

The experimental plan is to augment the approach reviewed above by selection in such a way to shift gene frequencies so that loci exhibiting partial to complete dominance will contribute progressively less to the results. Initial gene frequencies at segregating loci will be 0.5 in populations derived from crossing two homozygous lines. Continued selection should cause frequencies for the non-overdominant loci to approach either 1.0 or zero. In the case of overdominance selection favors the heterozygote so that gene frequency approaches an equilibrium value that will be in the range 0.2 to 0.8, unless the heterozygote advantage is very slight. If overdominance (of genes affecting grain yield) is present in more than a trivial amount its detection in this way will be more probable. Conversely, if negative results are obtained, the case against overdominance will be enhanced.

F_2 generation backcross matings have been made in two single cross populations for evaluation of genetic variances and corresponding level of dominance for grain yield in 1962. The population exhibiting the greatest level of dominance will be continued for this study. Following advancement to the F_5 generation this population will be divided into two groups: a control group which will be advanced by sib mating and a select group which will be subjected to full sib progeny test in every other generation of sib mating. Effectiveness of selection for increased grain yield will be determined in field trials following each cycle. The F_2 and advanced generations of the control group will be evaluated for estimation of level of dominance. The control and select groups will be evaluated for comparison of dominance estimates upon completion of three selection cycles when both groups are in the F_{11} generation. Completion of this study is expected to require a minimum of five years with the utilization of an overwinter nursery.

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9. Inheritance and linkage relations of genes for a serpentine character in *Zea mays*.

An S_2 culture from the cross A195 x Red 30 made in 1958 produced plants with varying degrees of undulation in the lower portion of the stem. The extreme type has a serpentine appearance. The A188 interchange series is being used to determine location of the gene(s) controlling this character.

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10. Association test between interchanges and multiple ear character.

Inbred E₁1 produces two almost identical ears per stalk. The pedigree indicates the multiple ear character was derived from Minnesota 13 variety. In order to determine the locus (loci) responsible for this character the 22 stocks of the all arms interchange tester series in A188 background (selected by Burnham and Longley) were crossed with E₁1 with the heterozygous interchange stocks as female parents. Semisterile F_1 's were backcrossed to A188 and also crossed to F_1 's within the stock.

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