DEVELOPMENT OF SCRUB GUMLANDS

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In considering the development of scrub gumlands in Northland, it must be borne in mind that the term gumland covers a wide range of podsolised soil types derived from a variety of sedimentary soils, and if the presence of gum holes and a strongly leached soil allows land to be classed as gumland, the term could be extended to some mature soil types derived from volcanic dolerite. The vegetation on the gumlands is mainly manuka scrub, fern, and varieties of rushes and sedges. Frequent burning has prevented regeneration of other species.

In development, the sandy gumlands on the west coast and on the peninsula above Kaitaia are the easiest to break in. Having all the characteristics of light sandy soils, they are worked down with very little trouble. At the other end of the scale are the gumlands derived from the heavy claystone soils, which are 'difficult to handle in the wet seasons. The topography and rainfall coupled with the original kauri forest have exerted a profound influence on gumland soils and the subsequent farming of them.

They are usually easy in contour with low ridges, easy slopes, and wide gullies. A rainfall of 50 to 60 in. has caused a large amount of seepage and leaching to take place, which increase in descending the slopes to the gullies. The seepage, combined with the effect of the acid-forming humus of the kauri, totara, and other trees, has leached out the top layers of the soil. The leaching varies from a few inches deep at the top of the slope to several feet deep on the lower slopes and flats; that is, contrary to the usual state of affairs, the flats are not-as-good-as-the-higher slopes.

From this it will be seen that an area of gumland will in reality be a variety of soil types commencing with the well-drained original soil on the ridges and knobs and finishing with a deeply podsolised soil with

no structure in the gully. The latter will be full of kauri roots making drainage and cultivation difficult in a dry season and almost impossible in a wet one. Frequently a pan is formed varying in thickness and necessitating a crowbar to chisel out a posthole.

GUMLAND DEVELOPMENT CULTIVATION

The initial development of the gumland soils should commence with the preliminary scrub crushing and burning in summer. If gorse is present the early burning will help to germinate the seed and the subsequent discing will kill many of the seedlings.

Generally the unevenness of the ground, gumholes, and kauri roots make mouldboard ploughing impossible and a double discing is necessary. On the steeper slopes a single discing on the contour is not sufficient.- The disced furrow turned up the slope will fall back to some extent and there is left untouched the strip between the centre discs. The double discing also chops up surviving scrub and rushes and facilitates their rotting.

The lower slopes and flats require special attention which often needs to be extended over 2 seasons. Gumholes, often several feet deep, need filling in and time allowed for consolidation. Timber must be pulled out and a drainage system put in. Unless these points are attended to, the area 'will be so uneven as to make it useless and impossible to get machinery over it for topdressing. and the establishment of pasture, and also maintenance of that pasture.

A winter and spring fallow is essential for adequate weathering and the subsequent cultivation necessary to bring a gumland soil to a seed-bed depends on its type. The sandy gumlands can be brought to a seed-bed with two or three strokes of the heavy harrows and levelling of the surface by dragging a 10 or 12ft. length of railway iron behind the harrows. On the less tractable gumland soils working down will start by tandem or giant discing followed by heavy harrowing.

On the heavy claystone gumlands there is a stage in the drying out of the soil in spring at which the land breaks down well, but where work has been delayed and the weathering insufficient, the heavy gumlands are difficult to work down, and unless the season is kind and alternate drying out and wetting leave the soil in a stable condition, the farmer reaches a stage where further cultivation only turns over the lumps.

The contractor usually makes use of the roller with or without the seed box attached as part of the cultivation programme, but the farmer frequently relies on the harrows and the wheels of his tractor to consolidate the seed-bed.

Early cultivation to a seed-bed to conserve moisture and allow early autumn sowing down is as important in Northland as elsewhere. A dry period after Christmas is common and if the land dries out in a lumpy condition at this time, it will probably be April before a seed-bed can be obtained,

EROSION

A certain amount of surface erosion of the newly-sown paddock is common due to the heavy rains which usually. follow a dry autumn. This can be counteracted to some extent by contour furrows which would break the flow of water and channel it to a few main points. Where heavy rain has scoured a slope it will be seen as bare streaks and ruts which make the surface bad for implements and look unsightly for years.

Deep cultivation, contour furrows, and drainage of the lower slopes help to reduce the effects of this type of erosion and the seed-bed itself should not be worked down to the fineness of an onion bed. The ideal gumland seed-bed is a well-consolidated one but with a surface on which lumps the size of a walnut are plentiful. A certain amount of litter such as fine scrub and rushes in the surface layer is useful in breaking the effects of a heavy rain.

