AMERICAN LAWN APPLICATOR

January/February 1981
Volume II, No. 1

Helminthosporium Leaf Spot

Herbicide Damage

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Donald Dusek
Park Superintendent, Victoria, Texas

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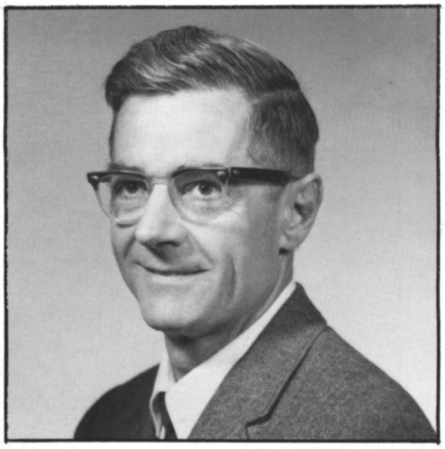
Lawn Tour

What is a lawn tour? It's when a group of people get together with experts to study and identify turf problems. It's better than looking at slides in a classroom. Photo taken in Michigan shows some of the 60 plus participants, including Dr. Joseph Vargas and Dr. Keith Kennedy, MSU, and Greg Patchen from the Cooperative Extension Services, who started this as an annual event four years ago. Get one started in your own home state!

Cultural Practices and Turfgrass Disease

by Malcolm C. Shurtleff and Marc C. Hirrel, University of Illinois

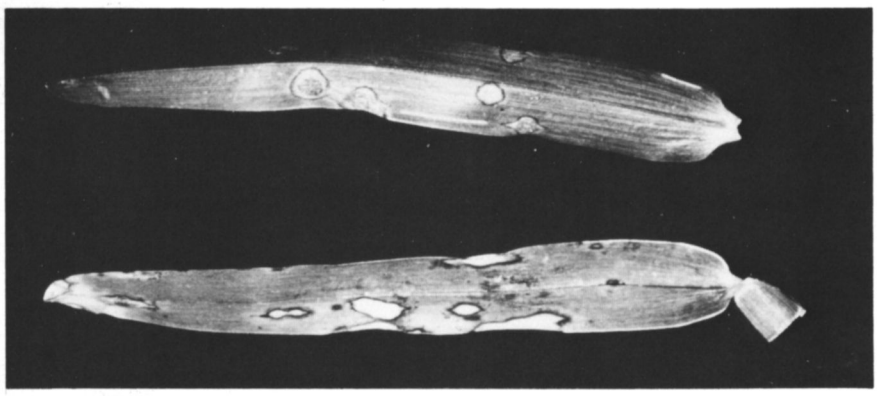


Malcolm C. Shurtleff *is Professor and Extension Specialist in Plant Pathology at the University of Illinois. He received his B.S. degree from the University of Rhode Island and both the M.S. and Ph.D. degrees in Plant Pathology from the University of Minnesota. Dr. Shurtleff's turfgrass interests lie chiefly in evaluating potential new fungicides and the effects of various cultural management practices on disease development.*

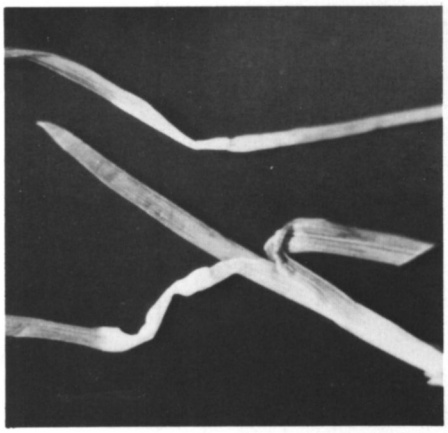
Marc C. Hirrel *is a Research Extension Associate in Plant Pathology. He received his B.S. degree from California State University at Long Beach. The M.S. and Ph.D. degrees in Plant Pathology were earned from the University of Illinois. Dr. Hirrel's research interests include evaluating new techniques for measuring development of Helminthosporium leaf spot.*

Everything you do to grass affects the development of disease in a positive or negative way. The height and frequency of cut, the type and variety of grass(es) grown, and the fertilization and watering practices are all important. The degree of aerification, the landscape plants growing in and around the turf, weed and insect control programs, thickness of the thatch layer, plus the surface and sub-surface drainage also affect what diseases develop and how serious they may become.

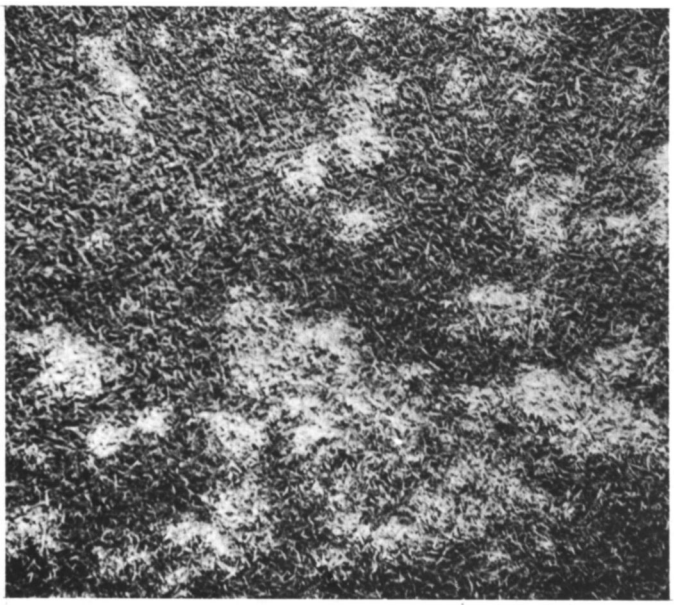
Proper management of any turfgrass area aimed at controlling diseases involves a series of cultural practices and timely chemical controls. Both the cultural and chemical approaches are basically preventive in nature. Without a sound cultural management program no fungicide or nematicide can do the job for which it was designed.



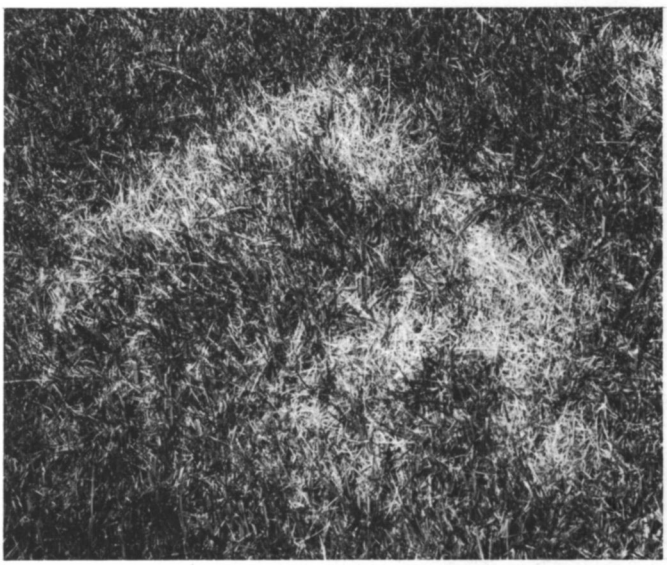
Piricularia or gray leaf spot of St. Augustinegrass. (Courtesy Dr. T. E. Freeman)



Straw-colored spots, caused by Pythium on collapsed grass blades of Kentucky bluegrass. (Courtesy Dr. Ward C. Stienstra)



Pythium blight attacking creeping bentgrass. The grass blades are covered with a fluffy, white mass of hyphae early in the morning.



Fusarium blight commonly develops as "frog eye" patterns in Kentucky bluegrass lawns, up to two or more feet in diameter. (Courtesy Dr. R. E. Partyka)

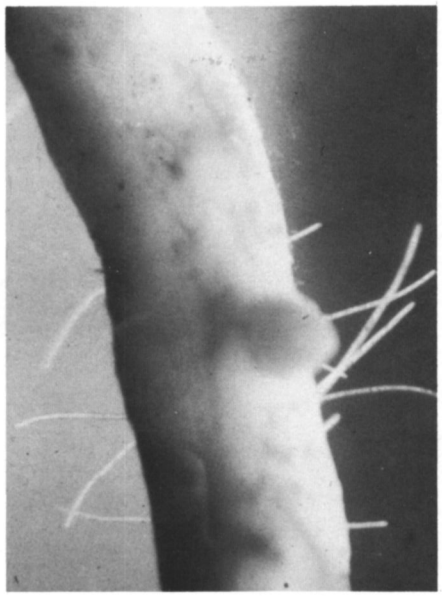
Closeup of hyphae of the Pythium blight fungus growing on ryegrass plants. The disease is serious on bermudagrass greens overseeded in the fall with ryegrass.

Cultural Practices

The basic principle of turfgrass disease control is to provide the most favorable conditions for healthy growth of the grass. This counteracts the multiplication and spread of disease-causing fungi and nematodes that are always present in all turfgrass areas. By promoting good grass-growing practices, we can keep fungi and nematodes "in their place" and largely prevent the damaging effects of the diseases they cause. Proper management also helps healthy turf to withstand moderate traffic, compaction or other abuse, a variety of environmental stresses, and recover more quickly from disease or injury. Weeds have difficulty competing in vigorous turf. Healthy, steadily growing grass can best withstand attacks by insects or other pests.

The specific cultural practices that keep disease losses to a minimum, and the diseases which each helps to control, are given in Table 1. An integrated disease management program involves carrying out all of these practices supplemented by local recommendations. Follow the suggestions of turfgrass specialists at your land grant university. These vary somewhat on whether northern or southern grasses are grown, rainfall and temperature distribution patterns, and the region of the country.

When the cultural practices outlined in Table 1 do not check the development

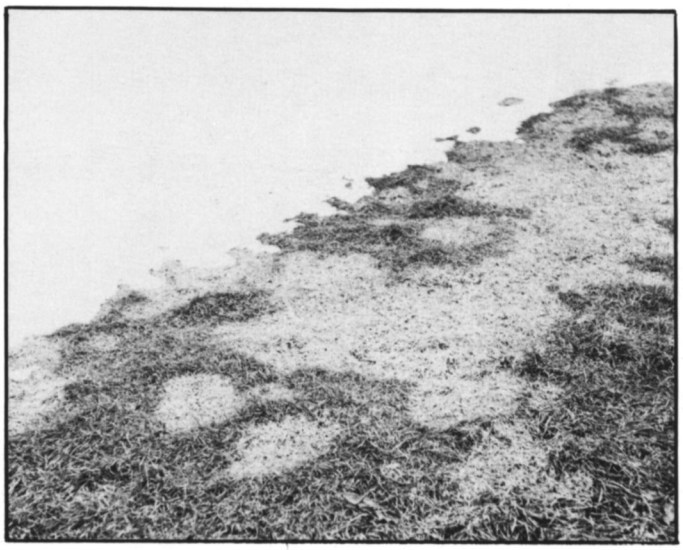


Lance (Hoplolaimus) nematodes feeding on the surface of a St. Augustinegrass root.

