

Heterosis and yield of grain in corn.

In recent years interest in overdominance ($Aa > AA$ or aa) for yield in corn has been shown primarily as the result of Hull's analysis of single cross trials in corn. On the basis of his findings he has proposed a method of recurrent selection for specific combining ability in corn (Jour. Amer. Soc. Agron. 37:134-245. 1945).

The type of gene action for yield in corn is of considerable importance in that the breeding approach required to obtain maximum yields is dependent upon it. If " $Aa > AA$ or aa " is the predominant type of gene action, crosses between lines differing in their genotypic constitution so as to give a maximum number of heterozygous loci when crossed should result in greatest possible yields. This suggests that maximum heterozygosity and hence yield will result when progressively better lines are crossed with progressively poorer lines, assuming of course that the good and poor lines are such because of the difference in numbers of favorable dominant genes in their genetic structure. Three relatively high-combining S_1 lines selected for progressively higher combining ability through testcross performance in S_2 to S_5 inclusive and likewise three low-combining S_1 lines selected for progressively lower combining ability through testcross performance in S_2 to S_5 inclusive were crossed in all possible single cross combinations within each generation of inbreeding. The lines had been tested against a single cross tester, Wf9 x M14, after each inbred generation and selections were made on that basis.

The yields in bushels per acre obtained from a test of this material planted at Lincoln, Nebraska in 1951 is shown in the accompanying table.

Class	Generation of Inbreeding					Means
	S1	S2	S3	S4	S5	
Low x Low	60.3	52.2	60.1	56.4	54.8	56.8
Low x High	60.6	67.3	63.7	70.8	70.5	66.6
High x High	69.0	75.1	68.5	73.0	77.5	72.6

Selection for progressively lower - or higher - yielding ability was effective in that a trend downward in yield for the low x low combinations and upward for the high x high combinations with continued inbreeding is evidenced in the data. The low x high combinations are centered between the two groups at each generation of inbreeding but tend to follow rather closely the trend of the high x high combinations. The evidence obtained seems to contradict the hypothesis of over-dominance as the predominant type of gene action for yield in this material.

J. H. Lonquist