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INTRODUCTION.

Maize is one of the most widely grown of all the cereal crops, and little need be said here to emphasise its importance to the human race, both as a food for man and stock. It can be grown under a wide range of climatic conditions, though it thrives best, and is most widely grown, in the sub-tropical areas.

Maize is a crop in which the phenomenon of hybrid vigour is particularly well shown. This fact seems to have been known from early times, though the explanation of it was not forthcoming till many years later, and it is reported that the Red Indians of America used to plant seeds of different colours in one hole, as they found this method gave increased yields (1). This phenomenon of hybrid vigour is still made use of today in the most up-to-date methods of maize breeding.

Maize is a naturally cross-pollinated crop, and owing to the monoecious nature of its inflorescence hybridisation is rendered extremely easy, so that most unimproved maize crops represent a very heterozygous mixture of different strains, which, if left alone for random crossing in the field, would soon produce an amazing number of different types, owing to the chance combination of different factors (2).

The improvement of maize by breeding methods has been going on since the early days of its growth, and possibly more is known about the genetics of this plant than about any other crop; this may be due in part to the fact that maize occupies such a prominent position in the agriculture of the United States, where numerous agriculturists and plant breeders have devoted a great part of their lives to a study of the genetics of maize.

Many different methods have been tried in the past to improve the yield, ranging from simple mass selection to the more complicated method of selection within selfed lines, followed by a final inter-crossing of the selected lines to bring back the hybrid vigour lost during continued selfing (3). A very clear and concise account

of the breeding methods used has been given in the paper by Maher and Prentice, and it seems superflous to recount it all here (6).

Most of the progress in the past has been due to selection, and valuable work has been accomplished by this means, but recent work seems to indicate that a judicious combination of selection and controlled pollination, both selfing and crossing, will play the more important part in the future. Selection to pick out the best characteristics, and selfing to fix what is selected (4).

As one of the objects of the experiment, which is being started this year, is to compare these two methods of breeding, a brief description of each will not be out of place.