

mangolds, and carrots. Kikuyu-grass (*Pennisetum clandestinum*), roots of which were imported from Rhodesia, has given very promising results both at Albany and Puwera. At Puwera a permanent pasture, with paspalum, white clover, and *Lotus major* as the permanent and Italian rye-grass and red clover as the temporary elements, is now established on the best tilth that we have obtained so far, and the pasture is being watched carefully to observe and record its behaviour under stocking with sheep, cattle, and horses. It has been demonstrated that even under average conditions of rainfall on the northern gum lands useful and profitable supplementary forage crops can be grown successfully. Having established crops with the best cultivation methods as a basis, it is now our intention to tackle the adjoining areas on which the virgin tea-tree and stunted shrubs are growing, and grass them by surface-sowing mixtures of seeds with paspalum as the permanent ingredient. If permanent pastures can be maintained economically, then the gum lands may later be utilized for various types of farming. (For further particulars the May, 1921, issue of the *Journal* may be referred to.)

Preliminary arrangements have been made to commence work at the experimental area of 15 acres taken over by the Department at Aria, twenty-four miles by road from Te Kuiti. There is a butter-factory at this centre, and the object of the work on the area referred to is to assist settlers in this and surrounding districts who are giving up grazing as their main calling and going into dairying. One of the chief investigations will be the control of fern, both bracken and soft or water varieties. Demonstrations with forage crops suitable for dairy cows will also be a major consideration.

*Co-operative Trials.*—A co-operative trial of root crops was begun last spring near Putaruru with a local settler. Owing to an unfavourable season, caused by drought, the root crops failed. Further trials will be carried out in the forthcoming season, including the sowing-down of permanent-pasture mixtures and the growing of supplementary forage crops for dairy stock and sheep.

In order to investigate the control of the root fungus known as *Rhizoctonia medicaginis*, which has shown up in many lucerne areas in the Waikato, the pumice country, and the Bay of Plenty, co-operative trials have been commenced with Mr. J. G. Raine, near Te Awamutu, and Mr. L. B. Dougherty, Cambridge. The former has had rhizoctonia in his crop of lucerne for a couple of seasons, and has willingly co-operated with the Department in setting out experiments with the object of discovering a means of control.

At Motuihi Island various mixtures of artificial fertilizers were used in conjunction with autumn-sown grass in 1920. A proprietary manure known as "Radio," which contains a considerable percentage of coal-dust, was used in a careful trial, particulars of which were published in the *Journal* for March, 1921.

*Advice and Instruction to Farmers.*—The demand from farmers for experimental areas, co-operative plots, and advice on agricultural matters has increased very much, and it has been increasingly difficult to cope with the work with the present strength of staff. Callers at the office are on the increase, and the work is so arranged now that at least one officer is usually in attendance there. Farmers are using the small herbarium of economic plants which has been set up in the office, and it is proving of practical value. The practice is growing slowly among farmers of sending in unknown plants for identification and a report as to their agricultural value. A small reference library has been added during the year, and officers of this as well as other Divisions are making use of it. It is apparent from inquiries that come from Farmers' Union officials and other local bodies devoted to country interests that farmers are depending less on their memory for retaining useful knowledge. They are finding books recommended by the Instructors in Agriculture useful. A show-case containing ranges of seeds and manurial samples has been set up during the year and has proved useful. In addition, the case contains exhibits of crops, which helps instructional work.

*Lectures and Practical Demonstrations.*—Lectures have been given on various subjects of local interest throughout the Whangarei, Northern Wairoa, and Kaipara sub-provincial districts, and also to various country bodies in districts south of Auckland City. Series of lectures have been given by Mr. Smallfield, Mr. Dibble, or myself to soldier trainees and cadets at Ruakura Farm of Instruction, and also to teachers and farmers attending special schools at Ruakura. The subjects covered have dealt chiefly with soils, manures, lime and liming, cropping, and feeding of stock. Useful discussions with a practical bearing have followed these lectures. Questions dealing with local problems are usually answered after the lectures.

Several demonstrations on ensilage have been given during the year. The practice of encouraging farmers to meet on Government areas or private farms to have what is known as a "field-day" is growing in popularity. On these occasions pastures are examined, pasture elements identified, and their useful and other characters dealt with. Crops are treated similarly. When weather permits, this class of instruction is extremely useful.

*Fertilizer-control.*—Official samples of fertilizers are taken under the Fertilizers Act, 1908, and sent to the Chemist for analysis. One firm was prosecuted during the year for selling bonedust materially deficient in nitrogen, and also for not registering the fertilizer offered for sale.

*Seeds.*—Farmers take advantage of the facilities given by the Biology Section for testing seed free of cost. Samples of seed are frequently sent forward with the object of having tests made of germination and purity. Two samples of seed taken from a consignment sold by auction in Auckland and tested during March gave the following results: Italian rye-grass, 37 per cent. germination; colonial cow-grass, 26 per cent. germination. A farmer who wished to sell some locally grown paspalum-seed found that the Biologist's report showed the percentage of germination to be nil. Such cases could be multiplied.

*Lime and Limestone.*—If the analyses of the 158 soil-samples taken during the last two years indicate the lime-requirement of the province, then this expressed as carbonate is approximately 3.2 tons per acre. The great difficulty in getting farmers to use lime at all is due, firstly, to the high