

These data were tested for conformity to expectation on the basis of linear regression and were found to give a close fit. Thus the aleurone spotting effect of increasing dosages of the \underline{R}^{st} allele appears to be additive.

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8. Partial restoration of paramutant R^r .

A test was made to determine the amount of restoration that paramutant R^r undergoes when passed through one sporophytic generation with three different r^r mutants from standard R^r , and when passed through one sporophytic generation as a homozygote. The modified R^r will be designated as $R^r:lst$ (Brink, MGCNL 32). The R^{lst} allele used as the "inducer" in this test has been described by Ashman (see current MGCNL). All alleles used in this test had been previously incorporated into the highly inbred line of W22. The female test parent used was the uniform inbred line W23 r^{GrG} . The mating plan was as follows:

Testcrosses

	$R^r:lst$ R^{lst}	(1)	W23 r^{GrG} x $R^r:lstR^{lst}$
W22 R^r R^{lst} (selfed)	$R^r:lst$ $R^r:lst$	(2)	W23 r^{GrG} x $R^r:lstR^r:lst$
W22 $r^r r^r$ x R^r R^{lst} (mutants from standard \underline{R}^r)	$R^r:lst$ r^r	(3)	W23 r^{GrG} x $r^r R^r:lst$
W22 $R^r R^r$ (selfed)	R^r R^r	(4)	W23 r^{GrG} x R^r R^r

The kernels of aleurone phenotype $R^r:lst$ and standard R^r mottled were scored with the aid of a head lens, magnification approximately 1.1x. The kernels were matched to a set of standard kernels ranging in aleurone pigmentation from colorless, through grades of mottling, to self colored. The kernels from testcross (1) above provide an estimate of the initial aleurone phenotype of the paramutant $R^r:lst$ allele. The kernels from testcross (2) provide an estimate of the phenotype of the $R^r:lst$ allele after it has passed through one sporophytic generation as a homozygote. The kernels from testcross (3) provide an estimate of the $R^r:lst$ allele after it has passed through one sporophytic generation heterozygous with the three respective r^r mutants. The kernels from testcross (4) provide an estimate of the phenotype of standard R^r . The scores for each class of $R^r:lst$ phenotypes and the R^r phenotype were converted to percentages. The results are as follows:

Testcross	Endosperm genotype of kernel scored	No. of kernels scored	Mean percentage pigmentation per kernel
W23 $r^g r^g$ x $R^r:1st R^r:1st$	$R^r:1st r^g r^g$	4550	15.34
W23 $r^g r^g$ x $R^r:1st R^r:1st$	"	900	40.64
W23 $r^g r^g$ x $R^r:1st r^r_8$	"	700	53.09
W23 $r^g r^g$ x $R^r:1st r^r_{25}$	"	900	53.30
W23 $r^g r^g$ x $R^r:1st r^r_{27}$	"	1250	51.35
W23 $r^g r^g$ x $R^r R^r$	$R^r r^g r^g$	400	82.48

The results may be summarized as follows:

- (1) The $R^r:1st$ allele extracted from $R^r:1st R^r:1st r^r_8$, $R^r:1st r^r_{25}$, and $R^r:1st r^r_{27}$ regularly reverts in pigment-producing potential toward, but not to the levels of, standard R^r .
- (2) The $R^r:1st$ allele extracted from the $R^r:1st R^r:1st$ homozygote shows significantly less restoration, in this case, than the $R^r:1st$ allele extracted from the mutant heterozygotes. This is not in agreement with certain earlier observations, and the relation requires further study.
- (3) The r^r mutants tested do not differ in restoring action. Progressive restoration of the $R^r:1st$ allele has been tested. Six independent r^r mutants from standard R^r , standard r^r , and standard r^g alleles were used in the test. The $R^r:1st$ allele was made heterozygous with each of the above restoring alleles. The heterozygotes, $R^r:1st r$, were selfed and then used as males on inbred W22 $r^g r^g$. The restored $R^r:1st$ aleurone phenotypes produced by the above mating plan are as follows:

- (1) $R^r:1st$ phenotype after one and two generations of restoration with each of the r alleles.
- (2) $R^r:1st$ phenotype after one generation of restoration with one of the r^r alleles and then one generation with the r^g allele.
- (3) $R^r:1st$ phenotype after one generation of restoration with each of the r alleles and then made homozygous for one generation.

The material from the progressive restoration test has not been scored in detail; however, general inspection indicates that little or no progressive restoration occurred.

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