

PH.D. DISSERTATION ABSTRACT

STATISTICAL EFFICIENCY OF FIVE TYPES OF PROGENY IN DETECTING LINKAGE BETWEEN MARKER AND QUANTITATIVE TRAIT LOCI

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The efficiency of five types of progenies in detecting linkage between a marker gene and a quantitative trait locus (QTL) is compared. These five progenies include the backcross generations; backcross to parent 1 (BC1), backcross to parent 2 (BC2), and three selfed progenies, F3, F4 and F5.

Using the method of comparison of marker genotype means, linkage is detected as a significant difference between the means of the alternative marker genotypes. The test assumes that the phenotypic trait values are normally distributed within marker genotypes with common variance.

Genetic expectations of the marker classes are derived assuming complete fixation at the marker and quantitative trait loci of the parents used, MMQQ and mmqq.

The results show that the efficiency of backcross generations is a function of the level of dominance exhibited by the QTL. In contrast, the selfed progenies are not affected by the level of dominance. The effect of recombination is to increase the sample size for all progenies. However, for small values of the recombination frequency, the number of offsprings obtained seems to be quite feasible for an experimental set-up. It is shown that at values of r beyond 0.2 the required number of offsprings may not be too practical. The backcross types of progenies are found to require less offsprings making them more efficient; however the selfed progenies may be more efficient with increasing effects of the environment which contributes to the increased variance within the marker genotypes.
