



Choosing Appropriate Vegetation for Salt-Impacted Roadways

Many communities rely on the use of grassed swales or biofilters to filter out pollutants in road runoff. The performance of these vegetative practices along roadsides depends to a great degree on the vigor and density of the floral cover. Two recent studies in Minnesota and Ontario have found that winter use of road salt can exert a significant impact on roadside vegetative communities. Since most locations still rely on road salt as a primary deicing agent, designers need to consider the selection of salt-tolerant roadside vegetation.

In the Minnesota study, Biesboer and Jacobson (1994) studied the role of road salt in limiting germination in six warm season grasses and surveyed roadside soil salt concentrations during a one-year period. Salt levels were measured at prescribed intervals from roadsides. Soil chloride concentrations were highest in the winter (October-May), reaching 22,000 ppm and fell below 2,500 ppm in the summer and early fall after spring rains flushed away accumulated salts. Areas within six feet of busy roads were either largely devoid of vegetation or the originally planted grasses were replaced by undesirable, weedy non-grass species. This pattern was attributed to several factors, including salt accumulation in roadside soils due to winter salting operations.

Biesboer and Jacobson found that salt concentrations were highest within the first three feet from the road and then rapidly declined within 30 feet. They

concluded that most warm and cool season grasses could germinate and grow beyond 10 feet from a road without experiencing salt stress. Planting grasses within 10 feet of a road requires careful selection for salt tolerance. In particular, warm season grasses such as blue grama (*Bouteloua gracilis*) and buffalo grass (*Buchloe dactyloides*) are attractive choices due to their ability to withstand high salinities.

Traditionally, most road designers used cool season grass species along Minnesota roadways. Native warm season grasses, however, have several characteristics making them more attractive options for on-site planting (Table 1). Most importantly, warm season grasses typically germinate in early summer, well after spring rains reduce soil chloride concentrations. Biesboer and Jacobson investigated the salt tolerance of six native warm season grass species, based on their ability to germinate after being surface sterilized and exposed to various salinities (Figure 1). It was discovered that all germination was reduced when seeds were exposed to salt concentrations greater than 2,500 mg/l. Salt concentrations rarely approach this level in early summer, when warm season grasses typically germinate. Consequently, the authors concluded that most of the warm season species could germinate in roadside soils along Minnesota roads. Indeed, some species (blue grama and buffalo grass) exhibited particularly high salinity tolerances.

Two roadside sites were selected in 1993 to field test the survival of warm season grass species. Interestingly, while blue grama was planted, buffalo grass was not among those species included in the field study. Preliminary field data are still being collected and will be useful in evaluating several species' tolerances of road salt.

Germination of wetland plants can also be affected by roadside salt concentrations. Isabelle and his colleagues (1987) demonstrated that roadside snowmelt can alter both the species composition and biomass of wetland vegetation. Snow treated with salt was collected from Ontario roadsites. Scientists then sowed seeds of five wetland plant species in greenhouse plots and exposed them daily to snowmelt/tapwater mixtures containing 0, 20, and 100% snowmelt. Seedlings were harvested one month later.

The study found that the number of germinating seeds was inversely proportional to snowmelt salt

Table 1: Characteristics of Native Minnesota Grass Species That Make Them Desirable for Roadside Use (Biesboer and Jacobson, 1994)

- Germination of seedlings or an initial flush of growth from overwintering plants typically occurs in late May-June, after roadside salt accumulations and debris have been flushed from soils by spring rains
- Deep root systems enable them to reduce soil erosion and possibly draw water from the road bed
- Generally short structures may reduce or eliminate the need for mowing.