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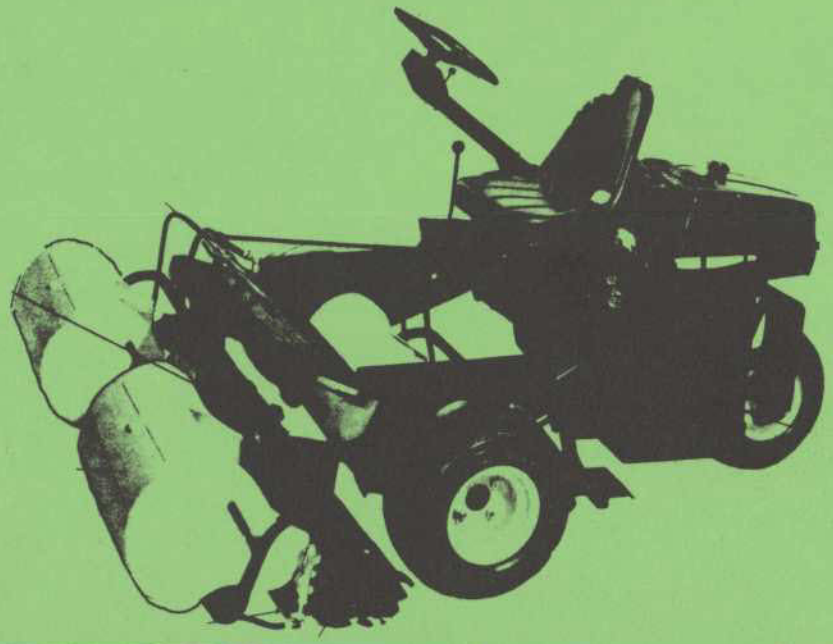

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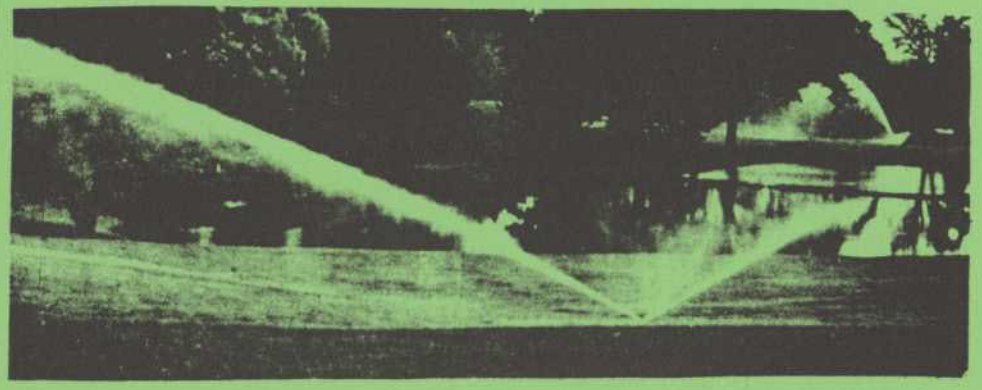

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The following article is taken from the January-February issue of the GEORGIA TURF GRASS NEWS.

EDITOR

Avoid the Temptation Sand Topdressing . . .

John R. Hall, III, Extension Specialist, Turf, V.P.I.

Many gold course superintendents are observing with great interest the experimental practice of frequent sand topdressing of golf greens. The cheaper cost of straight sand topdressing is certainly tempting when compared with some of our more commonly used topdressing materials. The choice of a topdressing mixture is no less important to the quality of a putting green than the choice of soil mixtures for new green construction. Bad decisions in either instance can lead to golf greens which are costly to manage at best or impossible to keep alive in the summer, at worst. The most expensively constructed greens, utilizing mixes specified by laboratory tests can be ruined by the improper choice of topdressing material.

Topdressing of bentgrass greens has as its primary function the "truing" of greens by stabilizing the puffy thatch layer that normally develops in a bentgrass turf. It has come to be realized that topdressing also encourages stolon rooting, aids in thatch decomposition, stimulates new shoot growth, provides micro-organisms antagonistic to parasitic fungi and provides nutrients to the turf. In winter

USGA Green Section Conference Set

Our office has received the following schedule for the USGA North Central Region Green Section Conference to be held Tuesday, March 20, 1979 at Broadmoor Country Club, 2155 Kesler Boulevard, Indianapolis, Indiana. A $15.00 fee, which includes luncheon and registration should be sent to Mr. Carl Schwartzkopf, P.O. Box 592, Crystal Lake, Illinois, 60014, no later than March 12, 1979. EDITOR

Morning Session - 10 a.m. to 12 noon. Presiding - Ray D. McDonald, Executive Secretary, Indiana Golf Association.

