SOIL SURVEY
of the
ROCKY MOUNTAIN HOUSE SHEET

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Alberta Soil Survey
Report No. 19

Soil Survey
of
Rocky Mountain House Sheet

BY

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COVER EXPLANATION

This chimney is one of two and are all that remain of the old trading post of Rocky Mountain House. These remains are preserved as rare examples of the primitive chimneys built by the fur traders in their forts long before this region had a settled population.

The Rocky Mountain House trading post was built in 1799 by North West Company. David Thomson wintered here in 1800-1, 1801-2, 1806-7, and from here he set out in 1807 for the discovery of the Columbia River. It was for over seventy years the most westerly and the most southerly post in the Blackfeet country and remained in operation until 1875.

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INTRODUCTION

This is the nineteenth report in the reconnaissance soil survey series to be published by the Alberta Soil Survey. Each of these reports covers a specific portion of the Province of Alberta; the areas covered averaging about 2,000,000 acres. Each report then marks a further step forward in obtaining a complete inventory of the province's soil resources.

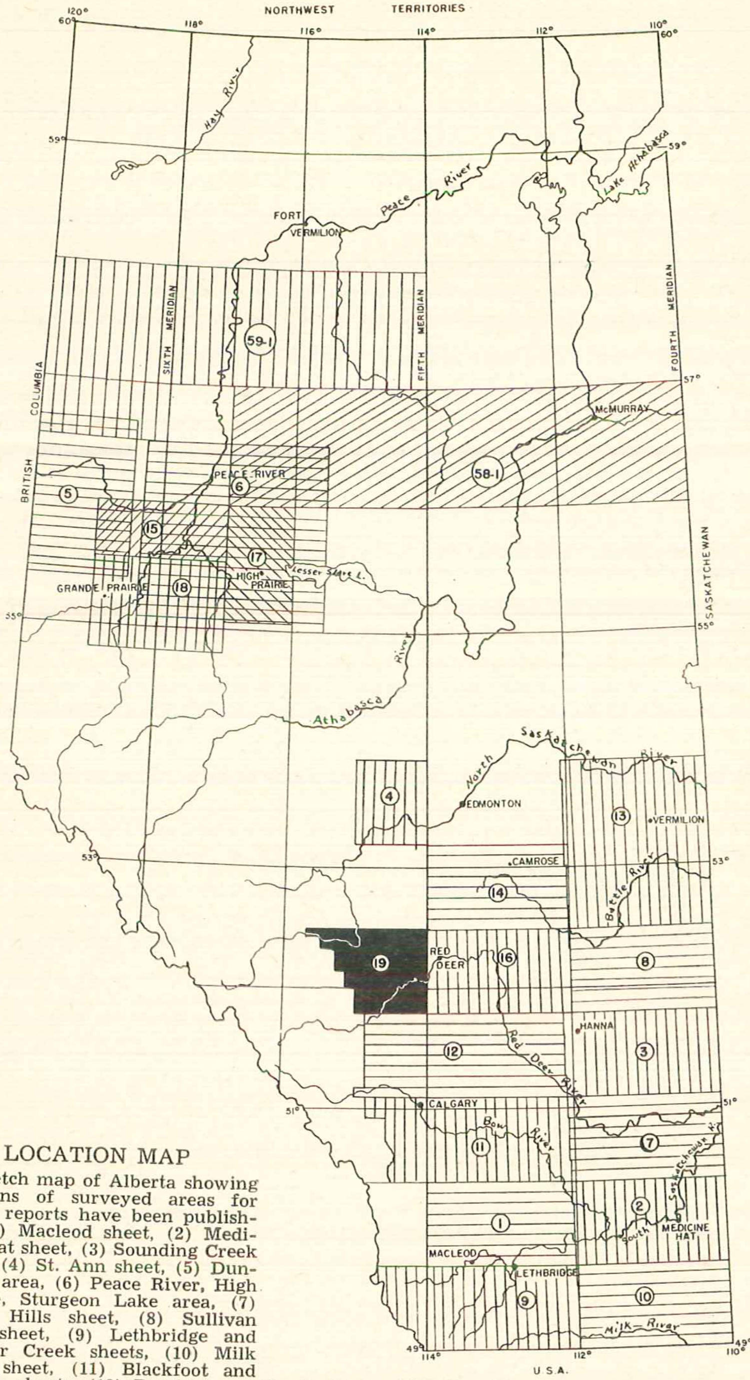
This soil report is divided into a number of sections and sub-sections. The first part of the report gives a general description of some of the physical characteristics of the area. Included is an explanation of some of the terminology used in describing the soils. The second part of the report describes the soils of the area. The soil types are arranged in a systematic order to show the relationship one to another. The third part of the report is the appendix which gives, in some detail, data relating to the soils and the area. Specific data on most of the individual series is outlined in Table No. III.

The soil map, on the scale of one inch equals two miles, is an integral part of this report. It shows the location and extent of the different soil types, as well as indicating the main topographic features. Three other maps are included, one showing the relative producing capacity of the soil areas; one showing the extent and location of the cultivated land, and one showing the kind of parent material on which the soils were formed.

The soil map and report should be kept and used together; one supplements the other. In reading the report it is suggested that the description of a particular soil series be supplemented by reading the general descriptions given at the beginning of the particular section. The term earth that appears in the map legend is synonymous with the term modal soil in the report. For example, the description of "Antler loam" should be read following the more general discussions given under Chernozemic Black soils and modal Black soils.

The classification of our soil resources into recognized categories is essential before intelligent use can be made of the wealth of scientific agricultural information now available. It is our sincere hope that this report will help towards a better understanding of the soils of the Rocky Mountain House area; an understanding that is essential if we are to achieve full production without soil deterioration.

PLATE I



LOCATION MAP

Sketch map of Alberta showing locations of surveyed areas for which reports have been published: (1) Macleod sheet, (2) Medicine Hat sheet, (3) Sounding Creek sheet, (4) St. Ann sheet, (5) Dunvegan area, (6) Peace River, High Prairie, Sturgeon Lake area, (7) Rainy Hills sheet, (8) Sullivan Lake sheet, (9) Lethbridge and Pincher Creek sheets, (10) Milk River sheet, (11) Blackfoot and Calgary sheets, (12) Rosebud and Banff sheets, (13) Vermilion and Wainwright sheets, (14) Peace Hills sheet, (15) Rycroft and Watino sheets, (16) Red Deer sheet, (17) High Prairie and McLennan sheets, (18) Grande Prairie and Sturgeon Lake sheets. (IN BLACK) Rocky Mountain House sheet.

58-1—Exploratory Soil Survey of Alberta Map Sheets 84-C (east half), 84-B, 84-A, and 74-D.

59-1—Exploratory Soil Survey of Alberta Map Sheets 84-D (north half), 84-E, 84-F, and 84-G.

NOTE: Reports for areas 1 to 9 inclusive and 11 are out of print, but may be obtained on loan from the University Extension Library, University of Alberta, Edmonton.

Soil Survey of the Rocky Mountain House Sheet

by

T. W. PETERS*, W. E. BOWSER*

DESCRIPTION OF THE AREA

The Rocky Mountain House sheet lies in west central Alberta, see plate I. It consists of townships 33 to 40 inclusive, from range 1 west of the fifth meridian to the Rocky Mountain Forest reserve boundary. The mapped area covers approximately 1,600,000 acres.

The soil information presented in this report, including the soil map, was obtained by a reconnaissance soil survey of the area. Traverses were made at one mile intervals along the road allowances. The boundary lines between the soil types were established along the lines of traverse and then projected between the lines of traverse. Aerial photographs were used extensively to increase the accuracy of the mapping. Therefore, if more detail within a section is required further inspection should be made.

An appreciation of the factors that have determined the development of the soils of the area, and that influence the agriculture practised on them, is of value in using the soil map and interpreting other soil data. These factors are discussed briefly in the first part of the bulletin. Following this, the soil types that occur are described and their agricultural capabilities and limitations listed. Chemical and physical analytical data as well as other data are given in the appendix.

SETTLEMENT HISTORY

The trading post of Rocky Mountain House was built in 1799 by the North West Fur Company about a mile north of the confluence of the Saskatchewan and Clearwater rivers. Shortly afterwards the site was moved to a point on the north bank of the Saskatchewan just above the confluence. The post remained in operation until about 1875. David Thomson wintered here in 1806-07 and set out from here that spring on his journey of discovery that led to the Columbia River. Dr. Hector of Captain Palliser's party wintered here in 1858.

The eastern side of the area was settled around the turn of the century; settlement radiating out from the Edmonton-Calgary railway line. The building of the Red Deer-Rocky Mountain House-Nordegg railways about 1914 gave impetus to the settlement of the western portion of the area, and by 1921 the rural population totalled about 10,000: the present rural population is about 15,000.

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The 1921 census reports about 200,000 acres cultivated in the area: at present there are about 600,000 acres cultivated. The cultivation map (plate III) shows the present distribution of the cultivated land.

Comparing the cropping pattern of 1921 with 1951 the following trends are noted: (a) some reduction in the percentage sown to wheat, (b) a small percentage decrease in fallow land, (c) a small decrease in the percentage of hays, and (d) a large increase in the percentage of barley.

Rocky Mountain House is the largest town in the area (population 1,285). Sylvan Lake, (population 1,114) is a resort town as well as serving a rural community. Sundre, (population 923) is located on the Red Deer river, and has no railway connection. It serves the oil industry as well as the surrounding farming community. The village of Caroline (population 290) is also without railway connection. It serves a local lumbering industry as well as a farming community. The other villages in the area are Bentley, (population 536), Eckville (population 456), and Bowden (population 296).

A study of the place names of the trading centres is revealing as well as interesting. Condor commemorated a gunboat used in the bombardment of Alexandria, Egypt, in 1882; Sundry, Norway was the birthplace of Sundre, Alberta's first postmaster; Alhambra was the name of a fortress of the Moorish kings of Grenada; Forshee is a namesake of a town in Virginia; and Markerville commemorates the name of Alberta's first dairy commissioner.

Sylvan lake, the largest lake in the area, has long been a summer resort. A Provincial park has recently been established at Crimson lake.

CLIMATE AND VEGETATION

The climate of the Rocky Mountain House sheet is characterized by moderately warm summers and relatively cold winters. The mean summer temperature (May to September inclusive), at Rocky Mountain House is 50°F. The average daytime high for this period is about 65°F. January is the coldest month with a mean average of 10°F. The average annual precipitation at Olds is 18 inches, at Rocky Mountain House, just under 20 inches. The yearly variation is usually not great, although the total has been as low as 10 inches and as high as 30 inches. Fortunately over 60% of the precipitation falls during the growing season, April to October. A large percentage of the precipitation that falls during the winter months is lost in the spring run-off.

As the average elevation increases from approximately 3,000 feet on the east side to over 4,000 feet on the west side, there is a gradual shortening of the growing season toward the west. It decreases from about 175 days at Olds to less than 150 days west of Rocky Mountain House. The average frost-free period at Olds is 100 days; at Rocky Mountain House the frost-free period is 50 days. For more detailed meteorological data pertaining to this area see Table I, Page 39.

The native vegetation found in any area is mainly the result of climatic factors existing in that area. In the mapped area the vegetation changes from a parkland type in the southeast portion to heavy forest in the west half. The parkland vegetation is characterized by open grassland country interspersed with aspen poplar and willow groves. Spruce and pine may be found along stream courses, on sand hills and around marshy areas. The forest vegetation consists of aspen and black poplar, birch, spruce and pine. The percentage of coniferous trees increases to the west. Wild fruit such as raspberry, saskatoon, cranberry, pin-cherry, and chokecherry flourish throughout the area. Black spruce, dwarf birch, tamarack, blueberry and low bush cranberry predominate on the organic soils of the depressional areas.

Black (Chernozemic) soils dominate the parkland area. Under a grassland vegetation organic matter tends to accumulate in the surface (A) horizon. Grass feeds fairly heavily on mineral nutrients and their roots penetrate quite deeply. Therefore the surface of these black soils is fairly well supplied with plant nutrients. These soils are about neutral in reaction, that is, neither strongly acid nor alkaline.

Grey Wooded (Podzolic) soils dominate the wooded area. The leaf litter that collects in the forest decomposes quite rapidly and the products of this decomposition together with other soluble material is carried well down into the profile by the percolating rain

Fig. 1.—Barley being grown in the foreground on Grey Wooded soil with clearing and heavy tree cover in the background.

water. A grey leached soil results. These soils tend to be acid in reaction.

The types of soil that have developed, the available moisture and the length of the growing season are the main determinants of the types of crops that can be satisfactorily grown. Wheat is the principal crop in the eastern portion. Coarse grains and forage are the main crops grown in the western portion.

