ROAD SALT DAMAGE AND TOLERANT GRASSES

By William R. Kennedy
Research Editor
University of Wisconsin-Madison

Landscape plants do well preparing themselves for winter. They develop a reduced metabolism and begin living off of stored reserves. Most of the competitors of plants lie dormant also during the winter months, assuring that both will start on an even keel at spring's outset.

There is one enemy of plants though that works exclusively in winter, the street and highway snow removal crews. Their use of salt in deicing roads leads to serious alteration of a plant's biota. And, if the landscape industry doesn't solve this salinity problem, there'll be fewer landscaped medians, fewer contracts and more medians and roadside areas covered with blacktop and concrete.

Paul Drolsom and Lou Grueb of the University of Wisconsin have been conducting a study to examine the effects of salinity on plants and soils. They've hit upon some interesting reasons for the adverse effects and are working at identifying and developing varieties that resist high salt levels.

Road salt, principally sodium chloride, can move to the surrounding roadside in a number of ways. It can fall on neighboring soil directly from the salt truck, through brine splash or runoff. Salt can also be kicked off the road by passing vehicles or recrystallize and form a fine white powder that is easily scattered by the wind. A highway industry study showed that half of the salt applied to pavement is carried away only hours after application either on the vehicles themselves or through brine splash and crystal movement.

All this salt laying on the soil and plants neighboring roadways affects the plant biota in many ways.

The soil structure, a basis for fertility, drainage and ultimately plant survival, is drastically altered by salt. Excessive sodium (Na) levels in the soil reduce the cation exchange capacity. Simply, reduced cation exchange sites create a tighter soil that results in poor drainage. Also fewer exchange sites prevent other nutrients from bonding in the soil and making it more difficult for the plant to get the nutrients it needs.

"The high salt levels also create drought conditions for the plant by increasing the osmotic potential of the soil solution according to Grueb. This means simply that more water is tightly retained in the soil structure rather than being made available to plants. This drought stress is especially a problem in dry years.

High sodium levels cause havoc in a number of ways, but the chloride irons "cause greater direct damage to more species of plants adds Drolsom. "We're not sure in what ways the chloride is toxic, but we do know later stages of chloride toxicity are manifested in burning and firing of leaf tips and margins, bronzing, yellowing, premature leaf abscission and sometimes chlorosis" according to a Pennsylvania study.

Grasses With High Road Salt Tolerance

Alkali Socaton	Rescuegrass
Inland Saltgrass	Canada Wildrye
Nuttall Alkaligrass	Western Wheatgrass
Bermudagrass	Tall Fescue
Tall Wheatgrass	Barley
Rhodesgrass	*Puccinellia distans*

Landscapers can protect themselves from excessive salt problems by planting salt tolerant grass species. Most salt tolerant species are native to the western U.S. alkaline soils. Some of these grasses do not persevere in the harsh winter cold of the areas that demand the salt applications for road safety.

One grass that appears to overcome this problem is *Puccinellia distans* or alkalai grass. This grass which is native to western Nebraska and Alaska may have the best potential for use in the upper midwest. The grass was observed growing naturally in the salt contaminated soils along the interstate highways surrounding Chicago according to University of Wisconsin researcher Robert Newman.

The old standby in cool climates, Kentucky blue, has low tolerance to salt even though Fylking, a cultivar of Danish origin was slightly more tolerant than common, Merion or Windsor Kentucky blue.

The following list of grasses shows grasses with good tolerance of high salt levels. The list will be helpful if you land a job landscaping a road right of way or homes along busy thoroughfares.

Alkali socaton; Inland saltgrass; Nuttall alkaligrass; Bermudagrass; Tall wheatgrass; Rhodesgrass; Rescuegrass; Canada Wildrye; Western wheatgrass; Tall fescue; Barley; plus *P. distans* which is sometimes improperly identified as Nuttall alkaligrass. **WTT**

FOLIAR ADSORPTION FACTORS OF PHOSPHOROUS AND RUBIDIUM

By David W. Reed and Harold B. Tukey, Jr., Department of Floriculture and Ornamental Horticulture, Cornell University, Ithaca, New York.

Foliar nutrition can offer a more efficient, economical and rapid method of supplying nutrient material to plants than conventional soil application. There is renewed interest in foliar nutrition due to the current high cost of fertilizer and concerns about environmental pollution by leaching and run-off from ground application. As a result, the Horticultural Research Institute (HRI) is helping to support this valuable research.

