

V. MISCELLANEOUS.

(1) *Pyrethrum Production*.—Commercial-scale harvesting was carried out with the $\frac{1}{2}$ acre of high-yielding pyrethrum being grown at Owairaka. Time taken, wages, and weight of dried flowers have been recorded. Analyses of yields of pyrethrins are being made.

(2) *Medicinal Plants*.—On behalf of the Botany Division, plants of *Hyoscyamus niger*, *Digitalis lanata*, *Atropa belladonna*, *Datura stramonium*, and *Papaver somniferum* were raised under glass and grown in the field at Oratia for tests of their medicinal value when grown under Auckland conditions.

(3) *Linen-flax Retting*.—Rets from some factories and retted straw from others have been examined and all organisms present isolated and compared. Considerable variations occur in organisms from different factories, different straw, and at different periods of the year. Pure cultures have been prepared from the main organisms, and rets are being carried out in the laboratory with a view to finding the most suitable strains for bulk distribution.

(4) *Industrial Microbiology*.—War conditions have stimulated inquiries relative to production under New Zealand conditions of materials manufactured with the aid of fungi. Collection and testing of strains used for manufacture of citric acid and marmite are being undertaken.

(5) *Lucerne Nodule Organism*.—Cultures sufficient to inoculate 127,200 lb. of lucerne seed were distributed to 1,371 farmers.

SUGAR-BEET RESEARCH SECTION.

Research Officer: Dr. O. H. FRANKEL.

This Section was established in June, 1941. Its objects are to produce sugar-beet seed suitable for New Zealand conditions and to co-operate with the Department of Agriculture in agronomic investigations connected with the establishment of a sugar-beet industry in the Dominion. The work is carried out in co-operation with the Wheat Research Institute, staff, buildings, and equipment being used in conjunction by the Section and the Institute. A Sugar Beet Research Committee was established on which the Departments of Agriculture and of Industries and Commerce, the Plant Research Bureau, and the Wheat Research Institute are represented.

A laboratory for the testing of sugar-beet has been provided in one of the buildings of the Wheat Research Institute at Lincoln, and an experimental area of 4 acres leased at Tai Tapu.

Seed from a number of selected individual beets of Kleinwanzleben N was made available by the Department of Agriculture, which permitted of fifty-eight lines being taken into replicated progeny tests. A variety trial included seven American and three German varieties, in addition to a line of New-Zealand-raised seed. These areas, as well as the best of the fifty-eight lines, will be used for the selection of mother beets for further selection.

PLANT CHEMISTRY LABORATORY, PALMERSTON NORTH.

Director: Dr. J. MELVILLE, on active service. Dr. B. W. DOAK, Acting-Director.

RYE-GRASS ALKALOIDS.

The main work on these for the year has been the isolation of sufficient of a fluorescent alkaloid from perennial rye-grass to enable its toxicology to be studied. When injected into mice it is mildly photosensitizing, but this has not been the case when administered orally. The alkaloid is toxic to mice in 5 mg. doses intraperitoneally. Analysis of a pure specimen of the alkaloid hydrochloride gave the formula $C_{36}H_{22}N_4(OCH_3)_4 \cdot 2HCl$. The compound which has been named "perloline" is not directly connected with facial eczema of sheep.

Two methods have been developed for the rapid estimation of total chloroform-soluble alkaloids in herbage. It would appear that perloline usually amounts to about half of the total alkaloids present

HAY AND SILAGE STUDIES.

In collaboration with officers of the Grasslands Division, work has been carried out dealing with the losses involved in making silage in pits and in stacks. Studies of the digestibility of silage have also been made. It has been shown that the digestibility of the protein suffers greatly if the silage has been allowed to overheat.

EFFECT OF URINE AND DUNG ON CHEMICAL COMPOSITION OF PASTURES.

In conjunction with officers of the Grasslands Division, a trial has been conducted investigating the separate and joint effects of urine and dung on the botanical and chemical composition of the pasture. Marked differences in the botanical composition have been apparent, and the chemical analysis of samples is well under way. The total return of nutrients per acre by way of animal residues amounts to the equivalent of at least 1,400 lb. sulphate of ammonia, 1,400 lb. potash salts, and 500 lb. superphosphate, showing the great influence of the grazing animal on soil fertility.

SOIL SURVEY.

Soil survey investigations are undertaken by the Soil Survey Division (D. L. I. Grange, Director), and by the Cawthron Institute (Sir T. Rigg, Director).

SOIL SURVEY DIVISION.

GENERAL SURVEY, NORTH ISLAND.

During the year soil maps on a scale of 4 miles to the inch covering the whole of the North Island were published in two colours, red for the topographic data, and black for the soil boundaries. In preparation is a comprehensive legend covering soil type and chemical data which will contain information which can be utilized for the taking-out of single soil values—i.e., for maps showing separately phosphate, lime, potash, and nitrogen content of soils, slope, drainage, erosion, &c., data which is essential for the effective utilization of the survey.

From the general survey in particular, and from others mentioned below, maps have been drawn for the use of the Army.