SOIL SURVEY OF RUSSELL & PRESCOTT COUNTIES

REPORT No. 33 OF THE ONTARIO SOIL SURVEY

Prepared jointly by The Research Branch, Canada Department of Agriculture, and The Ontario Agricultural College

CANADA DEPARTMENT OF AGRICULTURE, OTTAWA
ONTARIO DEPARTMENT OF AGRICULTURE, TORONTO

SOIL SURVEY of RUSSELL and PRESCOTT COUNTIES

by

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SOIL SURVEY MAPS AND REPORTS
PUBLISHED BY COUNTIES

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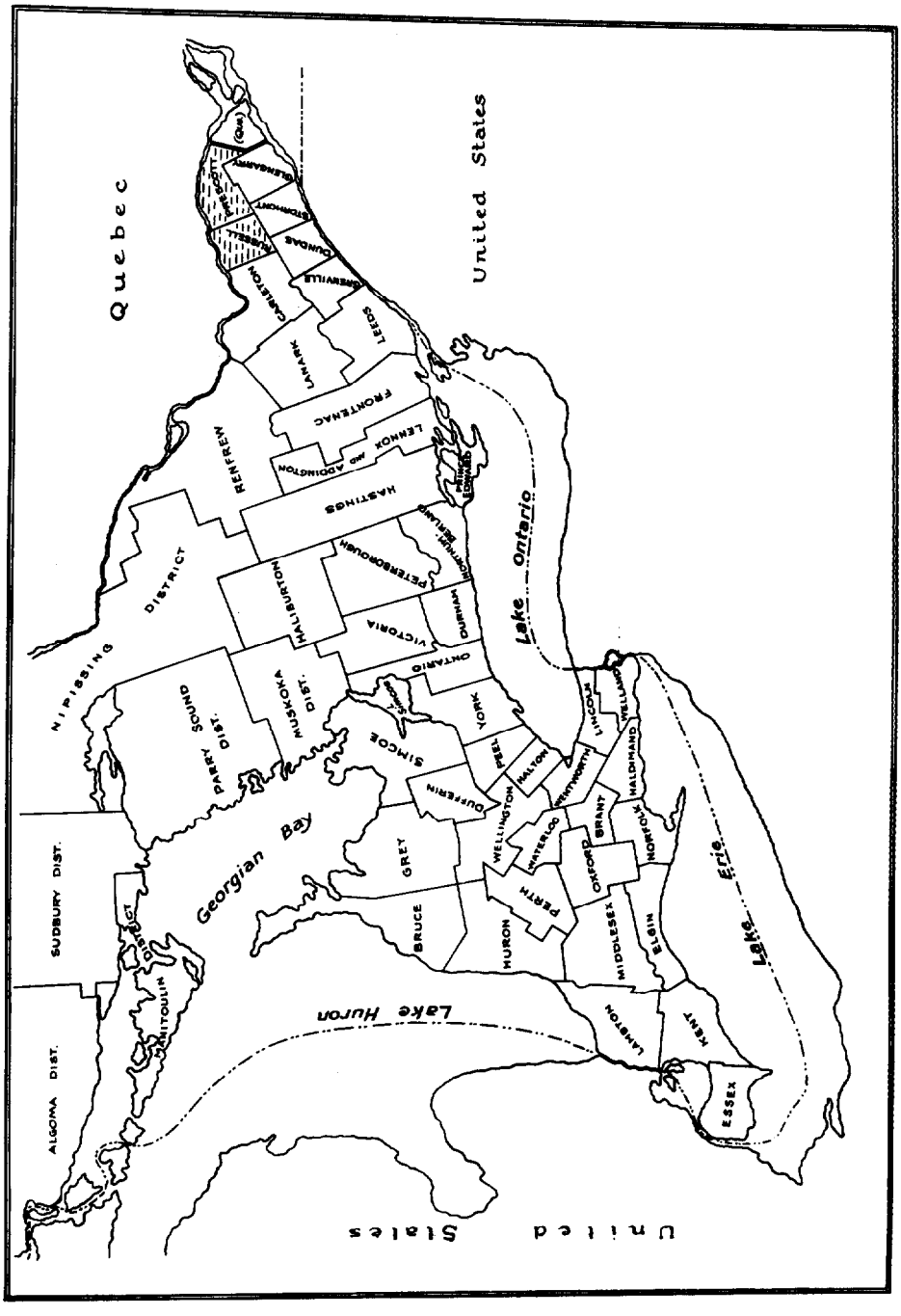
The soil map was prepared for printing by the cartographic section of the Soil Research Institute, Research Branch, Department of Agriculture, Ottawa.

OUTLINE MAP OF ONTARIO SHOWING LOCATION OF RUSSELL AND PRESCOTT COUNTIES



INTRODUCTION

The reconnaissance soil survey of Russell and Prescott counties was begun in 1949, held in abeyance for a few years and completed in 1958. The soil map that was prepared, showing the extent and distribution of the various soils, accompanies this report.

The report itself presents data on the geology, the climate, vegetation and drainage, and indicates the influence these factors have had upon the kind of soil development that has taken place, and on the types of farming which are being practised. A description of each soil series is given, together with a discussion of its use for agricultural purposes. Such discussions on land use are necessarily general, since it is difficult to obtain basic information relating to crop yields and fertilizer practices that apply to specific soil types.

A section on soil management is included, in which some fundamental principles of management are applied to specific soils in the area. There is also a section on soil rating in which the soils are rated according to their present and potential agricultural use. In the absence of crop yield information the rating has been made chiefly on the basis of the physical and chemical characteristics of the soil.

The aim of the survey is to supply basic information about the soil, such as its location, origin, characteristics, present use and suggestions for its future use. Such information is embodied in the report and the soil map and should be of interest not only to the farmer but also to the extension man and the research worker.

GENERAL DESCRIPTION OF THE AREA

Location

The counties of Russell and Prescott are located in Eastern Ontario between 74°30′ and 75°30′ west longitude and 45°15′ and 45°45′ north latitude. The province of Quebec borders Prescott on the east and the Ottawa river forms the northern boundary of both counties. The western boundary of Russell is approximately 10 miles from the city of Ottawa. These counties occupy part of what is referred to as the Ottawa valley, a smooth plain that comprises much of the area of several counties in this part of Eastern Ontario.

The total land area of Russell County is 260,480 acres and of Prescott County 316,160 acres.

Population

The total population of Russell County as reported by the 1956 Census was 18,994 and of Prescott County 26,291. Although these counties are comparable in size the larger population in Prescott County may be accounted for by the growth of such urban centres as Hawkesbury and Vankleek Hill. The population of these towns are 7,929 and 1,647 respectively.

Transportation

The transportation facilities of these counties are served by the usual net work of county roads. Highway No. 17 from Ottawa to Montreal parallels the Ottawa river at the extreme north of the counties and is a connecting link between the major towns located in that region. Some of the county roads are oil surfaced but the majority have only surface gravel.

The Canadian Pacific railway line from Ottawa to Montreal passes through the northern parts of the counties and the Canadian National Railway through the southern half. The marketing centres of Ottawa and Montreal are therefore readily accessible to both counties and products from the dairy industry can move to these centres without much delay.

GEOLOGY OF THE BEDROCK

The bedrock that underlies the surface deposits in these counties is of Ordovician age. Although limestones occupy the largest area, there are many local exposures of shale. These rock formations consist principally of horizontal-lying beds of limestone and dolomite that outcrop most prominently along the present channel of the Ottawa river. In the interior of these counties there are few exposures of bedrock, since they are covered to varying depths by surficial deposits. The influence of the underlying bedrock on the drainage and physiography of the region is considerable.

SURFACE DEPOSITS

The surface deposits that provide the parent materials of the soils of these counties have a wide range in texture and a variable origin. Glacial tills, which are non-sorted materials made up of broken rock fragments ranging in size from clay to boulders, cover a relatively small percentage of the total land area. They occur principally as isolated hills or small elevations distributed over the county and are surrounded by sand and clay plains.

The till deposits are chiefly of local origin and are usually calcareous since they are derived from limestone, but in some areas such as those occurring north of the town of Russell, they contain a predominance of red shale, exposures of which are present in this area. Most of the stony hills occurring in Prescott County consist of glacial tills, the stone and boulders being derived from the underlying limestone bedrock.

Clay sediments and sand sediments are the major surface deposits in both of these counties. The clay sediments are considered to be both of marine and lacustrian origin. It is not possible, however, to differentiate the clay soils on this basis, but since there are some wide differences in the fine textured soils of these counties, it has been assumed that the origin of the sediments have influenced the soil development. Many of these clays are banded red and grey and may have a depth of 50 or 60 feet. These banded sediments are the most commonly occurring clays and are non-calcareous; that is, they do not effervesce when treated with hydrochloric acid, but they are alkaline below the weathered zone. Some clay sediments along the southern boundary of Russell County are calcareous and can be correlated with similar sediments occurring in the adjacent county of Carleton.

The sand deposits are rather extensive. These deposits, which are either deltaic or have originated as outwash, have their largest distribution in the central part of Russell County and the northern part of Prescott. No doubt some duning has contributed to the rough topography associated with some of these sandy areas.

Adjoining these sandy areas are flat plains of fine sands and silts, which are alternately banded and of considerable depth. These are probably of deltaic origin and they merge and interlock with the clay plains and the sandy hill areas. Water deposited sediments of variable texture are therefore common over both of these counties and only in certain areas is it possible to delineate those that are purely clay or sand.

RELIEF

The land area of Prescott and Russell has an elevation range from 150 to 350 feet above sea level and has the appearance of a monotonous plain in which rivers and streams have cut narrow V-shaped channels. The dissection of the clay plains are most noticeable adjacent to the Ottawa river and there

a rolling type of relief is common. Further inland, little dissection has occurred and flat plains are much larger in area.

The most rolling relief is associated with the sand and till areas. Only rarely in these counties is the difference in elevation between the hills and the plain areas very great, rather they merge without any abrupt change.

The till areas appear to be either morainic islands within a lacustrine plain or remnants of mesas and buttes with a glacial till cover. The most prominent of these areas is Van Kleek hill which, on its western side, rises rather abruptly from the adjacent sand and clay plain.

DRAINAGE

The rivers and streams that provide the drainage pattern for these counties rise within the Ottawa valley plain and eventually empty into the Ottawa river. Only two rivers of any note traverse the region, namely the South Nation and the Rigaud. The South Nation runs east along the southern boundary of Russell County, then turns north after it crosses the Prescott County boundary, and empties into the Ottawa near Wendover. The Rigaud crosses the south east corner of Prescott County and is a drainage system that has little effect on the overall drainage of that county.

These rivers and their tributaries are slow flowing streams with gentle gradients. The drainage system is immature and the streams flow in narrow channels cut into the clay sediments. A fairly large network of streams have become established but are not sufficiently developed to drain the many bogs that occur in the central and southern portions of these counties.

VEGETATION

The counties of Prescott and Russell have had a long period of settlement and one of the major consequences of that settlement has been the removal of the forest. As a result, the forest vegetation is sparse and confined to woodlots or to uncultivated areas which have a variety of young hardwood growth and occasionally some evergreens. In its virgin condition, it is probable that most of the poorly drained flats were covered by forest stands of elm, red maple, black and white ash, yellow birch, white birch, black alder, basswood and willows. The better drained soils such as the sands had a heavy stand of pine. The effect that these forest trees have had upon the soil may be largely obliterated by cultivation, but in the early settlement of the country fertile soils were frequently associated with those carrying stands of ash, elm and maple.

CLIMATE

From the recorded data, the climate of Russell and Prescott Counties corresponds closely to that of the Ottawa region and the upper Ottawa valley.

The climatic data recorded for Ottawa can, therefore, be used as a reference. Tables 1 and 2 contain data for several stations in eastern Ontario, selected for comparative purposes. In general, this area has a climate of temperature extremes with cold and snowy winters and warm summers. The yearly rainfall is 34 inches, with fairly even distribution throughout the year. The snowfall in Ottawa and vicinity is the highest for the eastern parts of the province.

The mean annual temperature varies from 41° to 43°. For the winter months, temperatures are almost identical with those of Pembroke and it would appear that in this respect this region is like the more northerly parts of the province.

