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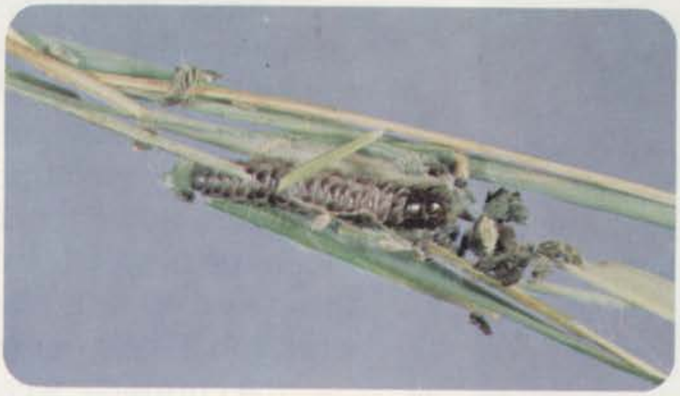

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Spurge— A Troublesome Lawn Weed

by Robert C. Shearman, University of Nebraska

Lawn care service operators have been troubled with effective control of prostrate *(Euphorbia supina Raf.)* and spotted *(E. maculata L.)* spurge. Both are annual, broadleaf weeds with spreading, decumbent growth habits that form a dense mat and effectively compete with desirable turfgrasses. They are particularly troublesome in thin, undernourished lawns, and during periods of high temperature and drought stress. Most turfgrass managers will agree that prostrate and spotted spurge are a problem even in well kept lawns.

Although both prostrate and spotted spurge exist in turf, prostrate spurge is found more commonly than spotted spurge. This is particularly true throughout the midwest and Great Plains region. Turfgrass managers often lump the two species together and simply refer to them as spurge. The remainder of this discussion will treat them similarly.

Very little information exists in turfgrass literature regarding selective control of spurge. Postemergence control of spurge using 2,4-D, MCPP, dicamba, bromoxynil, and dichloroprop, alone and in various combinations, has been reported by various researchers (1, 4,5,6,7). Postemergence herbicides presently available do not readily serve the needs of the lawn care industry for effective spurge control. Turn-around times for lawn inspection and treatment may exceed 6 to 8 weeks. Postemergence herbicides requiring repeat applications at intervals of less than 6 weeks (1,6,7) cannot be expected to give satisfactory control under these conditions.

Spurge plants may produce as many as 600 to 3500 seeds per plant. These seeds may be viable in soils for as long as 12 years. Spurge germinates when soil temperatures reach 60 to 65°F and continues germination through soil

Table 1: Trade, common and chemical names of herbicides used in spurge control studies conducted at Nebraska during the period of 1977 to 1982.

Trade	Common	Chemical
Balan	benefin	N-butyl-N-ethyl-α,α,α, -trifluoro-2,6-dinitro-p-toluidine
Betasan	bensulide	0,0 diisopropyl phosphorodithioate S-ester with N-(2-mercaptoethyl) benzensulfonamide
Dacthal	DCPA	Dimethyl tetrachloroterephthalate
Ronstar	oxadiazon	2-tert-butyl-4-(2, 4-dichloro-5-isopropoxyphenyl) - Δ^2-1,3,4-oxadiazolin-5-one
Tupersan	siduron	1-(2-methylcyclohexyl)-3-phenylurea

temperatures in excess of 90°F. This means that spurge produces high numbers of seed that can serve as a source of pest encroachment and that this source has a lengthy and indeterminant period of germination, making it extremely difficult to control effectively with postemergence herbicides, particularly in light of the restrictions imposed by lawn care service programs.

Preemergence herbicides offer an alternative to postemergence control of spurge. Researchers have reported spurge control using bandane, DCPA, oxadiazon, and siduron (1,3,8,9). Studies using preemergence herbicides for spurge control have been conducted at the University of Nebraska Turfgrass Research Facility located near Mead since 1977. These studies were part of an investigation initiated to determine effective spurge control for the lawn care industry. Preemergence herbicides were selected as the most suitable approach with the understanding that several postemergence herbicides were efficacious, but their application timing was unsuited to the typical lawn program.

Several preemergence herbicides, rates and application programs were evaluated during the course of this study. Data in Tables 2 to 4 represent only a portion of that collected, but are indicative of the results observed throughout the study. DCPA (Dacthal) was the most effective preemergence herbicide for the control of spurge. Bensulide (Betasan) and benefin (Balan) were the least effective; however, both materials demonstrated good crabgrass control. Oxadiazon (Ronstar) and siduron (Tupersan) were intermediate in ranking for spurge control. This was primarily due to the fact that both materials gave variable control of spurge. In some cases oxadiazon gave highly ac-

Table 2: Preemergence herbicide control of spurge in Kentucky bluegrass.

Herbicide	Rate (lbs/acre)	Control (%)
	(a)	(b)
DCPA (5G)	10	85
"	10 + 10	98
"	6 + 6 + 6	54
DCPA (5G)	12	93
"	12 + 8	98
"	12 + 10	100
"	12 + 12	100
Bensulide	12	7
"	12 + 8	20
"	12 + 10	27
"	12 + 12	20
"	6 + 6 + 6	–
Oxadiazon	4	66
"	4 + 4	90
"	2 + 2 + 2	90
"	1 + 1 + 1	49
Benefin	2	39
"	2 + 2	49
"	1 + 1 + 1	27
Check	–	0

(a) Single treatments were applied on April 22; repeat treatments were applied on April 22 and June 3; and multiple applications were made on April 22, May 12, and June 3, 1980.

(b) Percent control was based on comparison with the untreated check. Values of 90% or greater are considered effective control.

Table 3: Preemergence herbicide control of prostrate and spotted spurge in a Kentucky 31 tall fescue turf.

Herbicide	Rate (lbs/A)	Spurge Control (%)
	(a)	(b)
DCPA (75 W)	10 + 10	97
"	12 + 10	97
"	12 + 12	100
Siduron (50 W)	12 + 10	92
"	12 + 12	93
Oxadiazon (2.0 G)	4	83
"	4 + 4	92
Check	—	0

(a)Treatments were initiated on April 29 with repeat applications made on June 10, 1981.

(b)Percent control based on comparison with untreated check. Values of 90% or greater are considered effective control.

ceptable spurge control while, in other studies, its control was unacceptable. Oxadiazon gave excellent annual grass control throughout this study.

Spurge infestations were considered to be heavy, so pressure on herbicide efficacy should have been maximized in most cases. In early studies weed population was light and a single application of DCPA at 12 lbs./acre applied in late April gave acceptable control; however, when heavy infestations were encountered, DCPA was most effective when applied in repeat applications. Initial applications of DCPA at 10 or 12 lbs./acre followed by 8 or 10 lbs/acre at six to eight weeks have given the best spurge control. DCPA gave good to excellent annual grass control.

Prostrate and spotted spurge are troublesome lawn care weeds. Turfgrass managers should be aware that part of the difficulty in controlling them stems from their somewhat indeterminate germination period and their potential high seed number that acts as a source of reinfestation. This coupled with the typical lawn care application program make spurge a difficult weed to control with postemergence herbicides. Lawn care service operators should look carefully at preemergence herbicide programs for spurge control.

Table 4: Preemergence herbicide control of spurge in a Kentucky bluegrass turf.

Herbicide	Rate (lbs/A)	Control (%)
	(a)	(b)
DCPA (75W)	10	87
"	12	90
"	10 + 8	93
"	10 + 10	96
"	12 + 8	98
"	12 + 10	100
"	12 + 12	100
DCPA (5G)	10	80
"	12	87
"	10 + 8	92
"	10 + 10	96
"	12 + 8	94
"	12 + 10	100
"	12 + 12	100
Oxadiazon (2G)	2	66
"	3	68
"	4	89
"	2 + 2	77
"	3 + 3	84
"	4 + 4	89
Siduron	12	73
"	12 + 8	81
"	12 + 10	81
"	12 + 12	89
Check	—	0

(a)Initial applications made on April 27, 1982 and repeat treatments applied on June 22, 1983.

(b)Percent control is based on comparison with untreated check. Values of 90% or greater are considered acceptable control.

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The formation of a new department for the sales and marketing of specialty chemicals has been announced by the Agricultural Chemical Division of Stauffer Chemical Company. Specialty products produced by Stauffer are used for control of weeds, insects and diseases in home lawns and gardens and in commercial turf, trees and ornamentals markets. The new structure divides Stauffer's U.S. specialty market into four regions: Southern, Northeast, Midwest and Western.

According to Herb Day, sales manager for the new Specialty Sales Department, "Each region has a sales and marketing representative who will be involved in the marketing of these products through meetings, contact with customers and work in the field." Day says the new structure, ". . .will give us closer contact with our present customers and enable us to develop new customers and new products as they come forth."

The sales staff includes John C. Boltin of Tampa, Florida for the Southern region; Jack Welch of Dayton, New Jersey for the Northeast region; Dan P. Corrigan of Omaha, Nebraska for the Midwest region and Dave L. Chapman of Sherman Oaks, California for the Western region. The men bring a total of almost 70 years experience in agri-chemical sales to the Specialty Sales Department.

