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*Customer eligibility for Toro's Unit Down Program, and responsibility for freight and handling options, subject to local distributor option.

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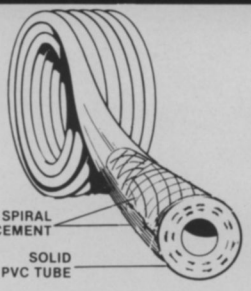

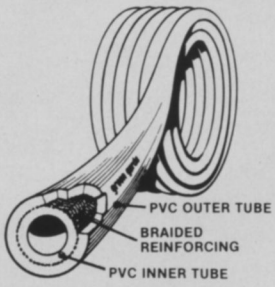

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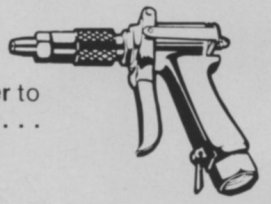

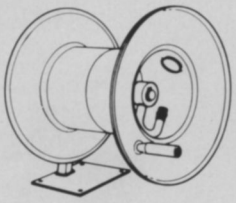

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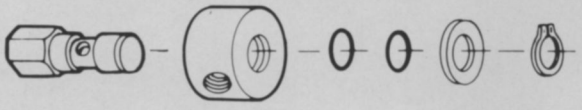

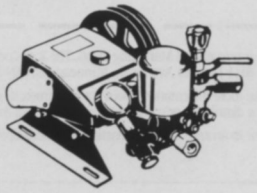

Hi-Performance TRIPLEX PLUNGER PUMPS . . . the choice of successful operators. Rugged! Reliable! Outperforms and outlasts diaphragm pumps! Pumps almost any fluid. Available in six models, from 3 to 35 GPM, up to 500 PSI service pressure. **Nothing else to buy . . .** pumps come with pressure regulator, pulley, glycerine-filled gauge, bypass valve, surge chamber, mounting rails, NPT adapters . . . **ready to use!**

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JANUARY 1987
VOLUME 8 NUMBER 1

ALA

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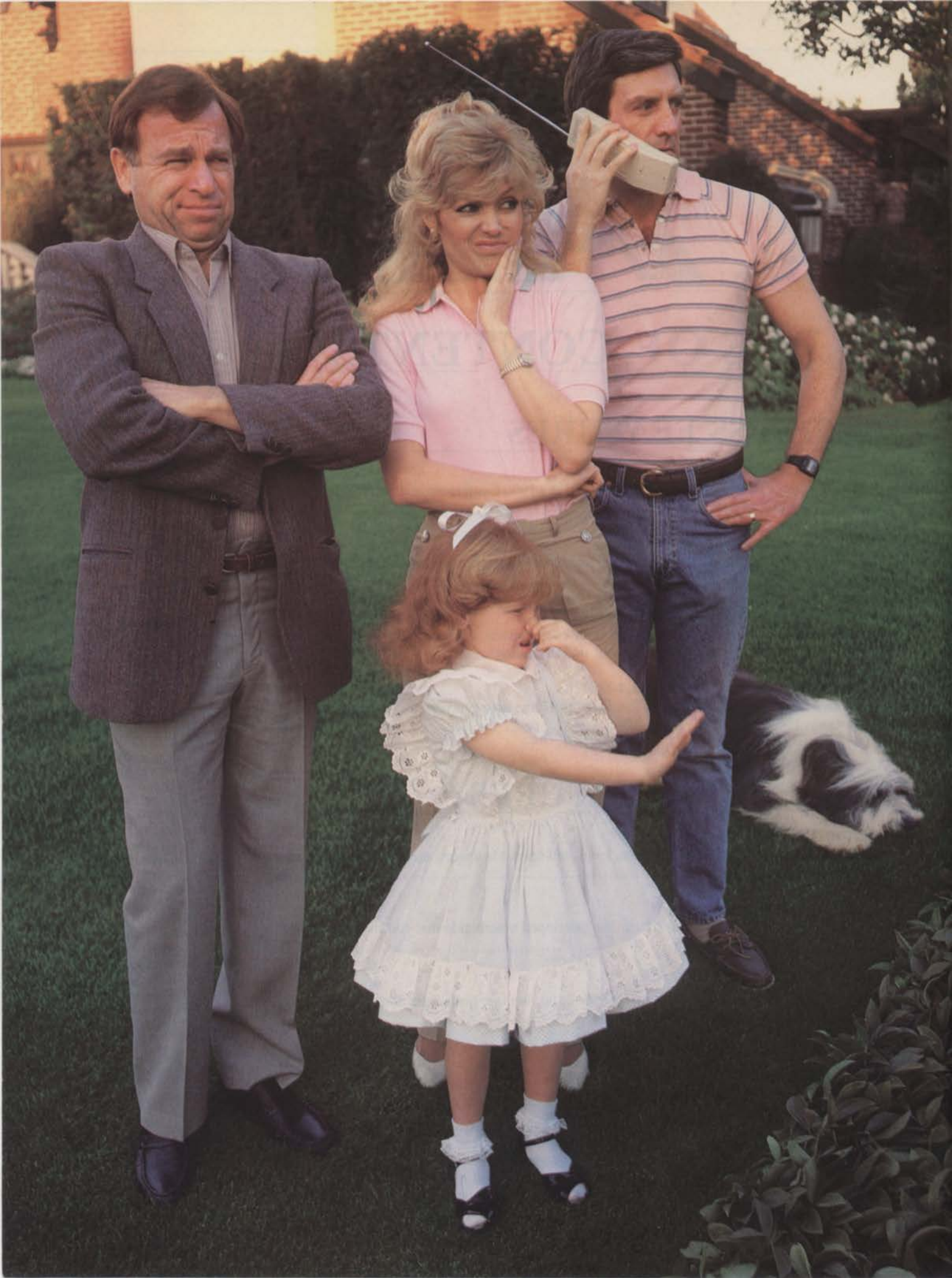
COVER

Interior plantscaping is coming on strong and some exterior professionals are finding that out for themselves.
(Cover photo by Barney Taxel)

ALA (USPS 65747000) is published 12 times per year. One year subscription rates: $18.00 in the United States, $21.00 in Canada, and $60.00 in other foreign countries. Two year subscription rate: $26.00 in the United States. Single copy rate: $2.00. Subscriptions and classified advertising should be addressed to the Cleveland office. Second class postage paid at Cleveland, Ohio and additional mailing offices. Postmaster: Return Form 3579 to ALA, 4012 Bridge Avenue, Cleveland, Ohio 44113.



New DURSBAN: No stink, no squawk, no bugs.

New formulation reduces neighbor complaints.

Let's face it. DURSBAN* insecticide used to have a very pronounced air about it. One that could even trigger complaints occasionally.

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New technology.

DURSBAN Turf Insecticide now contains a more highly purified grade of chlorpyrifos, its active ingredient. And minimizing the impurities has significantly reduced the odor.

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That means you can apply DURSBAN Turf Insecticide whenever it's needed, even on the hottest days. Without worrying about odor-triggered complaints from neighbors or customers. Applicators, who live with it all day long, will appreciate it, too.

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Your chances of getting called back for re-treatment are slight, too. DURSBAN is famous for effective control of most any surface feeding insect you'll encounter. And for its 6 to 8 weeks of residual control, to catch late-arriving insects.

DURSBAN bonds tightly to organic matter in soil as soon as it dries. So it stays put and keeps controlling. Won't wash away. And you can use it with confidence, because it has a proven human safety record.

First in the industry.

DURSBAN insecticide's first label was for turf applications, indicative of Dow's continuing commitment to the lawn care industry. And DURSBAN has earned the industry's respect for its broad spectrum effectiveness, residual control and cost efficiency...which all add up to today's best insecticide value.

New **DURSBAN** Turf Insecticide is available in 2.5 gallon plastic jugs and 55 gallon drums. If you prefer a wettable powder, you can get the same advantages in DURSBAN 50W, now offered in water soluble packets for the easiest, quickest mixing and measuring ever. Whichever you choose, you'll get fewer complaints—from neighbors, or applicators. Get the full story from your chemical distributor today.

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VIEWS ACROSS THE TURF INDUSTRY

WILL YOU BE USING 2,4-D IN 1987?

"Yes, we're going to use it because we really know more about 2,4-D than any of the other products on the market right now. I would rather go with something that I know a little bit more about than use some of the new products which we have less experience with. Obviously, if more studies are conducted and it's really substantiated that 2,4-D is a product we shouldn't be using, then we'll switch." **— Paul Schnare, Accu-Grow Lawn Care, Inc. , Cape Girardeau, Missouri**

"It's an issue that I've given a lot of consideration to and I will begin the season using 2,4-D until conclusive evidence determines it contributes to non-Hodgkin's lymphoma. I know that some of the larger companies have chosen not to use it, but I think that it would be publicized if they had conclusive data 2,4-D was associated with non-Hodgkins lymphoma. Since that is not the case, it must have been a marketing decision." **— Frank Reynolds, Reynolds Lawn Care, Inc., North Haven, Connecticut**

"We hope to be using it. The regulations up here haven't gotten quite so tight as they have in the States. We haven't found a substitute for it, although some people are working on it. If we find something else, we might switch, but I doubt that we would advertise the policy as some of the American companies have. I think it puts a bit of paranoia into the public when a big company like ChemLawn quits using 2,4-D." **— Rhonda Rathbun, F.A.F. Enterprises, Hillsburgh, Ontario, Canada**

CALENDAR

Jan. 18-20
New York State Arborists, ISA Chapter, Conference, Albany Mariott Hotel, Albany, New York. Contact: Margaret Herbst, New York State Arborists, 310 Madison Avenue, New York, New York 10017; 212/986-1160.

Jan. 21-23
Virginia Turfgrass Conference and Trade Show, Marriott, Richmond, Virginia. Contact: J.R. Hall, III, Virginia Polytechnic Institute, Virginia Cooperative Extension Service, Blacksburg, Virginia 24061; 703/961-5797.

Jan. 27
Professional Turf and Landscape Conference, Yonkers Raceway, Yonkers, New York. Contact: John F. Cockerill, Professional Turf and Landscape Conference, 475 Central Avenue, White Plains, New York 10606; 914/693-3792.

Feb. 4-6
Industrial Vegetation Management Association Annual Meeting, Embassy Suite, Irving, Texas. Contact: Robert M. Cope, IVMA, 1015 North 122nd Street, Omaha, Nebraska 68154; 402/498-0881.

Feb. 7
"IQuick Classes" sponsored by the California Landscape Contractors Association, Los Angeles Airport Hilton, Los Angeles, California. Contact: Larry Rohlfes, CLCA, 2226 K Street, Sacramento, California 95816; 916/448-CLCA.

Feb. 10-11
Capital Region Turf and Ornamental School, Holiday Inn, Grantville, Pennsylvania. Contact: James Welshans, Dauphin County Extension Service, 1205 South 28th Street, South Wing, Harrisburg, Pennsylvania 17111; 717/564-6956.

Feb. 17-18
Northeastern Pennsylvania Turfgrass and Grounds Maintenance School, Luzerne County Community College, Nanticoke, Pennsylvania. Contact: Robert Kotch, Luzerne County Extension Service, 200 Adams Avenue, Scranton, Pennsylvania 18503; 717/825-1701.

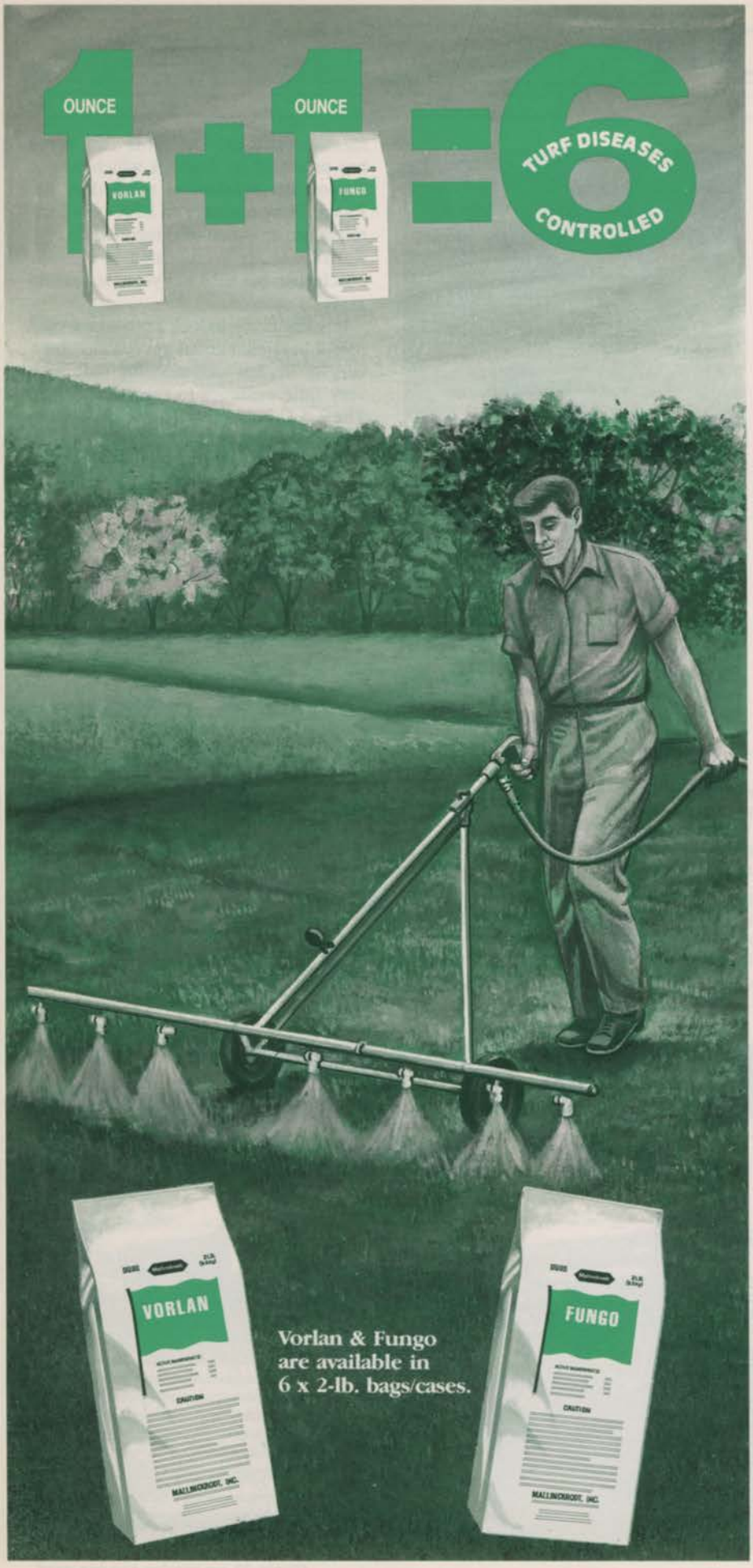
Feb. 21
"IQuick Classes" sponsored by the California Landscape Contractors Association, Radisson Hotel, San Jose, California. Contact: Larry Rohlfes, CLCA, 2226 K Street, Sacramento, California 95816; 916/448-CLCA.

Feb. 23,24
Annual Shade Tree Symposium, Americana Host Farm Resort, Lancaster, Pennsylvania. Contact: Sara Attig, International Society of Arboriculture, 1321 Squire Drive, Ambler, Pennsylvania 19002; 215/643-0413.

Feb. 24-26
Western Pennsylvania Turf Conference and Trade Show, Pittsburgh Expo Mart/Marriott Hotel, Monroeville, Pennsylvania. Contact: Henry F. Meinert, Jr., Meinert Brothers Landscaping, 325 Dorseyville Road, Pittsburgh, Pennsylvania 15215; 412/963-8801.

Feb. 26-27
Tenth Annual Landscape Industry Conference and Trade Show, Regency Hotel, Denver, Colorado. Contact: Diane Matt, Executive Director, Associated Landscape Contractors of Colorado, 3895 Upham Street, Suite 150, Wheat Ridge, Colorado 80033; 303/425-4862.

Send meeting announcements to ALA Magazine, 4012 Bridge Ave., Cleveland, Ohio 44113.



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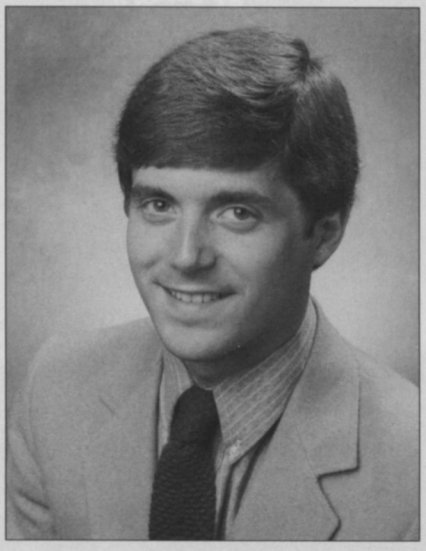
INSIDE STORY

We stand on the threshold of the 1987 turf season. The misadventures of the 1986 season are still with us in the form of ripple effects. This year's media coverage of the lawn pesticide controversy will probably not be as intense as 1986 coverage, but you can bet the same type of stories will resurface at about the same time lawn care trucks once again begin to wind their way through the suburbs. This will also be the year the media moves away from generalities about the dangers of lawn pesticides to focus on specific issues.

The 2,4-D issue is the first and probably biggest issue to be extracted from the big pesticide picture. By now, everyone knows that ChemLawn has discontinued its use of 2,4-D for 1987 and the rest of the industry is now forced to take a stand on the issue. We will have to wait and see how consumers will react to ChemLawn's move, but chances are, if they know ChemLawn has dropped 2,4-D, they will assume it is unsafe and question any lawn care company's use of the product.



The Kansas study linking 2,4-D use to non-Hodgkin's lymphoma seems to be the only research study the media has picked up on — ignoring subsequent developments in the issue. The 2,4-D Task Force has produced its findings which do not support the conclusions reached by the Kansas study researchers. EPA even commissioned an expert who reported that the Kansas study's findings were inconclusive, but EPA has yet to act on this expert's opinion.

It is beginning to look as though a very useful herbicide could get lynched by a very small, but well-meaning mob with very little evidence to support its case. The 2,4-D issue is dealt with in detail in this issue in the article, "The Industry Ponders the Fate of 2,4-D."

Among other things, we also have an article on getting into the interior plantscape trade from the exterior landscape maintenance segment, a PLCAA conference review, and a report on dealing with distributors. Keep reading! ■

Jim Weidner

QUESTIONS & ANSWERS

Q. In May 1985, I treated a lawn that had a large variety of trees on it. They are: Norway spruce, linden, Colorado spruce, basswood, locust, scots pine, muhgo pine, and maple. I used MCPA at the rate of 1 pint per acre, with hand-held equipment, using a Teejet 730308 flat fan at 30 psi, producing 15.8 gallons per minute. The temperature that day was 62 degrees and the wind speed was 2 to 5 miles per hour.

In the spring of 1986, scots pines were showing tip burn, casting of one year and older needles, and twisting of needles was evident. One basswood was showing hypertrophic growth of new foliage with necrosis occurring on leaf edges. The Norway spruce are dying. No pathogens were found. The live spruce exhibited tightly curled shoots from last year. Spruce gall aphids were not associated with this. None are showing epinastic symptoms.

In my opinion, a combination of cold winter, and a lack of fertilizer are the problems here. What is your opinion? — *Larry Bradshaw, Lasu Pest Control, Missoula, Montana*

A. The injury described appears to be MCPA damage. MCPA can injure the tree species listed, either by drift to tree foliage or through root uptake. If a heavy rain occurred soon after application, root uptake by trees could be considerable. Injury symptoms for MCPA include needle twisting, abnormal growth, and dieback, and would be very similar to injury caused by 2,4-D.

