Wheatgrowing Practice.

The threshing returns from the harvest of 1941 were analysed and the results published. Cross 7, a wheat bred by the Institute, has now reached the position of being the most widely-grown wheat in New Zealand. For the harvest of 1941 it covered 8,000 more acres and yielded 800,000 more bushels of grain than Tuscan, its nearest rival. The quality of the flour made from Cross 7 wheat continues to be highly satisfactory.

Fife-Tuscan, another wheat produced by the Institute, was first distributed to farmers in 1940 and in that year 220 acres were sown. In 1941 the estimated sowings were 2,600 acres, so that it appears to be spreading satisfactorily.

Tainui, still another Institute wheat, is spreading rapidly in the Manawatu District. It yields somewhat better and is much more resistant to summer storms than Jumbuck, the standard variety for the district.

Plant-breeding.

The crop sown in the glasshouse in April, 1941, flowered in August; all the desired crosses were successfully made, and the seed was ripe in October. It was immediately sown in the open field, and ripened in March, so that two crops were procured in one year. The greenhouse crop was better than that raised in the preceding year.

Owing to the calls of the war on the staff it has been decided to restrict the plant-breeding work to what can be carried out by the reduced staff available.

Laboratory Work.

(*a*) *Moisture Testing.*—The service offered to farmers and others in testing their wheat to see when it is ready to harvest or deliver to store has this year been used to the utmost. In response to various requests, branch stations were established at Blenheim, Ashburton, Timaru, and Temuka, apparatus being borrowed from millers and others to enable these stations to function. The long-drawn-out harvest necessitated an excessive number of moisture tests, the total number of determinations made up to 23rd March being 4,823, compared with 2,000 last year, and with about 3,000 in the busiest year previously experienced.

(*b*) *High-extraction Flours.*—Much experimentation was done on flours of extraction higher than the normal 70 per cent. to 72 per cent., in case a shortage of wheat developed under war conditions. If such a position arises, the Institute is ready with plans for making bread of reasonable palatability from flours of up to 85 per cent. extraction. The method adopted has developed from previous work on the destruction of glutathione, an injurious constituent of certain fractions of the wheat-grain.

(*c*) *Emergency Yeast-supplies.*—Much time was given to working out plans for bakers to make their own yeast, or to use specially dried yeast prepared by a modern process, in case the ordinary supplies of compressed yeast failed. Copies of the formulæ found to give the best bread were distributed to all bakers and to the Emergency Precautions Committees.

(*d*) *Meals and Biscuits for Overseas Forces.*—After suitable experiments had been made, recommendations were offered to the Food Controller to secure that these food products should remain in good condition after long periods of storage under adverse climatic conditions.

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).

Apple.

(*a*) *Long-term Manurial Investigations.*—Further evidence is given by the experiments at the Government Research Orchard, Appleby, and by the Mildura blocks of the Cawthron Institute, that a "complete" mixture containing P, N, and K is essential for orchards on Moutere loam. Over the nine-year period that has elapsed since treatments were first applied at the Research Orchard, Dunn's Favourite trees under PNK treatment have produced an average of 20 lb. more fruit per tree per annum than the untreated control trees, Delicious 48 lb. more, Cox's Orange 53 lb. more, and Sturmer 114 lb. more. The absence of any of these three major constituents is attended by more or less serious consequences, but especially is this so if nitrogen is omitted.

In the main block of Cox's Orange at Appleby, nitrogen appears to have had some effect on the biennial-bearing habit of the variety; the control plots and those with PK were almost devoid of fruit in 1941, while the N plots and the PNK plots carried 1½ and 2½ bushels per tree respectively. Nitrogen must not be used unwisely, however; Jonathan trees receiving 4 lb. ammonium sulphate per tree per annum still remain over-vegetative, with fruit of poor colour and poor keeping-quality—disadvantages that more than offset any increase in yield.

On both Sturmer and Jonathan, plots without potash remain inferior in yield to those with potash, and show the characteristic deficiency symptoms. Jonathan trees receiving potash continue to bear fruits of enhanced red colour, and yield remains higher on these trees.

In the Mildura blocks of Jonathan, trees that had been for twelve years without manurial treatment have been given various fertilizer combinations for the past four years. Trees receiving NK are markedly inferior to trees getting NP, and show poor growth, bear small-sized fruit of poor finish, and tend to defoliate prematurely. These trees demonstrate that phosphate-deficiency symptoms can be found under field conditions as well as in pot cultural experiments. At the Research Orchard, also, the necessity for inclusion of phosphate in manurial programmes on Moutere loam is clearly shown in the yield increments produced when P is included separately from and together with N on the Sturmer variety. Increments over the untreated controls in the 1941 season are as follows: P, 37 lb. per tree, N, 54 lb. per tree, PN, 142 lb. per tree.

(*b*) "*Minor*" *Element Studies.*—The Cawthron Institute has continued its field and analytical work on magnesium deficiency, and has found that magnesium carbonate at 2 lb. per tree has proved the best corrective to apply, and is accompanied by an increase in the magnesium content of the