Stauffer Chemical Co., manufactures many different specialty products. Some of these are: Aspon*, a turf insecticide for chinchbug and sod webworm control; Betasan*, a selective herbicide for crabgrass, goosegrass and poa annua control and other weeds in turf; Captan, a fungicide for fruit trees and ornamentals and Vapam*, a temporary soil fumigant for treating garden soils, potting soils and lawn renovating.

These products are available to home users under various private label formulations while commercial users will find them under private labels or the Stauffer label. For more information contact Stauffer Chem. Co.,, Agricultural Chem. Div., Specialty Sales Dept., Westport, CT 0688 1, or use the reply card.

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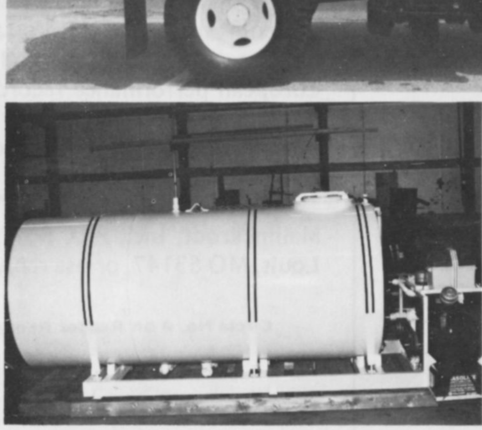

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Nigrospora or Rhizoctonia?

by Malcolm C. Shurtleff, 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.*

What is one of the most serious midsummer disease of fine quality Kentucky bluegrass turf? What causes the roughly circular, yellow or tan to straw-colored sunken areas of dead grass that may or may not have a center of living grass? Some of you would say Fusarium blight. Others might say Nigrospora patch or blight. Still others might say it's a complex caused by species of *Fusarium, Nigrospora, Rhizoctonia, Helminthosporium, Curvularia,* anthracnose, or other fungi attacking grass that is weakened and under one or more of half a dozen environmental stresses. You may *all* be right! Things in the "turf disease world" are rather topsy-turfy at present.

In the past few years several new diseases have been described by turfgrass pathologists. These include reports of (1) *Nigrospora* from Michigan, Minnesota, New York, Texas, and Wisconsin; and (2) Yellow patch from many states, caused by *Rhizoctonia cerealis* a species different from the old large brown patch fungus *Rhizoctonia solani*.

Pathologists believe that these "new" diseases reflect changes in the cultural management of fine quality turfgrass. Furthermore, sod growers and homeowners are planting a large number of new turfgrass cultivars which were tested against several major diseases but not against the diseases that were rare or uncommon or that only attacked grass under stress. It has happened before! When Merion Kentucky bluegrass became widely available about 1950, it was considered highly resistant to all turfgrass diseases. In the next 10 to 20 years, Merion became our most susceptible Kentucky bluegrass cultivar to rust diseases, powdery mildew, stripe smut, and Fusarium blight. In the past 10-15 years plant breeders have released dozens of new turfgrass cultivars. Many of us think that we are falling into the same "trap" again, where very minor or unknown diseases may turn into major problems. Should we be growing blends or mixtures of turfgrasses that differ in their genetic makeup, rather than a single cultivar which may be very susceptible to diseases we don't even recognize at present? Also, are we managing our turfgrasses correctly— to minimize disease and stress?

NIGROSPORA PATCH OR BLIGHT

This disease, in the past two years, is reported to attack not only Kentucky bluegrass but also red fescue and perennial ryegrasses. Symptoms of Nigro-

Nigrospora

spora at an early or late stage have been confused with Pythium blight, dollar spot, Ascochyta and Fusarium blights as well as insect, chemical, dog, or other injury.

The disease starts off as water-soaked lesions on the leaf blade, or sheath that quickly fade to tan (on certain cultivars they may be surrounded by a deep purple to reddish brown border) or the lesions may be reddish brown to black. The lesions may girdle the leaf blade causing it to die back from the tip, turn tan to brown, then wrinkled and curled. On some cultivars the dying leaf turns deep purple and a uniform lesion extends downward to the leaf sheath.

Nigrospora blight or patch resembles dollar spot and Pythium blight when the air is saturated with moisture and a fluffy white mycelium grows up and over the grass blades.

At a later stage, severely affected patches of grass appear yellow and sunken giving diseased turf a pock-marked appearance. Large areas may be uniformly yellow and blighted.

Nigrospora blight or patch is believed to be caused by one or more cosmopolitan fungal species (*Nigrospora oryzae* or *N. sphaerica*) with a wide host range that includes many members of the grass family (wheatgrasses, foxtails, panicums, paspalums, millets, St. Augustinegrass, corn, sorghum, wheat, barley, rice and sugarcane). Nongrass hosts include tomato, potato, apple, clovers, pine, oak, banana, palms, casterbean, coffee, cotton, and peanut.

Nigrospora has long been considered to be a weak pathogen that only attacks plants growing under an environmental stress such as drought or poor and unbalanced fertility. It is a normal component of many tropical and temperate soils and is one of thousands of different fungi and bacteria that feed on dead organic matter in the thatch and soil.

Yellow patch

To best control Nigrospora, avoid putting the grass under stress

Nigrospora produces comparatively large (10-17 microns), shiny, black, football-shaped spores that are borne singly. It is easily distinguished from other fungi under a dissecting microscope. The smooth black spores are borne on short branched condiophores that push their way out through the stomata.

The *Nigrospora* fungus survives as spores and mycelium in host debris and soil. During warm-to-hot weather the spores are splashed, blown, or carried to healthy grass leaves by turf equipment, shoes, or other means. The spores germinate in a film of water and produce abundant white mycelium. Infections occur where the aerial mycelium contacts healthy leaf tissue. Like the Sclerotinia dollar spot and Rhizoctonia brown patch fungi, *Nigrospora* is also believed to colonize the leaf tips where the droplets of dew (guttated water) are rich in sugars and amino acids. The cycle is repeated when the fungus produces another crop of spores which germinate, invade healthy grass tissue, and develop mycelium inside the grass plant.

Severe attacks of *Nigrospora* are associated with periods of warm-to-hot muggy nights that have one or more light showers or a dense ground fog that occurs after a period of drought. This is more evident on infertile soils, or where sod has not formed a deep root system

Nigrospora or Rhizoctonia?

Nigrospora patch or blight on Kentucky bluegrass.

in the underlying soil *Nigrospora* apparently does *not* attack turfgrass that has not been weakened by stress.

The best control is to follow suggested cultural practices for the grasses being grown and their use. Avoid putting the grass under stress. This means applying adequate amounts of a balanced fertilizer based on a soil test. Irrigate deeply (to at least a 6-inch depth) and as infrequently as possible to avoid moisture stress. Water on a rising temperature so that the grass surface is dry by late afternoon or evening. Do not mow when the grass is wet. Avoid laying sod or applying herbicides when the weather is hot (above about 85° F.) and humid.

Cultivars of Kentucky bluegrass, red fescue and perennial ryegrass vary in susceptibility. Since more than one race of *Nigrospora* may exist, the same grass cultivars that are resistant in one location may not be resistant in another. Your best source of information on the relative resistance or susceptibility is from the research of Dr. Joe Vargas and his graduate student, Cindy Brown, at Michigan State.

In preliminary fungicide experiments by David Thompson at Cornell University, iprodione (Chipco 26019), cycloheximide (Acti-dione TGF) or cycloheximide with PCNB (Acti-dione RZ), and benomyl (Tersan 1991) provided fair to good control in the field. Fungicides that were insensitive to *Nigrospora* in these and other tests include chlorothalonil (Daconil 2787), anilazine (Dyrene, Dymec), triademefon (Bayleton), thiram (Tersan 75), mancozeb (Fore, Tersan LSR), metalaxyl (Subdue), propamocarb (Banol), ethazole (Koban), and chloroneb (Tersan SP).

YELLOW PATCH
(formerly called "Cool Weather Brown Patch")

This disease usually appears as narrow, yellow, tannish or straw-colored rings, no more than 1 to 2 inches wide, with fairly healthy grass in the center. The patches vary in size from about 2 inches to 3 feet in diameter. Many of the circular patches may merge to form a mosaic pattern. Symptoms usually occur suddenly. Newly sodded bluegrass (less than 3 years old) is most severely damaged, especially if placed on a poorly prepared, infertile, heavy clay soil.

Yellow patch may be transitory, lasting several days to a month or more. Severely diseased turf is usually killed but adjacent healthy turf quickly grows back into the diseased areas. White mycelium can often be seen at the crowns of affected plants and grayish tan, mottled lesions appear on the grass blades. The tips of diseased leaves may turn brown or reddish. The roots and lower crowns are often brown or black.

Yellow patch is caused by the fungus *Rhizoctonia cerealis* (sexual stage a species of *Ceratobasidium*). This fungus is distinctly different (to a specialist) than the fungus that causes Rhizoctonia brown patch. *R. cerealis* has binucleate cells, hyphal diameters of 2.8 to 8.7 microns, dolipore septa, and colonies on potato-dextrose agar (PDA) that are white to buff in color. Small (0.3 to 3.0mm), white to buff to dark brown sclerotia are formed in culture.