Foliar absorption of phosphorous (P) compounds has been studied extensively because smaller quantities of P are easily fixed and thus not available for plant use. Results of experiments studying various P compounds and factors affecting their foliar absorption have been highly variable, however. Despite the potential benefits, supplying P in foliar sprays is not practiced widely. pH of the treating solution, which determines the chemical form of P present in it, is one of the principal factors affecting foliar absorption of P. In addition, pH may alter the permeability of the cuticle, generally considered the foliar absorption rate-limiting barrier.

Work was initiated to better define the effect of pH of the treating solution on foliar absorption of phosphorous and rubidium compounds and to determine the factors affecting foliar absorption with possible adaptation to commercial applications. Absorption was assayed by measuring the amount of radioactive phosphorous or rubidium compounds recovered in the plant after application of a known amount, such as a drop to a leaf.

Results: Research results indicated that absorption of phosphate compounds was greatly affected by pH. Absorption was least at those pH values when salt deposits were formed on the leaf surface, and greatest when salt deposits were not evident. The formation or lack of formation of salt deposits was correlated with the solubility and moisture retention of the predominant phosphate form present in solution. Hence, pH did not directly affect the plant's ability for phosphate absorption, but affected absorption by dictating the phosphate form present in solution and the degree of absorption was determined by properties of the predominant phosphate form present. Maximum phosphate absorption occurred with sodium phosphate at pH 3-6, with potassium and rubidium phosphate at pH 7-10, and with ammonium phosphate at all pH values. Calcium phosphate was not readily absorbed.

Absorption of rubidium (Rb) as Rb phosphate also was greatly affected by pH. It was minimal at pH 3-6, but was greatly increased at pH 7-10. This was due to the same factors that were shown to affect phosphate absorption (e.g. the degree of drying and formation of salt deposits on the leaf). Rubidium was used since it behaves similarly to potassium and serves as a radioactive tracer in the study of the uptake of potassium. Rubidium chloride (at pH 3-10) was absorbed to a greater degree than Rb sulfate or nitrate.

Urea, one of the most rapidly absorbed and effective compounds used in foliar nutrition, and several similar, chemically related compounds were assayed as to their effect on foliar absorption of Rb and phosphate. All of these substances decreased absorption of both Rb and phosphate, which was attributed to the formation of salt deposits.

These results indicate that dibasic phosphate (K_2HPO_4), monobasic sodium phosphate (NaH_2PO_4) and monobasic or dibasic ammonium phosphate — ($NH_4H_2PO_4$) and [$(NH_4)_2HPO_4$] respectively — are the most useful phosphate forms. Dibasic potassium phosphate and potassium chloride (KCl) are the most useful potassium forms for foliar application to commercial crop plants.

Several additional experiments were conducted in order to determine the effect of 18 commercially available surfactants (wetting agents) on foliar absorption. Only three (AL 825, Ethomid 0/15 and Tween 85) increased phosphate absorption, but all decreased Rb absorption. Of the three surfactants that increased phosphate absorption, only one (AL 825) was not toxic to the foliage, and therefore practically applicable. However, the advantage of increased phosphate absorption must be weighed against the decreased Rb absorption.

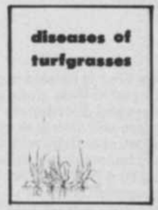
Time course studies demonstrated that both Rb and phosphate were rapidly absorbed and translocated throughout the plant, and hence, readily available for use by the plant. Absorption of both Rb and phosphate was not greatly affected by leaft age. This indicates that the data from all previous experiments, using only one leaf at a particular stage of development, are probably indicative of the response of the entire plant.

Absorption of phosphate by a variety of horticultural species varied greatly, ranging from less than 1% to approximately 15%, whereas Rb absorption ranged from less than 1% to approximately 40%. In addition, plants treated with foliar nutrients produced good growth following treatment and tolerated surprisingly high concentrations of nutrients to the foliage.