The average date of last frost at Ottawa in spring is May 7 and at Vankleek Hill April 29, which compares with May 3 at Belleville along the Lake Ontario shore. The average date of first frost in the fall varies from October 3 at Ottawa to October 9 at Vankleek Hill. This is a few days later than Belleville which has an average date of October 2. The figures for frost free periods are, Ottawa 149 days, Belleville 152 days, and Vankleek Hill 163 days. The data for Vankleek Hill is only for a period of three years, hence it may not reflect a long term trend. However, it would seem that from a climatic standpoint the counties of Russell and Prescott are not any more unfavourably situated for the growing of fruits, vegetables and most agricultural crops than the regions bordering eastern Lake Ontario.

CLASSIFICATION AND DESCRIPTION OF THE SOILS

The surface deposits previously described are the parent materials from which the soils have developed. This development has taken several forms as a result of differences in the parent materials, drainage and vegetation.

Under the cool humid conditions present in this region, and with forest vegetation, the processes of soil development tend to produce acid soils. This acid condition is the result of the removal of bases, particularly calcium, from the surface layers of the soil by percolating water. This is referred to as a process of leaching, and the effect produced on the soil is in the development of layers or horizons that differ from one another in thickness, color and structure and frequently in texture.

A cut made through these horizons exposes what is known as the soil profile. The various combinations of horizons that are thus exposed are frequently referred to as surface soil, subsoil and parent material. However, since most soils have more than three horizons, further subdivisions are necessary. In soil descriptions these three divisions are labelled A horizon, B horizon and C horizon and are further designated as Ao, A_1, A_2, B_1, B_2, C, etc. for more detailed and accurate descriptions where the main soil horizons are subdivided. These terms are used for the detailed soil descriptions given in the classification section at the end of the report.

The A horizon is the horizon where maximum leaching takes place and from which the bases are removed by the downward movement of water. In many soils the A horizon can be subdivided into A_1 and A_2. The A_1 horizon contains the largest amount of organic matter and the A_2 is the horizon with the lightest color and frequently has a bleached appearance. Some of the materials leached from the A_1 and A_2 accumulate in the B horizon, and in this region of the province these accumulated compounds may be either organic materials or inorganic material such as clay, or both. The result is that often the finest texture in the soil is in the B horizon. The C horizon, or what is more generally referred to as parent material, may be unaltered or only slightly altered by the soil forming process.

Poorly drained soils, or those in which ground water is present for a large part of the year, have a condition designated as "gley". The gleyed horizon is recognized chiefly by color, being dark grey or grey with a concentration of yellow and red colors producing a mottled appearance.

It is on the basis of the development of these horizons which characterize the soil profile that the soils of a region are classified.

One of the principal classification units is the Great Soil Group. This unit commonly consists of a number of soils that differ greatly in texture but are similar in the kind and arrangement of their horizons. The following descriptions give the characteristics of a soil profile in each of the major Great Soil Groups occurring in this region.

CLIMATIC DATA

TABLE 1

	Jan.	Feb.	Mar.	April	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
Average Temperatures (°F)													
Ottawa	12	13	24	41	55	65	70	66	58	46	32	17	42
Rockcliffe	14	15	28	42	56	65	70	67	59	49	35	18	43
Belleville	19	19	28	42	54	65	70	68	60	47	35	22	44
Renfrew	11	12	24	40	54	64	68	65	57	45	32	16	41
Pembroke	12	14	26	41	54	64	69	66	59	46	33	17	42
Average Precipitation (inches)													
Ottawa	2.9	2.2	2.8	2.7	2.5	3.5	3.4	2.6	3.2	2.9	3.0	2.6	34.2
Rockcliffe	3.2	2.3	3.2	2.9	3.1	2.9	3.3	3.1	3.4	2.3	2.9	4.0	36.7
Belleville	3.3	2.5	2.6	2.2	2.4	2.7	2.5	2.6	2.8	2.3	2.8	2.5	31.2
Renfrew	2.1	1.6	1.9	1.9	2.5	2.8	2.6	2.4	2.6	2.3	2.1	1.8	26.5
Pembroke	2.3	2.0	2.2	2.2	2.9	3.3	3.5	2.9	3.5	3.0	3.1	2.5	33.4
Average Snowfall (inches)													
Ottawa	21.5	17.3	14.4	4.4	T	..	..	..	..	0.8	6.4	17.2	82.0
Rockcliffe	22.7	18.9	16.9	3.3	T	..	..	..	..	0.1	7.6	25.6	95.1
Belleville	17.7	15.6	9.8	2.8	..	..	..	..	T	0.2	4.0	11.8	61.9
Renfrew	16.9	14.9	11.9	4.0	0.2	..	..	..	T	0.4	6.9	14.1	69.3
Pembroke	18.0	15.9	14.4	4.5	0.1	..	..	..	..	1.2	8.8	17.9	80.8

CLIMATIC DATA

TABLE 2

	Average Frost Free Period (days)	Last Frost (Spring)			First Frost (Fall)			Duration of Growing Season Mean Temp. 42°
		Average	Earliest	Latest	Average	Earliest	Latest	
Ottawa	149	May 7	Apr. 19	May 30	Oct. 3	Sept. 6	Oct. 28	190
Rockcliffe	145	May 10	Apr. 29	May 18	Oct. 2	Sept. 23	Oct. 24	
Belleville	152	May 3	Apr. 13	May 15	Oct. 2	Sept. 11	Oct. 20	202
Renfrew	125	May 18	Apr. 24	June 6	Sept. 20	Aug. 9	Oct. 9	
Pembroke	132	May 16	Apr. 23	June 20	Sept. 25	Sept. 1	Oct. 21	192
Vankleek Hill	163	Apr. 29	Apr. 23	May 3	Oct. 9	Sept. 21	Oct. 19	

Brown Forest Soil Profile

Brown Forest Soils

The Brown Forest soils occur on calcareous till materials in well drained or moderately well drained positions, the typical example being the Grenville soil series. These soils possess a black mull-like A_1 horizon, 3 to 4 inches in thickness, that is either neutral or mildly alkaline in reaction. The B horizon which may be divisible into two subhorizons has a brown or dark brown color and a thickness range of 10 to 15 inches. When this major horizon is subdivided, the lower horizon is distinguished from the upper by a darker brown color and an accumulation of colloidal material. This latter horizon is not more than 2 inches in thickness and adjoins the calcareous parent material. All horizons have a base saturation of 100 per cent.

Grey-Brown Podzolic Soil Profile

Grey-Brown Podzolic Soils

This soil development takes place in calcareous parent materials and is often best expressed in eastern Ontario counties in soils having a fine texture. In Russell and Prescott Counties the development is very weak and occurs principally in the areas where the soil material contains calcareous gravel. The profile consists of a black mull-like A_1 horizon underlain by a greyish brown A_2 horizon. This horizon is underlain by a textural horizon consisting of an accumulation of colloidal material. The Kars soil series is the type example for this region. This development does take place in the Grenville soil series where textures are possibly a little coarser than normal and in which a definite A_2 horizon can therefore be detected, The upper horizons of these soils are not base saturated but rapidly approach that point in the B horizon.

Podzol Soil Profile

Podzol Soils

The podzol type of soil development occurs exclusively on sandy soil materials in these counties. There is no detectable evidence that they have developed from calcareous sands but rather on deposits that are non-calcareous in origin. The process of podzolization is well expressed on all sandy soils regardless of drainage. Although, for purposes of classification, the more poorly drained soils are placed in a separate category, they have the same sequence of horizons as the well drained soils, but with complementary horizons that differ in chemical properties. In the well drained positions these soils have a thin organic surface horizon underlain by a grey A_2 horizon 2 to 4 inches in thickness. In the imperfectly drained, positions a thick A_1 horizon is commonly present which in turn is underlain by a strongly mottled A_2 horizon. The B horizon is reddish brown in color and contains accumulations of sesquioxides and organic matter and is usually divisible into two subhorizons. These soils are strongly acid throughout the surface and subsoil but are less acid in the parent material.

Dark Grey Gleysolic Soil Profile

Dark Grey Gleysolic Soils

The dark grey gleysoil type of development is most pronounced in this region in soils having a medium and fine texture. They are poorly drained soils and may or may not have a thin muck layer overlying the mineral soil. The dark surface horizon is underlain by a gleyed layer or a strongly mottled horizon extending to a depth of 24 inches. This horizon is frequently divisible into two subhorizons, the upper horizon being slightly lighter in color than the lower. The base saturation is usually high. The type example for this area is the North Gower soil series.

Series, Types and Phases

The units by which soils are mapped and described are designated as series, types and phases. The principal mapping unit is the series which in turn may or may not consist of two or more types or phases. The features that characterize the series are determined from the profile and all the soils included in a series are relatively uniform both in their development and in their land use. The soil type is a subdivision of the soil series, based on the texture of the surface soil. The full name of the soil type is a combination of the series name and the surface texture, for example, Bearbrook clay. Phases are usually subdivisions of soil types and are based on external characteristics of the soil. These separations are introduced to show differences in slope, degree of erosion, or content of surface stone from what is the normal condition on any given soil.

SOIL KEY

A. Soils Developed on Glacial Till

1. Red colored shaly or gravelly loam parent material

	Acreage
(a) Good Drainage	
1. Vars gravelly loam (Vgl)	7,300

2. Stony, calcareous, loam parent material

(a) Good Drainage	
1. Grenville loam (Gl)	16,900
2. Grenville loam — stony phase (Gl-st)	4,100
3. Grenville loam — shallow phase (Gl-sh)	5,900
(b) Imperfect Drainage	
1. Matilda loam (Mtl)	3,900
2. Matilda loam — stony phase (Mtl-st)	200
3. Matilda loam — shallow phase (Mtl-sh)	700
(c) Poor Drainage	
1. Lyons loam (Ll)	400

B. Soil Developed on Gravel Outwash

1. Coarse calcareous gravel parent material

(a) Good Drainage	
1. Kars gravelly sandy loam (Kgsl)	3,800

C. Soils Developed on Sandy Outwash or Sandy Deltaic Deposits

1. Non-calcareous fine sand parent material

(a) Good Drainage	
1. Uplands fine sandy loam (Ufsl)	3,600
2. Uplands fine sand (Ufs)	39,500
(b) Imperfect Drainage	
1. Rubicon fine sandy loam (Rfsl)	2,500
2. Rubicon fine sand (Rfs)	29,700
(c) Poor Drainage	
1. St. Samuel fine sand (Sfs)	7,400

D. Soils Developed on Sandy Deltaic Deposits Overlying Clay Deposits

1. Non-calcareous fine sand parent material

(a) Imperfect Drainage	
1. Mountain fine sandy loam (Mnfsl)	900
(b) Poor Drainage	
1. Allendale fine sandy loam (Afsl)	10,800

E. Soils Developed on Deltaic Deposits of Layered Silt and Fine Sand Overlying Clay Deposits

1. Layered silt and fine sand parent material

(a) Imperfect Drainage	
1. Castor fine sandy loam (Cfsl)	37,900
2. Castor fine sandy loam — shallow phase (Cfsl-sh)	600
(b) Poor Drainage	
1. Bainsville silt loam (Bsil)	26,600

F. Soils Developed on Lacustrine Clay Deposits

1. **Non-calcareous, layered red and grey clay parent material**
   - (a) Imperfect Drainage
     1. Wendover clay (Wc) 17,600
     2. Wendover clay — sand spot phase (Wc-ss) 21,800
   - (b) Poor Drainage
     1. Bearbrook clay (Bc) 131,300
     2. Bearbrook clay — sand spot phase (Bc-ss) 33,100
     3. Bearbrook fine sandy loam (Bfsl) 1,900
     4. Bearbrook silty clay loam (Bsicl) 2,600
2. **Calcareous Grey Clay Parent Material**
   - (a) Imperfect Drainage
     1. Carp clay loam (Ccl) 800
   - (b) Poor Drainage
     1. North Gower Clay Loam (Ngcl) 10,500
3. **Non-calcareous grey clay parent material**
   - (a) Poor Drainage
     1. St. Rosalie clay (Roc) 5,400
     2. St. Rosalie clay — sand spot phase (Roc-ss) 1,100

G. Shallow Soils on Limestone Bedrock

- (a) Good Drainage
  1. Farmington loam (Fl) 6,300

H. Organic Soils

- (a) Poor Drainage
  1. Muck (M) 23,500
  2. Peat (P) 11,100

I. Miscellaneous Soils

1. Bottom Land (BL) 700
2. Eroded channels (Er) 21,700

J. Soil Complexes

1. Uplands — Rubicon — St. Samuel (Ufs-Rfs-Sfs) 25,700
2. Uplands — Rubicon (Ufs-Rfs) 400
3. Rubicon — St. Samuel (Rfs-Sfs) 50,900
4. Grenville — Bearbrook (Gl-Bc) 500
5. Mountain — Bearbrook (Mnfsl-Bc) 1,200
6. Wendover — Bearbrook (Wc-Bc) 400

Vars Series (7,300 acres)

These soils are confined to a relatively local area in Russell county adjacent to the town of Vars. The soil material is derived from a local rock formation that outcrops in the area and has been modified by glacial action.

