RECURRENT SELECTION FOR SPECIFIC COMBINING
ABILITY IN CORN

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IMPROVEMENT of corn by isolation of inbred lines to be used in first generation crosses was suggested by Shull in 1909. The method has come to be widely used with so great success that its application to other species of plants and even of animals is being given serious consideration.

Identification of satisfactory inbred lines of corn for production of commercial hybrids has not been easily nor quickly accomplished. Difficulties with other species would seem to be greater than with corn. Furthermore, such data as are now available suggest to the writer that continued application of the method to corn may be less profitable than the first cycle of breeding has been for the improvement of yield.

From the foregoing viewpoint a modified breeding plan for the development of higher yielding corn has been outlined. Since experimental evaluation must require several years and possibly application by more than one operator, the plan is presented here on theoretical considerations alone. Current practice in developing superior hybrid corn rests squarely upon empirical results. Any theory of hybrid vigor is to be judged by the same data. However, if a theory may be developed to fit present data and in sufficient detail to predict results of untried experiments, it may have positive value in directing future work. If predictions from theory are then confirmed by experiment the theory may become more firmly established and more useful.

Hybrid vigor is here assumed to reside in the interactions of genes. It must then result from non-linear interaction of genes at different loci or between alleles. Either type of interaction alone or both together may explain hybrid vigor. Wright (13) has supplied a test which, as applied to collected data on yield of corn by Neal (7), does not allow much non-additive interaction between genes at different loci. Richey and Sprague (9) found backcross yields almost exactly intermediate between parent and F1 yields. In later data of Lindstrom (6) the mean deviation of F2 means from mid-point of F1 and parents is 2.2% of F1 yield. The deviation of backcrosses is 3.6%. These values are hardly significant. Moreover, if any appreciable degree of hybrid vigor were due to complementary interaction, it might appear in an excess of F2 yield over backcross yield. In Lindstrom's data the mean F2 yield is 65.8 and backcross yield is 71.7. Neither complementary...