9:00 - REGISTRATION

10:00 - WELCOME AND OPENING REMARKS, Alvin Raphael, Chairman, Green Committee, Broadmoor Country Club. Eugene S. Pullian, Vice President, USGA.

10:15 - THE USGA AND ITS ROLE IN GOLF - Stephen M. Foehl, Manager, Regional Affairs, USGA.

10:30 - MARKING THE GOLF COURSE - Thomas J. Meeks, Director, Rules and Competitions, USGA

11:00 - USGA GOLF HANDICAP SYSTEM AND COURSE RATING - Thomas J. Meeks, Director, Rules and Competitions, USGA

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11:15 - IMPLEMENTS AND BALL FILM

11:35 - USGA GREEN SECTION AND TURF ADVISORY SERVICE

12:00 - LUNCHEON

AFTERNOON SESSION - 1 p.m. to 3:45 p.m. Presiding - Lee Webb, CGCS, Superintendent, Crooked Stick Golf Club, Carmel, Ind.

1:00 - U.S. OPEN FILM - CHERRY HILLS - A MILE HIGH DRAMA

1:30 - GOLF CART PANEL - Purchase or Lease - Tom Goorhouse, Vice President, Boylan Leasing Company, Plainville, Mich. **Cart Maintenance** - Ralph Kitchen, District Manager, Boylan Leasing Company, Indianapolis, Inc. **Golf Course Design with Carts in Mind** - Pete Dye, Golf Course Architect, Delray Beach, Fla. **Cart Control on the Course** - John Morris, CGCS Highland Golf and Country Club, Indianapolis, Ind.

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Topdressing of bentgrass greens has as its primary function the "truing" of greens by stabilizing the puffy thatch layer that normally develops in a bentgrass turf. It has come to be realized that topdressing also encourages stolon rooting, aids in thatch decomposition, stimulates new shoot growth, provides micro-organisms antagonistic to parasitic fungi and provides nutrients to the turf. In winter overseeding of bermuda grass it serves to improve seed-soil contact and enhance germination. In vegetative establishment with stolons or sprigs, it aids in rooting. In northern climates topdressing is utilized to actually "rebuild" or modify the existing golf green soil.

John Madison and William B. Davis of the University of California have conducted topdressing research utilizing sand materials common to the west coast and produced desirable results. The University of California guidelines suggest utilizing sand particles between 9.25 and 1.0 mm in diameter and using 1/9 cubic yard of topdressing per 1000 sq. ft. of green (about 1/30" thick) at each topdressing.[1] Topdressing frequency is dependent upon the growth rate of the bentgrass, but for calculation purposes, three week intervals between topdressings appear to be normal in their region. Pesticides, nutrients and bentgrass seed are added to the topdressing as pressures dictate. The system is apparently working well under California's environmental conditions.

There are several areas of concern that come to mind when one contemplates a change in topdressing mixtures from the traditional sand-soil-peat or weblite-soil-peat to straight sand. Some of the more obvious questions arise from what we know to be the characteristics of sand as a growing medium. We must assume that the end result of long term use of the light, frequent sand topdressing is a bentgrass green growing in a layer of sand. Straight sand or sandpeat mixtures have been noted to exhibit the following characteristics:

1) excessive water infiltration
2) excessive nutrient leaching
3) lower microbial activity
4) hydrophobic drying
5) lack of moisture reserve
6) susceptibility to layering.

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Excessive water infiltration -- The idea of improving water infiltration rates with sand topdressing is valid but one must ask where is the water going? If the 2 or 3 inch layer of sand is finally achieved after 5 to 6 years of sand topdressing, it is likely the rapidly infiltrating water is going to build up at the interface between the newly applied sand and the old soil. Will this zone become anaerobic causing death or roots in midsummer? Obviously, this is not a problem in western states where rainfall seldom exceeds 8 inches per year and irrigation is the primary source of water. On the east coast, however, we receive 40 to 55 inches of rainfall per year and it often comes in excessive spurts. Our two most popular mixtures (70 percent sand - 20 percent peat - 10 percent soil and 65 percent weblite - 15 percent soil and 20 percent peat) are providing infiltration rates around 8'' per hour. A sample lab analysis of a straight sand with 95.8 percent of the particles between 0.25 and 1.0 mm, 1.5 percent silt and 0.3 percent clay exhibited and infiltration rate of 88.7'' per hour. On the east coast where water is provided in uncontrollable amounts perhaps we are better off not having the infiltration that would come with a 3'' layer of sand on top of an existing greens mixture with a considerably slower infiltration rate. Our excessive moisture is now moving off primarily as surface drainage. In situations where surface drainage is inadequate, sand topdressing is not going to solve the problem.

