

For the last three years a number of lines, which were selected from the material that yielded Hilgendorf, were tested at Lincoln, and also, in the last season, in four trials by the Department of Agriculture. One line, 140,014/4, has so far yielded consistently and substantially more than the original Hilgendorf; in the majority of last season's trials it out-yielded the standard, Cross Seven. In baking quality it is distinctly superior to Cross Seven, though perhaps not quite as good as Hilgendorf. If these favourable results are confirmed, this wheat holds out the promise to solve the problem of a high-quality wheat. Further trials and seed propagation are being advanced rapidly.

Another line of work points in a similar direction. As soon as Hilgendorf was discovered as a very high-quality wheat, crosses were made with Cross Seven, and these, through alternate use of a glasshouse generation, have been rapidly advanced. Six hundred lines from these crosses are now entering into the yield-trial stage. This highly promising material is used also for the purpose of ascertaining whether under New Zealand conditions selection for protein content will efficiently advance a breeding programme for baking qualities. It will be remembered that Hilgendorf itself exceeds Cross Seven on the average by 2 per cent. in protein content. Many hundreds of single plants were tested for protein content last year, and this year similar tests were carried out on their progenies. This work is being continued further.

*Disease Resistance.*—It is widely believed that the incidence of mildew (*Erysiphe graminis*) has been increasing in seriousness in recent years. In consequence a breeding project for mildew resistance was started recently and is being advanced as rapidly as possible through growing two generations in one year, one of them under glass. It is hoped that a mildew-resistant Cross Seven type will be available in a few years' time.

*Investigations.*—Studies on the inheritance of quantitative characters and on the effects of various methods of selection are being continued.

#### CEREAL CHEMISTRY, MILLING, AND BAKING

*Flour-quality Investigations.*—The study of the causes of the dark crumb colour of breads made from high-extraction flours has been carried on, with interruptions. At the present stage it is possible to put forward the following explanation: the dark crumb colour is due to the high germ content of high-extraction flours, not to their bran content. Wheat germ contains a substance that forms a dark oxidation product when, during dough fermentation, conditions—viz., acidity—become favourable for certain oxidizing enzymes. A further purely atmospheric darkening takes place on the cut crumb surface of such bread.

Applied to milling, this explanation suggests that crumb colour could be improved by excluding from the flour all mill streams rich in germ, but due attention to vitamin content would be necessary. It also provides an analytical method for measuring the contribution that individual mill streams make to the total darkening in a flour. This method should be valuable as an aid to improvements in the milling process. The results obtained so far are being written up in the form of two scientific papers.

*Vitamin B<sub>1</sub> Content of New Zealand Flour.*—From 1st March, 1949, the flour-extraction rate was reduced to 78 per cent. This made a general improvement in the baking quality of the flour and caused the vitamin B<sub>1</sub> content to fall from 3.5 p.p.m. to an average of 3.2 p.p.m.

*Damage by Wheat-bugs.*—Early in January the Institute's officers noticed that some wheat lines of the new harvest had been attacked by the so-called "wheat-bugs." These insects puncture the developing grain in order to suck juices from it and, in so doing, inject small amounts of saliva into the grain.