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GRASSING GUMLANDS OF NORTH AUCKLAND.

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In past ages the kauri pine flourished in many parts of North Auckland, It is estimated that the kauri took hundreds of years to mature, the trees stood closely together and were of huge dimensions,

The accumulation of acid humus on the floor of the forest in the course of time gradually leached the soil and thus reduced fertility. The timber from the trees was of considerable value and it was not very long before the forest areas were gradually depleted.

Over large areas the fossilized resin (known as kauri gum) from the kauri trees was to be found buried in the soil along with fallen trees which were sunk in swamps and were all that remained of what was once a huge forest. These tracts in which kauri gum was deposited were exploited for the gum which was of great commercial value and the land so worked came to be known as "Gumland". Thousands of pounds were realised from this product which was recovered by the primitive methods of digging with spades, After the gum had been recovered the Land was looked upon as useless owing to low fertility and the very rough state in which it was left after digging,

The gum was found buried from a few inches to several feet in depth and as the sole object was to recover the resin the result is that dug areas present a very rough and uneven surface, The gumdigger left the land in a very bad state for farming" Again and again the land has been dug over and great clods have baked hard, deep holes were dug and left unfilled., In order to clear the scrub preparatory to digging the fire stick was freely used,

Consequently the whole gum fields were frequently burnt, ultimately leading to complete destruction of the thin layer of black surface soil.

About the beginning of this century serious attempts were made to ascertain the possibilities of bringing this class of country into grass.. At first results were not very encouraging, but eventually means were devised with the aid of lime and fertilisers whereby the despised gumlands could be brought into economic productivity. The development of this land has been progressing steadily during the last few years. Experience of farmers and experimental work by the Department of Agriculture has shown that by using systematic methods this once thought useless land can be converted into fairly high producing pasture land.

SOILS:

The gumlandsoils cover extensive areas in North Auckland. They are of several types, having been derived from different underlying rocks, All, however, have been produced by the leaching action of the acid humus which covered the ground when the areas were formerly clothed with kauri forest,

The kauri grew on old consolidated sands, on clays and on basic volcanic soils and it is difficult to visualise the disastrous effects the kauri forest has had in changing the soil profile, rendering these soils in a condition which makes some of them a hopeless proposition from a farming point of view.

The soils may be class-ified into five broad types,

viz:

- (a) Old consolidated sand areas (podsol)
- (b) Clay with a thin surface silt layer found on flats or gently rolling land, (immature podsol)
- (c) Clay on lower slopes and in hollows. (immature podsol)
- (d) Clay with sticky subsoil exposed. (podsol)
- (e) Basic volcanic origin. (podsol)

(a) The old consolidated sand areas extend along the

west coast from North Head of the Kaipara Harbour to Parengarenga in the far North, at One Tree Point, Mangawai and Waipu on the East Coast. This type shows the typical profile of a **mature podsol**. It consists of a layer of five inches of **grey** sand, a layer of five inches of whitish sand and then a layer of six inches of a blackish humus pan on cemented sandstone, with iron and alumina pans at different depths. The soil is badly drained in winter, and, **an** account of the sandy texture of the topsoil, **is** dry during the summer. This mature profile is best developed on the flattish spur tops and easier slopes. Where the slopes are steeper slumping takes place and the soils are not so mature. Poor drainage restricts development work on this soil type.

(b) Where the land was flat, or gently rolling, the leaching was so intense that the finer particles were leached from the surface, leaving behind a new deposit, a grey silty skelton of the former soil and forming impervious pans below, Although, not a very attractive looking proposition lying in its rough state, the resultant soil of this type can be successfully grassed with a high producing **sward**.

(c) In the hollows and on the lower slopes, where grey silt tended to accumulate, whitish silica **pans** were formed as the leaching continued, The drainage of this type is important, soils of this type will grow; quite good grass, providing the necessary drainage is attended to before any attempt is made to sow to grass.

(d) From some **areas**, after the kauri forest has **dis-**appeared the grey silt top was washed through long exposure to heavy **annual** rains, leaving the sticky clay subsoil exposed. This type is a hopeless proposition from an agricultural point of view.

(e) On soils of basic **volcanic** origin which were covered with kauri forest the brown crumbly loams which normally develop have been **altered** to greyish brown and even

greenish sticky clays, The alteration in the soil texture has been such, that we have another soil type, which is difficult to grass under present known methods,

DEVELOPMENT:

A large portion of the gumland in North Auckland has been taken up for farming purposes. From results now showing it has been definitely shown that most success has been obtained on (b) the **grey** silt soil type. Unfortunately in the past the areas taken up were in most cases too large. The settlers had little or no capital and in many cases their farming experience was very meagre. Poor cultivation, poor strains of grasses and clovers, late sowing, inadequate top-dressing and lack of cheap lime resulted in poor, low producing pastures consisting mainly of browntop, danthonia, and lotus species with little or no white clover. Permanent water is scarce over large areas. The lack of water is a serious drawback to development. It is impossible to sink satisfactory bores and on most gumlands farm water has to be held by dams. This water is anything but good. If the dams are not fenced off from stock the water soon becomes in a filthy condition.

