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1. Effect on quantitative characters of a permanent heterozygosis system.

Several quantitative plant and ear traits have been studied in the offspring of one selfed F_2 ear derived from crossing two lines, possessing respectively the well known y factor and an ij type semilethal mutant. The recombination frequency between these factors, both located on chromosome 6, is very low (near 0.02); moreover, the $y\ ij/y\ ij$ recombinants, when found, behave as lethals.

The aim of this work was to determine whether the double heterozygote ($Y\ ij/y\ Ij$) has some morpho-physiological advantage compared with the other viable genotypes involving the same alleles. Through self-pollination, the genotype of the tested plants (with the exception of two $Y\ Ij/Y\ ij$ and one $y\ Ij/y\ ij$) proved to be $Y\ ij/y\ Ij$ or $y\ Ij/y\ Ij$; the comparison, then, has been possible between these two classes only. The data obtained are reported in the table.

The lack of information about the behaviour of the other viable genotypes prevents a decision as to whether the higher performance of the double heterozygote depends on a negative action of the y factor, when homozygous, or on a heterotic effect due to the factors under study or to some others closely linked with them. In any case, the y and ij factors seem to constitute a permanent heterozygosis system, less drastic than previously studied systems based on balanced lethal factors, but possibly more efficient, at least in some environmental conditions, in improving the fitness of a population.

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1. Further data on the Ga factor of chromosome 9.

In 1968 further data have been obtained in order to locate Ga_8 on the linkage map and to test its rate of transmission. Plants of $Ga\ wx/$

ga Wx constitution pollinated by Ga Ga individuals produced, out of 176 plants, 21 recombinants. This corresponds to 11.93% crossing over, a value unaffected by the possible competition between ga and Ga pollen since the heterozygous parent was used as the female. Since this value is not lower than that obtained on the hypothesis of non functioning of ga making use of self-pollinated progenies (as reported in a previous MNL), it should follow that ga pollen is practically incapable of functioning at least in the presence of Ga. This actually appears to be the case. Among the progeny of plants of Ga wx/ ga Wx and Ga Wx/ ga wx constitutions appear individuals segregating about 25% wx kernels. If ga pollen functioned to some degree, some of these individuals should be Wx wx ga ga; actually, out of 46 tests, not a single case of such a genotype has been detected. All the ears showing 25% wx kernels turned out to be Wx wx Ga Ga. Apparently either ga does not function or the ga ga combination is lethal.

The very poor functioning of ga pollen is also indicated by the results of pollinating Ga Ga plants with tassels of Ga Wx/ ga wx and Ga wx/ ga Wx individuals. The latter combination is especially convincing; if a value of 12% crossing over is considered, the comparison is as follows:

No. of ears	Non crossover	Crossover
Actual	3	108
Expected	97.7	13.3

Obviously it should be concluded that the functioning of ga pollen is negligible (from these data ga fertilizes 264 times less than Ga:

$$\frac{97.7}{13.3} \times \frac{108}{3}.$$

These results indicate that in calculating linkage relationships between Ga_g and chromosome 9 markers it is practically correct to assume that ga pollen is unable to perform fertilization in the presence of the Ga grain.

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