THE SOIL'S PARENT MATERIAL

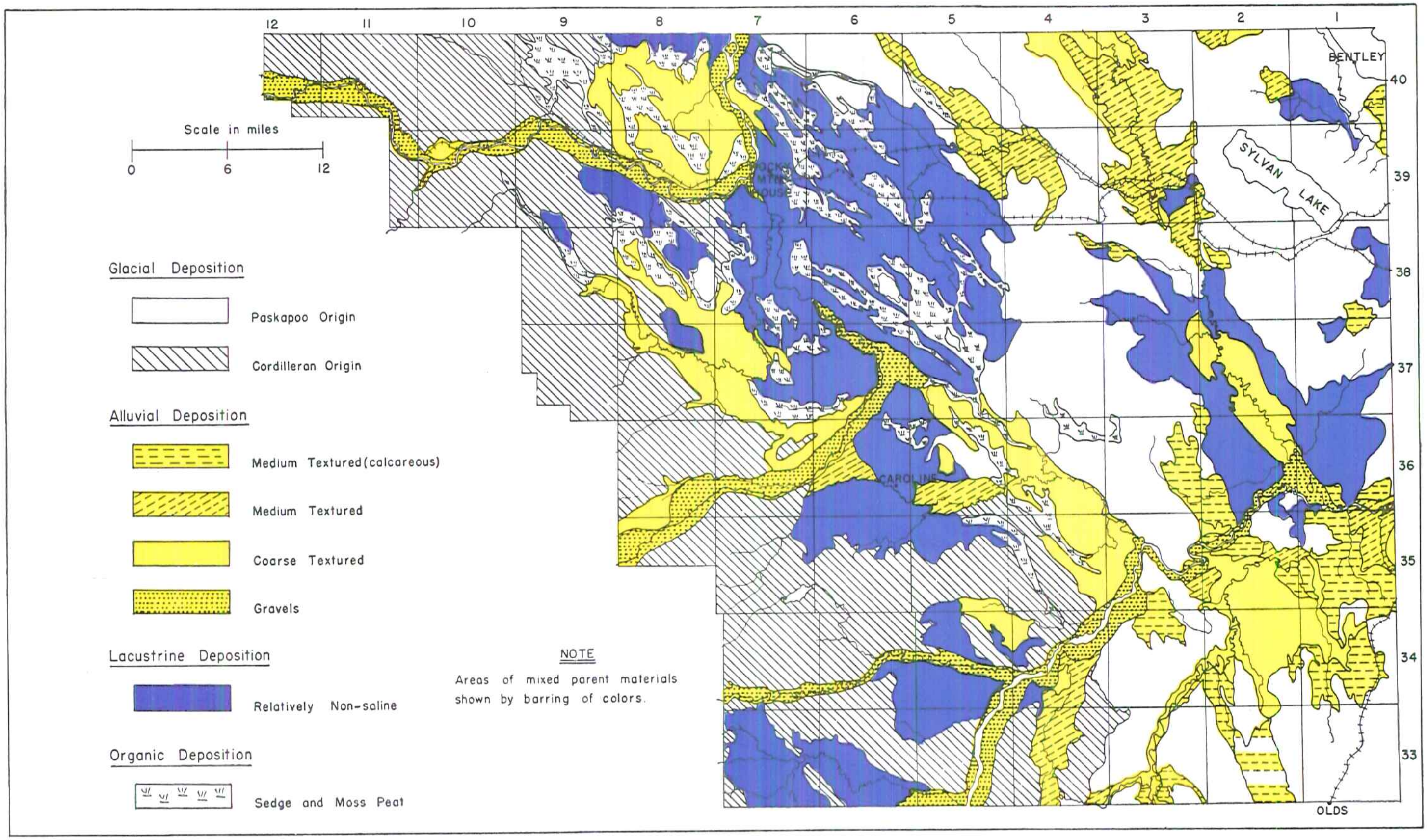
Through the eons of geologic time the surface of the earth has been continually changing shape. Tectonic forces within the earth have always been active: new mountain ranges being thrust up, other mountain ranges subsiding into the earth's crust. At the same time the agents of erosion (heat, wind, water and ice) have been continually at work. Material has been eroded away from one area and deposited in another. Tremendous depths of this moved and removed material now cover the earth's surface. Much of it has again re-consolidated into bedrock.

Within the mapped area great depths of sedimentary material have been deposited. The uppermost bedrock formation is a buff colored sand and siltstone called the Paskapoo formation. This formation was laid down under fresh water conditions and is relatively non-saline. According to information available the Paskapoo formation is thought to have been laid down before the Rocky Mountains were thrust up.

The last major geological event in Western Canada was the appearance of the continental ice sheet. At that time the air temperature cooled slightly and a huge ice mass formed in Northern Canada. This ice mass was several thousand feet thick and began moving in a south and southwesterly direction. As it moved it abraded the underlying bedrock and carried some of it for considerable distances. When the climate again warmed somewhat, the ice melted from the front northward; the time of this has been set at about 20,000 years ago. When this glacier melted, a mantle of ground up rock material was left; in many places over a hundred feet thick. This heterogeneous mixture of stones, gravel, sand, silt, and clay so deposited is called GLACIAL TILL. The glacial till in the map area is grey brown in color and has a medium to high lime carbonate content.

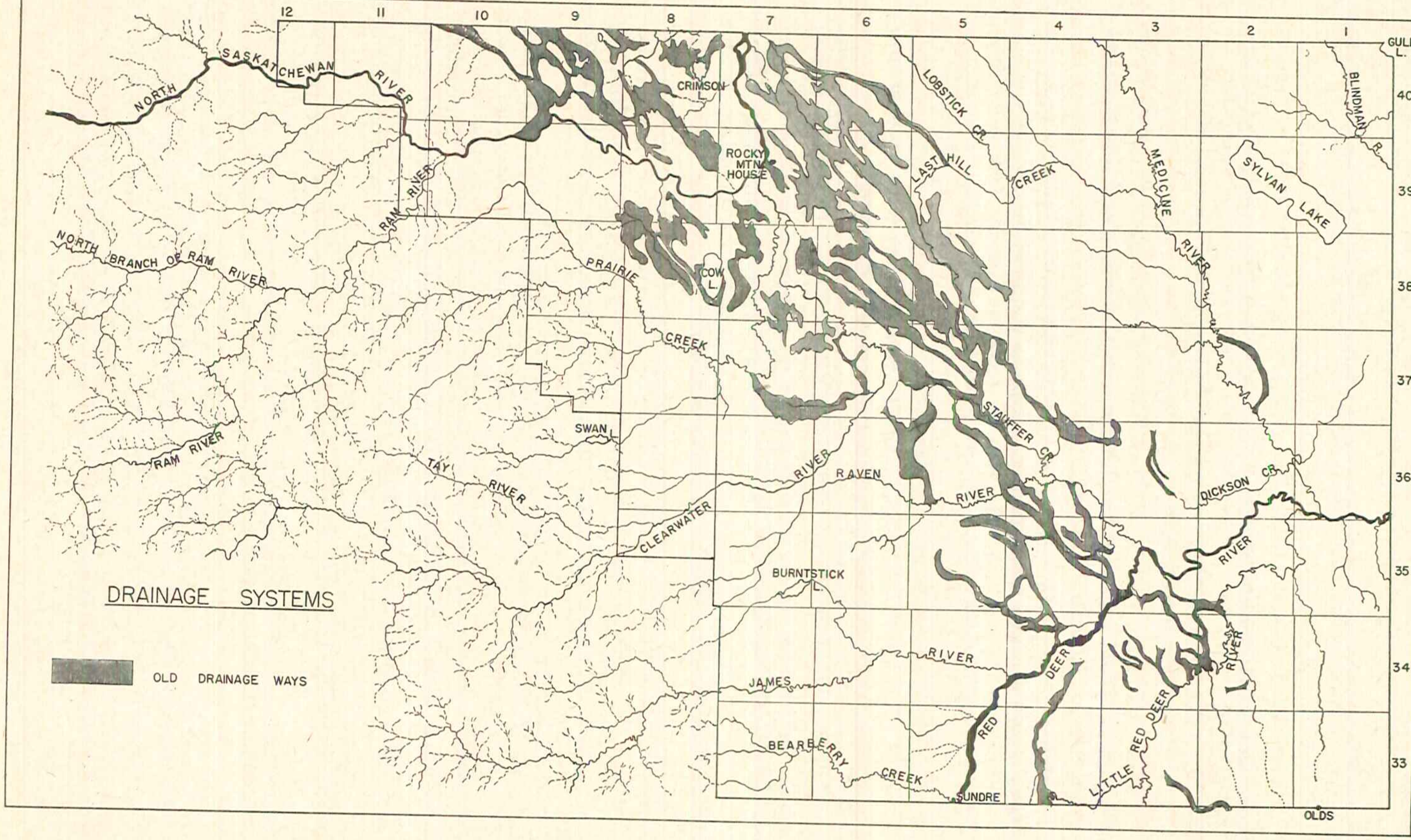
At the same time that this continental ice sheet was moving southward a smaller ice sheet formed in the Rocky Mountains and moved out eastwards. These two sheets met along a line about where Rocky Mountain House now stands, see plate. This western ice sheet left a till that was more stony and more calcareous than the till left by the eastern ice.

The effects of glaciation did not stop with the deposition of the glacial till. While the ice was melting there were obviously large amounts of water present. Rivers ran from the ice front and carried rock material with them. The finer, or smaller particles were



Scale in miles
0
6
12
Glacial Deposition
Paskapoo Origin
Cordilleran Origin
Alluvial Deposition
Medium Textured (calcareous)
Medium Textured
Coarse Textured
Gravels
Lacustrine Deposition
Relatively Non-saline
Organic Deposition
Sedge and Moss Peat
NOTE
Areas of mixed parent materials shown by barring of colors.
12
11
10
9
8
7
6
5
4
3
2
1
40
39
38
37
36
35
34
33
BENTLEY
SYLVAN LAKE
CAROLINE
OLDS

PLATE II


12 11 10 9 8 7 6 5 4 3 2 1
40 39 38 37 36 35 34 33
GULL L.
NORTH SASKATCHEWAN RIVER
CRIMSON L.
ROCKY MTN. HOUSE
LOBSTICK CR.
LAST HILL CREEK
BLINDMAN R.
SYLVAN LAKE
MEDICINE RIVER
RAM RIVER
NORTH BRANCH OF RAM RIVER
PRAIRIE CREEK
COW L.
STAUFFER CR.
SWAN L.
TAY RIVER
CLEARWATER RIVER
RAVEN RIVER
DICKSON CR.
RIVER
BURNTSTICK L.
JAMES RIVER
RED DEER RIVER
LITTLE RED DEER RIVER
BEARBERRY CREEK
SUNDRE
OLDS
DRAINAGE SYSTEMS
OLD DRAINAGE WAYS

Most of the area is well drained except the level to gently undulating area extending from Rocky Mountain House south east to the Red Deer river. This area has numerous peat bogs.

Springs are numerous throughout the area and increase in numbers towards the foothills. Wells vary considerably in depth but as a rule good quality water is easy to find at relatively shallow depths.

Plate II shows the main drainage courses as well as ancient drainage ways. Most of the ancient drainage ways have very small intermittent streams and peats have developed in the low lying channels. These drainage ways run in a north west — south east direction and form a striking drainage pattern in this area. It is suggested that these channels were cut along the front of the ice sheet as the ice melted. Some of these old valleys connect the present North Saskatchewan and Red Deer drainage courses. In general, the valleys are wide and deep.

SOILS

If an exposed road cut is examined discernible layers will be seen from the surface downward. These layers differ in COLOR; they differ in the relative amounts of fine and coarse particles they contain (TEXTURE); they differ in the way these individual particles are held together in blocks, plates or granules (STRUCTURE); as well as in other properties. These layers are called HORIZONS and are the result of soil forming processes. These horizons are given a name symbol as follows: The A horizon is the surface horizon. It is the horizon that usually contains the greatest amount of organic matter, and is the horizon of maximum weathering, eluviation (leaching) and of maximum biological activity. The B horizon is the sub-surface horizon and is usually finer textured than the A horizon. It usually has a well-defined structure and may have accumulated weathered products that have been leached out of the A horizon. The C horizon is the relatively unchanged parent material. There are usually no soil horizons in or below the C horizon. However, a D horizon is recognized when there is underlying material that is different from the material from which the soil profile was formed. Quite often each of these major horizons is subdivided, for example A_1 and A_2.

The kind of soil that develops in any one place is the result of the factors of moisture, temperature, and biological activity acting on the ground-up rock material (PARENT MATERIAL) over a period of time. Wherever similar conditions exist similar soil profiles will develop. A change, however, in any one of these factors may result in a different soil being formed. Each set of conditions results in a specific kind and arrangement of the horizons —a soil unit. These units, for classification and mapping purposes are called *SOIL SERIES,* and are given specific names—usually the names of places where they where first mapped. In the Rocky

Mountain House area 28 soil series were recognized, plus alluvium, gravel deposits, and organic soils. Within rather narrow limits soils of the same series have similar agricultural use and capability. As suggested above all soils given the same series name have, for practical purposes, the same order and thickness of horizons as well as similar color, texture, and structure. There are, however, characteristics that may be common to many series. To show this relationship between the soil series it is possible to arrange them into broader groupings.

The soils of this area are arranged under six ORDERS, namely, the Chernozemic soils, the Podzolic soils, the Solonetzic soils, the Gleisolic soils, the Organic soils, and the Regosolic soils. These groupings have world-wide application and use. Each of these six orders is divided into groups and sub-groups. These last two sub-divisions also have wide geographical representation and more general agricultural use capabilities. Table 11, Page shows how the series are fitted into this classification system.

SOIL TEXTURE

Soil texture refers to the relative proportions of sand, silt, and clay particles in the soil. Sand particles can be seen by the naked eye, silt particles feel floury but are not plastic; clay particles are the finest (smallest in size) of all. Soils high in clay are usually very *PLASTIC*. They are sticky and can be molded into shapes.

Soils are commonly grouped into three main texture groups, namely: sandy soils (coarse textured soils), loamy soils (medium textured soils), and clayey soils (fine textured soils).

Fig. 2.—Dark Grey Wooded soils on gently rolling to rolling topography west of Gilbey.

Coarse textured soils are mostly sands and gravels. They are loose, have a very low water holding capacity and usually are low in plant nutrients. These include the sand, loamy sand, and sandy loam texture classes.

Medium textured soils include the very fine sandy loam, loams, silt loam, and clay loams. They, as a rule, hold a fairly high percentage of moisture, are usually well supplied with plant nutrients and are relatively easy to cultivate.

Fine textured soils contain over 35 to 40 per cent clay and usually are very sticky. They hold a large amount of water and are usually well supplied with plant nutrients. They are, in general, the most difficult to keep in good tilth. Sandy clay, silty clay, and clay are the textural classes in this group.

