Determining the Heritability of Salt Gland Density: A Salinity Tolerance Mechanism of Chloridoid Warm Season Turfgrasses

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Objectives:

Determine the broad and narrow sense heritabilities of salt gland density in zoysiagrass. Zoysiagrass is the ideal model system to determine salt gland heritability, as salt gland densities and relative salt tolerances of a large number of genotypes have already been determined. As salt gland density had been found to be an important salt tolerance mechanism in other turfgrasses in the Chloridoideae subfamily (i.e. bermudagrass, buffalograss) results should be applicable to these breeding programs as well.

Water shortages are resulting in a major shift to use of secondary, saline water sources for turf irrigation, particularly in the western U.S., and in coastal areas. Though there is increasing need for improved salt tolerant turfgrass cultivars, breeding progress has been limited. Understanding of basic salt tolerance mechanisms and their genetic control may greatly expedite turf breeding programs.

Salt tolerance in the Chloridoid grasses, including bermudagrass, buffalograss, zoysiagrass, and saltgrass (*Distichlis* spp.) is strongly associated with shoot salt exclusion, which seems to be associated with leaf salt gland density. We are examining the relationship between salt gland density and salt tolerance in the zoysiagrasses. Fifteen zoysiagrass varieties are being examined for salinity tolerance and salt gland density. These fifteen are being crossed to produce offspring to examine salt gland heritability, or genetic control (i.e. if it is passed on from parent to offspring). Research to date supports initial observations that salt gland density plays a premier role in salt tolerance of Chloridoid turfgrasses.

Currently, development of salt tolerant turfgrass cultivars has been very limited, due to the difficulty of screening thousands of breeding accessions for salt tolerance. If gland density is highly heritable, it should be possible to select new salt tolerant individuals in breeding programs simply by looking at their leaves under a microscope to determine their salt gland density. This procedure should be much easier, and more accurate than screening large numbers of individuals under salt stress, and so may greatly expedite progress in developing new salt tolerant turfgrass cultivars.