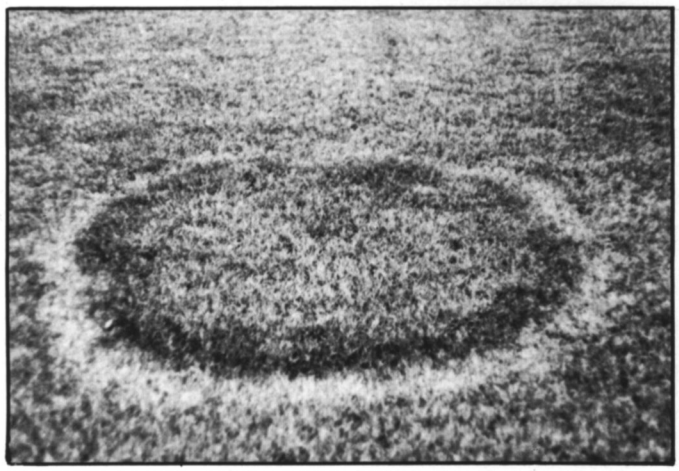
Helminthosporium leaf spot on leaves of Kentucky bluegrass.

Sting (Belonolaimus) nematode damage to the roots of St. Augustinegrass. (Courtesy Dr. William Powell, University of Georgia)

Smut-infected leaves of Kentucky bluegrass. Note shredding of leaves. (Courtesy Dr. H. B. Couch)

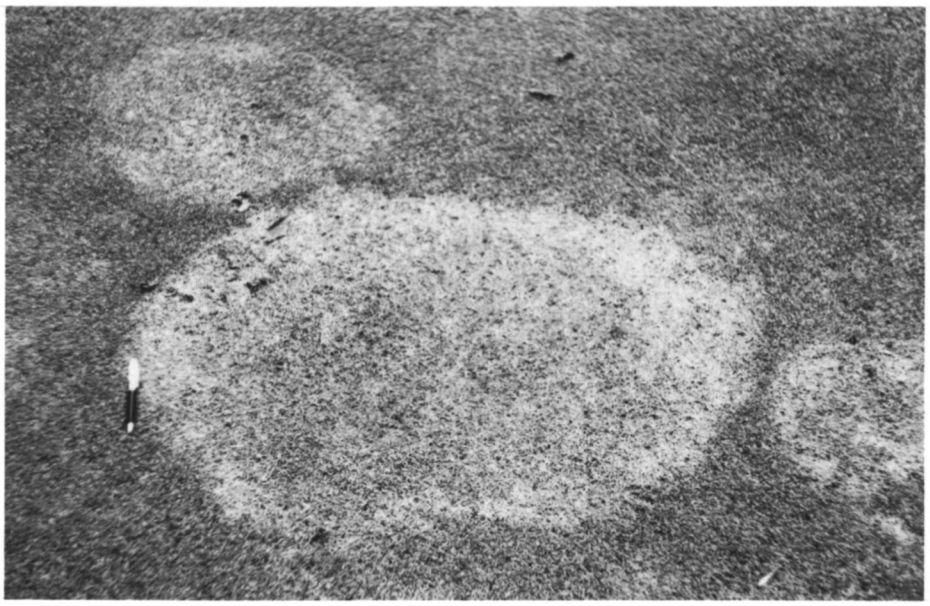


Typhula blight or gray snow mold at the edge of melting snow.



Fairy ring in dry soil in the fall. The ring of thin or dead lawngrass is on the outside, and dark green, fast-growing grass is on the inside.

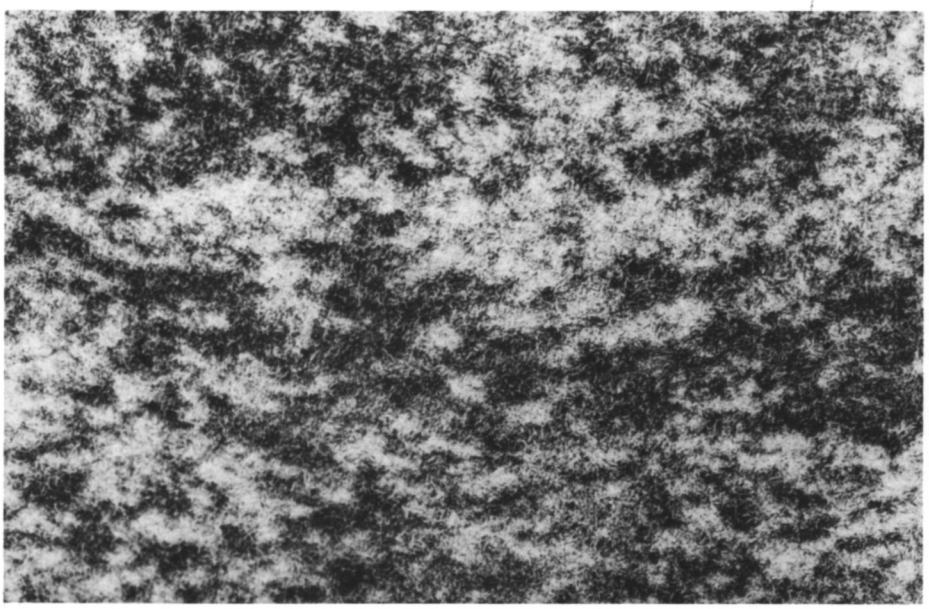
Cultural Practices



Rhizoctonia brown patch on a creeping bentgrass golf green.

Powdery mildew on the leaves of Kentucky bluegrass. The disease is most common on grass growing in the shade when nights are cool and damp and the days are warm and dry.

Sclerotinia dollar spot on closely cut bentgrass. Many of the spots have merged to form irregular areas of strawcolored dead turf.



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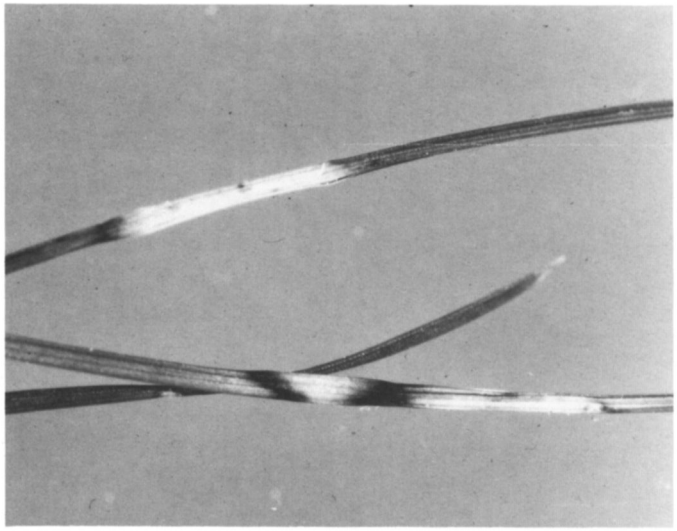
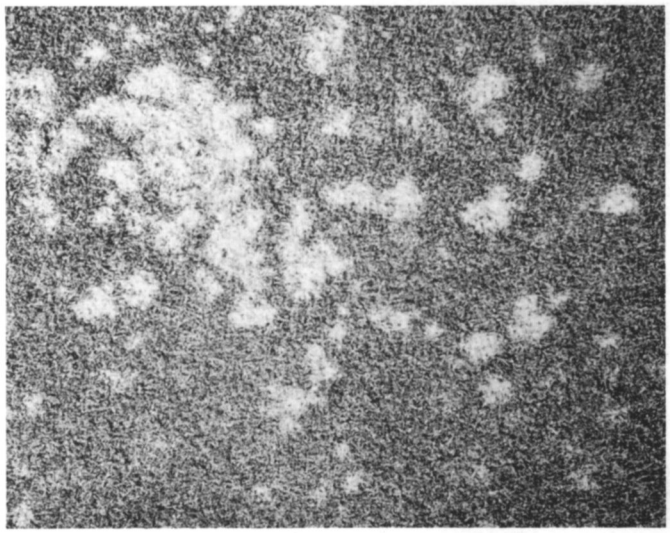


Closeup of Sclerotinia dollar spot lesions on three grass blades.



Sclerotinia dollar spot on a creeping bentgrass golf green.

Typhula blight or gray snow mold is encouraged by fertilizing late in the fall, leaving the grass long going into winter, a thick thatch, poor surface drainage, and excess shade combined with poor air movement.

Cultural Practices

of turfgrass diseases, a preventive fungicide program is needed. We suggest that you use products recommended by extension turfgrass specialists. Be sure to follow the manufacturer's directions on the package label for rates to use, interval between applications, possible compatibility problems with other chemicals, grasses on which the product is to be applied, plus safe use and handling.

* * *

Rhizoctonia brown patch on creeping bentgrass. Algae are growing within the diseased area.

Suseptible (left) and resistant (right) Kentucky bluegrass varieties in early spring to Septoria leaf spot.

Stripe smut in a Merion Kentucky bluegrass lawn.

Powdery mildew on leaves of Kentucky bluegrass. (Courtesy Thomas M. Sjulin)

Rust on leaves of Kentucky bluegrass. (Courtesy Charles T. Schiller)

Slime mold (Physarum) on the surface of grass blades.

Helminthosporium leaf spot and crown rot of Kentuckt bluegrass. (Courtesy Dr. Donald H. Scott)

Melting-out in a Merion Kentucky bluegrass lawn.

Typhula blight scars in a Kentucky bluegrass lawn.

Lesions of Sclerotinia dollar spot on Kentucky bluegrass leaves.

Fairy ring in the mushroom stage. (Courtesy Dr. Timothy Bowyer)

Fusarium blight in a Merion Kentucky bluegrass lawn.

Closeup of Fusarium blight on Merion Kentucky bluegrass.

Pythium blight on a creeping bentgrass golf green.

Closeup of active Pythium blight in a creeping bentgrass golf green.

