

# What can a hole in the ground do?

When your grounds become hard-packed from constant use and temperature changes, or if the ground is naturally hard, grass has a tough time growing.

The answer is aeration.

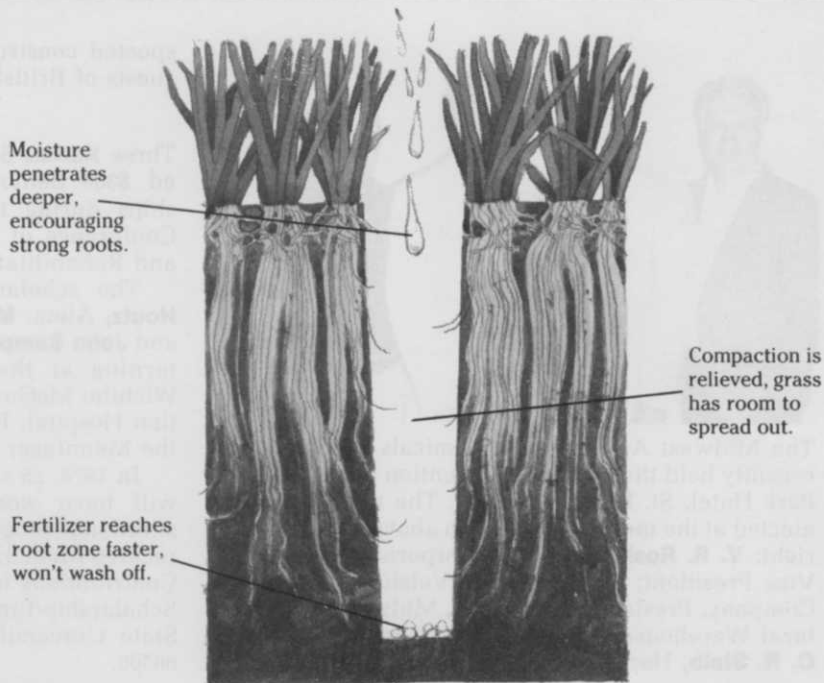
These holes allow air, water and fertilizer to penetrate to the root zone where they're needed. They relieve compaction, giving grass room to grow. New, more drought-resistant roots are stimulated. And the turf takes on a springy, soft feel.

Ryan makes two pieces of equipment specifically for aeration of parks, athletic fields, playgrounds, golf course fairways, or any large turf area.

The Ryan Renovaire® is designed to contour aerate compacted turf on hilly as well as flat areas. Its 12 tine wheels are mounted in pairs, operating independently to give both high and low spots equal penetration.



RENOVAIRE



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Fertilizer reaches root zone faster, won't wash off.

Compaction is relieved, grass has room to spread out.

The Ryan Tracaire® is used to aerate large level areas, especially athletic fields. Mounted by a 3-point hitch, it gets the job done quickly, easily, efficiently.

Both the Renovaire and the Tracaire can be equipped with coring, slicing or open spoon tines for aerating all types of soil in all seasons. Both can be used with a 12-foot-wide dragmat to

break-up cores and groom the grass. And both are built to last, like all Ryan equipment.

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TRACAIRE

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## PEOPLE



The Midwest Agricultural Chemicals Association recently held their annual convention at the Chase Park Hotel, St. Louis, Missouri. The new officers elected at the meeting are shown above from left to right: **V. R. Roskam**, Oil-Dri Corporation, Second Vice President; **R. C. Moreau**, Velsicol Chemical Company, President; **Larry Bert**, Midwest Agricultural Warehouse Company, First Vice President; **C. R. Staib**, Hercules, Inc., Secretary Treasurer.

The Florida Turf-Grass Association elected new officers and directors at the annual conference and show held in Orlando in October. New president is **C. Wayne Sloan**, assistant vice president of Gulfstream Land and Development Corporation in Plantation. Immediate past president is **David L. DeBra**, executive vice president of operations for DeBra Turf and Industrial Equipment Company in Hollywood.

**Harvey E. Phillips**, Belleview Biltmore Hotel and Golf Course, Clearwater, was elected vice president. Phillips was a director. **James T. Carter**, president of Bingham Seed Company in Jacksonville, was elected secretary-treasurer.

