

2. Enhancement of \underline{R} expression in plants hemizygous for the \underline{R} locus.

In the 1965 News Letter it was stated that paramutable \underline{R} alleles are metastable, i.e., they have a capacity to vary heritably in plants not carrying an overtly paramutagenic allele. One evidence of such metastability is that alleles conditioning a mottled phenotype in single dose are enhanced in level of action toward self-color when maintained through successive generations heterozygous with a recessive \underline{r} allele. \underline{R}_2^g (a plant color mutant from standard \underline{R}^r , comparable with standard \underline{R}^r in paragenetic properties) has been maintained for three successive generations in stocks heterozygous with \underline{r}^r , and also in otherwise comparable stocks hemizygous for the \underline{R} locus. Enhancement has occurred in parallel fashion in both cases. The mating scheme consisted of an initial pollination of $\underline{R}_2^g \underline{R}_2^g$ on silks of $\underline{r}^r \underline{r-x}_1$ plants ($\underline{r-x}_1$ = deficiency in chromosome 10 spanning the \underline{R} locus), followed by recurrent pollinations of $\underline{R}_2^g \underline{r}^r$ and $\underline{R}_2^g \underline{r-x}_1$ sibs on $\underline{r}^r \underline{r-x}_1$ females. Mean single dose aleurone scores for the parental $\underline{R}_2^g \underline{R}_2^g$ stocks ranged from 5.38 to 5.72 (seven class scale; 1 = colorless, 7 = self-colored). Mean scores from two $\underline{R}_2^g \underline{r}^r$ lines after three generations of heterozygosity were 6.46 and 6.50. Mean scores from two comparable $\underline{R}_2^g \underline{r-x}_1$ lines after three generations of hemizyosity were 6.61 and 6.24. It appears, therefore, that enhancement may occur autonomously; i.e., it is not of necessity directed by the partner allele as with paramutation of \underline{R} to \underline{R}' in $\underline{R} \underline{R}^{st}$ heterozygotes.

Derek Styles

3. Complete reversion of \underline{R}' .

$\underline{R}_2^g \underline{R}^{st}$ plants from $\underline{R}_2^g \underline{R}_2^g \times \underline{R}^{st} \underline{R}^{st}$ matings were used as pollen parents in crosses with $\underline{r}^r \underline{r-x}_1$ plants ($\underline{r-x}_1$ = deficiency in chromosome 10 spanning the \underline{R} locus). $\underline{R}_2^g \underline{r}^r$ and $\underline{R}_2^g \underline{r-x}_1$ sibs were then used to establish \underline{R}' lines which were further subdivided at each generation by recurrently mating with $\underline{r}^r \underline{r-x}_1$ females and separating again into $\underline{R}' \underline{r}^r$ and $\underline{R}' \underline{r-x}_1$ sublines. A number of \underline{R}' lineages were obtained in this manner, some of which were successively heterozygous ($\underline{R}' \underline{r}^r$), and some successively hemizygous ($\underline{R}' \underline{r-x}_1$). As there was no consistent difference in reversion pattern between heterozygous and hemizygous lineages, the separation into $\underline{R}' \underline{r}^r$ and $\underline{R}' \underline{r-x}_1$ classes at each generation served only as a basis for establishing new sublines. Change in \underline{R}' aleurone expression was followed by testcrossing representatives of each lineage at each generation on W23 $\underline{r}_2^g \underline{r}_2^g$ females.

Testcross scores of homozygous $\underline{R}_2^g \underline{R}_2^g$ plants average ca. 5.50 (seven class scale; 1 = colorless, 7 = self-colored). The \underline{R}' class on testcross ears from the three $\underline{R}_2^g \underline{R}^{st}$ plants used to start this experiment scored 2.10, 2.04, and 2.72.