Summary: In summary, solution pH affected uptake of P and Rb compounds by dictating the chemical form of the compound present in solution. Solubility, moisture retention, and crystallization on the leaf surface were factors determining absorption. Partially as a result of this research, it can be seen that foliar nutrition offers advantages in production of commercial horticultural crops; in landscape maintenance; in more efficient use of fertilizer to reduce pollution of lakes, streams, and ground water supplies; to conserve energy and reduce costs; and is a very rapid means of correcting possible nutrient deficiencies. **WTT**

Technical and Instructional Books

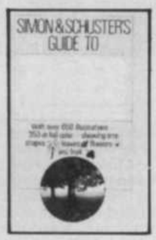
TREE SURGERY
Tree Surgery, A Complete Guide, gives an up-to-date account of modern tree surgery operations. The theory behind acquiring the skills and knowledge necessary to perform competent tree surgery is outlined clearly and precisely.
$15.00



DISEASES OF TURFGRASSES
Couch's Diseases of Turfgrasses is one of the best references on that subject to date. No turf library is complete without it. It provides an in-depth analysis of turfgrass disease causal organisms and control of them. From diseases caused by pathenogenic plants to viral turf diseases, Couch presents information necessary for any plantsman to achieve fine turf.
$24.50

WOODY LANDSCAPE PLANTS
Manual of Woody Landscape Plants is a valuable reference for anyone interested in woody plants. The book provides concise, factual information on common and not-so-common woody ornamentals, ground covers and vines as well as the narrowleaf and broadleaf evergreens which are adapted to Midwestern and Eastern climates.
$19.00

TREE MAINTENANCE
Tree Maintenance is an indispensible guide to anyone involved with the care and treatment of trees. All phases of tree care are described in non-technical language. The book includes a comprehensive list of effective and safe pesticides for trees.
$25.00

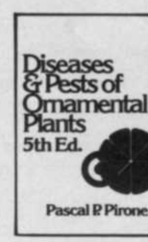


GUIDE TO TREES
Simon & Schuster's Guide to Trees provides beginner and expert with a reference to 300 trees. Black and white line drawings and 350 color photographs accompany descriptive text on each tree, including etymology, habitat, description, propagation, and conditions for growth.
$17.00

TREE FARM BUSINESS MANAGEMENT
Tree Farm Business Management covers all phases of a tree farming operation, from obtaining an accurate timber inventory to timing sales for profitable results. Budgeting, preparing scientific financial forecasts, special tax problems, and other financial matters are given thorough coverage.
$16.00

DISEASES OF SHADE TREES
Diseases of Shade Trees is an excellent introduction to tree diseases, including infectious and noninfectious. Part III, Special Topics, covers nonpathogenic conditions, disease diagnosis and living hazard-trees. The book describes the theory and practice behind maintaining a healthy tree that serves a positive purpose.
$22.00

SOIL MICROBIOLOGY
The second edition of Soil Microbiology integrates microbiology, soil science, and biochemistry to characterize soil microflora. The revised edition adds a closer scrutiny of environmental problems, information on soil toxicants formed by microorganisms, and a chapter on microbial metabolism of pesticides.
$19.50



DISEASES & PESTS OF ORNAMENTAL PLANTS
Diseases & Pests of Ornamental Plants, fifth edition, includes new ornamental disease hosts, identifies new diseases, and describes the spread of known diseases to a wider range of host plants. The book keynotes environmental factors adverse to the health of 500 ornamentals.
$19.00

Weeds Trees & Turf
Books Dept./Fran Franzak
9800 Detroit Ave.
Cleveland, OH 44102

Name ____________________

Company ____________________

Address ____________________

City __________ State __________ Zip __________

Quantity	Title	Unit Price	Total
______	**Guide to Trees**	**$17.00**	______
______	**Soil Microbiology**	**$19.50**	______
______	**Diseases & Pests of Ornamental Plants**	**$19.00**	______
______	**Tree Surgery**	**$15.00**	______
______	**Tree Farm Business Management**	**$16.00**	______
______	**Tree Maintenance**	**$25.00**	______
______	**Diseases of Shade Trees**	**$22.00**	______
______	**Manual of Woody Landscape Plants**	**$19.00**	______
______	**Diseases of Turfgrasses**	**$24.50**	______

Total ______
Shipping & Handling Chg. (1.00 per book) ______
Total Payment Enclosed ______

WTT Index 1978

KEY: Feature article (FA): news story (NS): conference report (CR): editorial (ED): government news (GN): news feature (NF): landscape contractor news (LCN).