New directors are: **W. Timothy Hiers**, superintendent at Suntree Country Club in Melbourne; **Lloyd D. Purdy**, sod division supervisor for A. Duda and Sons in Oviedo; **Robert B. Sanderson**, superintendent at General Development Corporation in Port Charlotte; **Michael Swanson**, vice president of Pursley Turfgrass Company in Pinnellas Park; and **William G. Wagner**, Golf course superintendent at Tequesta Country Club.

An examination of British golf course construction was undertaken by members of the Golf Course Builders of America. Builders **David Canavan** of Moore Golf, Culpeper, Va.; **Frank Underwood** of Bowie, Texas; **James Kirchdorfer** of ISCO, Inc., a Louisville, Ky. irrigation supply company; and **Harry Lambeth**, executive director of GCBA, in-

spected construction in Scotland and England as guests of British builders.

Three Kansas State University seniors were awarded \$300 Senior Horticultural Therapy Scholarships during the banquet at the sixth annual Conference of the National Council for Therapy and Rehabilitation through Horticulture.

The scholarship winners announced: **Becky Houtz**, Alma; **Maureen McGowan**, Columbia, Mo.; and **John Sampson**, Clay Center, Neb. Houtz is interning at the Kansas Elks Training Center, Wichita; McGowan is at the Veterans Administration Hospital, Roseburg, Ore.; and Sampson is at the Menninger Foundation, Topeka.

In 1978, 25 senior horticultural therapy seniors will have worked 25,000 hours within 12 institutional programs. Many of the students do not receive financial support during their internships. Contributions to the Senior Horticultural Therapy Scholarship fund can be made through the Kansas State University Endowment Office, Manhattan, 66506.



**Paul N. Kultgen**, of Random Lake, Wis. has been promoted to the position of service supervisor at Simplicity Manufacturing Co., a leading builder of powered lawn and garden equipment.

Most recently he was consumer service representative. In his new position, he will be responsible for all aspects of warranty administration, field service, factory service and service training.

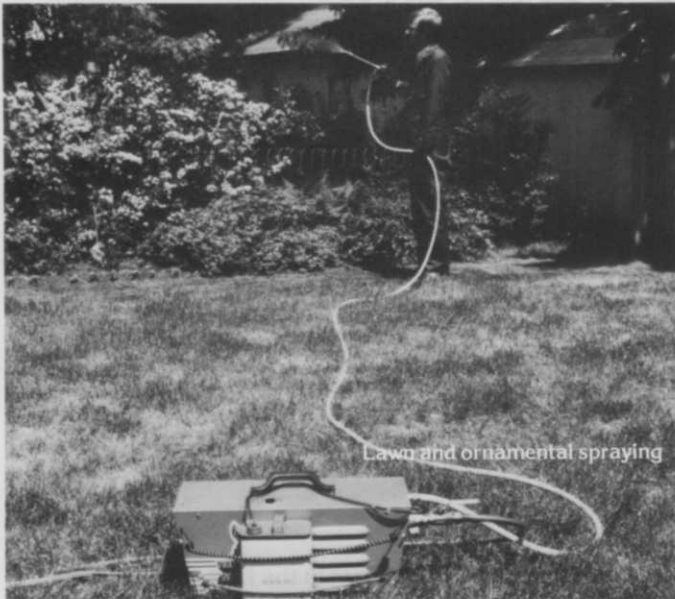
Kultgen joined Simplicity as an assembler in 1965 and has held various positions of increasing responsibility in the service department since 1971.



**Dave Davis** has been promoted to Manager of the Training Department at Rain Bird Sprinkler Mfg. Corp. In his new assignment, Davis will be responsible for all internal and external training programs.

Rain Bird currently offers 15 different training seminars. During his 7 years at Rain Bird, Davis has conducted 325 design schools with over 8,000 people in attendance. This program will continue on an expanded basis under his leadership.

