

## New alleles of *enr1* and *enr2*.

--Stinard, PS

Stinard (2007. MNL 81:33-35) describes two *r1* haplotype-specific enhancers of aleurone color isolated from an accession of *R1-r(Venezuela459#16039)* from the Brink *r1* haplotype collection donated to the Maize Genetics Stock Center by Jerry Kermicle. The enhancers were linked, with a separation of 25.2 centiMorgans; one enhancer, *Enr\*-459A*, expressed equally well in male and female outcrosses with susceptible *r1* haplotypes and the other enhancer, *Enr\*-459B*, expressed only in female outcrosses. Chromosomal location was unknown, and their relation to the characterized enhancer loci *enr1* and *enr2* (Stinard *et al.* 2009. The maize *enr* system of *r1* haplotype-specific aleurone color enhancement factors. J Hered 100:217-228) was not known. Stinard *et al.* (2009) found *enr1* and *enr2* to be separated by 23.4 centiMorgans in direct linkage tests and expression patterns of *Enr1* and *Enr2* alleles match that of *Enr\*-459A* and *Enr\*-459B* respectively. Linkage tests of *Enr\*-459A* and *Enr\*-459B* were subsequently performed with *enr1* and *enr2* and the results are reported here.

Since the phenotype of *Enr\*-459A* most closely matches that of *Enr1* alleles with respect to good expression in both male and female outcrosses, it was mapped only with respect to *enr1*. A homozygous *r1-g(Stadler) Enr\*-459A* line was crossed to a homozygous *r1-g(Stadler) Enr1-628* line, and F1 plants were outcrossed as males to responsive homozygous *enr1 R1-r(Venezuela559-PI302355)* testers. The parental classes and the double factor recombinant class would be expected to have full color aleurones, and the recombinant class lacking both factors would be expected to have pale aleurones. Kernels from these crosses were scored for aleurone color, and exceptional pale or colorless kernels were subsequently planted and the resulting plants selfed and outcrossed to *enr1 R1-r(Venezuela559-PI302355)* testers to confirm genotypes. Of 13 exceptional kernels obtained from a population of 5166 kernels, only 7 could be tested and all were found to be parental types. Therefore, no recombinants were found from an effective population of 2872 kernels, indicating a separation of less than 0.07 +/- 0.05 centiMorgans. We conclude that *Enr\*-459A* and *Enr1-628* map to the same location and are most likely allelic. *Enr\*-459A* has been renamed *Enr1-459A*.

The female-only expression of *Enr\*-459B* matches that of other *Enr2* alleles and therefore *Enr\*-459B* was mapped only with respect to *enr2*. A homozygous *Enr\*-459B R1-r(Venezuela559-PI302355)* line was crossed to a homozygous *Enr2-694 R1-r(Venezuela559-PI302355)* line, and F1 plants were crossed as females by homozygous *enr2 R1-r(Venezuela559-PI302355)* testers. The parental classes and the double factor recombinant class would be expected to have full color aleurones, and the recombinant class lacking both factors would be expected to have pale aleurones. Kernels from these crosses were scored for aleurone color, and exceptional pale kernels were subsequently planted and the resulting plants crossed as females by *enr2 R1-r(Venezuela559-PI302355)* testers to confirm genotypes. Of 3 exceptional pale kernels obtained from a population of 3712 kernels, only 2 could be tested and both were found to be parental types. Therefore, no recombinants were found from an effective population of 2475

kernels, indicating a separation of less than 0.08 +/- 0.06 centiMorgans. We conclude that *Enr\*-459B* and *Enr2-694* map to the same location and are most likely allelic. *Enr\*-459B* has been renamed *Enr2-459B*.