

2. The investigation of the theory of the combining ability of maize.

Our collective of scientific workers pays special attention to the study of this theory mainly because every correctly selected combination immediately results in an increase of the heterotic effect and so also of the total yield. The basis for this investigation is the study of the world collections of varieties and lines of Zea mays L. On the basis of the evaluation of these collections suitable material for the conditions existing in the country is selected, and this material is cross-bred with male partners that have been selected in advance. The offspring obtained in this way are then tested with regard to various properties and according to the manifold requirements of our plant production in the various microclimatic conditions of Czechoslovakia. These various microclimatic conditions are of especially great importance in this country, since, although Czechoslovakia is not a country covering a large territory, it is most heterogeneous geographically and climatically. This complex work is being done by a large collective of scientific workers in co-operation with practical growers. On the basis of detailed studies a total of 10 microclimatic areas was selected, in which the combinations of offspring are tested and evaluated with regard to the various purposes they are to serve. Theoretically this work follows three main trends:

- 1) The study of correlations on the basis of the results achieved in the empiric tests.
- 2) The cytogenetic and microanatomical investigation of the inner structure of the starting material (mainly the morphology of the chromosomes, etc.) as a necessary complement of the correlative studies.
- 3) Chemico-serological investigations of the starting material as a necessary complement of the correlative studies (mainly in the direction of mutual antigen reactions, etc.).

L. Říman
M. Pastorek

3. The investigation of pollen sterility in maize.

Considerable attention is being paid to this problem, and the research work follows chiefly the following sectors and directions:

- a) the identification of the sources of pollen sterility of various origin, to be achieved by means of a search for new and reliable methods of classification of the various forms of pollen sterility. Special attention is being paid to the new trends of the study of the classification of pollen sterility by means of biochemical and chromatographical analyses.

- b) The world collections of lines of maize are evaluated with regard to their capability of stabilizing pollen sterility, or, on the other hand, of renewing pollen fertility with various sources of sterile pollen, for the purpose of their utilization in hybrid combinations.

The results achieved hitherto are utilized, in co-operation with a team of scientific workers and growers, for combining productive hybrids adapted to the climatic conditions of Czechoslovakia.

E. Javorek

4. The study of the methods of improving maize.

In this sector of work several methods of improving maize mainly with material of domestic provenience are investigated and checked. The effectiveness of these methods and the substantiation of their introduction into the practical improvement program are evaluated. The possibility of a suitable synthesis of the elements of several methods of improvement for the purpose of increasing the effectiveness and of shortening the time required for the improvement of lines is being examined.

In a further part of the work data are collected for the critical evaluation of the methods of early testing of lines as methods of predicting the combining ability of the lines prior to their transition to homozygosis, and also the effectiveness of the application of these methods in improvement work is being checked.

Besides this also the possibility of utilizing the results of the examination of the general combining ability for the study of the special combining ability and for the prediction of the likely value and composition of double line hybrids is being investigated and elaborated. These investigations are carried out by a number of scientific workers and growers in Czechoslovakia. The work connected with the complex of the tasks of the study of the methods of maize improvement is carried out in close co-operation and co-ordination with a team of workers investigating the theory of combining ability.

A. Plovárčí