Excessive nutrient leaching in the straight sand greens and sand-peat greens is consistently necessitating higher nitrogen and potassium fertilization levels except in those cases where undercomposed organic matter is used and nitrogen is released. Is building greens that require more nitrogen a move in the right direction, if we consider current and future fertilizer prices? The 1973-74 fertilizer food shortage just gave us a ''pre-shock'' of things to come.

Lower microbial activity - Sand greens are likely to be less active microbiologically than mixtures containing soil. It's possible that urea formaldehyde products will be utilized with less efficiency on sand greens because of the requirement for microbiological active soil?

Hydrophobic drying has been a - problem on some sand-peat greens. The formulation of water repelling organic layers on sand particles in sandpeat mixes that have been allowed to dry out have created considerable headaches. The rewetting of these hydrophobic areas is extremely difficult and has led to death of the bentgrass in some instances. Can we safely assume this won't happen in sand greens? It does not appear to be happening in conventional and sand-soil-peat greens.

A lack of moisture reservoir in sand and sand-peat greens is a serious concern. Water delivery

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systems, as advanced as they are, still leave a lot to be desired in a 3 to 5 MPH breeze. With a sand or sand-peat green one literally has no margin for error. The sand green requires constant "babysitting" to insure uniform distribution and continued replenishment of the small moisture reservoir held by the sand.

Susceptibility to layering - Two things are certain - no two golf course superintendents will run a golf course the same way and very few will stay at any one golf course more than 20 years. This creates a potential for changes in topdressing mixtures that could be lethal, especially if a sand topdressing program has been used. If a new superintendent feels the sand topdressed greens are too droughty and switches to any topdressing that holds moisture under a great tension than the layer of topdressed sand, a false water table effect is created. The new topdressing that holds more water at a greater tension will not release it into the sand layer until enough pressure (water) is present to release the water into the larger pore spaces of the sand layer. This same problem could arise on sand peat greens where topdressing containing soil is utilized. Percolation through this interface will likely get worse with time as the soil topdressing layer gets thicker because it will tend to retain more moisture and the false water table depth will increase. Once the later is deeper than the aerations tines, the only sure solution is to rebuild the green.

Obviously there are a lot of unanswered questions with regard to the use of sand topdressing. Common sense tells us that if you currently have a topdressing mixture that works - don't change. Once you switch to sand topdressing, there is no turning back with out considerable cost - agronomically and possibly financially.

Developing a topdressing mixture that has the right capillary and noncapillary pore space, infiltration rate, moisture retention, pH and bulk density is not an easy matter. It requires laboratory tests that are quite complicated. Commercially prepared topdressing mixtures meeting USGA specifications and complying with VPI & SU greens mixture recommendations are available. Yes, they do cost more than sand, but in the long run the cost of commercially prepared topdressing is inexpensive when compared with the costs associated with reconstructing a green or maintaining a green that has been abused with bad topdressing practices.

REFERENCES:
1. Madison, J.H. and Davis, William B., 1977. Problems of Progress. Tee 2 Green Corp., 1212 W. 8th Street, Kansas City, Missouri, pp. 16. Reprinted from: Mid-Atlantic Asso. of GCS Newsletter 31(11), Nov. 1978.

PLAN TO ATTEND THE MIDWEST REGIONAL TURF CONFERENCE AT PURDUE UNIVERSITY MARCH 12 to MARCH 14, 1979.

