

5. Dominance of genes controlling yield in maize.

Gardner, et al. (Agron. Jour. 45:186-191. 1953) outlined a method for estimating the degree of dominance of genes determining quantitative characters in corn and applied the method to two F_2 populations of Southern dent corn. All estimates obtained for yield were in the overdominance range varying from 1.31 to 2.14. Comstock and Robinson (Heterosis. Iowa State College Press. 1952) have shown that linkage of partially or completely dominant genes could result in estimates as large as those observed. Therefore an experiment was conducted in 1954 to determine the degree of dominance of genes determining various quantitative characters in an F_2 population descended from a cross between two corn belt lines. The F_8 population obtained by random breeding over the years was also used in the same manner as the F_2 to determine whether linkage was causing bias in estimating degree of dominance by this method. Results for yield gave an estimate of degree of dominance of only 0.44 in the F_2 generation and 0.63 in the F_8 generation. The amount of dominance variance observed was the same for the two populations but 75 per cent more additive genetic variance was observed in the F_2 population as compared to the F_8 . Analyses of data on other quantitative characters have not been completed but all estimates obtained so far are in the partial dominance range.

The degree of dominance obtained for genes controlling yield is somewhat surprising in view of earlier findings in Southern dents using the same method. These results certainly do not appear to support the overdominance hypothesis and there is no evidence of linkage bias in the estimates obtained using this particular population. Since the test planted at Lincoln, Nebraska, was a complete failure because of drouth, data were collected on only one test at North Platte, Nebraska. The interaction of additive genetic effects and of dominance effects with environment could not be estimated and, of course, are included with the genetic effects in the analysis used (See Gardner, et al. cited above). No complete interpretation has yet been given these data and the experiment is being repeated at 2 locations in 1955 using a new sample of progenies.

C. O. Gardner