Cultural Practices

TABLE 1
Cultural Management Practices That Aid in Controlling
Turfgrass Diseases

Cultural practice	Helps control
Provide good surface and subsurface drainage when establishing a new turf area. Fill in low spots where water may stand. Before seeding, sprigging, sodding, or plugging, remove stumps, large roots, construction lumber, bricks, concrete, plaster, tin cans, and other debris. Uniformly mix all soil amendments (e.g., peat moss, calcined clay, etc.) into the soil. Test the soil reaction (pH) and follow the soil report. A pH between 6 and 7 is best.	Leaf spots, melting-out, crown rots, Rhizoctonia brown patch, Sclerotinia dollar spot, Corticium red thread, Fusarium blight, Pythium blight, Typhula blight, Fusarium patch, fairy rings, spring dead spot, seed rot, seedling blights, nematodes, algae, moss, compaction, chlorosis.
Grow locally adapted, disease-resistant grasses or combinations (compatible blends of varieties and mixtures of species). Check with the local county Extension office or extension turfgrass specialist at your land grant university for suggested grass species and varieties to grow.	Leaf spots, melting-out, crown rots, rusts, leaf smuts, Fusarium patch, Typhula blight, Fusarium blight, Sclerotinia dollar spot, powdery mildew, salt tolerance, traffic, spring dead spot.
Buy only top-quality, disease-free seed, sod, sprigs, or plugs from a reputable dealer. Whenever possible, plant at recommended rates when the weather is cool and dry. The seedbed should be well prepared and fertile. Avoid overwatering, especially from planting to seedling emergence or plant establishment.	Leaf spots, melting-out, crown rots, Pythium blight, seed rot, seedling blights, leaf smuts, rusts, Typhula blight, Fusarium blight, Sclerotinia dollar spot, Fusarium patch, nematodes.
Supply N, P, and K according to local recommendations and soil tests. Recommendations will vary with the grasses grown and their use. Avoid over-stimulation with fertilizer, especially with a water-soluble high-N material in hot weather. A high level of K helps suppress disease development. Reduce winter injury and snow mold damage by avoiding fertilizing for a month to six weeks before the grass normally goes dormant for the winter.	Leaf spots, melting-out, crown rots, powdery mildew, rusts, Rhizoctonia brown patch, Sclerotinia dollar spot, fairy rings, Typhula blight, Fusarium patch, Pythium blight, seed rot, seedling blights, Fusarium blight, Corticium red thread, anthracnose, spring dead spot, nematodes, algae, moss, winter injury, chlorosis.
Mow frequently at the height recommended for the grasses grown (1½-2½ inches for upright, lawn-type grasses; bentgrasses, zoysias, and bermudagrasses may be mowed to ½-inch or less) and the area. Avoid scalping! Remove no more than ¼ to 1/3 of the leaf surface at one cutting. Keep the turf cut in late fall until growth stops. Keep the mower blades sharp.	Leaf spots, melting-out, crown rots, powdery mildew, Rhizoctonia brown patch, Typhula blight, Fusarium patch, rusts, Fusarium blight, Fusarium patch, rusts, Fusarium blight, nematodes, slime molds, winter injury.

(Continued on next page)

Cultural practices (Table 1 continued)

During drouths, water established turf thoroughly. Moisten soil to a depth of six inches or more at each irrigation. In most regions of the U.S., repeat every 7 to 10 days if the weather remains dry. Water as infrequently as possible to allow gaseous exchange between soil and atmospheric air. Avoid frequent light sprinklings, especially in late afternoon or evening. Practically all fungi need free water on grass blades to infect.	Leaf spots, melting-out, crown rots, Rhizoctonia brown patch, rusts, Sclerotinia dollar spot, Corticium red thread, powdery mildew, Pythium blight, Fusarium blight, leaf smuts, nematodes, seed rot, seedling blights, anthracnose, algae, moss, winter injury.
Core compacted turf areas one or more times each year with a hand aerifier or power machine. Reduce foot and vehicle traffic by putting in a walk, fence, shrubbery, flower bed, ground cover, parking area, patio, etc.	Melting-out, Pythium blight, Fusarium blight, Typhula blight, spring dead spot, Fusarium patch, anthracnose, compaction, algae, moss, winter injury.
Increase light penetration and air flow to the turfgrass area and speed drying of the grass surface by selectively pruning or removing dense trees and shrubs bordering the turf area. When landscaping, space plantings properly to avoid an excess of shade and allow adequate air movement.	Leaf spots, melting-out, crown rots, Rhizoctonia brown patch, Sclerotinia dollar spot, Corticium red thread, powdery mildew, Fusarium patch, Typhula blight, Pythium blight, algae, moss.
Remove excess thatch in early spring or early fall when it accumulates to ½ inch for higher-cut grasses; 1/8 inch for fine turf. Use a "vertical mower," "power rake," or similar dethatching equipment. These machines may be rented at most large garden-supply stores or purchased from turf equipment suppliers.	Leaf spots, melting-out, crown rots, Rhizoctonia brown patch, Sclerotinia dollar spot, Corticium red thread, rusts, Fusarium patch, Typhula blight, anthracnose, Fusarium blight, Pythium blight, leaf smuts, spring dead spot, slime molds, algae, moss, winter injury.
Remove clippings where feasible. Long clippings, especially when left in clumps on wet grass, invite disease attacks.	Leaf spots, melting-out, crown rots, Rhizoctonia brown patch, Pythium blight, rusts, Corticium red thread.
Follow suggested insect and weed control programs for your area and the grasses being grown. Some insects transmit disease-causing fungi; weeds may harbor them.	Practically all diseases. This area has not been studied extensively by turfgrass specialists.

Lawn Sprayers Association of Michigan Wants More Members

The Lawn Sprayers Association of Michigan is inviting owners of lawn fertilizing companies to become members. The association can benefit you by keeping you informed about regulations, good business practices, products, and equipment. Since 1974 the L.S.A.M. has been meeting regularly during the winter months.

At each of the L.S.A.M. meetings they have guest speakers, suppliers or equipment manufacturers. The guest speakers give talks about insurance, governmental regulations, and business management. The vendors give presentations about their products. After the presentations the officers conduct a meeting where everyone participates. During these meetings goals and objectives are formulated and ideas are shared.

Some of the accomplishments of L.S.A.M. are: reducing Workmen's Compensation costs, sponsoring a Cobo Hall Garden Show booth, organizing training sessions for new employees, and working with other green industry professionals, such as the Green Industry Council. If you want to become a member write to president John Anderson, 20010 9 Mile Road, St. Clair, Michigan 48080.

Tuflex Mfg. Co.

Tuflex Mfg. Co. has introduced a fiberglass spray tank. The PC 200-gallon divided tank contains two separate 100-gallon compartments for diversified spraying. Throwing two valve switches, the suction and return line goes from one chemical spraying to the other. Contact Tuflex Mfg. Co., Box 13143, Pt. Everglades Station, Fort Lauderdale, FL 33316, or use reply card.

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"Careful. Ol' Charlie here, has that lawn pretty well mined."

Sulfur Coated Ureas

Canadian Industries Ltd. Process

by R. A. Brown, National Sales Manager, The Andersons

The introduction of sulfur coated urea was a very important breakthrough in the turf fertilizer industry. Yet many people in the field still believe its in the experimental stages. When, actually it has been under development for more than 15 years, tested in 29 different countries on everything from ornamental turf to pineapples.

Sulfur coated urea represents the union of the two most important nutrients for turf– nitrogen and sulfur– in a single prill. The combining of these two nutrients is extremely advantageous and when the slow release benefits are added, we really have something to work with.

It is important to note that urea is the best source of water soluble nitrogen for turf from an availability, lasts longer with less leaching; economical, highest concentration of nitrogen, and agronomical, low salt index per unit of nitrogen– only 1.6 salt index, standpoint. Sixteen years ago there were only 13 states with soils deficient in sulfur. Today, more than 30 states have sulfur deficient soils. This increase has occurred because sulfur is no longer available in adequate amounts from rainfall or regular mixed grades of fertilizer.

30 states have sulfur deficient soils

For this reason, we must supplement fertilizer with sulfur which is both available and economical. Now we can create a fertilizer containing nitrogen and sulfur that will uniformly feed turf all of its nitrogen in one growing season, and at competitive cost.

Fusion of the urea and sulfur is formed in five basic steps. During the first step urea is heated to prepare its surface for sulfur coating. It then enters a rotating drum to be sprayed hydraulically with the sulfur and then with a wax sealant. The product is cooled, coated with diatomaceous earth conditioner to prevent caking, screened and transferred to storage for testing.

Many understand the need and importance of nitrogen for turf, but some may not be aware of what value sulfur is to turf. The more nitrogen that is fed to and used by turf, the greater its need for sulfur. When sulfur deficiencies occur in turf the same warning signs appear as do with nitrogen deficiency– yellowing of leaves and faint scorching of leaf tips.

When used in combination with proper ratios of nitrogen, phosphorous and potash, sulfur offers the following benefits:

1. Improves water penetration in soil
2. Increases availability of iron, manganese, copper, zinc and boron to the plant
3. Improves soil structure
4. Builds healthy protoplasm and plant tissue to help resist drought, disease and winter damage
5. Enhances color
6. Promotes turf growth and density
7. Aids the turf response when used in combination with nitrogen
8. Helps keep alkalinity in balance
9. Aids nitrogen release from organic matter
10. Improves recuperation capacity

How and why does sulfur coated urea release its nitrogen and sulfur? If you place a prill of sulfur coated urea under a microscope, you'll notice the surface is full of tiny rivulets and lines resembling a finger print. There are no two finger prints alike, and there are no two prills of sulfur coated ureas alike either. It is because of this difference that there is a steady release rather than everything releasing at once.

The wax coating acts as a sealer to help keep moisture out and fill in pores and fissures. When the wax wears off, either naturally or mechanically, the sulfur coating will allow moisture to be absorbed through its shell. As the moisture level increases, pressure builds causing microscopic holes to form through which the sulfur and nitrogen solution leaks.

Moisture is key to sulfur release

Because of the varying thickness of wax and sulfur, as well as the fracturing that occurs, the prills release at varying rates depending on their physical construction and the way the elements affect them. While soil acids, and, to a very limited degree, bacteria, do affect release, moisture is the most important factor and yet excessive moisture or high temperatures do not markedly increase the rate of nitrogen release.

If you take 10 prills of sulfur coated urea and apply them April 15, three would start to release as soon as they received moisture and continue releasing for two to three weeks. In other words, 30 percent will begin releasing the first week, and the balance over a period of 150-180 days.

Sulfur Coated Ureas

There has been concern expressed about the sulfur coating breaking in shipment, while being spread, or from foot, golf cart or maintenance equipment traffic causing a quick release of nitrogen resulting in burning or erratic color. There is, in fact, an actual fracturing that occurs from the time the product is shipped and actually released. This fracturing amounts to approximately 30 percent, and it is this percentage that gives us our immediate release the first week after application.

Normal foot and vehicle traffic does not exert enough pounds of pressure per square inch to crush sulfur coated urea when it is on a turf cushion. However, on several tees, where heavy sulfur coated urea was applied, excessive foot traffic did increase the percent of fracture. But, the result was quicker tee recovery which was beneficial rather than detrimental.

C I.L. has a super-fine sulfur coated urea prill screened especially for green use. When this product is applied, it should be rinsed into the turf to help prevent mower pick-up. If the green is mowed with a basket attached, approximately eight percent of the product will be picked-up on the first mowing. However, if the basket is eliminated on the first mowing, up to 10 percent of the product may be fractured by the mower blades. This 10 percent would not create any burn or damage but rather just speed up the initial response. Regular size sulfur coated urea can be used on greens, but we do not recommend it.