Turfgrasses susceptible to yellow patch include Kentucky bluegrass, creeping bentgrass, perennial ryegrass, tall fescue, Bermudagrass, and zoysiagrasses. Other hosts of *Rhizoctonia cerealis* include oats, wheat, rye, and probably other grasses where it can cause root decay and a disease called sharp eyespot.

Yellow patch is a cool (50° to 77° F), wet weather disease that occurs in overcast weather from late winter to about mid-spring and then reappears in autumn.

The fertility level does not apparently influence the degree of yellow patch, but adequately balanced fertility may encourage quick recovery of diseased turfgrass when weather conditions improve.

No fungicide controls have been published for the control of yellow patch, but chlorothalonil (Daconil 2787), anilazine (Dyrene), PCNB (Terraclor), iprodione (Chipco 26019), and mercury (PMA, Calo-clor, Calogran)—for use by golf superintendents only—are suggested as possibilities.

Another very similar disease, caused by a related species of *Rhizoctonia (R. zeae)*, has been observed attacking Kentucky bluegrass and tall fescue turf during hot, muggy weather (optimum about 90° F.). Its relationship to the diseases described earlier is unknown.

Fusarium blight, Nigrospora patch or blight and yellow patch all cause roughly circular areas of diseased grass. Fusarium blight and Nigrospora patch occur in hot weather following a period of drought while yellow patch is a cool, wet weather disease. We don't know much about what *Rhizoctonia zeae* causes at present, although researchers at North Carolina State are working on the problem.

In Illinois, we have noticed numerous fungi growing on the outside of decayed Kentucky bluegrass roots tightly appressed to the epidermis. Their role, if any, in this disease complex is unknown at present. Recently, workers in Pennsylvania found one or more basidiomycete fungi (showing clamp-bearing hyphae) associated with dead grass crowns in a rapid midsummer wilt disease of Kentucky bluegrass and *Poa annua*. The wilted grass plants occurred in patterns similar to those of Fusarium blight, Nigrospora patch and yellow patch. The fungal hyphae entered the grass crowns through breaks in the epidermis associated with emerging roots and leaves. The water-conducting tissue of decayed crowns was plugged much like you find in Toronto bentgrass plants affected with Toronto decline disease.

Yellow patch

SUMMARY

Midsummer blight of Kentucky bluegrass, characterized by more or less circular rings of yellow or tan to straw-colored dead grass, that may or may not have a tuft of apparently healthy grass in the center, may be caused by several fungi acting alone or possibly in combination and are associated with environmental and other stresses.

Where does this leave us for control measures? The best advice that I can give is to keep turfgrass growing vigorously and as free of environmental or other stresses as possible. This includes proper watering, mowing, fertilizing, thatch removal, insect and weed control, shade reduction, management of drainage, plus planting a mixture or blend of grasses that differ in their genetic make-up. Of course, the soil at planting or sodding should be fertile, well-drained, deep, properly mixed or prepared, free of compaction, and have a soil reaction (pH) between 6 and 7.

Remember, the shorter the height of cut the greater the stress and susceptibility to damage caused by pathogenic organisms and the slower will be the recovery of the grass from pathogen attack. A chief reason is that when you reduce the cutting height in half (say from 2½ to 1¼ inches) you also reduce the root system in half making the grass vulnerable to drought.

A second basic principle is that most turfgrass pathogens, except the powdery mildews and rusts, exist both as saprophytes and parasites. In other words, these fungi can survive on dead debris in the thatch layer and upper soil and, when environmental conditions are favorable, attack living grass tissue and cause disease.

A third management principle is not to grow more organic matter (as thatch) than can be decomposed or removed from the turfgrass planting. (You all know the detrimental effects of thatch, i.e., poor wetting of the soil and greatly restricted plant growth.) Thatch is removed and broken down into basic elements and plant nutrients by earthworms, other animal life, bacteria, and fungi. If the decay process is equal to the accumulation process, the result will be a great reduction in the number and severity of disease attacks.

The last principle is **not** to "eyeball" a potential disease and jump to the wrong conclusion. Misdiagnosis is all too common and frequently results in poor or no control. Fungicides are sometimes applied to turf when insects, nematodes, dogs, or chemical injury is the real problem. Or the disease is diagnosed and treated as say dollar spot, Pythium blight, Fusarium blight or brown patch when another disease is the problem for which the fungicide is not effective. (Sometimes when the fungicide does not work turf people call this "fungicide resistance.")

Of all the types of economic plants that are grown, correct identification of the pathogens causing disease in turfgrass are the most difficult diagnoses to make. In your position you can't afford to guess— it could mean your reputation and your job. Be right—don't guess.

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PROXOL® KILLS GRUBS AND SURFACE FEEDERS. *FAST!*

There's no need to wait over a month for a grub control to work. Economical Proxol 80SP insecticide readily penetrates thatch to work fast for an effective broad spectrum kill, including grubs and surface feeding sod webworms, armyworms, and cutworms.

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Proxol kills grubs and surface feeders. Fast! Over 150 U.S. distributors and 8 regional TUCO Distribution Centers assure convenient product availability. These same sources also have Acti-dione,® a TUCO broad spectrum fungicide, long used by golf course superintendents, to stop turf disease problems before they start.

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Outside Michigan — 800-253-8600
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616-385-6613

TUCO
Division of The Upjohn Company
Kalamazoo, Michigan 49001

New Spreader

Lakeshore Equipment & Supply Co., Elyria, OH, has produced a new, high-quality rotary spreader designed for professional, multi-use spreading of dry materials such as seed, fertilizer and granular pesticides. The push-type rotary Lesco Spreader is virtually corrosion-resistant with a polyethylene hopper; stainless steel on/off assembly, impeller shaft and axle; Delrin gears and impeller and powder-coat epoxy frame coating; 4.10/350-4 pneumatic tires and ball bearings and zerk fitted wheels. The material capacity of the Lesco Spreader is about 2,700 cubic inches. The weight capacity varies from 50 to 80 pounds depending upon bulk density of material. The full hopper contents can cover from a few thousand to more than 80,000 square feet depending on factors such as particle size and bulk density. The material is metered through the stainless steel on/off assembly and dropped onto the spinning impeller.

An electric power attachment with battery kit to make units self-propelled is in the prototype stage. For more information, contact Lakeshore Equipment & Supply Co., 300 South Abbe, Elyria, OH 44036, or use reply card.

Circle No. 8 on Reader Reply Card

Mobay Names New Sales Rep

Richard Burns has been appointed as the new sales representative for upper midwest territory of Mobay Chemical Corporation, Specialty Products Group. Burns will be representing the Specialty Product Group's expanding line of pesticides to the professional turf, landscaping, commercial lawn care, pest control and other specialty chemical markets. His territory will cover the states of Minnesota, Wisconsin, Iowa, Illinois, Indiana, North and South Dakota, Nebraska, northern Michigan and eastern Missouri. Burns comes to Mobay from a position as Research Technician with the University of Illinois. He graduated from the University in 1977 with a Bachelor's degree in Ornamental Horticulture.

Circle No. 9 on Reader Reply Card

Circle No. 10 on Reader Reply Card

PLCAA Show— '82

by Maureen Mertz, Managing Editor

Once again I have to rate the PLCAA convention and trade show as a complete success. The Third Annual PLCAA Convention was held in Indianapolis, Indiana, November 16, 17 & 18.

Attendance was down slightly from last year. However, those that attended certainly received their money's worth. Arms full of product information were distributed by the 115 equipment and chemical companies that completely filled the 172 space convention hall. The quality of the trade show has improved over the past three years. Equipment companies displaying such products as lawn mowers and aerators were represented for those who are in need of this type of equipment in their business. However, there were a larger number of exhibitors whose products lines deal more directly with the applicator.

There was much knowledge to be gained by attending the educational sessions. The speakers did an excellent job in gearing their discussions toward helping you run your business more efficiently.

Business was mixed with pleasure at the early bird cocktail party on Monday evening— I think Al VanHorn won the polka contest. Another delightful evening was hosted by Chipco (Rhone-Poulenc) on Tuesday evening. All were invited to attend a Bluegrass Festival and I think just about all attended. The evening was truly enjoyable. Thank you Chipco.

The association itself is getting stronger and is financially sound. It is now in a good position to liquidate its debts and begin to increase member services. One goal for '83 is to increase their number of members. In order to do this, three objectives were taken into consideration in regard to membership dues:

1. To raise activities of the association, more members will increase the ability to finance the activities.
2. Broadening the membership of the association. Presently the larger firms dominate the membership which gives them the major voice. It is the desire of the association to have more input and more voices.
3. Equitable distribution, given the size of the firm as to what they are paying in relative contributions.

