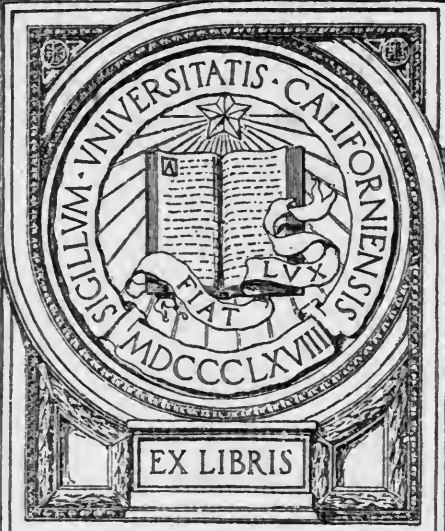


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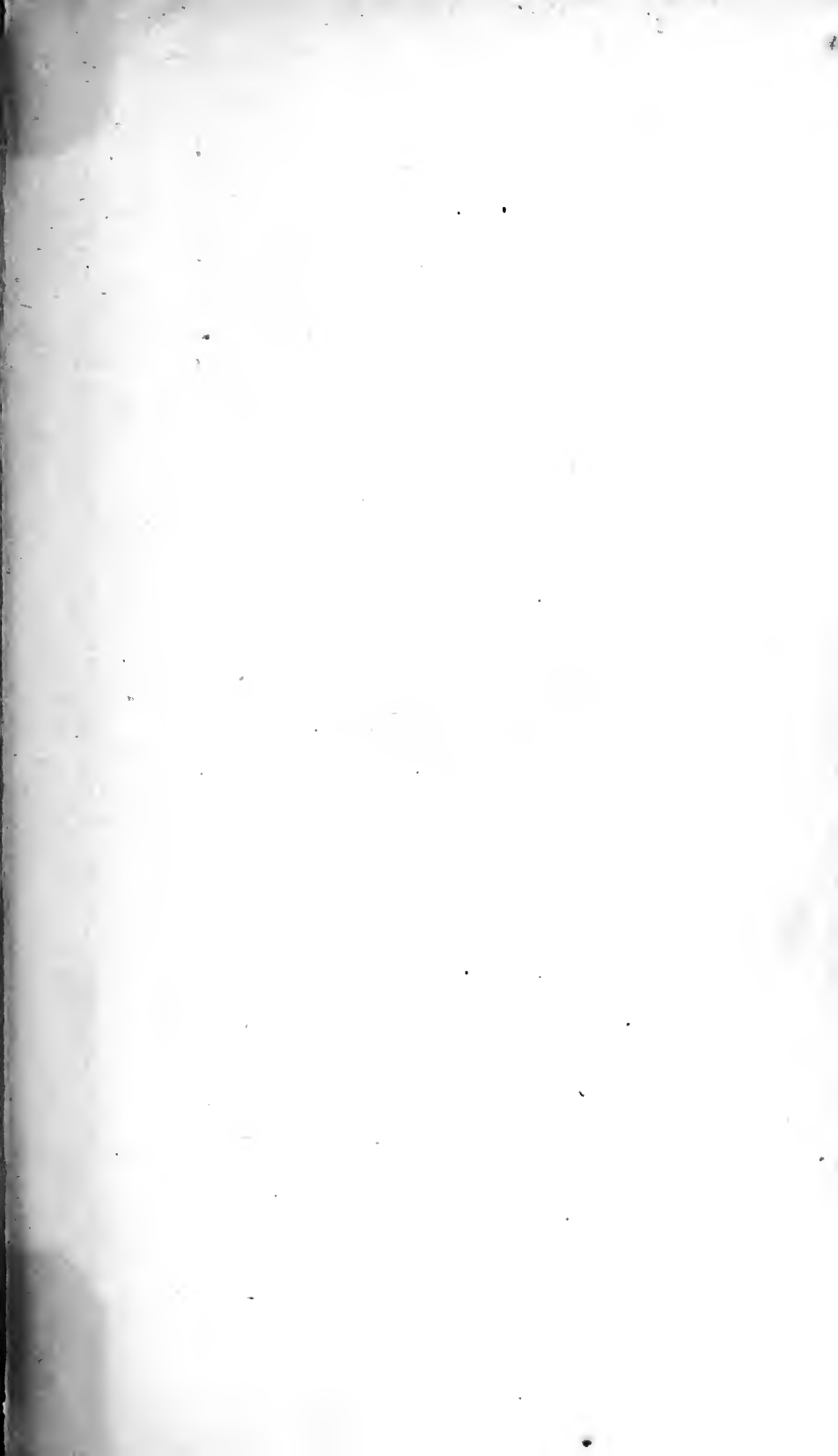
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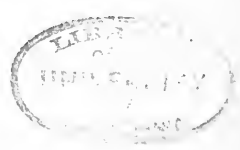
SOILS OF THE EASTERN UNITED STATES AND THEIR USE—XXXI.

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THE PENN LOAM.