CHERNOZEMIC SOILS

The word Chenozem is of Russian origin. It was the name given to the black soils of the Ukraine. Chernozemic soils have developed under a grassland vegetation in moderately to well-drained locations. They are characterized by a dark surface A horizon and a lime accumulation horizon in the subsoil (see profile diagram on soil map). Under somewhat arid conditions the A horizon is relatively shallow and brown in color. Under a more humid climate the A horizon is deeper and of a darker color. The chernozemic soils mapped in this area all have black surface (A) horizons.

Chernozemic Black Soils:

The black soils of this area were, it is believed, formed under a grass vegetation although at the present time groves of aspen poplars dot the landscape. Grass is a fairly heavy feeder on minerals and therefore the surface horizons of these soils were kept fairly well supplied with the mineral plant foods. These soils have over seven inches of a black surface horizon that is relatively high in nitrogen. Initially therefore, these soils were fairly rich soils. In some cases however, continued grain-fallow cropping has reduced this initial high fertility and plant nutrient deficiences are becoming apparent. The organic matter content is also being lowered. This not only reduces fertility but also makes the soil more susceptible to wind and water erosion. One of the first mineral deficiencies to become apparent in these soils is that of phosphorus. Experimental data and the experience of some of the farmers indicates that profitable returns can be obtained by using a phosphate fertilizer. Areas that have been under a cereal-fallow rotation for some time will usually respond to the application of nitrogen fertilizer and the inclusion of legumes in the rotation. The black soils in this area have been used primarily for wheat production, although mixed farming is now being practised fairly extensively.

In all, approximately 540,000 acres of black Chernozemic soils were mapped in the Rocky Mountain House Sheet.

For purposes of this report the black soils have been divided into four sub-groups, namely:

1. Modal Black soils
2. Solodic Black soils
3. Degrading Black soils
4. Meadow-like Black soils

MODAL BLACK SOILS

These soils have black surface A horizons that are loose and granular in structure. The B horizon is brown to yellowish brown in color. This B horizon has a massive appearance in the coarse textured soils, usually has a prismatic structure in the intermediate textured soils and has a blocky structure in the fine textured soils. The transition from the A to the B horizon is usually quite gradual; that is, there is a gradual fading out of the black A horizon. The lower portion of the B horizon has a lime carbonate accumulation.

The following series have been mapped as modal Black soils in this area:

Antlel Loam (Ant. L):

Antler loam is a modal Black soil developed on glacial till that is primarily of Paskapoo formation origin. Sandstone slabs are commonly found within the profile. The topography of these soil areas is from undulating to rolling. The areas of Antler soil were mainly grass covered. Willow and aspen poplar occur in clumps, particularly on the northern slopes. A few depressional areas occur; however, the drainage is fairly well developed.

Antler loams have from eight to ten inches of a black A_1 surface horizon; a yellowish brown B horizon and a limy C horizon. The lime occurs at about 24 to 30 inches from the surface.

Antler loam on the undulating topography types rates as good to very good arable land. It has a fairly high initial fertility although many farmers are now getting response from the use of phosphate fertilizers. It is quite receptive to water and in general on slopes up to ten percent water erosion is not a great hazard.

Didsbury Loam (Db.L.):

Didsbury loam is a thick Black soil developed on a fairly uniform glacial till primarily of Paskapoo formation origin: the surface one or two feet is usually somewhat sorted and relatively free of stones. The dark colored A horizon is usually over 18 inches in depth. The A and the B horizons often contain numerous abandoned animal burrows. These are generally filled with calcareous material from the C horizon. The B horizon is a brown to greyish brown color. This soil occupies the fairly well drained positions on level to gently undulating topography. The micro-external drainage of the area is not too well developed and therefore, numerous slightly lower spots occur throughout the area. The main external drainage in this area is, however, well developed and connects to the broad, deep post-glacial channels that traverse the areas.

Didsbury loams, as found in this area, rate as good to very good arable lands. Vegetative growth on this soil is usually quite luxuriant and therefore, wheat crops are late in maturing. Phosphate fertilizer might be of value in hastening maturity. Excellent yields of forage crops and coarse grains can be expected.

Penhold Loam, Silt Loam (Pe.L., Pe.Si.L.):

Penhold soils are modal Black soils developed on alluvial lacustrine material that is relatively high in lime carbonate. These soils have eight to ten inches of black A horizon. They have a brown to yellowish brown B horizon and a limy C horizon. There is a sharp break from the B to the C horizon. They are stone free. Penhold soils occur on level to undulating topography and usually are found in basin-like areas. Low poorly-drained spots occur throughout the areas. These are mainly mapped as Penhold meadow.

The high lime content of the subsoil (usually found within 24 inches) may tend to reduce yields, particularly in dry years. It has a tendency to reduce the availability of the phosphorus. They are eroded by wind fairly easily and therefore the fibre and organic matter content should be maintained. In general these soils rate as very good arable land.

Peace Hills Sandy Loams, Loamy Sand (Ph. SL., Ph. FSL., Ph. LS., Ph. CSL.):

Peace Hills soils are modal Black soils of coarse texture developed on alluvial aeolian parent material. The black A horizon of the loamy sand is often less than eight inches thick; the A horizon of the sandy loams average about twelve inches in thickness. The B horizon is fairly firm but the C horizon is usually a loose sand. The topography of the loamy sand areas is usually dune-like whereas the topography of the sandy loam areas is level to gently rolling. Some aspen poplar and low shrubs are found in the virgin areas. The low spots between the knolls in the gently rolling areas are usually somewhat marshy or peaty.

These soils have a lower reserve of mineral plant nutrients than the finer textured soils and should respond to the addition of mineral fertilizers. Also, these soils have a low water holding capacity and are subject to wind erosion when disturbed. The fibre and organic matter content should be maintained at a fairly high level. This means the inclusion of hays and legumes in the rotation at fairly frequent intervals.

Depending upon the texture and topography these soils rate from pasture to good arable lands. The fine sandy loams on good topography are the good arable lands.

Ferintosh Sandy Loam (Fth. SL.):

Ferintosh sandy loam is a Black soil developed on coarse gravelly outwash material. It is usually found along stream courses and in

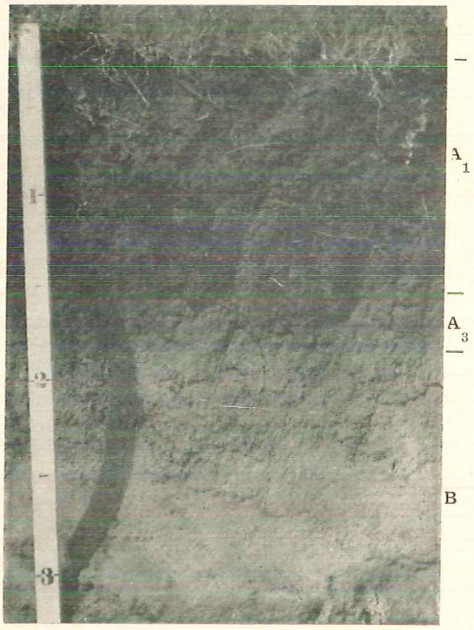


Fig. 3.—Peace Hills fine sandy loam, a modal Black soil. Note the deep black A_1 horizon (18″). This soil will erode with wind unless the organic matter and fibre content of the surface soil is maintained.

post glacial channels. The topography is from level to gently undulating. It can be recognized by a loose black A horizon overlying a very gravelly subsoil.

Since this soil is well to excessively drained it is a droughty soil. It probably also has a low fertility reserve, and should be used primarily for pasture and hay crops. It rates from non-arable to fairly good arable land, the non-arable land having the gravelly sub-soil very close to the surface.

SOLODIC BLACK SOILS

Solodic Black soils are transitional towards the Solonetzic group. They have been mildly influenced by salt in the parent material. They have a black A_1 (surface) horizon that is loose and usually somewhat platy in the lower portion. There is a gradual break to a thin light colored platy A_2 horizon. The B horizon usually has a small to medium blocky structure. There may be a salt accumulation horizon present in the C horizon. There is a lime carbonate accumulation horizon.

Ponoka Loam, Silt Loam (Pk.L., Pk.Si.L.):

Ponoka soils are medium textured solodic Black soils developed on uniform alluvial to lacustrine parent material. This material is stone free. However, at three to four feet the underlying glacial till may be found and a stony or gravelly layer often occurs at the contact of these two materials. Usually there is a sharp break from the black A horizon to the brown prismatic B horizon. In some cases, however, there is a very thin light colored A_2 horizon immediately below the black A_1 horizon. The B horizon in this case has a fine blocky structure.

The black A horizon is usually over ten inches in thickness and is loose to granular in structure. If not allowed to deteriorate this surface horizon is rich in plant food. Ponoka loams take water readily and are fairly water retentive. They are good to excellent arable soils. It should be noted, however, that soils with a high growth potential are often kept low in available plant foods. They should respond to the application of both nitrogen and phosphorus fertilizers.

Ponoka soils occur in level to undulating topography. These soils rate as good to very good arable land on level to undulating topography. Low somewhat depressional spots occur throughout the areas. These low areas are usually somewhat marshy.

Cygnet Loam (Cy.L.):

Cygnet loam is a medium textured solodic Black soil developed on glacial till that is mainly of Paskapoo origin. The till in these areas shows evidence of being sorted by either wind or water. When it is found associated with Antler loam it occurs usually on the lower slopes. When found in association with Ponoka or Penhold loams it occupies the slightly higher positions.

This soil has a fairly deep black A horizon that is loose to weakly platy. There is a brown A_2 horizon and a fine blocky B horizon. Lime occurs at 30 to 40 inches. In the more westerly areas the A horizon is often a dark brown indicating some podzolic leaching. These latter areas in particular should respond to the application of fertilizers as well as the inclusion of legumes in the rotation.

Cygnet loam occurs chiefly in undulating to gently rolling topography. When on undulating topography it rates as very good arable land.

DEGRADING BLACK SOILS

Degrading Black soils are assumed to have been Black soils at one time but have been under native tree cover for a sufficient period of time to have had noticeable acid leaching. That is, there is a loss of organic matter from the A horizon and the A horizon is brownish rather than black. There is considerable variation in the amount of leaching of the A horizon; the A_1 horizon varies in color from a very dark brown to dark greyish brown. This gives the fields a spotted appearance. There is a light brown to greyish brown weakly platy A_2 horizon. In most places the A_1 horizon is thicker than this A_2 horizon. The B horizon has a blocky structure but is quite friable. A lime carbonate layer may be found at depths of 40 to 50 inches from the surface.

Since these soils occur mainly in the transition area between the grassland and the woodland, Black soils, Grey soils, and all the intermediate stages occur in close association. Those more closely resembling the Black soils are placed in the Chernozemic order; those closer to the Grey Wooded are described with the Podzolic order.

Four series were mapped in this subgroup:

Benalto Loam (Ba.L.):

Benalto loam is a medium textured degrading Black soil developed on glacial till composed chiefly of material from the Paskapoo formation. There are very few stones near the surface. Stones are found in the subsoil. Benalto loam occurs on undulating to rolling topography. In most of the areas external drainage is well developed.

This soil has from six to ten inches of dark brown A_1, about two inches of light brown A_2, and a fine to medium blocky B horizon that is moderately permeable to water. Lime occurs at 40 to 60 inches. The variable color of the surface is quite apparent in the fields.

Benalto loams have a fairly high native fertility but will respond to the application of nitrogen and phosphorus fertilizers and the inclusion of legumes in the rotation. Sulphur carrying fertilizers may also be profitable. On the undulating topography this soil rates as a good arable land.

Rimbey Loam, Silt Loam (Rb.L., Rb.Si.L.):

These medium textured degrading Black soils have developed on fairly uniform stone-free alluvial or lacustrine parent material. The A horizon is often variable in color giving the fields a patchy appearance. Glacial till is usually found at 30 to 40 inches below the surface and the contact between the till and overlying material may be stony, gravelly, or sandy. These soils can be distinguished from Benalto loams by the overlying stone-free material and the stony contact layer.

Rimbey soils have from eight to twelve inches of a dark brown to very dark brown A_1 horizon, from one to two inches of light brown A_2 horizon, and a fine to medium blocky B horizon. They occur on level to undulating topography and the external drainage is well developed. Water infiltration into the D horizon is slow and therefore water erosion is apparent on some of the slopes. The inclusion of legumes and grasses in the rotation should be encouraged in order to maintain or increase the fibre content. At the same time cultivation across the slopes rather than up and down the slopes will materially help in controlling the water erosion. These soils rate as good arable lands on undulating topography.

Bearberry Clay Loam, Clay (By. CL., By. C.):

Bearberry soils are fine textured degrading Black soils developed on lacustrine materials. These soils have about four inches of

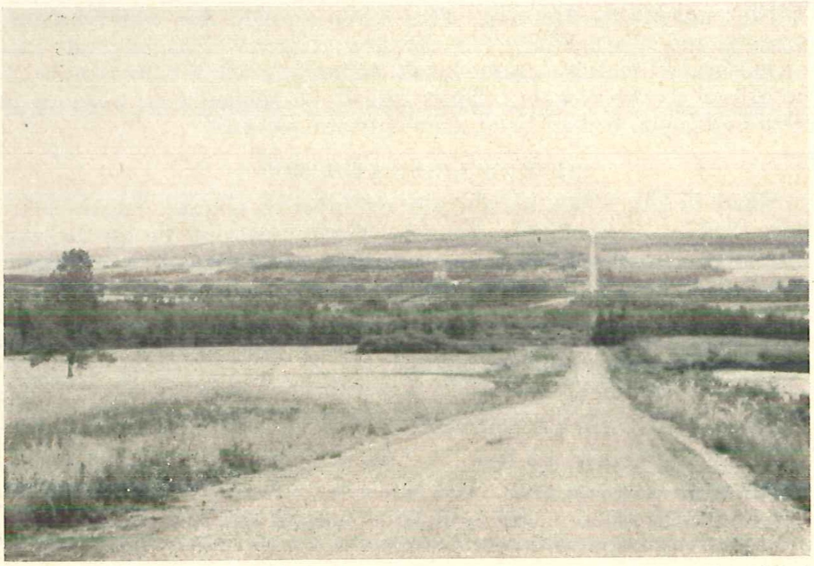


Fig. 4.—Farming country near Withrow. Grey Wooded and Degrading Black soils are farmed here.

a dark grey A_1 horizon, and about four inches of a grey A_2 horizon. The B horizon is coarse blocky in structure and fairly firm. Lime occurs at 30 to 40 inches.