This material is predominantly glacial till but various grades of gravel are also common in roadside exposures.

The till has a distinctly red color that also dominates the color of the soil profile. These soils occur in the landscape in the form of ridges and low rounded hills. The land form suggests esker formation and the presence of conglomerate rock outcrop or cemented gravels in some of the deeper cuts indicates that the deposits have been modified by water action.

These are well drained soils and almost free from surface stone. The texture of the surface soil and throughout the soil profile varies considerably within short distances since the gravel content from different locations may range from 20 to 80 percent. In general the surface texture is gravelly loam. In the areas in which these soils occur, there are no slopes that are too steep for cultivation. Almost the entire area is under cultivation and has some of the best farms in the district. These soils have an advantage over the adjacent soils

A roadside cut showing the gravelly nature of the Vars series.

with level topography in seasons of high rainfall. It is noticeable that during the fall season fodder corn is harvested on the Vars soils somewhat earlier than on the more poorly drained soils in the surrounding district.

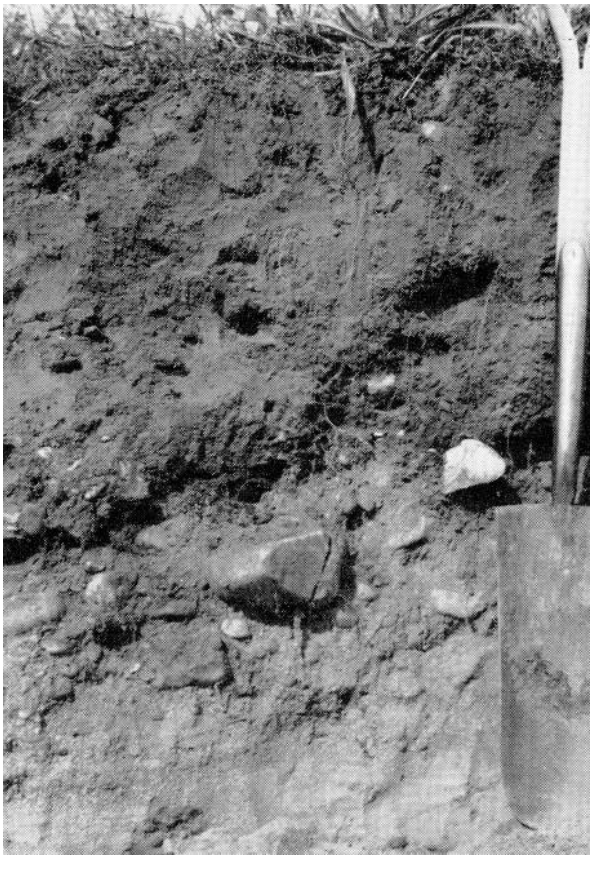
The soil is only slightly acid, at the surface and throughout the profile. If the original soil material was calcareous, the lime has been removed to a considerable depth. However, enough lime stone probably remains within the individual shale particles to take care of plant needs. It is a soil that is suitable

for general farming where hay and spring grains are the main crops grown. Vegetable crops or any shallow rooted crops would not be able to obtain sufficient soil moisture for satisfactory production.

These soils are classified as Grey Brown Podzolic but, because of the gravelly nature of the soil material and the dominant red color carried by the shale, the horizon expression is weak. The textural B horizon is detected only as clay coatings on the gravel particles. The cultivated surface soil is neutral in reaction while the subsoil horizons are slightly acid. The shale gravel is calcareous at a depth of 5 or 6 feet.

Grenville Series (26,900 acres)

The soils that are classified as Grenville are important agricultural soils in the eastern counties of Ontario. In Russell and Prescott Counties the total acreage of these soils is not large and in their makeup they vary considerably from the more typical Grenville soils that are found in the counties of Grenville and Carleton.



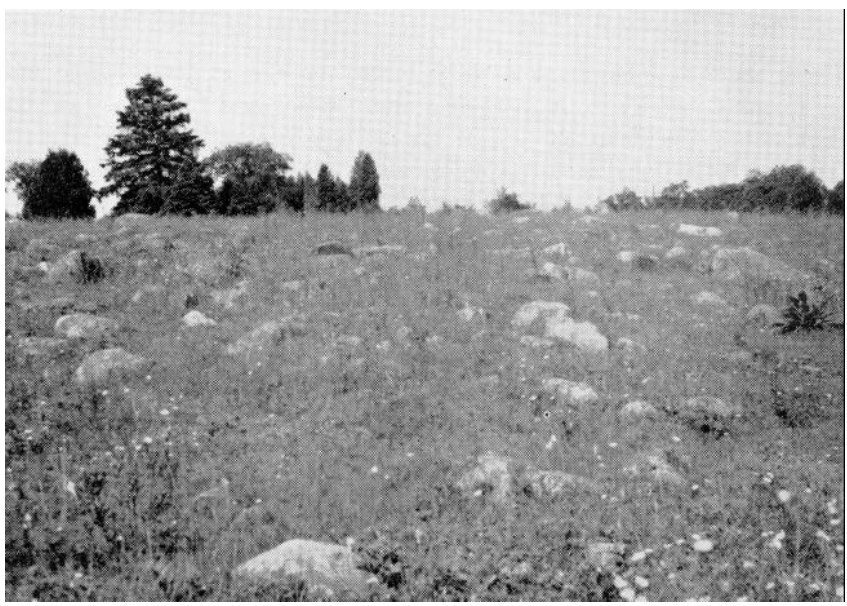
Profile of Grenville loam, a Brown Forest soil with a thin dark brown accumlation horizon occurring at the juncture of the solum and the calcareous parent material.

These soils generally occur on the highest elevations in this region. As mentioned previously, in Russell County particularly, these hills are isolated blocks of land surrounded by alluvial sediments. In Prescott County a fairly large block of these soils is present at Vankleek Hill and extends east to the Quebec boundary. This area is also surrounded by alluvial sediments and considerable modification of the till has been accomplished by moving water on the slopes of the hills and to some extent on the higher elevations. As a consequence gravelly soil textures and stony soils are quite common.

The soil material is derived principally from limestone, and limestone boulders are distributed over the surface and throughout the soil mass. In Prescott County, however, the soil material is not entirely of limestone origin. Much of the till in this area consists of a mixture of granitic material and limestone material in which the granitic material has originated from the pre-Cambrian rocks north of the Ottawa river. Hence, Grenville soils, here, are coarser in texture than normal, and also more acid than the typical soils which are derived from limestone. Large granite boulders occur in equal numbers with limestone boulders and much of the area is too stony for cultivation.

The area which is most nearly like the Grenville soils of other counties is that at Vankleek Hill and a few miles east of the town. Although this area is quite stony, the soil is derived from limestone and loam textured soils predominate. These soils have a friable loam surface and a crumb structured loam subsoil. Drainage is good and plant roots can readily penetrate the soil to a considerable depth.

From the standpoint of land use, two phases have been separated in this series, namely, a stony phase and a shallow phase. The areas mapped as stony



Grenville stony phase soils being utilized as pasture.

phase have a much greater quantity of field stone than the normal soils. In most cases these stony phases are non-arable but can be used as grazing land. The areas designated as shallow phase consist of soil areas in which bedrock is at or near the surface. In the main, these are also non-arable soils although where a foot depth of soil is present it may be possible to carry on a limited amount of cultivation.

The Grenville soils are good for general farming where hay and spring grains are the principal crops grown. Fodder corn is grown extensively and is probably harvested more readily on these soils than it is on the adjacent clay plains.

These soils are classified as belonging to the Brown Forest Great Group. All soils possess a friable dark colored surface horizon with a relatively high organic matter content. The subsoil may show some horizon differentiation and some colloidal clay concentration at the juncture with the parent material. In general, the depth of the profile does not exceed 24 inches.

Matilda Series (4,800 acres)

These are the imperfectly drained soils occurring on the same parent material as the Grenville soils but found on smooth land areas or on the lower slopes of the hills, where greater amounts of water are carried either by runoff or by seepage through the soil from higher elevations. These soils are therefore moister than the Grenville soils for a longer period of the year.

The mottled colors common to soils that are not well drained shows up in the subsoil. During periods of heavy rains these soils are saturated and the water drains away very slowly.

These soils do not cover a very large acreage in the county and are similar to the Grenville soils in their stone content and frequency of gravelly textures. Since the drainage is not good, they are rather poor agricultural soils and are often cultivated simply because they occur in the same landscape as the Grenville soils. Many areas have, therefore, been mapped as a complex of these two soils series rather than attempt to separate them by actual boundaries.

The surface soil is dark colored and has a fairly high content of organic matter. Soil development is very weak and a dark yellowish brown color occurs in the subsoil, indicating the presence of a B horizon but showing no particular zone of organic or clay accumulation. These soils are classified as belonging to the Brown Forest Great Group. The depth of the soil to the calcareous parent material is commonly not more than 14 inches.

Matilda soils are being used to produce the crops of the region such as hay and spring grains and can be expected to be less satisfactory for fodder corn than the associated better drained soils.

The stony phase and shallow phase soils that have been mapped in this series are essentially non-agricultural, other than having some limited use as pasture land.

Lyons Series (400 acres)

These are the poorly drained soils occurring in the same areas as the Grenville and Matilda soils. They are located at the bottom of the slopes or in depressions where the land is flooded for a large part of the year. Towards the end of the summer season these areas dry out and the water table is lowered two or more feet below the surface.

These soils do not possess the horizons that are found in the better drained soils. The surface soil is dark and high in organic matter but the subsoil has the same background color as the parent material. Mottling is usually present but the presence of a gley layer is not very pronounced. These are presently classified as Dark Grey Gleysolic, but can be considered as being rather poor examples of that Great Group, since gleyed horizons are seldom present.

There are no large areas of these soils in Prescott and Russell counties and the areas that do occur have no value for agricultural purposes.

Kars Series (3,800 acres)

The Kars series includes those soils that have developed on gravelly parent materials, and occur in the landscape as long narrow ridges or as individual hills. The ridges were probably eskers laid down during the time of glaciation, but were subsequently washed and smoothed by lacustrine or marine waters.

The slopes of the hills and ridges are therefore smoother than is common with these kind of deposits. The surface textures are more sandy and less gravelly than the subsoil, probably as a result of a surface deposition of sand.

The gravel is calcareous when tested in gravel pits, but most of the lime appears to have been leached out of the soil profile. The soil development is quite pronounced, and closely resembles the Grey Brown Podzolic development that is common in Central Ontario. These soils have a dark colored surface horizon, a grey leached and slightly acid subsoil, followed by a thin brown horizon with somewhat finer texture than that above. This latter horizon lies directly upon the calcareous or slightly calcareous gravel.

As agricultural soils, these are cultivated and used for growing the common crops of the region. Their ability to drain freely is an advantage during the rainy spring and fall seasons but during the dry summer months are not as satisfactory as those soils that have a more loamy texture.

