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Salt damage on roadside pines.

Photo credit:  
Plant Disease Clinic

Minnesota winters provide very little disease excitement for plant pathologists. Yes, there is the occasional ice storm, with broken limbs and branches, but for the most part, winter serves to numb our brains, and forget the problems that are developing while plants are "sleeping." One such problem is salt damage.

Most people only think of salt damage and how it affects their cars. Very few people think about salt at all, unless they've landed on their backside and wonder where the salt is!

Although no estimates exist as to how much salt is placed on sidewalks (or not), in Minnesota, 200,000 -300,000 tons of de-icing salt are applied to roads each winter.

### What is salt?

Salt is composed of sodium (Na) and chloride (Cl), chemically depicted as NaCl. Salt occurs in a variety forms, including the mineral halite, which is mined and used in rock salt. Sodium chloride is sold in several different particle sizes depending on its intended use. Rock salt consists of discrete crystals, where fine granules make up the typical of table salt and even finer popcorn salt. Kosher salt exists as coarser flakes, and compressed pellets are used in water softeners. Although often consisting of both salt and sand, the salt used on roads consists of mostly (98.5 percent) sodium chloride with traces of other mineral salts.

### How does Salt Damage Plants?

Salt becomes toxic to plants when it dissolves in water, and the sodium and chloride ions separate. Sodium ions in the salt replace the needed nutrients phosphorus and potassium in the soil, making them unavailable to the plant. Have you ever tried to get table salt out of a wet shaker? Then you know salt absorbs water. Rock salt does the exact thing in the soil, absorbing the water that would normally be available to roots, causing root dehydration, changing root physiology, and causing additional plant stress. Meanwhile, chloride ions are absorbed by the roots, transported to the leaves, and accumulate there interfering with photosynthesis by impacting chlorophyll production.

Salt doesn't only affect the roots: When sprayed onto plants by passing vehicles, salt damages plant cells, including buds and small twigs, thereby reducing cold hardiness and leaving tissue more susceptible to freezing damage.

### How to Diagnose Salt Damage

In examining plants to determine if salt is playing role in the observed damage, be sure to note which side of the plant has more severe symptoms. Damage should be more severe on side facing the road, with the plants closest to the road most severely affected. Usually, evergreen damage appears in late winter, with needle browning beginning at the tip. Keep in mind that snow covered branches will be less affected than those exposed to salt spray, and that as you move above the spray zone symptoms should abate.

It is more difficult to diagnose spray damage on deciduous plants. Usually, leaf buds facing the road are killed or are very slow to break. Flower buds facing the road often fail, but the unaffected side of the tree or shrub flowers normally. Repeated damage by



Witch's brooming on  
dogwood caused by salt.  
Photo credit:  
Chad Behrendt

salt may result in witches brooms, or a tufted appearance.

### How to Prevent Salt Damage

The easiest way to prevent salt damage is to avoid de-icing salts and use coarse sand to provide traction and make sidewalks and driveways less slick. If you must use salt, use it judiciously, and erect barriers with plastic fencing, burlap or snow fencing to protect sensitive plants and minimize contact with salt. When possible, use de-icing agents with calcium chloride, or calcium magnesium acetate (CMA), a salt-free melting agent made from limestone and acetic acid.

If an area is heavily salted, consider planting salt-tolerant plants like the ginkgo (*Ginkgo biloba*), winged euonymus (*Euonymus alatus*), or Japanese tree lilac (*Syringa reticulata*). Rugosa roses (*Rosa rugosa*) can take salt as well as the strongest margarita, and can be seen growing next to the Atlantic ocean. As an added bonus, numerous cultivars exist, with an array of color and fragrance. Perennials like Statice (*Limonium* spp), sea thrift (*Armeria maritima*) and reed grass *Calamagrostis acutifolia* 'Karl Foerster' are often listed as salt tolerant. Although salt damage may not always be as manageable as you'd like, there's no reason for it to raise your blood pressure!

Please check out the new diagnostics web pages at  
<http://www.extension.umn.edu/projects/yardandgarden/diagnostics/>