this tassel initiation stage of development? What memory mechanism receives and stores this information in the pollen and then reflects the environmental response in pigment cell differentiation in the endosperm of the testcross parent? Such a mechanism must possess an additive capability for the one to six L:D cycles during flower initiation. While this short-term memory offers no special conceptual problems beyond those of differentiation of cells in the individual treated, to account for the above data as a carry-over effect from the pre-tassel somatic tissue, through the pollen, to the endosperm formed in the testcross on the female, does strain existing genetic models.

We have previously reported the paramutational additive effect on R-expression of R^{st} through ten generations; it is possible that the environmental effects recorded above may now help to determine the ontogenetic times that R' is susceptible to additive "suggestion" from both paramutation and the environment.

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1. The effect of linkage and breakage between the elements of locus Rp_1.

It has been shown (Saxena and Hooker, 1968) that several dominant "alleles" at Rp_1 (Rp_1^a, Rp_1^c, Rp_1^k) consist of closely linked genes for resistance and susceptibility to different biotypes of Puccinia sorghi. The elements conditioning resistance to a portion of the rust biotypes in two complex "alleles" can be recombined with resultant broadening in spectrum of resistance. Results reported here are from a study in progress undertaken to observe the effect of breakage on these recombined elements for resistance.

The recombinant Rp_1^c-Rp_1^k (linkage 0.16 ± 0.03%) was used for this study and the following testcross: Rp_1^c-Rp_1^k a_1 a_2 c r pr / rp_1 a_1 a_2

$\underline{c}\ \underline{r}\ \underline{pr}$ x $\underline{rp_1}\ \underline{A_1}\ \underline{A_2}\ \underline{C}\ \underline{R}\ \underline{Pr}$ / same was made using the susceptible plant ($\underline{rp_1}\ \underline{A_1}\ \underline{A_2}\ \underline{C}\ \underline{R}\ \underline{Pr}$) as pollen parent. All pollinations were handmade. Since no suitable markers are available close to $\underline{Rp_1}$, and an outcross could be impossible to differentiate from a crossover product, the pollen parent with dominant genes for purple aleurone was used as an added precaution against pollen contamination.

"Allele" $\underline{Rp_1}^c$ conditions resistance to *P. sorghi* culture 936c but not to 941bR; "allele" $\underline{Rp_1}^k$ conditions the reciprocal reaction. Both alleles give resistance to 901aba. The recombinant $\underline{Rp_1}^c$-$\underline{Rp_1}^k$ is resistant to all three cultures. Thus, parentals can be easily distinguished from nonparentals in the progeny test.

To eliminate all parentals, the progeny was first tested with 901aba, and subsequently with a mixture of cultures 936c and 941bR. From a total of 12,038 seedlings thus tested, 18 suspected nonparentals were saved and allowed to grow to maturity. These were testcrossed by susceptible plants and the seed saved for further progeny testing.

On progeny testing, 11 out of 18 plants saved proved to be parentals and two nonparentals. Progeny of three are still undergoing testing. For further characterization, the progeny of the two nonparentals was tested with 15 biotypes of *P. sorghi*. One of these proved to be indistinguishable from $\underline{Rp_1}^k$. "Allele" $\underline{Rp_1}^k$ is susceptible to cultures 904d and 936c whereas the modified $\underline{Rp_1}^k$ is susceptible to only 936c. Further testing is in progress.

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