# TANKS FOR THE MEMORY!



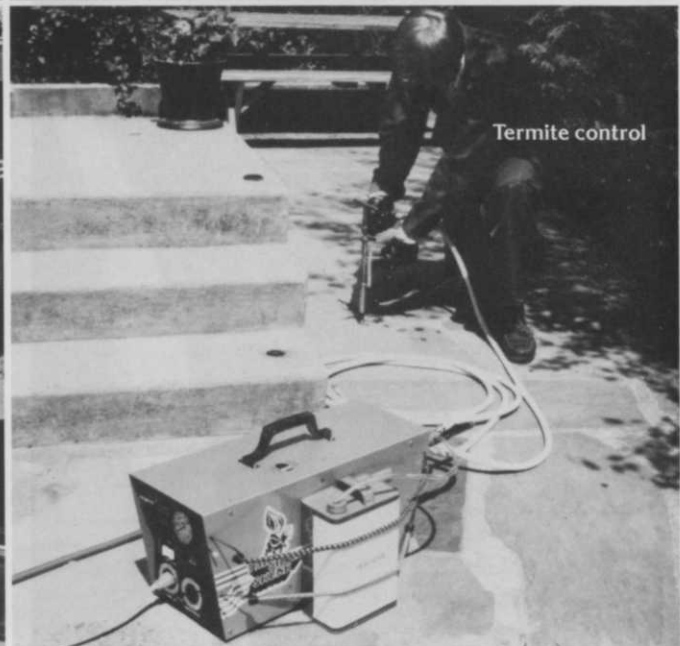
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directly to a garden hose for a water source. "The Silver Skunk" features portability, simple calibration, allows the operator to easily switch from one concentrate to another, records total gallons used on each job and is designed for extended service life. The unit comes complete with 100 feet of high-pressure spray hose, a wand, three nozzles and adapters. You're ready to go to work the moment "The Silver Skunk" walks through the door.

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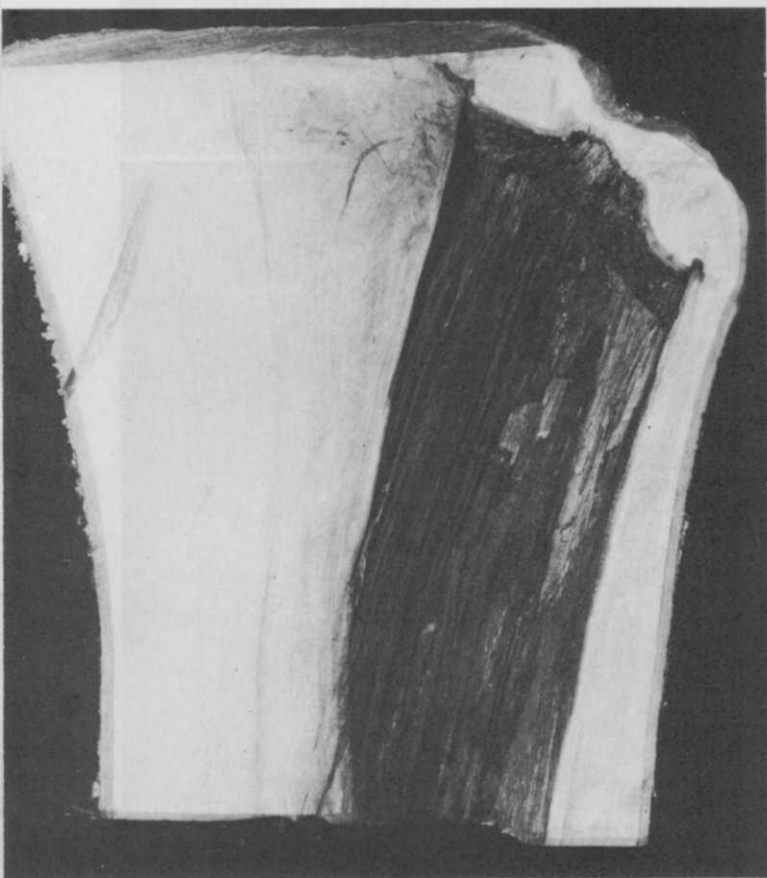
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# DEALING WITH DECAY FACTORS IN OUR URBAN FORESTS

By **Alex L. Shigo**  
Chief Scientist, Plant Pathology  
U.S. Forest Service  
Northeastern Forest Experiment Station  
Durham, New Hampshire

*"You become responsible, forever, for what you have tamed."*

*(Antoine de Saint Exupery: The Little Prince).*



**The diameter of the hollow** in the above tree was the diameter of the large stem at the time it was cut. The defect was compartmentalized. When cavities are filled, care must be taken to minimize breakage of the compartment rim surrounding the cavity. The diameter of the defect in the birch at right is the diameter of the tree when it was wounded. The defect was compartmentalized. The wood formed after the injury was not infected.