Bearberry soils are found on undulating to rolling topography in which the external drainage pattern is fairly well developed. Water infiltration is, however, slow and erosion could become a serious problem, particularly on the steeper slopes. The native cover on these soil areas is dwarf birch, willow and tall grass.

These soils occur west of Sundre which has a relatively short growing season, namely less than 155 days. Most of the area therefore, is used for the production of coarse grains and forage crops.

Bearberry soils in this district rate as fairly good to good arable soils when found on undulating topography.

Sundre Loam (Sd. L.):

Sundre loam has developed on outwash material. Gravel and cobblestones are found at depths of 18 to 24 inches from the surface. The areas that are on higher well drained positions are degrading Black soils. There is, however, a gradual change towards the lower flood plains. In the latter position the profile more nearly approaches an imperfectly drained alluvium with lime occurring well up in the profile. The soils in the higher positions have about eight inches of a dark grey A_1 horizon and two to three inches of grey A_2 horizon. The lime horizon is found usually within two feet of the surface. These soils occur mainly on level bench lands and, except where there is a water table close to the surface, are well to excessively drained. They have a fairly low water holding capacity and also a fairly low fertility reserve. Sundre soils rate as non-arable to fair arable lands depending on the proximity of the gravel to the surface. They should be seeded to a mixture of grass and legumes and used primarily for pasture.

MEADOW-LIKE BLACK SOILS

Meadow-like Black soils occur on level to slightly depressional areas that are imperfectly drained. Water does not lie on the surface for any great period of time but they drain very slowly. These soils can be recognized by a black to grey black A horizon and a fairly sharp break to a grey brown sticky (gleyed) B horizon. Free lime carbonate is usually found at the top of the B horizon; at times in the lower part of the A horizon.

Most of the Meadow-like soils of this group are best suited to coarse grains. Those soils with a slow run-off might be used to grow hay crops.

Penhold Meadow (Pe. M.):

Penhold meadow is the only Meadow-like Black soil mapped in this area. In general this soil has about 12 inches of black A horizon. The B horizon is grey in color, (often iron stained), massive in structure, and usually has lime at 16 to 18 inches. The native cover is mainly coarse grasses.

These soils occur in the slightly depressional portions of larger level to undulating areas. They rate as fair to good arable lands depending mainly on the degree of external drainage. Individual areas that are large enough might best be seeded to a hay crop.

PODZOLIC SOILS

The word "Podzolic" is of Russian origin and means ashy or ash like. Podzolic soils were formed under relatively humid conditions and under a forest vegetation. They are, therefore, relatively strongly leached and have light-colored, ashy surface horizons. This is in strong contrast to the Chernozemic soils that have dark-colored surface horizons. Grey Wooded soils are the only group of Podzolic soils found in this area.

GREY WOODED SOILS

Grey Wooded soils have developed under a forest vegetation in the cooler portions of the north temperate zone. In this area they occur mainly in the western two thirds of the mapped area. The annual rainfall here is about 18 inches. There was fairly complete tree cover.

Grey Wooded soils are characterized by a leaf mat (A_0 horizon), a distinct leached ashy and usually platy A_2 horizon and a well developed B horizon that contains more fine clay than does the overlying A horizon or underlying C horizon. The C horizon is highly base saturated and usually contains lime. They generally have an overall greyish color. The Grey Wooded soils of this area are low in fertility since the leaching process by which they were formed has removed much of the soluble mineral plant food from the upper horizons. These plant foods are carried by the rain water to the lower horizons. The subsoil is quite often richer in mineral plant nutrients than is the surface soil. In the native forested state the leaf mat decomposed quite rapidly and the products of this decay leached out readily. The surface mineral horizon therefore, is also low in organic matter and hence nitrogen.

The Grey Wooded soils of this area are low in fertility and low in organic matter but are in a favorable rainfall area. These soils will, therefore, respond to good cultural practices. Their productive power can be materially increased by the addition of organic matter and the application of mineral fertilizers. The inclusion of legumes in the crop rotation is essential. These add nitrogen as well as fibre. Organic matter helps to reduce the threat of water and wind erosion. Sulphur is one of the mineral plant nutrients in short supply. Other mineral deficiencies, for example phosphorus, are beginning to appear. Although these soils are slightly acid, little response has yet been obtained from the use of lime. This is possibly due to the relative high content of lime in the parent material, which is within reach of the plant roots. Wheat grown on these soils is usually low in protein content and hence of poor quality. Conversely, good malting barley can be grown. Legumes for hay and seed have proven quite successful.

The fine-textured subsoil usually found in these soils takes water slowly. Water erosion, therefore, can be quite serious, particularly on sloping land. Increasing the fibre and organic matter of the surface will help to prevent this water erosion by increasing its water-holding capacity. These soils are vulnerable to wind erosion once the surface crust is broken. Again fibre and organic matter in the surface will help to prevent this. Windbreaks should be left wherever possible.

Three subgroups of Grey Wooded soils were mapped in this area, namely, the modal Grey Wooded soils, the Podzol Grey Wooded soils, and the Dark Grey Wooded soils.

MODAL GREY WOODED SOILS

The modal Grey Wooded soils of this area occur mainly in the north central portion of the mapped area. They have a fairly thick leaf mat (average 2 to 3 inches) on the surface. Underlying this leaf mat are the following horizons: first, a very thin (often absent) dark A_1 horizon; second, a relatively thick ashy, pale-brown A_2 horizon; and third, a dark greyish brown, compact, blocky structured B horizon. A lime carbonate horizon usually occurs at 50 to 60 inches from the surface. These soils are slightly to medium acid in reaction.

There are approximately 170,000 acres of regional Grey Wooded soils mapped. A brief description of the mapped series follows,

Breton Loam (Bn. L.):

Breton loam is a medium textured modal Grey Wooded soil formed on glacial till left by the continental ice sheet. This till is from a heavy loam to sandy clay loam in texture. Stones occur throughout the profile. There are a few granite and gneiss boulders, brought in from the north east as well as sandstone slabs from the underlying Paskapoo formation. Breton loam occurs on gently undulating to hilly topography. Codner silt loam and peat areas are found in the associated depressional areas. All Breton loam areas were tree covered, aspen poplar being the most common tree. Black poplar, spruce and pine also occur; they are scattered throughout the aspen growth, and occasionally in clumps of relatively pure stands.

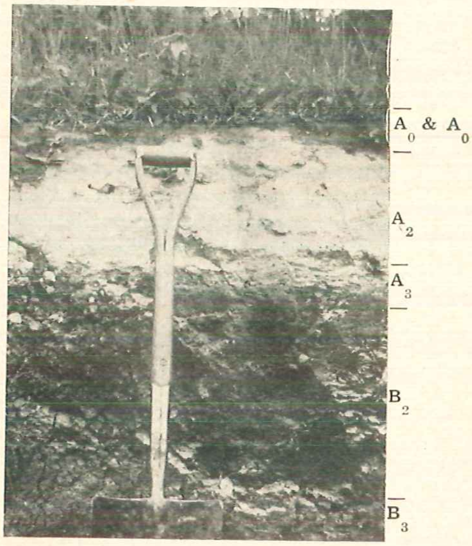


Fig. 5.—Breton loam, a modal Grey Wooded soil. Note the depth of the ashy A_2 horizon. This soil type should be built up by the use of legumes and mineral fertilizers.

Breton loam has from two to four inches of leaf mat (A_0). The dark grey A_1 is usually very thin and often practically non-existent. the very pale to pale brown platy A_2 is usually three to four inches in thickness. When exposed in the road cut this A_2 "flows" down the side. This is particularly noticeable in the spring. (There is a gradual increase in the intensity of the brown color of the A_2 horizon going from east to west across this area.) The transition from the A_2 to the blocky B horizon is gradual, that is there is an A B horizon. The fine to medium blocky structured B horizon changes downward to a coarse blocky to massive lower B horizon. Lime is found at from 40 to 80 inches from the surface. There is an average of about five percent calcium plus magnesium carbonate in the parent material.

The leaf mat is usually slightly acid to neutral. The most acid part of the profile is usually the upper portion of the B horizon.

The pH of this B horizon is usually moderately acid and occasionally very strongly acid (pH 4.75).

Breton loam is of low initial fertility. It rates as fair to fairly good arable land on undulating topography. As suggested in the general discussion above, these soils will respond to good management practices.

Tolman Loam (To. L.):

Tolman soils are medium textured soils formed on somewhat variable shallow lake laid deposits. The upper portion of the profile is stone free. Stony glacial material is usually found at three to four feet from the surface and a gravelly or sandy layer often separates these two materials.

These soils have from one to two inches of leaf mat (A_0), from two to three inches of grey black A_1 horizon and from three to four inches of a grey platy A_2 horizon. The B horizon is fairly heavy textured and is medium blocky in structure.

Tolman soils are usually found on level to undulating topography. In the native state they are covered mainly by aspen poplar. These soils are somewhat sandy and have a fairly good infiltration rate. Rarely are slopes over two percent. Water erosion is, therefore, not usually a hazard. They are, however, somewhat subject to wind erosion. Tolman soils rate as fair to good arable in this area.

Modeste Loam (Md. L.):

Modeste loam soils are medium-textured Grey Wooded soils formed on Paskapoo bedrock. Relatively unweathered bedrock is found close to the surface — often within two feet. This bedrock material is composed of layers of sandstone and siltstone that are usually light olive in color, and that break into angular fragments. They are shallow soils.

Modeste loam is generally found on level to undulating topography, often on lower bench lands. Only small areas of this soil occur, and very little of it has been cultivated. The tree growth on these areas has a stunted appearance. These soils are rated as poor to fair arable land. If cultivated the organic matter content should be substantially increased to add fertility and to increase the water holding capacity.

Culp Sandy Loam, Loamy Sand (Cu. SL., Cu. LS.):

Culp soils are coarse textured Grey Wooded soils formed on sandy aeolian material. They have a thin leaf mat (A_0) and a thin dark A_1 horizon — usually the two combined are not over two inches in thickness. The leached pale brown A_2 is deep, often over 10 inches in thickness. The B horizon is firm and massive rather than blocky. The C horizon is usually loose sand. Culp soils are found on gently rolling to rolling topography, much of it is dune like appearance. A sparce growth of aspen poplar covers the area. Marshy spots occur between the knolls. These vary from meadows to shallow peat areas.

There are a few areas mapped as Cu Cob. SL. These areas have sufficient cobblestones on or near the surface to interfere seriously with cultivation. Culp soils are rated as pasture to fair arable land.

Since these soils are low in organic matter and coarse in texture they have a low water-holding capacity as well as being low in native fertilty. They are vulnerable to wind erosion. Most of the areas might well be left in permanent pasture.

DARK GREY WOODED SOILS

Dark Grey Wooded soils are not as strongly leached as are the modal Grey Wooded soils described in the above section. They have from three to five inches of a brown A_1 horizon over the lighter colored leached A_2 horizon. Leith sandy loam is the only series mapped in this subgroup, although limited acreages of others occur along transition lines.

Leith Sandy Loam, Loamy Sand (Le. SL., Le. L.S.):

Leith soils are coarse textured Dark Grey Wooded soils formed on alluvial aeolian parent material. They often occur in association with Culp soils; in places the northern slopes are Culp and the southern slopes Leith. These soils have about five inches of a brown A_1 horizon and upwards of eight inches of a greyish brown A_2 horizon. The B horizon is fairly firm and has a weak prismatic structure. The lime horizon usually occurs at 30 to 40 inches from the surface.

Leith soils occur on undulating to rolling topography; some of it dune like. They have a low water holding capacity and are subject to wind erosion. Hay should be the principal crop. Leith soils on undulating to gently rolling topography are fairly good arable lands.

PODZOL GREY WOODED SOILS

The Podzol Grey Wooded soils are so called because of a secondary profile (podzol-like) has developed in the A_2 horizon of the original Grey Wooded profile. They are found in this area under mixed coniferous and deciduous forest and usually above the three thousand foot elevation. Immediately under the leaf mat there is a pinkish white A_2 horizon being formed. This horizon is usually over one inch in thickness. Immediately below this there is a distinct brown to reddish brown B horizon formed. Varying amounts of the light grey-brown A_2 horizon of the Grey Wooded soil may remain; although in places the reddish brown podzol B sits directly on the blocky grey wooded B. The remainder of the profile resembles the Grey Wooded soil, that is, it has the heavy textured blocky B horizon. In this area lime is found at about 30 to 40 inches from the surface. These soils are slightly to strongly acid in reaction. They apparently are more strongly leached than are the Grey Wooded soils. There is a gradual change from Grey Wooded to Podzol Grey Wooded soils across this area from east to west. Approximately 590,000 acres of these soils are mapped. The four series in this subgroup are described below.