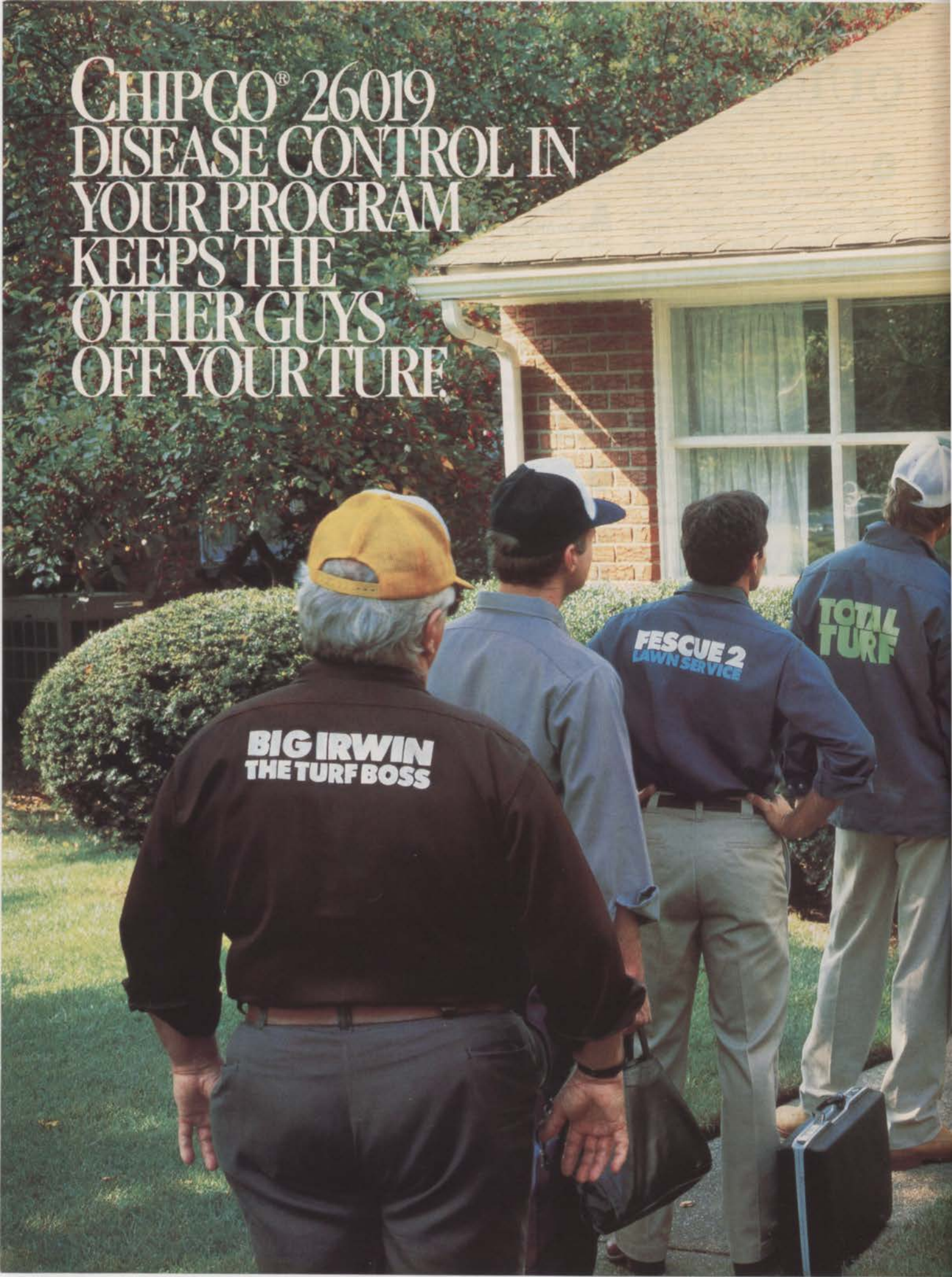
I hope this answers your question. — *Jeffrey F. Derr, Weed Scientist, Virginia Polytechnic Institute and State University, Blacksburg, Virginia*

Q. My customer has a honey locust tree in his yard. He picks up the majority of the leaves with his mower. Is it necessary for him to rake up the remaining leaves? — *J. Olson, Chicago, Illinois*

A. Yes, as many as possible. Leaves from trees tend to release compounds that are toxic to most other types of vegetation, including turf. You should try to remove as many fallen leaves as possible. — *Dr. Joe Vargas, Michigan State University, East Lansing, Michigan*

ASK THE EXPERTS

Do you have a burning lawn care question for a member of our Advisory Board? Address your question to **Gordon LaFontaine**, President of Lawn Equipment Corporation; **Dr. William Meyer**, Vice President, Research, Turf-Seed, Inc.; **Des Rice**, President of Turf Management Systems, Inc.; **Dr. Al Turgeon**, Professor and Head of Agronomy, Pennsylvania State University; **Dr. Joseph Vargas**, Professor of Botany and Plant Pathology, Michigan State University; or **Dr. Patricia Vittum**, Associate Professor of Entomology, University of Massachusetts. Submit your question to **Questions and Answers, ALA, 4012 Bridge Avenue, Cleveland, Ohio 44113; 216/961-4130.** ■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NEWS IN BRIEF

NEW YORK DEC ANNOUNCES REG CHANGES

In 1983, the New York Department of Environmental Conservation (DEC) passed a prenotification law. Now the Department is going to tighten up on this law, according to David Sek, Assistant to the Vice President of Monroe Tree and Lawntender, Rochester, New York. "Apparently, DEC is going to require that we state the date and time of each application along with our prenotification," says Sek. "In the case of a medium-sized company like ours, we are going to have to state the date and time of over 50,000 applications. We are trying to plan what we are going to do once they come out with this policy statement." Sek believes the new rules will be impossible to enforce.

Until now, Sek says the guidelines for prenotification have been fairly loose. Previously, lawn care companies were required to send the DEC a list of each chemical they applied and some precautionary statements on each chemical each spring before the season started.

The first step in the process toward a change in the law will be a "notification of policy" delivered by the DEC. "In the next six months there will be public hearings before it becomes the actual DEC regulation," says Sek. "A small group of people want the DEC to write the law that way. There is no groundswell of support from our customer base or the public in general to do this. It is over-regulating the business and it is definitely an economic burden. It would cost so much to keep trying to prenotify people with specific times and dates that we would never get the work done."

Marilyn DuBois, Chief of DEC's Bureau of Pesticide Management, Albany, New York, is responsible for implementing regulations which impact the lawn care industry. She says her department was responsible for developing regulations for notification as a result of some amendments that were passed in 1983. In 1984, a policy document was compiled on notification for prior to application of pesticides. She says this document was somewhat limited and was prepared under her predecessor. "One of the issues that we determined as a priority for this year was to really upgrade that guidance until we needed new regulations," says DuBois. "We drafted a new enforcement guidance policy for pesticide application notification."

"It is directed toward notification of parties on the premises to be treated," says DuBois. "It is not intended to be a notification document for adjacent property owners. If you were treating a residential yard for pesticide application, you are not obliged, through this document to notify adjacent property owners." The regulation is only intended to provide notification to property owners whose properties are to be treated with pesticides, according to DuBois.

"We require that a copy of the label be part of that notification," says DuBois. "We do not accept modifications of labels that are more promotional than accurate representations of the label information." She says the regulation also has special requirements for what is suitable notification for community pesticide application programs such as mosquito control, right-of-way treatments by utilities, and farmers.

"We will adopt this as guidance policy until we complete our formal rule-making for new regulations," says DuBois. "In effect, when we adopt it, it will be the policy for guidance and will function in lieu of regulations until we complete the regulations." DuBois anticipates the adoption of this policy by the beginning of 1987.

She notes that much of this policy is already in place and on the books. The regulation was simply neglected and misinterpreted. "This was an opportunity to update the document and fill in the gaps where appropriate until we do some rule making, which we hope to do within the next six months," says DuBois.

PLCAA AWAITS EPA STANCE ON 2,4-D

The study by Kansas State University and the National Cancer Institute, linking 2,4-D to potential problems with non-Hodgkin's lymphoma, has given the lawn care industry quite a jolt. With some of the larger companies changing policy on the herbicide, more and more firms will likely turn to the Professional Lawn Care Association of America (PLCAA) for direction.

In session titled, "Meeting of the Lawn Care Companies" at the recent Baltimore conference, PLCAA President Jim Wilkinson reported the Association's Board of Directors has yet to take a stand on 2,4-D, as it currently awaits word on the product's status from the Environmental Protection Agency (EPA).

"The EPA is very much aware of the Kansas State study and is looking at it in the context of the many other thousands of studies that have been done on 2,4-D in the past," said Wilkinson.

"The EPA is also aware of this association's concerns about 2,4-D. They are the experts, the official government body that

(continued on page 18)

PLCAA President James Wilkinson addresses the "Meeting of the Lawn Care Companies."

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Meanwhile, Grasshopper's out-front torsion-action deck eases tight against, even under, obstacles. Eliminating pushmowing, while manicuring rollercoaster terrain with no sweat.

What's more, Grasshopper PTO-driven accessories (including a wide line of three-blade decks, snowthrower, dozer blade and rotary broom), can save you time, money and labor all year round.

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NEWS

(continued from page 16)

has been set up to register these products, and we're going to have to rely upon them for the final determination of the continued registration."

Meanwhile, PLCAA is exploring the possibility of doing an independent review of 2,4-D with the American Council on Science and Health, Wilkinson said. The study might later aid the Association in preparing a position statement for PLCAA.

"We're not certain yet when that is going to be available," Wilkinson said. "But it is something we cannot wait on too long." Also in the session, Wilkinson addressed the matter of state regulation requiring sign posting following application.

The Association has changed its policy on sign posting in favor of voluntary posting, but it is still opposed to legislated sign posting. "The Association feels very strongly that posting regulation is extremely discriminatory," he said. "It singles out commercial applicators and applications to lawns. It does not present any form of health or safety information which would show any of us that the requirement for posting is being done to protect the public's safety and health."

PLCAA presently spends $5,000 to $6,000 per month countering media attacks on the lawn care industry. In 1987, the amount committed to "defense funds" is expected to increase dramatically. To help secure those funds, the PLCAA will increase membership fees in 1987 to a minimum of $100 for smaller companies and a maximum of $1,500 for the largest companies.

CLAYTON AND DUBILIER BUY O.M. SCOTT AND SONS

Clayton and Dubilier, Inc. has agreed to purchase ITT Corporation's Lawn and Garden Group through a newly formed company in a transaction that is part of ITT's ongoing asset redeployment program. Under the terms of the definitive agreement, a new company formed by Clayton and Dubilier and other investors, including management, will pay approximately $150 million in cash and repay intracompany debt for the ITT group, which includes O.M Scott and Sons Company and W. Atlee Burpee Company.

SCOTTS
THE LAWN PEOPLE

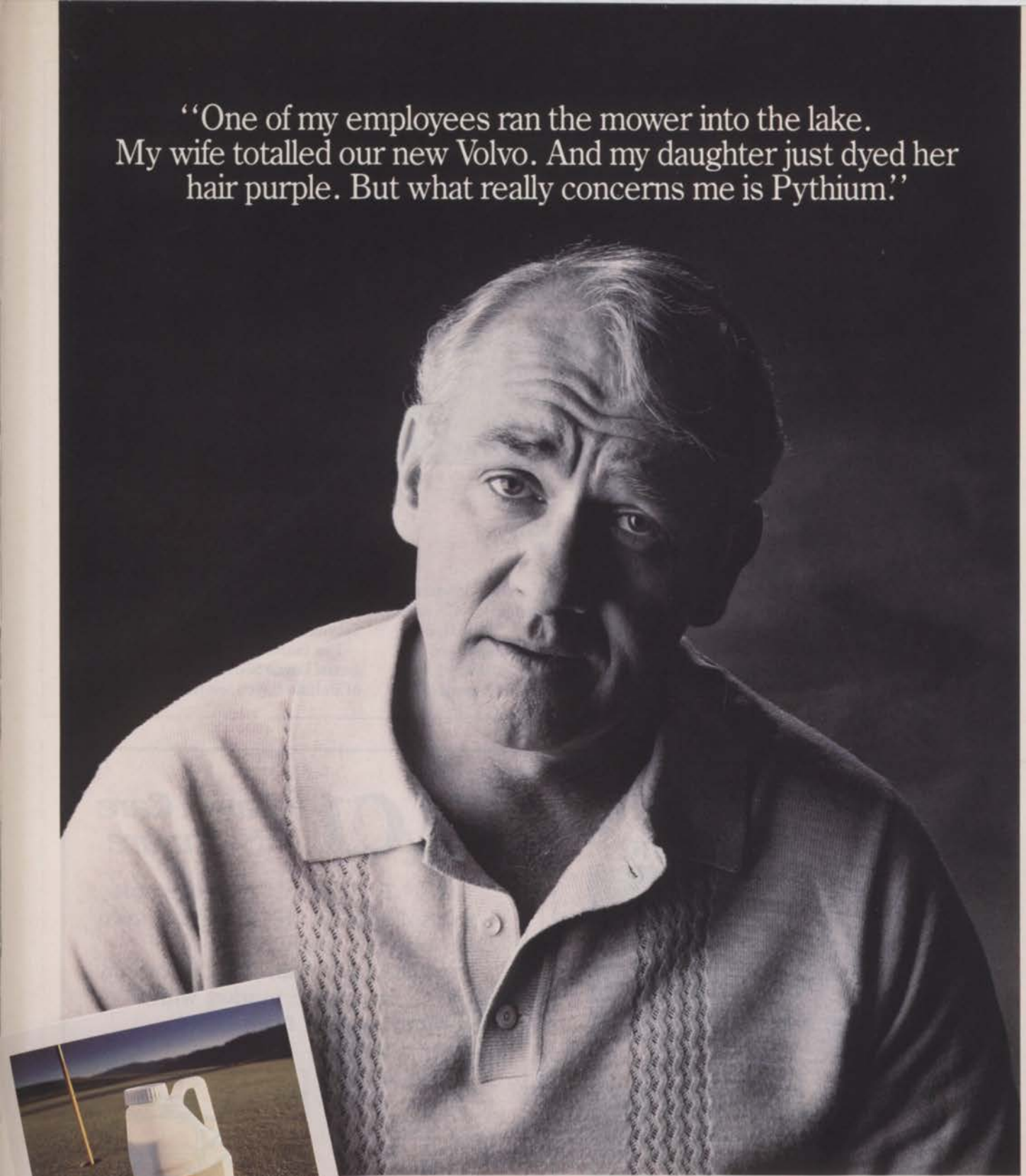
Clayton and Dubilier, Inc., based in New York City, specializes in leveraged acquisitions. The firm manages a substantial pool of institutional capital for management buyout transactions. This is the tenth buyout undertaken by the firm, including such companies as Uniroyal, Inc.; Arnold Foods Company, Inc.; and Harris Graphics Corporation.

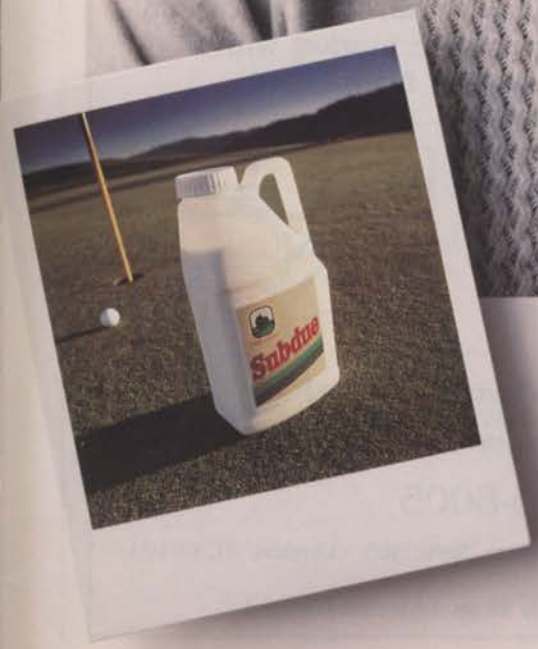
"Scott and Burpee are the strongest brand names in the retail and professional lawn care markets, as well as the home garden market," says Martin H. Dubilier of Clayton and Dubilier. "Scott's and Burpee's managements are aggressively introducing new products and positioning these businesses to compete most effectively in changing markets."

Tadd C. Seitz, President and Chief Executive Officer of O.M. Scott and Sons said that the reestablishment of Scott as an independent company assures that the company will remain headquartered in

(continued on page 20)

"One of my employees ran the mower into the lake. My wife totalled our new Volvo. And my daughter just dyed her hair purple. But what really concerns me is Pythium."





There's one sure way to avoid worrying about Pythium. Use Subdue® fungicide. Subdue stops Pythium on contact. And once absorbed by grass roots, Subdue protects your turf against further attack for up to three weeks. So don't let Pythium get you down. Get Subdue. Because you've got other things to worry about. CIBA–GEIGY

Circle 13 on reader service card

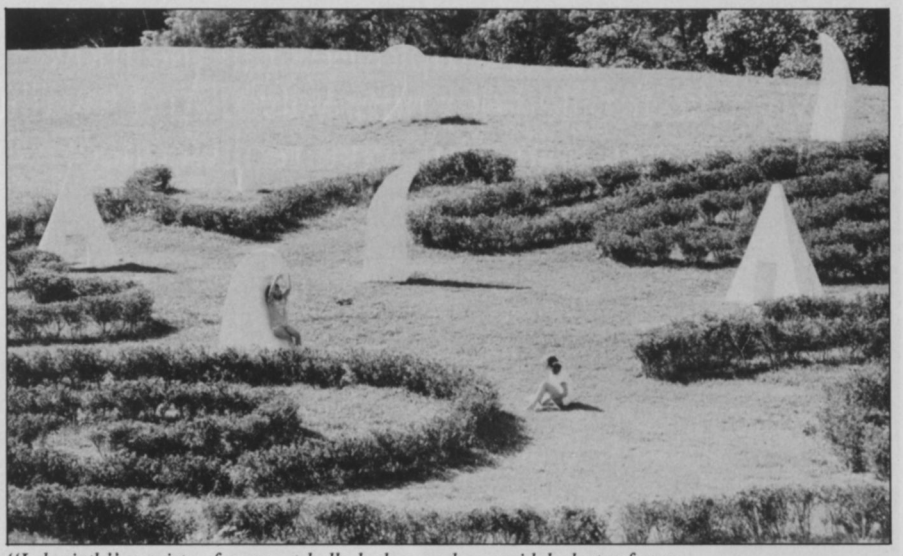
NEWS

(continued from page 18)

Marysville, Ohio "with all aspects of its business the direct responsibility of locally resident management."

ITT's Lawn and Garden Group, whose sales have grown since acquisition by ITT from $64 million to about $200 million, consists of Scott, headquartered in Marysville, and Burpee, headquartered in Warminster, Pennsylvania. The group serves three primary markets: the consumer lawn and garden market through retail outlets; the professional and commercial market, including golf courses, parks, schools, municipalities, lawn care services, and specialty agricultural markets; and the direct-mail home gardening market.

Scott is the nation's leading consumer products company in the do-it-yourself lawn care market, with more than 30 percent of the market. Scott is also a leading provider of turf care fertilizers, seed, and control products to the professional market. Scott was founded in 1868 and operated as a family business and then as a closely-held public company for 103 years before being acquired by ITT in 1971.



"Labyrinth" consists of compact holly hedges and pyramidal plaster forms.

ENVIRONMENTAL WINS LANDSCAPE AWARD

"Labyrinth," a massive landscape sculpture by Washington, D.C. artist Lenore Winters for the 1986 Houston Festival, has won a Distinguished Environmental Improvement Award from the Houston chapter of the American Institute of Architects, the Municipal Arts Commission, and the American Society of Landscape Architects. The award-winning earthwork was installed and supervised by Environmental Landscape Services, Inc.

The piece was commissioned for the annual Bayou Show and built on the banks of Buffalo Bayou, on the west side of the

Studemont Bridge at Allen Parkway. It was sponsored by the Houston Festival, which coordinated the event. In addition to Environmental's donation of more than 200 man-hours, the sculpture was made possible through the efforts of Great Western Growers and Aztec Rentals.

"Labyrinth" consists of living, growing compact holly hedges set in a free-form pattern and punctuated by organic feather, wave, and pyramidal plaster forms, four to six feet tall. It was initially intended to be a temporary display, but because of its popularity, the Houston Festival is seeking sponsorship to make the piece a permanent part of the Buffalo Bayou landscape.

LESCO MAKES FORBES LIST

LESCO, Inc. has been selected by *Forbes* magazine as the 66th best small company in America for 1986. Each year *Forbes* ranks companies with at least $1 million in earnings in a list based on profitability, return on equity, gain in earnings, annual sales, and long-term debt ratio.

To compile the list, *Forbes'* editors studied data from 4,700 companies and selected the top 200 companies to be featured in the November issue. To make the list, the magazine requires a minimum five-year average return on equity of 10.9 percent, profitability has to be 10 percent or better, and long-term debt must be less than equity. The average annual gain in earnings per share must also be at least 9 percent over the last five years. To make the list, companies must also record a five-year average annual sales growth of eight percent or better.

LESCO's five-year return on equity was 22.1 percent, debt/equity ratio was listed at 73 percent, and the five-year growth rate was 38 percent. LESCO is the only green industry company named to the *Forbes* list.

LAWNS ON THE SILVER SCREEN

According to an *Associated Press* wire report, movie director John Hughes ran into some lawn care hassles during the shooting of his new movie, "She's Having a Baby." For a particular scene, Paramount Pictures had to get a bunch of suburban Chicago homeowners to sign releases agreeing that their home lawns could be used. In exchange, the movie company arranged for a landscaper to

power rake, fertilize, seed, and top-dress all 27 lawns after the scene was shot last month. And one couple was paid to postpone needed painting and to let their front lawn go wild, because the home's exterior will be the "fixer-upper" bought by the movie's stars, Kevin Bacon and Elizabeth McGovern.

VIRGINIA RESTRICTS TURFSEED IMPURITIES

The State of Virginia has adopted regulations naming 10 seeds as restricted noxious weed seeds when occurring in certain lawn and turf mixtures. The regulation requires that the noxious weed seeds be listed on the label under the heading "Undesirable Grass Seeds" in order to be more understandable to the consuming public.

Seeds of the following plants are considered undesirable grass seeds when present in bentgrass, Kentucky bluegrass, chewings fescue, hard fescue, red fescue, varieties of named turf-type tall fescue, and varieties of perennial ryegrass or mixtures containing these grasses: Bermudagrass, annual bluegrass, rough bluegrass, bentgrass, meadow fescue, tall fescue, orchardgrass, timothy, velvetgrass, and redtop. These "weed" grasses must be listed by the number of seeds present per pound of turfseed. Buyers beware!

DOW SURVEYS AMINE/ESTER USAGE

Deciding whether to use an ester or amine herbicide can impact performance, the range of weeds controlled, and phytotoxicity. In a recent issue of Dow Chemical Company's *Lawn Care Report* newsletter, the company reported on the results of a survey in which they asked 400 lawn care operators about their herbicide usage.

For broadcast rounds, 62 percent of the survey respondents said they used an amine herbicide, while only 17 percent applied an ester. When it came to spot treatment, the score was basically even. Thirty-eight percent used an ester, while 36 percent applied an amine.

Lawn care operators favored an amine on broadcast rounds for one key reason: Amines are perceived to be less volatile. Those who used esters in broadcast rounds did so because of the added control received on difficult weeds.

That was also the main reason that operators slightly favored esters on spot rounds. When they went with an amine for spot treatments it was, again, because of concerns relating to volatility and off-target damage.

OTF SUPPORTS OSU TURF RESEARCH

The Ohio Turfgrass Foundation (OTF) has approved five research grants totaling $62,500 to Ohio State University. One grant is for the Ohio State University Turfgrass Research Center, and four are to support research by individual instructors. OTF approved a $15,000 grant for the University Research Center for the student payroll; equipment purchases, repair, and maintenance; tools; the Rhizotron; building and grounds maintenance; irrigation; state vehicle maintenance; seed; research materials; a field day; and miscellaneous expenses.

Karl Danneberger, Assistant Professor of Agronomy, received $7,000 from OTF

for two major projects: "Effect of High Temperature Stress on the Survival Rate of Annual Bluegrass Biotypes" and "Development of a Phenological Model for Kentucky Bluegrass."

OTF approved a request for $11,000 from William W. Shane of the Plant Pathology Department to complete four projects: "Investigations into Species Specificity of Bacterial Wilt Strains from Turfgrass," "Detection and Significance of Summer Patch and Necrotic Ring Patch Diseases on Kentucky Bluegrass," "Evaluation of the Anthracnose and Pythium Blight Forecast Models," and "Instrumentation for Assessment of Disease Severity in Turfgrass Plots."

