Improving Minnesota Roadsides with Salt-Tolerant Sod

What Was the Need?
Road salt is an important tool for keeping Minnesota’s roads clear of ice and snow during the winter months. However, salt also causes stress to the sod that is planted along roadsides, which can lead to failure of roadside sod establishment and persistence. This not only affects roadside appearance, but can also hurt water quality since damaged sod does not absorb stormwater runoff as effectively.

Minnesota previously offered a specification for salt-tolerant roadside turfgrass, MnDOT 260. However, that specification was based on information gathered from vendors rather than on research specific to Minnesota’s climate and winter maintenance practices. It also had not been updated in about 20 years, so the standard did not incorporate current seed and seed mixture technologies.

MnDOT needed a roadside turfgrass optimized for Minnesota’s conditions that incorporates currently available seeds and knowledge.

What Was Our Goal?
This research sought to develop new specifications for roadside turfgrass that would be better able to withstand the stresses that occur in Minnesota roadsides, including salt exposure, dry and hot conditions, and sand and compaction issues.

What Did We Do?
Researchers used several methods to identify turfgrass species and cultivars (varieties within a species) that are likely to successfully establish themselves and survive in conditions found on Minnesota roadsides.

• First, they planted 75 turfgrass cultivars from 14 species at two sites near Minneapolis to measure their establishment and winter survival rates under three distinct levels of salt exposure, soil types and runoff patterns.

• Next, they measured salt tolerance in a laboratory environment, exposing 74 cultivars to three different levels of salt in a nutrient solution.

• They also tested 51 different mixes of turfgrass. Testing mixes is necessary because no single cultivar can withstand all of the stresses faced by roadside turfgrasses. Different varieties can complement each other, but the interactions between cultivars are not well understood. Competition for resources means that some cultivars will not grow well with each other. Tests of mixes included field tests at two sites in and near St. Paul to evaluate survival and weed infiltration; measure tensile strength of the sod produced by the mixes (which is needed because sod requires a minimum level of strength to survive harvest, transportation and installation); and test the mixes’ resistance to drought.
What Did We Learn?

This research provided a solid base of information about the varieties of turfgrasses that are best suited to roadsides in cold climates. While Kentucky bluegrass has traditionally dominated the sod industry in the upper Midwest, this project suggests that roadside turfgrass should include fine fescues (a group that includes hard, Chewings, creeping red, slender creeping red and sheep fescues) in high proportions relative to Kentucky bluegrass and ryegrass.

Establishment and survival field tests showed that varieties that established well did not necessarily survive the winter and vice versa. However, several fine fescue cultivars demonstrated good survival rates under all conditions once established. They also performed well in laboratory salt-tolerance tests.

Moreover, fine fescues performed well in mixes. The inclusion of hard fescue or sheep fescue in a mixture improved the likelihood of maintaining 60 percent survival after two years, while the tensile strength test found that mixes containing fine fescue species can produce sod of adequate strength for shipping and placement. Fine fescues, and particularly hard fescue, withstood drought well, although that test was run at only a single location during an unusually wet and cool period and cannot be considered definitive.

As a result of this research, new standard specifications for sod mix components were developed, currently listed for producers as MNST-12—a blend of slender creeping red fescue; strong creeping red fescue; Kentucky bluegrass; and at least two of hard, sheep and Chewings fescue. For most of these species, any of several cultivars may be used.

What’s Next?

The MNST-12 turfgrass mixture is now being planted on roadsides across Minnesota. A collaboration among MnDOT, the Minnesota Crop Improvement Association, the University of Minnesota and the state’s sod industry will monitor developments and update this mix as new research warrants.

While MNST-12 can tolerate salt better than previous mixes, there are concerns about its use, particularly because fine fescues do not establish or root as quickly as Kentucky bluegrass. A Local Road Research Board project scheduled for completion in 2016 is investigating management techniques during the establishment period for fine fescues, including optimal watering frequency and quantity, soil moisture and pH requirements, the proper timing of laying sod and fertilizer needs.

MNST-12, a new turfgrass mix of predominantly fine fescue species, can withstand the salt levels typical of Minnesota roadsides, although more research is needed into proper management while the seed mixture establishes itself.