Taking all this into consideration, the association went out and discovered to pay more dues. As a result, the association has put a new dues schedule into effect. Membership dues will vary from $150 to $500 per year depending on their induvidual sales volume. This is truly a step in the right direction and I commend the association for recognizing and dealing with one of its major problems. I also commend the larger firms for their willingness to contribute more solely on the basis that they can afford more. This should result in giving the association a stronger voice which the industry will need in dealing with government regulatory concerns. Pesticide regulation and the future

Pictured above are a few of the boo

Terry Higgins, Rhone-Poulenc Inc. district manager in Indianapolis, welcomes more than 500 lawn care professionals who turned out to enjoy the food, refreshments and music at the Bluegrass Festival which was sponsored by Rhone-Poulenc's Chipco Turf and Ornamental Products line.

of your business will be one of the major focuses of the PLCAA in the upcoming year. Our industry, according to Jerry Faulring, though it uses less than 5% of the total amount of pesticides in the country, is under the greatest public scrutiny. The lawn care industry as a whole is not prepared to deal with government affairs. It is the desire of the association to form a committee whose purpose will be to plan a program in preparation for the industry's defense as well as its' offense.

Don Burton of Lawn Medic, and newly elected president of the PLCAA, said he would direct his efforts in the association to:

- Pursue the fiscal integrity of the association;
- Vigorously expand the membership;
- Strive to have members and non-members of the industry upgrade their business standards and promote professionalism;
- Take the offensive in regard to pesticide matters;
- Set up the mechanics and the apparatus to monitor and affect the state and local rule making legislation.

The importance of this issue cannot be stressed enough. In the words of Don, "Our business, your business, our industry, is on the line".

The new slate of Officers and Directors elected at the business meeting are as follows: President, Don Burton, Lawn Medic, Inc., Rochester, NY; Vice President, John Kenney, Turf Doctor, Framingham, MA; Secretary/Treasurer, Bill Fisher, Spring Green Lawn Care Corp., Plainfield, IL. Serving a three year term on the Board of Directors are: James Marria, Perma-Green Lawn Co., Boise, ID; Charles Mc Ginty, McGinty Brothers, Inc., Long Grove, IL; James Sackett, Ever Green Lawn Co., Inc., Troy, OH; James Wilkinson, Old Fox Lawn Care, East Providence, RI. Ronald Giffen, Lakeshore Equipment & Supply Co., Elyria, OH will serve a one year term as Associate Member Representative. Dr. Robert W. Miller, ChemLawn Corp., Columbus, OH, was elected to serve a 2nd 3-year term as Regular Member Director. Also on the board with a 1-year term remaining are: J. Martin Erbaugh, John Latting, Ronnie Zwiebel and Richard White; 2-year terms remaining include, Paul Bizon and Des Rice.

AMERICAN LAWN APPLICATOR urges you to join and support the PLCAA. **THERE WILL BE NEW LEGISLATION!** It does not have to be negative, it's up to you to get involved NOW, before all the regulations are written for you. ALA will run a column in each issue to keep you informed. John Kenny of Turf Doctor, and the new vice president of the PLCAA, will be working directly on this committee and will be writing the column. Watch for it in each issue, but please, do more than read the column. Support the committee and the association. They need your input, they need your help, they need you if they are going to be effective. This is a serious matter, much more serious than most of you realize. Your industry's future, your future, may very well depend on your support of this important project.

(John Kenny's first column appears on page 29.)

re visited by the 691 people who attended the third annual PLCAA convention and trade show held recently in Indianapolis.

How to Prepare Turf Insects for Identification

by Gary A. Dunn and M. Keith Kennedy

Gary A. Dunn has B.S. and M.S. degrees in Entomology from the University of New Hampshire. His present position is Extension Entomologist in charge of the Insect Diagnostic Lab of Michigan State University. Gary is a member of the American Registry of Professional Entomologists.

M. Keith Kennedy has his B.A. in Biology from Hendrix College and his M.S. and Ph.D. in Entomology from Cornell Univeristy. Keith was formerly Associate Professor of Entomology at Michigan State University and currently is Research Entomologist for Chemlawn Corp..

The first and most important step in controlling any insect pest is accurate identification of the insect or its damage. Many turf insects are easily recognized in the field while others require examination by persons with formal training in entomology. The importance of having unfamiliar insects promptly identified is underscored by the number of "new" turf insect pests that have become serious problems in the last 10 years, for example, black turfgrass ataenius, aphodius beetle, greenbug and winter grain mite.

When "new" insect problems are identified early enough, research can often provide a solution before a serious problem develops over a large area. This is why it is essential for the entire lawn care industry to be on the lookout for new and potentially damaging turf insect pests.

The following discussion will provide you with the necessary information for preserving and submitting turf insects for proper identification. Following these guidelines will help ensure prompt and accurate results.

SOFT-BODIED OR HARD-BODIED?

First decide if the insect is "hard-bodied" or "soft-bodied". All beetles, including billbug and weevil adults, ants, chinch bug adults, flies, mole cricket adults, grasshoppers, wasps and moths are generally considered hard-bodied. Aphids, grubs, chinch bug nymphs, mole cricket nymphs, caterpillars (such as webworms, cutworms and armyworms) fleas, leafhoppers and mites are considered soft-bodied. If in doubt, all specimens (except butterflies and moths) can be preserved and shipped in the manner described for soft-

Sod webworm adults should be preserved dry.

Table 1: Methods of preservation for turf arthropods.

Adults (wings present)		Adults or Immatures	Immatures
Moths webworms cutworms armyworms	Ants Beetles billbugs chafers Japanese beetles May/June beetles Ataenius beetles Big eyed bugs Chinch bugs Flies Grasshoppers Mole crickets Wasps	Aphids Big eyed bugs Chinch bugs Mites Spittlebugs Fleas Millipedes Centipedes Earwigs Leafhoppers Mole crickets Grasshoppers Wireworms Spiders	Billbug larvae Caterpillars webworms armyworms cutworms White grubs ↓ Boiling water or K.A.A. or K.A.A.D.
↓ Dry	↓ Alcohol (or Dry)	↓ Alcohol*	↓ Alcohol

*When in doubt, place specimen in alcohol.

bodied insects (Table 1).

PRESERVING SOFT-BODIED OR IMMATURE INSECTS

Proper preservation of soft-bodied insects, especially larvae (immatures), is the first and most important step in the identification of specimens. It is nearly impossible to observe detailed, often minute morphological characteristics on shriveled, distorted and blackened specimens. Therefore, steps must be taken to prevent this from happening and to assure proper handling of insect larvae from the time they are collected in the field until the time they are received by a diagnostic lab or qualified entomologist.

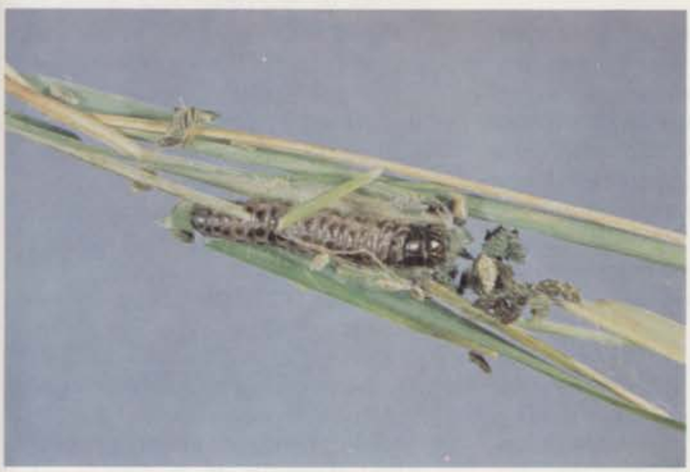
Most adult insects (except butterflies and moths) can be killed and preserved in alcohol (ethyl or isopropyl). This is NOT the case with most insect larvae. Many alcohol preserved specimens will decompose slightly or turn black with age. Therefore, special preservation techniques must be used in order to "fix" specimens and prevent premature decomposition.

Handling specimens in the field:

Try to collect 6 to 12 specimens of the most mature (largest) individuals of each species present including other stages of development when possible. The larvae should be kept alive until they can be properly preserved at the home or office or they can be dropped directly into a vial of larval fixative such as KAAD (see below). Plastic bags and waxed-type cardboard containers work well for holding live larvae. Grass (or soil, in the case of grubs) placed in the container will supply sufficient moisture. Keep all containers out of direct sunlight; keep them in the car under the front seat rather than on the dash board. A styrofoam cooler is ideal for extra protection of live larvae in extreme hot weather.

Preservation in the home or office:

There are two basic ways to "fix" insect larvae. One method uses boiling water; the other method uses chemical solutions. A simple method of fixing insect larvae is to kill them in hot water (near boiling, about 180°F). Heat the water until it begins to boil, then turn off the heat. Place the larvae into the



Sod webworm larvae (left) and white grubs (right) should be fixed with hot water or K.A.A.D. before placing in alcohol.

Preparing Insects for Identification

Adult insects such as Japanese beetles (left) or chinch bugs (right) can be preserved dry or placed directly into alcohol.

hot water; remove them with a strainer or forceps when the water has cooled and transfer to alcohol vials. Large caterpillars and beetle grubs may have to be gently boiled for several additional minutes before they are allowed to cool. Water which is too hot, or boiling too vigorously may cause specimens to burst. Store and transport the specimens in a LEAK-PROOF glass or plastic vial. Use ethanol, isopropyl (rubbing alcohol) or clear 100 proof liquor (gin or vodka) as a preservative. Small, delicate specimens should be confined to the bottom of the vial with a plug of tissue paper (Figure 1). Secure the lid tightly but DO NOT wrap with tape.