Dr. Harry Niemczyk, a Professor in the Entomology Department, requested and was granted $22,000 for work in three major areas, one of which was four field studies on the fate and movement of insecticides applied to turfgrasses. OTF approved a $7,500 grant for Dr. John Street, Associate Professor of Agronomy, for 13 turf studies, including "Computer Models for Predicting Root Growth of Cool-Season Grasses."

The Ohio Turf Foundation was founded in the early 1960s and first provided funds to OSU in the mid-1960s.

OSU FIELD DAY DRAWS 800 PARTICIPANTS

A glimmering late-summer day and a combined turfgrass and landscape horticulture field day drew nearly 800 participants to the Ohio State University Turfgrass Research Center on September 11. The event, sponsored by the Ohio Turfgrass Foundation (OTF), OSU, the Ohio Agricultural Research and Development Center, and the Ohio Cooperative Extension Service, began with an 8:30 a.m. breakfast and ended at 4 p.m. with adjournment presentations from the OSU Horticulture Faculty.

Dr. John Street (right), Agronomy Department, Ohio State University, discusses plots treated with preemergent and postemergent herbicides for annual grass control.

Dr. Karl Danneberger (left), Agronomy Department, Ohio State University, discusses effects of herbicides and plant growth regulators on control of annual bluegrass.

Among the 10 turf topics covered were herbicide, fertilizer, and fungicide evaluation studies, an insect control update, and growth regulator studies.

Landscape horticulture topics included transplanting research, tissue cultures, overwintering perennials, and weed control in landscape crops.

Directing research at the OSU Research Center are Karl Danneberger, Research Agronomist; Elton Smith, Extension Horticulturist; and John R. Street, Extension Agronomist. ■

PEOPLE

Rhone-Poulenc Inc., Agrochemical Division, Monmouth Junction, New Jersey, has announced the formation of a Chipco® Specialist Sales Group for the turf and ornamentals industries. Representing the growing line of Chipco products throughout the United States, the group currently consists of 13 turf and ornamentals specialists reporting to Sales Manager **Terry Higgins**, in Indianapolis, Indiana.

Business Manager **Dan Stahl** says, "The Chipco Specialist Sales Group is another step in Rhone-Poulenc Inc.'s long-term commitment of over 30 years, to better serve the turf and ornamentals industries with the Chipco product line."

In other news, Turf-Seed, Inc., Hubbard, Oregon, has announced that **Jay Glatt** has retired after serving eight years as Vice President and General Manager. **Darcy Loscutoff** will assume Glatt's duties as General Manager. Loscutoff has worked for Turf-Seed since high school.

John Zajac, Vice President and General Manager of Garfield Williamson, Inc., Jersey City, New Jersey, has been elected President of the American Seed Trade Association (ASTA).

Gilson Brothers Company has recognized outstanding performance by distributors in the sales and service of Gilson products during the past year. Carswell Distributing Company, Winston—Salem N.C., earned the President's Award for well planned, highly successful marketing programs for Gilson power equipment. From left to right are: John Peterson, President (Gilson), Bill Parsley, Vice President (Carswell), Bobby Goins, Sales Manager (Carswell).

A.S.T.A., with over 700 member firms, represents the seeds-for-planting industry. ■

PLCAA UPDATE

To help lawn care operators evaluate and better manage their businesses, results from the Professional Lawn Care Association of America's (PLCAA) second annual Operating Ratio Survey have been made available in the Association's *1986 Industry Operating Performance Report.*

Detailing the green industry's median sales growth for 1985, the report reveals an overall increase of 24.3 percent. More specifically, a breakdown chart shows that sales by chemical lawn care firms have jumped 19.3 percent, while companies focusing on landscape management expanded by a whopping 32.5 percent.

Leading the industry in growth were the Northeast region operators. These firms, in the aggregate, reported a 31.4 percent sales increase. West region lawn care operators were a close second with a 27.9 percent gain, followed by South region and North Central region operators (with sales growth of 22.6 percent and 15.3 percent, respectively).

Once again in 1985, the PLCAA reports that the strongest industry growth was among the smaller size operators (those with less than $300,000 in net sales volume). These industry pacesetters recorded an impressive 37.5 percent sales advance. In comparison, large volume operators (those with $300,000 or more in net sales volume) grew by only 16.3 percent.

Even more significant than the industry's sales growth was the high profitability levels achieved during 1985. Based on the PLCAA survey results, lawn care operators, in the aggregate, experienced a 40.3 percent return on net worth (or owner's investment). This was primarily achieved due to a high profit margin on sales (4.8 percent net profit after tax as a percentage of sales for the "typical" survey respondent).

The strongest profitability performance among the four regions was reported by North Central region operators. These firms experienced nearly 60 percent return on net worth, due largely to tight expense control and high profit margin (net profits after tax as a percentage of net sales) performance.

The 65-page booklet was recently mailed to the PLCAA's 1,000 member companies and included a free, confidential company profile upon request. According to PLCAA, any firm can utilize the material in the same manner, inserting their own figures to calculate and gauge such items as profitability, sales analysis, productivity, and financial management.

Also featured in the report is a section highlighting 1985 lawn care industry performance as related to the U.S. economy and an analysis of significant industry trends over the past two years. A sample company profile illustrates typical fiscal year-end months of lawn care firms and instructions are provided on how to decipher the material's financial data.

PLCAA's second annual survey results and report are available to non-PLCAA member firms at a cost of $150. To obtain a copy write: PLCAA, 1225 Johnson Ferry Road N.E., Suite B-220, Marietta, Georgia 30067. ■

PLCAA's BALTIMORE DEBUT

The PLCAA took its conference and show to the East Coast in 1986 and scored big in attendance and enthusiasm.

The Professional Lawn Care Association of America's decision to hold its conference and show in Baltimore, Maryland turned out to be a good one. The November 17-20 Seventh Annual PLCAA Conference and Show attracted a total attendance of 1703, an increase of 515 attendees over last year's conference in Tampa. PLCAA Executive Vice President Jim Brooks attributes the increased attendance to Baltimore's location. "More companies brought more people because more people could drive in," says Brooks. "They didn't have the cost of flying a bunch of people in."

Brooks notes that there was also more one-day pass attendees on the second and third days of the conference. The new location was also good for drawing new members. The Association picked up over 40 new members during the four-day conference.

In keeping with the conference's growth mode, the number of companies exhibiting at the trade show also grew to 158, an increase of 28 companies over last

OUTDOOR EQUIPMENT DEMONSTRATION

Lawn care professionals got a chance to test a wide range of lawn care equipment at the outdoor equipment demonstration.

Despite the brisk weather, many hearty souls turned out to see approximately 30 manufacturers and suppliers demonstrate their lawn care wares at an outdoor equipment demonstration on November 20, the last day of the PLCAA conference. The demonstration at Baltimore's Carroll Park was the second running of the event following last year's first successful outing in Tampa. The equipment demonstration in Baltimore started at 9 a.m. and ended at 1 p.m.

There is no substitute for hands-on experience and those in attendance got all the hands-on experience they could ask for from as many pieces of equipment as they cared to try. Before it was all over, the field at Carroll Park was undoubtedly the most aerated, dethatched, sprayed, drilled, and mowed piece of property in Baltimore.

Professionals got a chance to aerate with Cushman/Ryan's new experimental aerator and their new Mataway Overseeder, as well as the new Walk-R-Ide aerator from Terracare Products Company. Everything from proportioning systems to post hole diggers got a work out from lawn care operators eager to put the equipment to the test.

Buses were provided to shuttle people from the hotels to the demonstration area and back again at the end of the demonstration. Complimentary coffee and doughnuts provided by LESCO, Inc. helped take the edge off the cold weather.

The trade show (left) was well-attended, as usual, and a large gathering turned out to listen to Charles Garfield (below).

year's show. The trade show hall itself was a distinct improvement over the Curtis Hixson Convention Center in Tampa, according to Brooks. The Baltimore Convention Center was larger and had no columns in the hall to interrupt traffic. "It is definitely one of the nicest convention centers we have been to," says Brooks. "Because of the island configuration we had great visibility in that show. You could almost see back to the walls in lots of places."

EDUCATIONAL SESSIONS. Not to be overshadowed by the success of the trade show, the conference seminars were also well-attended and generated a great deal of interest. In his keynote address, "Strategies for America's Peak Performing Entrepreneurs," Charles Garfield acknowleged the fact that the lawn care industry now faces many obstacles.

"There are all the usual challenges like competition and the changes in consumer habits," says Garfield. "But then there's also the big one that's casting a shadow over all the others — the (bad) publicity about whether chemicals are necessary for life."

Garfield points out that peak performers take whatever situation they are given and make it work anyway. "Having a mission is where your organization should start," says Garfield. "But it's not only mission. It's also a matter of getting results in real time. What are your goals? Does everybody in your orgnization know what they are?"

Be careful not to mistake activity with outcome, he added. "Don't confuse the workaholics of the world with peak performers. Peak performers know how to

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HOPPING AND BOPPING WITH UNION CARBIDE

Once again, the Specialty Products Group of Union Carbide Agricultural Products Company, Inc. treated a group of their key customers and their guests to a fun-filled evening during the PLCAA conference. This time, the revelers were rockin' and rollin' at the Power Plant, billed as the most exciting nightclub on Baltimore's Inner Harbor. The celebration started at 6:30 p.m. on Wednesday, November 19, and didn't end until the club's management turned on the lights.

The entertainment was provided by Gene Vincent and the Cruisers who rocked the house with '50s rock and roll, topped off by an Elvis tribute. Guests were plied with cocktails, hors d'oeuvres, and a prime rib dinner. Everyone left with full stomachs, spinning heads, sore feet, and the opinion that Union Carbide had outdone themselves once again!

Gene Vincent and the Cruisers wowed the crowd with a fun Elvis tribute.

INTERIOR PLANTSCAPES

If you have a receptive market and qualified employees, you could go far in the interior plantscape field.

Interior "plantscaping" and interior plant maintenance is not exactly a new concept, but the concept has been enjoying exceptional growth in the last few years. Industry experts recognize this service as one of the fastest growing segments of the green industry. Growth opportunities in interior plant work have even attracted some exterior landscape maintenance professionals to this specialized service.

A survey of 254 interior landscape companies conducted by the Associated Landscape Contractors of America (ALCA) gives evidence of the profit potential of the interior landscape trade. In the Northeast region, for example, 47.6 percent of the respondents reported that each of their service technicians are responsible for $2,000 to $3,000 in monthly revenue. In the Midwest region, 21.4 percent of the respondents reported gross annual sales of $1 million to $3 million.

Pitcher actually keeps an eye on the progress of commercial construction and pitches his company's service to the building's owners.

While exterior maintenance companies certainly are not flocking to the interior trade, many of those who have made the move have met with success. Milford Landscaping and Maintenance of Milford, Connecticut, has been installing, maintaining, and designing interiors for nine years now. David Pitcher, Milford's Sales Manager, says his company was strictly exterior, but enough interior work fell into their laps by association that they decided to actively pursue the market.

"That is when interiors really started taking off," says Pitcher. "We started off with a small department with a couple people and now the department has grown to about 40 people." In the beginning, the entire interior staff consisted of a horticulturist hired from a local tech school to supply the needed expertise, one technician, and Pitcher, who sold the service.

"We have grown so much now that we have a maintenance manager who is in control of all the maintenance people," claims Pitcher. "We have a manager in charge of just installing new jobs weekly. We have about 300 accounts now."

A construction boom in the Milford area has opened vast market potential for Pitcher's company. Out of 10 buildings, he says nine of them will need interior plantings. "Nine out of 10 of the buildings' tenants are going to have plants and are going to have the service," says Pitcher. "In this area, the designer works on the space through the owner. They always recommend plants and tell the owners to get a service. They know if they don't get a service the plants are going to die."

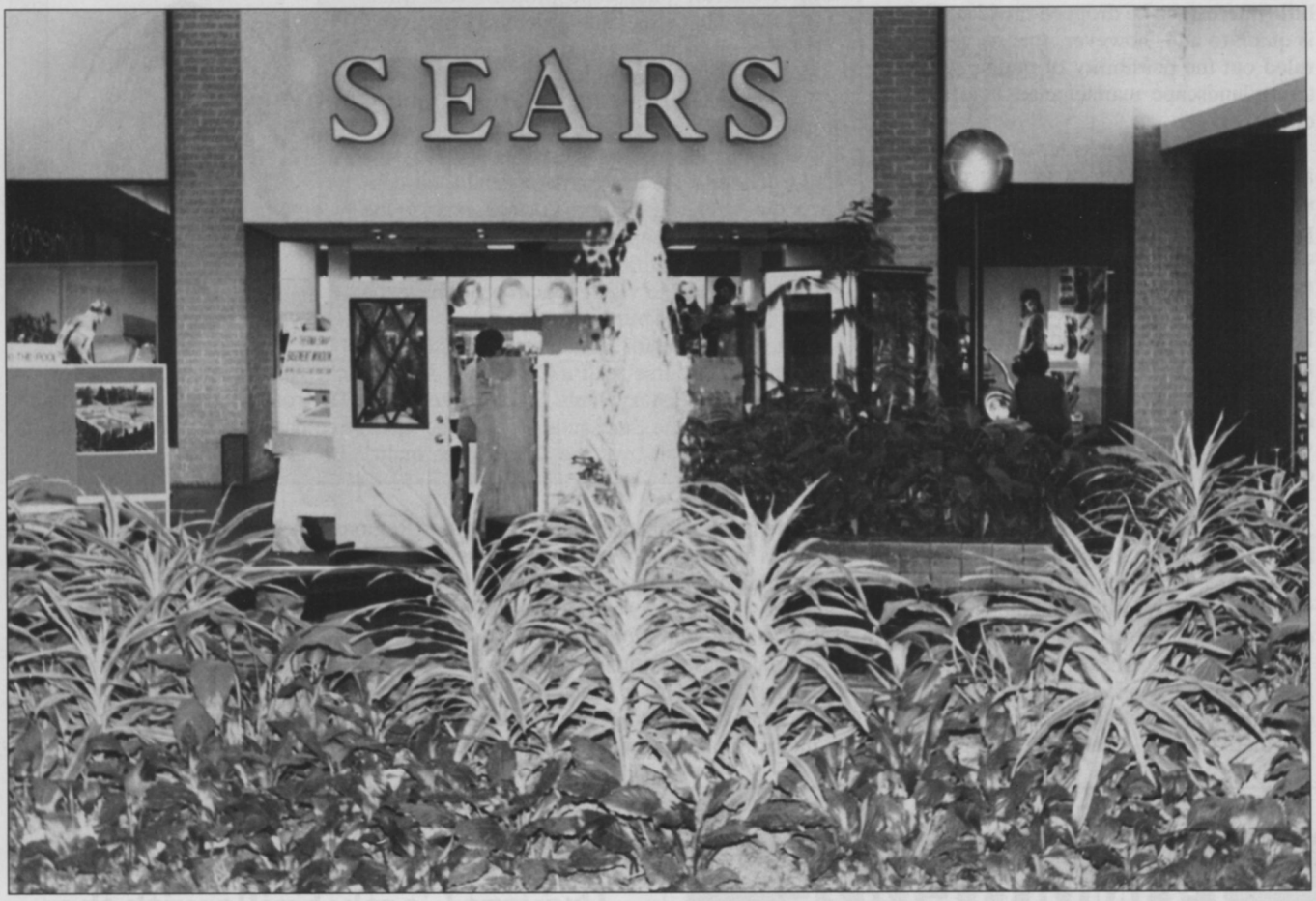
Quality work tends to breed more quality work. Pitcher says designers he has worked with in the past know Milford does a good job and will recommend them to clients with new buildings in need of interior and exterior landscaping. A good relationship with designers is beneficial because a building owner may be shopping for the best price, but a sympathetic designer can put in a good word for you and get you the account even though you didn't submit the lowest bid. "As a salesman," says Pitcher, "I try to stay in tight with designers and architects." Working with exterior landscapes also puts Milford in contact with many architects.

Pitcher actually keeps an eye on the progress of area commercial construction and pitches his company's service to the new building's owners. Once he has secured the exterior landscape contract, Pitcher says the interior contract generally goes hand in hand. "When you know those people there, we just pass it on to the interior division to do the atrium or the lobby area," says Pitcher. "We follow every project from the ground up. As soon as the building is finished, they put plants in the lobby to make the building look beautiful so people will lease the building."

Quite often, Pitcher has seen unequipped exterior landscape companies take on a client's interior work, thinking that the job would be much like the exterior landscaping they were familiar with. Unfortunately, Pitcher says interior plantscapes under the care of the uninitiated will be dead or dying within a year. Of course, this creates a whole new corrective landscaping market for Milford.

Quality, knowledgeable personnel is the key to a successful interior plantscape division, according to Pitcher. "We have a maintenance manager who inspects every site monthly to insure that the technician is doing a good job. We are high on training our people. We have quarterly meetings and training classes for everybody. We also periodically send people to botanical expositions."

Most of the exterior landscape firms in Pitcher's area that have gotten into interior work have been small mom and pop operations because they don't need a lot of equipment or working capital to get started. But other large exterior landscape firms like Milford also have Milford's built-in advantage over the mom and pop companies. "Since we are an exterior company, we already have all the equipment we need," notes Pitcher. "We have 40 people on interior and there is always another 30 to 40 on exterior and at the height of the season, we could have 150 people working here. When we need 15 people from exterior to install a large atrium we can just grab them.



The little companies just can't do that."

Given the right preparation, Pitcher advises any established exterior landscape firm to look into interior plantscapes. "If they are pretty solid on their exterior and they are looking to get into another area, I think they would be foolish if they didn't look into it."

Unfortunately, some well-established exterior landscape maintenance companies have failed in their attempts to initiate an interior plantscape division. Jack Mattingly Associates, Inc. of Charlotte, North Carolina, is primarily an exterior maintenance contractor. At one time, President Jack Mattingly saw an opportunity to service the interior plantscape at a shopping center where he was maintaining the exterior landscape. "We did it and did a very good job, but just could not get the thing to grow," says Mattingly. His primary problem was in finding the right personnel. He says the people he hired were either so good that they left his company and got into business for themselves or they were inadequate and incapable of running that division.

Mattingly got into interior work about seven years ago and got out of it about two years ago. Managerial control was also a problem at that time because Mattingly says his company was growing so fast then that they had a hard time keeping tabs on their budding interior division. Just five or six years ago there weren't many people in Mattingly's area who could be considered interiorscape professionals.

"It looked like it wouldn't be too hard to run that business because you don't have all the facets that you have in exterior maintenance, primarily equipment," says Mattingly. "I don't know why it didn't go. I don't think we really dedicated the time to it management-wise." Those exterior maintenance companies that Mattingly has seen cross-over into interiorscapes are primarily large organizations with sufficient management capabilities to keep the two divisions separate.

In some cases, exterior maintenance companies have shied away from interior work because they found their

Malls offer prime opportunities for interiorscape care.

markets were not receptive to the concept. Richard Hockett, President of Richard's Lawn Care, West Burlington, Iowa, surveyed his market in early 1986 and found little interest, so he dropped the idea. He is quick to add, however, that he hasn't ruled out the possibility of pursuing interior landscape maintenance at a later date.

He believes consumers have to be made aware of the benefits of interior plantscapes in shopping malls and office complexes. In Hockett's area, interiorscape care is primarily the duty of in-house maintenance people. "We had the same problem when we changed over from a lawn care company that did strictly spraying to a landscape management company," says Hockett. "We had a devil of a time trying to educate people on what we were. This year it has totally blossomed for us."

Hockett's market is populated by about 50,000 people employed in light manufacturing and agriculture. Interior plantscapes are a new concept. What little work that is currently available is being done by local garden centers.

In the South, Southeast, and East Coast, Hockett says the concept has really caught on, but in the Midwest, excepting the major metropolitan areas, interior plantscapes are not an aesthetic concern. A service he is looking into more closely is residential interior plantscapes. There are a number of elderly, wealthy people in Hockett's area who would like to have professionals care for their house plants.

The Brickman Group, Ltd., of Long Grove, Illinois does not have an organized interior plantscape division, but Regional Vice President Bruce Hunt can see the potential in this growing market. As President-elect of the ALCA, Hunt has seen tremendous growth in this segment in recent years.

The new tax laws will shake up the whole concept of construction projects as tax shelters, but Hunt says commercial

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INTERIOR PLANTSCAPE NIGHTMARE

If interior plantscape professionals think they will be sheltered from the strange and the bizarre by working indoors, they should think again!

Surinam cockroach

A pest control operator servicing a Pennsylvania shopping mall had a strange encounter with a particular cockroach species several years ago. It seems the exterminator could not control the roaches until he took a specimen to the Pennsylvania Cooperative Extension Service where it was identified as a Surinam cockroach. These tropical and very exotic roaches have the peculiar habit of burrowing in soil.

The exterminator treated the planters in the mall concourse with a Dursban® soil drench. According to Dr. Stanley Green of the Pennsylvania State University, "The roaches came boiling out of the soil by the thousands and for the next three days there were dead and dying roaches all over the floor of the mall." Believe it or not!

DEALING WITH DISTRIBUTORS

What makes a good working relationship between lawn care professionals and their distributors? Both sides speak out.

Business relationships are a lot like personal relationships — they need nurturing and good communication to make them successful. The association between lawn care operators and their chemical and equipment suppliers is no different. Both parties depend upon each other and want a mutually-satisfying rapport.

At times, however, each side becomes disgruntled with certain aspects of their unique partnership. Late deliveries and lack of personal contact upset lawn care operators just as late payments and lack of planning frustrate chemical and equipment distributors. The question is — how prevalent are these problems and can they be remedied in situations where they exist?

"I've got a couple distributors who give me some really outstanding service," says Fred Haskett, President of Greenworld Lawn Service, New Philadelphia, Ohio. "But I also have a few who couldn't even spell the word service, and we do less and less business with them all the time as a direct result."

