

## NASSELLA TUSSOCK CONTROL — OVERSEAS MEASURES

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### *Summary*

Although nassella tussock (*Nassella trichotoma*) occurs in several countries, only in New Zealand and Australia does it rank as a serious weed. A tour of the Australian states of Tasmania, Victoria and New South Wales was made in the spring of 1961 to study nassella tussock and its control. Only limited areas have been found in Tasmania and Victoria but some millions of acres are infested in New South Wales. Control measures in the past have been inadequate but research into methods of control is bearing fruit and the stage has been reached where a more ambitious scheme could well be considered.

### INTRODUCTION

NASSELLA TUSSOCK (*Nassella trichotoma*) is native to South America but occurs in several countries of the world (Healy, 1945; Connor, 1960). It is only in Australia and New Zealand, however, that its behaviour causes nassella tussock to be regarded as a serious weed. Control measures in three Australian states were studied by the writer in October–November, 1961, when infestations varying in size from a few plants to thousands of acres were seen.

### TASMANIA

All of the nassella tussock discovered to date in Tasmania is confined to a peninsula with an area of about 25 square miles and lying a few miles to the south-east of Hobart. The topography is generally hilly and mixed farming is practised.

The principal infestation extended over a total area of about 1,700 ac. (Blacklow, 1960) of which 300 ac. were densely infested when the weed was declared noxious in 1956. Since then, as a result of an intensive campaign by farmers, local body and Government staff, aided by a Government grant, the infestation has been reduced to manageable proportions.

Arable and semi-arable land was cultivated, smothering crops were grown and then followed by the sowing of improved pasture species. Where pasture cover had become open there was some evidence of re-infestation but the area appeared to be well under control.

To prevent further spread of nassella tussock the Tasmanian authorities have restricted the movement of stock and produce from the peninsula. Measures aimed at preventing the chance importation of nassella tussock seed from outside Tasmania were also under consideration.

### VICTORIA

Up to 1960 the only known infestations of nassella tussock in Victoria were within 20 miles of Melbourne (Donaldson, 1960). Since then, apart from two recently-discovered small infestations near Melbourne, two potentially-dangerous ones have been found elsewhere in the State. The first was at Hamilton, 180 miles west of Melbourne, and the second was found about 16 miles south-east of Ballarat.

The Hamilton area had extended over about 200 acres in which dense patches of up to 5 acres were present when the weed was identified. It is of interest to note that identification stemmed from the reading by one of the farmers concerned of an article on nassella tussock in the *N.Z. Journal of Agriculture*.

The land is undulating and it was possible to adopt a programme of cultivation, cropping and establishment of improved pasture. Roadsides and fence-lines were being cleared by hand grubbing but the whole area will need to be kept under close scrutiny for several years.

The Ballarat infestation extended over 400 to 500 acres within which were dense patches of up to an acre. It is considered that, of the known infestations in Victoria, this was potentially the most dangerous.

The land is largely arable but dissected by steep-sided gullies where cultivation would be impossible and, despite control by cultivation and hand grubbing, scattered flowering plants remained. In an isolated area of this kind great effort is warranted to prevent the formation of new seed.

#### NOXIOUS WEED CONTROL IN VICTORIA

Control of nassella tussock in Victoria is exercised under the Vermin and Noxious Weeds Act (W. T. Parsons, pers. comm.). Administration is in the hands of the Vermin and Noxious Weeds Destruction Board of the Victorian Lands and Survey Department and, as the name implies, its responsibilities cover not only weeds but also vermin such as rabbits, foxes, and dingoes.

In addition to the inspection of farm land, Board staff carry out vermin and weed control on roadsides and Crown land.

Inspectors stationed in approximately 140 districts throughout the State are aware of the threat of nassella tussock and are constantly watching for infestations which may occur. A fairly complete coverage of the State is therefore provided by inspectors and the possibility of extensive nassella tussock infestations remaining undetected should be remote.

It was stated that the seasonal activities relating to vermin and weed control can be quite satisfactorily dove-tailed, allowing efficient utilization of men and equipment.

#### NEW SOUTH WALES

Most of the nassella tussock so far discovered in Australia lies in New South Wales. It occurs in the extensive tableland region which consists of an undulating plateau standing between 2,000 and 3,000 ft above sea level. Geological action has produced a topography varying from broad basins through easy rolling country to rugged hill country.

Rainfall in infested areas ranges from between 30 and 35 in. per annum in the southern tableland down to between 24 and 28 in. in the central tableland. Although distribution throughout the year may be more erratic than in North Canterbury the rainfall pattern in the central tableland would resemble that of New Zealand's infested country fairly closely.

#### EXTENT OF INFESTATION

To carry out a detailed survey of nassella tussock-infested land in New South Wales would be a major task and apparently has not yet been undertaken. Estimates of the total area infested range from 2 to 4 million acres, while a figure suggested as the area where production has been noticeably reduced was 40,000 acres.

In dry climates soil type appears to be no barrier to the spread of nassella tussock and it was observed thriving on a wide variety of soils.

#### APPROACH TO CONTROL

There appears to be one fundamental difference in the approach to control between New South Wales and New Zealand. The aim in this country is towards eradication, whether that be possible or not, and control measures are shaped accordingly. In New South Wales, eradication is apparently considered impracticable and "co-existence" is accepted as an alternative.

