

Completed pasture maps of the undermentioned districts are now in the process of being finally draughted and prepared for publication: Te Mata, Kidnapper, Oero, and Waimaramara. Maps of a further group of four districts are now ready to hand to the draughtsman.

Altogether, approximately 1,900 square miles of pasture in Hawke's Bay have been mapped. Data relative to pasture have been secured, and trials with species and strains of various grasses and clovers worthy of trial have been sown on several areas.

Further data for the completion of the general pasture map of the whole North Island have been secured, the following districts having been mapped in a general manner: North Auckland, Poverty Bay, Hawke's Bay, King-country, portions of the Waikato, Bay of Plenty, Manawatu, and Taranaki.

Bulletin No. 2 of the Plant Research Bureau, "Pasture Survey—Technique of Intensive Mapping used in Hawke's Bay," was published during the year.

(4) FEED FLAVOUR AND GENERAL ECOLOGICAL WORK.

Feed-flavour Investigations.—The work at Palmerston North has proceeded along lines previously followed. During the year a trial was carried out on pastures containing approximately 30 per cent. and 70 per cent. of white clover to ascertain the degree of taint induced by these concentrations of white clover in the field. Small palatability trials were carried out on species of rye-grass and mixtures of rye-grass and clover.

Mowing trials were also commenced, to compare the rate of growth of pasture in the Waikato with specially selected pastures in Palmerston North. This trial is still being carried out. The feed-flavour investigations have been carried out in co-operation with the Dairy Research Institute and the Department of Agriculture.

Pasture Ecology and Field Trials of Various Species and Strains.—In addition to a considerable amount of field observations and eye estimations of the botanical compositions of various swards under differential treatments, work has continued on the critical analysis of pastures, using the three standard methods of analysis: (a) Establishment counts; (b) point analysis of ground cover; and (c) actual yield and potentialities at various seasons as shown by actual analysis by weight of dissected samples of plucked and cut herbage.

In the main it is found that any one system of pasture analysis is insufficient when used on its own. In order to obtain a complete picture it is necessary to use the three methods to show clearly the germination and establishment of the individual species and weed invaders, the true habitat of the species shown by the ground-cover analysis, and finally the producing-powers as shown by the weight analysis. Comparisons of the last two methods give very instructive ratios of cover to production and are very useful in comparisons of species and strains of pasture plants.

Work has continued on the standardization of field and laboratory sampling technique, consideration having to be given to such factors as variability of samples according to number and size of species, stage of wilting, height of tallest and lowest species, accuracy desired, &c. Detailed figures and graphs have been kept of several critical trials run in collaboration with the Department of Agriculture in order to study the actual production, &c., of the species under trial and as a response to manurial and management practices.

Hill-country Pasture Trials.—Trials of surface sowings of various clovers and grasses have been laid down on the Massey Agricultural College farm and on the hill country of Hawke's Bay and Apiti districts, working in collaboration with the Department of Agriculture. These trials consist of the three strains of subterranean clover, early, mid-season, and late flowering; two strains of *Lotus major*, pedigree and commercial; three strains of white clover, No. 1, No. 2, and Kentish wild white; and strains of English and New Zealand rye-grass. These strains are sown both with and without a base mixture of permanent species, and also with variable quantities of superphosphate and, in some cases, slag.

Detailed point analysis are being kept, together with observational notes on the change, if any, of the closed swards of danthonia and brown-top on which they are sown.

(5) CHEMISTRY.

Soil and Pasture Investigations.—The investigation of the effect of various fertilizer treatments on the chemical composition of herbage has been continued, and soil analysis in connection with the movement of added phosphate and lime have been continued for a further year. The addition of carbonate of lime to plots receiving phosphate in the form of superphosphate, basic slag, and North African phosphate has in all cases increased the amount of available P_2O_5 as measured by the citric-acid method. This is rather contrary to what would be expected in the case of the North African phosphate, as it is usually considered that the addition of lime decreases the availability of this fertilizer. In the Marton trials the plots receiving North African phosphate and lime show a higher available P_2O_5 content than any other treatment; but, in spite of this, the yield from this treatment is not as great as from other phosphate and lime treatments. The effect of lime treatments on the availability of the organic matter in the soil has been strikingly demonstrated, and it seems probable that the increased yield due to liming is not entirely due to the reduction in acidity, but also to the increase in the available nitrogen as a result of the greater decomposition of the organic matter. There has been a striking build-up in the total nitrogen content of the top layer of the soil under the conditions of grazing carried out in this experiment. Chemical investigations have not supported the contention that transference of fertility from one plot to another is seriously affecting the accuracy of the yield data.