When all of the nitrogen has oozed from the sulfur coated prill, a hollow shell of sulfur remains. This hollow shell is very fragile and easily crushed. Usually, up to 80 percent of the sulfur is available to the plant during the first year and the balance the second. It is because of this lengthy process that the sulfur portion only slowly affects the pH conditioner.

Sulfur coated urea is not dependent on warm soil temperatures for release so it is available from cool spring through cool fall. Since neither high temperatures nor too much moisture causes excessive release, sulfur coated urea is safe under all conditions. The greater the percent of sulfur coated urea in a mixed grade of fertilizer, the safer it is from burn or quick release.

In these days of inflationary costs, we should all become better shoppers and better buyers to keep costs down. C.I.L. sulfur coated urea is one of the most economical sources of slow release nitrogen available on the market. Every ton of C.I.L. sulfur coated urea contains 480 lbs. of sulfur which is worth about $62.00 if you were to purchase it alone. Sulfur coated urea releases all of its nitrogen the year of application; it does not carry over for one or two additional years, so you can receive good results with less product. These economy factors make C.I.L. sulfur coated urea a product well worth your strong consideration.

The Very First Systemic in FLOWABLE Form

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1980 Trade Shows
ALA Goes "On the Road"

by Maureen Mertz & Gaynell Radus

Those of us involved in the lawn care industry, because of the seasonal nature of our business, have the opportunity during the winter months to plan for our next season. One of the things that will aid us in a more financially successful spraying season is to attend the turfgrass conferences. These conventions give us the oportunity to discover new products, and equipment as well as re-evaluate those we are already familiar with. There is a wealth of information to be gained by attending the educational sessions given by highly qualified lawn care professionals and researchers from all over the country. The most current information on insect and weed control, financing, maintenance, treatment and prevention of lawn diseases can be obtained.

Gaynell Radus, Stephen Brown, Maureen Mertz and Art Brown— Green Industry Seminar; Detroit, Michigan

This year **AMERICAN LAWN APPLICATOR** attended several of these turfgrass conferences and the following is a summary of our impressions. Most of which are very favorable, however, we are not afraid to call a frog a frog—or is it a spade a spade.

THE GREEN INDUSTRY SEMINAR

The eighth annual Green Industry Seminar and Trade Show held on Oct. 21 & 22 hosted over 600 attendees and 42 booths at the Michigan State Fairgrounds in Detroit. This is a combination turf and ornamentals event, with lectures on turfgrass the first day and ornamentals the second.

— *"Herbicide Damage and Mimicking Symptoms," Dr. Robert Partyka, Chemlawn Corporation*

- *"Diagnosing Turf Problems," Dr's Kaufmann, Vargas, Kennedy, MSU*
- *"Potash Nutrition," Dr. Nick Christians, Iowa State*

The Green Industry Seminar is sponored by six separate Michigan associations, all working jointly to make this annual event a success.

PLCAA CONVENTION AND TRADE SHOW

The PLCAA (Professional Lawn Care Association of America) was held in Louisville, Kentucky, November 12, 13 & 14. For a first attempt by a newly formed organization, may we say that they did an exceptional job. The conference was well planned and executed. One example of this was the separate time allotted the speakers and exhibitors. Some of the topics covered in the spacious lecture hall were:

- *"Is Your Business Plan Set for 1981: Here's How. . ." Steve Derrick, Latick, Inc.*
- *"Moving Toward the Computer," Dennis McNichol, Computer Applications Technology, Inc.*
- *"Issues You Can't Avoid in the 80's," Jerry Faulring, Hydro-Lawn*
- *"Expansion: Ways, When, Where," Doug Baker, Leisure Lawn*

Downstairs the large convention floor accommodated 70 exhibitors. The entire mood of the convention was very positive and felt by the speakers, exhibitors and the 704 registrants that attended. Space was allotted at the back of the convention hall as a rest area where the convention gang could mingle, relax and have cold food and drinks.

Convention Hall— PLCAA; Louisville, Kentucky

The PLCAA fills a definite need in the lawn care industry, and if the success of their first convention is any indication of how successful the organization will be, they can't fail. Our congratulations to the PLCAA and best of luck to them in future endeavors.

"On the Road Again"

THE OHIO TURFGRASS CONFERENCE AND SHOW

The Ohio conference took place in Columbus on December 2, 3 &4. This was the largest of the four conventions that we attended. There were a total of 180 exhibits and 1745 attendants. Everything from turf samples and chemicals to lawn mowers and spray trucks were on display. A wide range of topics which were split between the golf courses and professional lawn services included:

- *"Anthracnose Not Wilt— Annual Bluegrass," Dr. Joe Vargas, MSU*
- *"Complications in Turfgrass Weed Control," Dr. Robert Shearman, University of Nebraska*
- *"The Impact of Governmental Regulations on the Lawn Care Industry," Bob Robinson, Chem Lawn Corporation*
- *Panel: " Incorporating a Disease Management Program Into Lawn Care Services,": John Latting, Latick, Incorporated; Dr. Roger Funk, Davey Tree Expert Co.; Allen G. Duey, Jay-Lan, Inc.; Mike Brown, L & M Lawn Care*

Trade Shows

Exhibit floor— Ohio Turfgrass Conference; Columbus, Ohio

John Street, one of the convention coordinators, was a hospitable host. He was able to handle many unforeseen problems except the two of us. He did, however, find us two a room so we wouldn't have to sleep in the lobby. A cocktail hour was held on the exhibit floor during which time buyers and sellers could meet on a purely casual basis or continue business discussions. A banquet, held on Wednesday evening featured Woody Hayes as a guest speaker.

From a purely inexperienced point of view, it was our impression that the exhibit hours could have been shortened, thus avoiding conflict with the lecturers, not to mention the conflict with our feet. Other than this slight inconvenience, the convention was very well organized and .successful.

NEW JERSEY TURFGRASS ASSOCIATION EXPO '80

Expo '80 hosted 72 exhibitors and 1226 registrants December 8-11. There were many festivities going on at all times which kept the mood light and friendly. Included among these were: a get acquainted cocktail hour; a VIP luncheon which effectively brought together leaders in industry, education, agriculture, government and the press for better understanding and improved relationships; and a banquet on the last evening featured the presentation of numerous awards, among which was a scholarship granted to Charles Kupatt, graduate student in turf, and John Dolger, student in the 20 week turf shortcourse.

The formal educational sessions offered a wide variety of topics which included:

- *"Control of Crabgrass and Goosegrass," Dr. Henry Indyk, Cook College - Rutgers University*
- *"Sulfur and pH Effects on Bentgrass," Dr. Roy Goss, Western Washington and Research Extension Center*
- *"Pesticide Regulations," Robert Myers, DEP Enforcement Coordinator*
- *"Herbicide Programs," John Jagschitz, University of Rhode Island*

We found the well-planned exhibit hours left sufficient time to conduct business on as well as off the convention floor. The location of Expo '80, Cherry Hill, New Jersey, was such that, for those who were so inclined and could afford it, Atlantic City wasn't far away. At least it didn't seem far after all the traveling we had done. How far it was, we're not sure, but we did have to drive over a foot to get back. Historic Philadelphia lay just across the river, and we also managed to spend some time there, although with no pictures, there's no proof.

The facilities were the one drawback that we observed. It appeared the convention may have out-grown its

Dr. Ralph Engel congratulates Charles Kupatt, recipient of the NJ Turfgrass Hall of Fame Eberhard Steiniger Scholarship Award; Cherry Hill, New Jersey

location, as exhibits had to be displayed in several rooms. This did not, however, seem to hamper business to any great length, and Dr. Indyk, General Chairman of Expo '80, went out of his way to accommodate everyone.

We must commend the representatives from all the companies who displayed their products, the speakers and the coordinators who all worked so hard to make each of these conventions a beneficial experience to all concerned with the turfgrass industry.

Lack of time made it impossible to attend as many conventions as we would have liked. Although it is not any easy task traveling from one destination to another in the few winter months that they are scheduled, we sincerely enjoyed, and benefited from each of them. We arrived back at the office safe and sound but not quite sane. Aba daba daba daba daba

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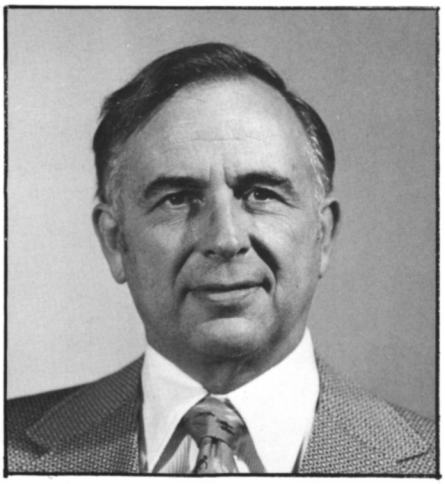
Turfgrass, The Times and Some Trends

by Dr. Robert W. Schery, The Lawn Institute



Dr. Robert W. Schery, Director of the Lawn Institute, is a nationally recognized turf authority, lecturer and consultant. In his post as Institute Director, he prepares educational and technical materials on the proper seeding and maintenance of turf, and serves as liaison between the Institute and research and technical staffs of the college experimental stations.

Dr. Schery is a native of Missouri, having been reared in the St. Louis area. He was educated at Washington University, completed graduate work at the University and the Missouri Botanical Garden.

He has traveled throughout the United States and the world, is co-editor of 'The Flora of Panama'' appearing in the annals of the Missouri Botanical Garden; and the author or co-author of such books as Plants for Man, Plant Science, Plant Agriculture, The Lawn Book, A Perfect Lawn, The Householder's Guide to Outdoor Beauty, Lawn Keeping, and others. Major research projects include tropical floristics, economic botany, and popular horticulture subjects. Several hundred magazine and journal articles have appeared under his signature.

Dr. Schery has been a member of the teaching and research staff of Washington University, senior technician for the Rubber Development Corporation, lecturer at the University of Wisconsin, and botanist for the Monsanto Chemical Company and the O.M Scott Company. As a consultant he has served the Garden Institute of Research & Development and several leading commercial houses. In 1973 he was awarded ''Recognition of Professional Excellence'' by the Ohio Turfgrass Foundation.

He is a member of the American Association for the Advancement of Science, American Society of Horticultural Science, American Society of Agronomy, American Horticultural Society, Ecological Society of America, Garden Writers Association of America, The Society for Economic Botany, Weed Science Society of America, and other professional organizations. He has been an officer and on the Board of Governors of The Nature Conservancy, and Treasurer and Life Trustee of the Ohio Chapter. Dr. Schery has served as Chairman of the Lawn & Turfgrass Division of the American Seed Trade Association, on its Board of Directors, and on various committees. He is contributor to Encyclopedia Brittanica, Encyclopedia Americana, and World Book, and author of sections in various gardening books including Agricultural Yearbooks and gardening encyclopedias. For further information, contact The Lawn Institute, 991 West Fifth Street, Marysville, Ohio 43040.