Uplands Series (43,100 acres)

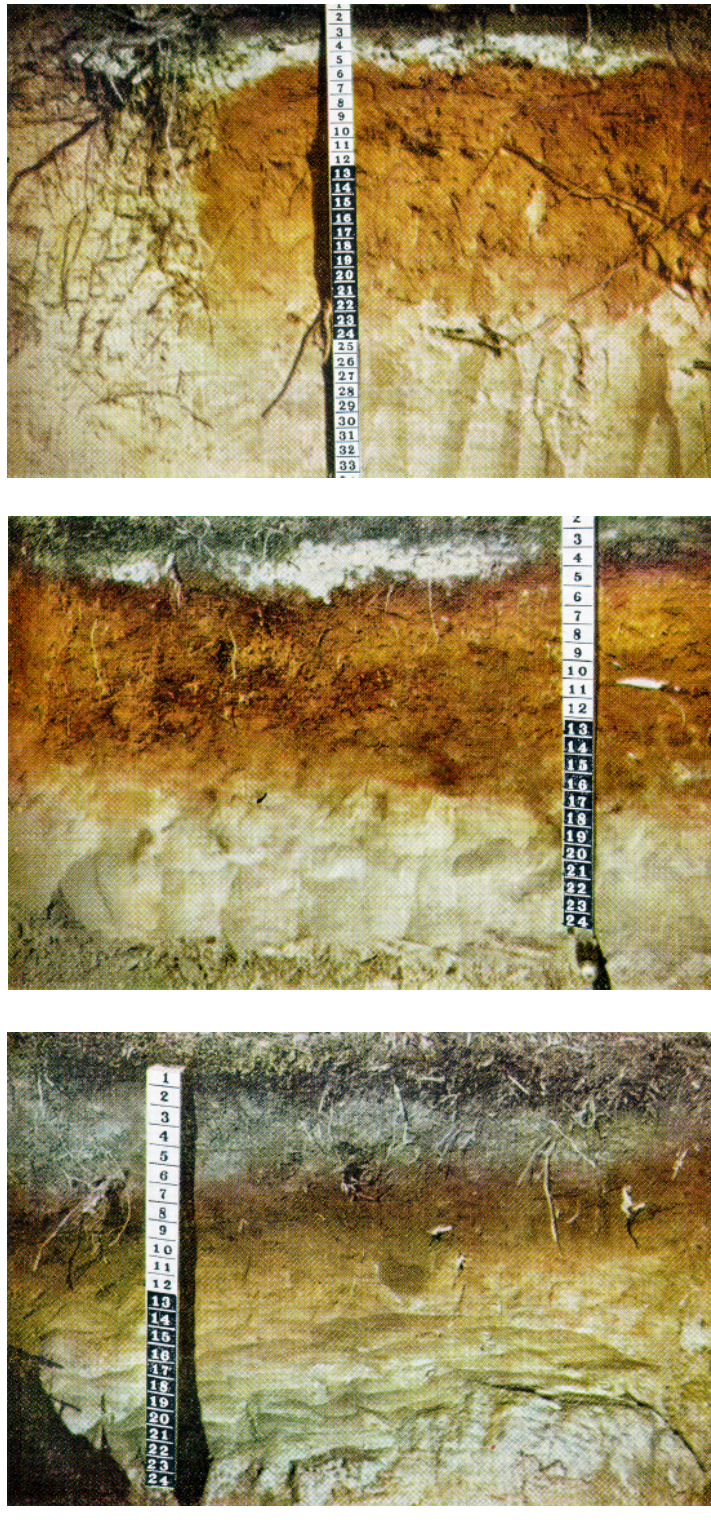
The Uplands soil series are the well drained soils that occur on the fine sand deposits distributed throughout the central and northern portions of these two counties. As mentioned previously under Surface Deposits, the sand deposits are non-calcareous, deep, and have quite a variable topography.

Much of the area, particularly in Clarence and North Plantagenet townships, has been duned at some time but has since been covered with forest vegetation. Dune-like hills are small both in height and length and are joined by smoother stretches of imperfect or poorly drained sands. The larger areas of these sand plains do not consist, therefore, of well drained sands but are rather complexes of variable drainage. In the Larose Forest reserve area of Russell County the well drained sands are frequently in the form of isolated hummocks surrounded by sands of inferior drainage.

The sandy deposits have uniformly fine particles. Varves or thin banded soils are common in the areas of smoother topography, indicating that the deposits in these locations have not been disturbed since they were laid down. Although the sands are uniformly fine, there is some variation in texture as the result of bedding and the increase in silt and clay content produces a fine sand, loam texture. By far the greatest of the area consists of fine sand in which the silt and clay content is very low.

The Upland soil profile is acid throughout. In undisturbed locations the profile will be found to have a thin organic mat on the surface underlain by a light grey layer of fine sand ranging in thickness from 2 to 4 inches. This grey layer is the poorest portion of the soil and almost devoid of plant nutrients

Potatoes growing on Uplands fine sandy loam. The dunes in the background are stabilized by naturally growing shrubs and bushes.



Virgin profiles of the Uplands (well drained), Rubicon (Imperfectly drained) and St. Jude (Poorly drained) series, showing the effects produced in the soil by differences in drainage.

and is usually the most strongly acid horizon in the profile. The subsoil horizons have a bright yellowish red color that extends to a depth of 24 inches. Light olive grey sand without any further horizon differentiation underlies this horizon.

Although cultivation and the production of crops is carried on in most of the areas where these soils occur, they are poor agricultural soils. They possess little fertility and have, in addition, a low moisture holding capacity. Fertilizer use for crop production on these soils should probably be designed only for the immediate feeding of the crop and not an attempt to build up the soil for subsequent crops. The cool climate in which these soils are situated would seem to have deterred their use as tobacco soils.

These soils are classified as Podzols and they have the characteristics associated with that group of soils. The light grey leached horizon of the Podzol is present in all drainage positions and is immediately underlain by a reddish brown accumulation horizon having an organic matter content ranging between 5 and 10 percent. A concentration of the compounds of iron are also present in this horizon but frequently less in the well drained positions than in the sands with inferior drainage.

Rubicon Series (32,200 acres)

The Rubicon series are the imperfectly drained soils associated with the Upland series. These soils occur almost exclusively on the smoother topographic areas where there are few, if any, stream courses cut in the sand plain or where the sand deposits overlie a clay deposit at a depth of a few feet.

In these locations water moves very slowly and the soil is often saturated to the surface for several months of the year. As a result the soil has developed strongly mottled horizons. In many of these locations also a fairly thick iron pan layer develops that is soft during the periods when the soil is wet but during the dry summer months becomes very hard and impermeable.

These soils tend to produce a peculiar color panorama in cultivated areas. The ploughed up hummocks of reddish colored subsoils alternate with greyish colored depressions, producing a brightly colored chequered appearance. In the uncultivated locations the soil profile possesses the same horizons that are found in the well drained Upland soils. The grey leached layer that is near the surface varies in thickness from 2 to 6 inches and is always deeper in the small depressions than in the raised hummocky positions. The iron pan layer, when it is present, occurs at a depth of about 10 inches. These soils are also well developed Podzols.

A large percentage of this soil is under cultivation. All the crops commonly grown in the region are produced, including hay and spring grain as well as corn silage. Like the Uplands series, these are rather poor agricultural soils

but, as a result of their topographic position, they have a better moisture reserve for the dry months of the year. Fertilizer experiments conducted on these soils indicate that remarkable increases in yield of spring grains can be obtained by the use of phosphatic fertilizers. Fertilizers that contain both phosphate and potash are necessary for the production of alfalfa.

*St. Samuel Series (7,400 acres)

Sandy areas that are poorly drained have been given the name, St. Samuel. These soils occur everywhere in association with the Uplands and Rubicon soils but are relatively small in area. They are therefore included with the better drained soils and only those areas that are more than several acres in size have been differentiated.

These soils occur on flat topographic positions or in local depressions. In general, cultivated fields contain many swampy undrained depressions. Their most common occurrence is on the outskirts of the large sand plains or within the sandy areas that have clay deposits at a depth of 3 feet.

These soils have developed a profile that has many of the characteristics of the better drained sandy soils. The surface organic horizon may be a dark colored muck or may be quite peaty. The grey leached layer below is somewhat darker than the same layer in the Rubicon soils and is generally much deeper. The underlying horizon is dark reddish brown, strongly mottled, and when dry shows strong iron cementation. The chief distinguishing characteristics between these soils and the Rubicon is that of a greater depth of the leached layer and darker colors of the subsoil horizons. All horizons are strongly acid.

The vegetation occurring on these soils ranges from swamp grasses to trees. Various heath plants and low growing shrubs are most common. These are non-agricultural soils.

Mountain Series (900 acres)

The Mountain soils are those that consist of a deposit of fine sand overlying clay and in which the depth of sand is less than 3 feet. Normally, under these conditions the soil is poorly drained but, in the areas with rolling topography where the valley portion extends into the clay substratum, the drainage of the overlying sand is improved. These soils are therefore classed as imperfectly drained.

These soils are somewhat analogous to the Rubicon in their profile development and, to some extent, in land use. The average depth of sand is about 2 feet in thickness; therefore, for cereal crops and hay this depth of soil may be adequate. Other crops such as alfalfa and tree fruits require deeper

* This soil corresponds most closely to the St. Jude as used in the Quebec Soil Survey.

soils for good root development and shallow soils therefore impose a restriction on the use of these kinds of crops.

The areas mapped in the county are small and occur in isolated areas south of L'Orignal and Hawkesbury. Nearly all are adjacent to, or surround, a natural stream course and are bounded on one side or another by a clay plain. Small isolated areas of clay may also occur within the main body of sand. From the standpoint of fertility and its importance in soil management, these soils should be treated the same as the Rubicon soils.

Allendale Series (10,800 acres)

The Allendale soils are poorly drained soils consisting of shallow sand overlying clay. These conditions occur rather frequently in both counties and occur wherever the larger bodies of sand join with the clay plains. The deposition of sand over the clay is uneven and therefore a considerable variation in depth will be found within any one mapped area. The range in depth of sand varies from 12 to 30 inches.

These are flat lying areas that have no natural surface drainage. The soil is therefore saturated with water during the spring and fall seasons. The soil development is similar to that of other poorly drained sands in this region. A dark surface horizon is underlain by a light brownish grey, strongly mottled sand. The deeper part of the subsoil consists of a dark yellowish brown sand that is strongly mottled and lies directly on the grey clay sediments. Occasionally an iron pan forms in this subsoil layer but is never quite as hard or continuous as it is in sands of deeper deposits. The sand in the surface horizons is quite acid and becomes less so as it approaches the underlying clay. A muck-like surface may also be present where ponded water conditions have existed for some time.

The land use in this region appears to be much the same on all soils regardless of soil texture. This is a dairy type of farming region and hay and spring grains constitute the principal crops grown. As a result, the differences in yields of these crops that are the result of differences in soils are difficult to obtain. It can be inferred, however, that because of poor drainage and hence the lack of aeration, the Allendale soils will be less satisfactory than better drained soils, except in dry seasons when some advantage may be derived from its perched water table. Some commercial vegetable crop production is taking place on some of these soils where they border Grenville county. It is doubtful that very much of the Allendale soil is suitable for this enterprise.

Castor Series (38,500 acres)

The Castor soils are important agricultural soils in Eastern Ontario. They occur in various counties such as Grenville, Stormont and Glengarry as well as in Russell and Prescott. In the latter counties the largest acreage is in

Russell County and they are found principally in the southern half adjacent to the Castor river. In Prescott County the major areas are in the western section near the Russell County border.

The sediments from which these soils have developed are of deltaic origin and profile exposures in road cuts or stream banks show that the sediments are composed of alternating bands of silt and fine sand. The soil profile therefore has a finer texture than other sandy soils such as Allendale or St. Samuel.

In this region all alluvial sediments overlie clay sediments. Such deposition is never regular and the depth of silt and sand over the clay ranges from 12 to 36 inches. Probably most of this soil area has a depth of overburden of 24 inches. The soil map shows some areas mapped as "shallow phase". In these areas the depth of silt is not more than 12 to 18 inches but extends beyond the depth of the plow layer.

The drainage within the soil varies from place to place, which may to some extent be due to the presence or on the other hand to the absence of alternating bands of silt in association with fine sand. These bands of silt will to some extent restrict the free movement of water. Lateral seepage may take place readily and the proximity of the Castor soils to river courses or stream channels may therefore influence the internal drainage. Thus, the drainage may be quite good in some areas and moderately poor in others. Since the topography over most of the area is flat there is little if any surface water runoff. The colors of the subsoil layers are therefore grey and possess a high degree of mottling.

The cultivated soil possesses a dark colored fine sandy loam surface in which the organic matter content is normally high. This surface texture may vary in small and local areas from fine sandy loam to silt loam. However, where silt loam textures predominate throughout the soil profile the internal drainage of the soil is poor and these soils are mapped and designated as Bainsville silt loam.

The subsoil horizons consist of one thin leached horizon followed by a yellowish brown horizon extending to a depth of 18 inches. These horizons are strongly mottled but are soft and friable in all seasons.