When Haskett entered the lawn care arena, price determined where he would purchase his chemicals and supplies. "The first couple years I made out a big bid sheet for everybody, sent it to five people, and waited to see what the quotes came back at. I don't do that anymore," he explains. "While price is always important, when there is very little difference in price, the company that is service-oriented will be the one I choose. I will pay more money if I'm getting some reciprocal service."

Like other lawn care professionals, Haskett has changed distributors over the years as he's had the opportunity to work with different suppliers. From his initial years in business to the last three years, he's made a major shift in his primary distributors, based on who delivered quality materials on a timely basis and maintained personal contact with his company.

Haskett became disenchanted with a supplier a few years ago when the company became more bureaucratic in its operations. At one time, Haskett could call the distributor and speak directly with the warehouse manager. He'd order a case of fungicide and it would be shipped that day. "Now it takes five days just to get the order to the warehouse," he complains. "They used to be a consumer-driven, service operation, but now they're too product-oriented."

But more aggressive companies that *are* service-oriented have come on the market, Haskett notes. "And they're in the business to sell us product when we need it. The same guy you talk to on the phone writes the order down, walks out to the warehouse and either hands it to someone and tells him to get it out that day, or he wraps it, stamps it, and puts it on the dock himself. That's important, and I'll pay more for that."

Such personal attention is something many lawn care professionals look for when selecting a distributor. While Haskett still "shops" for suppliers to some degree, he does less and less of it. "I have developed some loyalty to some suppliers based on their loyalty to me," he says. "Basically I will pretty much stay with the people who seem to give a darn about Greenworld's problems."

Some distributors, mostly the older, established firms who are used to dealing with garden centers and golf courses, don't understand the unique characteristics of lawn care companies, according to Haskett, and consequently, they do not effectively service this segment of the industry.

"There are a couple firms whose drivers won't unload the product. They're only responsible to tailgate the product," Haskett explains. "And that's okay if you're at a garden center or golf course — there's always staff present at the facility. But that's not the case in the lawn care industry. My wife can't unload 50 pounds of fertilizer."

On a few occasions, one distributor's driver refused to unload a delivery at Haskett's office site, so he returned to the warehouse 80 miles away with Haskett's shipment on board. When Haskett contacted the president of the company, he was told that there was no way to resolve the problem, even though Haskett suggested he could arrange for a technician to be at the office to unload the truck if the company would schedule a specific delivery time.

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"I really don't think he understood the difference between a garden center and a lawn care service," Haskett explains. "If our people are on site that means they're not generating income."

Hasket is understanding of those distributors who are trying to learn the specific needs of the lawn care market and is willing to work with them. "Lawn care is not that old. We're still a new entry," he says. "We've only been around for 10 or 15 years, and it's really only been in the last eight years that we've become a significant segment of the market. The golf courses and garden centers go back 20 to 30 years."

For those distributors who are trying to gain a foothold in the lawn care industry, Haskett strongly urges them to adapt to the market's problems.

Sales people need to be more than just order takers, he explains. They need to be knowledgeable about lawn care products and how a lawn care business operates. "If you're going to hire garden center people or nursery people or golf course people into your sales force, then that's their orientation," Haskett explains. "If you're really interested in the lawn care market, you should start looking at people who have some background in it. There are lots of people who have moved from lawn care into sales and back and forth, so they're available."

Of course, establishing and maintaining a good relationship with distributors is a two-way street, notes Haskett. The lawn care operator must also be understanding of the distributor's position, particularly when it comes to pricing and payment. First of all, he says, lawn care operators must understand the reality of distributors' margins on pricing; and secondly, they must be honest about their cash flow with their suppliers.

"Prompt payment is something that a lot of us aren't all that good at," Haskett admits, "but keeping close communications about our cash flow with distributors seems to be something that they respond to positively. If I call my distributors and let them know what's going on if I'm a little late, they're a whole lot more understanding and they're very appreciative of that."

"It's the same way with our customers. When I do a good job of communicating with the client, we get a positive response. When we blow it, the customer's unhappy with us. We've found that in situations where we make a mistake, if we take the time to talk about it up-front with our customers, they don't become angry people," he says. "The same holds true for distributors."

Free-flowing communication is important between partners in any relationship. With lawn care operators and distributors, the former must feel comfortable seeking information from the latter, and the latter must be available and willing to help the former.

"If I have a question about a particular chemical or if something's not working right, I'm not afraid to call my distributor and ask them about it," says Glenn Sidder, owner of Eradico Lawn Care Company, Ferndale, Michigan. "They're most willing to give me information. And if they don't know the answer, they'll direct me to where I can get the information."

Through the years, Sidder has come to learn what he can expect from each distributor. "I pretty much know what kind of service they're going to offer me," he says. "There's one that I have that I know I'm going to get minimal service from, but I'm going to get a good price. With a couple other distributors it's a combination of price and service and I have to look at what my needs are from tham at that time."

Sidder works with three or four different distributors and likes to keep them all available to him. It's dangerous for a lawn care businessman to be dependent on one distributor, he says. "You never know when one's going to go out of business, or when one's going to have a terrific price and you want to be able to purchase from them."

Sidder also prefers to work with local distributors. "I don't like dealing with out-of-state people. It's too hard. You miss that personalized service," he explains. "You're just a phone call to them. The local distributors that I work with carry all the different chemicals between them, so I can get anything and they're close."

Steve Bizon, owner of Bizon

Maintenance Company, Wilsonville, Oregon, agrees that proximity is important in choosing a distributor. "If we have a problem, I don't want to go 20 miles across town," he says. "Or if we need chemicals or fertilizer quickly, I like to be able to just drive a couple miles to pick it up."

In addition to choosing a distributor who is located near the office, Bizon looks for a supplier who will work around his company's invoicing schedules. "In some cases we're out 60 days from our customer, so we need someone who might carry us for 30 or 40 days. And if we find somebody who will be loyal to us, we'll be loyal to them as well," he says.

Bizon does not expect a lot of service from his distributors. As a mowing maintenance company, he staffs mechanics and specialists to handle problems that arise within his operation. "We don't call on our distributors very much, so if we can get a better price and maybe give up just a little bit of service, in my opinion it's worth it."

In fact, price has been the only problem Bizon has encountered with his chemical and equipment suppliers. "I wish distributors would have more stable pricing over a year or two period," he says. "It seems like they raise prices every six or eight months for material. And the worst," he says, "is the equipment manufacturers. They raise prices at least 5 percent a year."

Sidder works with three or four different distributors and likes to keep them all available to him. It's dangerous for a lawn care businessman to be dependent on one distributor, he says. "You never know when one is going to go out of business, or when one is going to have a terrific price, and you want to be able to purchase from them."

While prices are not always something distributors can control, there are other areas where they can help lawn care professionals, such as offering them a wide range of quality products. "Lawn care professionals don't want to have to go to 10 different places to get the products they need if they can find one source for everything," says Kenneth Pickett, Executive Vice President/General Manager of Earthway Products, an Indiana-based manufacturing firm which sells its products primarily through distributors.

In addition to having a wide variety of materials, Pickett says, distributors also need to stock a healthy inventory so products are available when lawn care operators need them. They also need to maintain constant contact with their customers, he says, because "if they don't take the responsibility, the lawn care professional is going to go somewhere else."

Anybody who is successful in sales, maintains a good rapport with his or her customers, says Bob Hutchinson of Specialty Market Sales for Countrymark, Inc., Columbus, Ohio. Part of a distributor's responsibility, he says, is to communicate with his customers, keep them apprised of new pricing, and inform them about innovations in the industry.

Hutchinson believes honesty is important to a good relationship between lawn care professionals and their distributors. By being above board and truthful with his customers, he feels he gets the same treatment.

While most lawn care distributors are satisfied with their customer relations, there are two major areas of concern that often crop up — the lawn care operator's ability to meet term arrangements and accurately plan product needs.

"If a lawn care operator suddenly realizes that he's out of product, I think every distributor tries to do everything possible to make sure that company is not down in production — if they don't make a habit of it," Hutchinson says.

A good distributor will come through in an emergency, but he cannot be expected to deliver "yesterday" on a routine basis. Lawn care operators must take the time to assess their product needs and order accordingly. In most instances, distributors are more than willing to help their customers plan accurately.

"I think most lawn care operators try to give a distributor enough advance notice to get products delivered," notes Hutchinson. "Most of them are very reasonable and try to give you enough lead time so that you can deliver when they need it."

While most lawn care distributors are satisfied with their customer relations, there are two major areas of concern that often crop up — the lawn care operator's ability to meet term arrangements and accurately plan product needs. "I think every distributor tries to do everything possible to make sure that company is not down in production," says Bob Hutchinson

Once an order is placed, a lawn care operator needs to uphold his commitment to the quantity desired and the terms of payment, explains Gary Clayton, the new Director of Technical Services for the Professional Lawn Care Association of America. Clayton previously served as Turf and Ornamental Specialist for PBI Gordon Corporation and Operations Manager for Bulkkem Corporation.

"Lawn care operators must recognize that a distributor also has to pay the bills, so the terms of the agreement must be upheld. If payment is due on a certain date, they need to comply with it, or certainly at the very least give the distributor as much advance notice as possible if there is a problem."

Oftentimes lawn care professionals wait until they receive a second invoice from their distributor before bringing cash flow problems to their attention, Clayton says. Don't let the problem come to a head like that, he advises. If a lawn care operator can't meet the terms of the agreement, he should explain why, offer a new arrangement, and ask if it is negotiable.

The lawn care operator/distributor relationship requires give and take, notes Clayton. "The key thing is for both parties to recognize the *elasticity* of their relationship." And, he says, "There should be some stretch in both directions." — *Vivian F. Rose* ■

The author is Assistant Editor of ALA *magazine.*

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SELECTIVE TALL FESCUE CONTROL

Researchers at Iowa State University set off in search of a selective control of tall fescue in Kentucky bluegrass turf.

Tall fescue is a cool season, perennial species that is widely used as a turfgrass throughout much of the central United States. In a Kentucky bluegrass lawn, however, the coarse blades of tall fescue can make it a serious weed problem and patches of this bunch-type grass are among the most difficult weeds lawn care specialists face in many parts of the country.

Tall fescue can be "spot-treated" with nonselective herbicides such as Round-up® , but because of the chemical and physical similarities of these two grass species, no herbicides have been available to selectively kill the fescue without damage to the bluegrass. In 1982, work began at Iowa State University with a herbicide called chlorsulfuron to determine if it has the potential as a selective control of tall fescue in Kentucky bluegrass turf. Preliminary work in herbicide trials had shown that this material discolored tall fescue without damage to bluegrass at low application rates.

Tall fescue disrupts the uniformity of Kentucky bluegrass turf and is considered to be a weed where they are found together.

Chlorsulfuron, a product of the DuPont Company, is a relatively new herbicide that is very active against many broadleaf weed species at rates as low as 0.25 ounces ai/acre. It is presently marketed under the name Glean® in the agriculture market and as Telar® for growth inhibition and weed control in turf.

Initial studies involved the treatment of 4-inch diameter plugs of each species with single applications of chlorsulfuron at rates equivalent to 0.25 to 4.0 ounces ai/acre and split application rates of from 0.25 + 0.25 to 3.0 + 3.0 ounces ai/acre. Split applications were separated by a 14-day interval with the first application applied at the same time as the single application rates. The treatments were replicated four times. The study was repeated in early 1983 using the same protocol.

The effects of the herbicide were very subtle at first and it was not until the fourth week following application that differences in response between the two species

Figure 2. Pots of Kentucky bluegrass and tall fescue six weeks following treatment with chlorsulfuron at the 4 ounce ai/acre rate.

(Left) Figure 3. Field plot with tall fescue on the left and Kentucky bluegrass on the right. (Below)Figure 5. Field plot 8 weeks after treatment with split applications of 3.0 + 3.0 ounces ai chlorsulfuron/acre. The grass remaining in the tall fescue side of the plot is orchard grass. The Kentucky bluegrass shows no damage from the treatment.

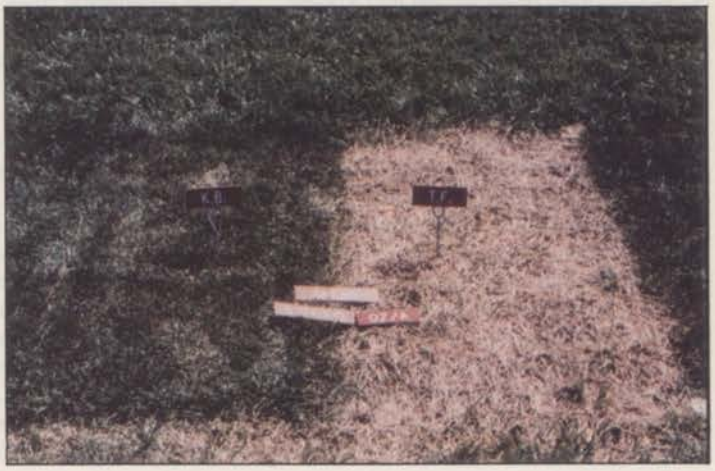
were visible. By the seventh week following application, tall fescue was showing severe damage at higher application rates, with kill ratings ranging from 78 to 95 percent at higher rates. Kentucky bluegrass showed only very slight damage in the first experiment and no damage in the second experiment (Table 1). The data from the greenhouse trial indicated that chlorsulfuron has potential as a selective control of tall fescue, but greenhouse studies are of little practical value without field trials to verify the results.

In June of 1983, two field areas were established from sod at the Iowa State University Horticulture Research

The data from the greenhouse trial indicated that chlorsulfuron has potential as a selective control of tall fescue, but greenhouse studies are of little practical value without field trials to verify the results.

Station. Both areas consisted of 12, 5- by 5-foot plots replicated three times for a total of 36. Each of the plots was divided in the middle, with Kentucky 31 tall fescue on one side and a Kentucky bluegrass blend of 25 percent each of cultivars Parade, Adelphi, Glade, and Rugby on the other side. The experimental areas were established by cutting all sod from plantings of the two species and by using 5- by 2-1/2-foot strips of sod to form the individual plots. The experiments were arranged as a split plot, with chlorsulfuron treatments as main plots and species as subplots.

The same 12 chlorsulfuron treatments used in the greenhouse study were used in the two field trials. Treatments were applied with a hand-held CO_2-pressurized boom sprayer in four passes over the plots



in different directions to insure uniform coverage. For the first experiment, the single application and the first of the split application rates were applied July 11, 1983, while the second application of the split rates was applied July 25, 1983. The second study was initiated on October 1, 1983, with the second of the split applications applied on October 15, 1983.

As in the greenhouse study, chlorsulfuron had little effect on the Kentucky bluegrass. Although there was some slight inhibition of growth at application rates of 3 ounces ai/acre and above (Figure 2), chlorsulfuron had no effect on the visual quality of the bluegrass at any of the application rates in either field study. Tall fescue showed a low tolerance to the chemical and was controlled at rates of 2 ounces ai/acre and above. Even at 1 ounce ai/acre, chlorsulfuron severely discolored and stunted the tall fescue, however, plots treated at the 1 ounce rate did recover by the third growing month after application.

The time required for damage symptoms to appear on the fescue varied with the time of application. Areas treated in July developed visible damage in two weeks. In the cool temperatures of October, symptoms did not

readily develop and severe damage to tall fescue was not observed until spring. Complete kill of tall fescue generally required at least eight growing weeks. Orchard grass occurred as a contaminant in the tall fescue plots. This species was unaffected by the chlorsulfuron (Figure 4).

Roundup® , which will kill green tissue, but does not inhibit seed germination, was sprayed over the area one year from the date that the chlorsulfuron treatments had been applied to eliminate all existing grasses from the test area. Two weeks later, all the aboveground tissue was removed to a 1-inch mowing height. An overseeder was used to reseed Kentucky bluegrass at the rate of 1.5 pounds per 1,000 square feet into the plots previously treated with chlorsulfuron. The study was irrigated daily for two weeks until germination was observed and then irrigated regularly to prevent moisture stress. The objectives of this part of the study were to determine if carry-over from the chlorsulfuron would inhibit germination of the bluegrass.

Kentucky bluegrass seed germinated 10 to 14 days after being seeded into Roundup-treated areas regardless of previous chlorsulfuron rate. Kentucky bluegrass covered 100 percent of all plots and no herbicide carryover was observed at any chlorsulfuron rate during establishment or in the months following establishment.

It is important to note that this was an experimental use of chlorsulfuron. The material is not labeled for the control of tall fescue. The rates used in this study are also several times higher than those recommended on the label. Will it be labeled for this use in the future? There is no indication at this point that it will. Labeling a herbicide for use in the ornamental market is very expensive and a sufficient sales volume would have to be assured to cover those costs. Also, chlorsulfuron has been observed to damage some ornamental trees and shrubs and it must be very carefully used around any landscape plants. This could limit its use in the turf market and more research on the product would be required before labeling it for tall fescue control.

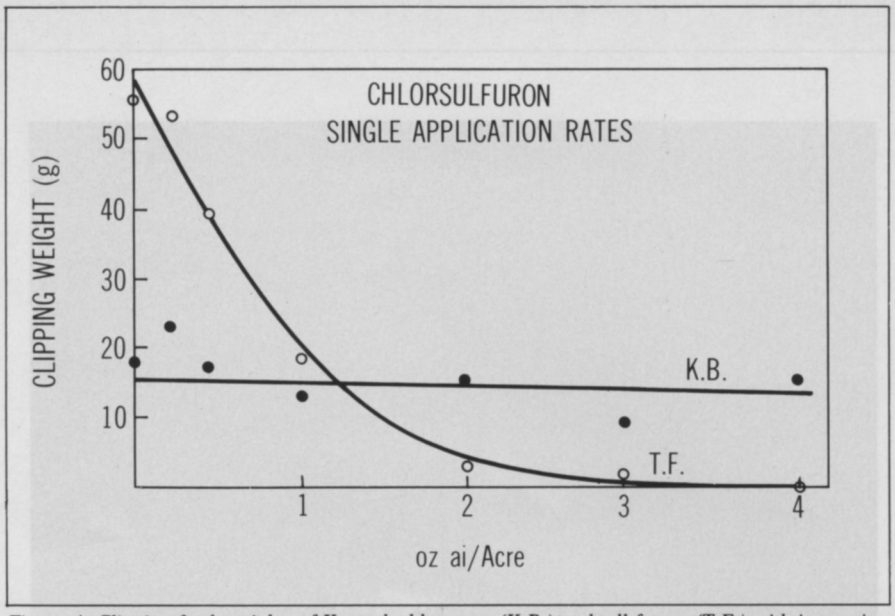
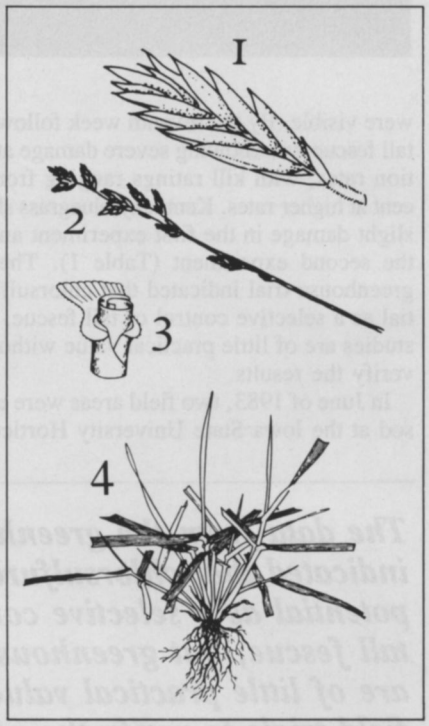


Figure 4. Clipping fresh weights of Kentucky bluegrass (K.B.) and tall fescue (T.F.) with increasing single application rates of chlorsulfuron following July treatments in the field study.

Perhaps the most useful part of the studies discussed above, is the finding that a herbicide exists that can select between two such closely related species as Kentucky bluegrass and tall fescue. Much progress has been made in the last two decades in the development of new herbicides and there is a trend toward ever-increasing selectivity. Knowing that these physiological differences exist, and eventually understanding the basis for these differences, could lead to the release of ever more useful materials for the turfgrass industry. — *Nick Christians, Brian Maloy, and Dorothy Larocque* ■



Tall fescue, (Festuca arundinacea:) 1) spikelet; 2) inflorescence; 3) rolled vernation; 4) whole plant.

CHLORSULFURON RATE	PERCENTAGE KILL RATINGS			
	EXPERIMENT I		EXPERIMENT II	
	KENTUCKY BLUEGRASS	TALL FESCUE	KENTUCKY BLUEGRASS	TALL FESCUE
Control	00	00	00	00
0.25	00	00	00	00
0.50	01	00	00	03
1.00	00	05	00	18
2.00	01	32	00	53
3.00	00	43	00	73
4.00	04	78	00	95
0.25 + 0.25	01	01	00	01
0.50 + 0.50	00	16	00	25
1.00 + 1.00	05	48	00	64
2.00 + 2.00	01	86	00	95
3.00 + 3.00	06	88	00	95
LSD 0.05	04	21	NS*	24

Table 1. Percent kill ratings for Kentucky bluegrass and tall fescue in the seventh week following treatment by chlorsulfuron.

The authors are Associate Professor of Horticulture at Iowa State University, former graduate student, and former undergraduate student of Horticulture, respectively. *Trade names are used for convenience of the reader and do not constitute an endorsement of products mentioned by the authors or by Iowa State University.*

A PHOTODYNAMIC HERBICIDE

Researchers at the University of Illinois have developed a photodynamic herbicide formulation that controls broadleaf weeds in bluegrass.

In 1984, we described the development of a new concept in the design of herbicides and demonstrated the phenomenology of the process by using a harmless amino acid, aminolevulinic acid (ALA) (1). Aminolevulinic acid is the precursor of all tetrapyrroles in plants and animals. Tetrapyrroles are a complex family of heterocyclic organic compounds to which belong all chlorophylls (Chl) hemes and their porphyrin precursors. By spraying plants with ALA, the latter is converted to various tetrapyrroles by the plant cells. In the light, some of the tetrapyrroles photosensitize the formation of singlet oxygen in susceptible plants. This in turn triggers a destructive free-radical chain reaction. Death follows soon thereafter (1).

The molecular basis of plant susceptibility to ALA-based herbicides has been shown to reside in the manner by which a particular plant species forms its Chl, or in other words, the manner by which it acquires its green color (2). For example, green plants have been shown to belong to one of four greening groups.