Since boiling has the obvious inconvenience of requiring a heat source, an alternate method has been developed which uses chemical solutions to fix larvae. These solutions allow fixating and preservation in the field. Two of the most widely used solutions are:

K.A.A.D.
- 1 part kerosene
- 10 parts alcohol (ethyl or isopropyl)
- 2 parts glacial acetic acid
- 10 parts Dioxane

If Dioxane is unavailable, the K.A.A. mixture (the first 3 chemicals listed) can be used for preservation with adequate results.

Kahle's solution
- 15 parts alcohol (ethyl)
- 10 parts distilled water
- 6 parts Formaline (40% formaldehyde)
- 1 part glacial acetic acid

Very small larvae should be placed in either solution for at least 1 hour while large specimens such as white grubs should remain overnight (12-24 hours). After fixation, the specimens should be transferred to acohol.

PACKING AND SUBMITTING SPECIMENS

Dry specimens— Most adult insects are considered to be hard-bodied and can therefore be preserved dry. Adults can be placed in a dry vial with some tissue paper or cotton added to prevent movement and breakage or packed between layers of loose tissue paper in a small jewelry or pill box (Figure 2). This small box should be taped and packed in a larger box for mailing.

Alcohol specimens— Vials containing specimens preserved in alcohol should be packed in a large carton or mailing tube with 2-3 inches of padding (styrofoam chips, crumpled newspaper or paper towels). The vial should be filled to the top with liquid.

After securing the specimens in the appropriate container, prepare a list of the following information. Please PRINT clearly or TYPE.

(1) name and address of collector
(2) date of collection
(3) where specimens were collected and grass type
(4) description of damage, if any
(5) information requested (identification, habits, control)

Include a small data label **inside** alcohol vials that contains; 1) name of collector; 2) location where specimens were collected; 3) date of collection. Use **pencil** not ink for this label. This ensures that vials will not be mixed up at any time during the identification process.

If possible, mail packages early in the week to avoid weekend layovers at post offices. Remember, if you enclose any type of letter (other than a list of information) in your package, U.S. Postal Service requires that separate postage be paid on the letter.

Please DO NOT: 1) ship live specimens (this is illegal); 2) place specimens in an envelope without any padding; 3) tape specimens to a piece of paper; and 4) put tape on vials.

Most land grant universities operate a pest diagnostic lab or clinic in conjunction with the cooperative extension

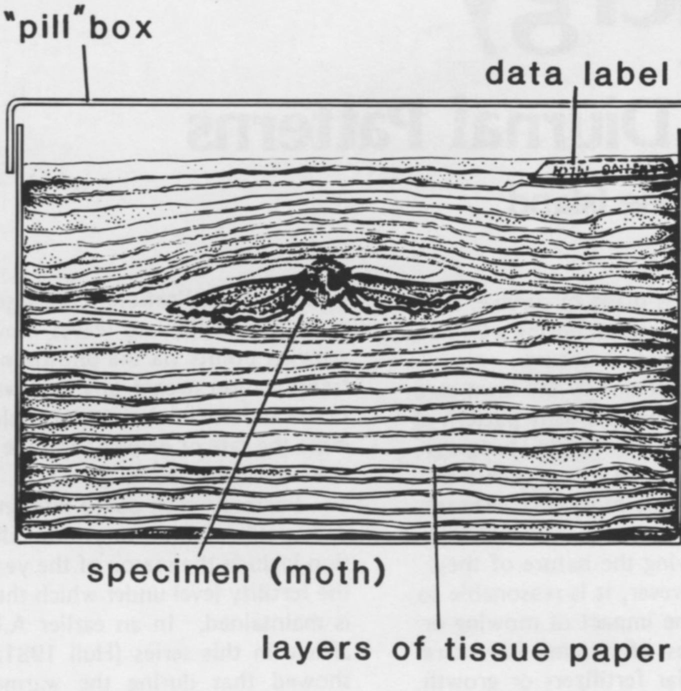


Figure 1: Preservation and shipment in alcohol. This method is ideal for submitting many types of turf insects for identification.

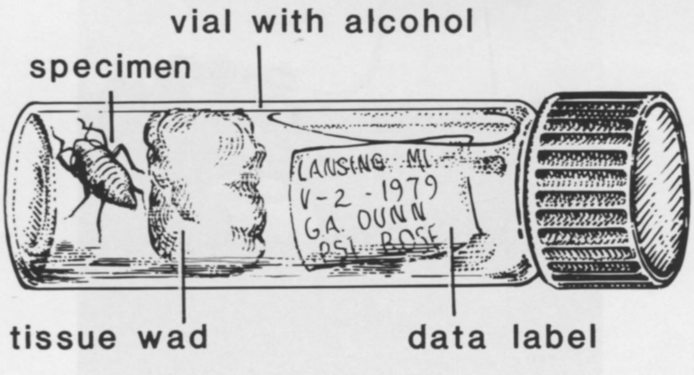


Figure 2: Preservation and shipment of dried specimens. This method should always be used for butterflies and moths; it can also be used for many other hard-bodied insects.

service. Check with your local county agent about where to submit insects for identification. There are also turf research entomologists in various states who will examine new or unusual insect pests, but check with them first before sending specimens.

WHERE TO OBTAIN ENTOMOLOGICAL SUPPLIES

There are several biological supply companies that sell both entomological and other scientific equipment and chemicals such as alcohol, vials, labels, nets, forceps, etc. Screw cap vials in both the 4 and 6 gram size work well for most turf insect specimens. Kerosene can be obtained from hardware stores, and glacial acetic acid can be obtained from either a biological supply house or a local pharmacy. Below are addresses of companies that deal in entomological equipment.

American Biological Supply Co.
1330 Dillon Heights Ave.
Baltimore, MD 21228

Astec Biologicals
311 Bernadette
Columbia, MO 65201

Bioquip Products
P.O. Box No. 61
Santa Monica, CA 90406

Carolina Biological Supply
Burlington, NC 27215

Turtox-Cambosco
8200 S. Hoyne Ave.
Chicago, IL 60620

Ward's Natural Science Establishment
P.O. Box 1712
Rochester, NY 14603

Ward's Natural Science Establishment
P.O. Box 1749
Monterey, CA 93940

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Part 3
Bluegrass Energy Distribution: Diurnal Patterns

by Richard J. Hull, University of Rhode Island

Richard J. Hull is a Professor of Plant and Soil Science at the University of Rhode Island. He received his B.S. and M.S. degrees from the University of Rhode Island in agriculture and agronomy respectively and the Ph.D. in botany from the University of California at Davis. For five years, Dr. Hull studied the physiology of perennial weeds at Purdue University in Indiana. At Rhode Island, his research has concentrated on the nutrition of turfgrasses, woody ornamentals, and tidal salt marsh vegetation.

Light energy captured by grass plants is converted to photosynthetic products which normally accumulate in leaves as starch or sucrose. This chemical energy must eventually be transported to where it is needed to fuel plant growth. In Kentucky bluegrass turf, growth occurs at the tips of tillers and roots, apical meristems, and in the intercalary meristems at the collar and sheath base of emerging leaves. While this transport from photosynthetically active leaf tissue to sites of growth must take place for the turfgrass plant to survive, it is less clear exactly when during a 24 hour day this translocation occurs.

Is this important to the lawn care professional? Does the daily pattern of energy distribution within turfgrass plants influence the effectiveness of lawn management practices? These questions are not easily answered without first knowing the nature of these patterns. However, it is reasonable to assume that the impact of mowing or the effectiveness of systemic lawn care chemicals, foliar fertilizers or growth regulators, might be influenced by the timing of application. Because all chemicals applied to leaves move to growing points via the photosynthate translocation stream, any daily variation in the activity of the stream could determine the rate of delivery and the effectiveness of the chemical.

Factors which could influence the daily pattern of photosynthate distribution include the season of the year and the fertility level under which the grass is maintained. In an earlier A.L.A. article in this series (Hull 1981a), I showed that during the warmest summer months, heavily fertilized Ken-

Figure 1: Apparatus used to expose field grown turf to $^{14}CO_2$. The $^{14}CO_2$ is generated in the small vial glass by reacting $Na_2{}^{14}CO_3$ with lactic acid. The $^{14}CO_2$ is circulated through the bell jar by means of the rubber aspirator pump.

tucky bluegrass turf translocated less photosynthetic product to roots than did lower fertility grass. At that time, we had no indication of how this pattern might vary during the daylight hours. The research reported here explores this question and was first presented at the International Turfgrass Society Research Conference held in Guelph, Ont. last summer (Hull 1981b).

