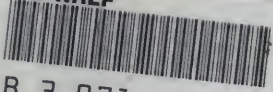
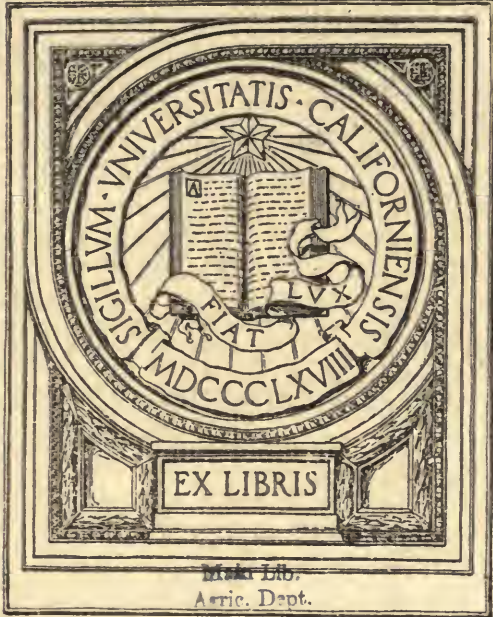


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SOILS OF THE EASTERN UNITED STATES AND THEIR USE—XXXII.

THE CARRINGTON SILT LOAM.

BY

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SOILS OF THE EASTERN UNITED STATES AND THEIR USE—XXXII.

THE CARRINGTON SILT LOAM.

GEOGRAPHICAL DISTRIBUTION.

The Carrington silt loam is an important and widely distributed general farming soil, occurring chiefly in the northwestern portion of the upper Mississippi Basin. It has been encountered in seven different soil-survey areas in five States, and has been mapped to a total extent of 739,584 acres. It is probable that additional soil-survey investigations will show that this type has an area of not less than 7,500,000 acres.

CHARACTERISTICS OF SOIL AND SUBSOIL.*

The surface soil of the Carrington silt loam to an average depth of 12 inches consists of a dark-brown to black silt loam, usually soft and friable and high in organic matter. The subsoil ranges from a dark yellowish brown to pale yellow silty clay loam, with a gradation downward in many cases into a more compact and dense clay loam of the same color. While the type as a whole is not marked by the presence of stone or gravel, there is usually a small quantity of stony material in the surface soil and this increases with depth until the deep subsoil grades into a stony or gravelly glacial till. Upon the low ridges which occur within the type there are usually areas more stony than in the undulating or level areas. There are also frequent small gravelly knolls or ridges crossing the type, though comprising a different class of soil.

The Carrington silt loam differs from the Marshall silt loam, with which it is sometimes associated, in that it is derived from the weathering of the glacial till and as a result is liable to contain stone and gravel, as contrasted with the stone-free character of the Marshall silt loam. The almost universal presence of stony material in the deeper subsoil of the Carrington silt loam is the chief feature distinguishing it from the other dark-colored silty prairie soils of the general region in which it occurs. The presence of the gravelly and stony ridges is also a marked characteristic of the type.

SURFACE FEATURES AND DRAINAGE.

The greater portion of the Carrington silt loam occupies the undulating to rolling prairie country lying between the main drainage ways of the upper Mississippi Valley. It is found at altitudes ranging from 750 feet to 1,100 feet in the more eastern areas of its occurrence, and from 1,000 feet to 1,300 feet above sea level in the Northwestern States. In surface configuration it ranges from low ridges and undulating plains to nearly level stretches of prairie country. In any small area of the type the extreme variations in elevation are inconsiderable and its total range in altitude is due to its deposition over the varied surface of the low plateau of the upper Mississippi Valley.

The natural drainage of the Carrington silt loam is good over all of the more rolling portions of its area. Within the more level tracts natural drainage has frequently been supplemented by the installation of tile drainage and the areas thus reclaimed have become very productive portions of the type. Only a small percentage of the total area of this soil has required such treatment. Local depressions and extremely level tracts may still be improved by further attention to this feature. In such areas the surface silty loam is frequently darker, more waxy, and less easily tilled than the typical upland occurrences of the type.

