9. Correlated inheritance of corn borer resistance from inbred lines to single and double cross progeny.

Where manual application of borer egg masses is used to secure a uniform initial infestation it is rather generally accepted that visual ratings of plant damage reflect the amount of borer survival quite well. It is of considerable interest to see how well the visual ratings of established inbreds are correlated with ratings given their hybrid offspring in the same or different seasons.

At the Waseca sub-station in 1950, 16 lines varying in resistance were grown in duplicate 15 plant rows, infested uniformly, and each row rated for resistance. Ratings on a 1 to 5 scale, with 1 the resistant class, were made for leaf feeding damage and also, at a later date, for total damage points occurring in the internodes, leaf sheaths, midribs, and tassel. One hundred and four single cross combinations made from these 16 lines were planted and infested in the same manner and visual ratings made.

In Table 1 the associations between visual ratings of the inbreds and ratings of all their single cross progenies are shown to be rather satisfactory considering the small number of replications used in the plots of inbreds.

Table 1.
Correlations among visual ratings for leaf feeding (L.F.) and damage points (D.P.) of 16 inbreds and the average of single cross progeny.

			Average of S.C. Progeny	
		Inbred D.P.	L.F.	D.P.
Inbred	L.F.	+ .64	+ .62*	+ .68
"	D.P.		+ .71	+ .75
Single Cross	L.F.			+ .89
"	D.P.			

*1% pt. for 14 D.F. = + .62

Where the leaf feeding rating of each single cross, 104 in all, was compared with the mean rating of the two inbred parents a highly significant correlation of +.59 was obtained. The relationship for damage point rating of the singles with their parental average was +.90.

Another group of 20 inbreds was grown in duplicate plots at Waseca in 1950 and each row rated for leaf feeding and damage points in a similar manner. In 1951, 27 double crosses from these 20 inbreds were grown in single hill plots of 3 plants per hill, spaced 42 x 42 in., replicated 20 times in a randomized block design, infested by hand, and each plant rated from 1 to 5 for both leaf feeding and damage points.

Ratings obtained on each double cross in 1951 were compared with the average ratings for the 4 component parent inbreds as determined in 1950. The calculated correlations are as follows; both values exceed the 1% point for significance:

Leaf feeding of inbreds vs. L.F. of double crosses = +.65
Damage points of inbreds vs. D.P. of double crosses = +.63

These parent-offspring correlations indicate that corn borer resistance is transmitted to hybrids at about the same level of effectiveness as many other agronomic characters of the corn plant.

E. L. Pinnell, E. H. Rinke, and F. G. Holdaway