LIME AND MANURE REQUIREMENTS

Lime: The deeply podsolised gumlands are found to have a pH of about 4.3 to 4.7 and an initial requirement of 1 to 2 tons per acre, the sandy types such as the Te Kopuru requiring the least. From trials it appears that if this dressing is followed by ½ to 1 ton the following year, subsequent dressings of 5cwt. per year are sufficient. The practice of working half of the lime into the seed-bed is probably beneficial in a dry autumn. On the other hand, good establishment is seen where the complete dressing is applied on the surface just before the seed is sown.

Phosphate: Normal dressings of 3 to 4cwt. are adequate, but 3 dressings in the first 12 months after sowing down are advised. Basic slag, as would be expected, gives excellent results. This may be due in part to the trace element content as well as the re-

active form of the lime and phosphate. North African phosphate also gives a good response. If, however, the land has been adequately limed, North African phosphate is not as good as super-phosphate.

Potash: The variation in leaching and soil type on the gumlands has already been stressed and this makes it impossible to state the potash requirement of any large area. Invariably the deeply podsolised flats and lower slopes are' deficient and the best practical method of ascertaining potash requirement is to run a strip at lcwt. per acre from the flat to the top of a ridge and note where the response) fades out. The mature and strongly podsolised gumland types such as the Te Kopuru, the Wharekohe, and the Kara types are invariably potash deficient and present no doubts in the field that a spade cannot confirm.

In spite of these deficiencies, clover growth may be good for the first season or two after sowing down, but a gradual weakening sets in where a paddock includes both the strongly podsolised, and better soil types. It is reasonable to find that the depth as well as the degree of podsolisation is important in determining potash deficiency on these soils, that is, an area may have a strongly podsolised layer 4 to 6in deep but growing a strong clover, which will not be found where podsilisation is 2 or 3ft. deep.

MINOR ELEMENTS

Minor element pasture trials are in progress, but as yet there has not been any marked response. A molybdenum trial on the Wharekohe silt loam has been in progress for 16 months, but has not shown a response in spite of the molybdenum content of 0.03 ppm. and a pH of 5.3.

There has been a slight pasture response reported from copper and vanadium on the Te Kopuru type. Copper deficiency, and to a less extent cobalt deficiency, has been found in livestock on the west coast sandy gumlands such as the Te Kopuru type, in particular, but the better types are also considered by the Animal Research and Animal Industry Divisions of the Department of Agriculture to be on the border line, particularly for sheep.

The heavier gumland soils are also deficient, but until land development brought in large blocks of gumland very little of this class of land was grazed by sheep; as dairy stock are not so susceptible to these deficiencies, little was heard of them.

A certain amount of trouble experienced in rearing young calves may be due to these deficiencies. The tendency to set stock calves and the practice of set stocking ewes and lambs on the deeply podsolised areas may cause trouble. If the varying degrees of podsilisation on an area of gumland are borne in mind, it would be possible to encounter trouble on a deeply podsolised flat and to escape it on the adjoining hill paddock.

CROPPING

Very little cropping is done on the gumlands and if it is carried out, it is at the expense of the pasture following, It is commonly thought that cropping improves the soil for grassing down, but it also is not uncommon for farmers to complain that an unthrifty pasture followed the cropping. Occasionally the farmer proves the point for himself by cropping half of a paddock in the summer with soft turnips and leaving the remainder to fallow. When both are sown down the following autumn the fallowed portion is much the better. Break feeding or carting turnips to dairy cows transfers what little fertility is present.

The nature of the soil makes the growing and handling of swedes and chou moellier crops for the winter difficult on the heavy gumland soils.

A crop of soft turnips sown in October can be a means of establishing a paspalum sward. The paspalum seed is sown with the turnips and germinates readily and the English grasses and clovers are oversown in the autumn. In this manner a paspalum mixed pasture is obtained in one year. If the paspalum is sown with the mixture in the autumn, it will take 3 to 4 yeard to obtain the result obtained by spring sowing.

D R A I N A G E

Difficulties in drainage of gumland are due to podsolisation of the soil destroying its structure. This frequently causes seepage bogs to form high up on a slope. The problem is then not to drain the area, but rather to conduct the surplus. water down the slope without causing erosion. Pan formation complicates the problem.

PASTURE ESTABLISHMENT AND MANAGEMENT

Providing the land has been adequately dressed with lime and phosphate pasture establishment is good and in a favourable season a paddock sown down in

March will be ready to graze in 2 to 3 months. The readiness of the heavy types of gumland to become sticky and water logged necessitates careful pasture management the first winter and spring.