Dark divinyl/light divinyl (D DV/L DV) plants such as cucumber, purslane, and mustard accumulate mainly divinyl protochlorophyllide at night (3,4). Monovinyl (MV) and divinyl (DV) protochlorophyllides are Mg-porphyrins that are quasi-terminal precursors of Chls. At daybreak and later in the day, the "D DV/L DV" plants form Chl mainly via the monocarboxylic DV Chl biosynthetic routes (routes 2 and 3 in Figure 1) (4,5). On the other hand, dark monovinyl/light

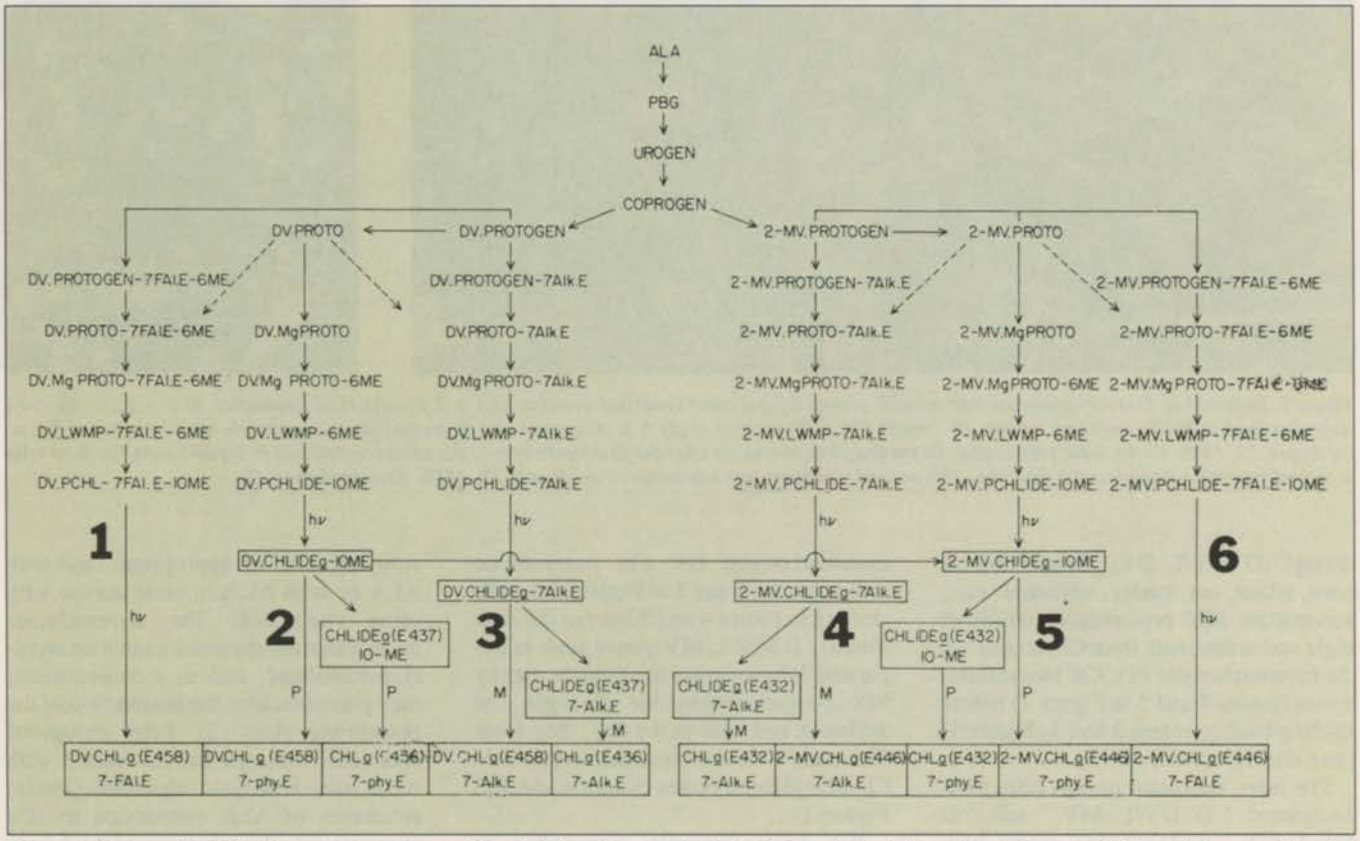


Figure 1. Six-branched Chla biosynthetic pathway: DV, divinyl; MV, monovinyl; FAl, fatty alcohol; Phy, phytol; E, ester; ME, methyl ester; Alk, alkyl group of unknown chain length; Me, methyl; ALA, aminolevulinic acid; PBG, porphobillinogen; Urogen, uroporphyrinogen; Coprogen, coproporphyrinogen; Protogen, protoporphyrinogen; Proto, protoporphyrin IX; LWMP, longer wavelength metalloporphyrins (the putative intermediates of ring E formation); 3, esterification with geranyl geraniol followed by stepwise conversion of the latter to phytol; M, methylation. Excerpted from (5).

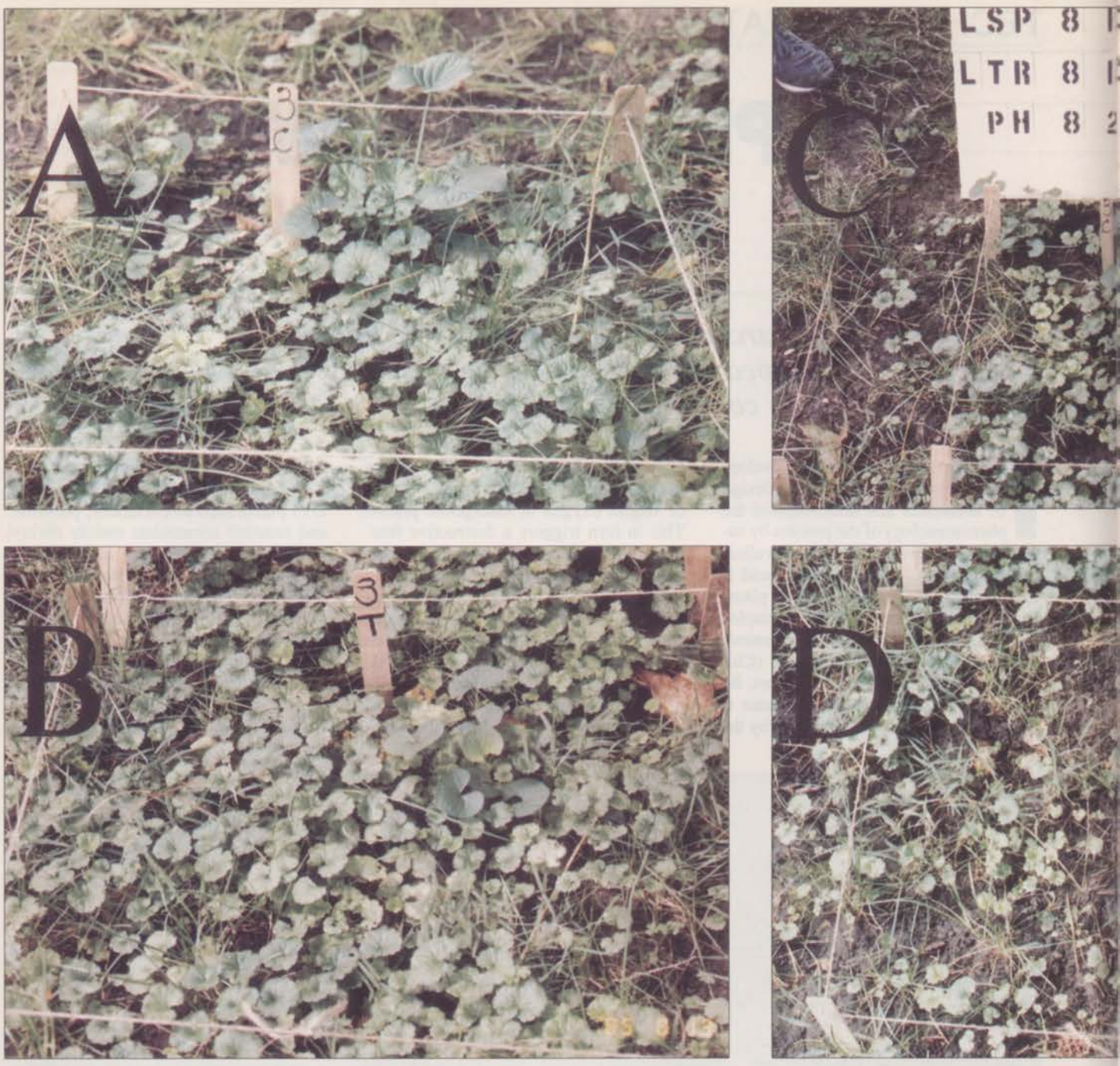
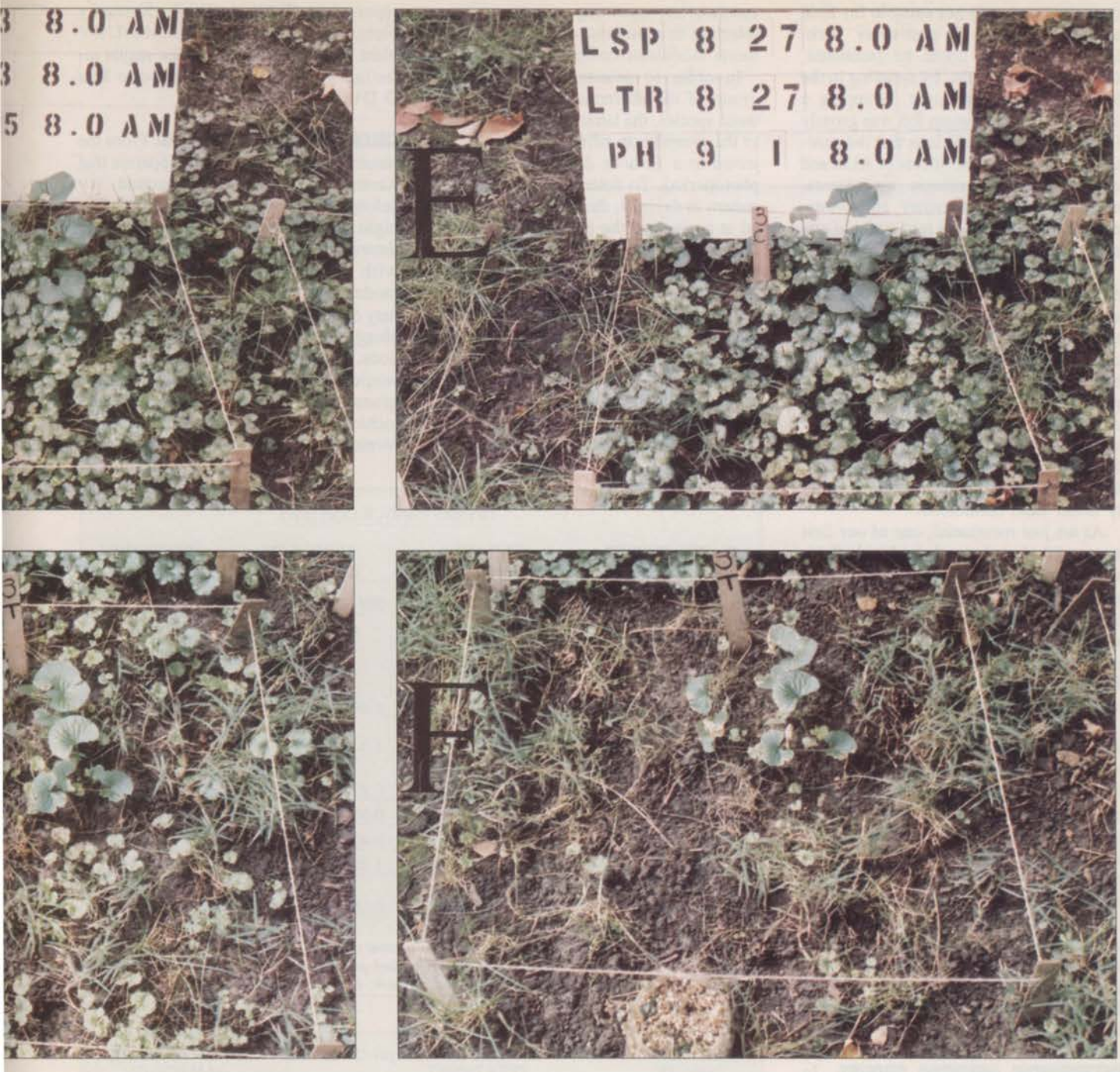


Figure 2. Response of Kentucky bluegrass infested with ground ivy and other broadleaf weeds to ALA + 2,2'—dipyridyl treatments. ALA + 2,2'—dipyridyl were dissolved in PEG : methanol : tween 80 : water (7:2:1:90 v/v/v/v) at pH 3.5. A: control and B: treated plots immediately after spraying at 8 a.m. on August 13, 1986; C: the same control and; D: treated plots two weeks after the first treatment; E: the same control; and F: treated plots five days after a second treatment similar to the first one. This second treatment was administered on August 27, 1986. Excerpted from (2).

divinyl (D MV/L DV) plants, such as corn, wheat, oat, barley, soybeans, etc., accumulate MV protochlorophyllide at night and at daybreak from Chl mainly via the monocarboxylic MV Chl biosynthetic routes (routes 4 and 5 in Figure 1) before shifting back to routes 2 and 3 (Figure 1) later during the day (4, 5).

The other two plant groups have been designated "D DV/L MV" and "D MV/L MV." D DV/L MV plants such as violet and ginkgo accumulate mainly DV protochlorophyllide at night and at daybreak form Chl mainly via the monocarboxylic DV Chl biosynthetic routes (routes 2 and 3 in Figure 1), before shifting to routes 4 and 5 later in the day. Finally, D MV/L MV plants such as apple and Johnsongrass accumulate mainly MV protochlorophyllide at night. At daybreak and later in the day, they form Chl mainly via the monocarboxylic MV Chl biosynthetic routes (routes 4 and 5 in Figure 1).

We have recently succeeded in demonstrating that a particular plant species can be induced to accumulate the wrong type of MV or DV tetrapyrrole by spraying it at the appropriate time with ALA or with ALA in combination with other chemicals. The accumulated, undesirable tetrapyrroles cannot be rapidly metabolized, and as a consequence, they photosensitize the destruction of the susceptible plant (2). Four groups of chemicals that can act in concert with ALA have now been identified (2): (a) enhancers of ALA conversion to MV tetrapyrroles, (b) enhancers of ALA conversion to DV tetrapyrroles, (c) inducers of ALA formation by plant tissues, and (d) inhibitors of divinyl tetrapyrrole con-



version to monovinyl tetrapyrroles. Since these chemicals alter the operation of the Chl biosynthetic routes depicted in Figure 1, they have been collectively designated as Chl biosynthesis modulators (2).

Because of the possibility of combining individual members of the four classes of Chl biosynthesis modulators and ALA, five, four, three, or two at a time, it has become possible to design a very large number of useful herbicides. For example, with the 13 Chl biosynthesis modulators already discovered, it is already possible to design 3,458 different herbicides. On the other hand, the discovery of one or two additional Chl biosynthesis modulators has the potential of resulting in 1,470 and 2,410 additional herbicides, respectively. One of the first photodynamic herbicide field applications that we developed dealt with the control of ground ivy in bluegrass.

EXPERIMENTAL STRATEGY. For obvious reasons, investigations into the effect of ALA and Chl biosynthesis modulators on various plant species were initially confined to highly controlled experimental conditions. These conditions made it possible to correlate the effect of a particular treatment, with the accumulation of specific tetrapyrroles, and the latter to photodynamic damage. This in turn involved wrapping the sprayed plants with aluminum foil and subjecting them to a dark-incubation period prior to exposure to daylight.

Wrapping the treated plants with aluminum foil prevented the applied spray from rapidly drying out on the leaf surface and thus permitted a good translocation of the chemicals to the chloroplasts, where conversion of ALA to tetrapyrroles takes place (6-9). In this manner, upon unwrapping the treated plants, even after several hours of dark-incubation, the leaf surfaces were observed to be still wet. On the other hand, dark-incubation allowed the translocated ALA to be converted to tetrapyrroles which in the absence of light accumulated in the plastids.

It was taken for granted that the aforementioned experimental system, although suited for quantitative laboratory

investigations, was not suitable for field studies. Although a post-spray dark-incubation period could be simulated, under field conditions, by spraying in the late afternoon or at night, wrapping a whole field in aluminum foil was grossly impractical. It was obvious that the spectacular photodynamic effects of ALA and of the Chl biosynthesis modulators, observed under laboratory conditions, needed to be translated into a viable and acceptable field system.

The field experimental strategy was developed in two steps: (a) in the first step, the requirement for wrapping the treated plants in aluminum foil was eliminated by developing appropriate herbicidal greenhouse formulations that resulted in the adequate translocation of ALA to the plastids without the need for wrapping, and (b) the best greenhouse formulations thus developed were then tested for photodynamic herbicidal activity under field conditions.

As we just mentioned, one of our first successful photodynamic herbicide field-applications was developed for the control of broadleaf weeds in a Kentucky bluegrass lawn. The choice of that specific application was directed by the convenience and ready availability of a frustrating real-life situation, right in my own backyard in Urbana, Illinois.

The development of a photodynamic spray formulation that killed broadleaf weed species while permitting the bluegrass to grow involved: (a) the classification of Kentucky bluegrass and of the infesting weed species into greening groups, (b) the choice of an appropriate Chl biosynthesis modulator to act in concert with ALA, (c) development of a solvent system that permitted an adequate translocation of the sprayed ALA and of the Chl biosynthesis modulator to the chloroplast, and (d) testing the performance of the developed herbicide in the field.

DETERMINING GREENING GROUPS. In that shaded backyard in Urbana, Illinois, we encountered considerable problems in establishing Kentucky bluegrass (*Poa pratensis* cv Aspens). Whenever the plot was reseeded, the bluegrass was rapidly taken over by ground ivy (*Glechoma hederacea* L.). The heavy infestation with ground ivy was also accompanied by a light infestation of common yellow woodsorrel (*Oxalis stricta* L.), blackseed plantain (*Plantago rugelii* Dene), common dandelion (*Taraxacum officinale* Weber), violet (*Viola adunca*), and musk thistle (*Carduus nutans*). Because of the differential photodynamic susceptibility of the various greening groups of plants to the accumulation of MV and DV tetrapyrroles, we first classified the Kentucky bluegrass and the aforementioned weed species, into greening groups prior to selecting an appropriate ALA-Chl biosynthesis modulator combination.

In order to determine the greening group of the aforementioned plant and weed species, the latter were transplanted to the greenhouse where they were subjected to a 10-hour dark, 14-hour light photoperiod. To determine the greening pattern in daylight, the plants were sampled at noon, and the amount of MV and DV tetrapyrroles was determined as described in (3). To determine the greening pattern at daybreak, the plants were transferred to a dark growth chamber, at the end of the light phase of the photoperiod, and after 10 hours in darkness, they were sampled and analyzed for their MV and DV tetrapyrrole content.

The results of these experiments are reported in Table 1. While Kentucky bluegrass was found to be a D MV/L DV plant species, ground ivy, the major infesting weed species, was found to be a D DV/L DV plant species.

CHLOROPHYLL BIOSYNTHESIS. From the results in Table 1, it became apparent that Kentucky bluegrass and ground ivy belonged to different greening groups at night (i.e., in darkness). It was therefore theoretically possible, by combining ALA with appropriate Chl biosynthesis modulators to design formulations that may destroy ground ivy, while sparing the bluegrass. The purpose of such formulations, when sprayed in the late afternoon, would be to induce the bluegrass and ground ivy to accumulate MV protochlorophyllide during the night. Such formulations are referred to as "dark

PLANT SPECIES	TETRAPYRROLE CONTENT						GREENING GROUP
	END OF DARK PHASE			MIDDLE OF LIGHT PHASE			
	MV	DV	MV/DV	MV	DV	MV/DV	
	nmol Pchlide per 100 mg protein			nmol Pchlide per 100 mg protein			
Kentucky bluegrass	7.79	0.90	8.65	0.99	2.20	0.49	DMV/LDV
Blackseed plantain	5.39	2.36	2.28	1.34	2.29	0.58	DMV/LDV
Common dandilion	9.79	0.83	11.79	0.27	0.63	0.42	DMV/LDV
Ground ivy	2.80	6.12	0.46	0.38	1.37	0.28	DDV/LDV
Musk thistle	0.54	3.75	0.14	0.47	8.95	0.05	DDV/LDV
Violet	0.00	5.50	0.00	1.09	0.24	4.54	DDV/LMV
Common yellow woodsorrel	12.93	11.37	1.13	9.15	4.59	1.99	DMV/LMV

Table 1. MV and DV protochlorophylide (Pchlide) content of Kentucky bluegrass and infesting weed species. Determinations were made at the end of the dark-phase and in the middle of the light-phase of the 10-hour dark, 14-hour light photoperiod. D: dark; L: light. Adapted from (2).

TREATMENT (g/ACRE)	TIME OF TREATMENT	pH OF SPRAY	PHOTODYMANIC DAMAGE (%)
160 g ALA	late afternoon	6.0	0
160 g ALA	late afternoon	3.5	10
160 g ALA	morning	6.0	1
160 g ALA	morning	3.5	15
160 g ALA + 240 g DPy	late afternoon	6.0	1
160 g ALA + 240 g DPy	late afternoon	3.5	30
160 g ALA + 240 g DPy	morning	6.0	5
160 g ALA + 240 g DPy	morning	3.5	75
320 g ALA	late afternoon	6.0	6
320 g ALA	late afternoon	3.5	60
320 g ALA	morning	6.0	1
320 g ALA	morning	3.5	48
320 g ALA + 240 g DPy	late afternoon	6.0	5
320 g ALA + 240 g DPy	late afternoon	3.5	75
320 g ALA + 240 g DPy	morning	6.0	12
320 g ALA + 240 g DPy	morning	3.5	80

Table 2. Effect of pH on the photodynamic damage caused by ALA and 2,2'—dipyridyl to cucumber seedlings under greenhouse conditions. Experimental conditions are decribed in the text. DPy: 2,2'—dipyridyl. Adapted from (2).