The 1980's may mark a watershed for turfgrass endeavors. Inflationary pressures, energy shortfall, and diminishing resources are among the inevitables dictating change. Uncertainty and turmoil worldwide color the national outlook. Conservativism seems in the ascendency, and frills are relegated to a back burner. Quality will, I presume, always be a concern. But lawns as a status symbol are likely to meet a fate similar to that of leviathan motorcars. So much for backdrop!

Perhaps the most dramatic turfgrass happening of recent years has been

Creeping bentgrass a delightfully fine-textured species, belle of the golf course world.

Turfgrass

the advent of the many improved cultivars. Changes have come, too, with lawn fertilizers, pesticides and equipment, although these changes have been largely evolutionary (systemic usage of fungicides and insecticides is perhaps an exception). Lawn fertilizers are now designed specifically for turf; they have become cleaner and easier to handle, with several systems for slow nitrogen feed-out. Weed controls have experienced advances and some retreats. The selective phenoxy herbicides live up to 2, 4-D's early promise. Yet fear of pesticides, and some ill-founded restrictions, have resulted in a number of suspensions (as currently is the case with silvex, highly effective adjunct for 2,4-D). Crabgrass preventers,— bensulide, benefin, DCPA, oxadiazon, siduron, etc.,— are all reasonably effective when properly used. With paraquat restricted from general usage, it's good to have had glyphosate become available for unselective knockdown, even if it is costly.

Equipment enjoys expanding usefulness and improved design. Mowers can be had to fit almost any need, from close-cropping of bentgrass to tall-mowing of relatively untended swards. Powered equipment tills the soil, digs out thatch, scarifies seedbeds, or vacuums the lawn. One special seeder drills (buries) grass seed precisely in rows, abbreviating seedbed preparation. Seeder-spreaders do a workmanlike job for the home lawn or for professionally kept turf. The growing lawn care industry has been stimulus for innovative spraying and application apparatus.

The difference breeding can make. That's the new Rebel cultivar of tall fescue to the left (finer texture) compared to familiar Kentucky-31 pasture cultivar to the right. Courtesy Loft Seed.

Lawn fertilizers now designed for turf

Thus the turfgrass realm these days is of some breadth and complexity. It has come to occupy an important place in academia. Trial-and-error empirical approaches are amplified by fundamental investigations that examine causes. Esoteric statistical analysis, electrophretic identification, genetic engineering, are no strangers to turfgrass research. Good training in turfgrass management requires not only practical skills, but some understanding of "book larnin."

I believe that biological lawn events will receive increasing attention. What with concern about energy and costs (remember, pesticides and fertilizer derive from petrochemicals), is it not likely that "natural" methods will gain more of a following? Perhaps this is not exactly what a lawn applicator likes to envision, but nitrogen-fixing microorganisms already have been inoculated

Turfgrass

into the grass rhizosphere (a symbiosis long recognized for legumes), and the interplanting of legumes with grass (such as was commonplace a few decades ago with white clover and Kentucky bluegrass) may enjoy a resurgence. Plantings involving a variety of legumes that not only make winter cover but provide a residuum of fertility for revival of bahiagrass come warm weather, have already been researched in depth in Florida.

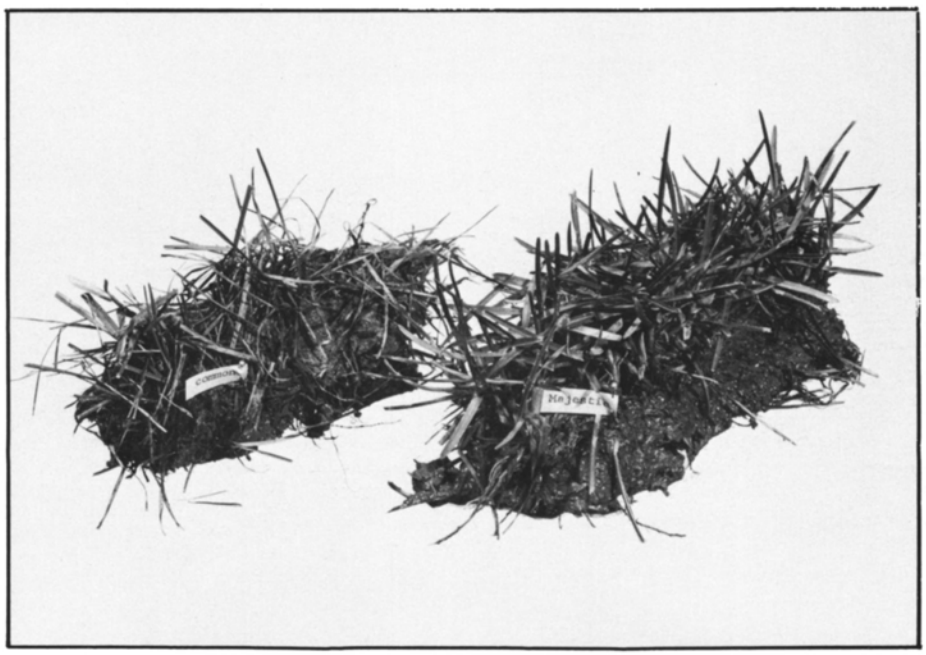
Interplanting of legumes with grass may enjoy a resurgence

Many breeding programs are turning towards low-maintenance species and cultivars. Busey has demonstrated in Florida that even so high-living a grass as bermuda is amenable to breeding for less intensively maintained strains. Will American homeowners, like the British, come to tolerate vegetation other than a grass monostand in a lawn, feeling that whatever stays green and withstands mowing has merit? This might happen sooner than one cares to imagine should selective phenoxy broadleaf controls be subjected to suspensions such as befell silvex. After all, imperfections in a lawn can easily be overlooked if soaring food costs, transportation, and the impact of world events become a preoccupation.

Why Kentucky bluegrass makes such a strong sod: note the dense root mass (washed free of soil), and the spreading rhizomes (white strands) at tip of knife. The sod, here, is inverted, root-side up.

The lawn service industry is thought to have influenced evolving labelling laws for lawnseed, manifest particularly in new Pennsylvania regulations (which serve as model for the entire Northeast). Complaints sometimes center on unwanted vegetation in a lawn, with lawn service treatments unthinkingly getting the blame. A homeowner, overseeding or planting lawn with poor quality seed, can introduce pasture species inadvertently. Under the new labelling these must be listed individually as "restricted noxious weed seeds"; included are not only the likes of timothy and orchardgrass, but a number of species which are excellent turfgrasses in their rightful context (e.g. bermudagrass, rough bluegrass, bentgrass and tall fescue). No doubt the lawn applicator will find this change comforting.

Turfgrass



Early spring sod rectangles in saturated soil. Note how the common grass is wracked by leafspot (weak and withered culms) compared to a cultivar bred for leafspot resistance.

In most instances, of course, lawn soils were long cultivated before home building took place, and are repository for weed seeds of many types, always a potential hazard if the turf thins or ground bares. For the specialist, such as a sod grower, who may sterilize his soil-bed prior to planting (or at least seek land free of serious crop pests), a more detailed seed analysis can be hired from a seed testing laboratory to determine exactly what kind and quantity of contaminants, if any, may be present in seed contemplated for purchase. This would represent overkill for an average user, for whom trivialities are relatively immaterial considering that his soil is already replete with crabgrass, Poa annua, and other species of weed seeds.

It is paradoxical that some of the same off-types which must be declared noxious under the new labeling when present as less than 5% in a mixture, are being honed for greater turfgrass usage. Tall fescue, for example, has been bred for shorter, less coarse, denser, polycross cultivars which will hopefully fill a long-existing need for durable summer turf in the difficult Transition Zone from Kansas to the mid-Atlantic seaboard. Thus, Rebel, Falcon and other cultivars are already offered in the marketplace. Likewise, zoysia is being reexamined for a southern style (C_4) turf in these middle latitudes. Dr. Portz, of Carbondale, Illinois, and his colleagues, have investigated means for achieving quick, full germination of zoysia seed. The role call also includes new cultivars of Canada bluegrass (mainly for wasteground), redtop (mainly for low ground and seepage areas) alkaligrass (mainly for saline soils of high pH), and so on.

Lawn soils are a repository for weed seeds

What about the status of the conventional fine turf species? Certainly new cultivars of these have been very much a focus of attention in recent years,– ever since discovery of Merion opened the doors to specially bred and selected cultivars. Some people fret that too many cultivars to keep track of are now had, and that these are not fully tested in all regions of usage. There is some truth to these contentions. But given time, much of the confusion will be eliminated. Newer cultivars bred to meet identified needs continually pressure older ones in the marketplace; in the tradition of "may the best man win", can't we await the decision there? As a matter of fact so many variables affect turfgrass performance that it is almost impossible to distinguish between that which is excellent and that which is routine, considering that modes of care vary greatly, climate and soils differ, weather is not exactly alike any two years, and the practical needs for mass marketing must be met if costs are to be kept reasonable.

Turfgrass

A familiar difference between well-bred improved turfgrass and the common type is the squatter (more decumbent) stature of the culms. Weaker growth of the common bluegrass will be mostly sacrificed in mowing, whereas the sturdier culms of the improved cultivars will retain much photosynthetic tissue.

The Lawn Institute's Variety Review Board cultivars are listed in the box. You will find among these selections both highly bred dandies and old-fashioned favorites. The point is that all of them serve some useful purpose, somewhere. Often one-plus-one adds up to more than two; for example, one western experience showed a bluegrass to be free from disease where a bit of ryegrass was interplanted with it, but succumbing to disease where planted alone! And who hasn't condemned a cultivar for proneness to a certain disease, only to find that disease never recurring (of course, just the reverse can take place, too) A number of the cultivars are quite useful for bulking blends and mixtures when a highly touted strain may be in short supply or unusually expensive. Presumably in time the best adapted of the cultivars will win out for the habitat where used, which is the theoretical basis for recommending blends and mixtures.

Keep in mind that no up-to-date cultivar is likely to be introduced into the trade unless it exhibits advantages of one sort or another. The investment in seed production and marketing can hardly be justified for a "dog" which is not likely to develop much of a following. Almost invariably a new cultivar will be good-looking, lower-growing, denser, more tolerant of prevalent lawn diseases than would be common grass. Increasingly, attention is being given to less basic but nonetheless important features, too, such as mowing quality, wear, aggressiveness (which often translates over to thatchiness), compatability, seed characteristics, vigor, color, response to treatments, special climatic adaptation, and so on.

Allelopathic responses are more likely to command attention– i.e. whether a cultivar produces substances repressive to other grasses, and whether it is readily so restrained by others. That many plants do practice such "biological warfare" has long been recognized, particularly significant in desert ecology where advantage accrues to plants which can keep others from growing near them in competition for a limited water supply. Dr. Tom Duff, of Rhode Island, has recently reported upon allelopathic influences existing in most of the familiar lawngrass species, as well as weed grasses (crabgrass, goosegrass, etc.). Seldom is allelopathy an overriding concern in the establishment and care of turfgrass, but it can help explain less-than-satisfactory stand establishment where grasses offer competition or their remains constitute allelopathic residues.

