

SOIL AND FERTILIZER RESEARCH

Soil Fertility.—A long-term project designed to study the interaction of the soil and various crops, including wheat as a major crop, has been established. The project includes four different crop rotations designed to produce divergent levels of soil fertility, four different cultivation treatments, and eight manurial treatments. The layout adopted is one of fractional replication recommended by the Statistics Department of the Rothamsted Experiment Station.

Copper Deficiencies.—Unsatisfactory growth of onions on an area of peat soils near Christchurch was reported in November, 1946. Pilot spray trials using various trace nutrients were applied and a marked response to copper was obtained. No other treatment gave any response.

The effect of copper deficiency was subsequently observed as affecting a range of market-garden crops grown over a wide area of this soil type, and further trials have been laid down.

Since the problem is one of considerable economic importance, it is proposed to expand the work and to undertake analyses of soil samples and of plant materials.

Lime and Liming.—A series of projects on lime and liming were started during the year. These include studies on the lime status of paddocks with known history on the College farm, investigations on the physical properties of ground limestones in relation to flow and distribution, and the efficiency of bulk-lime distributors.

A comprehensive set of samples of rock and of the ground product, representing thirty-one commercial limeworks in the South Island, was collected. Further samples are being obtained from certain works at intervals as a check on the variability of the product.

The lime content and sieve analysis of the ground samples has been determined, and the separate determination of calcium and magnesium has been commenced.

ENTOMOLOGICAL INVESTIGATIONS

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Insect Pests of Wheat Crops.—Several years' work on the susceptibility of wheat varieties to attack by Hessian fly (*Mayetiola destructor*) and Argentine stem-weevil (*Hyperodes griseus*) has shown conclusively that certain of the standard varieties which are commonly grown show distinct differences in susceptibility to damage. A special study of the Hessian fly has been in progress during the past year. With the co-operation of officers of the Department of Agriculture, samples of wheat from early-sown crops and samples of wheat straw from previous seasons' crops which had not been burned or ploughed under were collected from various wheat areas throughout Canterbury.

An examination of these samples has shown that there is no autumn infestation of wheat by Hessian fly taking place in New Zealand, as occurs commonly in the United States of America. No matter how early wheat is sown—and some of the crops examined were from volunteer seeding—there is no infestation by Hessian fly until September or October the following spring. Two generations of Hessian fly are produced during the year, the first causing damage from October to December, the second attacking from December to February and producing pupæ ("flax seed" stage) which lie dormant until the following spring.

All wheat-stubble samples were infested with over-wintering "flax seeds," the percentage stalks infested varying from 2.1 to 19.6. Further investigation of the over-wintering problem is being pursued, and samples of wheat dressings (third, offal from weed riddle, and cavings) from areas where wheat is threshed by mill are being collected in order to investigate the "carry over" which may occur where such offal is dumped instead of being burned.

Bumble-bees and Red-clover Fertilization.—Correspondence with Britain and the United States of America regarding the possibility of arranging for introductions of long-tongued bumble-bees known to frequent red clover has revealed that it would appear arrangements can be made for the collection in the Northern Hemisphere of fertilized queens during the months of September and October for despatch to New Zealand.