

Peroxidases of maize

| Tissue | Locus known | | | | | | | | | Locus unknown | | | |
|---------------------------|-------------|---|----|----|---|---|----|---|---|---------------|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | D | E |
| Leaf | + | 0 | + | +* | 0 | + | + | 0 | 0 | 0 | 0 | 0 | 0 |
| Coleoptile | +* | 0 | +* | + | v | + | +* | + | + | 0 | 0 | 0 | 0 |
| Mesocotyl | + | 0 | +* | + | v | + | 0 | + | + | 0 | 0 | 0 | 0 |
| Stele | + | 0 | 0 | 0 | v | 0 | 0 | + | + | 0 | 0 | 0 | 0 |
| Cortex | + | 0 | + | + | v | + | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Stem apex | 0 | 0 | 0 | + | 0 | + | + | 0 | 0 | 0 | 0 | 0 | 0 |
| Pericarp | + | 0 | +v | + | + | 0 | + | + | + | 0 | 0 | + | + |
| Embryo | 0 | 0 | 0 | + | 0 | 0 | 0 | + | + | 0 | 0 | + | + |
| Endosperm | 0 | 0 | 0 | + | + | 0 | 0 | 0 | + | 0 | 0 | + | + |
| Silk | +* | 0 | 0 | + | 0 | 0 | + | 0 | 0 | 0 | 0 | 0 | 0 |
| Pollen | 0 | + | 0 | 0 | + | 0 | 0 | 0 | 0 | 0 | 0 | + | 0 |
| Root | +* | 0 | 0 | + | 0 | + | 0 | v | 0 | + | + | 0 | 0 |
| Endosperm tissue cult. | + | 0 | 0 | + | 0 | + | 0 | 0 | 0 | + | + | 0 | 0 |

* Bands prominent only in mature tissues

v Expression variable

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2. Aphid resistance under apparent monogenic control.

In the autumn of 1972, aphid resistance was observed among a series of related shrunken-2 inbreds of the general pedigree (RR) AA8sh BC3 S1. There were 18 resistant lines and 21 lines that were susceptible or segregating. Further studies confirmed the homozygosity of resistant lines, and their aphid resistance under a wide variety of infections. Sorghum plants have been used to provide severe aphid infestations, minimizing escapes, and aphids are only rarely seen on the resistant plants.

The origin of the resistance is as yet unclear, with several possibilities. The basic inbred under conversion, a shrunken-2 version of Hawaiian inbred AA8, has no resistance. Conversion was being made

simultaneously to the Ht₁ gene (chromosome 2-121) and rust-resistant gene Rp₁ (chromosome 10-0), from different sources. The Ht source, a conversion of Illinois sweet corn inbred 101t, is not aphid resistant. The Rp source, a hybrid of W22 x B14A, is the more probable origin of resistance.

Resistance is recessive in all crosses we have made, and segregates monogenically in the crosses evaluated to date. A preliminary gene designation is the symbol aph. The possibility of linkage to the Rp₁ locus is suggested in one set of testcrosses, which segregated as follows: 43 resistant to both, 27 susceptible to both, 90 resistant only to rust and 80 resistant only to aphids.

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1. Mutations that restore fertility to S male-sterile maize.

Exceptional male-fertile plants arising from crosses involving S male-sterile shrunken-2 inbred lines and their corresponding isogenic maintainer lines are under continuing study. The majority of these male-fertile exceptions involve cytoplasmic "mutations" in that the male-fertile trait is not pollen transmissible (Genetics 71: 607, 1972). However, we have recently reported on four independently-occurring mutations which restore fertility in S sterile cytoplasm and are pollen transmissible (MGNL 47: 50, 1973, Theoret. Appl. Genetics 43: 109, 1973). Analyses of these four nuclear restorer mutations have continued and two additional cases have been identified and are also being characterized. These six changes arose in the same strains in which the numerous cases involving cytoplasmic "mutations" were identified. The mode of restoration observed for the six newly-arisen nuclear restorers is gametophytic, as it is with the standard S restorer Rf₃, rather than sporophytic, which is characteristic of the T restorers Rf₁ and Rf₂.