NORTHERN TURF

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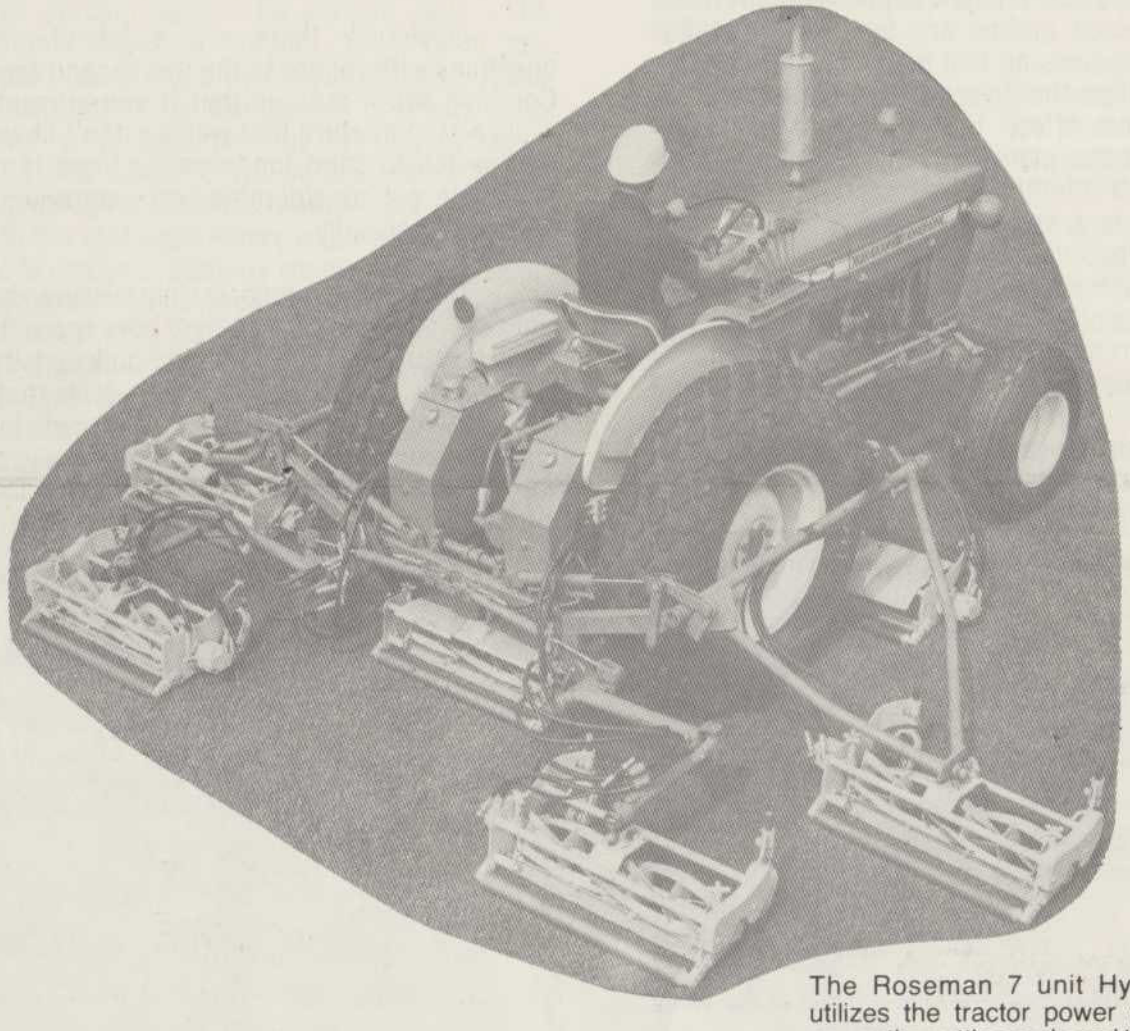