All cultivars serve some useful purpose

What about lawn clippings, thatch, and their influences? Firm conclusions are few and far between. Christians finds that a significant portion of phosphorus nutrition can come from the thatch layer, but this is not generally revealed by a soil test. Return of clippings has been shown repeatedly not to contribute greatly to build-up of thatch under average lawn conditions, but to have considerable nutri-

Continued on page 39

The Niche of the New Lawn Cultivar

Only recently have lawngrasses benefited from the breeding of superior strains, a familiar practice with agricultural crops since time immemorial to increase yields and to further mechanization. A few scattered introductions around mid-century triggered the deluge. Europe, accustomed to cartelization and governmental protection, was quick to sieze the opportunity, not until 1970 was legislation affording varietal protection signed into law in the United States.

We seldom see many of the early improved cultivars, since they are superseded by even better ones. Yet a number are still recognized for particular kinds of usefulness. Demand continues for some old-fashioned, minimal-maintenance varieties. Remember, too, that the living world seldom deals in absolutes. While modern cultivars are screened against threat of serious disease, not all manifestation of all diseases can be eliminated. Rather, tolerance is attained such that any disease will not materially affect a cultivar's performance. By combining cultivars in blends and mixtures, a balance is generally struck whereby some genotypes prosper even if conditions are not ideal for others.

For what interest it may hold, here are current Variety Review Board acceptances of the Lawn Institute. Any Institute member may nominate a candidate cultivar (which, according to the ground rules, must be well enough established to assure its availability), whereupon the Board rules upon qualifications. As new cultivars are added, others may be dropped.

KENTUCKY BLUEGRASS Poa pratensis– makes great sod from spreading rhizomes, tenacious, easily maintained, but somewhat slow to establish.

ADELPHI– Rutgers hybrid, generally a top performer.
AMERICA– Heralded introduction with some of the same parentage as Adelphi, Majestic, etc.
ARBORETUM– Ecotype from Missouri adapted to minimal care.
BARON– Selection from Holland of general usefulness.
BIRKA– Selection from Sweden tolerant of low maintenance.
BONNIEBLUE– Hybrid beauty from Rutgers.
ENMUNDI– An especially attractive selection from Holland.
FYLKING– Unaggressive Swedish selection, elegant, some disease but well-suited to blends.
GLADE– Selection from New York, shade or sun, strengthening with season.
MAJESTIC– Handsome Rutgers hybrid with excellent general qualities.
MERION– The original standard of excellence, dense and aggressive, wearing well; generous maintenance.
MERIT– Patented biotype from California, undemanding.
NUGGET– Unusually neat Alaskan selection, great in summer but greens late, shade tolerant.
PLUSH– New Jersey all-purpose selection withstanding low maintenance.
RAM I– Selection from a Maine golf course, enduring low mowing.
SYDSPORT– Vigorous Swedish introduction with excellent ratings.
TOUCHDOWN– Dense, vigorous selection from Long Island fairway.
VANTAGE– A low-maintenance selection from California holding-up well in summer.

PERENNIAL RYEGRASS, Lolium perenne– Ryegrasses sprout quickly, but do not spread, and are generally not so hardy as bluegrass in extreme climates. Almost all leading cultivars are polycrosses, most based upon germplasm developed at Rutgers. Compared to common ryegrass they tiller abundantly and are low-growing, winter hardy, and mow neatly.

BLAZER– Popular Pickseed proprietary.
CITATION– A three-clone Turf-Seed cultivar.
DERBY– An International Seeds standout.
DIPLOMAT– A high-rating Loft cultivar.
FIESTA– An excellent Pickseed proprietary.
MANHATTAN– Whitney-Dickinson's Rutgers polycross, utilizing bloodlines proved by natural selection in Central Park.
NK-200– A Northrup-King selection out of Canada, noted for winter hardiness.
OMEGA– An all-around Turf-Seed cultivar.
PENNFINE– A leading cultivar from Penn State, especially strong in summer.
REGAL– North American Plant Breeders prize proprietary
YORKTOWN II– An elegant Loft six-clone cultivar

FINE FESCUE, Festuca rubra– Well adapted to dry, infertile soil and shaded locations; often suffers stress from summer humidity, so that permanency is better in northerly climates.

BANNER– Noteworthy Rutgers 45-clone Chewings polycross.
ENSYLVA– A spreading polycross from Holland.
HIGHLIGHT– Handsome Chewings introduction from Holland.
KOKET– A Chewings polycross from Holland.
RUBY– A spreading fescue from Holland, mostly used in mixtures.

COLONIAL BENTGRASS, Agrostis tenuis– Highland is a natural ecotype that persists under minimal maintenance.

CREEPING BENTGRASS, Agrostis palustris– Emerald is a pedigreed pureline out of Congressional, Prominent an 8-clone Scandinavian composite; for well-kept turf "like a golf green".

ROUTH BLUEGRASS, Poa trivialis– Sabre is a choice selection from Rutgers, excellent for winterseeding in the South and for moist-shaded habitat in the North.

TALL FESCUE, Festuca arundinacea– Rebel and Falcon are "fine turf" polycrosses from Rutgers germplasm, offering hope for limited-care lawns in middle latitudes.

The Musser Foundation

Leadership is essential to progress. The turfgrass industry has reached its current high level because of informed, dedicated leaders. The biological and agronomic complexities inherent in the system demand extraordinary education and training. The Musser Foundation honors the memory of a turfgrass pioneer, symbolizing all who are involved. It seeks only to assure a continuous succession of highly trained teachers and scientists under whose expert guidance turfgrass managers will be better able to face the future with confidence.

The future of turf lies in the hands of those who use and enjoy good turf and those who seek to profit by providing goods and services. All may share in helping to provide continuity in leadership.

The Musser International Turfgrass Foundation is *your* charitable, educational, and scientific turfgrass corporation, non-profit and tax-exempt. It merits the unselfish support of every person who is involved in turfgrass in any way, anywhere in the world.

The Musser International Turfgrass Foundation is a non-profit organization, established in honor of the late Professor H. Burton Musser for his pioneer contributions to the turfgrass field. The Foundation was organized with the express purpose of further developing turfgrass research and education through the establishment of Fellowships at institutions of higher learning.

The MITF is a non-profit organization with tax-exempt status. All monies contributed to the Foundation will be invested to become self-sustaining, only the interest generated by the principal will be used for Fellowship grants.

Gifted individuals at any recognized turfgrass facility, anywhere in the world, who are dedicated to careers in the many facets of turfgrass science and culture. Consideration shall be given to students seeking graduate degrees and post-doctoral candidates. Applicants and projects shall be screened by a Research and Education Committee comprised of university educators.

The active proponents of the Foundation are a diversified group of individuals sharing the common goal of improving our environment for better living and recreation on turfgrass. Through personal involvement, each recognizes that improvements for lawns, roadsides or playing fields are dependent upon knowledge gained through research.

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"He spent 20 years in lawn fertilizer research."

Personnel Management in a Small Business

by Walter D. Wasilewski, Management Consultant

Walter D. Wasilewski, President and Senior Consultant with C.O.L.A. Management Consultants, Inc., 53637 Wolf Dr., Utica, MI 48087, (818) 781-3290. Background includes 25 years of experience in administrative and personnel management.

INTRODUCTION.

Most enterprises start out as a one or two owner-employee business. Part of the reason for early success in this type of business arrangement is that such personnel can cover all the bases without additional manpower. However, as the business grows and expands, additional manpower becomes necessary. Skills must then be developed. In short, personnel management becomes important.

People become the most important asset to the company. The quality of a company's personnel is frequently the single factor that determines whether the organization is going to be successful and if it will realize a satisfactory return on its investment.

Personnel management is really an art and a skill. Like any skill it can be sharpened. That is the purpose of this series on the subject, Personnel Management in a Small Business.

A lot has been written on how to train and develop employees effectively and ways to motivate them which no company can ignore. However, if the wrong applicant is hired for any job or the right applicant is hired for the wrong job, these plans cannot compensate completely or offset the original mistake made in hiring the person. Much can be said about cost of employee turnover, training, and interviewing, but the hidden costs are much higher. For example, customer dissatisfaction can be generated and even the actual loss of accounts.

STEP I.

Before recruiting, interviewing, and selecting plans can even start, we need an accurate description of each job that will be necessary to fill. What will the applicant do? What assignments will be handled? Keep your description short, but complete. Consider your future expectation for the position. By completing this important step, we will be able to determine what qualifications are needed by the applicant.

STEP II.

Next, an employee information handout should be compiled. The purpose of the handout is to set down your expectations to a prospective employee. It provides an interesting and clear picture of what the applicant can expect of the company.

EMPLOYEE HANDOUT EXAMPLE

1. *This is our business.*
2. *What you need to know:*
   - *Working hours*
   - *Reporting to work*
   - *Absence from work*
   - *Reporting absence*
   - *Pay period*
   - *Safety and accident prevention*
   - *Use of phones*
   - *How to air complaints*
3. *Benefits*
   - *Workman's compensation insurance*
   - *Suggestion awards*
   - *Profit sharing*
   - *Incentive plans*
   - *Unemployment compensation*
   - *Free parking*
   - *Holidays*
   - *Bonus plans*

Outlining this information gives the new employee a reference source. If your interview is long, few people can retain many details about several subjects at one sitting.

You may want to include this message: *This company is a service business. Efficient service depends on each employee doing their job correctly and promptly. Each job in this company is important. If it was not, it would be eliminated quickly. Whether customers continue to give us their business depends on the manner in which you and your fellow employees do your work.*

Next issue! We will explore effective recruitment and selection planning.

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Clemson Offers Exhibits of Lawn Grass Varieties

by Landon C. Miller, Assoc. Prof. of Horticulture

Need to know what may be the different lawn grasses look like? There are at least three places in South Carolina where varieties of lawn grasses are grown in large plots for the potential lawn owner and lawnscape contractor to observe and determine the desirable characteristics of each.

There is a two-year-old area on the Clemson University Campus in the Horticulture Gardens. Seventeen varieties of turf grasses are being grown in wide aisles between free flowing design flower beds. Each plot contains 1,000 square feet or more of single variety of grass. More varieties will be planted during the next several years. Present warm-season varieties include Emerald, matrella Meyer, and japonica Zoysia; centipede grass; Pee Dee 102, Midiron, Tifway, Tifgreen, Tiflawn, Tifdwarf, and common bermuda. Present cool-season varieties include Baron, Bristol, and Vista Kentucky bluegrass and Ky 31 and Rebel tall fescue. The common name of each variety is on a permanent plate at ground level beside every plot for ease of identification.