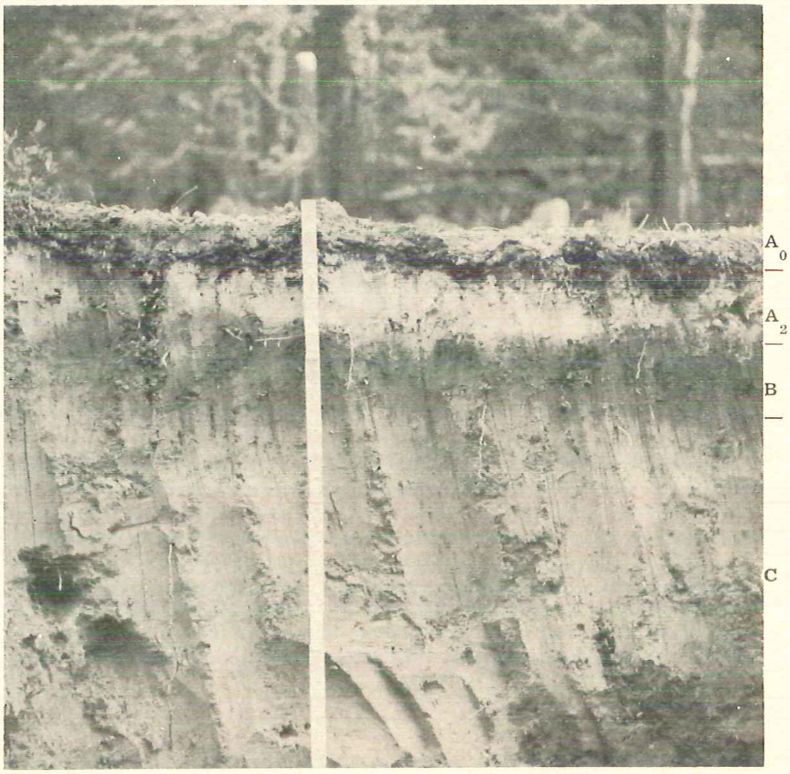
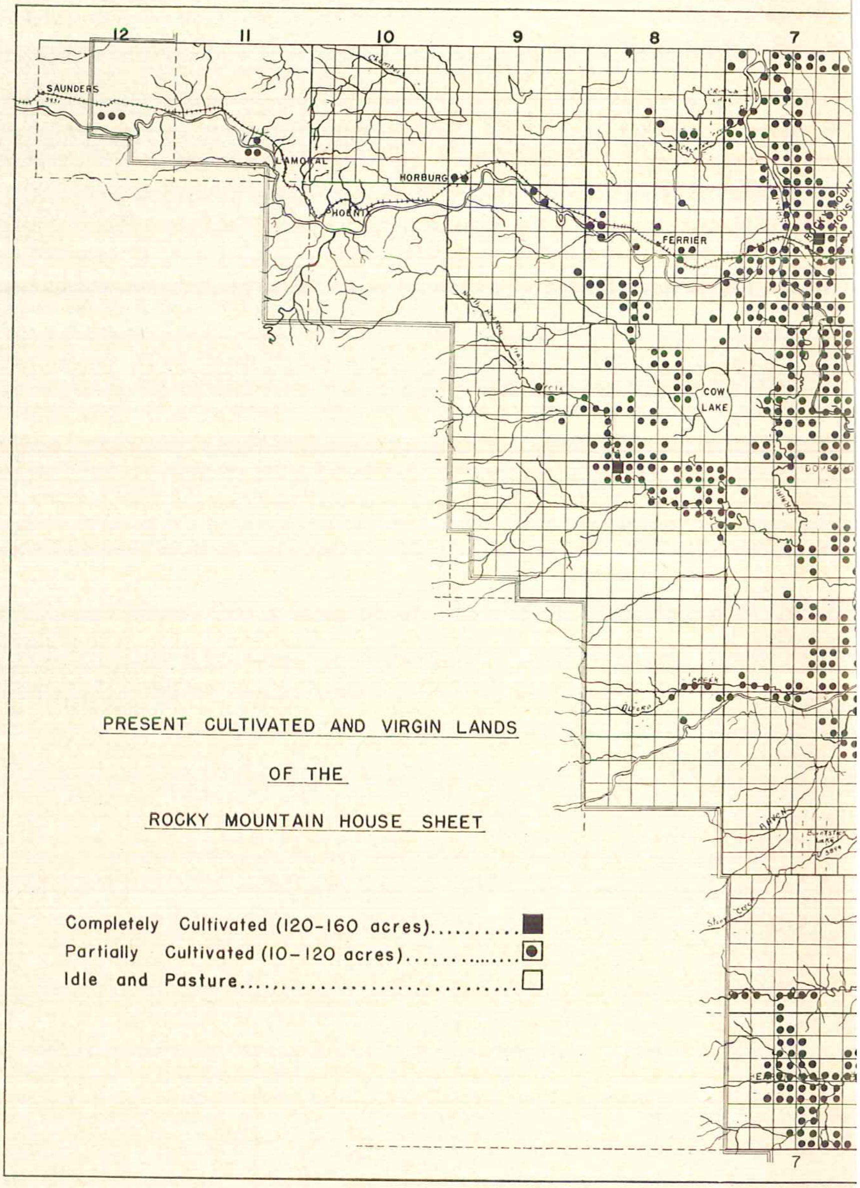


Fig. 6.—A Podzol soil developed on sand. The Podzol Grey Wooded Soils are a transition between this soil and the Grey Wooded soil. Usually found at higher altitudes and usually best developed on coarse textured material.

Caroline Loam, Silt Loam (Ca. L., Ca. SiL.):

Caroline soils are medium textured Podzol Grey Wooded soils formed on stone-free lakelain (lacustrine) material. These lake deposits are relatively thin and the underlying stony glacial material often occurs at three or four feet from the surface. A sandy layer may separate these two materials. In areas where this sandy layer is quite thick the soil is mapped as Ca L/S. That is, the sand is a D horizon. The secondary podzol-like development can be readily recognized in an undisturbed Caroline profile. This profile on cultivation resembles a Grey Wooded soil, except that the color is somewhat more brown.

Caroline soils have from one to two inches of A_0 (leaf mat), from one-half to one inch of a whitish podzol A_2 horizon, from two to three inches of a reddish brown podzol B horizon, and two to four inches of a greyish brown grey wooded A_2 horizon. The grey wooded B is medium blocky in structure and brown to yellowish

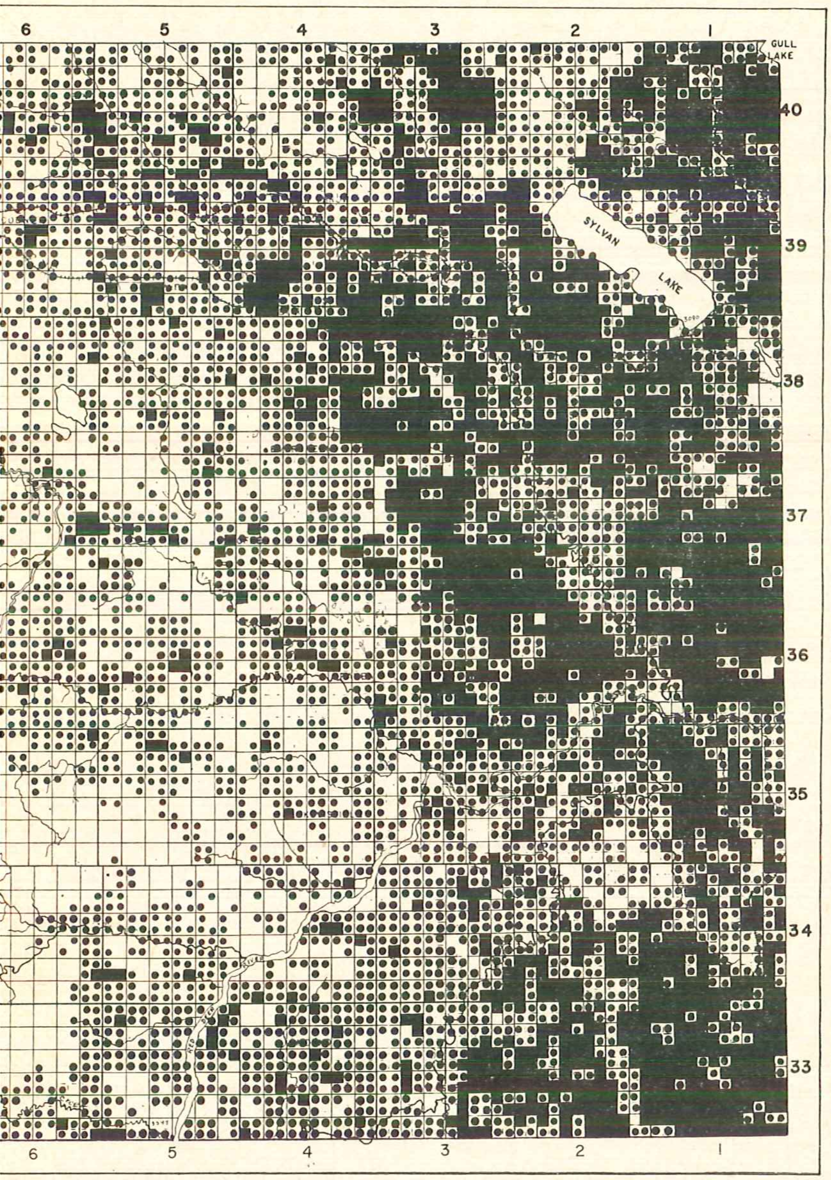


PRESENT CULTIVATED AND VIRGIN LANDS

OF THE

ROCKY MOUNTAIN HOUSE SHEET

Completely Cultivated (120-160 acres)..........■
Partially Cultivated (10-120 acres)............◉
Idle and Pasture...............................□


6
5
4
3
2
1
GULL LAKE
40
SYLVAN
LAKE
39
38
37
36
35
34
33
6
5
4
3
2
1

brown in color. It is considerably finer in texture than the overlying horizons. Lime usually occurs at 30 to 40 inches.

These soils occur on level to undulating topography with most of the slopes under four per cent. The native tree cover is mixed aspen and black poplar with some spruce and pine. Peat bogs are found in the depressional areas.

Caroline soils rate as fairly good arable land. A sizeable percentage of these soils is at present cultivated. Hays and coarse grains should form the principal crops.

Lobley Loam, Heavy Loam (Lob. L., Lob. HL.):

Lobley soils are medium textured Podzol Grey Wooded soils formed on glacial till brought in by the Mountain ice sheet from the west. This material is very stony, the stones being a mixture of smooth waterworn quartzites and fragmental chunks of dolomites. This till has a fairly high calcium plus magnesium carbonate content. The texture of the parent material varies from sandy loam to clay loam.

Lobley soils have two to three inches of leaf mat (A_0), from one to two inches of a whitish, podzol, A_2 horizon, and from two to four inches of a reddish brown podzol B horizon. There may or may not be any appreciable amount of light brown Grey Wooded A_2 remaining. The medium blocky structured Grey Wooded B is usually yellowish brown in color. Lime occurs at 36 to 48 inches; often there are streaks in the lower portion of the profile that are quite high in lime.

These soils are found on undulating to hilly topography and usually at elevations of over 3500 feet. A heavy growth of poplar, spruce, and pine covers the areas. Peaty soils occur in the low positions.

Lobley loams make up most of the area west of a line joining township 33, range 4, and township 40, range 9. Only the better topography phases along the east side of this area are cultivated. These soils rate as fair to fairly good arable lands providing good management practices are followed. They occur in an area where the growing season is short. Forage should be the principal crop. In general, this area might best remain forested.

Prentice Sandy Loam, Loamy Sand (Pc. SL., Pc. LS.):

Prentice soils are coarse textured Podzol Grey Wooded soils formed on sandy wind deposited material. The upper white leached horizon averages about one inch in thickness. A reddish brown B horizon about three to four inches in thickness occurs immediately under the white A_2. Lime occurs at eighteen to twenty-four inches. Prentice soils are found on undulating to rolling topography, much of it dune-like in appearance. Many of these dunes are of the barchan type. The main areas of Prentice soils are at the big bend of the North Saskatchewan river at Rocky Mountain House, and at the bend of Prairie creek west of Chedderville.

Since Prentice soils have a low water-holding capacity and are low in natural fertility, they rate as pasture to poor arable land. They should, if cultivated, be left in permanent pasture.

Horburg Sandy Loam (Hb. SL.):

The upper part of the Horburg profile is similar to the Prentice soil profile. However, gravel occurs at from ten to twenty-four inches from the surface. This gravel layer is usually two feet or more in thickness. Horburg soil is more commonly found on old river terraces, particularly on those closest to the mountains. The topography of these terraces is level to very gently sloping. In general these soils should not be cultivated.

SOLONETZIC SOILS

The word "Solonetz" is also of Russian origin and was applied to soils that were salty. Solonetzic soils are divided into three groups, namely: solonetz, solodized solonetz, and solod. All of these are found on saline parent material. These three groups represent three stages of development that is, in part, the result of differing amounts of leaching and/or maturity. The soils in the better drained positions are usually more strongly leached in the upper portion of the profile and the salt is found at lower depths than in those in the poorer drained positions. All of these soils have a columnar, fairly firm to very hard, B horizon. In the case of the solonetz and solodized solonetz groups these columns may be rounded at the top.

All of the Solonetzic soils in this area have black surface (A_1) horizons and occur in the more level areas along the east side of the map sheet. In all, there are approximately 45,000 acres of these soils mapped.

Two characteristics of the Solonetzic soils of this area adversely influence their agricultural use; namely, the hard, compact B horizon and the somewhat salty subsoil. Water infiltrates so slowly into the compact B horizon that heavy rains may saturate the surface horizon. If the soil is on sloping topography the surface horizon may become so wet that it will literally flow down slope exposing the undesirable B horizon. Also, since infiltration into the B horizon is very slow, much of the precipitation may be lost by evaporation before it can penetrate into the subsoil. These conditions are most apparent where the A horizon is thin. The salt may be sufficiently concentrated in the subsoil to adversely affect plant growth. This is most apparent in the lower areas where the salt tends to collect.

The management of these soils must take the above described characteristics into consideration. The B horizon should be made more friable; more receptive to air, water and root penetration. Sowing deep-rooted legumes, mixing in organic matter and possibly gypsum, offer possibilities. Breaking the B horizon with chisels might give temporary improvement. Increasing the organic matter

Fig. 7.—Wetaskiwin Silty Clay Loam. A solodized solonetz soil developed on lacustrine material.

content would tend to ameliorate the effect of the salt. In the more saline types salt tolerant crops might be stressed.