BY

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WASHINGTON:  
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## SOILS OF THE EASTERN UNITED STATES AND THEIR USE—XXXI.

### THE PENN LOAM.

#### GEOGRAPHICAL DISTRIBUTION.

The Penn loam is an important general farming soil found in the northern portion of the Piedmont Plateau. It occurs within the limits of the Triassic basins within the Piedmont region from north-central New Jersey through southeastern Pennsylvania and central Maryland into the north-central part of Virginia. The Penn loam has been encountered in seven different soil survey areas within this region and has been mapped to the extent of 320,266 acres. It is probable that within the entire region the type will be found to cover more than 1,500,000 acres.

#### CHARACTERISTICS OF SOIL AND SUBSOIL.

The surface soil of the Penn loam to an average depth of about 10 inches is a characteristic dark-red loam. The immediate subsoil is most frequently a heavy red silty loam, grading downward into a stiff red clay loam or clay. In many areas small fragments of sandstone and shale are scattered through both the surface soil and subsoil. The stiff clay subsoil usually rests upon the fine-grained red sandstone or red shale from which the type has been formed through the processes of weathering.

The Penn loam is readily distinguished from the majority of northern Piedmont soils by the deep Indian-red color of both the surface soil and subsoil and from the other soils of the Piedmont series through its obvious derivation from the Triassic sandstones and shales. In the more southern areas of its occurrence this latter characteristic facilitates separation from the red clay soils derived from the crystalline rocks of the more southern Piedmont regions.

#### SURFACE FEATURES AND DRAINAGE.

The Penn loam occupies level, rolling, and sometimes hilly areas within the northern Piedmont section. In general the area of this type consist of broad, ridged plains or undulating valleys lying

below the general level of the crystalline rocks which frequently border it upon either side. The surface of these Triassic basins is frequently roughened by ledges of trap rock which have broken through the sandstones and shales and constitute stony elevations above the general level occupied by the Penn loam. Within the areas of the type itself there are considerable variations in level, since many of the large streams have cut across the type, while smaller tributary streams flow through it. The absolute elevation of the type above sea level ranges from 100 to 400 feet in north-central New Jersey and from 200 feet to 800 feet in the more southern areas of its development.

Natural drainage has been well established over the surface of the greater portion of the Penn loam. The rolling topography, the presence of numerous stream channels, and the loamy texture of the soil tend to favor drainage conditions. There are few or no swamp areas within the limits of the type. The presence of the stiff, plastic, deeper subsoil frequently renders the internal drainage somewhat defective over the more level areas.

It is only upon the steeper slopes within the areas of the Penn loam that erosion becomes a serious problem.

#### LIMITATIONS IN USE.

The Penn loam is limited by its textural characteristics to the production of the general farming crops of the climatic region within which it occurs. Within the general run of the type there are sometimes slightly sandy areas which are utilized for the production of vegetables and small fruits, but in general the type is much better suited to the production of corn, wheat, oats, rye, and grass, and to the heavy export tobacco than to any other crops. Tree fruits have been set to a limited extent upon some of the well-drained areas principally to furnish a home supply rather than on the scale of commercial orcharding.

#### IMPROVEMENT IN SOIL EFFICIENCY.

While the surface drainage features of the Penn loam are usually adequate, the presence of the heavy subsoil has given rise to the tillage of the type in broad beds which are thrown up by the plow, with water furrows at intervals of 40 to 80 feet. This practice has frequently been sufficient to complete the drainage of the Penn loam for the purposes of general farming. The installation of tile underdrains upon many of the more level tracts would aid materially in the complete drainage of the subsoil.

In very few instances would drainage be required over the entire area of the farm, and in many instances the natural drainage could be supplemented by a few lines of tile laid through the low-lying or



flat areas. Such an improvement in the drainage conditions would largely increase the crop-producing power of the more level areas of the type. It would also render possible early plowing and tillage, and would bring the subsoil into a better granulated condition, favorable to retaining soil moisture for the use of the crop during periods of summer drought.

The Penn loam is fairly well supplied with organic matter. Care should be exercised to maintain this condition, and in areas where erosion has been at all active or where through other causes the amount of organic matter in the surface soil is low stable manures should be freely used and green manuring crops should be turned under.

The type responds readily to the use of lime. It has been found that frequent small applications of this material are more effective than larger applications at infrequent periods. The use of 1,000 to 1,500 pounds of slaked lime per acre materially increases the yields of the small grains and grasses, particularly where clover is grown. The lime is usually applied to the ground when it is prepared for a small-grain crop, and is thus effective both in connection with the grain and with the seeding to clover or to mixed grasses.

#### LIMITATIONS UPON SPECIAL CROPS.

Only those areas of the Penn loam which depart somewhat from the normal characteristics and are somewhat sandy or otherwise more friable than the general average of the type can be used to advantage for special crops. With improved drainage and with increased organic matter in the surface soil, Irish potatoes might well be grown as a special crop upon this type. Upon similar areas other vegetables and small fruits could be produced for home use.