We have tamed our urban trees. We are responsible for their care.

A quick look at the condition of some of our urban trees will show that we have not met our responsibility. We seem to see more and more urban trees in trouble. Is it because we are becoming more aware of our trees? Or is it because the condition of our trees is declining? Probably both.

It is one thing to recognize a problem and another to do something constructive about it. What can we do to help our urban trees? Where should we start? Who should do it? Important questions. Here are some answers.

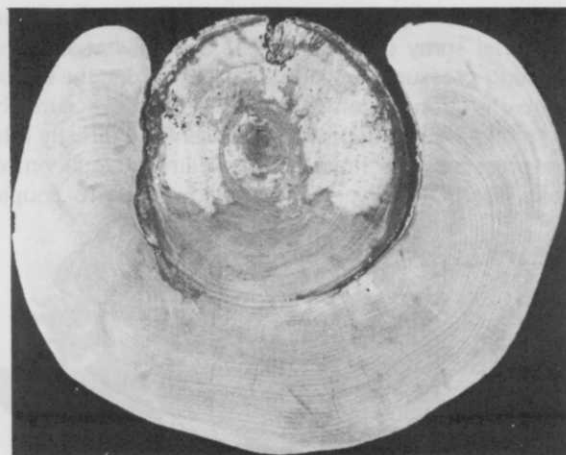
## Awareness

Awareness of a problem is the first step toward solution.

Too many people take trees for granted. Trees are considered so tough that they are thought to be able to take anything and everything we and nature can throw at them. As long as there are a few green leaves on a tree, it is considered healthy by most people. Trees can take only so much abuse before they begin to wane. *We must start a national awareness program for the proper care of our trees.*

## Myths and misconceptions

There are too many myths and misconceptions about proper tree care, for several reasons: 1) Tree care procedures are often based on incomplete or incorrect information. 2) Someone did what he thought was correct many years ago and the procedure has never been challenged or changed. 3) People often try to "play doctor" with trees and treat trees as they think a human doctor would treat a patient—clean the tooth cavity thoroughly, dress the wound with some protective and healing material, inject with a variety of materials, etc. Indeed, it is time to take a hard look at some of our tree care procedures.



### First aid for trees

We need answers from research to help us with many tree problems, although we do have an abundance of sound information on proper tree care now. The trouble is that old sound information is not being used and the person who needs the new information has not received it in a form that enables him to understand and use it. To solve the first problem, we must enforce or "put some teeth" into tree care contracts to make certain that well known sound principles and practices are followed. For example, there is no excuse for planting improperly, planting off-site, and pruning improperly, when we have sound information on these procedures. Yet our knowledge of these basic procedures is too often not followed.

To solve the second problem we must find better ways to package new information so that it will reach the people who need it. What's the use of "knowing the secret of life" if you can't tell somebody about it in a way he will understand? It is the responsibility of the researcher to package new information. It is time to take a new look at our tree care procedures.

### Forest tree — urban tree

When a tree is sick, it is sick. This is true regardless of where it is growing, in the forest, in your yard, or along a city street. It is time we recognized this. But there are some problems unique to urban trees: Most urban trees are planted. Sometimes trees are planted off-site or in the path of stress and wounding agents—lawnmowers, cars, snowplows, etc. The off-site tree or constantly stressed tree will wane and die.

Forest trees grow under a wide variety of stresses. Only the toughest survive. Urban trees coming from the safety of a nursery never experience wounding and other stresses until they are planted. Care must be taken in using information about forest trees for urban trees. But some basic information can be used for both forest and urban trees.