BLACK SOLONETZ SOILS

The Black solonetz soils of this area have a relatively thin dark surface (A_1) horizon, a very thin (often absent) light colored leached A_2 horizon and a very hard compact columnar B horizon. Lime and salt are usually found within two feet of the surface. Only one series is mapped in this subgroup.

Duagh Silty Clay Loam, Clay (Du. SiCL., Du. C.):

The Duagh soil is a Black solonetz developed on lacustrine material. It can be recognized by the thin, loose, granular A horizon, (averaging about 4 inches), a dark grey to black waxy hard columnar B horizon and a lime and salt accumulation horizon that occurs eighteen to twenty-four inches below the surface. Usually there is no leached grey A_2 horizon. These soils are practically stone free and are found on level to slightly depressional topography. Generally the Duagh soil areas are grass covered. However, sparse growths of willow and dwarf aspen poplar may occur.

Duagh soils have a relatively impermeable B horizon very close to the surface, have a fairly high salt content within two feet of the surface and are often poorly drained. They are, in general, fair arable lands. If cultivated, the hard B horizon must be broken up and, if possible, organic matter incorporated into it. Only a small acreage of Duagh soil is found in the area and it occurs with the Wetaskiwin and Malmo soils.

BLACK SOLODIZED SOLONETZ SOILS

Black Solodized Solonetz soils are characterized by a dark A_1 horizon, a light-solored A_2 horizon (usually about two inches in thickness) and a hard columnar B horizon. These columns usually have rounded, white-capped tops. Only two series are mapped in this subgroup.

Wetaskiwin Loam, Silt Loam (Wkn.L., Wkn.Si.L.):

The Wetaskiwin soil is a Black solodized solonetz developed on somewhat saline lacustrine material. It is usually found in association with Duagh and Malmo soils, and in stage of maturity lies between these two series.

These soils have a black loose to granular A_1 horizon from five to ten inches in thickness. They have a grey weak platy and porous grey A_2 horizon that is two or more inches in thickness. This grey A_2 distinguishes Wetaskiwin soil from Duagh soil. Wetaskiwin soil has a hard round-topped columnar B horizon. These round-topped columns distinguish it from Malmo soils. The saline C material is usually found at thirty to forty inches from the surface. The Wetaskiwin soils occur on level to gently undulating topography. The native aspen poplar that grow on these soils are usually larger than the ones found on the associated Duagh soils. The areas are stone free.

The Wetaskiwin soils of this area are used primarily for mixed farming and are rated as fairly good to arable lands. The general discussion on agricultural use given under Solonetzic soils above applies to these soils. Primarily there is need to increase the organic matter content of the hard B horizon thereby increasing the rate at which it will take water, and increasing the ease of root penetration.

Kavanagh Loam (Kv.L.):

This soil has been mapped as a Black solodized solonetz developed on bedrock material mainly of Edmonton formation. It has, therefore, a shallow profile. It can generally be distinguished by a thin dark brown to black A horizon, a very hard dark colored B horizon and the presence of exposed bedrock along the road cuts. The lower subsurface horizons vary somewhat in color and texture depending upon the character of the particular bedrock exposed at that place. Surface stones vary from very few to many. The stony spots occur where the finer material from the original till cover has all eroded away.

This soil is usually found on depressional to gently undulating topography. In the native state it supports a cover of grass and scattered clumps of dwarf poplar.

Kavanagh loam is an inferior soil, and rates from poor to fair arable. It is used mainly as hay or pasture land. Where small patches occur in the field, they can be improved by heavy manure applications and deep cultivation.

Only a very small acreage of Kavenagh loam occurs in the mapped area.

BLACK SOLOD SOILS

Black solod soils are characterized by a fairly deep black A_1 horizon that gradually fades into a lighter colored A_2 horizon. Below this there is a brownish grey AB (transition) horizon that breaks readily into fine blocky aggregates. Below this the B horizon is fairly compact and may be somewhat columnar. Structural remnants of previous columns can often be found extending up into what is now the A horizon. Only one series is mapped in this subgroup.

Malmo Silt Loam, Silty Clay Loam (Mo. SiL., Mo. SiCL.):

Malmo soils are medium to heavy-textured Black solod soils developed on lacustrine material that is slightly saline. They are relatively stone free. These soils have about ten inches of a black to grey black granular A_1 horizon. The lower portion of this horizon may be weak platy. There are from two to four inches of a greyish brown to brown fine blocky transition AB horizon. These blocky aggregates are somewhat porous and crush easily. There is a gradual transition from this horizon to the B horizon which usually has a moderately well-developed column-like macro structure. These columns, however, break down readily into small angular blocks. This is particularly apparent in the upper portion of the B horizon. These easily broken columns differ from the hard round topped columns found in the upper portion of the Wetaskiwin series.

Malmo soils are found on level to gently undulating topography, and although usually better drained than the Duagh and Wetaskiwin soils, with which they are associated, they also offer cultivation and management problems particularly during years of high rainfall. Water erosion can be a problem on the steeper slopes. Mixed farming is practiced in most of the Malmo soil areas.

These soils rate as fairly good to very good arable lands in this area.

GLEISOLIC SOILS

The word "Gleisolic" was derived from a word used by the Russian peasant farmers to describe the sticky clay subsoil found in low lying areas. Gleisolic soils are poorly drained soils and have developed in the presence of a high or fluctuating water table. The surface is often somewhat peaty. The subsoil is usually quite grey in color, often with a blue tinge and may develop distinct brown mottlings when exposed to the air.

Meadow soils are the only group of Gleisolic soils mapped in this area. In all there are approximately 25,000 acres of meadow soils in the Rocky Mountain House map sheet.

MEADOW SOILS

Meadow soils have a dark colored surface (A) horizon that is high in organic matter; some have a peaty surface. They are associated with depressional topography and as a consequence, are quite wet during part of the season. In this area, frost is a hazard in these low lying basins. Three series are mapped in this sheet.

Codner Loam (Cn. L.):

Codner loam is a Peaty meadow soil developed on stratified medium textured alluvial or lacustrine material. It can be recognized by a peaty to muck-like upper A_1 horizon, and a black (muck-like) lower A_1 horizon. The depth of the peat varies. Usually Codner is found on the rims of the basins and deep organic soils are found towards the centres of the basins. The subsoil is grey in color and may have distinct brown mottlings. The upper part of the B horizon may have a pronounced granular (shot-like) structure.

This soil is found on level to depressional topography and usually supports a growth of coarse grass and dwarf birch. In this area these soils rate as marginal to fair arable soil, depending on drainage condition. If drained, coarse grains might be grown satisfactorily. In general, however, they might better be used to grow pasture grasses.

Navarre Meadow (Nv. M.):

Navarre meadow is a fine textured slightly saline soil occuring on lacustrine material. It occurs in low, poorly drained areas. Navarre meadow can be recognized by a fairly deep black silt loam to silty clay A horizon and by a fairly sharp break to the fine textured, blocky subsoil which has distinct brown mottlings. Free lime carbonate may be found to the surface and salts are usually found in the lower horizons. These salts may come to the surface during dry periods.

Only a very small acreage of this soil occurs. Navarre meadow in this area rates as poor to fair arable land.

These soils are confined mainly to the black soil area of the Rocky Mountain House sheet and usually in association with soils of the Solonetzic group.

Raven Silty Clay Loam (Rv. SiCL.):

Raven silty clay loam is a meadow soil formed on lacustrine material. In this soil the upper A_1 horizon is dark grey to black and muck-like, and the lower A_1 horizon is dark grey in color. The B horizon is grey in color and often has distinct brown mottlings.

The upper part of the B horizon is quite granular (shot-like) in structure. This is a distinguishing characteristic of the Raven soil. The parent material is varved (finely layered) and has a fairly high lime carbonate content.

A water table is usually found at 30 to 40 inches. This soil is found adjacent to the bogs and on slight elevations in boggy areas; that is, the topography is usually slightly depressional to very gently sloping.

The proximity of the water table to the surface, the depressional topography and the fine texture tend to create a "cold soil". As a result this soil is more suited to the production of coarse grains and especially hay crops.

Raven soil rates as poor to fairly good arable land. The areas of Raven soils on gently sloping topography rate as fairly good arable land whereas those in the depressional areas rate as poor arable land. As yet Raven soils have been mapped only in the wooded area of the Rocky Mountain House sheet.

REGOSOLIC SOILS

The word "Regosolic" is in part, of Greek origin and refers to the loose material that covers the earth's surface. Regosolic soils are young, immature soils. Profile development is usually restricted to the formation of an A horizon. They are found mainly in recent river valleys and on steep rocky slopes. Alluvium and gravel are the two types mapped in this area.

Alluvium:

Alluvium is recent river deposited material. Sandy loams and silt loams are the textures commonly found. Lime carbonate in many cases is found to the surface. In most cases new material is periodically added to the surface by flood waters. Alluvium is usually well supplied with the mineral plant nutrients.

Most of the areas of Alluvium in the mapped area are cut up by ox bows and old drainage channels so that if cultivated, fields are small. These soils rate from fair pasture to fairly good arable land depending upon the uniformity of the deposition, the texture and the topography. There are approximately 60,000 acres of Alluvium mapped.

Gravel:

Gravel is recently deposited coarse outwash material found adjacent to streams and rivers. Very little if any fine textured material overlies the gravel.

Areas mapped as gravel have little or no agricultural value. Many, however, have commercial value. There are approximately 25,000 acres of gravel mapped.

ORGANIC SOILS

Organic Soils are poorly to very poorly drained. They have an organic surface layer more than 12 inches thick underlain by a mottled grey colored mineral subsoil. They are found in level to depressional topography.

Two general types of organic soils are recognized; sedge peats and moss peats.

Sedge peat is made up primarily of semi-decomposed sedges and grasses. It is fairly rich in plant nutrients. Moss peat is primarily sphagnum and is relatively low in plant nutrients. Sphagnum decomposes very slowly.

The sedge and moss peats have not been separated on the map because the two are so intermingled. Usually the larger bogs have sedge peat on the edges and moss peat in the center. The sedge peats when drained, rate as fair to fairly good arable land. The moss peats are generally unsuitable for cultivation. The deeper sedge peats and moss peats should be left undisturbed as they aid in maintaining ground water supplies as well as controlling run-off. Organic soils occur on approximately 188,000 acres in the Rocky Mountain House sheet.

GENERAL FARM PRACTICE SUGGESTIONS

Included with the descriptions of the soil types given in this report are suggestions regarding soil management. In this section these recommendations are summarized together with a few general observations.

The principal factors that determine crop production are: the kind of crop, the crop rotation, the cultural practices used, the climate, and the soil. The first three of these are directly under the control of the farm operator. They can be as good or as bad as he makes them—and his cash returns will be in proportion.

The climate is more or less a fixed factor. The farmer cannot change the climate but he can endeavor to understand it. There is now sufficient meteorological data available to at least calculate the average climate of an area, that is the climatic conditions that are most likely to prevail. The average annual rainfall, the months of highest and lowest rainfall, the probability of soil eroding rainstorms; all can be determined. Likewise, the average length of the season and the most probable occurrence of killing frosts are also known. The wise farmer will consider these averages when planning his farm operations.

The soil is the other relatively fixed factor in crop production. However, it is well known that the productivity of a good soil can be materially reduced by poor farming practices, and conversely, a poor soil can often be materially improved by good farming practices.

There is both good and poor soil in the Rocky Mountain House area. Most of the Black Chernozemic soils of this area have a high natural fertility and a good structure. They are not however, immune to deterioration. It is more profitable to keep these soils fertile than it is to try to build them up after they have been allowed to deteriorate. Soils that have lost their good granular structure, usually because the organic fibre has been reduced, are vulnerable to both wind and water erosion. A large percentage of the soils in this area are Grey Wooded. They are in general low in natural fertility. All are or were tree covered and many of the areas are of quite rough topography.

The combination of an inferior soil and rough topography usually means non-arable land. The most profitable use of such soils in this area is generally to leave them in forest production. When these less fertile soils occur on relatively level topography it may still be more profitable to leave them in forest. However, if they are cultivated, they can generally be much improved if deficient plant food elements are added as fertilizer and if the soil is maintained in a good state of tilth — and the second is as important as the first. Since the Rocky Mountain House area receives considerable rainfall, the soils in this area are quite responsive to good farming practices.

Fig. 8.—Many farmers near Rocky Mountain House, on Grey Wooded or Podzol Grey Wooded soils supplement their income with small saw mills.

There is today considerable data available on fertilizer use, crop rotations and cultural practices. This information has been gathered by government research agencies and by some farmers and it is available to all (see Table IV in the Appendix). It is firmly believed that if all the land in this area was being farmed "as well as we know how" the net returns from the farms would be at least doubled.

Some of the poorer soils of this area are those that are poorly drained. They are flooded part of the year. The water table is close to the surface and the plants suffer from "wet feet". They are cold soils and are often of very poor structure. As with the poorer upland soils the first decision to be made is whether these areas should be left in their native state or whether they might be profitably cultivated. In their native state they have value as water reservoirs, as wild life preserves, and often as producers of forest products. If cultivated, they usually must be artificially drained. This means keeping the water table at least three feet below the surface.

In the summary a productive soil is one that:

(a) has a friable surface allowing rapid infiltration of air and water and the easy emergence of plant seedlings,

(b) has a sufficiently open structure in the subsoil to allow for air, water and root penetration,

(c) has no tight obstructive layer, at least within the normal feeding range of the plant roots,

(d) has sufficient water-holding capacity to keep the plant roots supplied between rains, and

(e) has sufficient available plant food to grow the crop.