Erosion does not constitute a serious problem in any areas except along the immediate banks of deep-cut streams draining this soil. Such areas are most frequently pastured or, in the eastern timbered areas, maintained as a farm wood lot, so that the main body of the Carrington silt loam is not subject to losses from this source.

LIMITATIONS IN USE.

The Carrington silt loam is sufficiently loamy and coherent to be best suited to the production of the grains and grasses. Only where the type departs from its normal characteristics is it particularly adapted to special crops. In depressed areas where there has been an unusual accumulation of organic matter and where artificial drainage has been established, this soil is recognized as adapted to the production of cabbage and of sugar beets. The total area devoted to these crops is small, and they are grown to meet unusual facilities for marketing at beet factories or in the larger cities.

The type is found in an extensive region within which there are considerable variations in the mean annual precipitation from east to west and in temperature from north to south. In all of the more eastern and southern areas the rainfall is sufficient for maturing the general farm crops suited to the warmer temperate latitudes. In the extreme western areas of its occurrence there is occasionally a

deficiency in precipitation and a consequent crop restriction. Differences in length of growing season and of mean summer temperature are the most important factors, however, affecting crop adaptations. In the more northern areas the seasons are too short for the profitable production of corn as a grain crop and, as a result, the small grains and flax constitute the crops of chief importance.

IMPROVEMENTS IN SOIL EFFICIENCY.

The chief improvement which may be suggested in the agricultural occupation of the Carrington silt loam is the more general adoption of systematic crop rotations in the management of this soil. In all of the older settled communities this practice already prevails, but in the more western areas there is still a tendency toward one-crop farming for the production of wheat. The natural fertility of the soil is great, and even many years of almost continuous wheat cropping have not greatly impaired the efficiency of the type. Where a rotation consisting of corn followed by one or two years of wheat and by a subsequent seeding to mixed grasses with a considerable proportion of clover has been adopted, the best yields of each of these crops is secured. In some areas the failure of corn to mature in the short growing season interferes with the general adoption of this standard rotation, but the development of quick-maturing varieties has considerably extended the area within which corn may be successfully grown. In more northern areas, where the drainage of this soil type is adequate, potatoes might become a very valuable intertilled crop to substitute on a part of the acreage which should otherwise be devoted to corn.

The Carrington silt loam occurs extensively within regions where the use of commercial fertilizers is of recent adoption and where the saving and application of stable manures is not a general practice. In order to maintain the excellent organic matter content of the surface soil all stable manures made upon the farm should be saved and applied to the land, preferably when it is prepared for corn growing. The proper rotation of crops and the use of the stable manures will maintain the high crop-producing power of this soil without any widespread use of mineral fertilizers.

While tile drainage has already been installed upon thousands of acres of the type with very favorable results in increased crop yields and profits, there still remain many level or slightly depressed areas which should be thus improved. Frequently it is not necessary to install a complete drainage system for an entire farm, or even for all portions of a single field. The use of tile in draws and depressions to supplement the natural drainage of the greater part of the field is frequently all that is required. The tile should be of good size, ranging from 3 inches to 5 inches in diameter, and should be

placed at a depth not less than 3 feet below the surface. The smaller tile are sufficiently large for lines of high gradient, but with less slope larger tile should be used. The cost per acre of such improvement will, of course, vary under different conditions, but should not exceed \$15 to \$20 in the average case. The improvement of the drainage resulting is of great importance in permitting the earlier preparation of the land for seeding and in the prevention of loss of the crop through the rotting of seed, particularly in the more northern areas where the type is developed.

LIMITATIONS UPON SPECIAL CROPS.

In general the Carrington silt loam is better suited by its inherent properties and climatic surroundings to the production of the general farm crops than to special cropping. In some areas the production of sugar beets upon this soil has been attempted in an experimental way and the crops grown were satisfactory both as to tonnage produced and the sugar content of the beets. The chief difficulty in the extension of the production of this crop under ordinary eastern farm conditions has arisen from the large amount of labor required. Where sugar-beet factories have been established in the region the Carrington silt loam might well be utilized for the production of a small acreage of beets in conjunction with other crops.

