



Project Summary

Texas Department of Transportation

0-4949: Successional Establishment, Mowing Response and Erosion Control Characteristics of Roadside Vegetation

Background

The Texas Department of Transportation (TxDOT) and many other transportation agencies are under increasing scrutiny and pressure to utilize native plant seed on the roadside and to remove introduced species from seed mixes. Some of the most recent pressure is the result of Executive Order 13112 of February 3, 1999, on invasive species. This executive order was intended to prevent the introduction of invasive species and provide for their control, as well as minimizing the economic, ecological, and human health impacts that invasive species cause. However, this executive order presents a challenge for TxDOT and other state departments of transportation (DOTs), as highway roadsides are not only built with imported backfill materials but are also maintained by mowing and herbicide application.

The purpose of this project was to investigate whether TxDOT's standard seed mixes need modifications to better address the issue of invasive species while the primary goal of erosion control can still be well achieved. The research objectives were to investigate:

- the successional process of roadside grasses using a TxDOT seed mix and seeding procedure on field laboratory test plots and actual roadsides;
- erosion control properties of vegetation on 12 new plots seeded with a TxDOT seed mix and 10 existing plots originally seeded with a non-TxDOT seed mix; and
- the impacts of mowing on establishing and established grass communities.

What the Researchers Did

To achieve the above objectives, TTI researchers conducted actual highway roadside surveys and field laboratory experiments. In the roadside vegetation survey experiment, the researchers assessed seven Texas highways. Among those seven highways, FM 70 in Corpus Christi and State Highway (SH) 47 in Bryan were documented in detail. These highways were built more than five years ago and contain well-established vegetation. These conditions allowed the researchers to assess the successional changes from their original seeded condition.

In the existing field plot monitoring experiment, TTI researchers used ten plots on full-scale embankments, seeded with various grasses and forbs dating back more than five years, at the Hydraulics, Sedimentation, and Erosion Control Laboratory.

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The plot size was 66 feet long and 20 feet wide on 33 percent slopes and 50 feet long and 20 feet wide on 50 percent slopes. Because these plots had been left alone since seeding, their undisturbed vegetation succession could be assessed. In addition, the erosion control performance of these plots was tested using artificial rainfall simulators.

In addition to existing plots, researchers constructed twelve new plots, all on a 33 percent slope, as a comparison group to the existing plots. Six plots were on clay, and the other six were on sand. The new plots were seeded in compliance with the specifications for TxDOT Bryan District. Researchers applied seeds using a hydroseeder, mixed with spray-on mulch. To mirror the conditions of the existing plots, artificial rainfall was applied for erosion control testing.

What They Found

The researchers found that roadsides as maintained and mowed environments cannot be easily adapted to tall grass species (native or introduced). Short, sod-forming grasses, however, could grow better on roadsides than the tall grass species. Bermuda grass (*Cynodon dactylon*), an introduced sod-forming grass, was found to be a dominant species on front slopes of both FM 70 and SH 47. However, the dominance of Bermuda grass decreased on the back slopes toward the right-of-way boundary. Bermuda grass became less competitive with native species on less disturbed or undisturbed environments. The researchers observed that few seeded species still survived in established roadsides or laboratory test plots years after seeding. All field laboratory plots controlled erosion very well. Yielded sediments were much below TxDOT's minimum performance standards.

What This Means

The aforementioned results can be interpreted as follows:

- Roadside mowing makes a specific group of plant populations adaptable to roadsides.
- Within the scope of this project, Bermuda grass was not found invasive.
- Grass species in TxDOT's standard seed mixes did not show invasiveness on investigated laboratory plots and actual roadsides.
- Volunteer species tend to dominate roadsides in the long term, no matter what species were seeded initially.
- Established roadsides, either by native or introduced species, should control erosion well.

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