A Review of Deicers and their Effect on Vegetation

Introduction

The effect of deicers on grass, trees, shrubs and plants has long been a factor in the decision of which product to use. While deicing performance is the most important criteria for deicer selection, users want to be sure they are not creating one problem while they solve another. Unfortunately, if all you do is read promotional package labeling you are likely to be confused on the vegetation issue. Most deicer marketers claim their product won't harm vegetation while others seem to avoid the issue. What are the facts?

Available Research

Deicer impact on vegetation has been widely studied; however, most of the research relates to NaCl (rock salt) used to deice roads and highways. These studies generally indicate that while accumulation of sodium is detrimental to plants, there is more danger to plant life from accumulation of chloride.

Chloride Tolerance

Different plants have different tolerances for chloride. For example, younger plants are more susceptible to chloride damage than aged plants and grassy vegetation is generally more chloride tolerant than trees and woody plants. Several studies have developed lists showing the relative chloride tolerance of a variety of trees, shrubs and grasses, (see Table 1).

A plant's tolerance to chloride may also depend on the mode of exposure. The three primary modes of exposure are: (a) foliage contact from aerial spray, (b) root uptake from soil, or (c) osmotic stress inhibiting a plant's ability to

absorb water. Aerial spray is most commonly associated with highways, where tire action and wind lead to extended contact between chloride-containing mist and the evergreen foliage adjacent to the highway.

Because chloride is chloride regardless of its source, similar effects and concerns can be anticipated from other chloride-containing snow and ice control materials, such as MgCl2 (magnesium chloride), KCl (potassium chloride) and CaCl2 (calcium chloride). However, there are some interesting facts associated with CaCl2 that differentiate it from other chloride-based deicers.

The Calcium Chloride Difference

Calcium is naturally abundant in soils and waters, more so than any other deicer cation, (e.g., sodium, potassium, and magnesium). The addition of calcium from snow and ice control activities is small when compared with the amount already present in the environment.

Calcium is considered one of the major plant nutrients, given that it is a structural component of cell walls.

In fact, calcium chloride is added to irrigation water used on some golf courses in the southern U.S. It is also used in solutions sprayed onto fruit trees to help prevent diseases caused by calcium deficiency.

One study[1], comparing the uptake of sodium, calcium, and magnesium chloride by spruce seedlings, concluded that the presence of calcium ions had beneficial effects on ion regulation. Reduced accumulation of sodium in needles and young shoots occurred when calcium chloride was added to the sodium chloride.

Smart Deicing: Save Money and Reduce Risk of Vegetation Impact

All things considered, it is always smart to uniformly apply the minimum amount of deicer needed to get the job done. Not only does this save money by reducing deicer usage, but it also minimizes the risk of vegetation impact from over-exposure to chloride.

Application rate should be adjusted to match the conditions. Light snow/ice conditions require less deicer than heavy conditions. Less deicer is needed at warmer winter temperatures than at colder temperatures. If residual solid deicer remains on the surface long after all melting has finished, consider cutting back on application rate the next time similar conditions arise.

For More Information

For more information regarding Oxy Chem's calcium chloride products, please visit our website at www.oxycalciumchloride.com.

[1] Bogemans, J. L., J. M. Neirinckx, and Stassart. "Effects of Deicers Sodium Chloride and Calcium Chloride on Spruce (Picea Abies)." Plant and Soil 120, no. 2 (1989): 203–11.

Table 1— General Salt Tolerance Levels of Selected Plants and Grasses

Deciduous Trees		Deciduous Shrubs		Evergreen Trees & Shrubs		Grasses	
Common Name of Plant	Tolerance Level	Common Name of Plant	Tolerance Level	Common Name of Plant	Tolerance Level	Common Name of Plant	Tolerance Level
Thornless Honey Locust	High	Privet	High	Pfitzer Juniper	High	Kentucky 31 Fescue	High
Yellow Birch	Moderate	Honeysuckle	High	Creeping Juniper	High	Red Fescue	Moderate
Paper Birch	High	Forsythia	Moderate	Adam's Needle	High	Bromegrass	Moderate
White Birch	Moderate	Weigela	Moderate	White Pine	Low	Kentucky Blue Grass	Low
Red Maple	Low	Spirea	Low	Red Pine	Low		
Sugar Maple	Low to Moderate	Rose	Low	Jack Pine	High		
Redbud	Moderate			White Spruce	Moderate		
Green Ash	Low			Canadian Hemlock	Low		
White Ash	High			White Fir	Moderate		
Tulip Poplar	Low			Douglas Fir	Moderate		
White Oak	High						
Red Oak	Low						
Pin Oak	Low						
Bitternut Hickory	Moderate						
Shagbark Hickory	Moderate						
Quaking Aspen	High						
Red Elm	Low						
American Elm	Low						
Cottonwood	High						

Sources: P. D. Kelsey and R. G. Hootman, "Deicing Salt Dispersion and Effect on Vegetation Along Highways," in *Deicing Chemicals and the Environment*, ed., F. M. D'Itri (Chelsea, Mich.: Lewis Press, 1992); R. E. Hanes, *Effects of De-icing Salts on Water Quality and Biota* (Washington, D. C.: Transportation Research Board, National Research Council, 1976).

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