

8. Inheritance of characters in corn with special reference to the European corn borer.

A357, a susceptible inbred, was crossed with Flourey 235, a resistant inbred. The parents, F_1 , F_2 , and both backcrosses were grown in replicated randomized blocks under manual infestation. Characters studied by a class rating system were leaf feeding, overall damage (to leaves, internodes, mid-ribs, and tassels), tillering, and maturity. An additional character, rind hardness, was determined in the field by a puncture-test machine. The genes for resistance, hard rind, and tillering showed partial phenotypic dominance in the F_1 while genes for maturity showed an intermediate reaction. Data for both leaf feeding and overall damage analyzed by Power's and Mather's methods indicated two major gene pairs differentiated the parents. Estimates of heritability for leaf feeding and overall damage were .25 and .23. Rind hardness appeared to be controlled by at least three and probably four factor pairs and was not associated with corn borer overall damage although it was associated with low below-ear stalk breakage. Rind hardness would probably be expected to be more highly associated with damage by second brood borer than by first brood borer. Differences in tillering appeared to fit a two factor hypothesis better than one or three factor pairs. Rated maturity values were correlated with overall damage at the low level of +.23 and adjustments of resistance values were not made although the early plants showed a tendency to be more susceptible. The data suggested that a minimum of four factor pairs and probably more were differentiating the parents for maturity.

On the basis of these and similar studies it is concluded that the backcross method of breeding may be advantageous for adding corn borer resistance to otherwise desirable lines.

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