THE SOIL SURVEY OF THE WAIPA COUNTY,

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INTRODUCTION:

Soil surveys today are made by mapping soils as they exist in nature. A soil type is recognised in the field by the peculiarities of its profile and is mapped accordingly, Samples of each soil type are analysed, not as in the past to get fundamental data for the construction of a map, but in order to get specific information about a soil that has already been mapped.

A soil type may be regarded as a product of evolution just as any plant species. It has evolved from a comparatively simple rock substance by the influence of external agencies such as climate and vegetation, which 'have modified the physical, chemical, and biological processes operating within it. Some of its characteristics are "inherited" from the original rock substance, but a great many of them are due to its "environment".

Thus when we study the soil profile we are studying the effect of all the factors that have had a part in the production of that particular soil., For instance, it cannot with truth be said that the soil at any two places is the same if the climates of the two places are different. Such a condition is impossible for each soil bears the stamp of the climate under which it has evolved.

As the soil is an important part of the environment of a plant it follows that soil surveys, based on profile studies , must be of great value in the study of grassland problems.

MAIN SOIL TYPES MAPPED:

In the Waipa County, owing to the intricate arrangement of the soil types, it was early recognised that a soil survey would have to be detailed if it was to bc of value in assisting the agriculture of the district,

The soil map has been compiled on the scale of twenty chains to the inch, which allows of the intricate soil pattern on each farm to be fairly accurately drawn.

The main soil types may he considered as belonging to two groups: (1) the soils covering the rolling hills, and (2) the soils covering the wide flats.

Soils Covering the Rolling Hills: The soils covering the rolling hills are derived from basic volcanic ash which was erupted before 'the Waikato River had built up the wide flats which now cover so much of the country. Two important soil types have been recognised, the Hamilton clay loam, and the Ohaupo silt loam,

The Hamilton Clay Loam which covers most of the rolling hills in the northern half of the country, is derived from the ash of the Hamilton showe r. It is a rcddisn brown, heavy compact, mature soil, well drained and 'but little affected by frost, It sup-ports some of the best pastures in the Waikato.

The pastures come away readily in early spring, but during the late summer months they tend to suffer from drought. Where, however, they have been heavily phosphated, they resist the dry weather much better.

The Ohaupoilt Loam , which covers the rolling hills south from Ohaupo is derived from the ash of the Mairoa Shower. It is lighter brown in colour, and has a free , fine granular structure throughout which ensures excellent drainage . This soil is retentive of moisture, and pastures on it do not dry out as much as those on the Hamilton Hills .

Pastures on this soil have a lighter colour, and a more tufty appearance than those on the Hamilton clay loam, and, in general , appear to contain less rye,

Soils Covering the Wide Flats: The soils covering the wide flats are , for the most part, derived from acid volcanic material deposited by the Waikato River. Smaller areas of soil are derived from silt and clay deposited by the Waipa River and from material washed from off the rolling hills.

More than a third of the wide flats is , however , covered with peats which have collected in former lakes and in swamps .

The chief soil types are the Horotiu sandy loam , the Te Kowhai silt loams , the Whatawhata clay loam, the Te Rapa silt loam and the Rukuhia and Kahikatea peats.

The Horotiu Sandy Loam is derived from rhyolitic debrisdeposited by the Waikato River. It is a brown free soil resting on sand and gravel . The pastures on it come away early in spring and make exceedingly rapid growth in late spring and early summer, but they become parched in spells of dry weather. Many of the pastures on this soil have an open appearance and contain a large proportion of crested dogstail. This soil is friable and easily cultivated but the large number of annual weeds that thrive on it in the spring have deterred many farmers from cropping it,

The Te Kowhai Loams , like the Horotiu soils, are derived from the rhyolitic debris brought down by the Waikato River, but as they occupy the shallow depressions in the flats they are not so well drained, a condition, which is reflected in the colour of the subsoils, They are heavy compact soils; the topsoils are grey and the subsoils whitish.

These soils must be drained before they are suitable for pasture but there is no scientific data correlating drainage and production. Each farmer must rely on his own or his neighbours' experience.

