WEEDS OF SOUTH OTAGO AND SOUTHLAND

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SUMMARY

IN the area of South Otago and Southland where soils vary from deep rich alluvial plains to light bracken-covered stony soils and eroded high country and rainfall ranges from 40 to 45 in. in the coastal regions to 25 to 30 in. inland, the main weeds affecting the farming economy are outlined. Californian thistle, Scotch thistle, ragwort, cutty grass, spurrey, fathen, wild turnip, and redshank are among some of the weeds of the more fertile areas covered, while gorse, manuka, bracken fern, and tutu are discussed with others in the group of weeds of the second-class country. The paper discusses the importance and distribution of the weeds in the area, giving a background picture on which more detailed discussions of specific weeds can be based later in the Conference.

Some understanding of the farming topography, fertility, and climate of South Otago-Southland is necessary in order to give a fuller appreciation of the weed infestation of the district.

The South Otago portion comprises good fertile plain known as the Tokomairiro Plain situated round Milton. Both the flat land and surrounding hills were originally tussock covered and for this reason received early attention from the first settlers. Because the climate is a happy medium, the plain is ideally suited for fat lamb and cropping production. The hills where ploughable, carry reasonable pasture, but unfortunately after repeated burning the unploughable slopes have largely reverted to manuka. Coming westward from Milton to Lawrence, the country is rolling and undulating with reversion on the steeper slopes.

One of the features of South Otago is, of course, Clutha river, which leaves Central Otago by a gorge at the northern tip of the Blue Mountains. It then flows through a large stretch of undulating country which comprises a big portion of South Otago. This country was originally tussock covered, but has now been mostly cultivated and under normal conditions runs to browntop. Under repeated cropping the ridges are liable to erosion and the land therefore varies considerably in fertility. Good crops have been produced, but pastures run out and become browntop dominant, unless well limed and fertilised. Of recent years molybdenum has been of benefit.

At Balclutha the river forms a delta, the two branches of the river separating three almost equal areas of rich, alluvial land. Dairying, cropping, and beef production are all featured in the farming of the delta, which, if anything, has an even higher reputation than Southland for the growing of root crops. Swede crops of 80 tons per acre are not uncommon.

To the south of the delta lies the Catlins, consisting of small fairly fertile valleys surrounded by scrub- and bush-clad hills. The rainfall is 40 to 45 in., the bush consisting chiefly of kamahi (*Weinmannia racemosa*) and birch (*Nothofagus* spp.) The soil is inclined to be acid and low in fertility. The valleys have been settled and farmed, but the unploughable bush country offers little or no inducement as a farming proposition. This area continues into Southland and joins up with a coastal strip of undulating country which adjoins the Edendale plain.

Southland includes Fiordland to the west and from these mountains run the ever-widening valleys of the four main rivers, the Waiau, Aparima, Oreti, and Mataura, all of which flow approximately south to Foveaux Strait. These river valleys are of particular interest because they broaden out to form extensive plains, on the coastal portions of which are located many of Southland's high-producing farms.

The most extensive of these plains is the Southland plain, lying immediately behind Invercargill and to the south and west of the Hokonui hills

which divide eastern and western Southland. The area of the Southland plain is about 600,000 acres, about 40×25 miles.

Other extensive plains are the Waimea, Waikaia, Five Rivers, and West Plains, totalling in all about 600,000 acres. The Edendale plain, about 200,000 acres, is naturally drained and is regarded as some of Southland's most fertile land.

Parallel with the rivers are the Longwood Range, the Taringaturas, and the Hokonui hills. The country surrounding and separating these from the plains is undulating to steep, some being bush clad. Together with land now being extensively developed in the Te Anau area, this country makes up the bulk of Southland's second-class land.

The area near Te Anau is tussock and bracken covered, of which about 8,000 acres is being converted each year to pasture with an eventual goal of about 168,000 acres.

Broadly, both for South Otago and Southland the coastal area has the highest rainfall and the highest fertility. As one travels inland there is a drop in the annual rainfall and the soil lightens. The coastal areas at one time were devoted almost entirely to dairying, but fat lamb and wool production has become increasingly popular. Winter feed crops are grown in these areas, but cereal cropping is extremely limited because of rainfall which in this area varies between 40 to 45 in. per annum as compared with 30 in. at Lumsden 50 miles inland.

