

Inbred W23 carries a heritable factor that allows dominant expression of *ws\*-N947C*

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During the course of propagating the reportedly recessive white-sheath mutant *ws\*-N947C* (Maize COOP stock number 4508K), we outcrossed green heterozygous *ws\*-N947C* plants to various nonmutant standard lines to increase vigor. When F1's were planted in our selfing blocks for increase, we noted that outcrosses to hybrids made with W23 as one of the inbred parents segregated for white sheath plants. Outcrosses to standards not carrying W23, such as the inbred B73, produced only green plants. To study this phenomenon further, we outcrossed green heterozygous *ws\*-N947C* plants to both inbred W23 and to B73. Again, only outcrosses to W23 segregated for white sheath plants in the F1 (Mutant seedlings can be observed in sand-bench plantings, but expression improves as the plants mature, so field plantings are preferable for scoring for this mutant).

To further characterize the interaction between W23 and *ws\*-N947C*, white sheath plants from F1 crosses with W23 were crossed both as male and female parents with W23 and B73. Regardless of the direction of the cross, crosses of mutant plants to W23 segregated approximately 1:1 for green and white sheath plants, and all crosses with B73 were green. To carry the analysis one generation further, male and outcrosses of white sheath plants to B73 were reciprocally crossed with W23, and the progeny were tested in both sand bench and field plantings. About a quarter of the crosses produced white sheath progeny regardless of whether the initial F1 cross with B73 was made as a male or a female. The segregation ratios observed approached a 3:1 ratio of green to white sheath plants (actual data: B73 as male parent in F1: 65 green : 22 white sheath; B73 as female parent in F1: 56 green : 24 white sheath).

Two conclusions can be drawn from these data: (1) W23 carries a single genetic factor, which in the homozygous condition, allows *ws\*-N947C* to express in a dominant manner as a heterozygote. (2) The factor in W23 that allows dominant expression of *ws\*-N947C* is nuclear and not cytoplasmic since *ws\*-N947C* can express dominantly in either B73 or W23 cytoplasm. We do not yet know whether the factor from W23 is necessary for *ws\*-N947C* expression (*i. e.* will homozygous *ws\*-N947C* plants produce a mutant phenotype in the absence of the W23 factor?) In order to address this question, *ws\*-N947C* will be further crossed into B73 and outcrossed to W23 during each generation of introgression to determine whether it is possible to obtain selfs that segregate for recessive *ws\*-N947C* yet produce only green plants in outcrosses to W23.