If a soil is deficient in any of these factors it can be improved by selected management practices. A farm that is worth cultivating, is worth cultivating the best way we know how — it pays.

SOIL RATING MAP

Accompanying this report is a soil rating map of the Rocky Mountain House sheet. This divides the mapped area into six classes, or groups, one non-arable and five arable classes. *This rating map should be regarded as an average rating for a soil area rather than specific rating for individual land parcels.* This is particularly applicable in mixed areas. Here the area is given an average rating. A somewhat more specific parcel rating could be obtained by determining the soil series of the parcel and then applying the rating given this series in this report. No attempt has been made to state the type of crop that should be grown.

The data used in the compilation of this map are based mainly on the physical characteristics of the area. Such physical data as soil type, degree of stoniness, topography, rainfall and rainfall variability, were all taken into consideration. Economic factors such as distance from market were not considered, nor were such climatic factors as hail incidence or a local frost hazard.

It is practically impossible to set any definite productivity limits for these groups. It is also recognized that, particularly in the Grey Wooded soils, some types of crop will produce much better than others. For example, a soil might grow a poor wheat crop but produce a fairly good legume seed crop. Also, for example, it has been shown that with suitable crop rotations and fertilization very good crops of legume hays and cereal grains can be produced on grey wooded soils. In general, however, the ratings given reflect the "natural" ability of the soil to produce. Using wheat production as a measuring stick, Group Four soils are classed as marginal arable, since over a long period of years they have probably produced less than 12 bushels of wheat per seeded acre per year. Group Five soils have produced 12 to 16 bushels of wheat per acre; Group Six, 16 to 20 bushels per acre; Group Seven 20 to 28 bushels per acre, and Group Eight, over 28 bushels per acre. The Pasture and Woodland Group contains those soils which do not fit into any of the foregoing categories.

APPENDIX

The tables given in the Appendix of this report supplement in more detail the general information given in the body of the report.

TABLE I gives certain specific meteorological data. These data were obained from the records of the Dominion Meteorological Service.

TABLE II summarizes the classification system used in the mapping of the soils of the Rocky Mountain House sheet.

TABLE III, A. B. C. D., selected chemical and physical data pertaining to representative soils found in the Rocky Mountain House map area.

TABLE IV lists the locations on or near the map area where agricultural research and experimentation is being carried on. Cropping programs and other management practices are being studied at these stations. Additional sources of information are also listed.

TABLE I

Some Meteorological Data for Stations on the Rocky Mountain House Sheet

	Mean Temperature in °F				Precipitation in inches				Snowfall in inches		
	Rocky Mountain House	Nordegg	Olds		Rocky Mountain House	Nordegg	Olds		Rocky Mountain House	Nordegg	Olds
September ..	47.0	46.7	47.3		2.24	1.94	1.77		5.7	4.2	2.1
October	38.0	36.7	40.4		1.05	.81	.96		8.1	7.4	4.6
April	37.2	34.5	38.0		1.01	1.26	1.15		8.5	11.7	6.8
Pre Crop Season Average	40.7	39.3	41.9	Pre Season Total	4.30	4.01	3.88	Pre Season Total	22.3	23.3	13.5
November ..	21.0	24.5	25.2		.71	.78	.70		6.1	7.9	7.1
December ..	11.7	13.4	16.5		.79	.79	.52		7.8	7.9	4.9
January	9.8	11.5	11.4		.59	.72	.65		6.7	9.9	6.3
February	13.6	14.2	11.3		.67	.72	.63		5.8	6.9	6.6
March	22.0	21.8	20.4		.67	1.21	.75		10.1	14.8	9.3
Winter Average	15.6	17.1	17.0	Winter Total	3.43	4.22	3.25	Winter Total	36.5	47.4	34.2
May	48.0	43.6	48.0		2.01	2.15	2.05		2.4	6.5	1.1
June	54.0	49.6	52.4		3.75	3.99	3.25		0.3	0.3	....
July	59.4	55.2	60.3		2.73	3.10	2.42		....	....	....
August	55.7	51.2	54.0		2.87	2.90	2.58		Trace	0.3	....
Crop Season Average	54.3	49.9	53.7	Crop Season Total	11.36	12.14	10.30	Crop Season Total	2.7	7.1	1.1
Year Average	34.8	33.6	35.4	Year Total	19.09	20.37	17.43	Year Total	61.5	77.8	48.8

TABLE II

Classification Chart Showing the Subdivision Relationships of the Mapped Soil Series

ORDER	GROUP	SUBGROUP	SERIES
CHERNOZEMIC SOILS Moderately to well drained soils developed under grass.	Brown — Does not occur in this area.		
	Dark Brown — Does not occur in this area.		
	Black	Modal Black soils	Antler Loam Didsbury Loam Penhold Loam Silt Loam Peace Hills Sandy Loam Ferintosh Sandy Loam
		Solodic Black soils	Ponoka Loam and Silt Loam Cygnet Loam
		Degrading Black soils	Benalto Loam Rimbey Loam and Silt Loam Bearberry Clay Loam and Clay Sundre Loam
		Meadow-like Black soils	Penhold Meadow
PODZOLIC SOILS Moderately well drained soils developed under forest.	Grey Brown Podzolic — Does not occur in this area.		
	Podzol — Do not occur in this area.		
	Grey Wooded	Modal Grey Wooded soils	Breton Loam Tolman Loam and Sandy Loam Modeste Loam Culp Sandy Loam and Loamy Sand Culp Cobbley Sandy Loam and Cobbley Loamy Sand
		Podzol Grey Wooded soils	Caroline Loam and Silt Loam Caroline Loam over Fine Sand Lobley Loam and Heavy Loam Prentice Sandy Loam and Loamy Sand Horburg Sandy Loam
		Dark Grey Wooded soils	Leith Sandy Loam and Loamy Sand

SOLONETZIC SOILS Fair to moderately well drained soils developed on saline parent material.	*Solonetz	Black Solonetz soils	Duagh Silty Clay Loam
	*Solodized Solonetz	Black Solodized Solonetz soils	Wetaskiwin Loam and Silt Loam Kavanagh Loam
	*Solod	Black Solod soils	Malmo Silty Loam and Silty Clay Loam
GLEISOLIC SOILS Poorly drained soils developed under a high or fluctuating water table.	Dark Grey Gleisolic — Does not occur in this area.		
	Podzolic Glei — Does not occur in this area.		
	Grey Wooded Glei — Of minor occurrence in this area.		
	Meadow	Meadow Soils	Raven Silt Loam and Silty Clay Loam
		Peaty Meadow	Codner Loam
		Saline Meadow	Navarre Silt Loam
ORGANIC SOILS Very poorly drained soils with more than 12" of organic surface.			Sedge and Moss Peat mixed
REGOSOLIC SOILS Young or weakly developed soils.			Recent alluvium Gravel

*These groups are also found in the Brown, Dark Brown and Grey Wooded soil zones.

TABLE III—A

Horizon	Depth	Color	Moist Munsell Color	Structure	Texture
ANTLER LOAM - a modal Black soil on glacial till.					
A	0-10"	Very dark brown	10YR2/2	Weak prismatic to granular	L
B	10-24"	Yellowish brown	10YR5/4	Weak prismatic	L
Ca	24-32"	Olive	2.5Y4/4	Fragmental	L
C	at 60"	Olive	2.5Y4/4	Fragmental	L
DIDSBURY LOAM - a thick Black soil on resorted glacial till.					
A_{11}	0-10"	Very dark brown	10YR2/2	Loose, granular	L
A_{12}	10-24"	Very dark brown	10YR2/2	Weak, prismatic	L
B	24-36"	Light yellowish brown	2.5Y6/4	Massive to weak fine subangular blocky	L
D	at 54"	Light olive	2.5Y5/4	Massive	L
CYGNET LOAM - a solodic Black soil on resorted glacial till.					
A_1	0-14"	Very dark brown	10YR2/2	Granular to weak prismatic	L
A_2	14-15"	Light brownish grey	10YR6/2	Platy to weak fine subangular blocky	L-FSL
B_1	15-17"	Greyish brown	10YR5/2	Fine subangular blocky	CL
B_2	17-27"	Dark yellowish brown	10YR4/4	Medium subangular blocky	SCL
B_3	27-32"	Dark yellowish brown	10YR4/4	Massive to large blocky	SCL
Ca	at 36"	Olive	2.5Y4/4	Massive to fragmental	L
BENALTO SILT LOAM - a degrading Black soil on glacial till.					
A_0	1-0"			Leaf litter	
A_{15}	0-9"	Dark brown	10YR4/3	Loose granular to weak platy	SiL
A_2	0-11"	Dark greyish brown	10YR4/2	Coarse platy	SiL
B_2	11-23"	Brown	10YR5/3	Medium subangular blocky	CL
B_3	23-46"	Yellowish brown	10YR5/4	Medium subangular blocky	L
Ca & C	at 52"	Olive	2.5Y4/4	Massive	L
BEARBERRY SILTY CLAY - a degrading Black soil on lacustrine material.					
A_{11}	0-3"	Black	10YR2/1	Loose granular	SiC
A_{15}	3-10"	Dark grey	10YR4/1	Fine subangular blocky	C
B_2	10-28"	Dark greyish brown	10YR4/2	Fine subangular blocky to massive	C
Ca	at 36"	Light olive	2.5Y5/4	Fine to massive	SiC

Horizon	Mechanical Analysis S	Si	C	pH	N	P	C/N	H	Na	K	Mg	Ca	SiO_2 / R_2O_4	Vol Wt.
ANTLER LOAM														
A	37	43	20	6.7	0.45	0.09	9.8	0.7	0.1	0.7	4.4	23.0	4.1	0.99
B	34	40	26	6.4	0.11	0.05	10.0	0.6	0.2	0.4	3.5	25.0	4.6	1.5
Ca	25	41	34	7.9		0.06		0.0	0.1	0.2	4.3	36.7	3.7	1.52
C	36	42	22	7.9		0.06		0.0	0.1	0.2	4.4	33.6	4.3	1.71
C horizon averages over 10% calcium and magnesium carbonate.														
DIDSBURY LOAM														
A_{11}	39	36	25	7.6	0.52	0.08					*0.6	*1.3		0.91
A_{12}	35	40	25	8.2	0.45	0.07					0.7	2.8		0.79
B	43	41	16	8.2		0.05					0.8	3.5		1.61
D	43	43	14											
* Total magnesium and calcium.														
CYGNET LOAM														
A_1	36	40	24	7.0	0.40	0.08	14.0	3.5	0.1	1.7	7.3	31.8		1.28
A_2				6.3	0.10									1.65
B_1	38	26	36	7.7	0.07			1.0	0.2	0.4	5.7	22.2		1.65
B_2	46	23	31	8.0				1.0	0.3	0.4	4.4	17.5		1.72
B_3	48	22	30	8.4				0.0	0.3	0.4	5.2	17.2		1.59
Ca	41	34	25	8.8		0.05		0.0	0.2	0.3	7.1	40.8		
BENALTO SILT LOAM														
A_o				7.1	0.15	0.09								
A_{15}	24	56	20	5.8	0.25	0.09	12	2.7	0.5	1.2	3.0	35.0	4.1	0.94
A_2	26	55	19	5.8	0.31	0.05	9	1.1	0.4	0.7	2.1	10.2	4.5	1.38
B_2	44	27	29	5.6	0.23	0.04		1.4	0.4	0.6	4.1	20.5	4.2	1.65
B_3	30	44	26	5.5		0.06		2.1	0.4	0.5	3.9	20.9	3.3	1.61
Ca & C	37	44	19	7.7		0.06		0	0.4	0.5	3.1	29.9	3.4	1.73
BEARBERRY SILTY CLAY														
A_{11}	4	53	43	6.1	1.15	0.12								.79
A_{15}	3	30	67	5.7	0.36	0.08								1.14
B_2	-	48	62	5.1	0.12	0.05								1.48
Ca	-	49	51	7.5		0.05								1.54

TABLE III—B

Horizon	Depth	Color	Moist Munsell Color	Structure	Texture
PENHOLD MEADOW - a meadow-like Black soil.					
A_{11}	0-14"	Black	10YR2/1	Loose to weak very coarse prismatic	L
A_{18}	14-16"	Very dark brown	10YR2/2	Prismatic to medium sub-angular blocky	SiL
Ca	16-25"	Light olive	2.5Y5/4		SCL
D	at 25"	Light olive	2.5Y5/4		L
BRETON LOAM - a modal Grey Wooded soil on glacial till.					
A_o	2-0"			Leaf litter	
A_2	0-6"	Light grey to pale brown	10YR6/2-6/3	Medium to fine platy	SiL-L
AB	6-10"	Brown	10YR5/3	Medium to fine subangular blocky	L-CL
B_2	10-18"	Brown	10YR5/3	Medium blocky	CL
B_3	18-48"	Dark greyish brown	10YR4/2	Blocky to massive	CL
Ca	at 50"	Dark yellowish brown	10YR4/4	Blocky to massive	CL
C	at 70"	Light olive	2.5Y5/4	Massive to fragmental	SiCL
MODESTE SILT LOAM - a modal Grey Wooded soil on residual material.					
A_oA_1	1-0"			Leaf litter	
A_2	0-11"	Pale brown	10YR6/3	Fine platy	SiL
B_2	11-14"	Dark yellowish brown	10YR4/4	Medium subangular blocky	CL
B_3	14-26"	Light olive	2.5Y5/4	Fragmental	L
C	at 48"	Yellowish brown	10YR5/4	Fragmental	Si
CAROLINE SILT LOAM - a Podzol Grey Wooded soil on lacustrine material.					
A_oA_1	2-0"			Loose leaf litter	
A_{2p}	0-1"	Pinkish grey	7.5YR6/2	Very fine platy	SiL
B_p	1-3"	Strong brown	7.5YR5/6	Fine platy to crumb	SiL
C_p	3-7"	Pale brown	10YR6/3	Platy	SiL
B_1	7-11"	Brown to dark brown	10YR4/3	Coarse platy to fine sub-angular blocky	CL
B_2	11-18"	Brown to dark brown	10YR4/3	Medium blocky to sub-angular blocky	CL
B_3	18-22"	Light olive	2.5Y5/6	Blocky	CL
D	at 24"	Olive	2.5Y4/4	Massive to fragmental	L