Inland, cropping assumes greater importance, but fat lamb is still dominant. Cattle are a very minor consideration on the plains, though extensive cattle raising is carried out on the run country.

Over the whole area, however, the dominant feature is fat lambs, about four million being killed at the southland works and large numbers in South Otago. Provision of winter feed necessitates ploughing a certain acreage each year, and while this area is under the plough the opportunity is usually taken to grow either wheat or oats before going back to grass.

Thus in discussing the weeds and weed problems convenient divisions are: first, "Weeds of the higher producing pastures"; second, "Crop Weeds"; and third, "Weeds of second-class and unploughable country".

WEEDS OF HIGHER PRODUCING PASTURES

The weed population of higher producing pastures is to some extent dependent on the age of the pasture, and three fairly clear-cut divisions are possible. First, there is the established phase when a large variety of crop and annual weeds frequently make their appearance. Spurrey or yarr (*Spergula arvensis*), mouse-eared chickweed (*Cerastium glomeratum*), redshank (*Polygonum persicaria*), and fathen (*Chenopodium album*) are the most common. Where pasture establishment tends to be slow or patchy *Poa annua* can make an early appearance. In dealing with these weeds heavy stocking for a short period, thus eliminating as much as possible selective grazing, helps to overcome the problem. Of the weeds mentioned spurrey would undoubtedly be the greatest nuisance, though in areas where fathen and redshank are prevalent, they also provide a very effective smother.

After the initial establishment stage of pasture, Californian thistle (*Cirsium arvense*) is the major enemy of the higher producing pastures and much of the second-class country also. It is not uncommon for it to invade new pasture in bush ground and its distribution over Southland and South Otago is wide. The position is aggravated by the fact that no reasonably satisfactory methods exist for the eradication of Californian thistle.

Prior to the advent of hormone weedkillers cultivation when the paddock was under the plough followed by frequent mowings when sown to pasture was the main technique. Sometimes mowing apparently gave an almost miraculous 100 per cent kill, but mostly it was a continual war with the mower which though not giving a kill at least provided a relatively cheap method of suppression.

The mower was superseded by hormones, but the Californian thistle problem remains despite successive sprayings on the same areas. The cost of continual sprayings and the unpredictability of the final results is now tending

to swing the pendulum once again, with many farmers changing from hormones to mowing.

Scotch thistle (*Cirsium lanceolatum*) is seen frequently, but while individual plants are scattered throughout the paddock, they frequently do not provide the dense population of the Californian thistle. Nevertheless, these individual plants grow into large and vigorous specimens and must account for a considerable loss of grazing. Not infrequently both Californian and Scotch thistle grow in association with each other. On occasion fields may have an almost 100 per cent cover of thistles.

Fortunately, normally Scotch thistle is not a problem with hormone control. Under dry growing conditions, however, it would seem that control is more uncertain, as the only year when kills of Scotch thistle were disappointing conditions throughout the growing season were dry.

A recent unwelcome arrival in this area is nodding thistle (*Carduus nutans*). While the incidence of nodding thistle is not great, there has been over the last 12 to 18 months a remarkable increase in its distribution. Fortunately, farmer organisations are aware of the potential danger and are giving wide publicity to the problem. Control to be effective lies in ability to recognise the plant even in the early stages, spraying where the population is sufficient to warrant it, and even spot spraying with a knapsack sprayer or use of the spade with the odd plant.

The next major weed of pastures after thistles is probably ragwort (*Senecio jacobaea*). While in most of Southland and South Otago the sheep population overcomes the problem, dairy areas and farms are infested with this weed to varying degrees.

Unfortunately ragwort has been with us so long that it almost tends to be regarded as part of the landscape, much to the horror of northern visitors. It is felt that the control of ragwort could be pursued more vigorously than it is. Present control measures consist of mowing, spraying, or running a small mob of sheep principally as ragwort controllers.

In his publication "Weeds in New Zealand" F. W. Hilgendorf refers to Winton disease, a fatal condition of the liver of horses resulting from eating chaff cut from oat crops containing ragwort.

Today, however, horses are virtually gone and only a relatively small acreage of oats is cut for chaff, but on dairy farms, ragwort still grows profusely.

