NATIONAL INSTITUTE OF AGRICULTURAL BOTANY, CAMBRIDGE

REPORT FOR 1956

AT the annual general meeting of the Fellows of the National Institute of Agricultural Botany, held in Cambridge on July 13, Prof. E. T. Jones, director of the Welsh Plant Breeding Station, received the Institute's Cereal Award for his work in breeding the new winter oat 'Powys'. This variety combines the best features of the well-known *S.* 147 and *S.* 172 and has shown outstanding merit in a series of trials. It will not, however, be available for general distribution this year.

The thirty-sixth annual report* presented at the meeting records continued expansion of the work of the Institute and plans for further building-extensions have been under active consideration. Some changes in the organization of cereal trials have been completed, which will reduce the time before a decision regarding recommendation can be made from four to three years. 'Preliminary' trials of new varieties are now grown at four of the thirteen regional centres, and with the aid of special plot combine-harvesters reliable results can be obtained in the first year. The more promising varieties go into 'main' trials, with larger plots at more centres, incorporating three levels of nitrogenous top dressing, in addition to a basic dressing to ensure adequate supplies of phosphorus and potassium. Another new feature is the trial of varieties used as 'controls' during the past thirty-five years, to see how far modern cereals are improvements on the older ones. The transfer of responsibility for the production of stock seed of all the Aberystwyth strains of grasses and clovers from the Welsh Plant Breeding Station to the Institute has necessitated much reorganization of technical work and contracting arrangements, and a special granary extension for these seeds is in course of erection. Progress continues with the plans for supervising the quality of seed stocks grown in Britain. Cereal crops entered for inspection again exceeded 100,000 acres, and nearly 54,000 acres were field-approved. A Comprehensive Certification Scheme for special cereal seed stocks was operated on a limited scale for the first time in 1955, and it is hoped that the arrangements for the National Comprehensive Certification Scheme for Herbage Seed will be complete in 1956.

The report also provides useful information regarding the performance of different varieties of potato, pulses, roots, fodder and oil crops, and field vegetables. Management trials carried out with lucerne showed that the best time for the first cut is the early bud stage. This both gave the best-quality hay, and, as a result of the earlier second growth, enabled four cuts to be taken each season. For those interested in grasses, the classification of some seventy strains of perennial rye grass according to their time of flowering, and the results of trials with hormone weed-killers on grass seed crops are of particular value, relatively safe times for spraying being given for the different Aberystwyth strains.

Details of the work of the Official Seed Testing Station are included in the report. The large increase in cereal samples received for testing and the high percentage with germination which fell below the authorized minimum standard reflect the bad harvesting conditions in 1954.

* National Institute of Agricultural Botany. Thirty-sixth Report and Accounts, 1955. Pp. 54. (Cambridge: National Institute of Agricultural Botany, 1956.)

STUDIES IN MUTAGENESIS

Production of Bacteriophage Mutants by a Disturbance of Deoxyribonucleic Acid Metabolism

IN experiments in which the pyrimidine derivative 5-bromouracil was incorporated into the deoxyribonucleic acid of $T2r^+$ bacteriophage, according to the method of Dunn and Smith[1], it was observed that a large number of a variety of plaque-type mutants appeared among the progeny phages, as illustrated in Fig. 1. The observation of this apparently powerful mutagenic effect of 5-bromouracil led us to an investigation of the conditions upon which the production of phage mutant depends.

In a typical experiment, a culture of *Escherichia coli*, strain *B*, was grown with aeration at 37° C. in complete medium supplemented with 50 μgm./ml. 5-bromouracil, for four generations to a density of 2×10^8 cells/ml. (Complete medium is a glucose-salts medium[2] supplemented with 1 mgm./ml. sulphanilamide, 1 mgm./ml. vitamin-free casein hydrolysate, 25 μgm./ml. xanthine, and uracil equal to 5 per cent of any 5-bromouracil added. We had found that when commercial 5-bromouracil, which contained a 5 per cent uracil contamination, was added to complete medium, no further pyrimidines were necessary for bacterial growth. In complete medium plus pure 5-bromouracil, however, the bacteria required uracil for growth.) The bacteria were then centrifuged and resuspended in the same volume of complete medium plus various concentrations of 5-bromouracil, infected with 3×10^8 $T2r_2$ phages per ml., and the infection was allowed to proceed for 3 hr. At this time the bacteria were centrifuged, and the supernatant fluids were diluted and plated on broth agar. The results are presented in Fig. 2, where the 'infective yield' (the ratio of the number of infective, that is, plaque-forming, progeny to the number of input phage) is plotted as a function of the 5-bromouracil concentration in the medium. The percentage mutants (100 times the ratio of all mutant plaques to the total number of progeny plaques) is seen to be maximal at the concentration of 5-bromouracil giving minimal infective yield. No mutants were produced in the absence of 5-bromouracil. The quantitative results were observed to vary somewhat, depending on the exact growth conditions employed.