'Baron' Kentucky bluegrass turf was maintained at two fertility levels: 2.5:1:1 and 10:4:4 pounds of N, P_2O_5 and K_2O per 1000 sq. ft. per year. Under Rhode Island conditions, these constitute low and high levels of fertilization respectively. Six-inch diameter circles of turf were exposed to 15 μCi of $^{14}CO_2$ using the procedure described before (Hull 1976 and 1981a) and Figure 1. Grass was exposed to radiocarbon at 8:30 a.m., 12:00 noon, and 3:30 p.m. for approximately 15 minutes and harvested two hours after exposure. Experiments were conducted on bright clear days so daily variation in cloud cover and light intensity would not confuse the results. When harvested, a 4-inch plug was removed from the center of the exposed circle of sod. All soil was washed from the roots and the individual plants were divided into leaf blades, stems including leaf sheaths, rhizomes, and roots. These were dried, ground to a fine powder, and assayed for radioactivity. Because all radioactivity detected in stems, rhizomes and roots was the same carbon-14 which had been fixed photosynthetically by the leaves two hours earlier, it was possible to compare the extent of carbon distribution within grass plants during the three times of the day. This experiment was performed on 5 June, 30 July, and 2 October 1980. A com-

TABLE 1: Diurnal variation in percent distribution of recovered carbon-14 in Baron Kentucky bluegrass turf two hours after exposure to $^{14}CO_2$.

Time of exposure	% of recovered ^{14}C in			
	Leaf	Stem	Root	Rhizome
5 June, 1980				
8:30	82	18	0.4b*	0.04b
12:30	84	15	0.9a	0.21a
3:45	85	14	0.5b	0.05b
30 July, 1980				
8:30	83b	16a	0.7ab	0.13a
12:00	84b	16a	0.5b	0.03b
3:00	86a	12b	1.0a	0.13a
2 October, 1980				
8:30	84ab	16ab	0.2	0.07
12:00	83b	17a	0.2	0.03
3:30	92a	8b	0.2	0.02

***Values in a column for each date followed by the same or no letter are not significantly different at the 5% confidence level.**

Bluegrass Energy Distribution

panion study had been conducted on 'Merion' Kentucky bluegrass plots but the results were essentially the same so only the 'Baron' study will be discussed here.

Generally, within two hours from the time of $^{14}CO_2$ exposure, 85% of the carbon-14 remained in the leaves and approximately 15% had translocated to stems and leaf sheaths *(Table 1)*. Normally less than 1% of recovered carbon-14 was present in roots and only 0.1% was in the rhizomes. Variations around these numbers were significant and demonstrated diurnal pattern. The most rapid transport of photosynthetic product from leaves to stems and leaf sheaths occurred during the morning until shortly after noon. This was most apparent in midsummer. The greatest translocation to roots was observed from noon to afternoon with the time of most rapid root feeding occurring later in the day as the summer progressed. In early autumn, roots received little photosynthate and no diurnal variation was noted. Within the two hour experimental period, rhizomes received little photosynthate and no consistent pattern was detected.

While photosynthetic rates were not measured in this study; the total amount of carbon-14, as measured by its radioactivity, present in the turfgrass plants two hours after exposure to $^{14}CO_2$ did provide an estimate of the photosynthetic activity *(Table 2)*. On all dates, photosynthetic carbon fixation was most active in the morning through noon with a decline observed in the afternoon. Photosynthesis was greater in late spring and early autumn than it was during midsummer. Both the afternoon and midsummer declines in apparent photosynthesis might be the result of increased photorespiration if higher temperatures occurred at those times. However, while 30 July was the hottest of the three days, the highest temperature was normally recorded around noon and not at 3:30 p.m. (Hull 1981b).

Other researchers have reported a mid-day decline in apparent photosynthesis in many crop and wild plants (Neals and Incoll 1968). More recent studies conducted at Purdue University (Nafziger and Koller 1973) have linked an afternoon decline in soybean photosynthesis with starch accumulation in the leaf cells. While not all physiologists agree that starch can inhibit the photosynthetic rate, there is a general recognition that when products of photosynthesis concentrate in leaves a decrease in CO_2 fixation usually occurs. This phenomenom may best explain the afternoon decline in Kentucky bluegrass photosynthesis observed in our plots.

TABLE 2: Total radioactivity (counts) recovered in Baron Kentucky bluegrass turf two hours after exposure to $^{14}CO_2$.

Time of exposure	Total Counts		
	5 June	30 July	2 October
		$x10^{-5}$	
8:30	10.98a*	9:10a	10.48a
12:00	10.87a	9:00a	9.67b
3:30	9.33b	8.45b	9.92ab

***Values in a column followed by the same letter are not significantly different at the 5% confidence level.**

Translocation of photosynthetic products from leaves to stems was more rapid in heavily fertilized grass

The fertility level under which the turf was managed did not alter the diurnal patterns of photosynthate distribution but it did influence the rate of photosynthate translocation to stems and roots *(Table 3)*. In general, the translocation of photosynthetic products from leaves to stems was more rapid in heavily fertilized grass. Within two hours, approximately 60% more carbon-14 was recovered in the stems and leaf sheaths of grass receiving the 10-4-4 lbs/1000 sq. ft. fertilizer rate than was recovered in grass receiving a fourth of that rate. Conversely the low fertility grass exhibited greater photosynthate translocation to roots and rhizomes. This fertility effect was observed throughout the growing season except in early October when roots received little current photosynthate. The photosynthetic rates, as indicated by the total carbon-14 recovered in the grass plants, were greater in heavily fertilized grass than in that receiving less fertilizer *(Table 4)*.

These effects of fertility on photosynthesis and on photosynthate distribution are consistent with the nitrogen responses outlined by John Street of Ohio State University in a recent A.L.A. article (Street 1982). High nitrogen stimulates shoot growth which accelerates the consumption of

TABLE 3: Fertility effects on carbon-14 distribution in Baron Kentucky bluegrass turf two hours after exposure to $^{14}CO_2$.

Fertilizer rate	% of recovered ^{14}C in			
	Leaf	Stem	Root	Rhizome
lbs/1000 sq. ft.				
5 June, 1980				
2.5-1-1	88	11	0.8a*	0.16a
10-4-4	79	21	0.4b	0.01b
30 July, 1980				
2.5-1-1	87a	12b	1.0a	0.14
10-4-4	82b	17a	0.5b	0.06
20 October, 1980				
2.5-1-1	88	12	0.2	0.06
10-4-4	85	15	0.2	0.01

*Values in a column for each date followed by the same or no letter are not significantly different at the 5% confidence level.

TABLE 4: Total radioactivity (counts) recovered in Baron Kentucky bluegrass turf two hours after exposure to $^{14}CO_2$.

Fertilizer rate	Total Counts		
	5 June	30 July	2 October
lbs/1000 sq. ft.		x 10-5	
2.5-1-1	9.98b*	8.33d	8.92c
10-4-4	10.82a	9.37c	11.12a

*Values followed by the same letter are not significantly different at the 5% confidence level.

photosynthetic products thereby reducing product induced inhibition of photosynthesis and increasing the rate of CO_2 fixation. The rapid consumption of photosynthate by nitrogen stimulated growth leaves less remaining for translocation to roots and rhizomes. As a result, root and rhizome growth is depressed and the sod becomes weakened and less able to tolerate stress conditions such as drought, heat, and assaults by disease organisms or insects. Rapid shoot growth at the expense of root development is almost always a prelude of turf deterioration and requires more frequent mowing.

For the lawn care professional, these findings are of interest mostly for their impact on the timing of chemical applications. All chemicals applied to leaf surfaces are expected to enter the leaves and translocate to sites of utilization along with the photosynthate translocation stream. If the production of photosynthate or its translocation from leaves is impaired for any reason, the effectiveness of translocated chemicals will be reduced. This will hold for foliar applied fertilizers, growth regulators, some systemic insecticides, and herbicides. Because the rate of photosynthesis and translocation from leaves is greater during the morning hours, then would be the most appropriate time to apply lawn care chemicals which are expected to translocate within the grass plants. There is much evidence that chemical applications made in the morning are more effective than when made in the afternoon and the findings outlined here might explain why. The reduced rate of photosynthate translocation from leaves in low fertility turf suggests that the timing of chemical applications might be more critical on turf managed at low or moderate fertility. These findings also indicate that summer and autumn applications of chemicals may be more influenced by time of treatment than spring applications.

Bluegrass Energy Distribution

The impact of other lawn care practices may also be better understood when diurnal variation in energy distribution patterns are taken into account. If photosynthate translocation from leaves is greatest in the morning, it may be less injurious to the grass plants to delay mowing until afternoon. By midafternoon, the leaves and stems remaining after mowing should have received the major portion of their daily energy supply and thus be in good condition to maintain root function and continue growth. Irrigation might be most beneficial if applied during the afternoon. At that time, the irrigation water will lower the leaf temperature and alleviate mid-day water stress which may partially offset the afternoon decline in photosynthesis and translocation. Other aspects of a lawn management program might also be reconsidered in light of these diurnal energy distribution patterns but the above suggestions are offered as examples of how this information can be utilized by the lawn care professional.

