(*c*) Since the present New Zealand wheats have been introduced from foreign countries, and since good results have been achieved even by haphazard methods, it is thought that systematic introduction and trials may possibly disclose wheats still more valuable than those we now possess. Half-bushel lots of the best wheats from all countries whose conditions are similar to ours are therefore being imported for systematic trial.

(*d*) Cross-breeding is, however, the surest, though not the quickest, means of improving wheats, and a very large cross-breeding programme is in operation. Eleven hundred different kinds of wheats were grown last year, and studied during growth to see what characters possessed by any of them might make them suitable for crossing with our standard varieties. All varieties used or likely to be used for crossing are bred in pure lines, so as to secure reliable parents. Crosses are produced from few parents but in large numbers (1,228 F_1 grains in 1930), so as to increase the chances of finding favourable combinations. The crosses made in previous years were tried by the rod-row method in ten replicates. A chess-board with eight replicates was used for ten varieties, and an elaborate spacing trial was sown. In all, 4,992 plots were sown and harvested, 4,590 of these being hand sown. The area covered was 25 acres, most of this being trials of varieties of older crosses, tested by the half-drill-strip method. The further trials of an old cross, Hunters × Tuscan, were disappointing, for, although the quality was high, the yield was not equal to that of either of the parents. Of 176 families at the F_6 stage none proved a better yielder than our New Zealand standard varieties, and these failures have forced on us the procedure of more carefully analysing the yield of parents, and of attempting improvement by importation to fill up the time until useful crosses are available.

(2) *Chemical Tests of Wheat.*—At harvest-time samples of wheat of all varieties and from all localities were collected, and protein determinations were made, in the attempt to find if there were any localities that consistently gave high or low protein contents. It was hoped that 1,000 samples would be tested, but not more than 500 came to hand, and no conclusions could be drawn from the scanty material available. Such indications as there were pointed in the direction of greater variations in protein content from different fields in the same district than in the average fields of different districts. For the harvest of 1930, 2,500 sample packets were sent to growers through the courtesy of the *Wheat-grower*, and it is hoped that more material will be available for this year's work.

The use of header harvesters in Canterbury this year made the water content of wheat a matter of great interest, and a moisture-testing service was started by the Institute. Some 120 samples were tested for moisture during the harvest season.

(3) *Milling and Baking Tests of Wheats.*—During harvest wheat from fields of known history was collected in 6 lb. samples. These were selected to represent all the chief varieties, the chief wheat-growing localities, the commonest manurings, and the different methods of harvesting. In this trial nineteen wheats, cut green and cut ripe, each pair off the same field, were milled and baked, and eight wheats stook and stack threshed, each pair off the same field, were also milled and baked. Sixteen different varieties grown in the same field were similarly tested, and a total of 144 different millings and bakings were made to test the effect of manuring on the baking-quality of wheat. Altogether 325 wheats were milled and baked during the year, and a considerable amount of information was obtained on the effect of manuring, locality, and harvesting methods on the different varieties of wheat. Milling and baking tests were also made on samples of millers blends submitted for criticism.

(4) *Baking of Flours.*—Arrangements are made with millers by which the flours they are producing are periodically baked under uniform conditions, and a criticism of the resultant loaf is submitted. The baking-work started in earnest on the 3rd January, 1930, and during the three months following 1,500 loaves were baked under test conditions, judged, and recorded. Tests of flours submitted by bakers are also made.

(5) *Baking Methods.*—Many hundreds of tests have been carried out to find the baking method most likely to give a satisfactory loaf with normal New Zealand flour. Variations of temperature and fermentation periods are investigated, and, in particular, the effect of adding milk and malt. Different kinds of dried milk, condensed milk, &c., have been tested to guide the producers in preparing a product likely to benefit the baker and the consumer.

(6) *Subsidiary Activities.*—(*a*) A report on the possibilities of using the header harvester was prepared and issued to members of the committee before harvest. The report showed that the weather conditions during harvest in Canterbury are at least as favourable as in several American States in which harvesters are used, and made an attempt to estimate the costs of harvesting by the new and old methods. A committee was set up to investigate the work of harvesters in New Zealand during the harvest of 1930.

(*b*) An arrangement was made by which one of the staff at Lincoln College should pay special attention to the bacteria and moulds found in bread.

(*c*) The Chemist of the Institute visited many mills and bakehouses in Wellington and Auckland, and attended the meetings of the Master Bakers' Federation in Taranaki.

(*d*) A specialist committee, consisting of all the officers of the Department of Agriculture who are working with wheat, and the heads of departments of the Institute, was set up to discuss plans of work to secure complete co-ordination of effort.

NOXIOUS-WEEDS-CONTROL RESEARCH.

Advisory Committee: Professor H. B. Kirk (Chairman), Mr. Q. Donald, Dr. F. W. Hilgendorf, Mr. A. H. Cockayne. Director of Research: Dr. David Miller.

The funds for noxious-weeds-control research are provided by annual grants of £2,000 received from the Empire Marketing Board, supplemented by a similar sum from the Department, while the investigations are facilitated by the Cawthron Institute placing at the disposal of the Committee portion of its services.