Breeding is being continued with different types of this rye-grass. These are being studied as single plants and under sward conditions. Some 9,500 single plants from controlled pollinations are under study. Comparisons under pasture conditions of various bred types are being made at Palmerston North, Marton, and Lincoln.

Western Wolths Rye-grass.—There is a need, particularly in the South Island, for a Western Wolths type of rye-grass—*i.e.*, an annual rye-grass which, when autumn-sown, will produce a greater bulk of feed in the autumn, winter, and spring than will Italian rye-grass. Although seed is sold on the New Zealand market as Western Wolths, the great majority of the lines are Italian rye-grass or types of false perennial rye-grass. As a preliminary to the breeding of a true Western Wolths line, a survey was made of 104 New Zealand lines described as Western Wolths. Only one of these proved to be predominantly of the true Western Wolths type. This line, together with ten others obtained from Great Britain through the New Zealand Scientific Liaison Officer, will be used to provide single plants as a basis for selection and breeding.

Cocksfoot.—A two-year study of some 10,000 single plants from New Zealand and overseas lines has been completed, and mass selections have been made of three different types which will be used for comparative tests as single plants and in plots. Seed has also been obtained from 290 plants and will be planted out as single plants to provide initial progeny tests of the selected plants.

Timothy.—Thirty-two pounds of nucleus-stock seed have been obtained this season. Some 2,500 single plants obtained by hybridization of different strains are under study in the field.

White Clover.—The nucleus-stock area this season yielded 171 lb. of seed. No further breeding-work is at present being undertaken with white clover, the strain produced being, if anything, already on the aggressive side, particularly under high soil fertility conditions.

High and Low Cyanogenetic Glucoside White Clovers.—Two experimental lines of white clover have been bred—one is 50 per cent. higher in the glucoside than pedigree type 1 white clover, and the other contains no glucoside, and on these, grazing trials have been conducted. No deleterious effect has been noted on sheep grazed solely on the high-glucoside clover. Palatability trials with these clovers are also being carried out, but have not yet been completed.

Montgomery Red Clover.—A further nucleus isolation has been made this season. The nucleus-stock area yielded 707 lb. of seed for increase.

Broad Red Clover.—Three hundred and fifty pounds of seed have been obtained from the nucleus-stock area. Some 7,000 single plants from controlled pollinations are under observation in the field. The study of 3,500 single plants obtained by hybridization of broad and Montgomery red clover has indicated distinct possibilities of obtaining a highly-productive persistent red clover from hybrids between these two types.

Strain-testing and Nucleus-seed Production

Plot-testing for Certification.—Plot tests were completed on 2,500 plots sown in 1942. Samples for testing continue to increase, and this year sowings of 3,600 plots show a 40-per-cent. increase on those of the previous year.

Field Trials.—Field trials of improved strains have been laid down at Waitoa, Levin, Palmerston North, Marton, Rangiora, Kirwee, Methven, and Waitaki, and data have been collected on these and existing trials.

Trials in Great Britain.—Favourable reports of New Zealand strains of grass and clover seeds are being received from pasture trials in Great Britain. In most cases New Zealand strains are equal to or superior to English or Continental strains. Further seed has been despatched for a continuation of these trials.

Nucleus-seed Production.—Although the season was very late for the grass-seeds, favourable climatic conditions during harvesting resulted in good yields. Excellent conditions prevailed for the clover crops, and excellent yields were obtained. The establishment of additional nucleus-stock areas at the Agronomy Division has resulted in the requirements of the Department of Agriculture being met for all grass and clover seeds.

Field Ecology

Work in this section has continued on last year's lines, with an additional trial to test short-rotation rye-grass types. The trial aims to test persistency of four hybrid types and to study the role of these for short- and long-rotation pastures alone and in combination with perennial rye-grass. It is felt that the inclusion of long-lived hybrid rye-grass strains will enhance palatability, will give a longer seasonal spread of production, and will materially assist grazing management. The above trials are being conducted under a technique that permits return of stock residue proportional to the feed each plot has produced.

The Influence of the Animal on Pasture Development.—The trials laid down in 1941 have been continued, and continue to show marked influence of animal residues not only in total yield but also in relation to botanical composition, the variations in rye-grass being very marked in relation to clover. The somewhat more lenient grazing adopted this year has given a marked increase in cocksfoot. The following table sets out the total dry-matter and relative yields of the four treatments over the three complete years the trial has run:—

Yields of Dry Matter per Acre (in Pounds), and Relative Figures. (No return = 100)

	1941.	1942.	1943.
Full return	17,082 = 158	15,915 = 132	12,104 = 126
No return	10,791 = 100	12,016 = 100	9,578 = 100
Urine return	12,544 = 116	14,272 = 119	11,114 = 116
Dung return	12,473 = 115	14,473 = 120	11,000 = 115