CONVERGENT IMPROVEMENT WITH FOUR INBRED LINES OF CORN

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THE modern method of corn breeding is based on the utilization of inbred lines in some form of hybrid combination. Inbred lines of corn are more or less reduced in vigor as compared to normal varieties or hybrids. Since these lines are reduced in vigor some method of crossing is necessary to restore this vigor. This expression of hybrid vigor is greatest in single crosses between inbred lines each of which contains important genes for vigor of growth that are not found in the other.

As shown by many workers (2, 3, 7, 8), there is a significant positive correlation between the vigor of inbred lines and their performance in crosses. However, it is necessary to test the yielding ability of an inbred line in crosses as it is impossible to classify accurately the combining ability of inbreds on the basis of their performance as inbreds. Jenkins (4) has shown that certain inbred lines were high in combining ability when tested during the early generations of selfing and that these lines maintained this character in later selfed generations. Hayes and Johnson (2) gave considerable evidence to indicate that the combining ability of inbred lines selected from F₁ crosses was correlated with that of the inbred parents. Therefore, it seems that combining ability and vigor are heritable characters and that there is a positive association between these characters in inbred lines. Vigor is also a desirable character to have in inbred lines in order to maintain them more easily and economically.

The primary method of developing inbred lines has been by selection in self-pollinated lines that originated from open-pollinated varieties. Following the isolation of inbred lines and the determination of their value in crosses, it may be desirable to improve their vigor. This may be done by pedigree selection within self-pollinated progenies resulting from crosses between selected parents as reported by many workers (2, 5, 11). In addition, the backcross method may be used as a means of improving the vigor of inbred lines.

In the breeding methods involving backcrossing two methods have been used by corn breeders primarily for the purpose of improving inbred lines which have already proved desirable in hybrid combina-

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*Figures in parenthesis refer to “Literature Cited”, p. 149.