Horizon	Mechanical Analysis S	Si	C	pH	N	P	C/N	H	Na	K	Mg	Ca	$\frac{SiO_2}{R_2O_4}$	Vol. Wt.
PENHOLD MEADOW														
A_{11}				7.2	0.42	0.06						*.07		
A_{18}				7.5	0.15	0.04						1.38		
Ca				7.7	0.04	0.04						7.6		
D				7.7	0.04	0.04						10.7		
* Total calcium.														
BRETON LOAM														
A_o				6.4	1.3	0.13							5.0	
A_2	38	50	12	5.7	0.06	0.05	10	0.8	0.2	0.7	3.3	5.0	6.0	1.43
AB	38	35	27	5.1	0.04	0.03		1.0	0.2	0.8	4.6	16.4	5.1	1.72
B_2	31	33	36	5.2	0.04		12	1.5	0.2	0.6	4.4	18.9	5.1	1.81
B_3	35	37	28	5.3				1.9	0.4	0.6	3.1	15.0	4.5	1.77
Ca								0.0	0.4	0.6	3.8	27.8		1.61
C	11	59	30	8.0		0.06							3.5	
MODESTE SILT LOAM														
A_oA_1				5.8	0.60	0.08								
A_2	20	64	16	5.2	0.05	0.03		3.6	0.3	0.2	1.3	5.3		
B_2	37	33	30	4.8	0.04	0.02		4.7	0.3	0.4	3.9	11.4		
B_3	41	44	15	4.8	0.03	0.04		5.0	0.2	0.4	3.9	11.7		
C	2	89	9	5.4	0.02	0.07		3.0	0.3	0.3	4.8	15.8		
CAROLINE SILT LOAM														
A_oA_1				5.7	0.75	0.08								
A_{2p}	26	64	10	5.5	0.08	0.07	10	2.5	0.2	0.5	1.9	6.8	5.4	.91
B_p	24	66	10	5.8	0.10	0.16	9	3.7	0.2	1.4	1.0	4.4	3.4	1.22
C_p	26	67	7	5.5	0.03	0.04		1.1	0.1	1.3	1.3	5.7	5.9	1.51
B_1	23	45	32	5.0	0.04	0.05		1.4	0.2	0.6	1.9	10.1	4.3	1.46
B_2	45	27	28	5.0	0.04	0.05	10	1.2	0.2	0.5	1.8	14.7	3.9	1.54
B_3	39	31	30	4.9		0.06		1.1	0.3	1.2	3.2	13.4	3.5	
D	40	42	18	4.8		0.07		2.0	0.1	0.3	4.2	17.0	3.4	1.57

TABLE III—C

Horizon	Depth	Color	Moist Munsell Color	Structure	Texture
LOBLEY LOAM - a Podzol Grey Wooded soil on glacial till.					
A_0A_1	2-0"			Loose leaf litter	
A_{2p}	0-1"	Pinkish grey	7.5YR6/2	Very fine platy	SiL
B_p	1-5"	Yellowish brown	10YR5/8	Fine platy to crumb	SiL
C_p	5-10"	Light yellowish brown	10YR6/4	Platy	SiL
B_2	10-22"	Dark yellowish brown	10YR4/4	Medium to fine subangular blocky	L
Ca	at 36"	Olive	2.5Y4/4	Massive to fragmental	L-CL
BAPTISTE SANDY LOAM - a Podzol Grey Wooded soil on alluvial aeolian material.					
A_{00}	2.5-0"			Loose leaf litter	
A_0A_1	0-5"			Loose, slightly decomposed litter	
A_2	.5-3"	Pinkish grey	7.5YR6/2	Single grain	SL
B_2	3-7"	Brown	7.5YR5/4	Single grain to crumb	LS
B_{31}	7-15"	Brown	10YR5/3	Single grain	LS
B_{32}	15-23"	Brown to dark yellowish brown	10YR4/3-4/4	Single grain	LS
C	at 75"	Grey	10YR5/1	Single grain	LS
This profile not on soil map but found just northwest of the mapped area.					
LEITH SANDY LOAM TO LOAMY SAND - a Dark Grey Wooded soil on alluvial aeolian material.					
A_0A_1	2-0"			Loose leaf litter	
A_{15}	0-8"	Dark grey	10YR4/1	Massive to single grain	SL-LS
B	8-14"	Brown - dark brown	10YR4/3	Massive to weak subangular blocky	SL
Ca	at 14"	Olive	2.5Y4/4	Massive to single grain	LS
WETASKIWIN SILTY CLAY LOAM - a Black solodized solonetz soil on slightly saline lacustrine material.					
A_1	0-7"	Very dark grey	10YR3/1	Granular to weak prismatic	SiCL
A_2	7-9"	Grey	10YR5/1	Platy	SiL
B_2	9-19"	Dark greyish brown	10YR4/2	Columnar to fine blocky	C
B_3	19-25"	Brown	10YR5/3	Massive to coarse blocky	SiC
Ca & Sa	at 30"			Massive	SiC
C	at 40"	Light brownish grey	10YR6/2	Massive	SiC

Horizon	Mechanical Analysis												SiO_2	Vol.
	S	Si	C	pH	N	P	C/N	H	Na	K	Mg	Ca	R_2O_4	Wt.
LOBLEY LOAM														
A_oA_1				6.8	1.12	0.12		2.5	0.2	0.7	6.4	43.6	5.2	
A_{2p}	30	62	18	5.6	0.10			2.6	0.3	1.5	0.9	4.2	4.2	
B_p	36	57	8	5.0	0.13			4.4	0.2	0.7	2.0	6.9	5.6	
C_p	37	62	1	5.7	0.05			2.8	0.2	0.2	1.1	4.4	3.0	
B_2	39	40	21	5.2	0.04			2.6	0.2	0.2	3.6	11.3	4.6	
Ca	40	44	26	7.7				0.0	0.2	0.3	5.8	34.5	3.3	
BAPTISTE SANDY LOAM														
A_{oo}				4.7	0.59	0.07							4.6	
A_oA_1				4.7	1.11	0.02							5.7	
A_2	60	34	6	4.8	0.05	0.05		2.8	0.2	0.2	0.9	3.3	7.1	1.12
B_2	73	24	3	5.4	0.03	0.04		1.4	0.1	0.3	0.8	3.0	6.4	1.43
B_{31}	83	15	2	5.5		0.05		1.2	tr.	0.1	1.2	4.5	6.5	1.53
B_{32}	85	14	1	5.9		0.05							6.5	1.59
C	74	18	8	6.8		0.05							6.1	
LEITH SANDY LOAM TO LOAMY SAND														
A_oA_1				6.3	0.30	0.06								0.90
A_{15}				6.2	0.14	0.06								1.30
B				7.4	0.05	0.06								1.53
Ca				8.0		0.05								1.56
WETASKIWIN SILTY CLAY LOAM														
A_1	17	48	35	5.6	0.79	0.11	11	12.8	0.8	0.9	7.4	20.0	8.5	
A_2	20	61	19	6.0	0.20	0.05	11	4.8	1.2	0.2	5.2	4.1	11.0	
B_2	12	38	50	7.0	0.15	0.05	11	2.0	2.0	0.4	8.8	4.3	6.5	
B_3	17	43	40	8.1	0.08	0.04			8.7	0.8	15.0	10.7	5.0	
Ca & Sa				7.9					9.6	0.6	13.6	18.1	6.0	
C				7.9		0.05								

TABLE III—D

Horizon	Depth	Color	Moist Munsell Color	Structure	Texture
MALMO SILTY CLAY LOAM - a Black solod on slightly saline lacustrine material.					
A_1	0-11"	Very dark brown	10YR2/2	Granular to weak prismatic	SiCL
A_2	11-12"	Grey	10YR5/1	Weak subangular blocky to coarse platy	SiL
B_1	12-14"	Brown	10YR4/3	Medium to fine subangular blocky	SiC
B_2	14-30"	Very dark greyish brown	2.5Y3/2	Subangular to weak columnar	C
B_3	30"+	Very dark greyish brown	2.5Y3/2	Massive to subangular blocky	C
Ca	at 40"				C
C	at 48"	Light brownish grey	10YR6/2	Massive	C
RAVEN SILTY CLAY LOAM - a Meadow soil on lacustrine material.					
A_oA_1	2-0"			Loose decomposing leaf litter	
A_1	0-2"	Very dark brown	10YR2/2	Granular to shot	SiCL
Ag	2-8"	Very dark grey	10YR3/1	Shot	SiC
Bg	8-15"	Greyish brown	2.5Y5/2	Granular	SiCL
Ca	at 15"+	Olive	2.5Y4/4	Granular	SiCL
C	at 36"	Light olive	2.5Y5/4	Massive (varved)	SiC
CODNER SILT LOAM - a peaty Meadow soil on stratified alluvial lacustrine material.					
0	6-0"			Peat	
A_1	0-9"	Very dark greyish brown	10YR3/2	Granular to shot	SiL
Bg	9-15"	Olive	2.5Y4/4	Fine subangular blocky	L
C	at 36"	Light olive	2.5Y5/4	Stratified	SiL
NAVARRE MEADOW - a Black Meadow soil on slightly saline lacustrine material.					
A_o	1-0"				
A_1	0-13"	Very dark brown	10YR2/2	Granular	SiCL
Bg	13-23"	Olive	2.5Y4/4	Granular to massive	SiCL
C	at 40"	Olive	2.5Y4/4	Massive (varved)	SiC

C horizon varies from 0.2 to 2% salt (Na and Ca Sulphate) Hydraulic conductivity of B_2 0.05 inches per hour, shrinkage of B_2 -50%.

Horizon	Mechanical Analysis S	Si	C	pH	N	P	C/N	H	Na	K	Mg	Ca	$\frac{SiO_2}{R_2O_4}$	Vol. Wt.
MALMO SILTY CLAY LOAM														
A_1	20	42	38	6.0	0.60	0.09	12	7.4	0.3	1.1	6.8 *0.7	26.3 1.3	5.3	
A_2				5.8										
B_1	18	39	43	5.9	0.20	0.04	11	4.8	0.5	0.5	7.7	27.9	5.4	
B_2	21	18	61	6.0	0.10	0.02		2.5	0.4	0.6	7.2 *0.9	25.9 0.7		
B_3	24	19	57	6.9	0.06									
Ca	25	16	59	7.7		0.04	15+				1.4	2.1	4.3	

* Total calcium and magnesium. C horizon averages 0.5% non-volatile.

Horizon	S	Si	C	pH	N	P	C/N	H	Na	K	Mg	Ca	$\frac{SiO_2}{R_2O_4}$	Vol. Wt.
RAVEN SILTY CLAY LOAM														
A_o	13	58	29	6.4	1.94	0.13								.39
A_1	6	58	36	6.4	0.21	0.06								1.51
Ag	7	53	40	6.4	0.68	0.08								0.90
Bg	6	56	38	7.3	0.06	0.05								1.51
Ca	18	49	33	7.7		0.07								1.50
C	1	54	45	7.7		0.06								1.50
CODNER SILT LOAM														
0				7.2	2.19	0.16		1.4	0.2	0.5	4.3	13.2		
A_1	40	54	6	7.6	2.24	0.16								
Bg	31	45	24	7.7	0.21	0.08								
C	20	65	15	7.7	.03	0.05								
NAVARRE MEADOW														
A_o				8.1	0.53	0.07								
A_1	12	48	40	8.1	0.20	0.05							*18.4	
Bg	11	63	26	7.8									8.7	
C	1	58	41	7.6									5.4	

*Total calcium.

TABLE IV

List of locations at which agricultural research and experimentation is being carried out on or adjacent to the Rocky Mountain House Sheet.

1. Experimental Farm, Canada, Department of Agriculture, Lacombe.
2. Illustration Station, Canada, Department of Agriculture, Chedderville.
3. Breton Experimental plots, Department of Soil Science, University of Alberta, Breton.
4. Native Fruit Station, Department of Plant Science, University of Alberta, Crimson Lake.
5. School of Agriculture, Alberta, Department of Agriculture, Olds.

ADDITIONAL SOURCES OF INFORMATION

General Farm Management

Grey Wooded Soils and Their Management — University of Alberta, Bull. No. 21, revised 1959.

Cropping for Profit and Permanency — University of Alberta, Bull. No. 44, revised 1950.

Fertilizers in Alberta — Prepared by Alberta Advisory Fertilizer Committee. Alberta, Department of Agriculture, Pub. No. 5, revised 1956.

Fertilizer Recommendations for Alberta — Prepared by Alberta Advisory Fertilizer Committee. Alberta, Department of Agriculture, Pub. No. 70, 1958.

Varieties of Grain for Alberta — Prepared by Alberta Varietal Zonation Committee. Alberta, Department of Agriculture, Pub. No. 91, revised 1958.

Forage Crops

Hay and Pasture Crops for Alberta — Prepared by Alberta Forage Crops Advisory Committee. Alberta, Department of Agriculture, Pub. No. 63, 1957.

Grass and Legume Seed Crops for Alberta — Prepared by Alberta Forage Crops Advisory Committee. Alberta, Department of Agriculture, Pub. No. 79, 1955.

Legume Inoculation — University of Alberta Circ. No. 4, revised 1951.

The Necessity for Growing Legumes on Gray Wooded Soils. Scientific Agriculture, Vol. 14, pp. 327-335, 1933.

Technical Questions

See your local District Agriculturist.

Write to the Department of Soil Science, University of Alberta, Edmonton, or to the Experimental Farm at Lacombe.

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