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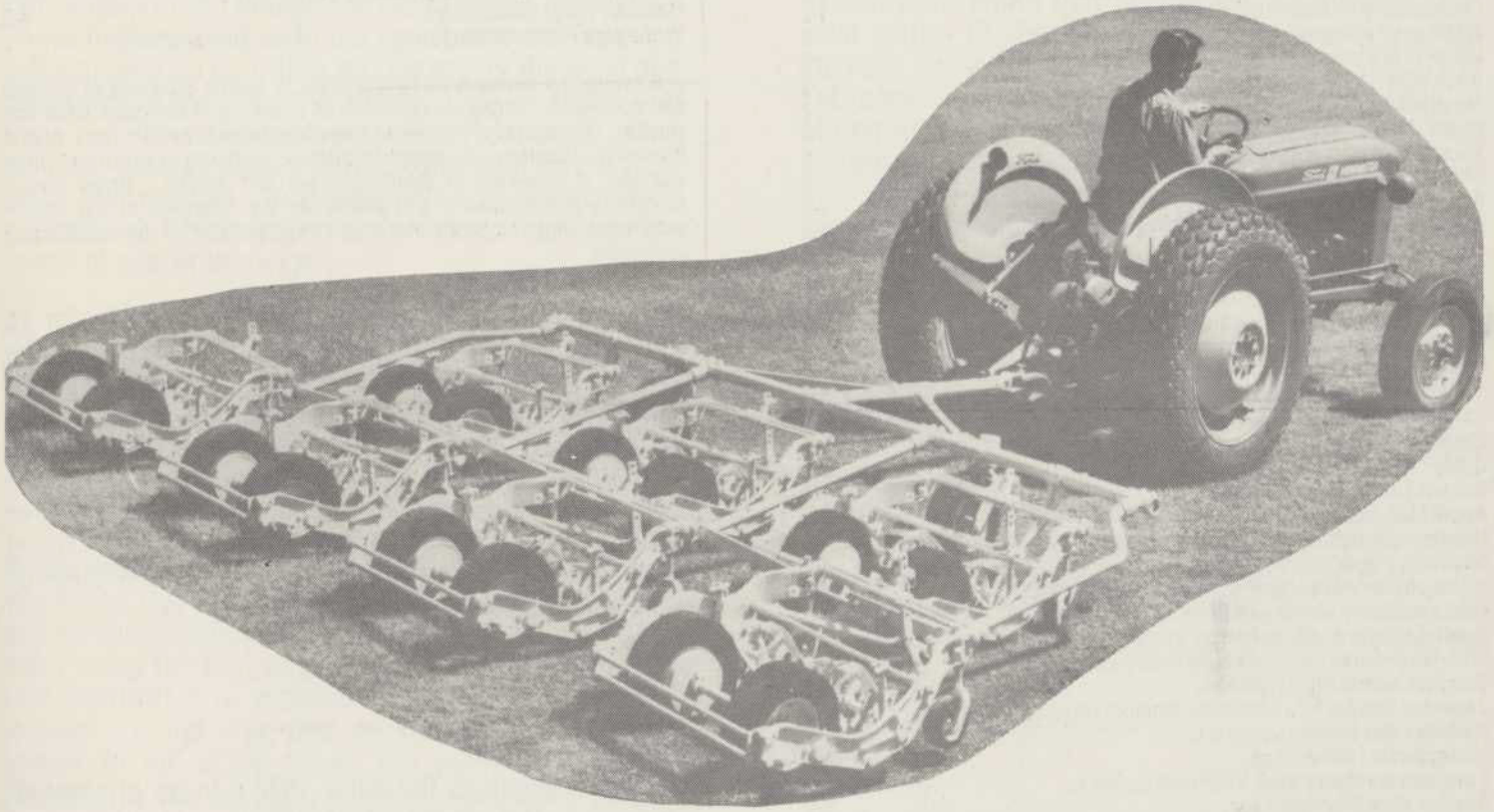

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FERTILIZER CHEMICALS, AND GRASS SEED

Our thanks to Jim Lathem of the Milwaukee Metropolitan Sewerage District for passing along the following article.

EDITOR

DE-ICING SALT VERSUS PLANTS

"Trees which have resinous or sunken buds appear to be more tolerant of salt spray."

by, Glen P. Lumis, Assistant Professor Department of Horticultural Science University of Guelph