As the soils are damp the pastures do not commence to grow in spring until about three weeks later than those on the Horotiu soils, and the flush is also later, and not so pronounced. The pastures keep green during the dry months and in the autumn often continue to grow after the pastures on the well-drained soils have ceased . The sward covering these soils is closer, has a darker green colour and contains a larger proportion of clover throughout the year than is the case with the Horotiu soils.

The Whatawhata Clay Loam which is derived from debris deposited by the Waipa River, is similar in many ways to the Te Kowhai soils, but is usually heavier in texture and "pugs up" more with heavy stocking. It probably has a higher natural fertility than have the Te Kowhai soils.

The Te Rapa Silt Loam is a peaty soil which occurs near the margin of the peat Lands. Although a considerable area is being farmed the pastures are generally poor, especially during the summer months when they dry out badly . Yorkshire Fog, browntop, and paspalum are the chief grasses but some few farmers have established fairly good rye and clover pastures.

The Rukuhia Peat, only comparatively small areas of which have been occupied, are generally but poorly farmed, On most farms the Peat is so deeply drained that during summer it suffers from drought. In winter the frost lies heaviest on the Peat lands and pasture growth during the colder months is extremely small. Under these conditions farming is difficult, Some few farmers, however, have established fairly good rye and clover pastures. The main essentials seem to be levelling of the field, liberal initial dressings of lime and fertilizer, control of the water table, and trampling by stock to consolidate the surface,,

The drying of Peat colloids is in part an irreversible process, and once peat is allowed to dry thoroughly it does not readily re-wet, but forms a light dry porous mass known to farmers as "puffy top". If some practicable method of controlling the water-table could be adopted, many of the difficulties&tending the farming of these peats would probably disappear.

The Kahikatea Peat soils, which have accumulated beneath Krhikatea forest are friable throughout their whole depth, and do not dry out in summer like the Peats of the Rukuhia Series. They support better pastures than are generally seen nn other types of peat.

CHEMICAL DATA:"

The chemicaldata on the soils are incomplete. There is a good supply of available Phosphoric acid in the topsoils Uhder pasture, and a deficient. amount in the virgin soils. It is thought that the heavy annual dressings Of phosphate manure have built up considerably the supply in the topsoils. From the analyses the Horotiu soil seems to have a higher natural fertility than the other soil types.

In manured soils the phosphoric acid is stored in the top 0-3 in,; the lower spits contain decidedly less amounts.

According to the standard adopted, the available Potash percentages may be considered good, but they do not give a lead as to whether the soils would respond to or need'potash manures.,

The soils range from a strongly acid reaction to medium acidity, The peaty soils, the Te Rapa silt 'loam and the Te Kowhai silt loams, are the most acid. Judged by the ratio of line' requirement to exchangeable lime there is most need for-liming on the peats, the Te Rapa silt loam and the Te Kowhai silt loam,

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x See Chemical Report on Waipa Soils, by T. Rigg, 1934.

D I S C U S S I O N.

Three points Of' interest to grassland farmers which a rise from the surveyare:-

(1) Even in an intensively farmed county like the Waipa there are often comparatively large areas Of Poor Pastures on the best soil types. As has often been pointed out this lagging Of a large portion of the farmers behind their better informed and more enterprising neighbours constitute one of the most important problems of agriculture. By clarifying the position for the farmer and the agricultural instructor, soil surveys will assist. in overcoming this lag,

(2) The moisture status of the soil is the factor that shows closest correlation with growth of pasture since unlike the plant food status , it cannot be easily corrected. Work on the peat soils and probably on soils like the Te Mowhai loams, where excess mois ture is being removed by drainage, should prove fruitful,

We should like to ask the agrostologists to what extent the 'farmer can exploit t'he moisture conditions of the various soil types by establishing pastures of' different botanical compositions.

(3) The chemical analyses of the soils, though at present incomplete , indicate that on certain of the soil types the existing practice of topdressing grasslands with calcium phosphates hns caused a large reserve of' phosphate to be built up near the soil surface. Much of this reserve will be positionally unavailable to the grass roots that penetrate more than an inch below the surface, and , moreover, during the summer months the reserve will not be readily available to the surface roots owing to the drying out of the top soil. The question naturally arises as to whether on soils that have the power to fix phosphates readily, our present method of topdressing is really so economically sound as has hitherto been supposed,