TREATMENT (g/ACRE)	TIME OF TREATMENT	PHOTODYNAMIC (DAMAGE %)
Solvent only	late afternoon	0
Solvent only	morning	0
160 g ALA	late afternoon	15
160 g ALA	morning	13
160 g ALA + 240 g DPy	late afternoon	80
160 g ALA + 240 g DPy	morning	85
Solvent only	late afternoon	0
Solvent only	morning	0
320 g ALA	late afternoon	85
320 g ALA	morning	65
320 g ALA + 240 g DPy	late morning	93
320 g ALA + 240 g DPy	morning	98

Table 3. Effect of replacing ethyl alcohol with methyl alcohol on the photodynsmic damage caused by ALA and 2,2'—dipyridyl to cucumber seedlings under greenhouse conditions. Experimental conditions are described in the text. DPy: 2,2'—dipyridyl. Adapted from (2).

sprays'' in contrast to formulations which may be sprayed in the morning, and which are referred to as ''light sprays.''

In this manner, at night, ground ivy would be forced to form undesirable MV tetrapyrroles, i.e. counter to its greening group, while the MV tetrapyrroles formed by bluegrass are perfectly metabolizable. This situation was complicated, however, by the realization that the infestation with ground ivy was accompanied by minor amounts of other weeds which belonged to different greening groups than either Kentucky bluegrass or ground ivy.

We attempted to design, therefore, an ALA and Chl biosynthesis modulator pair that may affect all the weed species present in the lawn. We conjectured that this could be achieved by using 2,2'—dipyridyl in concert with ALA. Indeed, it had already been demonstrated (a) that 2,2'—dipyridyl was a DV Mg-protoporphyrins (MP(E)) inducer which resulted in the accumulation of massive amounts of MP(E), particularly when used in conjunction with ALA (2), and (b) that although DV MP (E) accumulation was detrimental to both the MV and DV greening patterns, perennial bluegrass was perfectly capable of overcoming the treatment-induced stress and to rebound vigorously (1). Altogether we felt that ALA + 2,2'—dipyridyl might be a good starting formulation for the bluegrass problem. What remained to be done was to get the ALA and 2,2'—dipyridyl to translocate to the sites of metabolism in the chloroplast, under field conditions.

Although a post-spray dark-incubation period could be simulated, under field conditions, by spraying in the late afternoon or at night, wrapping a whole field in aluminum foil was grossly impractical.

SOLVENT SYSTEM DEVELOPMENT. A major issue remained to be addressed before field testing became possible. The solvent system that we had used in all of our experimental work consisted of acetone : ethyl alcohol : tween 80 : water (45:45:1:90 v/v/v/v). The presence of acetone and ethyl alcohol rendered this solvent rather volatile and made it unsuitable for greenhouse or field applications. An effort was therefore undertaken in order to develop a solvent compatible with the peculiarities of the ALA + 2,2'—dipyridyl combination. This was achieved by using cucumber seedlings as an experimental plant material.

We then studied the effect of pH. Aminolevulinic acid is a Zwitterion whose net charge is a function of pH. It has no charge at pH 6.47, i.e. at its isoionic point, but acquires a positive charge below pH 6.47 and a negative charge above that pH. Since the translocation of Zwitterions into biological tissues is influenced by the magnitude of the net electrical charge on the ion, we investigated the influence of this parameter on the translocatibility of ALA into cucumber cotyledons. This was achieved as described below.

Six-day-old, green cucumber seedlings were sprayed with solutions of ALA or with ALA + 2,2'—dipyridyl at pH 6.0 (nearly neutral charge on the ALA) or at pH 3.5 (i.e. ALA positively charged). Spraying was done either in the late afternoon (dark spray) or in the morning (daylight spray), at a rate of 40 gallons per acre and at an average diameter droplet size of 25 microns. To start with, the laboratory experimental solvent which consisted of acetone : ethanol : tween 80

: water (45:45:1:90 v/v/v/v) was used. It was adjusted to pH 6.0 or 3.5 either with dilute HCl or with KOH. The extent of translocatibility of ALA and of 2,2'— dipyridyl to the chloroplast was inferred from the incurred photodynamic damage. This assumption was justified since the occurence of photodynamic damage has already been shown to be related to tetrapyrrole accumulation in the chloroplast (1,2).

The following conclusions were drawn from the results of these experiments which are reported in Table 2: (a) photodynamic damage, and by inference, translocatibility of the chemicals to the chloroplasts, was much more pronounced at pH 3.5 than at pH 6.0 and (b) as anticipated, the ALA + 2,2'—dipyridyl combination was effective both as a dark spray and as a daytime spray.

Next we tested the effect of replacing ethyl alcohol with methyl alcohol in the acetone : ethyl alcohol : tween 80 : water solvent solution. Methyl alcohol is a cofactor in Pchlide biosynthesis (9, 10). It was, therefore, conjectured that its incorporation into a field solvent system may be beneficial and may result in enhanced conversion of ALA to tetrapyrroles and in enhanced photodynamic damage. We therefore substituted methyl alcohol for ethyl alcohol in the experimental solvent system.

Six-day-old green cucumber seedlings were thinned to 10 plants per container. The latter were sprayed exactly as described in the previous section (Table 2), except that the solvent consisted of acetone : methanol : tween 80 : water (45:45:1:90 v/v/v/v) and was adjusted to pH 3.5. The results of these experiments are reported in Table 3. Comparison of the results of Table 2 and 3 suggested that substitution of methyl alcohol for ethyl alcohol at pH 3.5 improved the incidence of photodynamic damage caused by ALA and 2,2'— dipyridyl

Then we lowered the volatility of the acetone : methanol : tween 80 : water solvent system further by replacing acetone with polyethylene glycol 600. In the course of experimenting with the effect of various adjuvants on the photodynamic effectiveness of ALA + 2,2'— dipyridyl, we observed, consistently, that the incorporation of polyethylene glycol 600 (PEG) into solvent systems containing organic alcohols, improved the performance of these solvents. It was, therefore, conjectured that by replacing acetone with PEG in the solvent solution, we may decrease the volatility of the above solvent and improve the photodynamic performance of the ALA + 2,2'—dipyridyl combination under greenhouse and field conditions. The proper proportions of PEG and methyl alcohol were determined as described below.

Six-day-old, green cucumber seedlings were sprayed in the greenhouse, exactly as described in the preceding section. In summary: (a) because of the expected improved performance of these treatments, the concentration of ALA was decreased from 160 grams to 80 grams per acre, (b) as the concentration of PEG was decreased from 9 to 0 percent, that of methyl alcohol was increased from 0 to 9 percent, (c) the concentration of tween 80 was maintained constant at 1 percent (v/v) and (d) to avoid clogging of the sprayer, the average droplet size diameter was increased from 25 microns to 55 microns by replacing the 0.3 millimeter internal diameter intake hose with a 0.5 mm intake hose.

From the results reported in Table 4 the following observations were made: (a) higher proportions of PEG and lower proportions of methyl alcohol resulted in better photodynamic damage than lower proportions of PEG and higher proportions of methyl alcohol, (b) this was true for both dark and daylight sprays, (c) as the proportion of methyl alcohol increased, the photodynamic performance of the dark spray lagged behind that of the daylight spray. The molecular basis of this phenomenon is still unknown.

This situation was complicated, however, by the realization that the infestation with ground ivy was accompanied by minor amounts of other weeds which belonged to different greening groups than either Kentucky bluegrass or ground ivy. Therefore, we attempted to design a herbicide that would affect all weeds.

On the basis of the results reported in Table 4, we opted for the PEG : methyl alcohol : tween 80 : water (7:2:1:90 v/v/v/v) pH 3.5 combination as a possible greenhouse/field solvent system for the ALA + 2,2'— dipyridyl combination. This decision was influenced by the realization that the presence of an organic alcohol into a functional solvent system would be advantageous, as a vehicle for the introduction of other lipophylic compounds, should the need arise.

The effectiveness of this solvent system as a vehicle for ALA and 2,2'— dipyridyl at various concentrations of ALA is described in Table 5. It was observed that the performance of that solvent system was consistently better for daylight sprays than for dark sprays.

The field effectiveness of ALA + 2,2'—dipyridyl dissolved in PEG : methyl alcohol : tween 80 : water (7:2:1:90 v/v/v/v) at pH 3.5, was finally assessed by determining the effect of the spray on the broadleaf weeds infesting the Kentucky bluegrass lawn. As was previously mentioned, ground ivy was the major weed in that lawn and was accompanied by a much lighter infestation of common yellow woodsorrel, blackseed plantain, common dandelion, musk thistle, and violet (Figure 2, A, B).

Square lots (0.5 x 0.5 meters) were staked and were sprayed at 8 a.m. on August 13, 1985. The spray consisted of 524 grams ALA + 403 grams 2,2'— dipyridyl per acre, dissolved in PEG :

SOLVENT	TIME OF TREATMENT	PHOTODYNAMIC DAMAGE (%)
9 PEG : 0 methanol : 1 tween 80 : 90 water	late afternoon	75
9 PEG : 0 methanol : 1 tween 80 : 90 water	morning	78
7 PEG : 2 methanol : 1 tween 80 : 90 water	late afternoon	65
7 PEG : 2 methanol : 1 tween 80 : 90 water	morning	63
5 PEG : 4 methanol : 1 tween 80 : 90 water	late afternoon	35
5 PEG : 4 methanol : 1 tween 80 : 90 water	morning	53
3 PEG : 6 methanol : 1 tween 80 : 90 water	late afternoon	40
3 PEG : 6 methanol : 1 tween 80 : 90 water	morning	65
1 PEG : 8 methanol : 1 tween 80 : 90 water	late afternoon	38
1 PEG : 8 methanol : 1 tween 80 : 90 water	morning	68
0 PEG : 9 methanol : 1 tween 80 : 90 water	late afternoon	13
0 PEG : 9 methanol : 1 tween 80 : 90 water	morning	50

Table 4. Effect of various proportions of polyethylene glycol and methyl alcohol on the photodynamic damage caused by ALA and 2,2'—dipyridyl to cucumber seedlings under greenhouse conditions. Experimental conditions are described in the text. Spraying was at a rate of 40 gallons per acre and all sprays contained 80 g ALA + 240 g DPy per acre. PEG: polyethylene glycol 600. Adapted from (2).

TREATMENT (g/ACRE)	TIME OF TREATMENT	PHOTODYNAMIC DAMAGE (%)
Solvent only	late afternoon	0
Solvent only	morning	0
160 g ALA	late afternoon	20
160 g ALA	morning	43
160 g ALA + 240 g DPy	late afternoon	80
160 g ALA + 240 g DPy	morning	95
Solvent only	late afternoon	0
Solvent only	morning	0
320 g ALA	late afternoon	83
320 g ALA	morning	95
320 g ALA + 240 g DPy	late afternoon	90
320 g ALA + 240 g DPy	morning	100

Table 5. Effect of higher concentrations of ALA in the 7 PEG: 2 methanol: 1 tween 80: 90 water solvent system on cucumber seedlings under greenhouse conditions. The pH of the spray was adjusted to 3.5. Spray rate was 40 gallons per acre. Other experimental conditions are as in Table 1. PEG: polyethylene glycol 600; DPy: 2,2'—dipyridyl. Adjusted from (2).

methyl alcohol : tween 80 : water (7:2:1:90 v/v/v/v) at pH 3.5. Spray rate was 20 gallons per acre. Average droplet diameter was about 55 microns. At that spray rate and droplet size, it was possible to achieve a very thorough coverage of the vegetation. Manifestation of photodynamic damage became apparent on the same day in the afternoon.

The overall effectiveness of the spray about two weeks after the first treatment and about one week after the second treatment (applied on August 27, 1985) is depicted in Figures 2 C, D and 2 E, F respectively. Control of ground ivy and of the accompanying broadleaf weeds was excellent, except for violet. The molecular basis of the relative violet resistance is presently under investigation.

SUMMARY AND FUTURE PROSPECTS. The research effort described in this work, may be readily adapted for the design of many other photodynamic herbicide applications capable of controlling other weed species in turfgrass. In summary, such an effort would involve (a) classification of the plant species to be destroyed and those to be saved into their respective greening groups, (b) selection of one or more Chl biosynthesis modulators to act jointly with ALA and to induce the undesirable weeds to accumulate undesirable tetrapyrroles that do not belong to a functional biosynthetic route, (c) development of a field solvent system capable of delivering the ALA and the Chl biosynthesis modulator(s) to the chloroplast, where ALA is converted to tetrapyrroles and finally, (d) testing the developed solvent system under the field conditions for which it had been designed. The field effectiveness of a particular formulation may be further refined by incorporation of additional adjuvants. —

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THE INDUSTRY PONDERS THE FATE OF 2,4-D

ChemLawn's decision to discontinue its use of 2,4-D has precipitated a growing controversy in the lawn care industry.

When ChemLawn Services Corporation talks, the entire lawn care industry listens and reacts. The rest of the industry may not arbitrarily follow suit, but you can be sure that the industry's astute businessmen are closely monitoring industry and consumer reactions to ChemLawn's 2,4-D decision. They are also making preparations to respond quickly, if necessary, in the future.

It all began in October when ChemLawn announced suspension of its use of 2,4-D, beginning with the 1987 turf season. ChemLawn reportedly made this move based on the results of a recent study conducted by the National Cancer Institute on the incidence of certain types of cancer in Kansas farmers using phenoxy herbicides. The results of the study were reported in an article titled, "Agricultural Herbicide Use and Risk of Lymphoma and Soft-Tissue Sarcoma," in the September 5, 1986 issue of *The Journal of the American Medical Association*. The researchers concluded that human exposure to phenoxyacetic acid herbicides increases the risk of non-Hodgkin's lymphoma.

"Although we don't consider that (the study) to be the final word," says ChemLawn Vice President Dr. Robert Miller, "it is a valid study and does raise some red flags and we are just taking a cautious approach." ChemLawn is evaluating possible non-phenoxy herbicide replacements for 2,4-D. "We are evaluating a number of alternatives and that is as much as we will say about what we are going to do," says Miller.

Following closely on the heels of ChemLawn's action, Tru Green Corporation has also arrived at a tentative decision to discontinue its use of 2,4-D sometime during 1987. Dave Jones, Tru Green's Director of Environmental Safety, says the decision is not "carved in stone," but the company will probably stop applying 2,4-D to its customers' lawns sometime this year.

Tru Green's move was not prompted solely by the results of the Kansas cancer study. Jones says the decision came out of on-going work done by the company's research department. "We got wind of the situation earlier," says Jones. "We are always looking for alternatives. We have been looking at this for a couple of months."

"There is a lot of controversy and mixed feelings here about the whole situation," says Jones. "2,4-D is an excellent product and to find a replacement is very difficult and very costly. The alternatives are expensive and complicated. There are a lot of people in the industry who are really considering the discontinuation of 2,4-D. I'm not saying that what ChemLawn is doing is right, but we're in the industry together and if that's the way the industry is going to go, I suppose we will go with it."

Jones says Tru Green is still looking at non-phenoxy herbicides to replace 2,4-D, but the company has not yet decided on a particular product. "We are still looking at them," says Jones. "They are available; we know where to get them." Tru Green still has hold-over supplies of 2,4-D from last year that Jones says will be used up before switching to another herbicide. "It is very difficult to *dump* any product anywhere, so you use it up and then discontinue its use."

INDUSTRY REACTIONS. At the recent conference in Baltimore, Maryland, the Professional Lawn Care Association of America's Board of Directors commented on the 2,4-D situation.

When contacted, seven of the eight newly-elected officers and board members pledged varying degrees of support for continued use of 2,4-D in their own operations. PLCAA board member Joseph Winland, Group Vice President of Support for Tru Green Corporation, Atlanta, Georgia, says his company will continue to investigate the situation before making a determination. "We are looking at it very hard," says Winland. "We realize there are a lot of sensitivities."

Board member David Sek, Assistant to Vice President for Monroe Tree and Lawntender, Rochester, New York, is a little more supportive of 2,4-D. Sek says the issue will be discussed at an upcoming branch manager's meeting and policy will be decided at that time, but he anticipates using 2,4-D this year. "But if so much controversy occurs that we have to change, we will hopefully be flexible enough that we can make the change quickly," says Sek. "We have looked at the alternatives and the alternatives don't seem to work as well as 2,4-D and they are more expensive."

Support for continued use of 2,4-D from PLCAA Secretary/Treasurer Paul Moore, President of Lawn Green, Inc., Las Vegas, Nevada, is firm. "We will definitely be using 2,4-D in 1987," says Moore. "We take the stance that PLCAA took. If it is approved by the government, we will continue to use it." He says none of his customers have made any comments about the safety of the 2,4-D he applies to their lawns. Moore says dandelions are 70 percent of his area's weed population and he needs the dandelion control that 2,4-D can provide.

The Davey Tree Expert Company of Kent, Ohio will most likely be using 2,4-D in 1987, but the company will be poised to substitute a replacement should the situation change. Dr. Roger Funk, Davey's Vice President of Technical and Human Resources, and PLCAA director, says his company has not yet made a firm decision on whether or not to continue using 2,4-D in 1987. "We had earlier considered dropping 2,4-D, but not all phenoxys from the roster next year," says Funk.

If public outcry or a government mandate should force Davey to drop 2,4-D, Funk says the company will probably

Bob Scobee (left) and Joe DeLuca of the Andersons announce the introduction of Break-Thru at the PLCAA show in Baltimore.

switch to combinations of MCPP, MCPA, and dicamba and/or trichlopyr, dicamba, and Maintain® . "More than likely," says Funk, "we probably will go ahead with our 2,4-D with limited purchases, waiting on what the public's response will be. If we find that it is adverse, we will very quickly move to one of these new combinations or both of the combinations."

Based on the information at hand, PLCAA board member James Mello, President of Nice 'N Green, Inc. of Romeoville, Illinois, doesn't feel a need to abandon his use of 2,4-D. However, some of the new non-phenoxy herbicides have shown results that Mello believes could rival the effectiveness of 2,4-D as a weed killer. "In some cases, on a lot of different weeds, they are giving us better weed control," says Mello. Instead of looking at the 2,4-D issue as an environmental concern, Mello is more concerned about finding an efficient replacement for 2,4-D should a replacement be necessary.

"For dandelions, the control that you get from 2,4-D is not going to be beaten, but dandelions are not the only thing we are trying to control," notes Mello. He says some of the new non-phenoxy herbicides have shown better broad-spectrum weed control. "From that standpoint, I'm looking at using some of these materials," says Mello.

The PLCAA Vice President stands behind the Association's position and supports continued use of 2,4-D. Russell Frith, President and CEO of Lawn Doctor, Inc., Matawan, New Jersey will continue to use 2,4-D this year. "We have not made an absolute decision because who knows what somebody might say next week," says Frith. "Everything we have seen, the 2,4-D Task Force report and other research reports, support the position that 2,4-D is a safe and viable product to use."

The president of the PLCAA is taking a little more cautious approach to the issue. James Wilkinson, General Manager of Old Fox Lawn Care, East Providence, Rhode Island says his company will continue to monitor the situation. "We are very interested in what additional information, particularly from the EPA, is going to come out in the future on 2,4-D," says Wilkinson. "As of right now, it looks as if we will be using 2,4-D, but we will be doing quite a bit of work with some of these new non-phenoxy alternatives in 1987 to evaluate their effectiveness."

Board member Marty Erbaugh, President of Erbaugh Corporation, Peninsula, Ohio, supports the continued use of 2,4-D with no reservations. "We will be using 2,4-D and we will not be posting signs," says Erbaugh. "We have considered the issue and we will continue using 2,4-D. We are committed to killing weeds."

Members of the scientific community are also less than impressed with the performance of some of the new non-phenoxy herbicides, relative to the weed-killing abilities of 2,4-D. Dr. Wayne Bingham of Virginia Polytechnic Institute and State University has worked with some of the non-phenoxy materials and is not convinced that they can fill 2,4-D's shoes.

"We would lose a lot if we lost 2,4-D," says Bingham. "2,4-D has really been the heart of every turf formulation we have. We have it in Weedone DPC® , Turflon D® , Super Trimec® , Trimec® — the ones we would consider good standards." Bingham says removing 2,4-D from herbicide formulations would reduce broad-spectrum weed control effectiveness considerably.

A non-phenoxy, like chlorflurenol will control dandelions and plantain when combined with dicamba and trichlopyr, but Bingham says we have to consider the dozens of other weeds found in the home lawn environment. "We have something like 100 very important weeds in turf, and maybe another 100 that occur once in a long while," notes Bingham. He says his studies have shown that 2,4-D alone will control about 50 percent of the weed universe. By combining dicamba with 2,4-D, Bingham says lawn care professionals can pick up much of the remaining weed population.

Dr. Ray Freeborg of Purdue University is enthusiastic about the prospects of using chlorflurenol as a tank-mix material for the control of broadleaf weeds. Freeborg worked closely with The Andersons in the development of their chlorflurenol product, Break-Thru® , and has also worked with other non-phenoxy herbicides.

"It seems like there really aren't too many alternatives," says Freeborg. He says Break-Thru and some new chemistry from Dow Chemical look very good. Freeborg says his research has shown chlorflurenol in tank mixes with other materials, such as dicamba and trichlopyr, to perform as well as 2,4-D in controlling broadleaf weeds. He is even skeptical about 2,4-D's status as an effective herbicide.

"There has been some evidence over the years that even 2,4-D is not as strong on some of those commonly-killed broadleaf weeds, such as dandelion and plantain," says Freeborg. "We are seeing more and more recovery. They get killed back, but there would be regrowth. There may have been enough genetic variability over the years to allow a dandelion or plantain to survive."

Freeborg believes 2,4-D's relatively low price has been a major reason for its popularity. "2,4-D really persisted in the market because of economy, and to some extent because of its broad spectrum of control," says Freeborg. "I am sure there will be a gradual evolution away from 2,4-D as they have other alternatives." He says the professional's move away from 2,4-D will be based on a concern for greater efficacy, rather than cost considerations. "As competition sees these new formulations performing better than their older formulations, even though they are more expensive, they should be willing to go to that additional expense."