Articles

A

B

C

D

E

F

G

AGRO·CHEM, INC. is

"CONTROLLED GROWTH THROUGH CHEMISTRY"

YOUR PROFESSIONAL APPROACH TO LAWN MANAGEMENT IN 3 EASY AND POSITIVE STEPS:

1. TEST YOUR SOIL
2. PRESCRIPTION FORMULATE YOUR FERTILIZER TO THE REQUIREMENTS OF YOUR SOIL TESTS
3. PROGRAM YOUR MANAGEMENT TO YOUR REQUIREMENTS

SOIL TESTING — The most positive and effective approach — developed through 30 years of Research & Development. This information is now available to you to guide you in the proper and most effective way of managing your lawn areas.

Sample soil test form provides the following essential information for professional management

TESTS	Value Found	Desired Value	Too High Amts In Soil (Toxic)	LEVEL O.K.	PROBLEMS	Too Low Amts. in Soil (Deficient)	Total Corrective Quant. For Restoration	Primary Appli. No. Appli. Req. = Safe Quant. To Apply Per Acre Per Appli.	Primary Appli. Mat. Cost Per Appli. Per Acre	Mat. Cost Per Unit	Secondary Appli. No. Appli. Req. = Safe Quant. To Apply Per Acre Per Appli.	Secondary Appli. Mat. Cost Per Appli. Per Acre
Total Ex. Cap.												
pH of Soil												
Organic Matter %												
Nitrogen No./Acre												
Sulfates No./Acre												
Phosphates No./Acre (P_2O_5)												
Calcium No./Acre												
Magnesium No./Acre												
Potassium No./Acre												
Sodium No./Acre												
Base Saturation % Calcium (60-70%) Magnesium (10-20%) Potassium (2-5%) Sodium (.5-3%) Other Bases (Variable) Exc. Hydr. (10-15%)												
Salt Conc.												
Chlorides												
Boron												
Iron												
Manganese												
Copper												
Zinc												
TOTAL COST FOR MATERIAL PER ACRE												

PRESCRIPTION FORMULATING — Putting your soil test recommendations to work for you in the exact manner required by your soil and lawn. In the past, Soil Testing was almost useless because very few people could obtain the exact materials required. Now, due to our computerized prescription blending plant, we formulate exactly to soil test recommendations or to your specifications. These formulations can contain the Primary Nutrients (NPK), the Secondary and Micro Nutrients (Ca, Mg, S, Fe, Zn, Mn, Cu, Bo) along with Soil Looseners, and/or Rebuilders, Mat and Thatch Decomposers and other required products — all can usually be formulated into one easy to use product.

Most all formulations can be had as,

A. Natural organic forms
B. Synthetic forms
C. Both organic & synthetic

MANAGEMENT PROGRAMS — Tailored to your soil and plant requirements and with your budget, goals, etc. Programs provide exact materials to use, amount to use per application, dates (when, where, how and other essential information).

As you see, Agro Chem's total concept takes the guesses and mistakes out of grounds management. Have your soil tested now for next year's program. Don't guess . . . soil test.

FREE SOIL TEST AND RECOMMENDATIONS for those attending our Lawn Management Training Clinics. Soil Samples must be received at least 30 days prior to reserved clinic date. Complete Soil Sampling Kit with instructions will be sent upon receipt of payment for reserved seat. Your Soil Test Results will then be explained in detail at the clinic so you will have full, first hand knowledge of what you should do on your grounds.

Circle 134 on free information card

YOUR TOTAL SOURCE FOR PROFESSIONAL MANAGEMENT

AGRO CHEM'S

Professional spray unit for the small, new applicator, and — it is expandable For the larger established applicator.

The basic unit includes
(as pictured)

1—Rectangular 300 gallon holding tank — 110 lbs. w/4" fill cap & man way
1—250' light weight pressure hose
1—Electric hose reel
1—Gas engine & special Pump
1—Lawn gun with assorted nozzels
1—Pressure regulator and bi-pass unit
1 each—Suction & Bi-pass hose
1—Root feeder

This basic 300 gallon unit can be expanded to whatever size spray rig desired by simply adding more tanks — eliminates purchasing new equipment as business expands.