Under the direction of Clemson University's Department of Horticulture, the Sumter Agricultural Demonstration Project, close to the Sumter Airport, maintains seven different varieties of warm-season lawn grasses in 1,000 square foot plots each. These include Oaklawn, and common centipede; Meyer Zoysia; and Tiflawn, common, Tifway, and Tifgreen bermuda. The cool-season grasses like fescue and Kentucky bluegrass will not persist on the deep sands of the local area. The Sumter plots are maintained for demonstration use only.

The Coastal Experiment Station on Highway 17 South in Charleston also maintains several varieties of lawn grasses in 500 square foot plots each, including common St. Augustine (Charleston grass), Floratam St. Augustine (Chinch bug resistant), and several hybrid bermudas and Zoysias as well as centipede.

Seventeen varieties of turf grasses are grown

The grasses at Clemson are used in a combination educational program of demonstration and research. Demonstration goals include maintaining the variety plots for public observation of the individual varieties and carrying out currently recommended cultural practices including fertility, weed control, disease control, and mowing practices. Research goals include introduction and testing of new varieties and improved cultural practices.

During the past two summers at the peak of the annual flower blooming season in the gardens, a day has been set aside as "Flower and Turf Day." Over 1,000 visitors have viewed the turf grasses in the gardens on each of the two days. Of course, the visitors also enjoy the flowers blooming on each side of the grassed aisles.

These turfgrass gardens are open to the public year around to visit and learn more about which lawn grasses grow well in the state. They also offer an opportunity to get a feel for the grasses by walking on them. You will not find a sign that says "Keep off the grass." You are encouraged to walk on these (barefoot, if you like) to discover more about God's fine turf ground covers.

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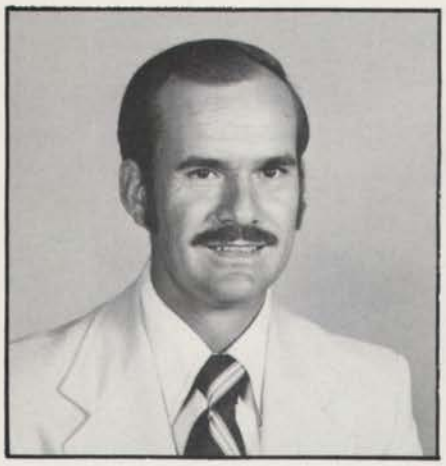
Spring Dead Spot of Bermudagrass

by Dr. Leon T. Lucas, Plant Pathology Ext. Spec.–Turf
North Carolina State University



Leon T. Lucas, Professor of Plant Pathology and Plant Pathology Extension Specialist-Turf Department of Plant Pathology, North Carolina State University, Raleigh, NC 27650.

Dr. Lucas is currently working in research and extension. This includes research on spring dead spot of bermudagrass, brown patch diseases, and nematodes on turfgrasses. In the extension program his work includes identification of diseases of turfgrasses, evaluation and recommendation of control practices, and publications on turfgrass diseases. He received his B.S. from N.C. State University (Plant Protection, 1964), and his Ph.D. from University of California, (Davis– Plant Pathology, 1968). He is a member of the American Phytopathological Society, Society of Nematologists, Sigma Xi, The Carolina Golf Course Superintendents Assoc., and The Turfgrass Council of North Carolina.

Spring dead spot (SDS) is the most serious disease of bermudagrass in lawns and on golf courses in the United States. The disease occurs in the region of the United States between the northern range of adaptation of bermudagrass and as far south as where freezing temperatures occur regularly during the winter. Portions of Maryland, Virginia, North Carolina, South Carolina, Georgia, Alabama, Mississippi, Tennessee, Kentucky, Illinois, Missouri, Arkansas, Louisiana, Texas, Oklahoma, Kansas, New Mexico, Arizona and California are in the SDS region. The disease has not been observed in Florida and the southern portion of the gulf coast states nor in New Mexico and Arizona.

Spring dead spot appears as small circular dead spots from six inches to several feet in diameter in the early spring as bermudagrass resumes growth and turns green (Fig. 1). The spots may remain brown throughout the summer or cover over slowly during the summer. Weeds, such as crabgrass, often invade the affected spots and reduce the growth of bermudagrass over the SDS areas. Symptoms in the fall and winter are either spots with weeds or sunken spots with bermudagrass that is shorter than the surrounding healthy grass (Fig. 2). Many of the spots occur in the same spot for three to four years and may enlarge from year to year. Perennial weeds often become established in the spots. The spots will often have a "doughnut or arc shape" after the disease has oc-

Figure 1

Figure 2

Spring Dead Spot

curred in the same spot for several years. The roots and stolons of bermudagrass in the spots are usually dark and rotten.

The disease usually develops in bermudagrass turf that is three to six years old. A high level of management that uses high rates of nitrogen fertilizer and results in the accumulation of excess thatch is often associated with the development of the disease. SDS occurs most often on the Tifton hybrid bermudagrass varieties and other improved varieties, but also occurs on common bermudagrass.

The cause of SDS in the United States is not known. The fungus, Leptosphaeria narmaria, has been indicated as the cause of the disease in Australia. This fungus has not been identified on SDS affected bermudagrass in the United States. Many different fungi such as Helminthosporium species, Fusarium species, Curvularia species, etc. have been isolated from bermudagrass by researchers in the United States, but none have been shown to cause the disease.

The disease has been controlled with fungicide applications in the United States and Australia. Control has been obtained with the fungicide nabam by applying it at monthly intervals in the summer and fall. Applications of thiram have given control in Australia. Control has been obtained recently in North Carolina with the application of high rates of benomyl in the fall. One application of 8 ounces per 1000 $ft.^2$ in October or November to turf that was affected with SDS the previous spring has given good control the following spring. Benomyl is not labeled for the control of SDS yet, but it should be economical to use on small areas of affected bermudagrass.

Management practices such as using lower rates, or frequent applications of small amounts, of nitrogen to avoid excess growth and removal of thatch as needed will help prevent the disease. Heavy verticutting or thatch removal should be avoided in early summer since the stolons growing over the affected spots may be removed. Management practices that encourage slow-even growth of bermudagrass and good winter hardiness such as a balanced fertility program and proper soil pH should help prevent SDS or help affected turf recover.

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Herbicide Involvement on Landscape Ornamentals

by Robert E. Partyka, Ph.D., Dir. of Horticulture, ChemScape

The term "herbicide" in the lawn care industry refers to specific compounds used to suppress undesirable plant species in fine turf. The same term to many lawn care customers often connotes the fact that it will damage or kill the plant. In fact, almost any word ending in "cide" seems to suggest a very lethal material. This has developed over a period of time and has made the public very much aware of pesticides.

The fact that "damage" is often mentioned when looking at plants exhibiting chemical symptoms always seems to suggest a demise of the plant. When, in fact, that is not the case. Symptoms may be present but one has to determine the degree of involvement and all the ramifications that may be associated with the problem. Thus, the term herbicide damage should be changed to herbicide involvement and thus staying away from a word that often suggests severe injury to a plant.

Oftentimes now the first suspected reason for plant decline in a home landscape is attributed to chemical compounds used to service the lawn. It is a known fact that some of these materials can injure ornamental plants. However, this often occurs only when there is an accidental spill such as a hose break and occasionally there may be an incorrect fill but computer fill charts and better metering systems help reduce these types of occurances. Drift, vapor and contact symptoms do occur on a not-too-frequent basis and are often cause for alarm by the customer. Such situations may be associated with environmental factors, negligence or location of sensitive plant material near the treated turf. What to look for and how to handle a "herbicide" situation is often a delicate matter.

The first group of materials applied to the lawn area are used to control the development of seeds. This group, known as pre-emergent materials, include compounds such as DCPA, bensulide, siduron, benefin, bandane, etc. When used at recommended rates, these compounds do not damage established plant material and therefore are not considered harmful to such plants. However, caution must be used to prevent placement of the material in gardens or other areas where seeded material is to be established at a later date. Since pre-emergent materials are relatively safe materials and are used early in the season, application techniques may become lax and could carry over to when other more injurious materials are used. Then, good spray techniques must be emphasized throughout the season.

Pre-emergent controls seed development

The second group of materials applied to the turf are a number of growth regulator type compounds used to reduce or control susceptible broad leaf weeds. These materials include 2,4-D, dicamba and MCPP. These materials may also cause some damage to woody ornamentals in the landscape if contact is made with the plant. One must be able to recognize the symptoms

Figure 1

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associated with a growth regulator compound, the degree of damage, how it made contact with the plant, the recovery potential of the plant and if the problem is an applied growth regulator or a mimicking symptom.

The growth regulator materials will cause a leaf curl and produce parallel veins upon contacting developing plant tissue (Fig.1). The degree of curl and parallel veination depends on material concentration and degree of plant coverage. In general when standard rates are used one can expect to see some leaf curl and petiole twisting in 24-28 house after contact in most susceptible plant material, primarily the broad leaf decidious plants. Broad leaf and needle evergreens may not show symptoms in this short time interval. However, if these plants are actively growing, leaf curl or needle twisting will become evident in a weeks time. If leaves are fully expanded no visible leaf curl may be evident from foliar contact on a needle plant but leaf roll may be evident on a broad leaf evergreen.

The method of plant contact will also determine the degree of injury and distortion. Direct contact is generally more damaging and should be avoided. Fumigation action from volatile fumes is dependant on the concentration of the material. Moving winds can dilute vapors and reduce local injury to plants but may carry it to another location, such as a non-customer neighbor. Since some volatilization occurs with most materials the most troublesome times occur when there is poor air circulation to confine the volatilized chemical. This type of damage will appear as leaf curl on susceptible plants but may be only a trace of parallel veins on more tolerant plants. Oftentimes, only a few leaves are affected on a branch, primarily the ones at the proper stage of development when fumigation took place (Fig. 2).

Poor spray habits developed with pre-emergent can cause problems later

Mist contact is similar to direct spraying of the plant but concentration is lower so plant reaction will appear on the foliage as described under volatilization. Symptoms will usually be more noticeable and severe and often the affected part may not grow out of the symptoms during the growing season. More material is absorbed by the plant, thus resulting in a longer symptom expression than with volatilization. Poor spray habits developed when using pre-emergent materials early in the season may cause some problems when the growth regulator materials are being used.

Root uptake of growth regulator compounds should not be a problem when label rates are followed. Most materials used are decomposed by bacterial action in warm, moist soils. The breakdown rate on dicamba is slower than other materials but usage rates are much less to result in minimum concern to plants. Root uptake, if present, is generally associated with mis-use of a material due to incorrect

Figure 2

Herbicide Involvement

Figure 3

fill procedures or not understanding the nature of the compound. Repeated sprays in a tight area near plants could result in higher than normal levels in the soil. If this is then combined with a shallow rooted plant, a sandy, porous soil or a period of high rainfall shortly after application, one may experience root uptake. The symptoms of root uptake are similar to what was previously described. The main point is that the foliage continues to show distortion during the entire season and possibly into the next before it grows out. (Fig. 3).