### Expanded concept of decay

Decayed wood associated with wounds has been, still is, and no doubt will continue to be a major problem of all trees throughout the world, regardless of where they are growing. The classical concept of tree decay emphasized characteristics of decayed wood, taxonomy of decay-causing fungi, and predictions of the proportion of cull trees for great numbers of trees in forests. The expanded concept of tree decay includes tree response to wounding and infection — Compartmentalization — and the interaction of many types of microorganisms in the processes that can lead to discolored and decayed wood — Succession. Compartmentalization and succession are orderly processes. Order can be regulated and understood. The more we understand the order of the decay processes, the better are our chances of regulating them.



**Commonly used asphalt-based wound dressings** do not stop decay. The tree above was improperly pruned and coated with a wound dressing. Such treatment does more harm than good.

### New decay model

A model—CODIT, Compartmentalization Of Decay In Trees—describes how discolored and decayed wood develops in living trees. On the basis of the expanded concept of tree decay and CODIT many tree care procedures have been re-examined. Here are some examples:

#### Wounds are major problems

Wounds are a major cause of injury to urban trees. Wounds start the processes that can lead to decayed wood; which can lead to hazardous, unattractive, and low-quality trees. Root, trunk, and branch wounds inflicted during construction of buildings and roads rank as a major type of injury. The injury is often not obvious until 5 or even 12 years later.

#### Trees do not heal wounds

A wound is a break in the bark that exposes the xylem. Once xylem is injured it is never repaired, replaced, or restored to its previous healthy state. In this sense, trees do not heal wounds. (Heal means to restore injured tissues to their previous healthy state.) Trees wall off or compartmentalize

## Urban Trees

wound xylem. Compartmentalization is an alternative to healing that has great survival value for trees.

### Wound dressings do not stop decay

Commercially prepared wound dressings—particularly the asphalt-based types—do not stop decay. When applied in a thick coat they can cause more decay. The dressings are primarily cosmetic for the tree and psychological for the tree owner. When wounds are treated, three factors must be considered: 1) closure, which is related to current growth rate; 2) dieback of cambium around the wound, which is related to time of wounding and position and severity of the wound; and 3) internal walling-off or compartmentalization of decay, which appears to be under genetic control.

### Biological control treatment of wounds

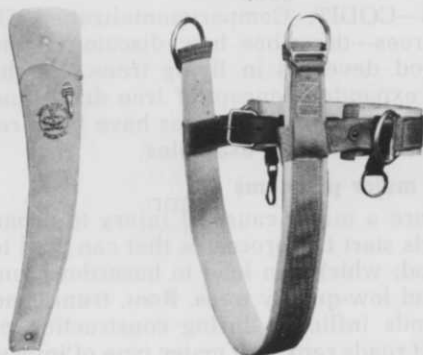
Results of recent research suggest that biological control agents such as the fungus *Trichoderma harzianum* delay the invasion of decay-causing fungi for at least 2 years in red maple. Research with other materials at the author's laboratory show that wound dieback can be decreased, and that other treatments delay the development of decay.



A decayed tree posing a threat to a greenhouse and residence. Too often people learn about decay too late.

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72" PTO Model

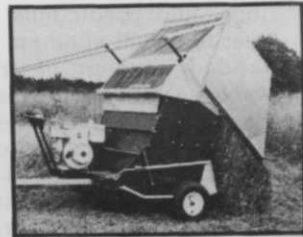


### The Pick-Up Mower

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### Compartmentalization appears under control