This basic spray rig is designed to fit in a pick-up truck, the tank situated between the rear wheel well and cab of truck. The motor, pump and hose reel on the right side leaving the remainder of the truck bed for other equipment and supplies.

Van pictured shows the basic spray unit in the van, leaving the entire rear area for storage of products.

As you will see, these sprayer units have been designed with a great deal of thought, research, and years of experience. They are designed and built by professionals, for professionals. For more details, either call or write Mr. Pierce.

Pictured:
16' Flat bed truck carrying 5 — 300 gal. tanks + 1500 gals.
2 — 500' hose reels & ability to apply as many as 5 different products or any combination required.

With advertisment signs

Without signs

Learn the newly discovered secrets of Mother Nature, new techniques, new problem and labor saving products and equipment.

GREGORY GREENGRASS.
"Gregory is my name, grass is my fame."

Acquire a totally new concept of maintenance that produces positive results.

LAWN MANAGEMENT TRAINING CLINICS — Designed especially for the man in charge of programing, purchasing and directing the maintenance of lawn areas of industrial and commercial property's. These clinics are designed to provide the manager with the understandable and usable knowledge so that he will be able to spot problems, understand their cause, correct and prevent them, plus select the best products, equipment and method to use for the individuals own area.

These clinics are based on scientific and proven facts that are applied to the practical approach to managing grounds.

Special purpose products for solving problems (and preventing recurrence) are introduced as are new types of equipment and techniques. Individual questions and problems are answered and solved.

All aspects are thoroughly covered in a totally understandable, "Eyeball to Eyeball" basis. A total concept you can't afford to miss.

Subject Matter includes:
The secret to Plant Growth Characteristics that bring you success.
Fertilizers—Primary, Secondary, and Micro Nutrients. Their function in soils and plants. Raw Material Sources — Natural and Synthetic forms — what is best to use.
Soils — The Key to growth success — solving problems.
Soil Testing—Testing Methods available - Understanding the value and interpretation of results - value of research - programing according to recommendations. Review of your soil test.
Lawn Care—Listing problems, objectives, budgets and programing to meet the requirements of the area. Using natures rhythm as a positive aid.
Weed Control—Lawns, Post and Preventative Procedures, Contact, Systemic, and Soil Sterilants, Industrial Weed Control, Aquatic Weed Control.
TREE, ORNAMENTAL AND SHRUB CARE—Root Feeding, Spraying.
Equipment—Selection, calibrating, and operation.
Application Techniques—Mixing and applying materials.
Planning and programing. Plus much, much more.

These 3 day clinics will be presented in January, February and March, 1979. Seating is limited; therefore make your reservations early.

