

LAND-UTILIZATION AND LAND-IMPROVEMENT

The Division has continued to give attention to the problems of land utilization and improvement. Its officers are represented on Catchment Boards and have devoted considerable time to the problems of soil conservation. The Division is also associated with land-settlement work through representation on the Land Settlement Board (Department of Lands and Survey) and Farm Advisory Committee (Rehabilitation Board). The Division itself has been mainly concerned with the problems of hill-country pasture improvement, land-utilization studies, pasture surveys, and the improvement of the over-all volume of primary production.

New Zealand's 14,000,000 acres of native tussock grassland represent a large area of low-carrying-capacity pastures. During the hundred or so years that this very variable country has been farmed very marked changes have taken place in its nature, owing to the effect of sheep, rabbits, and fires. Some of it is virtually unchanged; some has been altered a great deal.

For many years the Department of Agriculture has been investigating the question of re-vegetating the deteriorated areas of tussock country. It is only during the last three years, however, that a concentrated effort has been made. Three officers are now working almost full time on the problems presented in the various areas. A detailed study is being made of the rate of growth, seeding habits, and longevity of some of the tussock plants. The question of damage to the tussock by the "tussock grub" is being investigated, initially to ascertain the extent to which the "grub" is killing tussock plants.

In the depleted country of Central Otago investigations are sufficiently advanced for work to extend beyond the plot stage. On this depleted country rabbits are abundant, and all investigations must be carried out on areas that can be maintained virtually free of rabbits. As the result of trials conducted over the past thirty years or so certain introduced species of plants have been found that will survive under moderate grazing in this dry climate. The most valuable of these plants are the native grasses blue wheat-grass and *Danthonia pilosa* and the exotic plants Kentucky bluegrass, yarrow, sheep's burnet, tall oatgrass, tall fescue, cocksfoot, and *Brachypodium phoenicoides*. Zig-zag clover is the only clover tested that shows any promise of being valuable. Unfortunately it is a very shy seeder. This means, therefore, that unlike the hill country of the North Island the hill country of the South Island must be improved without the aid of a clover.

Many difficulties have been encountered in establishing clovers through oversowing on North Island hill-country pastures. It is now fully appreciated that clovers must be supplied with phosphate if they are to thrive and be of value. On easy country it is possible for both to be sown on a prepared seed-bed, and failures of the clover to establish are not common. On the hill country the failure of clovers to establish is frequent. Though failure is due to several causes, it is considered that one is the fact that when seed and fertilizer are broadcast much of the seed falls on ground without phosphate near it. To overcome this endeavours have been made to surround the seed with a phosphatic fertilizer, which will thus be immediately available to the young seedling.

Four pasture surveys have been commenced as a basis for extension work in pasture improvement. A survey of the pastures of Malvern County was carried out to define the areas where subterranean clover could be and yet was not being used for pasture improvement. Instructors in Agriculture will follow up this survey and discuss with individual farmers their problems in extending the use of subterranean clover. To secure a quick establishment of this clover officers of the Division have been experimenting with a drill attachment which enables clover seed to be drilled at 3½ in. centres (instead of the customary 7 in. centres) or to be broadcast in narrow bands just below the surface. Large areas of the native tussock grasslands in Tawera, Mackenzie, and Vincent Counties have been surveyed with the object of defining the type of covering in relation to soil, climate, aspect, altitude, and the effect of sheep and rabbits.