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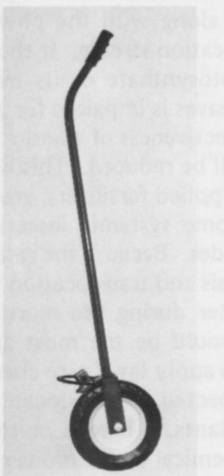
New Measuring Wheel



Now available– an extremely durable measuring wheel for estimating turf areas or measuring other linear distances. Rugged, dependable, solid steel construction and low cost are the features sressed by Professional Turf Specialties of Normal, IL for their new measuring wheel. The wheel can be ordered in your company colors in quantities of 25 or more. For more information contact, Professional Turf Specialties, 400 Northtown Road, Normal, IL 61761, or use reply card.

Circle No. 3 on Reader Reply Card

Menning's New "10 of Diamonds"

Menning Manufacturing, Inc. of Eagan, Minnesota introduces its newest unit, the10 of Diamonds. This unit is a portable cart mounted power washer and tree sprayer combination 20 Gallon poly tank– 1 HP Electric or 3 HP gasoline engine. Hypro 3 GPM piston pump, 0-500 PSI, 25' of high pressure hose, with trigger type spray gun. 10" Semi-pneumantic wheels are standard. Tow bar assembly is an optional item.

Menning manufactures sprays for turf and agriculture, and has over 60 models to choose from. Sizes range from 10 - 1,000 gallons in two lines of equipment. For more information contact Dave Sebold, Menning Manufacturing, Inc., 3227 Terminal Drive, Eagan, Minnesota 55122, or use reply card.

Circle No. 11 on Reader Reply Card

Classified Ads

7600 gallon upright STORAGE TANKS, excellent condition. $1,500 each. Contact : Atwood Lawnspray, Inc., 6489 Metro Parkway, Sterling Heights, MI 48077, Phone (313) 939-3636.

SPRAY TRUCK– 1979 Chevy one ton truck– 750 gallon tank– mechanical agitation– excellent spraying condition– low mileage– must sell–$9200. Call (502) 456-6777, ask for Pat McConnell.

1979 Louisville FORD TRUCK with custom designed storage compartments. 1979 FINN LAWN FEEDER with power take off. Both like new, will sell separately or together. (313) 468-5285.

1968 DODGE SPRAY TRUCK, 6 cyl., 5 ton, 1800 gal. 5 compartment tank. PTO, 300' hose and electric reel. $2500, call after 3:30. (313) 278-0440.

SPYDER FORKLIFT/TRAILER, 200 hours, exc. cond., Zionsville, IN $12,400. Call George (317) 873-5231 or 873-5937.

SPRAYING EQUIPMENT– pump, hose and reel. Price: $300 negotiable. Call Northville MI, (313) 348-6251. Ask for Bob.

1982 SKID SPRAY UNIT– 600 gal., SS compartmentalized tanks, chemical inductor, Myers 2C95 pump, 18 h.p. Briggs engine W/LP gas conversion, electric hose reel with 300 ft. hose. $7250. Call Elkhart, IN (219) 294-3039.

QUALIFIED INDIVIDUAL needed to work my turf spraying business in the N.Y., N.J. area. He or she must be licensed appropriately and be willing to work long hours March - October. Contact Tony Cioffari, Creative Landscaping, 398 Garibaldi Ave., Lodi NJ 07644 (914) 356-2074.

ACCOUNTS WANTED– national chemical lawn care company seeks accounts to acquire. Selling price open for negotiation. If interested, send name, address, phone number and number of accounts available to Dept. B, American Lawn Applicator, 31505 Grand River Ave., Suite One, Farmington, MI 48024.

WANTED TO BUY: Lawn care company in Midwest (Mich., Ill., Ind., Wisc.) area Small to med. size. Chemical turf applications only– no mowing or tree care. Send information to Lawn Care, P.O. Box 361, Grosse Isle, Mich. 48138.

WANTED: Used four wheel self-propelled Hahn or Cushman 120 - 175 gallon sprayer for greens. P.O. Box 191, Brentwood, TN 37027. (615) 794-6646.

WANTED: Dealers/Distributors for Ag Spray Hose. Hose is of finest quality and fully guaranteed. Receive distributor discounts and supplement your winter income. Call Dick Charles, Green Thumb Spray, (516) 485-1919.

Circle No. 12 on Reader Reply Card

Calendar of Events

January

MARYLAND TURFGRASS '83—
January 10 & 11, 1983, New Baltimore Convention Center. For exhibitor information contact Emory Patton, The Turf Center, 1409 Spencerville Rd., Spencerville, MD 20868, (301) 384-6300 or 421-9400, or contact Greg Richards, Professional Turf Corp., 656 Quince Orchard Rd., Gaithersburg, MD 20760, (301) 948-5252. For other information contact Cheryl Gaultney, Maryland Turfgrass Council, Inc., Box 223, White Marsh, MD 21162, (301) 335-3700.

SOUTHEASTERN PENNSYLVANIA TURF SCHOOL & TRADE SHOW—
January 11 & 12, 1983, Westover Country Club, Jeffersonville, PA. Contact Keith Zanzinger, Chester County Extension Service, 235 West Market St., West Chester, PA, 19380 (215) 696-3500).

49th IOWA TURFGRASS CONFERENCE—
January 19 - 21, 1983, Marriot Hotel, DesMoines, Iowa. Sponsored by Iowa State University. For more information contact Norman Hummel, Extension Turfgrass Specialist, 105 Horticulture Bldg., Ames, IA 50011, (515) 294-1870.

February

NORTHEASTERN PENNSYLVANIA TURF & GROUNDS MAINTENANCE SCHOOL—
February 22 & 23, 1983, Luzerne County Community College, Conference Center, Nanticoke, PA. Contact E. V. Chadwick, Luzerne County Extension Service, Court House Annex, 5 Water St., Wilks-Barre, PA 18702, (717) 825-1701.

PENNSYLVANIA TURFGRASS CONFERENCE & TRADE SHOW —
February 28 - March 3, 1983. Hershey Lodge & Convention Center, Hershey, PA. Contact Christine E. King, Executive Secretary-Treasurer, Pennsylvania Turfgrass Council, 412 Blanchard St., Bellefonte, PA, 16823 (814) 355-8010.

March

LANDSCAPE ONTARIO SYMPOSIUM
March 9, 1983 (9:00 to 3:30), Skyline Hotel, 655 Dixon Rd., Tornoto, Ontario, Canada. Sponsored by Ontario Ministry of the Environment, Landscape Ontario & the Ontario Golf Superintendents Assoc. Seating capacity is limited. Pre-registration is advised. For more information contact Landscape Ontario, c/o Helen Haines, 32 LauraLynn Crescent, Agincourt, Ontario M1S 2H5.

Ohio Turfgrass Conference

The Ohio Turfgrass Conference and Trade Show held recently in Columbus, Ohio, once again broke all previous attendance records.

The three day conference was attended by 1964 people who enjoyed seminar topics geared toward lawn care, golf course and grounds maintenence. The exhibit hall was filled to capacity by more than 110 individual companies, encompassing over 200 booth spaces, displaying products geared to all facets of the turfgrass industry. Everyone seemed very well pleased, as the educational sessions were better attended than ever before and the traffic through the trade show was excellent.

Next year the Ohio confernece will move to Cincinnati, December 6th through 8th.

THE THREE GREATEST LIES

One, "Yes, I'll still respect you in the morning." Two, "The checks in the mail." And number three, according to John Latting of the Bulkkem Corp., "Yes, I triple rinsed my containers."

Pesticide Users Problems of the 80's
by John Kenny, Turf Doctor, Framingham, MA

HISTORY:

For thousands of years, tradesmen have gathered together in groups, called "associations", to promote the kinds of quality workmanship and integrity of business practice that would ensure the mutual prosperity of the group. These associations have been quite effective in their self-regulating efforts and the existence of these associations has fostered improved technology as well as quality in performance.

Occasionally, groups of associations which have had common interests in specific problems have band together to form a large group of associations, called a "coalition". These alliances have most often been formed because of a single issue which temporarily binds these multiple groups into a common cause for their mutual benefit. These coalitions have frequently been quite effective in accomplishing their common goals.

History shows that the effectiveness of an association or of a coalition has been dependent upon the strength of the group. Money, power and influence have been the tools of effective alliances such as these and the records of failures have come from those alliances which have not been as financially sound nor as powerful nor as influential as their opponents.

UPDATE:

The exodus of the people from the farmlands to the cities has left a large job, farming, to a very small segment of our society. The tremendous rise in population of our urban and suburban areas has bred another tiny group of quasi-farmers, the lawn care people.

The total number of people in our society today whose jobs include the control of undesirable plant and animal life and the promotion of desirable plant and animal life is very, very small. Yet, the chemicals which are the tools of their trades, which ensure the quality of life for the average citizen, are under attack by extremists. Since the numbers of tradesmen are few, their profits meager, their infulence small, these users of pesticides join associations in order to fight the extremists.

In state after state, town after town, the extremists win battle after battle and pesticide prohibition approaches reality. The small victories by the users-group associations and coalitions are continually obviated by the sweeping losses as the smell of fear permeates our town meetings and city councils. The "grass-roots" groups, made up of citizens who favor a logical "risk-benefit" approach to regulation of pesticide use, are, most often, conspicuous by their absence. They seem poorly organized and their money, power and influence are a poor second best to the extremists and to the paranoia they fester within the wounds of ignorance.