As agricultural soils these are among the best in the counties. Dairying is the main agricultural enterprise and the principal crops grown are hay, spring grains and fodder corn. Fertility trials conducted by the Illustration Stations under the supervision of the Experimental Farm show that the Castor soils have a higher productivity than many of the other soils of the district. However, by the use of commercial fertilizers, which includes particularly the elements nitrogen and phosphorous, the yield of oats can be increased by as much as 50 per cent. Similar increases are also obtained on the alfalfa crop.

These soils can probably be adapted to a greater variety of crops than are presently used. The good texture, friability and fertility of this soil provides a good medium for many field and vegetable crops.

Bainsville Series (26,600 acres)

The Bainsville soils consist of soil materials that have the same mode of origin as the Castor, but differ from the latter in having poorer natural drainage and probably in most areas a more silty texture. Within the Ottawa valley region these soils tend to occur as transition soil areas between large sand plains and clay flats or between the Castor soil areas and clay flats. In general, therefore, the depth of overburden over the clay sediments is less than in the Castor series, or approximately the same as the Castor shallow phase, that is, 12 to 18 inches.

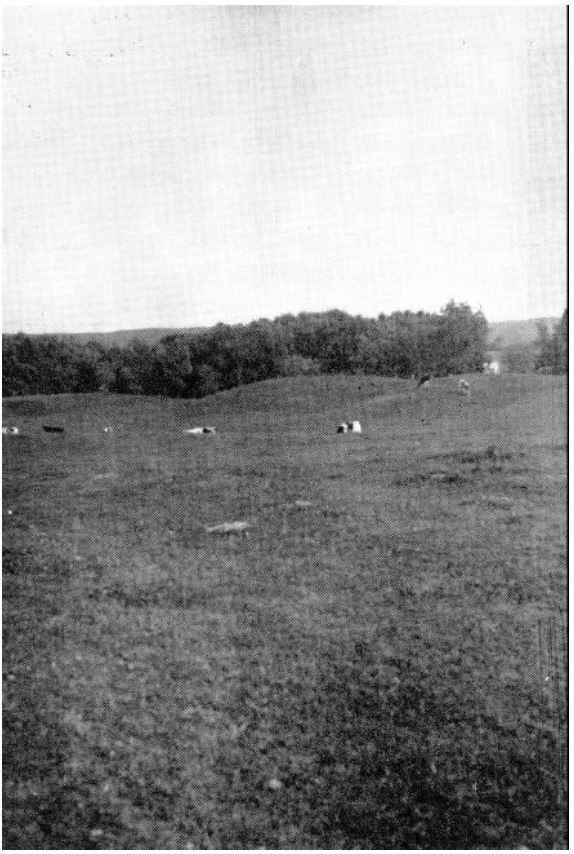
The poor drainage in these soils has given the surface and subsoil horizons darker colors than occur in better drained soils. When moist, the surface 6 inches is black in color and contains a high content of organic matter. This is underlain by a grey silt loam that usually carries some mottling, but is not very pronounced. There is frequently no horizon differentiation in the subsoil and in that case it is uniformly grey in color down to the clay strata.

In agricultural production these soils have approximately the same adaptation and value as the Castor series. For the crops presently grown in this region, the somewhat poorer drainage of the Bainsville soils does not seem to produce any marked differences in plant growth. Their agricultural ratings for dairy farming are therefore equal to that of the Castor.

Wendover Series (39,400 acres)

The Wendover soils are imperfectly drained clay soils that occur adjacent to the Ottawa river and occupy the rolling divides between the eroded banks of stream channels. These stream channels run parallel to one another and are sufficiently deep that they can remove all surface water from the surrounding divides. The topography is therefore quite variable, depending upon the numbers of the eroded channels that are present.

The soil material is a heavy clay that consists of alternating layers of red and grey clay sediments, each layer being one to several inches in thickness. The total depth of these clay sediments is probably in the order of 30 or 40 feet. The color of these layers persists in the soil profile even under intense weathering and little alteration has taken place in them through soil development processes. In undisturbed locations the surface soil is dark grey in color but on cultivation is light grey and therefore can scarcely be differentiated from the subsoil. When the soil is dry, a light grey horizon can be seen near the surface and may be the first evidence of a leached horizon. Some



Rolling topography of the Wendover series adjacent to the Ottawa River.

mottling is present even in these surface horizons, which would seem to indicate that the amount of water held by these soils is high in most seasons of the year.

The soil is quite strongly acid to a depth of 15 inches and on further depth approaches the neutral point. No calcareous layers have been found within the deeper sediments and it is therefore assumed that the primary sediments were devoid of lime.

As an agricultural soil they have many drawbacks and this influences directly the kind of crops that are grown. Most of these soils are used as pasture land, a land use that is dictated by the roughness of the topography. Since hay crops are a part of the crop rotation, some cultivation is necessary for seeding down, but the condition of the pasture fields would seem to indicate that this operation has been reduced to a minimum. The clay texture of the soil makes it imperative that they be cultivated when they are moist and not when they are too wet or too dry. The danger of surface soil erosion is always present and will be most acute when there is no grass cover. The

natural fertility of these soils is not good and, therefore, the use of commercial fertilizers and manure will be necessary in any cropping program.

A separation of this soil series designated as, Wendover sand spot phase, has been included as a mapping unit to take care of areas in which local dumps or hills of sand 20 or 30 feet in diameter are surrounded by clay. The area ratio of sand to clay is difficult to assess but the sand is often deep enough to provide a sand profile in that local spot. In detailed mapping these local soils would be classified as Mountain. The presence of sand in this way does not

Banded red and grey clays of the Wendover and Bearbrook soil series.

improve the agricultural value of the soil since it is strongly acid and usually imperfectly drained.

Bearbrook Series (168,900 acres)

The Bearbrook soils are very important soils in these Eastern Ontario counties. They constitute nearly one third of the total county acreage and are all capable of being used for the production of agricultural crops.

These are clay textured soils and are derived from the same kind of sediments that have produced the Wendover soils. They differ from the Wendover soils primarily in that they occur on the flat or smooth topography and therefore possess poor natural drainage.

These clay flats occur in rather large individual blocks such as those found in Cumberland, Alfred and Longeuil townships, but they are also present as small isolated areas, in other parts of the county. The areas where these

soils occur possess a very ineffective stream system and consequently there is little removal of surface water. This lack of stream development accounts for the presence of the Alfred bog in Caledonia township.

The soil profile possesses the same sequence of alternating bands of red and grey clay that characterize the Wendover series. However, because of poor drainage these soils possess a somewhat darker surface soil than the Wendover, a condition that is due to a higher content of organic matter. The soil is strongly mottled throughout the surface and subsoil layers but becomes less mottled and more olive colored with depth. The horizon differentiation, if there is any, is obscured by the red and grey banding.

A number of type and phase separations have been made in the field mapping of these soils. In the major part of the area, the surface and subsoil textures are clay and the soil is designated as Bearbrook clay. The Bearbrook

Landscape of the Bearbrook series.

clay-sand spot phase, however, includes those areas that have local dumps of sand, 30 or more feet in diameter, scattered over the clay flats. These sand pockets are smooth and not very noticeable except on cultivation. The sands are acid in reaction and poorly drained. The Bearbrook fine sandy loam is the designation given to areas having a 6 to 8 inch deposit of fine sand over the clay. On cultivation these soils retain their sandy surface textures. The Bearbrook silty clay loam is also a separation based on surface texture. This soil area occurs at Lapointe Bridge south of Plantagenet springs. It represents an area of flood land adjacent to the South Nation river. The deposit of silt varies in depth from 12 to 18 inches and is black in color and has a marked granular structure. This is considered by local farmers to be excellent crop

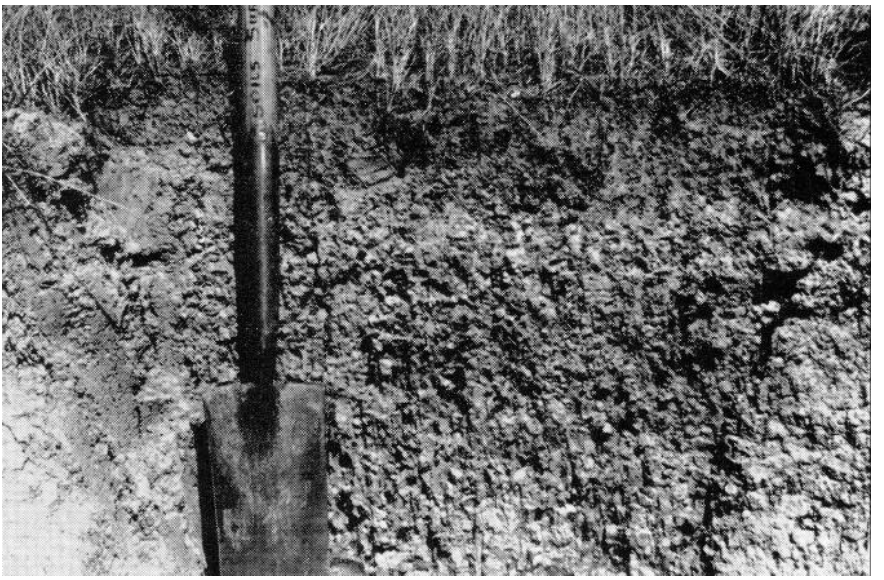
land. The topography is smooth and the soil merges into the surrounding Bearbrook clay plain.

All of the Bearbrook soils are cultivated and producing hay, oats and fodder corn crops. Since dairying is the major farm enterprise, the production of good legume hay is most important. These soils are excellent for this purpose but have serious drawbacks in the production of cereal grains and corn. Any excessive rainfall delays harvesting operations, more so than on most other soils in the county. A more intensive use of these soils can only be accomplished by the installation of municipal drainage ditches into which lateral drains can be run from surrounding farm properties.

Carp Series (800 acres)

The Carp soils have a very limited distribution in these counties. They are more widely distributed in Carleton, Dundas and Grenville counties, in which county soil reports they have been fully described.

Carp soils have developed on clay deposits of either lacustrian or marine origin, and varves or thin sedimentary layers are present in the parent material.



Profile of Carp clay loam. Some evidence of the development of a grey A_2 horizon and a dark colored B can be seen below the dark colored A_1.

In contrast with the sediments from which the Wendover and Bearbrook soils have been formed, these sediments are calcareous and the soil profile is either neutral or slightly alkaline in reaction. Also, the materials contain a fairly large percentage of silt and the texture often approaches a silty clay loam. Whether because of its silt content in combination with clay, or its high base

status, these soils possess a granular structure that is unique in clay textured soils in this region. It is this structure characteristic which is used as the main criteria in differentiating the Carp soils from other clay textured soils in the county.

The topography is flat and broken only occasionally by stream or river courses. As a consequence the drainage is poor except near the stream banks where the surface water is able to escape. The soils with the better drainage are designated as Carp soils and those with poor drainage as North Gower soils.

The Carp soils show some slight development of the soil profile which consists of a dark grey surface horizon followed by a light brownish grey horizon, then a brown mottled horizon which overlies the parent material at a depth of 15 inches. The granular structure is most prominent in the surface horizons but is also present to some extent in the subsoil horizons. The reaction of the surface soil ranges from slightly acid to neutral, whereas the subsoil is either neutral or moderately alkaline.

These are good agricultural soils and are considered to be among the best clay textured soils that occur in the Ottawa valley region. The use of commercial fertilizers, however, is recognized as being neccessary for profitable production on these soils as well as the less productive soils of the county. Fertilizer experiments that have been conducted by the Central Experimental Farm indicate that striking increases in yield of oats and subsequent hay crops follow the application of phosphatic fertilizers.

North Gower Series (10,500 acres)

The North Gower series are the poorly drained soils occurring in association with the Carp soils. The characteristics of the sediments from which these soils are derived are explained under Carp series.

These soils possess the same smooth topography that is characteristic of the large clay flats that occur throughout the counties. Since streams are few and poorly developed, natural drainage of the soil is dependent on that which can seep through the soil. Water moves slowly through clay textured materials, and therefore the soil is wet for a large part of the year.

These soils have developed some characteristics that serve to differentiate them from the Carp. In general, the surface is darker than is prevalent in the Carp soils. The cultivated surface soil has a granular structure and a neutral reaction. The subsoil has no horizon differentiation, but consists of a grey, strongly mottled clay to a depth of 20 or 30 inches. When moist, the granular structure in the subsoil is quite pronounced, but is less so in dry seasons. The high contrast mottling that is a feature of the profile is not present in the parent material, where free carbonates are usually present.