Drainage and the application of lime have both played a major part in converting swamp or semi-swamp country to high producing pasture. Despite the extensive drainage, however, wet land weeds are often troublesome in pasture. After conversion to improved grasses rushes (*Juncus* spp.) are often troublesome for a time, but improved drainage and cultivation and liming usually succeed in overcoming them.

However, cutty grass (*Carex tenaria*) as it is known locally can and often does prove more troublesome, as it thrives over a wider range of soil moisture conditions. While it is generally regarded as a wet land weed, it will tolerate and grow on reasonably well drained land. Ingress usually arises from isolated plants along fencelines or round uncultivated runners in the paddock. From these points the weed spreads out into the pasture and in bad infestations can virtually choke the pasture out. Cultivation of the paddock is usually resorted to, but unfortunately the unploughable runners and fencelines still remain as a source of reinfestation. Work has been carried out locally with dalapon, and while an initial good kill can be obtained, regrowths tend to reappear.

Another member of the *Carex* family *Carex comans* is very troublesome in localised areas at the back of Riverton and at Gorge Road. It is a small tufted sedge usually 5 to 6 in. high. Variation occurs within the species and apparently there have been and may still be differences of opinion regarding its botanical name. However, once established in a pasture it becomes very aggressive and can take almost complete possession.

Flat weeds such as daisy (*Bellis perennis*) and cats-ear (*Hypochaeris radicata*) are frequent inhabitants of pastures, particularly where winter grazing has weakened and opened up the pasture. However, the grass normally strengthens during the growing period and mostly a reasonable

balance of grass, clover, and flat weeds is maintained. Spraying eliminates these weeds relatively easily, but under set stocking and late autumn and winter grazing reinfestation is likely. Furthermore, on the subject of stock ill thrift, a body of opinion favours a percentage of such weeds in the pasture.

In the later years of a pasture's life, the better species run out with a corresponding increase in weed content. This increase consists mainly of the flat weeds already mentioned, moss, *Poa annua*, browntop (*Agrostis tenuis*), sweet vernal (*Anthoxanthum odoratum*), and Yorkshire fog (*Holcus lanatus*).

Of pasture weeds the main offenders in the early life of the pastures are spurrey, mouse-eared chickweed, fathen, and redshank. In new country sorrel (*Rumex acetosella*) is sometimes present. As the pasture ages Californian thistle, Scotch thistle, and ragwort are also fairly prevalent and also in the offing is the potential threat of nodding thistle. Cutty grass, principally because of the difficulty of control even with cultivation, provides problems of its own. And then as the pasture runs out the grass weeds browntop, sweet vernal, and Yorkshire fog together with moss and flat weeds make ploughing inevitable and the pasture gives way to a winter feed crop and we also turn our attention to this other phase of farming.

CROP WEEDS

Some mention of cropping methods is desirable. Grass is ploughed for sowing winter feed round November-December. Utilisation takes place in the following winter and the area is frequently sown to a cereal in the spring.

The major winter feed crops are swedes, turnips, and chou moellier, which mostly are ridged. The implement used is a ridger which sows two bands of fertiliser, one below and one with the seed, and at the same time forms ridges 24 or 26 in. apart, depending on the ridger size. The fact that the crop is sown in ridges allows it to be scuffled at various stages following germination, thus allowing weed control and suppression until the crop is vigorous enough to supply its own weed smother.

In practice, however, the above process is not always successful. Farmer efficiency plays a part as also do weather conditions, and in some years crops may not even be scuffled once. However, when carried out efficiently, this method of inter-row cultivation can and does effectively control weeds.

The main weeds occurring in these crops are spurrey, redshank, fathen, shepherds purse (*Capsella bursa pastoris*), and wild turnip (*Sinapis arvensis*). The first four all tend to provide a thick smother and quite a lot of work is being carried out at present on chemical control of these weeds. Control is complicated by the lack of tolerance of the crops to weedkillers, but details of work will be given in later papers.

Wild turnip is a problem. The weed seeds profusely and the seed can persist in the ground for many years. Paddocks in which the weed has been allowed to seed become very dirty. Control lies in pulling the plants and removing them from the paddock, as the seed pods will often mature and shed seed after pulling. If contamination of the paddock is high, this can be an insurmountable task.

