The quality of the wheat now being milled is very good, and highly satisfactory flour is being produced. This is due in part to the excellent harvest, and in part to the large proportion of Cross 7 now available for blending with other wheats.

The germ of wheat is not usually included in the flour because it causes a deterioration in the appearance and palatability of the loaf. During the year the Institute discovered a method by which the germ might be cheaply and expeditiously treated in such a way as to allow its inclusion in the loaf without impairing its quality. This process has been provisionally patented in New Zealand so as to prevent its exploitation, and it will shortly be published so that all bakers may freely take advantage of it. The inclusion of germ in the loaf will increase the vitamin content, which is sometimes regarded as deficient, and will secure for human consumption 1 per cent. more of the content of the wheat-grain.

Some work has been done in the preparation of dried gluten, which is used in starch-reduced breads. A good deal of the gluten now used in New Zealand is imported from Australia.

The routine testing of flours and wheats for millers and merchants continues to expand, although several mills have with our assistance installed their own testing laboratories. During 1939, 1,658 different lines of wheat were milled, and loaves were baked from 6,033 different flours.

Other Activities.

One course of the School of Baking was conducted during the year, efforts in this direction having been restricted by the absence of a Travelling Baker Expert.

The Department of Agriculture kindly arranged for an exhibit of the Institute's work to be included with its own at all agricultural shows in the wheatgrowing districts.

Five bulletins for millers have been published during the year, detailing the qualities of the wheats of different varieties in different districts. One bulletin was published for bakers, advising them of the peculiarities of the new season's wheat.

The assistance given by Lincoln College, by the Departments of Agriculture, and Census and Statistics, and by the Agronomy, Entomology, and Plant Diseases Divisions of the Plant Research Bureau, are again gratefully acknowledged.

FRUIT RESEARCH.

Advisory Committee.—Sir Theodore Rigg (Chairman), Dr. G. H. Cunningham, Messrs. W. Benzies, T. C. Brash, F. R. Callaghan, A. H. Cockayne, J. Corder, W. K. Dallas, A. Osborne, R. Paynter F. S. Pope, A. M. Robertson, H. E. Stephens, L. W. Tiller (Secretary).

INTRODUCTION.

This report covers activities of the Plant Diseases Division of the Plant Research Bureau, the Appleby Research Orchard, the Horticulture Division of the Department of Agriculture, and the Cawthron Institute. The report is divided into main sections dealing with the various types of fruit, and storage aspects are dealt with separately in the section "Fruit Cold Storage Research."

The following abbreviations are adopted in discussing the manurial experiments: P = treated with phosphatic manure, normally as superphosphate, at 4 lb. per tree per annum; N = treated with nitrogenous manure, normally as ammonium sulphate, at 2 lb.; K = treated with potassic manure, normally as potassium sulphate, at 1 lb.

APPLES.

Fertilizer Experiments.

Research Orchard.—The present is an opportune time for reviewing the manurial experiments from an economic aspect, and the Appleby results are treated mainly from this angle in the present report.

Cox's Orange: Ammonium sulphate applied at the rate of 2 lb. per tree has now produced a significant and economic increase in crop over the untreated trees or the PK trees. PNK trees are much healthier than N trees, although crop increases are not yet statistically significant owing to variability of the material.

Dunn's Favourite: N and PNK trees are both showing to advantage in growth and foliage development over the untreated control trees. Variability of the trees has prevented the yields from reaching a significant level of difference, but the trend is strongly toward a crop increase paralleling the vegetative increases.

Delicious: Over the period of the experiment up to and including the 1939 crop the N trees had produced a total of 226 lb. more fruit per tree than the untreated control trees, and the expenditure on manure for the period was approximately 1s. 8d. The PNK trees yielded a further 107 lb. each at an extra cost of approximately 3s. 5d. for fertilizer. The PNK trees are in healthier condition than the N trees.

Jonathan: With a base dressing of phosphate and potash, 2 lb. ammonium sulphate per annum has given a total yield increase of 155 lb. fruit per tree, for a cost of approximately 1s. 9d. while 4 lb. ammonium sulphate has given only a further 70 lb. increase. The development of red colour has been strongly depressed by the nitrogenous treatments, and an approximate assessment of the market values of the crops, on the basis of current prices, suggests that the increased yields are fully offset by the reduced prices obtained. The trees themselves, however, show that some nitrogen, additional to a base treatment of phosphate and potash, is essential if they are to remain healthy.