TOMORROW:

The "grass-roots" organizations, the "associations" and the "coalitions" are not yet succeeding at steming the tides of over-regulation.

Money will win this fight, as it has so many times before. Money buys the power to print the news. The news controls how the masses react. The news creates public opinion (it does not reflect it) and the public is the only real influence, since, in the hands of the voter, lies the re-election ballot. Tomorrow's dividends are paid on today's investments and if the resources of the guardians of the common prosperity are not dedicated to the perpetuation of that prosperity, then tomorrow will be a sad day. A sad day indeed.

If we, the lawn applicators, do not fund our associaitons, then we will get what we deserve. This is a classic case where, if we are not for it, then we are against it. No one else will do it for us!

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Business Manuals

Three business boosting manuals for professionals in the Greens Industry, are offered by Green Pro Cooperative Services. These manuals are the same ones used at their profit workshops and busines seminars. Turf Care Profit Manual– shows how to increase profits, get better results to professionalize your business. Ornamentals Need Care, Too– deals with profits from ornamental care, including deep root feeding and winter protection of evergreens. Expanding Into The Turf Care Business– is the title of a new manual written expressly for those looking to get started in– or expand into this business. An invaluable guide exploring the profit potential, capital & equipment needs– what to expect from the business. Contact Green Pro Cooperative Services, 380 S. Franklin St., Hempstead NY 11550, for more information & price list, or use reply card.

Circle No. 14 on Reader Reply Card

Hudson Introduces New Polyethylene Sprayer

Hudson's new polyethylene sprayer is designed for long, reliable service in demanding industrial situations. Available in 3 or 4 gallon capacities, the new Industro sprayer features a tough, polyethylene tank which is corrosion-resistant, light and easy to carry. Additional features which make the sprayer easy to use include: large funnel opening for easy filling, polyolefin pump for fast, easy pump up, curved spray extension for easy reach and accurate placement, and malleable steel handle with comfortable finger-grip design.

The hose and supply tube remove easily for inspection or cleaning. Other top-quality features include a long-life control valve and plunger, pressure indicator/relief valve, and extra-tough hose. For more information on the new Hudson Industro polyethlyne sprayer, contact: H. D. Hudson Manufacturing Company, Professional Products Division, 2500 North Church Street, Rockford, IL 61103, or use reply card.

Circle No. 17 on Reader Reply Card

Pene-Turf Soil Treatment

Pene-Turf Soil Treatment is now available for use in golf course, athletic field and lawn soil management. Golf course superintendents and professional turf managers are beginning to realize the benefits of using Pene-Turf Soil Treatment, says the manufacturer.

Pene-Turf improves permeability and aeration in the soil and aids water percolation. It leaves soil moist and crumbly to depths of 4 feet, and can eliminate isolated dry spots and wet spots. Pene-Turf promotes proper drainage, and makes thatch more permeable and can actually aid chemical incorporation. Pene-Turf helps reduce soil erosion problems. It is non-toxic, non-flammable and completely biodegradable. It won't harm earthworms or beneficial soil bacteria and is safe to use near lakes and streams.

For more information contact Four Star Agricultural Services, Inc., 110½ East Wabash St., Bluffton, IN 46714, or use reply card.

Circle No. 18 on Reader Reply Card

New Cleary Rep

Bill Riden has joined the W. A. Cleary Chemical Corporation as Technical Sales Representative for Western Pennsylvania, Ohio, Indiana and Kentucky. Bill will cover the golf course and professional lawn care market.

Prior to joining Cleary Chemical, Bill was a Senior Technical Representative for O. M. Scott's Pro-Turf Division serving the golf course market. Bill received a B.S. in Agronomy from Penn State University with graduate work in agronomy from the same university.

Dacthal Production Ahead of Schedule

Diamond Shamrock has resumed production of Dacthal herbicide well in advance of the anticipated schedule, at the recently reconstructed Houston, Texas plant. "Dacthal herbicide will be available for the 1983 turf season," noted George Lawrence vice president and general manager of the Agricultural Chemicals Division of Diamond Shamrock. Lawrence also announced that Dacthal will return to the market at the same price at which it was offered in 1981.

Supplies of Dacthal herbicide were interrupted in July 1981 when the Diamond Shamrock plant which produces the herbicide was damaged by an explosion. Reconstruction of the facility began in Fall 1981 shortly after the Diamond Shamrock board of directors approved nearly $20 million in funds for rebuilding.

Dacthal, a widely used proprietary pre-emergence herbicide controls many annual grasses and broadleaved weeds on turf, ornamentals and over 30 crops including onions, garlic, cole crops, strawberries and cotton.

The Agricultural Chemicals Division is part of the Chemical Unit, a Cleveland-based commodity and specialty chemicals operation of Diamond Shamrock Corporation. The Unity employs some 7,000 people in research and production facilities in 18 of the United States and in more than 30 countries around the world. Diamond Shamrock Corporation is a Dallas-based energy and chemical company with 1981 sales and operating revenues of $3.4 billion. For more information on Dacthal contact Diamond Shamrock Corp., Chemical Unit, 1100 Superior Ave., Cleveland, OH 44114, or use reply card.

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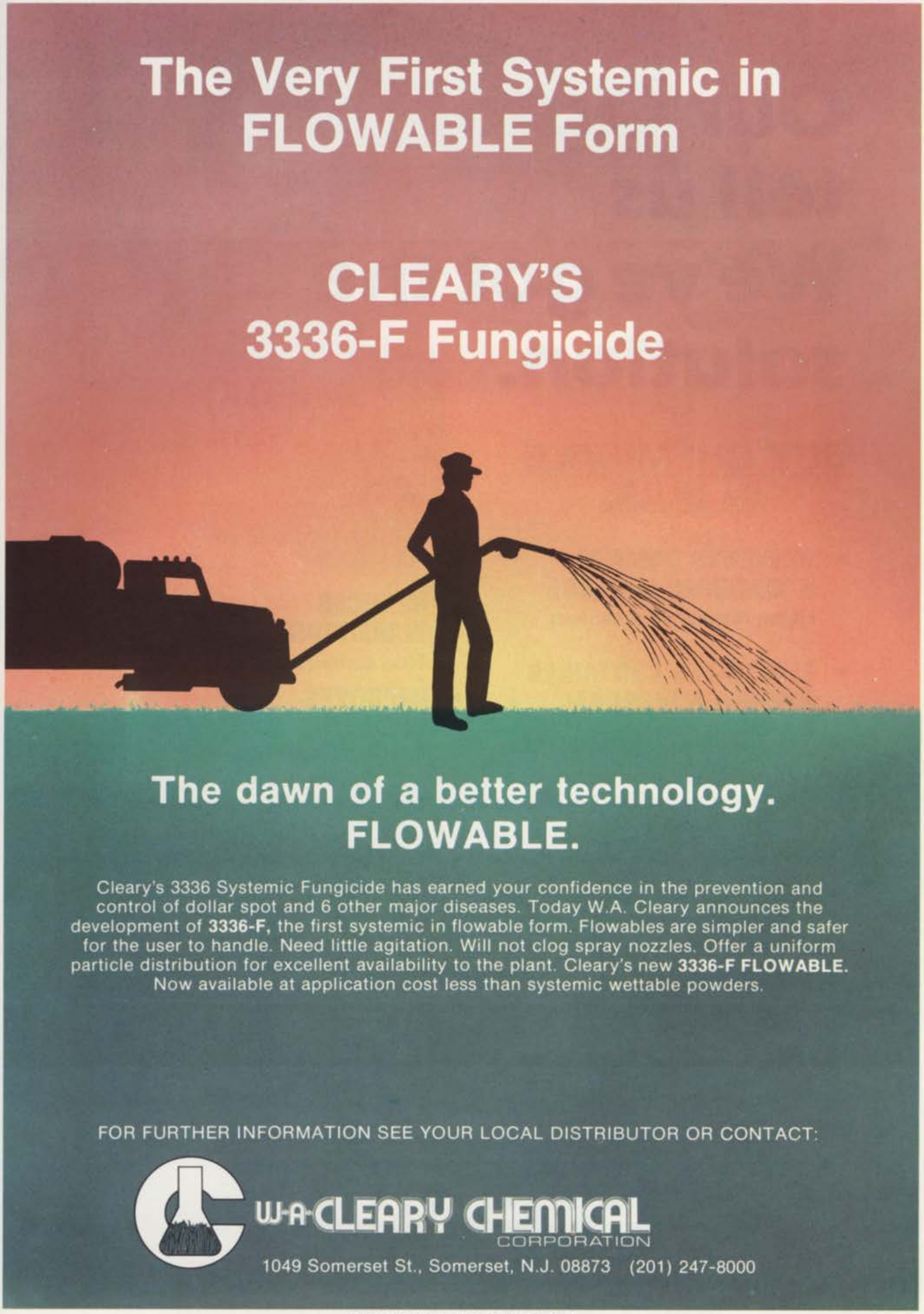

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