In agricultural use, these soils have much the same adaptation and value

as the Carp soils. The removal of surface water is a continual problem. Few municipal drainage systems have been installed, a condition that is necessary in order to provide main drainage outlets. Despite such handicaps, the North Gower soils are among the most productive soils in the Ottawa valley region. They are particularly adapted to such crops as oats and hay. Experimental plot work indicates that the use of commercial fertilisers is profitable and marked increases in yields can be expected from the use of fertilizers and particularly those that contain phosphorous.

Dairying is the major farm enterprise in this area and the crops grown are principally oats, hay and fodder corn. These soils have limited uses for other agricultural crops.

Profile of North Gower clay loam. These soils possess a marked granular structure.

St. Rosalie Series (6,500 acres)

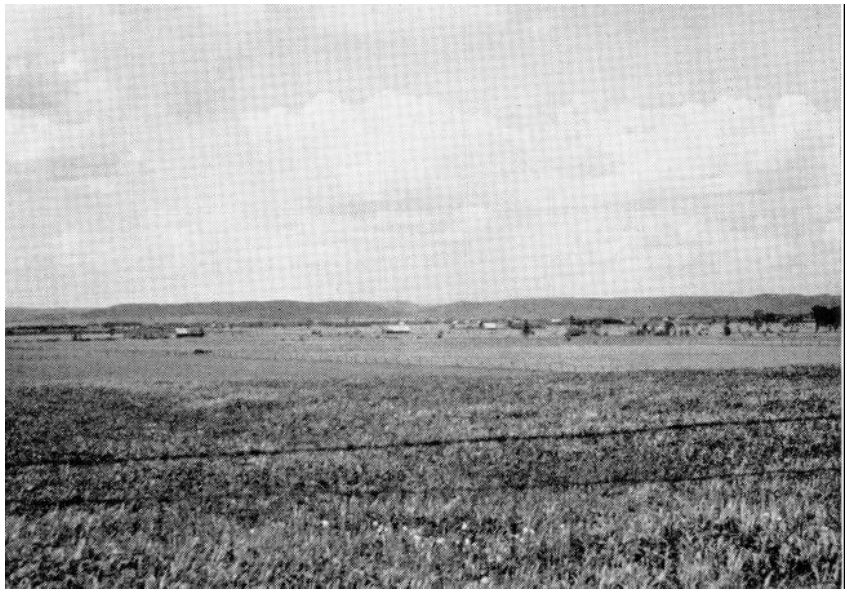
The St. Rosalie soils are clay textured and occur on flat clay plains in association with the Wendover and Bearbrook soils. They resemble these latter soils very markedly but can be differentiated on the basis of color. Whereas the

Bearbrook soils are derived from banded red and grey sediments, the St. Rosalie are derived solely from grey colored sediments.

This differentiation may not have much significance from the standpoint of land use but it does indicate materials of different origin or of mode of deposition. In general, a uniform deposit of grey clay has a more massive structure than is the case when bands of red clay are present. Under cultivation, therefore, these soils are tight and tend to form hard clods when plowed.

There is no profile development evident in these soils. In cultivated areas, the surface is grey in color and has usually very poor aggregation. The subsoil is strongly mottled, also grey in color, and is undifferentiated from deeper material except by degree of mottling, which fades out at a depth of 20 to 24 inches. The reaction of the entire soil is acid but approaches the neutral point below 30 inches. No free carbonates have been found in the sediments from which these soils are derived.

These soils are cleared and cultivated and used in the same way as other clay soils in the counties, that is, in the production of hay and grain. They are perhaps the least desirable among the clay textured soils, since they are difficult to drain, and difficult to cultivate.



Clay flats of the Ottawa River Valley consisting of the soil series Bearbrook clay and St. Rosalie clay, with the Precambrian upland in the background.

Farmington Series (6,300 acres)

The Farmington soils are essentially non-arable and occur in the counties in the form of small pieces of land, found most commonly in the rock outcrop

areas adjacent to the Ottawa river. This series represents those soils that are shallow over limestone bedrock and consist predominantly of a thin deposit of glacial till.

Where there is an exposure of limestone bedrock the topography is usually quite smooth and the soil cover has a thickness that is less than 12 inches. In Russell and Prescott Counties these rocky areas have roughened at the surface by glacial action and the surface soil is very stony. These soils are found in large blocks of land in adjacent counties such as Carleton and Grenville, in which county reports they are fully described.

Landscape of the Farmington series. The tree vegetation is Juniper, Cedar, Elm and Maple.

The soil texture is most commonly loam, although more sandy or clayey textures may occur where the areas border sand and clay plains. Six to twelve inches of this material overlies the bedrock. The soil is usually high in organic matter and is neutral in reaction. The subsoil color is brown and some soil development has taken place but not sufficient to show horizon differentiation.

The large areas of Farmington soils can be used as pasture land during the seasons when grass growth is vigorous. Many good woodlots can be found on these soils and they often serve a secondary purpose as shelter for livestock.

Muck (23,500 acres)

Organic soils occur in large, relatively undrained depressional areas within the counties. These soils consist primarily of an accumulation of decayed plant materials, which are the remains of sedges, rushes and water loving shrubby

plants. A pit examination made of the soils in these areas will turn up logs and broken parts of trees at any depth. The material is therefore a mixture of decayed sedges and wood from trees.

The term Muck is most frequently applied to those organic soils that are black in color and in which the organic materials are relatively well decomposed. The muck soils that occur in these counties are brown in color rather than black and much fibrous, undecomposed organic material is present. The fibrous material, however, breaks down readily on cultivation to form a loose crumbly soil. There appears to be little variation in the nature of the material with depth, although at 3 feet it is permanently saturated with water.

These muck soils are acid in reaction, and in that respect differ from muck soils which occur in Grenville and Dundas Counties which are neutral to alkaline. The fertility problems in muck soils will therefore differ markedly between counties as a result of differences in soil reaction and in base status. Not much specific information is available on the fertility status of these soils in Russell and Prescott, nor of the nutritional deficiencies that might be expected.

The utilization of these soils for agricultural purposes has been confined up to the present time to cultivation around the border of the larger areas. The uncultivated muck is covered with tree vegetation.

Eroded Channels (21,700 acres)

The areas designated as Eroded Channels comprise not only the small gully-like channels that occur in the cultivated areas throughout the county but also the stream valley slopes on which the soil is bare and exposed for most of the year.

These slopes are steep and short and no effort is being made to establish grass crops on the exposed slope. The extent to which streams are presently eroding their banks is difficult to assess but the acreage may be expected to increase year by year. Little of the material eroded from the stream bank accumulates in the valley bottom but is carried along by the stream and emptied into the Ottawa river.

These carved scars in the upland serve as natural drainage ways for the flat clay and sand plains, and in this respect they serve a useful purpose. They may be used in the future as the principal drainage outlets for a systematic drainage program within the counties.

Soil Complexes (84,500 acres)

The areas on the soil map that are designated as "Complexes" consist of two or more soil series that occur together in such an intricate way that it is not possible to separate them on a map of this scale. Within any one of these map areas there is a recurring pattern of soils in which the individual series differ from one another either in drainage or in soil materials.

The following complexes of soil types are shown as occurring in these counties: Uplands fine sand, Rubicon fine sand, St. Samuel fine sand; Rubicon fine sand, St. Samuel fine sand; Uplands fine sand, Rubicon fine sand; Grenville loam, Bearbrook clay; Wendover clay, Bearbrook clay; Mountain fine sandy loam, Bearbrook clay.

The individual series have been described previously and their presence in the complex indicates that the soils found here have these series characteristics but that the individual areas are small.

In farm operations these soil areas are generally treated as a unit, and in the case of the Mountain-Bearbrook complex a farmer may cultivate through a sandy soil and then through a clay soil within the distance of a few feet. From an agricultural use standpoint, a soil complex such as Rubicon-St. Samuel, which consists of soils having different drainages, is perhaps not as serious as the one previously mentioned, namely Mountain-Bearbrook complex, which consists of different soil materials. A complex such as this, which consists of a pattern of sand and clay, creates special problems in soil management. The Uplands-Rubicon-St. Samuel complex, on the other hand, is rendered non-arable because of the hill and depression type of topography associated with these sandy materials.

SOIL MANAGEMENT

The term "Soil Management" refers to the various practices that are used or recommended in the use of soils for the growing of agricultural crops. These practices vary with different soils and with different crops and the farmer learns through experience the kind of practices that give the best results. The reason why many different methods are necessary is that soils may be too hilly, too sandy, too dry, too wet or too infertile for good farming. Whatever the limitations of the soil or of a particular farm, the central objective in soil management is to develop and maintain a proper relationship between the plant and the soil in which it grows.

Success in the growing of crops depends therefore on the farmer knowing two sets of factors: the requirements of the different plants he can grow and the characteristics of the soil on his farm. Almost any kind of soil can be modified by management to grow any climatically adapted plant, if one is willing to go to the expense and trouble of preparing it. Most successful farmers try to find satisfactory combinations of crops that are adapted to the soil with a minimum of soil change for good growth.

As mentioned in previous pages, most soils consist of an arrangement of definite layers or horizons one above the other, with different colors and other properties. These horizons together are called the soil profile. Very young soils or those occurring in poorly drained positions may not have horizons.

In the examination of a soil, the principal things to observe are depth, texture, structure, drainage and nutrients.

Depth:

In general the soils of Prescott and Russell have sufficient depth to provide space for the development of plant roots and the storage of water for normal crop production. This problem becomes acute only in those areas where the soil is thin over the bedrock. During the growing season, the months of July and August are the most critical and during this time the grasses lose their active growth which, combined with overgrazing, permits weeds and bushy plants to become established.

It is possible that the use of some management practices could improve the quality and quantity of the forage plants growing on these soils. Such practices would include the eradication of weeds and fertilization where possible. However, land use on shallow soils will have to be based on a minimum of capital expenditure because of the low market value of the land, and it is unlikely that such practices would be advantageous at the present time.

Texture:

This term refers to the relative proportions of sand, silt and clay that make up the soil material. The texture in many soils changes from horizon to horizon and extremes are often present when one kind of a deposit overlies another.

The classes of soil texture start with sand, which has only a little silt and clay. Then, with increasing amounts of clay, the principal classes are loamy sand, sandy loam, loam, silt loam, clay loam and clay. The classes can be distinguished by squeezing a moist sample between the fingers. The sands are harsh and gritty and the particles scarcely hold together. At the other extreme, clay can be rolled into a smooth sticky ball.

In general, soils of intermediate texture such as sandy loams, loams and silt loams are easiest to handle. Sands and loamy sands are open and water drains readily through them so they hold rather small quantities of water and are said to be droughty soils. Clays, on the other hand, tend to become hard and stick together in clods unless they are handled carefully.

Following is a listing of the soils in the two counties of Russell and Prescott, arranged according to broad textural groups.

CLAY SOILS

Name	Acreage
Wendover	39,400
Bearbrook	168,900
N. Gower	10,500
St. Rosalie	6,500
Total	225,300

SANDY SOILS

Name	Acreage
Uplands	44,100
Rubicon	32,200
Castor	38,500
Mountain	900
St. Samuel	7,400
Sand Complexes	77,000
Total	200,100

SILT SOILS

Name	Acreage
Bainsville	26,600
Allendale	10,800
Total	37,400

LOAM SOILS	
Name	**Acreage**
Vars	7,300
Grenville	26,900
Farmington	6,300
Matilda	4,800
Lyons	400
Total	45,700

ORGANIC SOILS	
Name	**Acreage**
Muck	23,500
Peat	11,100
Total	34,600

MISCELLANEOUS SOILS	
Name	**Acreage**
Eroded Channels	21,700
Bottom Land	700
Total	22,400

Structure:

The individual soil particles — sand, silt or clay — group themselves to form various kinds of aggregates which are called structure. The ideal structures are those which are small and soft, such as granular or crumb. The next best are the small blocky nut-like aggregates, between which water and roots can move.

The formation of desirable soil aggregates is generally accomplished by organic matter, that is, the dead portions of plant materials which are added to soils either by the death of plants at the surface or the decay of plant roots. In cultivated soils where crops are continually being removed, there is little return made to the soil of this very important material.

