in pasture and hay land. The native vegetation is often sparse and does not have a high value even for pasture. Much of the soil is covered with a fairly dense forest growth, including elm, ash, cottonwood, boxelder, willow, and hackberry. Locally the subsoil material is used for building purposes and road construction. Accurate land values for this soil are not obtainable, as it occupies only a small part of the farms bordering the river.

It is doubtful if any of the type should be used for crop production, as it is very unstable when cultivated, and is also rather droughty during dry years. The growing of tame grasses and clover would greatly increase the producing power of the soil.

RIVERWASH

Riverwash occupies a few small bodies adjacent to the channel of the Elkhorn River. Its total area in Cuming County does not exceed 200 acres. The largest development occurs between the main stream and an old cut-off in section 3, T. 23 N., R. 4 E. The material includes sand bars and sand flats which lie only a few feet above the normal flow of the stream, and are inundated with each slight rise. Riverwash is not regarded as a permanent soil, as the material changes with each overflow, and even during normal flow, small areas are shifted about, destroyed, or added to by the varying current.

SUMMARY

Cuming County is situated in northeastern Nebraska. It contains 570 square miles, or 364,800 acres. It lies in the loess-hill region of Nebraska. The topography is that of a level to steeply rolling upland, modified by numerous narrow strips of flat alluvial lands and traversed by the broad shallow valleys of the Elkhorn River and Logan Creek.

The average elevation of the upland is about 1,425 feet, and of the bottom lands 1,350 feet above sea level. The general slope is to the southeast. The drainage is effected through the Elkhorn River and its tributaries, and the area as a whole is well drained.

The county was established in 1855 and the first permanent settlement made in 1857. According to the 1920 census the population is 13,769, all of which is classed as rural. Westpoint, the county seat, has a population of 2,002.

The transportation facilities of Cuming County are good. The main line of the Chicago & North Western Railway from Omaha to Lander (Wyo.) follows the Elkhorn River valley. Public roads reach all farming communities. Omaha, Sioux City, and Chicago are the chief markets for grain and livestock.

The climate is well suited to grain farming and stock raising. The mean annual temperature is 49.8° F. and the mean annual precipitation is 30.64 inches. The average growing season is 154 days.

The present agriculture of the county consists of diversified farming, including the production of grain and hay and the raising of livestock. Corn, oats, alfalfa, red clover, and wheat are the principal crops. The livestock industry consists chiefly of the raising of hogs and the winter fattening of cattle.

Systematic crop rotation is not practiced, although the farmers have evolved many indefinite systems which they use on their land and change their crops with reasonable regularity. No commercial fertilizers are used; barnyard manure is applied when available. Most farms are well improved and modern labor-saving machinery is in general use.

The most extensively developed soils of the county are the Marshall soils. They have been derived from loessial material under

conditions especially favorable for deep soil weathering and the accumulation of organic matter. The lime has been leached from the surface and upper subsoil, but is abundant below 30 inches.

The Marshall fine sandy loam is very similar to the silt loam, except that the surface soil has been modified by the addition of wind-blown sand.

The Marshall silt loam is the predominant soil type and occurs throughout the uplands in all parts of the county. The topography varies from nearly flat to steeply rolling. The soil is very productive and well adapted to all crops common to the region.

The Knox silt loam is very inextensive. It occurs wherever the dark-colored surface soil of the Marshall silt loam has been greatly thinned or entirely removed by erosion.

The Valentine loamy fine sand is developed through the weathering of wind-blown deposits of sand. It is of little agricultural importance in Cuming County on account of its small extent and unstable nature. It drifts badly unless carefully managed.

The Waukesha soils occupy terrace positions along the larger streams. They are derived from reworked loessial material and are very strong and fertile. The Waukesha silt loam is the most extensive terrace soil and includes some of the most valuable farm land in the county.

The O'Neill loamy fine sand is rather extensively developed upon the terraces of the Elkhorn River in the southeastern and northwestern parts of the county. The soil is derived from reworked sandy material and differs from the Waukesha soils in its more open and porous nature. It is subject to drifting unless protected by vegetation.

The Judson silt loam occupies slopes between the uplands and terraces. It is a strong fertile soil and equals the Marshall silt loam in productiveness.

The Wabash, Lamoure, Cass, and Sarpy soils occupy the bottom lands or flood plains along the larger streams and tributaries throughout the county. The Wabash and Lamoure types are derived from reworked loessial material and differ chiefly in that the subsoil of the Lamoure series is highly calcareous and usually lighter in color than that of the Wabash. The soils of both series are rich in organic matter and well adapted to all crops common to the region where drainage is adequate.

The Cass and Sarpy soils have weathered from sandy bottomland deposits. The surface soils of the Cass types are well supplied with organic matter and the soils are productive. The Sarpy soil contains a low percentage of humus and is used chiefly for pasture land.

Riverwash includes small sand bars and sand flats adjacent to the channel of the Elkhorn River. It is all included in pasture land.

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