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DEPARTMENT OF TRANSPORTATION

OFFICE OF RESEARCH & INNOVATION

TECHNICAL SUMMARY

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PROJECT COST:
$200,000

Turfgrass testing occurred across five states, including these urban turfgrass plots in Michigan.

Performance Testing of Regional Roadside Turfgrass

Researchers tested a wide variety of turfgrass cultivars over several growing seasons, with plots in both urban and rural environments across five states. Data about cultivar successes and failures were stored in a project website to assist agencies in choosing the best turfgrass species for their roadway sites.

What Was the Need?

Vibrant green grass along roadways is a significant feature of urban and rural Minnesota landscapes. Statewide, MnDOT maintains more than 24,000 acres of turfgrass planted along Interstate highway medians, roadway slopes, street terraces and other areas. Roadsides are challenging environments for establishing turfgrass, with many site-specific stressors.

Failed installations often result in the need to eliminate the existing vegetation and then reseed, which may cost between $150 and $530 per acre for seeds plus the cost of labor. Sod can cost nearly $20,000 per acre. Turfgrass installations fail for many reasons, but observation and previous research suggest that failures often occur when the wrong species is used at a given site. Using the correct turfgrass species for a specific area contributes strongly to successful turfgrass installation.

In previous studies, Minnesota has tested various turfgrass species at multiple sites. However, year-to-year weather variability does not allow for test sites in a single state to provide adequate information about grass tolerances to many roadside stressors. Further, new species cultivars with better heat, drought and salt tolerance are being released, but states have not updated their seed mixes to include them. Results of local testing could promote their use. MnDOT sought to test many turfgrass cultivars and some new, untested species in a wide range of soils and seasonal weather in roadside environments across selected northern states.

What Was Our Goal?

The primary objectives of the project were to assess the performance of potential roadside turfgrasses across multiple northern states and to collect resulting unbiased data for use by public agencies.

What Did We Do?

The initial task was solicitation of cold climate states to participate in the project. Of the approximately 15 states contacted, five had the necessary university horticulture programs and departments of transportation (DOTs) to collaborate with researchers: Michigan, Minnesota, Nebraska, New Jersey and Wisconsin. Researchers in each of these states were to test 50 individual cultivars and 10 standard mixes—two from each state. The cultivars were chosen through breeder recommendations and public data that indicated potential use as a roadside turfgrass.

Researchers in each state seeded plots in two locations: an urban or suburban street with a curb and daily traffic volume of 10,000 to 15,000 vehicles; and a rural highway without a curb, a ditch sloped away from the road and daily traffic volume of at least 30,000 vehicles.

Three replications of 5-by-3-foot test plots were planted in a randomized block design. Researchers used the same amount of seed and starter fertilizer, and identical germina-

continued

"The development of resilient turfgrass species and mixes is most effectively accomplished as a collaboration among cold climate states. Working across state lines, we can simultaneously test many species and mixes across a wide range of soil and weather conditions."

—Dwayne Stenlund,
Erosion Control Specialist, MnDOT Office of Erosion Control and Stormwater Management

"This project shows that state agencies should continue to investigate best management practices for turf establishment and maintenance to make sure the genetic potential of adapted cultivars is realized."

—Eric Watkins,
Professor, University of Minnesota Department of Horticultural Science

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A grid overlaid on a plot in New Jersey allows each grid intersection to be logged as originally seeded, a weed or bare soil.

tion blankets for all plots. Minnesota and Wisconsin applied early watering, while other states' site plots relied on rain. Plots were mown as needed (rural areas less frequently than urban plots).

Soil samples were collected before seeding and each spring after thaw to determine residual winter salt. Researchers also tested for phosphorus and organic material, pH levels, electrical conductivity (indicating salt levels), sodium content and other factors. In addition, each state collected 24 core soil samples at the project's start and end to determine physical soil characteristics.

Researchers assessed the sites using a grid intersection method. They counted the number and kinds of plants—grass or weed—at each intersection of a grid placed over the plot. Plots were assessed in October 2016, April and October 2017, and April 2018.

A website was created that incorporated all data from the test plots.

What Did We Learn?

The project highlighted the importance of multisite testing and difficulties in establishing turfgrass: Only six of the 10 sites resulted in first-year data due to weather and human interference.

Accumulated degree-days (the sum of the daily temperature above 40 degrees Fahrenheit) did not explain the differences in turf establishment, however. Successful fine fescue coverage appeared at sites with higher snowfall and, thus, higher salt amounts. In several cases, turfgrass establishments suggested that only genetics were at play.

Fine fescues are more tolerant of salt than other species and performed well at urban sites. Results also suggested that high salt usage sites would benefit from mixtures incorporating alkaligrass.

What's Next?

This project is the first to provide participating DOTs with unbiased, up-to-date information about turfgrass cultivars and mixtures used on cold state roadways. Future studies would be most effective if they were coordinated with the same group of researchers or expanded to include more. One approach could be partnering with the National Turfgrass Evaluation Program to use its testing infrastructure.

This Technical Summary pertains to Report 2019-38, "Regional Roadside Turfgrass Testing Program," published August 2019. The full report can be accessed at mndot.gov/research/reports/2019/201938.pdf.