Near some of the larger cities the lower-lying and artificially drained areas of the Carrington silt loam have been used to a small extent for the production of cabbage. The yields secured and the profits returned have been satisfactory.

In all of the more southern areas of its occurrence the Carrington silt loam has been utilized for the production of apples, pears, and cherries for home use. The more rolling and ridged portions of the type, where both air and water drainage are ample, might be used for commercial apple orchards. The greater part of its area is not so well suited to the production of the tree fruits, and the type can not be recommended as a general orcharding soil.

The Carrington silt loam is therefore better suited to the general farm crops than to the production of any specialties.

EXTENT OF OCCUPATION.

In all of the areas where it has been encountered the Carrington silt loam has been occupied for agricultural purposes almost to the limit of its total extent. Practically all of the type was originally prairie land and only limited portions of it, in the more eastern States, were timbered. The first stages of occupation were for grazing the native prairie grasses, followed by the production of grain, chiefly spring wheat and corn. In all of the older settled communi-

ties the growing of a single grain has given place to mixed-crop farming and to the adoption of regular crop rotations. At present, probably 85 per cent of the type is utilized for the production of grass or grain, and the remainder consists of small undrained areas and tracts of wooded land, found chiefly in the more eastern localities. There is therefore little opportunity for more extended occupation of the type.

CROP ADAPTATIONS.

In Indiana, Wisconsin, and southern Minnesota the Carrington silt loam is an excellent corn soil, yields ranging from 35 to 60 bushels per acre, with an average yield in excess of 40 bushels. In these localities corn is raised in regular rotation with some small grain and mixed grasses, the corn being most commonly planted upon the plowed sod land. The use of stable manure as the chief fertilizer for the corn crop is common to the dairying districts where the type occurs and the large yields of corn are readily maintained by this practice. In the more northern latitudes, particularly in the Dakotas, the growing of corn occupies a subordinate place and the yields range from 25 to 30 bushels per acre. With the introduction of short-seasoned varieties into the cooler climates the Carrington silt loam should prove an excellent corn soil even in the more northern areas of its occurrence. A large proportion of the corn grown upon the type in Indiana and Wisconsin is fed on the place to dairy and beef cattle, and for these purposes much of it is harvested into the silo.

Spring wheat is more extensively grown upon the Carrington silt loam than any other grain crop. In Minnesota and North and South Dakota the larger part of the acreage of the type is annually sown to this crop. Excellent yields are obtained, ranging from 12 to 25 bushels per acre, and frequently exceeding 30 bushels where crop rotation is practiced and stable manure is used. In such cases wheat follows corn and is sown for one or two years, with a seeding to mixed grasses with the last wheat crop.

Upon the dairy farms oats constitute the chief small-grain crop and yields of 35 to 50 bushels per acre are secured. The average yield is probably in the vicinity of 40 bushels.

In Minnesota and the Dakotas barley constitutes an important and widely distributed crop upon the Carrington silt loam and exceptionally heavy yields are reported, ranging from 30 to 40 bushels per acre. Rye is grown in some localities, giving excellent yields.

A considerable proportion of the total area of the Carrington silt loam is put annually in grass either for hay or pasturage. Usually the mixed grasses, chiefly timothy and clover, are sown, but considerable areas of clover alone are raised both for the hay crop

and for the harvesting of the seed from the second crop. The mixed grasses yield from 1 to 2 tons per acre, with an average yield of about $1\frac{1}{2}$ tons. Clover alone yields about the same, while the seed is harvested from the second crop, giving yields from $1\frac{1}{2}$ to 6 bushels per acre.

In the extreme western region of its occurrence flax and spelt are also grown.

