A REALISTIC WHOLE PLANT

MICROCULTURE SELECTION SYSTEM FOR TURFGRASSES

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A broad range of warm and cool season turfgrass lines with definitive variations in salt and drought stress resistance (based on field tests) have been adapted into a comprehensive, uniform, continuous whole plant microculture system. The microenvironmental conditions have been optimized to provide a realistic analog to natural conditions and enhance visualization of the cultures during time course evaluation. The specific adaptations provide excellent root systems area and adequate aerial atmosphere so that each of the plant organs can respond to imposed stress with natural mechanisms of defense. Novel (microcomputerized video image analysis) methods for whole plant microculture screening analysis, and non-destructive quantification have been developed to amplify and strenghen the analytical approach.

The whole plant microculture system is directly compared in simultaneous tests with a solution batch culture system for evaluation of turfgrass salt tolerance characteristics. Paired sets of resistant and susceptible lines from each species are concurrently screened in solutions and whole plant microculture by gradually increasing salt concentrations to mimic field stress conditions. Both the solution culture and microculture systems have been designed to yield critical information that has previously been unavailable to turfgrass researchers in the stress tolerance arena of investigations/ information on turfgrass relative growth rate, osmotic adjustment, and quantitative color and morphometric response to imposed salt stress regimes. Both systems also allow unobstructed visualization and measurement of root system response to increasing salt stress information that is inherently unavailable in conventional field or greenhouse research.

Information gleaned from these completed studies will augment previous field results testing relative to salt tolerance responses of grasses. In addition, the microculture screen provides a rapid method for presecreening germ plasm that has not been feild evaluated, aids in elucidation of stress tolerance mechanisms, and can be readily adpated to screeing of somaclonal variants from callus-phase and biotechnological turfgass research efforts.