It was never anticipated in the early days that the gumlands could be made to carry a sward of good ryegrass, paspalum, white clover, after once being broken up. Early development aimed at first raising the soil fertility by ploughing in green crops, tile drainage, subsoiling and the use of burnt lime this procedure was very costly and did not give very satisfactory results. It has been found that it is not payable to grow field crops in gumland as is the case with better quality soils. Turnips and swedes cannot be used to any advantage in the process of development. The building up of humus by growing such crops as blue lupins and lotus hispidus for ploughing in, once thought essential; is not necessary. While settlers were working on these lines no certified seed was available, freight charges on fertilis-

ers and lime were high, which resulted in poor grass' seed mixtures being used with little or no fertiliser applied to push the young pasture on. With these methods a poor, weak pasture was established, which rapidly reverted to danthonia and browntop, with teatree and rushes taking possession again.

Work done by the Department of Agriculture and the experience of farmers with the necessary equipment to do the cultivation thoroughly have more recently demonstrated, that even the very roughly dug over areas are capable of growing good pastures. A marked change is now to be seen in the methods adopted through previous experience - development of smaller areas is being undertaken, the preparation and cultivation work is more thorough, certified strains of grasses and clovers are being sown; adequate supplies of lime and phosphate are being applied and the results of this practice are apparent everywhere. With the success which is now being obtained in developing gumland it has been clearly demonstrated that the secret of success is wrapped up in, the thoroughness of three main points.

The first important step is early ploughing, followed by a second ploughing after the first ploughing has been subjected to plenty of cultivation. The first ploughing should be done during March or April and the second during October and November; so that a good firm seed bed can be worked down during the summer months. The seed bed should be ready for sowing during latter end of February. The second point is the necessity of sowing early with certified strains of grasses and clovers, while the third point is the use of adequate supplies of lime and phosphate. It has been definitely proved on gumlands, that lime is essential for a successful response from phosphatic fertilisers. Ground limestone should be applied, at the rate of 1. ton per acre, just prior to sowing the grass seed and a dressing of superphosphate or basic slag at 3 cwt per acre should be applied when sowing, followed by a further

dressing of superphosphate during September at 2 cwt per acre.

If full attention is not paid to the above points the resultant pasture will be unsatisfactory. It is a definite waste of money and labour to do the cultivation work thoroughly and perhaps sow a cheap grass seed mixture, or neglect to use sufficient lime and phosphate, On the other hand, it is also a waste of money and time to sow certified strains of grasses on, a poorly prepared seed bed, even if adequate supplies of lime and phosphate are used. Poor Cultivation generally means a loose seed bed with late sowing - this is **disasterous** - early sowing on a well prepared seed bed is the key note of **success** - early sowing means good white clover establishment and as in the establishment of pastures on, practically all soil types white clover is the essential pasture plant for the successful growth of other grasses.

The method which is giving successful establishment of ryegrass., paspalum, white clover pasture on dug over gumland is briefly described as follows:-

Manuka scrub is cut during the summer and the area, burnt off thoroughly - all Manuka over six feet in length is saved for making fascines for draining wet hollows, parts of the gumland areas become boggy in the winter, bake hard and dry-out in the summer, through the formation of a hard pan where the top grey silt joins the clay. Underground fascine drains lower the water table and enable a good pasture to be maintained on these previously wet areas, Large gum holes are filled in and the area roughly levelled - surface timber is removed and the land is ready for the first ploughing. The first ploughing should be done with a snowplough in late autumn and early winter. The single furrow should be ploughed for six months and worked down and levelled with discs and harrows as weather permits. It is then ploughed a second time during the late spring and if possible is better ploughed up and down the slopes to

such as superphosphate and basic slag, providing they are used in conjunction with lime, Without lime and phosphatic manures neither white clover, nor perennial rye will grow,