In the older settled communities, where regular crop rotations have been adopted, and particularly where corn may be successfully grown, dairying and stock raising have become established industries upon the Carrington silt loam and associated soils. As a result considerable areas of the type are devoted to pasturage and the greater part of the grain and hay produced upon the soil is fed to the farm stock. In such areas a money crop is frequently grown. In southern Wisconsin this crop is usually the binder tobacco, giving yields ranging from 1,000 to 1,500 pounds per acre and averaging about 1,200 pounds. In other localities potatoes, sugar beets, and cabbage constitute the supplementary crops raised in conjunction with the grains and grass.

The Carrington silt loam may therefore be characterized as a fertile and valuable general farming soil, chiefly devoted to the production of corn, wheat, oats, and hay, but also used to a limited extent locally for the production of special crops.

FARM EQUIPMENT.

In the dairying sections the Carrington silt loam usually carries a complete equipment of substantial farm buildings. In the grain-growing regions the building equipment is less elaborate, but sufficient for the farm. In all areas where it occurs the farm live stock is well up to the average, and in all cases heavy draft animals are used for the tillage of the type. The equipment of farm machinery is also well suited to the cultivation of a heavy and fertile soil. Improved farm machinery is characteristic of the region where this type occurs most extensively.

SUMMARY.

The Carrington silt loam is an extensive and valuable general farming soil found upon the uplands of northern Indiana, southern Wisconsin and Minnesota, and in the eastern portions of both North and South Dakota.

Over the greater portion of the type the drainage of soil and subsoil is adequate. In minor, depressed areas tile drainage is necessary for the successful cultivation of tilled crops.

The type is better suited to the production of grains and grass than to special crops. Corn is extensively grown in the more southern regions, together with oats as the prevalent small-grain crop. In Minnesota and the Dakotas spring wheat constitutes the chief grain, with rye, barley, and grass as important crops and flax as a subordinate crop in the most northern areas.

Dairying and stock raising are usual in all of the more southern regions where this soil is found.

The Carrington silt loam is occupied to almost its entire extent for some agricultural purpose and is considered a fertile and profitable soil.

The type is usually well equipped with substantial farm buildings and adequate work stock and machinery.

Approved.

JAMES WILSON,

Secretary of Agriculture.

WASHINGTON, D. C., *January 15, 1912.*

APPENDIX.

The following table shows the extent of the Carrington silt loam in the areas surveyed to date.

In the first column is stated the particular soil survey in which the soil was encountered, in the second column its extent in acres, and in the third column the volume of the Field Operations of the Bureau of Soils in which the report upon the area may be found. Those desiring a detailed description of the soil and of the general conditions which surround it in any particular area may consult these volumes in almost any public library.

Areas of the Carrington silt loam encountered in the soil survey.

Survey.	Area of soil.	Date. ¹
Indiana:	<i>Acres.</i>	
Tippecanoe County ²	72,320	1905
Minnesota:		
Blue Earth County ³	128,704	1906
Rice County.....	38,144	1909
North Dakota:		
Carrington area ³	240,128	1905
Jamestown area ³	41,280	1903
South Dakota:		
Brookings area ³	135,808	1903
Wisconsin:		
Janesville area ⁴	83,200	1902

¹ Year of publication, Field Operations.

² Mapped as Marshall loam.

³ Mapped as Marshall silt loam.

⁴ Mapped as Janesville silt loam and as Miami black clay loam.

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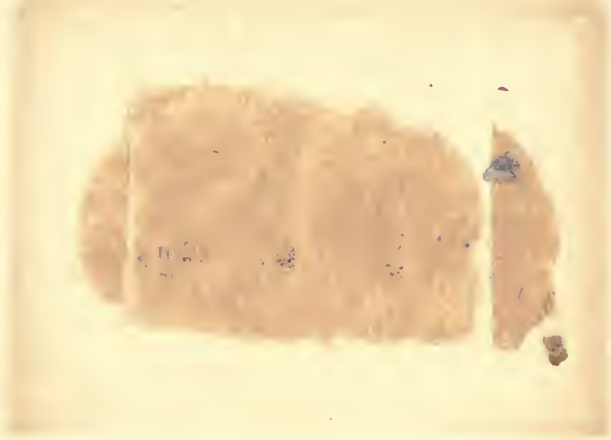
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