fertiliser treatments. White clover seed at 3 lb per acre was broadcast over all plots.

Clover seedlings appeared in large numbers, but within a few weeks those on certain plots became yellow and died, while those on other plots thrived and soon provided a dense ground cover of vigorous white clover. These results were achieved on a soil of very low fertility and one on which only such low-fertility-demanding species as browntop, gorse, *Pinus radiata*, and Spanish heath manage to survive.

Though marked responses to phosphate and molybdenum in the absence of lime had been recorded in parts of the Sounds area, clover establishment in this trial was nil on plots without lime. However, with lime at 5 cwt or more per acre these fertilisers gave outstanding results. Because of the success of the light rate of lime, lower rates ranging from 4 cwt down to 1 cwt per acre were added next autumn, and 3 cwt per acre proved the minimum rate at which white clover would establish and grow vigorously.

Liming and Seed Inoculation

Treatments with low rates of lime and with rhizobium bacterial culture are being investigated, these treatments being superimposed on basal applications of phosphate and molybdenum. Bacterial culture has allowed white clover to establish and grow reasonably well without any applied lime, and quite vigorously with lime at 1 cwt per acre. The relationship between lime and bacterial culture in clover establishment is still not clear and research into it is being continued.

Permanent Eradication

Up to the present all plots on which clover establishment was successful have supported a dense cover of grasses and clover and, most important, during the five years since the first plots were laid down no Spanish heath has regenerated on the plots. Those on which clover failed to establish had in only two years become re-infested to a greater degree than before treatment.

Costs

If the density of Spanish heath plants is so great that spraying is essential before pasture establishment can proceed, the cost of herbicide would be about £2 10s. per acre. Application by air would cost a further £2 per acre.

The results of oversowing after spraying, showing white clover on a lime-molybdenum plot.

Spanish heath can be killed with 2,4,5-T ester, but higher rates and more frequent applications are needed of this material, which is much more expensive per gallon than the ester of 2,4-D.

Prevention Better than Cure

The most effective way of minimising the cost of Spanish heath control, however, is to forestall infestation by improving soil fertility. The spraying of existing Spanish heath plants is then avoided. Where this is done heath control becomes synonymous with normal land improvement and the same techniques apply.

In an area with parent Spanish heath plants the prolific seed production and the many avenues of dispersal make prevention of seed spread practically impossible. Such agencies as sheep, cattle, goats, deer, wild pigs, birds, and wind no doubt contribute to the distribution of the seed and this is one reason why land improvement is considered the best approach to the problem.

Where land is too steep for cultivation, fertiliser and seed would be distributed from the air. The cost would vary with the type and quantities of fertiliser required, the location of the property, and so on. As land infested with Spanish heath or in danger of infestation is generally of low fertility, fairly heavy initial fertiliser dressings will usually be needed. The local officers of the Farm Advisory Division can provide detailed advice for farmers and he should be consulted.

The Future

With the uncertain economic outlook the cost of land development may be regarded as high and this is one important reason for careful planning. If the project is developed block by block, the cost of fencing (which is vital to any land improvement programme) can be spread over several years, grazing can be satisfactorily managed, and increased stock numbers can be progressively reached.