

VIII. *Silage.*

With a view to improving the quality, process of manufacture, and palatability of silage a series of experiments has been commenced, and it has now been ascertained that sweet and green silage can be made when cultures are used, that the product can be improved by the addition of molasses, and that by the use of the Virtanen process (which involves the application of certain acids in dilute solutions), a good-quality silage can be produced. The cost of acid, however, makes its use in New Zealand prohibitive.

IX. *Grass and Clover Diseases.*

Owing to defective germination appearing as a serious trouble with certain lines of perennial rye-grass seed, investigations are proceeding to ascertain whether four fungi, found in association with such seed, are in any way responsible for the reduction in vitality.

Owing to variations occurring in rust-immunity in certain lines of selected perennial rye-grass, steps are being taken to ascertain whether rust-resistant lines may be selected.

AGROSTOLOGY SECTION.

The investigations of this section have been continued along the lines of searching for desirable strains of all forms of pasture plants, and during the year an additional 1,000 plots of perennial rye-grass have been set out for trial. In these trials are included special selections from the best lines at present being grown, with the object of securing elite strains for future development.

It has been demonstrated from an extensive trial that a negligible amount of deterioration occurs in perennial rye-grass plant type when grown from lines once removed from mother seed. This information has an important practical application in connection with commercial-seed production.

Italian Rye-grass.—Work has commenced upon the strain-characteristics of Italian rye-grass and allied types such as Western Wolth's and Wimmera. Three main strains of Italian rye-grass have been selected for further investigation.

Strain investigations are also proceeding with cocksfoot, Yorkshire fog, brown-top, and paspalum.

White Clover.—Strain work with white clover has advanced on parallel lines with that done in connection with perennial rye-grass, and in some elite-strain selections that have been made it has been shown that some of these are as much as 45 per cent. better than the standard certified mother plants.

In order to proceed further with white-clover investigations, a series of crosses was made from various types which reacted differently in regard to their HCN content.

Red clover has also been subjected to strain selection investigations, and, in addition, a number of crosses have been made between desirable types of plants.

Similar work is also proceeding with subterranean clover and *Lotus major*.

CHEMICAL SECTION.

The investigations of the Chemical Section have dealt largely with analyses of the samples collected from mowing-trials on the Marton plots. These involved analyses to indicate—

- (1) The effect of heavy infrequent against light frequent applications of lime, on the chemical composition of the herbage, and on the lime and phosphate status of the soil.
- (2) The effect of various nitrogenous fertilizers, when applied at the same time as superphosphate, compared with the effect of these same fertilizers applied so that the date of application of the nitrogenous fertilizer is some months different from the date of application of the superphosphate, on the chemical composition of the herbage, and their effect on the soil.
- (3) The effect on the chemical composition of the herbage and on the phosphate status of the soil of superphosphate, basic slag, and North African phosphates when applied with lime and without.

Chemical Method of determining Type in White Clover.—Some 500-odd samples of white clover herbage have been analysed for potential hydrocyanic-acid content. The percentages of HCN of these have been examined with reference to the type notes made by the Agrostologist. It has been found that an excellent correlation exists, and tentative standards for HCN content have been set to correspond with the standards set for the eye determination of type. It is considered that this determination, when used in conjunction with the eye assessments, will render the determination of type more easy. A preliminary paper dealing with this method is in the press.

General Work.—A number of samples of linseed selections were analysed for oil content for the Agronomist, and an investigation into the chemical composition of various rape types as affected by sampling at different stages of growth is also being carried out for this officer.

BOTANICAL SECTION.

During the year work on the revision of the systematics of the grasses of New Zealand and of the alien flora has been continued to the extent that the manuscript of two publications has almost been completed. At the same time an introductory book on the grasses of New Zealand has also been prepared.

Investigations have continued into the supposed poisonous plants which have allegedly caused mortality in stock. Particular attention has been devoted to bringing the herbarium up to date, and a considerable number of exchanges have been arranged with overseas stations. The investigation on Northern Spy root-stocks has resulted in the isolation of nine types for further study. These are being propagated and their influence on different scions will be tested out during the coming year.