In sandy soils, each grain of sand is often by itself, the soil being loose and without structure. Clayey soils, on the other hand, if deficient in organic matter become cloddy if ploughed when too wet or too dry. Wherever they occur within the depth of normal rooting of plants, such hard, cloddy soils must be reworked to make them granular or blocky. It is not enough to break up massive clods. Organic matter must be added, as is done by the addition of barnyard manure or the ploughing down of green manure, in order that fragments will not flow back together into masses when they are wet again.

Drainage:

Poorly drained soils are rarely, if ever, productive. It is possible for grass crops to survive and frequently flourish under extremely wet conditions but most cultivated plants cannot remain too long in soils that are saturated with water.

In most cases, the drainage condition of the soil can be determined by its position in the landscape. Often, however, there is little evidence in the surface soil alone of poor drainage beneath. Therefore, it is important that such conditions be identified by an examination of the soil profile. The conditions of soil drainage are indicated fairly reliably by soil colors. Bright solid colors of brown or yellow suggest fairly good drainage, but in low ground, grey and mottled horizons indicate poor drainage.

The remedy that must be applied to poor drainage must be determined for each individual field. Where open ditches and high crowns may be satisfactory for one field, only tile drainage may be suitable for another. In all cases the cost of installation and maintenance of a drainage system in relation to the price of the crop produced will need to be considered.

In the present survey the soils of the county are separated into three drainage classes namely, well drained, imperfectly drained and poorly drained. A summary of the acreages of land that have been classified as belonging in each of the three drainage classes are as follows:

	Acres	% of Total
Well drained soils	118,400	20.5
Imperfectly drained soils	150,000	26.0
Poorly drained soils	308,200	53.5

Nutrients:

Nutrients are the food that plants derive from the soil. They cannot be seen in the soil but the plant nutrient level of soils can be roughly estimated from the vigor of growing plants. A measure of nutrients contained in the soil can be obtained in the laboratory from samples collected by the individual farmer.

Some general statements can be made with respect to the nutrient elements that will apply to all soils occurring in this area.

One of the most important conditions required for good plant growth is that there be a balance of plant nutrients in the soil. All plants take at least 12 essential elements from the soil. The most common elements found to be deficient are nitrogen, phosphorus and potassium. These are the elements contained in mixed fertilizers. Calcium and magnesium are included in liming materials and small amounts are usually present in mixed fertilizers. The other elements used in lesser amounts are sulphur, iron, boron, manganese, copper, zinc and molybdenum.

Each of the above elements is contained in manure but, since it would take a long time to build up the phosphorus content of a phosphorus deficient soil with manure alone, it is more practical to use chemical fertilizer in addition to organic matter. Deficiencies of nitrogen can be remedied by manure, nitrogenous fertilizers, or by the growing of leguminous crops such as red clover and alfalfa, particularly if they are plowed down while a good stand is still remaining. But only a part of the phosphorus and sulphur supplied to crops is derived from this organic matter. The remaining portion is derived from the inorganic fraction of the soil.

The inorganic or mineral fraction makes up the bulk of most soils. It is derived from rocks of various kinds and their degradation products. The nutrient supplying power of the larger particles — that is, the sand and silt — are quiet different from those of the fine particles or clay fraction. Since the nutrient elements are held in the soil mainly by the finer particles, clay textured soils are commonly considered to have a higher nutrient supply than coarse textured soils.

In order to estimate the amounts of fertilizer that it is necessary to apply to achieve a balance of plant nutrients in the soil, several things need to be determined, the nutrients already in the soil, plus those normally added in

manure; the general requirements of the plants to be grown; and the amounts of the nutrients contained in the various fertilizer materials available for use.

This information is being obtained for a great many specific soil types by the research being done on experimental stations and experimental farms, and by soil testing laboratories. Differences in climate, soil, and plants mean that the research must be conducted in many locations. For localities in which no research results are available, recommendations are based on results obtained in related conditions.

SOURCES OF INFORMATION

Farmers and all agricultural workers are urged to make requests for information that they need in solving soil management problems from the Agricultural Representative, Experimental stations and Agricultural Colleges. Experimental work is being done at the Kemptville Agricultural School, the Experimental Farm in Ottawa and the Illustration Stations at Casselman in Russell County and Caledonia Springs in Prescott County and information can be obtained on the uses of fertilizer, the testing of new crops and the various farm practices that apply to farming conditions in these counties.

If information is needed about the soil itself, this can best be obtained by collecting soil samples, as directed by the Agricultural Representatives who are located in the towns of Plantagenet in Prescott County and Rockland in Russell County. These samples can then be mailed to the Agricultural School at Kemptville for analysis. This service is carried out by the Department of Agriculture and is free of charge.

RATING OF THE SOILS FOR AGRICULTURAL CROPS

The suitability of the various soils that occur in Russell and Prescott counties for the growing of cultivated crops has been discussed in the preceding pages of this report. In the table that follows, an attempt is made to summarize the suitability of each soil for all the crops that are commonly grown in this region of the province.

The different soil series and phases have been rated for specified crops on the basis of five categories; namely, good, fair, poor and very poor. This rating is based on the characteristics of the soil itself, and the appearance of the crops growing on the soil, together with information supplied by farmers and officers from Agricultural Stations. Although the reliability of these ratings has not been verified by crop yield figures, they have proven to be reasonably accurate for purposes of farm management and land use planning in other counties.

The letters used in the table and their meanings are as follows:

G — good, F — fair, P — poor, VP — very poor.

SOIL RATING FOR PRINCIPAL CROPS

Soil Name	Oats	Hay	Fodder Corn	Potatoes	Clover	Pasture
Allendale fine sandy loam	F	F-P	P	F-P	F-P	F
Bainsville silt loam	G	G	F	P	G	G
Bearbrook clay	F	F	P	VP	F	G-F
Bearbrook clay — sand spot phase	F	F	P	VP	F	F
Bearbrook fine sandy loam	F	F	P	VP	F	F
Bearbrook silty clay loam	G	G	F	VP	F	G
Carp clay loam	G	G	G-F	P	G	G
Castor fine sandy loam	G	G	G-F	F	F	G
Castor fine sandy loam — shallow phase	G	G	F	P	F	G
Farmington loam	VP	F	VP	VP	F	F
Grenville loam	G	G	G	F	G	G
Grenville loam — stony phase	P	P	VP	VP	P	P
Grenville loam — shallow phase	P	P	VP	VP	P	P
Kars gravelly sandy loam	F	F	F	P	F	F
Lyons loam	P	P	VP	VP	P	F
Matilda loam	F	F	P	VP	F	G
Matilda loam — stony phase	VP	P	VP	VP	P	F
Matilda loam — shallow phase	VP	P	VP	VP	P	F
Mountain fine sandy loam	F	F	P	VP	F	F
North Gower clay loam	G	G	F-P	P	F	G
Rubicon fine sand	P	F	P	P	P	P
Rubicon fine sandy loam	F	F	P	P	F	F
St. Rosalie clay	F	G	P	VP	F	F
St. Rosalie clay — sand spot phase	F	G	P	VP	F	F
St. Samuel fine sand	P	F	VP	VP	P	F
Uplands fine sand	P	F	P	P	F	F
Uplands fine sandy loam	P	G	P	P	F	G
Vars gravelly loam	G	G	G	P	G	G
Wendover clay	F	G	F	VP	F	G
Wendover clay — sand spot phase	F	G	F	VP	F	F
Muck	F	F	P	G	F	F
Peat	VP	P	VP	VP	P	P
Bottom Land	VP	P	VP	VP	VP	F
Eroded Channels	VP	VP	VP	VP	VP	VP

These ratings are based on general farm management practices and apply specifically to Russell and Prescott counties.

TAXONOMIC CLASSIFICATION, SOIL PROFILE

In the following pages the soils are classified into Order, Great Group, Soil Group and Family on the basis of definitions given by the National Soil Survey Committee, 1958. Some of the soils listed are not good representatives of the modal concept of the Group in which they have been placed, chiefly because of indistinct horizon development. This lack of development is a feature that is most common on the clay textured soils in this region.

Allendale Series

Location: Lot 12, Conc. VII, Caledonia twp., Prescott county.

Parent Material: Fine sand overlying clay deposits.

Classification: Order — Gleysolic
Great Group — Gleysol
Soil Group — Orthic Gleysol
Family — Kenabeek

Horizon	Depth Inches	Description
(Ac) Aa	0-8	Fine sandy loam; black (10YR 2/1); contains high percentage of organic matter; friable; pH 6.4.
(G_1) Cg1	8-18	Fine sand; olive grey (5Y 4/2); single grain structure; loose; strongly mottled; pH 6.4.
(G_2) Cg2	18-24	Fine sand; grey (10YR 6/1); single grain structure; loose; high contrast mottling; pH 6.8.
(D) II	24+	Clay; grey (2.5Y 6/1); pH 6.8.

Bainsville Series

Location: Lot 19, Conc. VI, Russell twp., Russell county.

Parent Material: Layered silt and fine sand overlying clay deposits.

Classification: Order — Gleysolic
Great Group — Dark Grey Gleysolic
Soil Group — Orthic Dark Grey Gleysolic
Family — Bainsville

Horizon	Depth Inches	Description
(A_1) Aa	0-6	Silt loam, black (10YR 2/1); granular structure; friable; pH 6.5.
(G_1) Bjg1	6-12	Silt loam; olive grey (5Y 4/2); granular structure; friable; low contrast mottling; pH 6.3.
(G_2) Bjg2	12-18	Silt loam; greyish brown (2.5Y 5/2); firm, cohesive; high contrast mottling; pH 6.4.
(D) II		Clay; grey (10YR 5/1); pH 6.8.

Bearbrook Series

Location: Lot 10, Conc. VI, Alfred twp., Prescott county.

Parent Material: Non-calcareous, layered, red and grey clay.

Classification: Order — Gleysolic
Great Group — Dark Grey Gleysolic
Soil Group — Orthic Dark Grey Gleysolic
Family — Lincoln

Horizon	Depth Inches	Description
(Ac) Aa	0-5	Clay; dark brown (10YR 3/3); structure varies with cultivation, frequently granular; pH 6.2.
(G) Bjg	5-12	Clay; light brownish grey (10YR 6/2); low contrast mottling; pH 6.5.
(C) C	12+	Clay; brown (10YR 5/3) and grey (10YR 5/1); tough and firm; pH 6.5.

Carp Series

Location: Lot 20, Conc. IX, Cambridge twp., Russell county.

Parent Material: Calcareous grey clay.

Classification: Order — Podzolic
Great Group — Grey Brown Podzolic
Soil Group — Gleyed Grey-Brown Podzolic
Family — Perth

Horizon	Depth Inches	Description
Ac (Aa)	0-5	Clay loam; very dark greyish brown (10YR 3/2); coarse granular structure; friable; pH 6.8.
A_2g (Aeg)	5-8	Clay loam; brown (10YR 5/3); low contrast mottling; fine crumb structure; friable; pH 7.1.
B_2 (Btg)	8-15	Clay; brown (10YR 5/3); low contrast mottling; granular structure; pH 7.2.
C	15+	Clay; grey (10YR 6/1); firm; pH 7.2.

Castor Series

Location: Lot 8, Conc. II, Russell twp., Russell county.

Parent Material: Layered silt and fine sand overlying clay deposits.

Classification: Order — Podzolic
Great Group — Podzol
Soil Group — Gleyed Podzol
Family — Rubicon

Horizon	Depth Inches	Description
A_1 (Aa)	0-5	Fine sandy loam; black (10YR 2/1); granular structure; friable; pH 6.5.
A_2g (Aeg)	5-8	Fine sandy loam; olive grey (5Y 5/2); low contrast mottling; firm; pH 6.3.
B_2g (Bfhg)	8-15	Fine sandy loam; yellowish brown (10YR 5/4); firm; high contrast mottling; pH 6.3.
Cg	15-27	Fine sandy loam; dark greyish brown (2.5Y 4/2); medium contrast mottling; firm; pH 6.5.
D	27+	Clay; grey (10YR 5/1); pH 6.5.

Farmington Series

Location: Lot 10, Conc. VI, Cumberland twp., Russell county.

Parent Material: Loam soil material over limestone bedrock.

Classification: Order — Brunisolic
Great Group — Brown Forest
Soil Group — Orthic Brown Forest
Family — Farmington

Horizon	Depth Inches	Description
A_1 (Ah)	0-3	Loam; dark brown (10YR 4/3); pH 7.2.
B	3-9	Stony loam; greyish brown (10YR 5/2); pH 7.8.
D	9+	Limestone bedrock.

