Research Summary

Salinity Tolerance of Seven Warm-Season Grasses

There is no doubt that soil salinity is an increasing problem worldwide and that an increasing percentage of the land area devoted to turfgrasses will require salinity-tolerant grass species. The objective in this research was to assess the comparative salinity tolerances of seven warm-season grasses, as well as to identify related salinity tolerance mechanisms. The experiment was conducted in a glasshouse in a solution culture system. The salinity treatments involved a gradual daily increase of 25 m*M* NaCl up to 600 m*M* NaCl. Plant response measurements were taken following a 24-hour equilibrium at each 100 m*M* NaCl increment.

The comparative salinity tolerances of the seven warm-season grass species are summarized in the following table. The most tolerant species is listed at the top, followed in declining order of salinity tolerance for those below. All seven C_4 warm-season grasses are in the subfamily Chloridoideae. The results show a wide range in relative tolerance among the seven grasses, which can be grouped in three levels of high, intermediate, and low degrees of salinity tolerance. The comparative species salinity tolerances were negatively correlated with the leaf sodium (Na^+) and chloride (Cl^-) levels. Cellular salt glands were observed in the leaves of all seven species. The mechanism of salt tolerance appeared to be associated with saline ion exclusion. The root weight and relative root length increased under the saline conditions of this study.

Scientific Name	Common Name
Distichlis spicata var. *stricta*	saltgrass
Sporobolus airoides	alkali sacaton
Cynodon dactylon	dactylon bermudagrass cv. Arizona common
Zoysia japonica	Japanese lawngrass cv. Meyer
Sporobolus cryptandrus	sand dropseed
Bouteloua curtipendula	sideoats grama cv. Haskell
Buchlöe dactyloides	American buffalograss cv. Prairie

Comments. Saltgrass and alkali sacaton were highly tolerant of salinity, whereas American buffalograss and sideoats grama were relatively sensitive to salinity. It would have been interesting if St. Augustinegrass (*Stenotaphrum secundatum*), seashore paspalum (*Paspalum vaginatum*), and weeping alkaligrass (*Puccinellia distans*) had also been included in this study.

Source: Salinity Tolerance Mechanisms of Grasses in the Subfamily Chloridoideae, by K.B. Marcum. *Crop Science,* 39:1153–1160.

JB COMMENTS

Turfgrasses—Stream and Lake Bank Issues

A common recommendation promoted by activists is to eliminate turfgrasses along streambanks and lakefronts, and replace them with trees and shrubs, the premise being that turfgrasses are a major problem in nutrient overloads into the water. Unfortunately this is an ill-founded concept that actually may increase both nutrient loading and soil erosion into the water.

First, in terms of erosion control along streambanks, turfgrasses are far superior to trees in stabilizing soils and minimizing soil erosion. This is because of the unique fine, fibrous root system, which permeates and stabilizes the soil in a manner that trees cannot duplicate. In addition, the dense turfgrass canopy on the surface of the soil has the capability to slow high-velocity over-land water flows to non-erosive velocities. Again, trees have a minimal capability in terms of slowing high-velocity, overland flows of water from adjacent areas. The turf canopy also acts as a sponge to hold a significant amount of water in place for ground water recharge.

Activists tend to counter with a response that clippings from grasses are thrown into the water, thereby adding unwanted nutrients to the water. First, a recent multi-year study on a sandy soil involving several turfed fairways positioned adjacent and parallel to a nearby clear-water trout stream showed normal fertilization practices resulted in no significant phosphorus or nitrogen entering the stream water. **A counter response to the allegation that trees are superior in terms of grass clippings entering the water is that deciduous trees lose their leaves in the autumn and have the potential of adding major amounts of nutrients to stream and lake waters.** In addition, wildlife such as geese and ducks that are viewed as desirable also add a greater quantity of nutrients to the water via their excrement.

To maximize the beneficial aspects of grasses along streambanks, it is best that the turf be mowed at a higher height of 3 to 4 in. (75–100 mm). Also, nutrient fertilization in these areas should be minimal, and used only as needed to achieve a relatively dense surface vegetation and root system, which maximizes the beneficial effects of the grasses in terms of soil erosion control, uptake of nutrients, and degradation of undesirable organic compounds.