DECIDIOUS TREES	INJURY RATING
Horse-chestnut Aesculus hippocastanum **L.**	1
Tree of Heaven Ailanthus altissima [**Mill.**] **Swing**	1
Norway maple Acer platanoides **L.**	1
Cottonwood Populus deltoides **Bartr.**	1
Black locust Robinia pseudoacacia **L.**	1
Honey locust Gleditsia triacanthos **L.**	1-2
Red oak Quercus rubra **L.**	1-2
Supar maple Acer msaccharum **Marsh**	1-2
English walnut Juglans regia **L.**	1-2
Black walnut Juglans nigra **L.**	1-2
Shagbark hickory Carya ovata [**Mill.**] **K.Koch**	1-2
Choke cherry Prunus virginiana **L.**	1-2
White ash Fraximus americana **L.**	2
White Elm Ulmus americana **L.**	2
Black willow Salix nigra **Marsh**	2
Mountain ash Sorbus **spp.**	2
Poplar Populus **spp.**	2
Silver maple Acer saccharinum **L.**	2
Chinese elm Ulmus pumila **L.**	2
Red maple Acer rubrum **L.**	2-3
Lombardy poplar Populus nigra italica **Muenchh.**	2-3
Basswood Tilia americana .	2-3
White birch Betula papyrifera **Marsh**	2-3
Gray birch Betula populifolia **Marsh**	2-3
Catalpa Catalpa speciosa **Warder.**	2-3
Pear Pyrus **spp.**	2-3
Quince Cydonia oblonga **Mill.**	2-3
Trembling aspen Populus tremuloides **Michx.**	3
Largetooth aspen Populus grandidentata **Michx.**	3
Crabapple Malus **spp.**	3
Golden willow Salix alba tristis **Gaud.**	3-4
Bur oak Quercus macrocarpa **Michx.**	3-4
Apple Malus **spp.**	3-4
Hawthorn Crategus **spp.**	4
Manitoba maple Acer negundo **L.**	4-5
Allehgeny service berry Amelanchier laevis **Wieg.**	4-5
White mulberry Morus alba **L.**	4-5
Beech Fagus grandifolia **Ehrh.**	5
Siberian pea-tree Caragana arborescens **Lam.**	1
Staghorn sumac Rhus typhina **L.**	1-2
Japanese lilac Syringa amurensis japonica (**Maxim.**] **Fr. & Sav.**	1-2
Common lilac Syringa vulgaris **L.**	1-2
Honeysuckle Lonicera **spp.**	1-2
European cranberry-bush Viburnum opulus **L.**	1-3
Russian olive Elaeagnus **spp.**	1-3
Mock orange Philadephuls **spp.**	1-3
Japanese barberry Berberis thunbergii atropurpurea **Chenault**	2
Burning bush Euonymus alata [**Thunb.**] **Sieb.**	2
Forsythia Forsythia x intermedia **Zab.**	2-3
Privet Ligustrum **spp.**	2-3
Alder buckthorn Rhamnus frangula L.	2-3
Speckled alder Alnus rugosa [**Du Roi**] **Spreng.**	3
Flowering quince Chaenomeles lagenaria [**Loisel.**] **Koidz.**	3-4
Bumalda spirea Spirea x bumalda **Burv.**	3-4
Beauty bush Kolkwitzia amabilis **Greabn.**	3-4
Gray dogwood Cornus racemosa **Lam.**	3-4
Red osier dogwood Cornus stolonifera **Michx.**	4-5

CONIFERS	INJURY RATING *
Blue spruce Picea pungens **Englem.**	1
Jack pine Pinus divaricata [**Ait.**] **Dumont**	1-2
Mugo pine Pinus mugo **Turra**	1-2
Austrian pine Pinus nigra **Arnold**	2
Tamarack Larix laricina [**Du Roi**] **K. Koch**	2
Juniper Juniperus **spp.**	2-3
Norway spruce Picea abies [**L.**] **Karst.**	3
White cedar Thuja occidentalis **L.**	3-4

Yew Taxus **spp.**	4
Red pine Pinus resinosa **Ait.**	4-5
Scots pine Pinus sylvestris **L.**	4-5
White spruce Picea glauca (**Moench**] **Voss**	4-5
Hemlock Tsuga canadensis **L.**	4-5
White pine Pinus strobus **L.**	5

☆A rating of 1 indicates no twig dieback or needle browning of conifers and no dieback, tufting, or inhibition of flowering of decidious trees and shrubs. Ratings of 5 represent complete branch dieback and needle browning of conifers and complete dieback, evidence of previous tufting and lack of flowering of decidious trees and shrubs. Under severe conditions plants rated 5 will eventually die. Ratings of 2,3, and 4 encompass slight moderate and extensive gradations of the above injury symptoms.

Highway de-icing salt is an important contributor to the decline of roadside plants. This was the conclusion reached by myself and other workers at the University of Guelph who have studied the effects of de-icing salt along Ontario roadsides and in the laboratory. Drs. G. Hofstra and R. Hall of the Department of Environment Biology and myself have published the results of several studies. One of these was financially supported by the Ministry of Transportation and Communications.

Finding the cause

Our work began in the early 1970's in an attempt to determine the cause of injury to evergreen and decidious plants along highways. Many people had observed injury in the late winter and early spring which we did not think was characteristic of winter injury.

Careful observation

A distinct pattern of damage became evident. Injury was most severe on the side of the tree facing the road. Plants on the downwind side of the road were damaged to a greater extent than similar plants on the opposite side of the road. An intensive study of a pine plantation adjacent to a major highway showed that tree damage decreased as distance from the highway increased. Pine branches which were covered by snow for much of the winter were green

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