

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.).

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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.