CORPORATE RESPONSES. Chemical

companies are watching industry, EPA, and public responses to the 2,4-D situation. PBI/Gordon Corporation has taken the approach of offering the industry a 2,4-D-free product, rather than a non-phenoxy product. D-Free Trimec® does not contain 2,4-D, but it does contain the phenoxys MCPA and MCPP, in addition to dicamba. PBI/Gordon President Everett Mealman says the performance of D-Free Trimec stacks up with the performance of any other amine formulation containing 2,4-D, such as PBI's regular Trimec amine product. He admits, however, that the D-Free material is a little slower in controlling some weed species.

Mealman perceives a lot of confusion in the marketplace over the 2,4-D situation. "We see people uncertain as to what products they should use," says Mealman. "Everybody is beginning to recognize that 2,4-D received an unfair rap. At the same time, there are a number of lawn care companies who simply don't know what strategy to use as they enter the marketplace. We have some people who have committed to us for the D-Free product, some *substantial* people."

Non-phenoxy herbicide contenders to 2,4-D's throne include trichlopyr, dicamba, chlorflurenol, and bromoxynil. The Specialty Products Group of Union Carbide Agricultural Products Company, Inc. has a non-phenoxy herbicide called ME4® Brominal® which contains the active ingredient bromoxynil. Company research trials have shown that Brominal in combination with dicamba will control

BREAK-THRU: ANATOMY OF A NON-PHENOXY HERBICIDE

The Andersons' search for a non-phenoxy herbicide began in 1979 following the suspension of Silvex, according to Mike Kotz, the research scientist who developed the Break-Thru formulation. "The charter was pretty well-defined," says Kotz. First, management wanted a product that will kill dandelions. Second, it had to have broad-spectrum weed control or at least be compatible with materials that will give it broad-spectrum weed control. Third, the ingredients of the new herbicide must carry no negative public perceptions.

That first year, a thorough literature search was conducted to see what kind of alternative materials were available. In 1980, Kotz began screening materials. In conjunction with their own testing, The Andersons went to agronomist Dr. Ray Freeborg at Purdue University who would reevaluate the materials they had already screened to confirm or reject The Andersons' findings.

"The ingredient we decided to concentrate on was chlorflurenol," says Kotz. Chlorflurenol has been used in this country as a plant growth regulator, but it is widely used in agricultural herbicide formulations in Europe. It is attractive as a herbicide because it has no odor, a low vapor pressure, and a high flash point. Kotz says it is environmentally sound because it is quickly and completely degraded in the soil. No contamination of groundwater occurs.

He says in cancer studies it was found to be non-toxic, non-carcinogenic, and life expectancy wasn't shortened. "In the teratogenicity study, three dosage levels to pregnant animals showed no effect on the pregnacy rate or body change, same litter size, and no effect on embryos or the fetal development."

During 1981, a couple different weed and feed formulations for the retail market, which included chlorflurenol, were developed and submitted to EPA for registration. The first product consisted of one pound of chlorflurenol and 1/6-pound of dicamba per acre. A second weed and feed formulation was completed in late 1981. This formulation lowered the rate down to 1/4-pound of chlorflurenol per acre and 1/6-pound of dicamba.

During the next couple years The Andersons sponsored research on its chlorflurenol herbicide at several universities across the country to look at turf tolerances, spectrum of weed control, effect of cultural practices, and other factors. "By 1983 we had two weed and feed registrations, and we decided to develop a liquid product for the professional lawn care industry," says Kotz.

They had problems in taking the formulation from a granular to a liquid state, but in 1985, Kotz says they hit upon a formulation that would stay together in the tank. "In 1985 we developed the acute toxicity data the EPA required, submitted the package to the EPA, and secured the registration," says Kotz. "On March 3, 1986, we produced the first commercial batches. We put it together for shipment on March 10, and it was in the field in a few days."

The final product, Break-Thru, contains 1-1/2-pound total chlorflurenol methol esters to the gallon. "We are calling it a WDS, which stands for water-dispersible solution," says Kotz. Other formulations of chlorflurenol tend to form large crystals which clump on the leaf surface and produce little effect. The Break-Thru formulation is incorporated inside the cuticle and the cuticle is redeposited as part of the leaf surface, according to Kotz. There is less likelihood of the material being washed off the leaf by rain following an application.

The product is designed for tank-mixing with foliar-applied herbicides which thereby reduces the necessary amounts of those herbicides. Kotz says he has had the most experience with Banvel® , Turflon® , and dicamba. The best combination for a broad spectrum of weeds, according to Kotz, is a three-way mix of dicamba, Turflon, and Break-Thru.

According to The Andersons, Break-Thru is safe with virtually any turfgrass species and will not harm seedlings. However, if it is over-applied, some growth regulator effects will result. Kotz cautions against mixing it with micronutrients, soil-applied pesticides, wettable powders, and formulations containing clays. — *Tim Weidner*

The author is Managing Editor of ALA *magazine.*

many established broadleaf weeds.

Whereas the phenoxys kill by translocation through the roots, bromoxynil kills on contact with the leaf surface and burns back top growth. "It has the very distinct advantage of good tolerance by turfgrasses," notes Union Carbide's Barbara Emerson. "It is effective on some weeds that don't respond terribly well to 2,4-D, like spurge."

Emerson says professionals have to realize that since bromoxynil is a contact killer, they can't expect the same degree of control. It has to be tank-mixed with a material like dicamba to get translocation and extended control. Many weeds will burn back, but regenerate, when treated with bromoxynil alone. However, Emerson says weeds that have no regenerating buds at the crown can be clobbered, such as knotweed. By adding dicamba to the tank-mix, Emerson says you can also count on the potential for continued root absorption because dicamba stays in the soil longer than phenoxys.

Dow Chemical Company's current contribution to the non-phenoxy herbicide field is trichlopyr, which was introduced in November, 1984 in Dow's Turflon D herbicide. Tony Hall, Dow's Product Development Manager for Turf Herbicides, says the company expects a non-crop registration early in 1987 for a trichlopyr-related material called clopyralid. Another experimental herbicide called fluroxypyr, also chemically-related to trichlopyr, was developed in Dow Europe and first registration is anticipated in 1989.

"They both have interesting weed control spectra that could make them useful to the lawn care industry," says Hall. "The plan is to come up with a pre-mix product of clopyralid and trichlopyr as a non-phenoxy broad-spectrum material."

The Andersons have perhaps the most celebrated non-phenoxy product on the market. Break-Thru is a non-phenoxy herbicide which is designed to approximate the herbicidal effects of 2,4-D. "We are excited about this new product," says Joe DeLuca, Professional Products Marketing Manager for The Andersons. DeLuca debuted Break-Thru at a press conference at The Andersons' booth at the PLCAA trade show in Baltimore. "As it relates to the current issue on phenoxys and 2,4-D, we are not saying that the book is closed on phenoxys or 2,4-D. Instead we are saying that this is an alternative product that the marketplace wanted."

The product will be sold direct by The Andersons, as well as through turf product distributors. "We will go beyond our 26 states to market the product," claims DeLuca.

CONCLUSION. The whole issue of whether or not to use 2,4-D may soon be taken out of the lawn care professional's hands. The EPA has put 2,4-D through a peer review process and has received the conclusions of the reviewers, according to an EPA official. The official says EPA will soon make a decision as to whether or not the chemical will be put through the special review process.

ChemLawn's announcement that it will discontinue its use of 2,4-D in its 1987 application program has created a shock wave across the industry. Although most lawn care operators have publicly stated that they support the continued use of 2,4-D, off-the-record, many businessmen are grumbling about the true nature of the 2,4-D controversy. Many operators are of the opinion that ChemLawn's abandonment of the product is a marketing tactic designed to cleanse a company image that had become tarnished by adverse media coverage in 1986. This marketing tactic could bring about the demise of 2,4-D, unless EPA delivers the final blow first.

Lawn care operators across the country may say they are staying with 2,4-D in 1987, but you can bet most will go into the 1987 season with one eye on ChemLawn and the other eye on their 2,4-D inventories! — *Tim Weidner* ■

The author is Managing Editor of ALA *magazine.*

PLCAA's BALTIMORE DEBUT

(continued from page 27)

prioritize activities. They know how to get results and leverage resources. Most of all, they understand that people are a resource, not a cost.''

Finally, remember that offering your employees positive feedback creates effective teamwork. ''It's the single most powerful motivator in human beings,'' concludes Garfield.

Author of *Peak Performers: New Heroes of American Business*, Garfield has long been fascinated by top achievers. While pursuing a career as a mathematician, he completed two graduate degrees and began work on Apollo 11. Later, Garfield received a Ph.D. in clinical psychology from the University of California at Berkeley. He currently serves on the clinical faculty of the University of California Medical School in San Francisco.

There are at least 10 reasons why the time may be ripe to pull out of the lawn care business and get into something less frustrating, according to Dr. Elizabeth Whelan.

Author of *Toxic Terror*, Whelan is currently Executive Director of the American Council on Science and Health. She holds doctoral and masters degrees in epidemiology from the Harvard School of Public Health, and a masters degree in public health from the Yale School of Medicine. In a presentation titled, ''10 Reasons to Get Out of the Professional Lawn Care Business or Be Ready to Accept the Challenges of the Late 1980s,'' Whelan shed some light on the current chemical controversy in the United States.

''Americans really don't want to hear scientific facts about decreasing risks of premature disease and death,'' said Whelan. ''They enjoy worrying about their neighbor's lawn posing a health risk. It's sure easier than giving up cigarettes.''

Consumers suffer from shellshock as well, she said. ''Americans have tuned out so that you cannot get a message to them. We get so much bad news about nutrition and the environment, that it becomes standard to link chemicals, corporations, and capitalists, with cancer. The reality is that we are living longer than ever before, but it's a story the media can't sell — it's boring.''

Whelan believes Americans expect a toxic-free environment. ''We've developed an obsession with the idea that man has surrounded himself with new, overwhelming risks, and won't accept the reality that there are safe ways of using potentially unsafe materials.''

''We're a very educated society, but toxicology is a tremendous mystery to most people,'' says Whelan. ''Cigarettes are now known and familiar, but 2,4-D is unfamiliar. Americans want every last carcinogen out.''

''Considering the whole spectrum of what people are going to worry about in the next five years with the increased fear of AIDS, rational scientific study of all risks may become more difficult.''

''If you were to attempt to stay in your business,'' Whelan concluded, ''you would have to challenge the public with scientific fact. You'd have to point out the purely hypothetical nature of the risks of using your trade chemicals. You'd need to educate your constituency to the fact that there is no evidence of ill health caused by approved-use lawn care chemicals.''

With all the emotionalism in today's media coverage about the lawn care industry, is there a chance to get at the facts and present your side of the story to the public? Ford Rowan thinks there is a chance.

''Countering Media Bias Against the Lawn Care Industry,'' was the topic of Rowan's presentation to conference attendees. President of Rowan & Blewitt, Rowan is a former NBC correspondent and currently media consultant to the PLCAA.

''Health risks are difficult for the media to summarize, yet

(continued on page 57)

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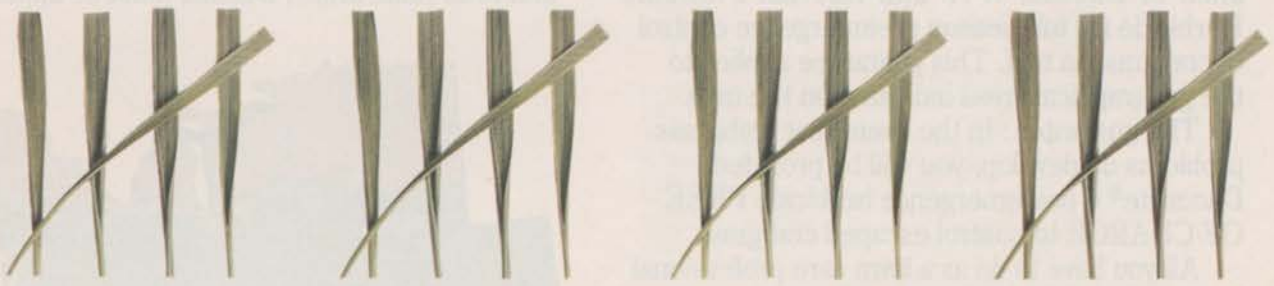

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MARSH CARE?

The Ruppert Landscape Company tackled a marsh reclamation project in Baltimore Harbor. And you think you are bogged down in your work?

Lawn establishment typically involves such grasses as zoysia, fescues, and bluegrasses. The lawn care professional considers many factors when choosing varieties — climate, rainfall, sunlight, soil conditions, and pedestrian use.

The situation is a little different if the term "lawn" is stretched to define a stand of any type of grass, such as *Scirpus*, *Spartina*, *Typha*, and *Peltandra* (bullrush, cordgrass, cattail, and arrow arum). Considerations might then include: elevations at high and low tide, salinity, boat wake, shadows cast by shore structures, and possible industrial pollutants.

This is the story of how a landscape contractor and an important coastal city worked together to establish a stand of grass to improve the health of an international port. The contractor was Ruppert Landscape Company of Ashton, Maryland, the city was Baltimore, and the port was Baltimore Harbor.

Waters from Baltimore Harbor flow directly into Chesapeake Bay. Concern for the Bay has led to increased public scrutiny into Harbor activities. In 1979, a new vehicular tunnel was completed under Baltimore Harbor. The City of Baltimore, in the spirit of environmental awareness, commissioned a group to study the impact of its construction.

The impact was tremendous. The dumping of dredge material from the construction site resulted in the loss of 143 acres of open water. To recover some of the lost aquatic habitat, the city pledged to reclaim or replace the wetlands. The first area chosen was a six-acre cove at the mouth of the tunnel.

The plan was simple: Plant several varieties of marsh grasses in such a way that, when established, would resemble and function as a natural marsh. However, to implement the plan would require methods not normally used by a landscape contractor.

First, the required varieties and quantities of grasses (over 100,000 plants) were not readily available. Seed from existing marshes had to be collected and custom-grown, then transported to the site. Continual watering with brackish water (not fresh!) was necessary to maintain the plants prior to planting.

Access to the site itself was difficult, and a boat was used to carry crew and materials to different points along the

(continued on page 63)

Pre-planting vista. This was the condition of the site at notice to proceed. Note debris — especially the large pile in right midground that had to be removed by the tractor trailer load. Statue of Orpheus is visible in the background (April 29, 1985). After planting. The practical and environmental challenges of planting have been met. The harbor is healthier in a small way (June 1, 1985).

PLCAA's BALTIMORE DEBUT

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easy to sensationalize," explains Rowan. "And that's the kind of thing television does, it transmits sensation better than it transmits information."

"Most reporters are generalists," he added. "You really cannot expect that they know a heck of a lot about your business. They may try to learn it, but they're never going to know quite as much as you do. It's hard to teach a reporter risk analysis at a professional level. Deadlines are also tight and condensation occurs."

Yes, it's true, said Rowan, that most of the news covered is bad. "Reporters are looking for the 'out of the ordinary' which usually translates into something bad. They're always looking for the most interesting thing."

Subjectivity is an inherent problem. "I think every human being in the world is biased. We look at the world through a mind set that has been formed through our attitudes, values, and opinions. We carry our opinions with us, and reporters do too."

To counteract negative publicity, Rowan suggested, "Talk about the benefits. You can win, but there's certain things you have to do. I would suggest you choose your battles wisely. But don't go volunteer — a low profile is fine. If you don't tell your side of the story as an industry, no one will. Don't assume the American people are dummies. They're listening and picking and choosing what to believe."

The key to the survival of your business, says Dr. John Hall, is understanding the total impact of any agronomic compromise. Once that is done, the lawn care operator must work to minimize the negative consequences.

A professor and Extension Agronomist for the Virginia Polytechnic Institute and State University, Hall holds a Ph.D in Agronomy from Ohio State University. He was previously a turf specialist on the faculty of the University of Maryland.

In "Agronomic Compromises in Lawn Care Programming," Hall told attendees, "This is a challenging time, in which you are faced with some survival questions. You've got gut reactions but you're going to have to compromise everyday because you're in business."

Choices are affected by material availability, personnel training, weather restrictions, marketing, environmental concerns, and economics. Hall breaks down lawn service operating costs into the following categories: Salaries, 65 percent; machinery, 17 percent; materials, 10 percent; and miscellaneous, 8 percent.

"Your whole future rides on materials," said Hall. "If you need to save money, don't do it on products. That is a serious compromise, because your future relies on the efficacy (of those products)." He says avoid compromises that are overly influenced by monetary considerations. Hall insists that lawn care professionals must get specific about the level of quality necessary in the product.

"I don't want to play down safety concerns," Hall adds. "Broadleaf herbicides seem to be where the crisis is now. 2,4-D is one of the most highly tested compounds we are using. Yet I have more concern about switching to some of the lesser tested materials." He admits that there are differences between broadleaf herbicides in terms of toxicity.

Pressure to please customers is a strong influence, says Hall. "One calls up and asks why his neighbor's lawn is greener when they're both paying the same price for lawn care. But, if you over-stimulate leaf growth at the expense of the root system, the phone is going to ring off the hook. How do you compromise?"

First, Hall says the operator must realize that every compromise produces multiple effects. Even such a small thing as lowering the mowing height 1/4-inch will have massive impact. Changes in the

amount of nitrogen put down will have even more massive effects. Switching from one herbicide to another, according to Hall, could effect the root system, change water requirements, and cause more frequent soil compaction. This would create a need for more aeration.

The payoff for a preventive maintenance program is reducing down time on equipment and avoiding costly repairs. Some companies manage to succeed in this arena while others fail.

"Not thinking ahead, and having your equipment go down, can seriously effect the productivity of your operation," says Richard Smith, in his presentation, "Mowing Equipment Maintenance: Three Case Histories for Success."

Smith, Manager of Commercial Training for the Toro Company, designs and develops Commercial Service publications and conducts educational seminars on commercial equipment for the consumer and turf markets. He holds a degree in Industrial Technology from the University of Wisconsin.

Smith's presentation was developed from a survey conducted by Toro. Of those mowing/maintenance companies that responded, 65 percent reported having a daily and weekly maintenance program, while 35 percent said they conducted maintenance on their equipment once a month or not at all.

The operator should play a significant part in determining the quality of the mowing equipment, says Smith. "Attempts should be made to hire people who are equipped to become good, conscientious operators. Accepting someone undesirable because of low pay scales may be very costly, resulting in safety and equipment breakdowns. Expensive equipment is a large investment and cannot be jeopardized because of unqualified operators."

NEXT YEAR. Looking ahead to next year's conference and show, the association will be making a departure from the usual schedule. Holding the Eighth Annual Conference and Show in San Antonio, Texas on November 12-15 will mean that move-in will be on Wednesday and activity will start on Thursday. The main days of the show will be Friday, Saturday, and Sunday.

Jim Brooks says this scheme was chosen partially because of availability of the facilities, but also because he hopes the airlines will give the association better rates if attendees stay over Saturday. He says the hotels will also give better rates to groups that check in on evenings when the hotels are traditionally not busy. "Another reason," says Brooks, "is that with this schedule, the lawn care operator will not have to be away from his business for a full business week."

Since the PLCAA is still a young association in a growth mode, Brooks says, the conference has to move to areas where the PLCAA doesn't have as much visibility. Texas is also a prime conference location because it is a state where the lawn care industry is growing, according to Brooks.

"The economy of Texas was probably growing a little more when we made the decision, because they didn't have the oil crisis they are having now," admits Brooks. Nonetheless, he says, San Antonio is a great convention city. "We think people are really going to like it. There is lots to do there. I think those who haven't been there are going to be surprised, as they were about Baltimore." He says many of this year's conference goers were pleasantly surprised to find Baltimore to be a fun place. No doubt more fun and surprises await conference attendees in San Antonio in 1987! — *Julie November* ■

The author is Assistant Editor of ALA *magazine.*

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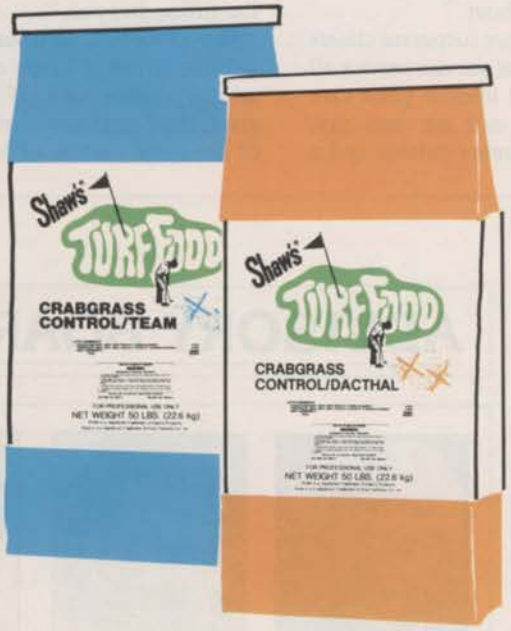

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INTERIOR PLANTSCAPES

(continued from page 30)

construction is still booming and that is good for the future of interiorscapers. "I have been talking to developers who are not building out of the motivation of tax sheltered investment and they still see a strong economy for continued building of office space," says Hunt.

But to make a go of an interiorscape business, Hunt says the technicians must be well-versed in disease control, fertilization, lighting, and other special needs of interior plants. "An exterior contractor going into it is not going to offer the client the professional skills that are necessary to make the interior thrive," says Hunt.

Therese J. Haaf, owner of T.J.'s Lawns and Landscapes in Woodstown, New Jersey, would disagree with Hunt's assessment. Haaf has been in the exterior maintenance and landscaping business for nine years and has been doing interior work for about five years. She can provide interior/exterior landscape maintenance, installation, and design. Most of her work has been in office complexes.

Haaf has an education in ornamental horticulture and did design work for local florists and greenhouse work with foliage plants before starting her own business. A solid background in horticulture is essential for any exterior landscape maintenance operator who is considering a move into the interiorscape field, according to Haaf.

"A lot of people are going to school for ornamental horticulture," says Haaf. "Maybe 10 years ago, the bulk of the people who were in the business really didn't have any technical background in the horticulture area. I am trained with plants and design work. That gives my customers more confidence."

