RESEARCH LABORATORY TECHNICAL REPORT

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Storm-Related Salt Injury

On Trees and Shrubs

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Salt water spray can cause severe damage to many species of turf grass, ornamental shrubs and trees. Damage results when salt (sodium chloride) in sea water is either sprayed onto plant foliage or penetrates into the soil where roots develop. Salt water spray can travel long distances during hurricanes, Northeasters or other storms. However, most damage is seen on plants within 100 yards of the ocean or bay.

Symptoms

Spray damage to leaves usually becomes visible within a week of the storm. It is seen as "burning" or scorching of the margins of leaves, or tip down dieback of needles (Figure 1) If damage is severe, leaf buds, new growth, and small twigs might die. If salt spray damage occurs repeatedly, there might be a proliferation of growth associated with dead twigs called "witches broom." Symptoms are worse on the side facing the water or the direction of the storm winds.

In cases of sea water flooding or heavy spray accumulation, salt will enter the soil and make it difficult for the plant to take up water through its root system. Plant symptoms will be similar to those that occur during droughts: wilting, leaf margin scorch, twig dieback, and premature fall coloration. Salt in the soil can also promote soil compaction and reduce uptake of other essential elements.

Figure 1: Leaf margin scorching symptom

Plants stressed by salt are susceptible to secondary pests including borers, bark beetles and certain diseases. These secondary invaders contribute to crown dieback and even plant death.

Plant sensitivity to salt varies greatly among species and individuals of the same species. Many ornamentals exhibit a very high degree of tolerance while others, particularly shallow-rooted species and evergreens, are readily injured. Injury is dependent upon the concentration of salt within the soil or on the foliage. Symptoms are usually evident only after salt has accumulated to a toxic level for the plant species. Salt concentrations can be determined from laboratory analyses of soil from the root zone of symptomatic plants. Soil samples must be taken shortly after the storm to provide accurate information.

Protection Before the Storm

Protective barriers of burlap, polyethylene, wood, etc., will help prevent salt spray from coming into contact with foliage and branches.

Horticultural oil and anti-desiccant sprays have been reported to act as a barrier to salt spray; however, results have been extremely variable and inconclusive.

Recognized cultural practices including fertilization, mulching, root invigoration, and irrigating will help prevent or alleviate salt injury. Care should be taken to select only those fertilizers with low salt indices which are suitable for ornamentals.

Treatment After the Storm

Rinse: If salt residue remains on the leaf surfaces after the storm, rinsing with fresh water can reduce the time that salt is present and, therefore, might reduce the amount of damage. Shrubs can be rinsed with a garden hose while taller trees need to be sprayed with a commercial hydraulic sprayer.

Gypsum: Gypsum (calcium sulfate) is a naturally occurring soil amendment that has long been used in agriculture as a source of calcium and sulfur. It is also an amendment used to improve soil structure. Gypsum can be used to counteract some of the effect of salt injury.

Gypsum is surface-applied with a lawn spreader or soil-incorporated with Bartlett's Root Invigoration. Recommended rates vary between twenty and forty pounds per 100 square feet of soil surface, depending on salt content and soil texture. Gypsum is commercially available from many farm and garden centers.

Irrigation: Application of 2-3 inches of irrigation after soil inundation can aid in salt movement to below the rooting depth. A soil penetrant can be applied with or before irrigation to aid in soil movement. Long, deep periods of irrigation are preferable to short, shallow ones.

Plant Resistant Species

In areas subject to salt spray or inundation, injury can be minimized by selecting plants resistant to salt damage. See Table 1 for a partial listing of commonly planted, resistant species. State extension services or the Bartlett Tree Research Laboratories can provide a more complete listing for a given area.

Table 1: Species Tolerant to Salt

Deciduous	Evergreen
Ash	Austrian pine
Black locust	Blue spruce
Hawthorn	Cryptomeria
Hedge maple	Florida anise
Honey-locust	Japanese black pine
Horsechestnut	Juniper
Mulberry	Live oak
Paper birch	Mugo pine
Quaking aspen	Shore juniper
Red oak	Hollies: American,
Sycamore maple	Japanese, Chinese,
Weeping willow	inkberry and
White oak	Yaupon holly
White poplar	Magnolias: Southern
	and sweetbay

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