seed was recovered by selfing after each backcross. After two backcrosses, the yellow opaque seed were selected from CM 104, CM 105, CM 109, CM 110, CM 111, CM 201, CM 202, Eto-25-F, Eto-182, and Eto-297 to develop a synthetic variety. About 100 seed from each inbred were mixed thoroughly to randomize. These seeds were planted in isolation and free interpollination among the inbreds was allowed. The F_1 seed was harvested and yield trials in the F_2 are in progress. Studies on the incorporation of opaque-2 by the backcross method into Indian inbreds and the development of new varieties are in progress. The assessment of protein quality and quantity in these varieties is in progress.

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1. Adaptation of maize cultivars under South African conditions.

The research project was motivated by the need for greater reliability in determining maize cultivar adaptability in the different maize areas of South Africa. Data from South African cultivar trials, which were carried out during the four seasons 1965/66 to 1968/69, were used for further analysis. Various methods were used and computor programs which facilitated analysis have been developed.

The regression lines of specific cultivar yield over mean yield of standards were represented graphically and, on testing, found to be linear. Basically six types of lines can be differentiated, namely:

1. lines with a negative regression coefficient and an intercept of nought,
2. lines with a positive regression coefficient and an intercept of nought
3. lines with a positive intercept and a negative regression coefficient,

4. lines with a negative intercept and a positive regression coefficient and,
5. and 6. lines with regression coefficients of nought but with positive and negative intercepts, respectively.

Lines with positive regression coefficients represented cultivars with a higher production in the high yield areas than in the low yield areas. Conversely, lines with negative regression coefficients are representative of cultivars with better performance in low yield areas than in high yield areas. A performance index can be read from the graphs. The portion of the line above the X-axis (the standards' line) indicates performance higher than the mean of standards and the portion of the line below the X-axis represents a consistently lower performance than that of the mean of standards. The magnitude of difference can be read from the Y-axis.

The closer to the horizontal or X-axis, the more uniformly such lines would perform in relation to the standards and such lines are representative of cultivars showing maximum adaptability.

Multiple correlations with specific cultivar yield as the dependent variable were also calculated. In every case a linear correlation was found between specific cultivar yield and mean trial yield.

A multiple correlation with mean trial yield as the dependent variable showed that this variable was determined by certain causal climatic factors such as mean yearly rainfall and height above sea level. A cultivar that shows the best trend in the same region of the X-axis as the mean potential of a particular area would thus be the best adapted for that area.

The initiation of this project has thus been justified to a large degree by the positive and practically applicable results which resulted.

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