There are, of course, various levels of "co-existence" as demonstrated by the presence of quite highly productive demonstration areas and farms within the heavily-infested region. But whether control can be maintained, even by sound farming methods, while land is subject to continual re-infestation from blown seed is extremely doubtful.

#### CONTROL WORK ON FARMS

Because control rather than eradication is sought, nassella tussock suppression on farms is largely limited to that which is possible by pasture improvement.

Practically no large-scale aerial control work had been done so pasture improvement for nassella tussock control is limited to arable or semi-arable land. Crawler tractors seemed much less common on farms than in New Zealand, with the result that much rolling country which New Zealanders would regard as arable remains uncultivated.

Burning of densely-infested areas is the custom. This gives some degree of seed control but is damaging to soil structure. Successful oversowing under these conditions is largely a matter of chance and the presence of rabbits in fairly large numbers is an additional obstacle to successful pasture establishment.

There were, nevertheless, some striking examples of how far vigorous, well-managed pastures can go towards suppression of nassella tussock.

*Phalaris tuberosa* appears to be well suited for the maintenance of a sward tight enough to suppress nassella tussock seedlings even under relatively heavy stocking.

#### DEMONSTRATION AND RESEARCH WORK

The N.S.W. Department of Agriculture has established a number of demonstration areas on farms and has a research worker, M. H. Campbell, engaged full time on detailed research work at Bathurst. Dr J. A. Carnahan of C.S.I.R.O., Canberra, is also devoting considerable attention to plot-scale work on nassella tussock control.

The demonstration areas were mainly on arable or semi-arable land where a pasture mixture had been sown after varying degrees of cultivation. Superphosphate was the fertilizer generally used and on one 50-acre project 2 cwt per acre had been applied at sowing and a further 2 cwt within the next two years.

The Department of Agriculture contributes towards the cost of this work and requires in return an agreement that management over the first two years will follow a set plan. The essential feature of the plan is that no grazing is permitted in the first year and subsequent over-grazing must be carefully avoided.

On demonstration areas, also, there was ample evidence of the value of *Phalaris tuberosa* in suppressing re-infestation.

#### INTENSIVE RESEARCH

Malcolm Campbell is carrying out an intensive programme of detailed work, but his whole approach is restricted by the absence

of any special financial provision for large-scale application. Control practices which Campbell is working to formulate are based on the knowledge that their cost must be limited to what the average farmer can afford.

Much of the work of both Campbell and Carnahan therefore is founded on the fact that if nassella tussock is burned before or after spraying it can, in certain circumstances, be killed with relatively low rates of 2,2-DPA. Furthermore, if a vigorous pasture cover can be quickly induced, the ultimate kill of nassella tussock following application of herbicide will be more complete than if no competitive cover were provided.

Under the conditions which exist in the heavily-infested areas subterranean clover is the only pasture species which establishes at all readily from oversowing. By means of topdressing and grazing management, oversown subterranean clover is encouraged to compete with the nassella tussock and build up a store of seed in the soil. At the appropriate time the combination of burning and spraying is employed in an endeavour to bring about a change from nassella tussock dominance to pasture dominance.

#### USE OF AIRCRAFT

Some aerial topdressing and sowing had been practised prior to the time of this visit but with the exception of one small trial no aerial spraying of nassella tussock had been done. The presence of eucalypt trees, which are scattered over all the infested land, is regarded as an obstacle to aerial work. However, it seems likely that extensive use could be made of aircraft for treatment of non-arable land.

#### FOREST TREES

Although large areas of exotic forest are present in the Bathurst region, there has been no large-scale planting of trees specifically for nassella tussock control.

#### LEGISLATION

No special legislation for nassella tussock control, such as the New Zealand Nassella Tussock Act, has been enacted in New South Wales. The problem is covered by the general noxious weeds legislation, though one local body has been specially set up to promote nassella tussock control. Unfortunately its activities, in relation to the magnitude of its task, are severely hampered by lack of funds.

### CONCLUSIONS

Although nassella tussock is not a weed in its native South America, the strain infesting Australia appears to be just as aggressive as that found in New Zealand.

Provided no extensive areas of nassella tussock remain undetected in Tasmania and Victoria, control in these States should cause no great difficulty.

New South Wales, on the other hand, has large areas infested and there the weed is far from being under control.

That sound farm practices can go a long way towards control has been illustrated on demonstration areas.

Control by cultivation could be adopted on large areas of undulating land. Large-scale operations such as are used in land development by the N.Z. Lands and Survey Department could well be employed.

The perfection of a technique for the selective control of nassella tussock seedlings in pasture (Leonard, 1962) would permit full

utilization of land redeveloped by cultivation. *Nassella* tussock suppression by pasture competition alone implies a low stocking rate and therefore low carrying capacity.

Research into *nassella* tussock control has yielded sufficient information to justify the launching of a full-scale scheme of control. But large-scale control work is costly and, whether on arable or non-arable land, may well be beyond the resources of individual farmers. The statesmen-like action of successive New Zealand governments in this connection could serve as an example worth following.

Additional legislation may be desirable but experience in New Zealand has shown that the passing of legislation alone is not enough. There must also be the means to implement it.

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