Haaf was originally in the business of caring for commercial and industrial exterior landscapes, but because of her background, she soon found herself getting into interior work. "I fell into the different problems people were having with inside plants and it opened the door for me to maintain them and design when additions were built on," says Haaf. "When I went into other landscaping contracts, I would ask about the interior work. That is how it all came about."

She says many of her corporate clients appreciate the fact that she can service all of their exterior and interior plant care needs. "They can call me and say, 'Terry, we need planters outside and a sign painted.' They like to have only one person to call for inside and outside work. They see plant care as one category. By seeing the outside work done well, they automatically think the inside work will be done well too, which it is."

Since she is doing the exterior and interior work for many accounts, she and her technicians are on-site several times a week, which creates job security. "They like to see people tending," says Haaf. "They like to see their money at work."

There is also a psychological effect at work here.

"I have a lot of offices I can't get into during the day because of meetings or visitors, so I would do them at night or on the weekend. The secretaries started saying that no one is caring for the plants and they are dying, when in fact, there was nothing wrong with them, they just didn't see anyone fussing over them. So I just started doing them during the day and when I couldn't do a building I would have to come back, but the talk around the office stopped."

One of the benefits of having an interior sideline is that it keeps core employees working year-round. If the weather is good, Haaf continues working outside until about the middle of January and she

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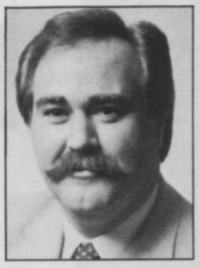
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Gordon LaFontaine is President of Lawn Equipment Corporation, Novi, Michigan. **Dr. William Meyer** is President of Pure-Seed Testing, Inc., Hubbard, Oregon. **Des Rice** is president of The Weed Man, Ltd., Mississauga, Ontario, Canada. **Dr. Al Turgeon** is Professor and Head of the Department of Agronomy, Pennsylvania State University. **Dr. Joseph Vargas** is Professor of Botany and Plant Pathology, Michigan State University, East Lansing, Michigan. **Dr. Patricia Vittum** is Associate Professor of Entomology, University of Massachusetts, Waltham, Massachusetts.

starts back up at the beginning of March. Between the middle of January and the beginning of March she can keep her people on the job with interior work.

Haaf can draw on 14 to 17 employees to do exterior and interior work, but the bulk of her interior work is done by three key employees. "They are people I have trained," says Haaf. "I don't have enough interior work to put people into it every single day of the week."

It is important to note, however, that the employees Haaf trained for the interior work came to the job with backgrounds in interior plant work. "I couldn't teach somebody who has no awareness of foliage care," says Haaf. "I probably do 60 percent of the work. I like to go in weekly to check on things."

The equipment necessary to perform interior plant care all depends on the kinds of interiors you will run up against. Haaf says it is important to remain flexible. At one location, Haaf says she had to install planters atop 15-foot-high floor displays. In that case, she needed a very tall ladder. Her most important piece of equipment is a 55-gallon drum with attached cart and hose that she uses to water indoor plants. Also attached to the drum is a pesticide duster, shears, and bags for clippings and trash. For liquid spray treatments, she uses a 3-gallon compressed air sprayer.

Haaf has nothing but good things to say about the potential interior plantscape market in her area. Improved interiorscape aesthetics have become associated with improved work habits of office workers. "Plants have just been incorporated in there to soften things and make the atmosphere better," says Haaf. "In these offices, when people have plants around their desks, they consider them theirs. If you move them they get upset!"

Success in the interior plantscape field seems to hinge on the acceptance of the marketplace to the concept and the professional's ability to gear up to do the work. Some areas still do not appreciate the value of professionally designed, installed, and tended interior plants, but most major metropolitan areas have embraced this concept. Given the viability of the marketplace, the exterior landscape maintenance professional then has to make a managerial commitment to support his new interior plantscape division with qualified people and aggressive marketing. — *Tim Weidner* ■

The author is Managing Editor of ALA *magazine.*

MARSH CARE?

(continued from page 56)

cove's perimeter. Crews used specialized planting bars as well as hip waders, life jackets, and other somewhat unusual equipment. Finally, insurance had to be obtained in accordance with the Harbor Workers and Longshoreman's Act!

A year later the success of the endeavor can be judged on the following criteria: Did the plant material survive the onslaught of tide, storms, toxins, and time? Did it thrive and send out new rhizomes? Has the new marsh established itself firmly enough to withstand the action of erosion? Does it work to stabilize the soil and prevent further runoff of silt into the harbor? Does the area resemble a natural habitat? Has it attracted fish, birds, and other wildlife?

On the basis of these criteria, the wetlands planting in Baltimore Harbor is a success. — *Pat Ruppert* ■

The author is in charge of Special Projects at Ruppert Landscape. For more information, contact Ruppert Landscape Company, Inc., 17701 New Hampshire Avenue, Ashton, Maryland 20861; 301/774-0400. If you are "bogged" down, Pat Ruppert could help!

PRODUCTS

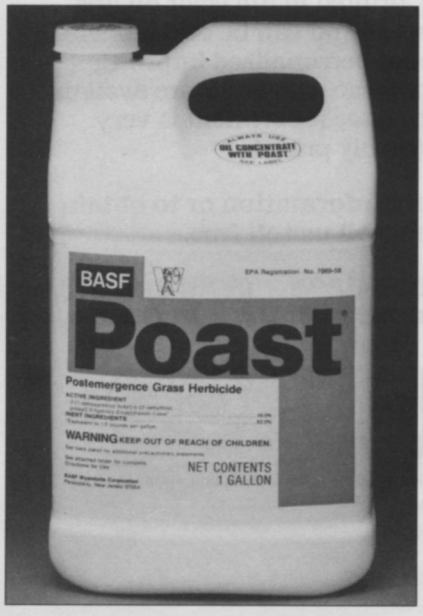
A new aerator is being added to **Terracare Products Company's** 1987 product line-up. The Walk-R-Ide is made for the lawn care industry. Equipped with a removable stand on the rear of the machine, the operator can either ride or walk the aerator, depending on aerating conditions.

Powered by an 8—horsepower industrial Briggs and Stratton engine, a Peerless transaxle with one-speed forward and reverse, the Walk-R-Ide has an outstanding ability to turn very sharp corners while aerating. With 60, 5/8-inch coring tines, the aeration pattern is 3-1/2 by 4 inches with up to 3-inch penetration. All of these features make the Walk-R-Ide the best of its type on the market today.

Circle 101 on reader card

Poast® herbicide from **BASF Corporation** is a highly selective, broad spectrum postemergence material for control of bahiagrass, large crabgrass, smooth crabgrass, and goosegrass in established and seedling centipedegrass. Centipedegrass is a common lawn grass in the coastal plain of the southeastern United States.

Poast rapidly enters target grasses through the foliage and translocates throughout the plant. Within two days, growth slows or stops. Control symptoms progress through reddening of the foliage to leaf tip burn. Subsequently, burn back of the plant will be visible. Depending upon environmental conditions, these symptoms generally are observed within three weeks.



The relationship between Poast and centipedegrass is unique. Centipedegrass is the only grass species that has a high level of tolerance to Poast. Conversely, Poast is the only postemergence grass herbicide on the market that is safe to use on centipedegrass. Poast should not be applied to any other desirable turfgrass species, because serious injury may occur. However, Poast may be used safely around ornamentals.

Poast will control virtually all annual and perennial grasses in seedling, transplanted, and established trees, shrubs, non-grassy ornamentals and non-grassy ground covers. Sprayed over-the-top, Poast can be applied broadcast to large areas or as a spot treatment to small areas. For best results, the herbicide should be applied to actively growing grasses before extensive tillering and/or seedhead formation has taken place.

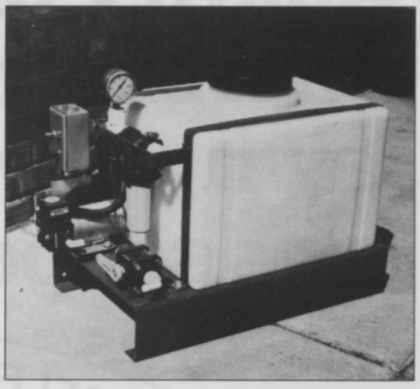
Circle 102 on reader card

The Model 85 Seed-N-Thatch from **Olathe Manufacturing, Inc.** is a 5—horsepower thatcher with an integral out-front seeder. Get two jobs done at once! This unit makes other thatching machines obsolete.

Circle 103 on reader card

The **AgTec** division of the **Ag-Chem Equipment Company, Inc.** has introduced a low-volume spray system to lawn care professionals. This new economical add-on unit enables the operator to spot spray and save the unnecessary use of expensive chemicals in lawn areas which do not require special treatment. It can be added-on to presently owned spray systems, including high-volume units.

The sprayer, called the Model LCI, features a 12-gallon or larger poly tank with a 12-volt electric single injection pumping system. Low volume herbicides, insecticides, soil conditioners, or other lawn treatment agents can be injected with the dual-line injection hose handgun sprayer. It can be used for high- and low-volume spraying. It has a variable speed control and pump capacity up to 2.8 gpm. A 12-volt electric Hannay reel provides convenient rewinding of the hose. The unit comes completely assembled.



Circle 104 on reader card

Middlesworth Engineering and Manufacturing, Inc. announces the addition of the Model C54R Commercial Riding Rotary Lawn Mower to their line. This is an out-front mower with a 54-inch

(continued on page 66)

Mauget® takes the 'nots' out of tree care.

You've used the 'nots' before. Not now...not this year...not me...not profitable...not registered.

This year, why not bring your 'nots' to a Mauget Micro-Injection seminar. Learn how to solve the knotty problems for your customers. Topics include nutrition, insect and disease control, and application techniques.

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Ramada Inn-West
510 Lane Ave

January 19
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January 31
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Sheraton Park Place Hotel
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Circle 97 on reader service card

PRODUCTS

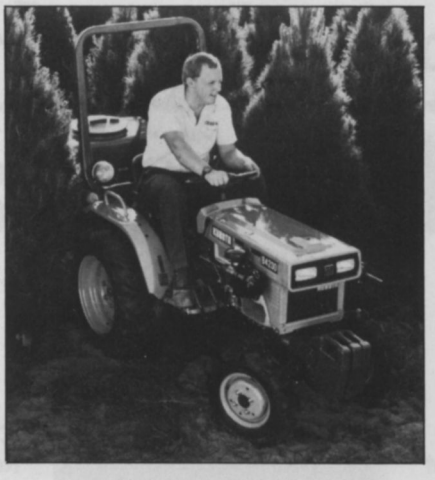
(continued from page 64)

cut. It features a height adjusting lever with cutting heights of 1-inch to 4 inches. This unit has a hydrostatic transmission with variable ground speeds from 0 to 6 mph and true zero-turning radius. It uses a 16—horsepower Kohler cast iron engine.

The wide-track axle, along with the low compact design, provides excellent maneuverability on hills. The mower is designed to provide a very comfortable operating position. The operator does not straddle the engine or framework. A convenient handrail is provided to assist the operator in getting off and on the machine. It also has a deluxe seat with armrests. The "C" series of mowers also includes a 40-inch rotary mower and a 44-inch flail mower.

Circle 105 on reader card

The world's smallest four-wheel-drive tractor with a hydraulic three-point hitch has just been introduced by **Kubota Tractor Corporation.** The B4200D is



powered by a two-cylinder water-cooled diesel engine, provides 12.5—horsepower, and was specifically designed for use by nurseries, small orchards, landscapers, and homeowners. With a width of just over 33 inches, and a wheel base of only 48.4 inches, the B4200D is particularly practical for use by Christmas tree growers.

Although the unit is a low, cost-efficient tractor designed to operate in narrow conditions, it features many big tractor extras like four-wheel-drive and a three-point hitch. The tractor is available with the BF200 Loader and the RC-44-42 Mid-mount Mower. This unique feature enables the operator to have both the mower and the loader on the tractor at the same time, instead of having to remove the loader and the subframe. The mower is powered by the B4200D's mid-PTO shaft. Two-speed rear PTO is also standard.

Kubota markets a complete line of tractors from 10 to 85 PTO— horsepower, along with a variety of lawn and garden implements, compact excavators and outdoor power products.

Circle 106 on reader card

After two decades of being manufactured as a wettable powder, Dacthal® preemergence herbicide is now available in a flowable formulation for sale in 2-1/2-gallon containers and 55-gallon drums. Dacthal Flowable Herbicide gives lawn care professionals and golf course superintendents an easier, more convenient way of controlling crabgrass,

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spurge, and 21 other troublesome annual grasses and broadleaf weeds in established turf and 120 ornamental plantings.

Manufactured only by **Fermenta Plant Protection Company**, this new product offers professionals the same advantage they have come to depend on from Dacthal — excellent turf tolerance, virtually no leaching, volatility, or photodecomposition when exposed to sunlight.

Circle 107 on reader card

OMC Lincoln has introduced a new 21.5—horsepower diesel engine for the Cushman® Front Line® tractor. The new three-cylinder diesel engine gives Front Line buyers a choice of three power plants: A 22—horsepower air-cooled gasoline engine, a 17—horsepower diesel, or the 21.5— horsepower diesel. All Front Line tractors can be equipped with 60- or 72-inch mower decks, as well as other attachments.

The new diesel-powered Front Line features hydraulic power steering, a new OMC-designed PTO clutch with a new coupling design between the clutch and engine, a Donaldson air cleaner and Stanadyne water separator to protect against fuel contamination.

The engine is rubber-isolated from the frame to minimize vibration, and the engine is cooled by a remote, rubber-isolated radiator with V-belt-driven fan. An overheat warning system will signal the operator if the coolant temperature should ever rise above a safe level.

The new 21.5—horsepower diesel tractor is a four-wheel model, with 23 x 10.5-12 turf tires in front and 16-6.50-8 rear tires. The new model is also equipped with a larger fuel tank. The tractor is also equipped with an automatic seat switch that shuts down the engine if the operator leaves the seat when the PTO is engaged. And, a key switch activates an electric solenoid on the injector pump to shut off the engine and minimize chances of the operator leaving the key on and running down the battery.

Operator comfort features include a high visibility control console, seat that adjusts forward and back, and a shock ab-

sorber on the seat to ensure a smoother ride.

Circle 108 on reader card

Kioti Tractor, Inc. introduces the first in a new line of rugged, versatile compact tractors with a substantial price advantage. Imported from Korea, the 22—horsepower, front-wheel assist, water-cooled diesel is powered by a fuel-efficient, three-cylinder, four-cycle, low-vibration engine. The LB 2204 has a larger operator area and easier-to-read, more complete instrumentation than comparable products. It comes with both front and rear PTO, three-point, category-I hitch, and wet disc brakes. Under the top-opening hood, all service points are easy to reach. ■

Circle 110 on reader card

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Evergreen Lawns, a Division of The Hawley Group, Ltd., an international service company doing in excess of a billion dollars in sales annually wants to acquire lawn care companies of all sizes. All inquiries strictly confidential. Please contact: Steve Hirshmugl, Director of Finance and Acquisitions, Evergreen Lawns Corporation, 1390 Charlestown Industrial Drive, St. Charles, Missouri 63303; 314/946-9700.

HELP WANTED

General Manager—
Control of all phases of maintenance operations, field, sales, equipment, and personnel. Must have irrigation knowledge. Salary and benefits based accordingly. Send resume or phone: Barry Cohen or Mike Grey at B.L. Cohen Landscape, Inc., 250 Commercial Street, San Jose, California 95112; 408/288-9394.

Management Trainee/Supervisor—
NORTHERN NEW JERSEY. We grow superior lawns. Quality oriented, growing company with residential and com-

mercial accounts needs person with good basic knowledge of how plants grow. Minimum of one to two years related experience. We offer good salary, rapid advancement, plenty of challenge and recognition. Call and write: GREEN-A-LAWN, P.O. Box 5010, Bergenfield, New Jersey 07621; 201/836-5530.

Winners Only—
If you love the lawn care business, and are still looking for your personal security and comfort levels, send us your resume. Your experience should be in all phases of lawn care, management, customer sales, and service. We are expanding our operations and will offer the right individual a unique once in a lifetime opportunity. When you prove your abilities, we'll guarantee your success. Send your confidential resume to: P.O. Box 5677, Rockville, Maryland 20855.

Help Wanted—
Working managers experienced in all phases of lawn servicing looking for opportunity to grow. We offer lots of work, advancement opportunities to the right people, good to excellent compensation and security. Must be willing to relocate to the East Coast (Washington, D.C. area) or if you're the right person we will consider you for a new office from Virginia Beach to Northern New Jersey. Call or write to: Ron Miller, Super Lawns, P.O. Box 34278, Bethesda, Maryland 20817; 301/365-4740.

Landscape Personnel—
Successful and established full service landscape management company in the beautiful mountains of western North Carolina is seeking a special person for full time employment. We are a small company with accelerating sales and a very particular and demanding clientele. I am looking for a perfectionist who knows and is comfortable with hard work. You must be under 35, in excellent health, and have at least one year of experience in both irrigation design and installation, as well as chemical applications to turf and plantings. Mechanical abilities are appreciated.

Your level of motivation must be outstanding. This is a once in a lifetime opportunity to help and become a vital part of a thriving business that is poised for tremendous growth. Send resumes to: Landscape Management Systems, Inc., P.O. Box 1090, Candler, North Carolina 28715.

For Sale—
1976 Ford 350 1-ton spray truck. Both 500-gallon poly-tank and all spraying accessories are one year old. Truck in excellent condition. $6,000.00. Call Pat McConnell 502/968-8100.

Spray Truck—
1981 GMC Sierra 3500 chassis cab, 36,000 miles, good condition. Equipped with Pro-Turf 400/200 split tank system, Myers 2C95 pump, PTO, two Hannay reels with Michelin hose. Call Fred Haskett, Greenworld at 216/364-7544.

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AD INDEX

To some turf herbicides, everything on

Fortunately, there is WEEDONE® brand DPC AMINE broadleaf herbicide.

Unlike common esters, it's a powerful 50/50 mix of 2, 4-D and dichlorprop in a non-volatile amine salt formulation.

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And unlike most three-way herbicides, WEEDONE® brand DPC AMINE contains no dicamba.

So there's no risk of root uptake or the damage it can cause to surrounding trees and ornamentals.

And while it works on over 70 weeds, including many of the more difficult to control, it's harmless to most species of turfgrass.

Making it the only post-emergent broadleaf herbicide you may need for lawns, parks,

this page looks like a broadleaf weed.


Silver Maple


Dandelion


Ground Ivy


Dogwood


Spotted Spurge


Lilac


Henbit


Chickory


Yellow Woodsorrel (Oxalis)


Boxwood


Thymeleaf Speedwell (Veronica)


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Yarrow

golf courses, athletic fields, virtually any turf area.

Which not only simplifies inventory and handling, but budgeting as well.

For even more economy, WEEDONE® brand DPC AMINE herbicide mixes easily with most liquid fertilizers for one-trip broad cast application.

So, no matter when you need it, no matter how determined the weed, ask your turf chemicals supplier for WEEDONE® brand DPC AMINE broadleaf herbicide.

After all, you shouldn't have to clear the land just to clean up a little weed problem.

From the turf care group at Union Carbide.

Circle 11 on reader service card

Agricultural Products Company, Inc. As with any insecticide or herbicide, always read and follow label instructions. Member of Golf Course Superintendents Association of America.

Now you can hang up your gloves in the fight against broadleaf weeds with LESCO Three-Way Selective Herbicide.

Deliver the knockout punch to more than 30 broadleaf weeds — including such tough champions as ground ivy and spurge — with the combined effectiveness of 2,4-D, MCPP and dicamba. You'll get quick-action, single-application control.

Available in five-gallon, 30-gallon and 55-gallon containers, LESCO Three-Way Selective Herbicide eliminates the inconvenience and inefficiency of tank mixing individual components. Bulk shipment by tanker truck or tote tank is also available in most areas.

Controlling broadleaf weeds doesn't have to be a fight. Order LESCO Three-Way Selective Herbicide today. Call toll free.

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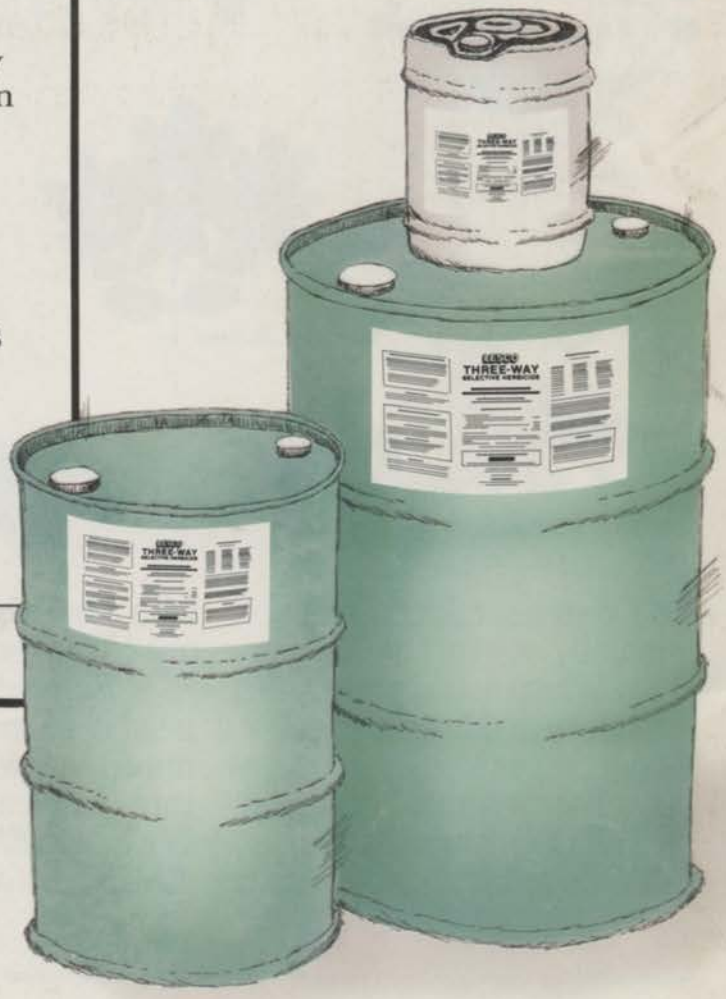

Circle 10 on reader service card