Californian thistle can be troublesome in brassica crops and is often a bad weed in cereal crops. However, while spraying Californian thistle in pasture often gives disappointing results, spraying in a cereal crop is usually successful in that the weed, if not killed, is at least suppressed until after harvest. Dock (*Rumex obtusifolius*), while not as prevalent as Californian thistle, also invades crops. In cereals wireweed (*Polygonum aviculare*) is sometimes present but seldom serious, the same remarks being true for cornbind (*Polygonum convolvulus*).

WEEDS OF SECOND-CLASS AND UNPLOUGHABLE COUNTRY

On the second-class country, as is the case elsewhere in New Zealand, three of the major weeds are gorse (*Ulex europaeus*), manuka (*Leptospermum scoparium*), and to a less extent broom (*Cytisus scoparius*). Inaccessibility provides difficulties in controlling these weeds. Where the gorse can

be reached spraying is giving good results and in addition the helicopter has provided a means of gaining access.

Manuka is being attacked in two ways. Blight is spreading rapidly through the manuka stands. Initially the blight was slow to establish, but in the last two or three years its spread has been rapid. Land development is also converting a percentage of manuka scrub to farm land. The practice is to bulldoze the manuka into heaps, sow to turnips or pasture, and in the following year burn the dried-out heaps.

In the northern and drier parts of Southland sweet brier (*Rosa eglan-teria*), following the reduction and elimination of the rabbit population, is making an unwelcome appearance. This is a particularly hard weed to eradicate, as it grows on inaccessible country, is tolerant to most sprays, and seeds are readily spread by birds and animals.

On much of the second-class country bracken fern (*Pteridium esculen-tum*) is abundant, particularly in the Te Anau area, where substantial areas are now being developed. Much of this country is ploughable, the process being to plough, cultivate, sow to grass, and stock with cattle. On the steeper and stonier country where ploughing is not practicable heavy bush and bog discs are used. Finally on the inaccessible area a start is to be made with aerial topdressing, oversowing, subdivision, and stocking with cattle.

Tutu (*Coriaria* spp.) and St. John's wort (*Hypericum perforatum*) all occur in various parts of the district, but the incidence is not great and there would not appear to be any significant increase in their distribution.

That completes the group of major weeds on the second-class and unploughable country.

However, there are still one or two weeds which warrant some mention. The first, hemlock (*Conium maculatum*), is distributed fairly widely throughout the district, but is seldom aggressive. Its distribution is confined mainly to areas among trees, round old buildings, disused homesteads, and in neglected orchards. However it is not on the increase. On the other hand barley grass (*Hordeum murinum*) tends to be distributed in much the same way, that is, among trees, round sheds, and in waste areas, but unlike hemlock it would appear to be on the increase, and while it is not spreading rapidly it could well prove a menace if not curtailed.

Mention has already been made of the part played by drainage in Southland. The three main weeds of the open drains are watercress (*Nasturtium officinale*), monkey musk (*Mimulus guttatus*), and floating sweet grass (*Glyceria fluitans*).

CONCLUSION

Ploughing and inter-row cultivation of ridged crops are traditional in Southland and South Otago and the factor in determining just which paddock would be ploughed for winter feed is largely the weed content of the pasture. In other words a paddock is ploughed, cropped, and sown to grass and remains in grass until weeds necessitate ploughing once again. This method is ideally suited to the general farm management programme. Perhaps for this reason also the use of hormone weedkillers made slower progress in this southern area of New Zealand than elsewhere. However, of more recent years farmers have realised that spraying provides another useful weapon and their interest has grown, particularly in the field of crop spraying and gorse control.

The main problems for the future may well be solved by a combination of the traditional cultivation techniques and spraying, particularly in regard to weeds, such as cutty grass and *Carex comans*. Ploughing run-out and weedy pastures is of course the main weapon, but if hormones can assist in effectively overcoming problem weeds, for example Californian thistle in the more fertile areas and sweet brier in the back country, the combination of cultivation and spraying should prove most useful.

Several papers which follow relate to work on specific weed problems in the district. Sweet brier, *Carex tenaria*, nodding thistle, spurrey, and weed control in brassicas and lucerne are dealt with.