#### EXTENT OF OCCUPATION.

In practically all of the areas where the Penn loam is developed it is highly prized as a general farming soil, ranking second only to the soils of the limestone valleys with which it is frequently associated.

As a result the greater portion of this soil has long been cleared and used for agricultural purposes. In north-central New Jersey, southeastern Pennsylvania, and central Maryland it is probable that 80 per cent of the type is occupied either for tilled crops or for permanent pasture. In the Virginia areas where it occurs the percentage is slightly smaller. Only the steeper slopes and those which are strewn with boulders from the higher lying trap ridges are left in forest or otherwise unoccupied. In the majority of areas all of the moderate slopes and the more level areas are farmed with a regular rotation of crops. It would hardly be possible to extend the occupation of the Penn loam.

## CROP ADAPTATIONS.

Corn is the almost universal tilled crop grown upon the Penn loam. Under ordinary conditions of soil fertility and of tillage methods the yields secured range from 25 to 50 or even 60 bushels per acre in the more northern areas and from 15 to 45 bushels farther south. The larger yields are usually secured from areas where the total depth of mellow surface soil ranges from 12 to 15 inches. The lower yields are secured where erosion or faulty tillage has given rise to a shallow-surface soil. The chief difficulty encountered in corn production upon this type arises from the stiff, heavy nature of the deeper subsoil. Unless the land is bedded up for the purpose of carrying away excess moisture it is sometimes difficult to prepare the soil for an early planting and, on the same areas, the crop is liable to suffer from drought during the latter portion of the season. Tile underdrainage would largely remedy this condition.

Winter wheat is extensively grown upon the Penn loam and is even better suited to this type than corn. Yields of 18 to 25 bushels are produced in southeastern Pennsylvania and from 10 to 20 bushels are secured in the Virginia areas. Oats are also grown extensively, yields ranging from 30 to 45 bushels per acre. Rye is grown to a limited extent, giving yields of 20 to 25 bushels per acre.

The Penn loam is an excellent grass soil. The land is usually seeded to a mixture of timothy and red clover and under favorable conditions yields of the mixed hay range from 1 to 2 tons per acre. The average acreage yield for the type is probably in the vicinity of  $1\frac{1}{2}$  tons.

Throughout the region where the Penn loam occurs the regular general-farming crop rotation consists of corn followed by wheat for one or two years. The grasses are seeded with the wheat and cut for two or three years before the rotation returns to corn. Frequently wheat is sown following corn and a crop of oats is taken succeeding the wheat. The barnyard manure is most frequently applied to the corn crop. Commercial fertilizers are used with the small-grain crops and the land is usually limed at the same time.

The heavy export tobacco is produced to a limited extent upon the Penn loam in central Virginia, giving average yields of 700 pounds per acre. Dark cigar-filler tobacco is also produced in southeastern Pennsylvania.

Throughout the region where it occurs the crops grown upon the Penn loam are largely fed to beef and dairy animals. The maintenance of a considerable proportion of the type in grass lands and in permanent pasture gives rise to this practice. The soil is well suited to both industries.

## FARM EQUIPMENT.

The farm equipment upon the Penn loam is usually excellent, consisting of well-built and commodious barns and houses and of moderately heavy teams and modern tools. This heavier equipment is required for the proper tillage of the soil, while the farm buildings result from the general practice of maintaining a considerable amount of live stock upon the farms occupying the type.

## SUMMARY.

The Penn loam is an extensive general-purpose farming soil occupying the Triassic basins in the northern Piedmont region.

The type occupies level to rolling or sometimes hilly lands in the northern Piedmont section and shows a considerable range in the absolute altitude above sea level.

The soil is naturally fairly well drained throughout its extent, but the more level portions of the type would be benefited by tile underdrainage.

Corn, wheat, oats, and grass constitute the most important crops grown. The yields of all of these crops are good. Tobacco is grown to a limited extent upon the type in southeastern Pennsylvania and in Virginia.

The equipment of teams, tools, and farm buildings upon the Penn loam is good and is well suited to the tillage of a rather heavy loam soil upon which general farm crops are grown and a considerable number of live stock is maintained.

More than three-fourths of the entire area of the Penn loam is occupied for the production of grain and grass and as permanent pasture. The remainder of the area consists of the steeper or more stony slopes which are usually left in forest.

Approved.

JAMES WILSON,

*Secretary of Agriculture.*

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

## APPENDIX.

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

In the first column is stated the particular 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 Penn loam encountered in the soil survey.*

Survey.	Area of soil.	Date. <sup>1</sup>
<b>New Jersey:</b>	<i>Acres.</i>	
Trenton area.....	171,712	1902
<b>Pennsylvania:</b>		
Adams County.....	54,592	1904
Berks County.....	13,824	1909
Chester County.....	23,072	1905
Lebanon area.....	26,890	1901
<b>Virginia:</b>		
Campbell County.....	5,696	1909
Leesburg area.....	18,880	1903

<sup>1</sup> Year of publication, Field Operations.

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