Grenville Series

Location: Lot 4, Conc. III, West Hawkesbury twp., Prescott county.

Parent Material: Stony, calcareous loam till.

Classification: Order — Brunisolic
Great Group — Brown Forest
Soil Group — Orthic Brown Forest
Family — Grenville

Horizon	Depth Inches	Description
Ac (Aa)	0-7	Loam; very dark brown (10YR 2/2); crumb structure; friable; pH 6.5.
A_2 or B_1	7-14	Sandy loam; dark brown (10YR 3/3); crumb structure; friable; pH 6.4.
B_2	14-20	Sandy loam; very dark greyish brown (10YR 3/2); crumb structure; friable; pH 6.6.
C	20+	Loam; grey (10YR 5/1); calcareous; stony till.

Kar Series

Location: Lot 12, Conc. V, West Hawkesbury twp., Prescott county.

Parent Material: Calcareous outwash gravels.

Classification: Order — Podzolic
Great Group — Grey Brown Podzolic
Soil Group — Brunisolic Grey-Brown Podzolic
Family — Dumfries

Horizon	Depth Inches	Description
Ac (Aa)	0-4	Gravelly sandy loam; dark greyish brown (10YR 4/2); fine crumb structure; loose; pH 6.8.
A_2 (Ae)	4-12	Gravelly sandy loam; yellowish brown (10YR 5/6); fine crumb structure; pH 6.6.
B_2 (Bt)	12-17	Gravelly loam; brown (10YR 4/3); fine subangular blocky structure; pH 7.0.
C	17+	Coarse sand and gravel, usually unstratified, weakly calcareous; pH 7.0.

Matilda Series

Location: Lot 12, Conc. VI, West Hawkesbury twp., Prescott county.

Parent Material: Stony, calcareous, loam till.

Classification: Order — Brunisolic
Great Group — Brown Forest
Soil Group — Gleyed Brown Forest
Family — Matilda

Horizon	Depth Inches	Description
Ac (Aa)	0-6	Loam; dark brown (10YR 3/3); pH 6.0.
Bg	6-20	Loam or gravelly loam; brown (10YR 4/3); crumb structure; pH 6.5.
C	20+	Loam or gravelly loam; light brownish grey (2.5Y 6/2); slightly calcareous.

Mountain Series

Location: Lot 12, Conc. III, West Hawkesbury twp., Prescott county.

Parent Material: Fine sand overlying clay deposits.

Classification: Order — Podzolic
Great Group — Podzol
Soil Group — Gleyed Podzol
Family — Mountain

Horizon	Depth Inches	Description
Ac (Aa)	0-4	Fine sandy loam; very dark greyish brown (10YR 3/2); crumb structure; pH 6.2.
A_2 (Ae)	4-6	Fine sand; grey (10YR 6/1); single grain structure; loose; pH 4.6.
B_{21} ($Bfhg_1$)	6-10	Loamy fine sand; yellowish red (5YR 4/8); crumb structure; small ortstein nodules; low contrast mottling; pH 4.8.
B_{22} ($Bfhg_2$)	10-16	Loamy fine sand; yellowish brown (10YR 5/4); crumb structure; loose; mottled; pH 4.8.
D (II)	16+	Clay; grey (10YR 6/1); pH 5.0.

North Gower Series

Location: Lot 18, Conc. IX, Cambridge twp., Russell county.

Parent Material: Calcareous grey clay.

Classification: Order — Gleysolic
Great Group — Dark Grey Gleysolic
Soil Group — Orthic Dark Grey Gleysolic
Family — Brookston

Horizon	Depth Inches	Description
Ac (Aa)	0-8	Clay loam; very dark grey (10YR 3/1); medium crumb structure; friable; pH 7.0.
G_1 (Bjg1)	8-12	Clay loam; grey (10YR 5/1); medium granular structure; low contrast mottling; pH 7.0.
G_2 (Bjg2)	12-26	Clay; grey (10YR 5/1); granular structure; high contrast mottling; pH 7.2.
C	26+	Clay; grey (10YR 6/1); tough and firm; pH 7.2.

Rubicon Series

Location: Lot 26, Conc. XI, Russell twp., Russell county.

Parent Material: Non-calcareous, outwash or deltaic sand.

Classification: Order — Podzolic
Great Group — Podzol
Soil Group — Gleyed Podzol
Family — Rubicon

Horizon	Depth Inches	Description
Ao (H)	2-0	Black semi-decomposed organic matter, matted by living roots; pH 5.1.
A_2 (Ae)	0-2	Fine sand; grey (10YR 6/1); single grain structure; firm; pH 5.0.
$B_{21}g$ (Bfhg1)	2-4	Loamy fine sand; dark reddish brown (5YR 2/2); crumb structure; loose; pH 5.3.
$B_{22}g$ (Bfhg2)	4-10	Loamy fine sand; strong brown (7.5YR 5/8); crumb structure; loose; contains some dusky red ortstein nodules; mottled; pH 5.4.
$B_{23}g$ (Bfhg3)	10-18	Fine sand; yellowish brown (10YR 5/6); single grain; low contrast mottling; pH 5.5.
B_3g (Bfhg4)	18-24	Fine sand; olive (5Y 5/3); single grain; loose; low contrast mottling; pH 5.8.
C	24+	Fine sand; light grey (5Y 6/1); varved or layered sediments; pH 6.2.

Horizon.	Sand %	Silt %	Clay %	pH	Organic Matter %	Free Iron %	Free Iron as Percent of Total Iron	Total Fe_2O_3 %	Total Al_2O_3 %	Total SiO_2 %
A_2	84.4	11.9	4.7	5.0	1.55	.08	5.8	1.38	4.67	93.8
B_{21}	90.0	6.3	3.7	5.3	12.52	2.08	29.0	7.17	23.50	72.7
B_{22}	86.3	7.1	6.6	5.4	5.84	1.21	28.8	4.20	21.76	74.8
B_{23}	93.0	.8	6.2	5.5	2.62	.58	15.2	3.81	16.18	80.5
B_3	96.8	1.2	1.9	5.8	1.40	.28	7.6	3.69	11.31	84.3
C_1	98.5	0.0	1.5	6.2	.46	.06	1.9	3.06	8.16	88.1
C_2	98.6	0.0	1.4	6.1	.46	.02	.5	3.53	11.79	84.1

St. Rosalie Series

Location: Lot 22, Conc. IV, Alfred twp., Prescott county.

Parent Material: Non-calcareous grey clay.

Classification: Order — Gleysolic
Great Group — Dark Grey Gleysolic
Soil Group — Orthic Dark Grey Gleysolic
Family — Lincoln

Horizon	Depth Inches	Description
Ac (Aa)	0-5	Clay; very dark grey (10YR 3/1); coarse granular; pH 6.5.
G (Bjg)	5-15	Clay; olive grey (5Y 4/2); massive; large blocky structure; strong contrast mottling; pH 6.5.
C	15+	Clay; olive grey (5Y 4/2); tough and massive; pH 6.7.

*St. Samuel

Location: Lot 26, Conc. XI, Russell twp., Russell county.

Parent Material: Non-calcareous outwash or deltaic sand.

Classification: Order — Podzolic
Great Group — Podzol
Soil Group — Gleyed Podzol
Family — Rubicon

* This soil has been mapped as St. Jude in the Quebec Soil Survey.

Horizon	Depth Inches	Description
Ao (H)	3-0	Black organic layer, semi-decomposed leaves, moss and wood fragments; pH 4.3.
A_2g (Aeg)	0-4	Fine sand; grey (10YR 5/1); loose; abrupt boundaries between horizons above and below; pH 4.4.
$B_{21}g$ (Bg1)	4-8	Fine sand; dark reddish brown (5YR 3/4); weak crumb structure; mottled; pH 4.9.
$B_{22}g$ (Bg2)	8-13	Fine sand; dark reddish brown (10YR 4/4); loose; mottled; pH 5.1.
Cg	13+	Fine sand; light olive grey (5Y 6/2); loose, varved sediments; mottled; pH 5.4.

Horizon.	Sand %	Silt %	Clay %	pH	Organic Matter %	Free Iron %	Free Iron as percent of Total Iron	Total Fe_2O_3 %	Total Al_2O_3 %	Total SiO_2 %
A_2g	89.0	4.8	6.2	4.4	2.58	.02	2.8	.74	12.10	85.9
$B_{21}g$	94.9	.2	4.9	4.9	2.61	.04	3.4	1.17	7.76	89.1
$B_{22}g$	98.3	0.0	1.7	5.1	1.40	.06	3.4	1.72	5.88	91.0
Cg	98.6	0.0	1.4	5.4	.66	.08	2.2	3.63	9.98	85.7

Uplands Series

Location: Lot 26, Conc. XI, Russell twp., Russell county.

Parent Material: Non-calcareous, outwash or deltaic sand.

Classification: Order — Podzolic
Great Group — Podzol
Soil Group — Orthic Podzol
Family — Wendigo

Horizon	Depth Inches	Description
Ao (H)	2-0	Black semi-decomposed organic layer.
A_2 (Ae)	0-3	Fine sand; grey (10YR 6/1); single grain structure; firm; pH 5.0.
B_{21} (Bfh1)	3-6	Loamy fine sand; dark reddish brown (5YR 3/4); crumb structure; loose; pH 5.3.
B_{22} (Bfh2)	6-12	Loamy fine sand; dark yellowish brown (10YR 4/4); crumb structure; loose; pH 5.6.
B_3 (Bfh3)	12-22	Fine sand; light yellowish brown (2.5 YR 6/4); loose; pH 5.8.
C_1	22-36	Fine sand; pale yellow (2.5Y 6/4); loose; pH 5.8.
C_2	36-48	Fine sand; light olive grey (5Y 6/2); loose; pH 5.8.

Horizon.	Sand %	Silt %	Clay %	pH	Organic Matter %	Free Iron %	Free Iron as percent of Total Iron	Total Fe_2O_3 %	Total Al_2O_3 %	Total SiO_2 %
A_2	86.1	8.0	5.8	5.0	3.15	.13	5.8	2.24	8.93	88.7
B_{21}	90.0	3.9	6.1	5.3	5.26	1.14	34.4	3.31	5.77	91.2
B_{22}	92.2	3.1	4.7	5.6	2.40	.39	11.9	3.26	12.81	83.3
B_3	97.8	0.0	2.2	5.8	1.61	.26	7.2	3.61	13.08	82.8
C_1	99.0	0.0	1.0	5.8	.86	.12	3.0	3.96	16.97	78.9
C_2	97.3	0.0	2.7	5.8	.60	.10	2.2	4.59	15.55	79.4

Vars Series

Location: Lot 24, Conc. III, Russell twp., Russell county.

Parent Material: Shaly or gravelly glacial till.

Classification: Order — Podzolic
Great Group — Grey Brown Podzolic
Soil Group — Brunisolic Grey Brown Podzolic
Family — Dumfries

Horizon	Depth Inches	Description
Ac (Aa)	0-5	Gravelly loam; dark reddish brown (5YR 3/3); granular structure; friable; pH 6.9.
A_{21} (Ae_1)	5-11	Gravelly loam; dark reddish brown (5YR 3/3); coarse granular structure; friable; pH 6.5.
A_{22} (Ae_2)	11-16	Fine gravel; reddish brown (2.5YR 5/4); loose; pH 6.5.
B_2 (Bt)	16-24	Gravel; dark reddish grey (5YR 4/2); reddish brown coating on gravel particles; pH 6.5.
C	24+	Gravel; reddish brown (2.5YR 5/4); calcareous at a depth of 5 or 6 feet; frequently residual from shale or fine conglomerate sandstone.

Wendover Series

Location: Lot 13, Conc. VII, Cumberland twp., Russell county.

Parent Material: Non-calcareous, layered, red and grey clay.

Classification: Order — Regosolic
Great Group — Regosols
Soil Group — Orthic Regosols
Family — Rideau

Horizon	Depth Inches	Description
Ac (Aa)	0-5	Clay; very dark greyish brown (10YR 3/2); coarse granular structure; pH 6.4.
C	5+	Clay; brown bands (10YR 5/3) alternating with grey (10YR 5/1); some granular structure present when soil is moist; soil becomes tough and very firm with increasing depth; pH 6.4.