but with them they will thrive

In addition to the lime applied prior to sowing the grass seed, a dressing of superphosphate or basic slag at the rate of 3 - 4 cwt. per acre is necessary at the time of sowing. It has been found advantageous to follow this with a dressing of superphosphate at 2 cwt. per acre during the spring. This second dressing may seem excessive, but quick acting phosphate applied just when the clover is ready to commence growth in the spring, has a wonderful effect in improving the sward. A dressing of superphosphate at this stage is far more effective, than double the quantity delayed until the following autumn. Once established it is necessary to maintain the sward and it can be maintained at a satisfactory level of production, with a similar amount of topdressing, -as is required, to maintain pastures on much of our dairying land. Annual autumn dressings of superphosphate at 3 - 4 cwt. per acre are necessary; with lime at 5 - 10 cwt. per acre every few years. Concentration of stock greatly assists in bringing about high producing pastures - early and good establishment of white clover is necessary to make use of lime and phosphatic topdressing so that the pastures can be heavily stocked - heavy stocking means more animal droppings and these droppings are most valuable in bringing about an improved pasture sward.

A mixture of superphosphate 2 parts and lime 1 part at 4 - 5 cwt per acre, applied annually each autumn; superphosphate, and basic slag, mixed in equal parts, applied at 3 cwt per acre, also gives satisfactory results, but here again, it is necessary to use additional lime every few years. In reviewing the main features necessary for successful pasture establishment on gumland, it will be noted, that extra stress has been laid on the necessity for thorough cultivation

and early sowing. These two features are definitely controlled by the farmer - the work is not easy - it means planning ahead followed by hard toil - the results of thorough work are sure and lasting. There is reversion to tea-tree - rushes are one of the main difficulties, but they give more trouble when the land is only ploughed once or surface cultivated before sowing.

Fencing material and lack of water are two features which must be considered when developing gumland. There is little or no fencing material to be found on this country and as before mentioned it is generally badly watered. The purchase of fencing materials and lack of water add to the difficulties of development and farming. Although these drawbacks have to be contended with, thorough methods as outlined in this paper have resulted in the making of many gumland farms, which from the point of view of capital invested and returns obtained, compare more than favourably with most of the higher priced lands, in North Auckland.

It may be interesting to review the experience of a settler who took up a section of 105 acres of virgin gumland, in 1931.

The section was taken over during September, 1931. During the following summer a small area of eight acres was cleared and teatree burnt, the gum holes levelled and teatree fascine drains put into the wet low lying areas. Ploughing was commenced during the early autumn and the furrow slices disced down as weather would permit. The area was ploughed again during the late spring and the land was continuously cultivated with disc harrows throughout the summer. An ideal seed bed had been prepared by January when 1 ton of ground limestone per acre was applied. After a few harrowings to keep the surface soil loose, the area was sown with certified seeds during the second week in February with superphosphate at 3 c'wt. per acre. Thorough cultivation,

early sowing combined with good certified strains of grass and clover seed plus adequate **supplies** of plant food in the form of lime and phosphate gave an excellent **strike** of clover, through **which** the **ryegrass** made a good stand, The young grass was grazed by dairy stock six weeks after sowing - carried eleven milking cows from 1st April to 1st November and produced an ample supply of good **feed**. The **results** from this sowing were so encouraging that a further twenty-two acres were **prepared** in a similar way during the following year and sown during the **following February**. The herd increased to twenty cows besides two horses and four head of young stock. The following year another ten acres was excessively wet and it was impossible to **do** the necessary cultivation in a thorough manner,

Rather than waste good seed and **fertiliser** on a poorly **prepared** seed bed, he wisely withheld sowing. Climatic conditions **were** more favourable during the following year and fourteen acres were sown under ideal **conditions** during February-of **1936**. In **order** to square out the ploughing on to the boundary a small area of about two acres was **ploughed** once during the summer and worked up for sowing during the autumn. It was particularly noticeable that never at any **stage did** the clover growth compare in any way with the area which had been double ploughed and cultivated in a thorough manner. This area of two acres to-day supplies an object lesson, definitely showing the necessity for double ploughing and unhurried cultivation to obtain successful pasture establishment on this soil type. **After five** years of single handed work this settler developed fifty-four acres - carrying thirty dairy cows and three horses. The production of butterfat during the **1936/37** season when twenty-five cows were milked on the fifty-four acres, reached **8,560 lbs**, giving a **per** acre production of approximately **158 lbs**.

The subsequent topdressing of the pastures has

been a feature in maintaining and improving the sward which has enabled the butterfat production to reach such a satisfactory level on a soil type which in the past has been regarded by many as useless, The pastures have received a dressing of ground limestone each autumn at 5 cwt. per acre in addition to 3 cwt. of superphosphate per acre applied during February or early March and it has been the practice to give the grazing areas a further dressing of superphosphate at the rate of 2 cwt. per acre during August.

This example could be supplemented with many more, but this one will serve to show that the once despised gumland can be made to carry good dairying pastures.