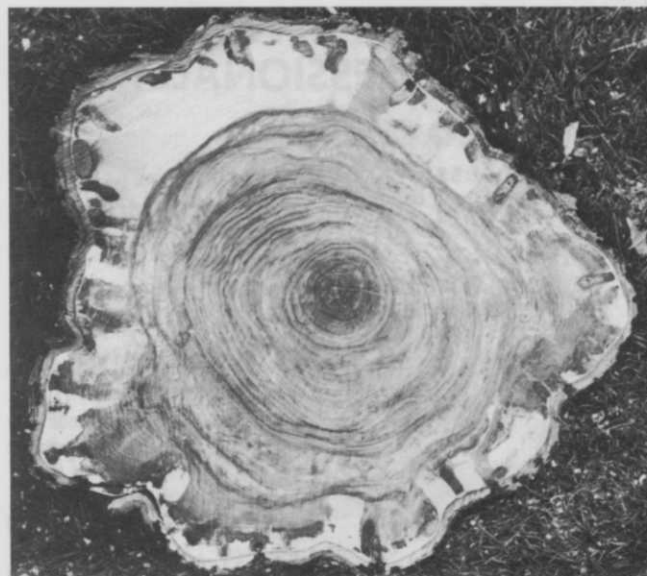
Compartmentalization of injured and infected wood appears to be under genetic control. Some trees of the same species can compartmentalize decayed wood to a smaller volume than other trees. This means that we may be able to select trees that can withstand the stress of many wounds over many years, and still have only small columns of decayed wood. This brings us closer to having decay-resistant trees.

### Pruning can be good or bad

Proper pruning can help a tree; improper pruning can hurt a tree. A proper pruning program should be established early in the life of a tree and continued throughout its life. The best time to prune is late in the dormant period. The worst time is when the leaves are expanding, or soon after the leaves begin to fall. In the spring the bark is loose and dieback may develop. In the fall, wood-inhabiting microorganisms produce an abundance of spores that can infect wounds. When pruning dead or dying branches do not cut the living callus collar around the stub. This is an instance where flush cuts are not recommended.

### Hazard trees: new detection methods

Decay can make trees hazardous. An electric pulsed-current meter—the Shigometer®<sup>1</sup>—gives



**Cross-section of the base** of an elm tree that had received numerous injections for prevention of Dutch elm disease. Deep injection wounds repeated for several years can cause severe internal injury.

information that can be used to detect decayed wood rapidly and accurately in living trees. The new electrical method can also be used when



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For the larger  
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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.



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## Urban Trees

cavity fillings are planned. The proper installation of rods and other hardware can then be determined. The proper use of the Shigometer requires some skill and practice.

### Cavity filling: don't play dentist!

When cavities are filled, great care should be taken not to clean out the decayed wood so thoroughly that healthy wood is injured from the inside of the tree. The decayed wood is compartmentalized in the tree by a tough rim of protective tissues. If this protective rim is broken from the inside, decay will spread rapidly from the cavity to the surrounding healthy tissues. Cavities can still be filled for aesthetic reasons or to form a base for the inrolling callus.

### Proper bracing and cabling

The time a tree can remain safe and attractive can be extended by proper cabling and bracing. When hardware is put into healthy tissues, the injured wood will be compartmentalized. But when holes are put into decayed wood, the decay will spread rapidly into the surrounding healthy wood. When hardware is used in a trunk that has decay, the rod must go *completely* through the stem, and washers must be placed on the outsides. The washers will hold the rods in place even though decay may develop around the rod. Do not dead end rods that penetrate decayed wood.

### Injection wounds can injure trees

Many holes are being drilled into trees to inject chemicals. Great care must be taken when injecting chemicals. A hole is a wound. Deep drill wounds repeated for several years can cause severe internal injury. When internal columns of injured wood coalesce, large pockets of dead wood will result. Dieback around deep injection holes can also lead to cankers. When injections are necessary because of infection, the holes should be as few, as shallow, and as clean-edged as possible. Until better injection methods are developed, go very carefully!

### Holes for draining water can cause problems

Holes drilled into decayed wood to drain water can cause severe injury to a tree. Decay will spread rapidly into the healthy wood surrounding the hole. But holes can be drilled into wetwood without spreading decay. Wetwood is a wood condition caused by bacteria; the wetwood is not decayed.

### Seams usually start from wounds

Large, deep invaginated cracks, commonly called frost cracks, are usually not initiated by frost. Wounds start the processes. The cold or frost acts as a trigger. Most large so-called frost cracks start from the inside and spread outward. Weakened areas on the trunk also act as starting points for other types of seams, especially when temperatures drop rapidly. These seams are usually very shallow.