Grazing with 'sheep is preferable to. avoid pugging, but since most gumland farmers are dairying, this is usually a counsel of perfection. If the pasture is established early, it can usually be handled with dairying stock before the winter rains 'and cold temperatures slow down growth. If sowing down is late, pugging can be avoided by leaving out of the seed mixture the Italian or short-rotation ryegrass, which will smother the clover.

New pasture on gumland invariably shows a characteristic yellowing and thinning the first winter, although establishment and growth have been good in the autumn. This appears to be nitrogen starvation, which appears in June when the gumland is waterlogged and temperatures are low. Under such conditions new pasture could not and should not be grazed. The yellowing disappears in the first spring and does not return.

New pastures go through a cycle over a period of years. The first season the. balance of clovers and grasses is normal. This is followed by a thinning out of the grasses with. a dominance of the clovers which frequently give trouble with bloat. With adequate topdressing,, fertility is built up and the grasses gradually improve, but three or four years of clover dominance can be expected.

It will be realised that pasture management on the gumland presents the difficulties experienced anywhere where the soil is heavy and the winter rainfall high.

The orthodox perennial ryegrass, paspalum, white clover pasture can be grown without difficulty. Timothy will persist in the wetter spots, but is not very vigorous. Cocksfoot will grow well on the better drained slopes.

Up to the present the answer to the winter. pugging has been the run-off,. By this method the paddocks 'are spelled and pugging avoided during the winter,-but-theeherd must come back for calving in August and for 2 or 3 months a certain amount of pugging is unavoidable. What has been gained in spelling the pasture, however, is often lost in butterfat production by poor nutrition of the herd at the most important period, that is, for 2 or 3 months before calving.

The alternative must come with closer settlement. It will entail drainage, fencing, and concrete strip races. With these improvements a production per acre equal to that obtained from many of the better types of Northland soils can be looked forward to.

DISCUSSION

Q. Can the speaker explain why easily the best paddock on my farm is one on which I have sown crops? It has easily the best grass.

A. (Ballinger) : The general rule is that cropping does not improve the fertility of any land. If the questioner is one of the few who put on large amounts of manure with their cropping, his results are understandable. Small applications of manure with cropping and stock wandering on and off do not improve fertility.

Q. How do you control second growth of manuka?

A. (Brown) : Intensive stocking is the best answer to that. sort of development. It is difficult for the individual farmer to stock in the same way as developers such as the Department. You can control second growth of manuka with wethers and dry cattle. Such methods must be peculiar to large organisations having large resources of stock that can be worked hard in large numbers and then. taken off to pep. them up.

Q. Would somebody raise the contentious question of manuka blight ?

A. (Madden): Manuka blight is being sufficiently well developed in the country and is superseding the hard way of the slasher and burning. The insect is doing marvellous work and has already done it in some places. The mealy bug or manuka blight is well established in some parts. of Northland. Farmers who were wise enough to bring the blight here were wary of discussing it with their neighbours and relunctantly confessed they had some on their places. Where the manuka IS dying other more useful plants are taking up the running-in, many places grasses. and clovers and in others trees of a more useful type.

Q. Gorse is harder to get rid of than manuka and many farmers are afraid gorse will take over after the mealy bug has done the job with the manuka.

A. (Madden): The farmer who has been industrious enough to fell his manuka has always been regarded as a good farmer and the man who neglected it as a bad farmer. Manuka is a worse pest than gorse. We don't know a. spray that will deal with it. Contractors are spraying gorse on steep hill country quite effectively and at a price satisfactory to farmers. Contractors handling gorse that. way are having just about 100 per cent success. But where manuka is felled, burnt, and the area resown, always, however well farmed it is, there are seedings coming up. Gorse fortunately can be dealt with by spraying and I would prefer gorse to manuka on hill country.
(Ballinger) : Hill country men would consider that if you give them manure and stock they would be prepared to clean up any hill country they were offered.

Q. Could the speaker advise on seed mixtures for gumlands?

A. (Ballinger): A suitable seeds mixture is 201b. of perennial ryegrass, 31b. of white clover, 5 to 10lb. of short-rotation ryegrass, 2 to 3lb. of red clover, 21b. of subterranean clover, and a little timothy and cocksfoot if desired.

Q. Have those who have been fallowing for 2 years tried ryecorn prior to as well as with grass?

A. (Ballinger) : Invariably the land is left without cropping. Sometimes a crop of soft turnips is taken. Gumlands in a crop in winter are a hopeless proposition. Sowing pastures with ryecorn has gone out of fashion. If you have strong growth of ryecorn, it will smother the clover and if there is a poor strike of ryecorn, you are no further ahead.