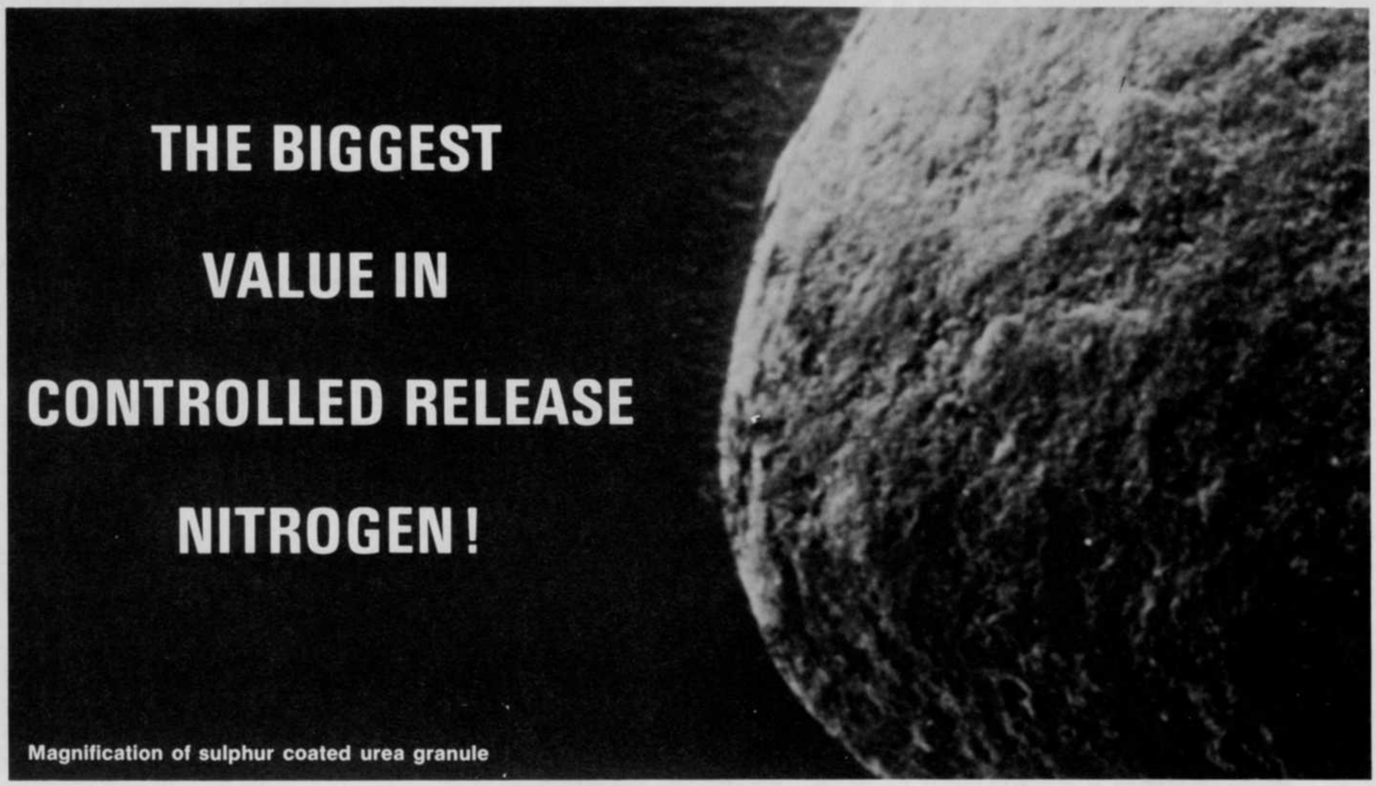
Call Mr. Joseph for details, costs, and dates. 312-455-6900.

Write or call for your nearest Agro Chem dealer. Dealer and Distributor inquiries invited.

AGRO·CHEM, INC.
"CONTROLLED GROWTH THROUGH CHEMISTRY"

Phone: 312-455-6900

11150 Addison
Franklin Park, Ill. 60131



If you're a lawn applicator . . . If you're not using Sulfur Coated Urea . . . READ THIS!

Then call us toll-free at:

East of the Mississippi
1-800-321-5951

In Ohio Dial 1-800-362-7413

Or Call Collect 216-323-7544

If you're a lawn applicator and you're not using LESCO 36 Sulfur Coated Urea in your program, it's costing you money, it's costing you performance, and maybe it's costing you customers.

LESCO 36 Sulfur Coated Urea is a giant leap for turf management. This controlled release nitrogen source delivers a guaranteed minimum of 36% nitrogen and 12% sulfur. Between 10 to 20% of the nitrogen is available within the first 7 to 10 days, with the remainder available over a period of several months. This means quick greening, sustained feeding and reduced application costs. And because you buy from Lakeshore, you buy from the manufacturer. And that means quality and savings.

If you are a truckload buyer, take advantage of our toll-free information service and call Barb today. She'll have our representative contact you immediately. Those east of the Mississippi can reach her by dialing 1-800-321-5951. (In Ohio, dial 1-800-362-7413.) If you're west of the Mississippi, call Barb collect at 216-323-7544.

Take that small step and call today. We'll be glad to tell you about LESCO 36 and our other fine LESCO Products, such as LESCOSAN (Betasan*), the liquid pre-emergence crabgrass control that outsells all the competition. Our LESCO Quality Products and Friendly Service are always as close as your phone.

*(Betasan—Registered TM of Stauffer Chemical Company.)

LESCO PRODUCTS

Division of Lakeshore Equipment & Supply Co.

300 S. ABBE ROAD, ELYRIA, OHIO 44035

A FAMILY OF FINE PRODUCTS—Lescosan 12.5G—Lescorene—Lesco 4—Lescobor—Lescopar—Lescopex—Lesco Non-Selective Herbicide Lesco MSMA—Lesco Thiram 75W—Lescozyme—Lakeshore Chinch Bug & Sod Webworm Control

Circle **117** on free information card

Authors