On some broad leaf deciduous plants, late season leaf curl may occur during drought stress conditions. This is often difficult to distinguish from a herbicide induced problem or one of water stress in the plant. There have been times when symptoms appearing on plants suggest that growth regulator compounds are held in the soil or in the roots and are expressed during periods of plant stress. Leaf curl and parallel veins are evident in the late season growth. Parallel veins often suggest that a growth regulator as related to a herbicide may be involved. There are many normal growth regulators in plants and weather extremes can trigger these to produce some unusual leaf growth.

The time of year or stage of plant development is often critical as to symptom expression. Growth regulator compounds contacting woody ornamentals in the spring when rapid growth is occuring will often result in considerable distortion of leaves, stems and petioles. Similar rates used in the latter part of the season, when rapid cell expansion has stopped, will often show minimum effects other than some petiole curl. Therefore, it is important to exercise more caution in early season applications than in late season when plant tissue is fully mature. This does not mean that one can become more careless in the later part of the season because there are other plants, particularly flowering summer annuals and vegetables, that are still susceptible to these materials. Unfortunately, these plants are easily distorted, killed or else in the case of vegetables, flavors can be impaired to render them useless.

If herbicide damage is noted on woody ornamentals one must determine the degree of damage and the recovery potential of the plant. Fortunately, most woody ornamentals will recover from the growth regulator materials used in the lawn care service. One could say the plants are most forgiving even though there are many distorted leaves evident during the growing season. Fertilizing to maintain a healthy plant will help if there is evidence of considerable leaf distortion. Most plants will not require any other treatments but could be kept well watered if a dry season should prevail. Post emergent materials or non-selective herbicides are often used for specific problems. Symptom patterns of yellowing and definite drying of tissue can generally be associated with placement of materials.

Recognizing the symptoms produced by the common lawn weed control materials and understanding their mode of action will go a long way in determining why a landscape plant failed. Other possibilities that may produce symptom patterns of mimicking nature need to be explored.

* * *

IPM at the University of Nebraska

A new program called Integrated Pest Management was recently initiated at the University of Nebraska. The idea is very simple. It uses all available methods of pest prevention and control to keep pests from reaching damaging levels while minimizing potential pesticide influence on man, the environment, and turf. In other words, it looks at a total turf management program as a means of minimizing pest problems.

The goals of IPM are to: 1) insure proper use of pesticides, 2) minimize effects on man and his environment, 3) improve cost effectiveness by insuring maximum efficiency, and 4) produce an acceptable turf. These can be partially accomplished by early detection and prevention of turfgrass problems.

Some practices are available to turf managers that may help in pest prevention or control. These practices are not new. They have been employed by conscientious turf managers for many years. One such practice is the use of adapted turfgrass species and cultivars. Turf managers should take into account turfgrass use, environment, intensity of management and potential pests before making a selection. Use of turfgrass mixtures and blends is highly recommended.

Cultural methods available to turf managers include mowing, fertilizing, watering, and soil cultivation. Choosing the correct mower, keeping the cutting edge sharp, mowing on a regular schedule, and using the mower properly can help insure good plant performance and reduce potential pest attacks. A proper fertilizer program takes into account: (a) soil test results, (b) type of grass being grown, (c) soil texture and the organic matter content, (d) season of year, (e) irrigation, (f) mowing practices, and (g) cost and ease of fertilizer applications.

Sanitation helps reduce pest problems

Sanitary procedures can help reduce potential pest populations and problems. Things to consider here are: (a) use clean seed, sod, sprigs or stolons to reduce pathogens and weed introduction, (b) wash equipment after use, and (c) eliminate equipment and personnel movement from infected to non-infected areas.

Priorities should be set if chemical methods are chosen. Only necessary areas should be treated and label directions must be followed precisely. Turfmen should use the safest, most effective pesticides available and insure proper application timing. They should also leave a check area, if possible, to assess cost effectiveness. Remember that chemical control is a management tool that should not be separated from the total management program.

When considering the different methods available, it should also be kept in mind that not all problems are pest-related. Such things as nutritional deficiencies, misapplication of chemicals, poor drainage, dry spots, shade stress, dull mower, and scalping could be easily mis-diagnosed as pest injury. It is extremely important that turfgrass managers be aware of the needs and conditions of their turf, as well as the effects of environment and management on its performance. They must also be alert for the unexpected and any changes that will affect turf performance. Awareness of these factors will help to determine the true cause of a turf problem.

Turf Pests

The three major pests associated with turfgrasses are diseases, weeds, and insects.

DISEASE PREVENTION AND CONTROL

Be thoroughly familiar with the major diseases. You will find that not all diseases are pathogenic. For example, slime mold does not severely injure turf and can be easily removed by brushing. Fungi, like the host plant, require adequate moisture, nutrients and the proper temperature for growth. For this reason it is important to know which factors favor or discourage disease. A turf manager should become familiar with the weaknesses

IPM

and strong points of grasses that he manages and the environmental conditions that influence their performance. He should also take into account the potential diseases in his area. This will allow him to determine which management practices are best to use. Use of disease resistant cultivars in mixtures or blends should be considered whenever possible.

Proper irrigation can reduce disease infection. Water infrequently but deeply, and apply water only as fast as the soil can absorb it. Apply water uniformly. Proper drainage should also be considered. A fertilization program can either enhance or reduce disease problems. Select the right fertilizer and apply it at the proper time and rate. A fertilizer program should be centered around meeting the nutritional needs of the turf. Avoid overstimulation of the turf. Some physical methods available to help discourage disease include coring or vertical mowing to reduce compaction and thatch, and improve surface drainage. Pruning of lower tree limbs and upper canopies and removal of heavy underbrush to improve air movement can help reduce disease incidence in shaded sites.

Treat only areas in need

If chemicals are chosen as a means of control, turf managers should insure that the problem has been properly diagnosed. They should set priorities and treat only those areas in need. In some instances familiarization with the disease may allow for application of a specific rather than a broad spectrum control. Managers should also consider use of a partial curative program rather than a complete preventative program. Cost effectiveness should be measured whenever possible. In all instances they should follow label directions and insure the proper timing of application.

WEED PREVENTION AND CONTROL

A dense, vigorous turf is the best means to prevent weed problems. Clean seed, sod, sprigs or stolons is another method of reducing weed encroachment. Washing of equipment should not be overlooked. Fallowing areas before seeding can reduce weed problems. Hand weeding should be considered, especially on small areas with annual weeds. Increase the mowing height whenever possible. This has been shown to reduce weed problems, especially for weeds that require light for germination like crabgrass and goosegrass.

Mowing reduces seedhead formation on many weeds and is an excellent method of reducing potential weed problems. It has been shown that a single crabgrass plant can produce as many as 100,000 seeds.

If chemical control is required, insure that the weeds are correctly identified so that the right herbicide is selected. Apply the herbicide according to label instructions.

INSECT PREVENTION AND CONTROL

Turf managers should become familiar with important insects in their area. They must become knowledgeable of where the insects reside and the insects' life cycles. This will help determine where and when to look for potential problems. Turfmen should also become familiar with the signs and symptoms of the different insects. The best way to determine if insects are a problem is through close inspection of the turf site, both above and below the soil surface.

IPM

Some indicators of subsurface insects include: (a) thinning of the lawn, (b) individual plants being pulled from the soil, (c) lack of turf rooting, and (d) mole, skunk, or raccoon activity. Some indicators of surface insect activity include: (a) skeletonized leaf blades, (b) shoots chewed off at the crown, (c) observation of birds feeding, and (c) observation of adult insect activity. Unfortunately, information is limited regarding management and its effect on insects. The consensus at the University of Nebraska– Lincoln is that a vigorous, non-succulent turf will be better able to withstand certain insect populations than a poorly maintained turf. It is also felt that reducing thatch accumulation helps; perhaps not in reducing populations, as much as increasing the insecticide's effectiveness. Remember, a vigorous, healthy turf is the result of proper management practices.

Recent studies at the University of Nebraska suggest that the potential exists for tolerance to insects among Kentucky bluegrass cultivars. Perhaps in the future lists of insect tolerant cultivars will be available to turf managers.

If use of an insecticide becomes necessary, select the proper one based on correct diagnosis of the problem. Follow label directions precisely. Also, insure proper timing of application so that you will be treating when the insect is most vulnerable. Set priorities and treat only those areas that are being infested. Apply the safest, yet most effective, control and evaluate effectiveness if possible.

Summary

IPM, as taught at the University of Nebraska, should be considered a viable means of pest control. Remember that a good pest control program uses all methods in an effort to reduce pests. These methods include: (a) use of adapted turfgrass species and cultivars in suited blends and mixtures, (b) proper use of cultural practices such as watering, mowing, fertilizing and soil cultivation, (c) familiarization with common turf problems, whether they are pest or non-pest related. Early pest detection, prevention or both will minimize pest damage and result in a savings of time, effort and money. This can be accomplished through frequent turf inspections, proper pest identification and proper pest management practices. Should a problem occur, determine the cause or causes. If the problem warrants control, choose the safest, most effective control or controls available. Make sure that precautions are taken to prevent the pests' recurrence. When chemical control is necessary, select the proper pesticide, follow label directions, and insure proper application rates and timing for best effectiveness.

Continued from page 25

Turfgrass

tional value. Mulch-mowing has enhanced turf quality experimentally, at least with tall fescue in a seasonally-difficult high plains environment. Much more of practical value is likely to be revealed by research in the future!

I have touched upon only a few of the developments likely to interrelate with lawn service. A successful lawn service business would seem increasingly to require knowledgeable guidance and trained technical personnel for capable assessment and integrated service. This is the unique opportunity that the lawn applicator has; occasional fertilization alone is something which a homeowner can rather easily do for himself under stringent circumstances. Planting of lawns, and even their mowing (like the package services typically offered in California and Florida, or in the maintenance of condominiums and business properties) may loom more importantly? The elderly, especially, benefit from full programs. Even though elderly people often have limited income, many are able and quite willing to pay a fair fee for complete service. This would seem a huge, but so far unprofitably developed, market for lawn and garden services.

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Glen Lessig Joins Lakeshore

Glen W. Lessig has joined Lakeshore Equipment & Supply Co., Elyria, OH, as a salesman for the lawn care industry. Lessig had formerly worked for four years as a branch manager for Leisure Lawn and Excelawn in Dayton, OH, and Crestwood, KY. Prior to his managerial work, he was a lawn technician for Excelawn in Crestwood, KY, and assistant superintendent at Hunting Creek Country Club in Prospect, KY. A 1973 graduate of Western Kentucky University in Bowling Green, Lessig majored in political science. He has attended various agronomy and business courses at Indiana University and Purdue University. A member of the Indianapolis Jaycees and Indianapolis Chamber of Commerce, Lessig lives in Crestwood, KY. For more information, contact Barbara G. Betz, Lakeshore Equipment & Supply Co. (216) 323-7544.

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