And remember, we have tamed urban trees and we are responsible for their proper care! **WTT**





## Healthy Turf Next Spring Starts With IBDU® This Fall

Sure, there's more to maintaining quality, disease-free turfgrass than a couple of fertilizer applications. But turfgrass scientists across the country are reporting that a fall application of IBDU (31-0-0) can produce turfgrass with better root development and less disease problems.

Dormant turfgrass plants continue to produce rhizomes and roots, even though vertical growth has stopped. During this time nitrogen should be made available to the turfgrass plant as carbohydrates are naturally accumulating. Thus, scientists say, the optimum timing for nitrogen applications is during the fall and early winter months.

IBDU (31-0-0) is ideally suited for dormant nitrogen fertilization. Because of its slow release characteris-

tics based on hydrolysis, IBDU releases nitrogen later in the fall and earlier in the spring promoting better rhizome and root growth. A fall fertilizer program using IBDU should produce healthier more vigorous turfgrass plants and reduce the severity of several turfgrass diseases.

Remember. Healthy turf next spring starts with IBDU this fall.

**par ex**<sup>®</sup>  
PROFESSIONAL PRODUCTS

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# SOIL PROPERTY DETERMINATIONS POSSIBLE WITH PORTABLE TESTERS

The physical and chemical properties of a soil profile must be well understood in order to institute a management program that will take advantage of characteristics favorable to plant growth and overcome those that limit soil's function as a growth medium. Even the hardiest of plant species will not grow unless basic metabolites are present.

Soil testing, in most cases, is done by technicians in well equipped laboratories. However, companies making soil test kits have simplified them to the point that it is easy for a grounds manager to perform many spot tests and make immediate corrections, or to sleep better, knowing that his plants are growing under optimum conditions.

The sand:silt:clay ratio, types of clay, the physical and chemical nature of the soil separates, aggregate stability, particle and bulk densities, pore space, and organic matter content of a soil can provide insight into management techniques that take advantage of natural properties and overcome detrimental qualities.

Understanding pH and its relationship to nutrient release in the soil solution is important. Buffer pH must be overcome in initiating any change in pH. Cation exchange capacity can provide insight into a soil's ability to take fertilizer additions into solution and render them into compounds for plant uptake.

Plant tissue analysis can be used to indicate uptake of some nutrients and is probably the best test for nitrogen utilization by plants.

## Soil pH

Soil reaction, or pH, is recognized as one of the more critical properties of a soil solution.

Whether a soil is acid, neutral, or alkaline depends upon the ratio of hydrogen ions (H+) to hydroxyl ions (OH-) in the soil solution. As a calculation, pH is expressed in terms of the H+ concentration. The pH value is the logarithmic reciprocal of the hydrogen ion concentration. As a simple formula:  $pH = \log 1 / (H^+)$ .

In mathematical terms, a pH value of 7 indicates neutral conditions with a 1:1 ratio of hydrogen and hydroxyl ions. Moving in either direction, acidic or alkaline, from a neutral value, the values for pH increase in logarithmic increments.

This can best be understood by realizing that while, at a pH of 6, the hydrogen ions are 10 times more numerous than the hydroxyl, the hydroxyl ions have decreased proportionately and are only one-tenth as numerous.

This inverse relationship leads to a 100 times increase in one ion concentration over the other, as pH values move in either direction. At pH, 8, there are 10 times more OH- ions, but only one-tenth as many H+ ions. The concentration of OH- ions is therefore 100 times greater than H+. The solution is alkaline.



However, while establishing a mathematical pH value is a rather stable operation, the value can be distorted if it is not standardized against soil performance.

Concentration of the ions occurs at different areas within the soil solution. Hydrogen ions tend to concentrate at the soil colloidal surfaces creating more alkaline conditions in the outer areas of the soil solution.

With a meter, pH can be determined accurately. However, because of this precision, interpretations may be made on false pretenses. Seasonal variations in pH within a given location, localized effects of fertilizer applications, and the amount of water used to prepare the soil prior to measurement can give an inaccurate indication.

Even with these limitations, pH is extremely indicative of the physiological conditions of a soil. The relationships between nutrient availability and microorganism activity at different pH values can be

