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James B. Beard
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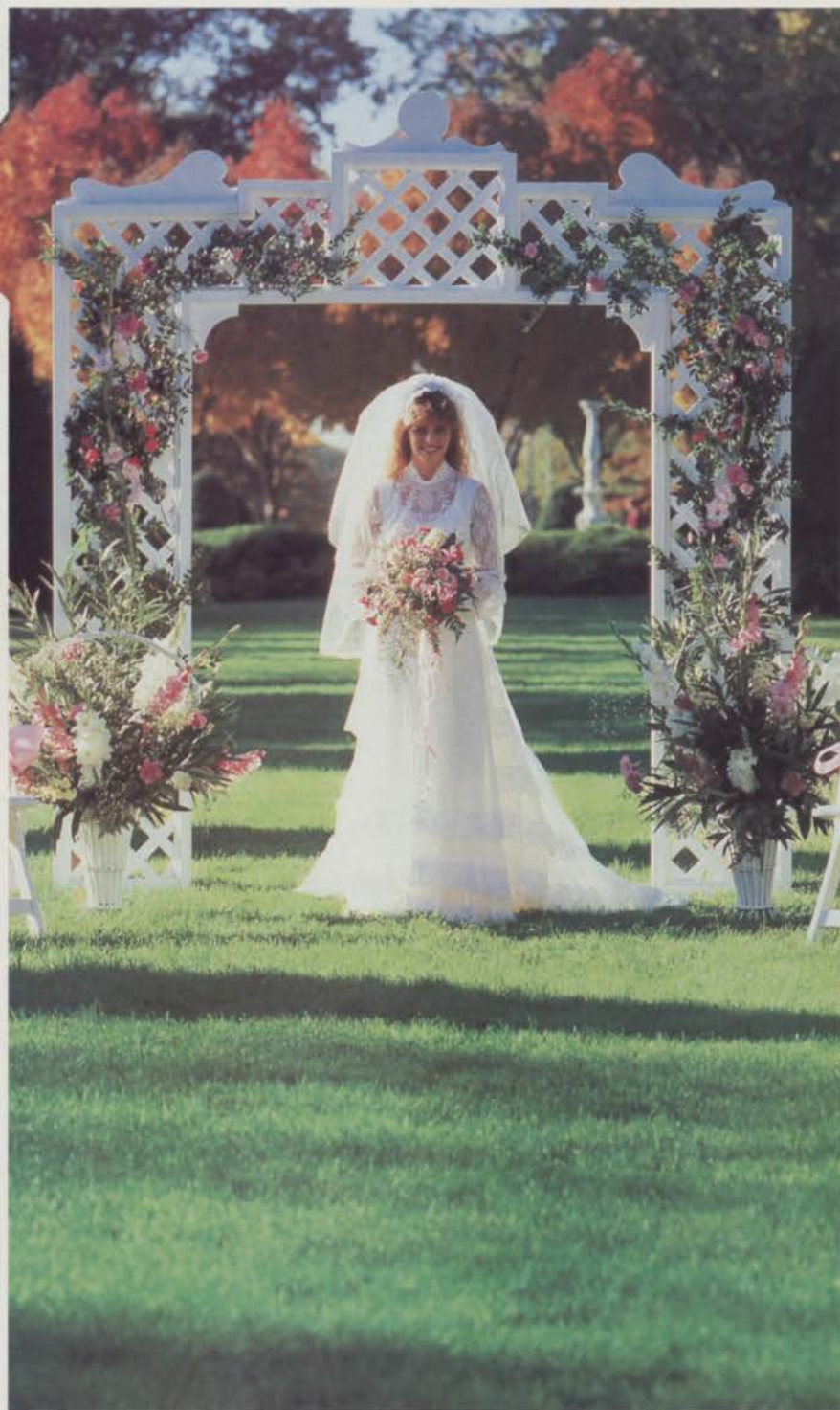
FEBRUARY 1986 • \$1.25

**SPECIAL CHEMICAL
PRODUCTS SECTION
SURVEY REPORT
TRAP TROUBLES
OHIO SHOW REVIEW
AMINES AND ESTERS
PHOSPHATES: FROM THE
MINE TO YOUR LAWN
RINSE WATER DISPOSAL**

**LAWN CARE CHEMICALS
ARE INDUSTRY
NEEDS BEING MET?**



A thing of beauty is a joy forever. Unless there are mole crickets in there.



Mole crickets. They're spoilers. Give them an inch and they'll take a lawn.

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OFTANOL works in the top 1-1½ inches of soil, where the mole crickets are, and remains active up to 120 days.

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IT STOPS THE SPOILERS.**



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COVER

Do you have a chemical in your storeroom to solve every lawn application need? Like the people we interviewed for this month's cover story, you are probably not alone in thinking that lawn chemicals have some room for improvement. (Cover photo by Barney Taxel)

ALA (USPS 65747000) is published twelve times per year. Copyright 1986 Gie, Inc. Publishers, 4012 Bridge Ave., Cleveland, OH 44113. All rights reserved. No part of this publication may be reproduced or transmitted by any means without permission from the publisher. One year subscription rates: \$12.00 in the USA and Canada; Single copy rate: \$1.25; Foreign subscriptions: \$30.00 per year. 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.

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Let us send you a sample of FERROME⁺⁺C™ so you can see with your own eyes how fast it changes weak-looking dull grass into vibrant, deep-green, healthy-looking grass.

Lawn care companies that have been quietly testing Ferromec for several years have proven that it is not only an effective tool for getting new customers, but also in holding their present customers in the face of some pretty tough competition.

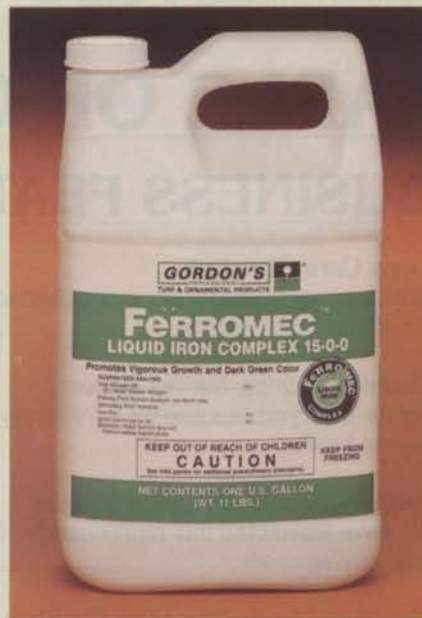
Even more exciting are the reports that Ferromec costs them practically nothing because of what they save on reduced fertilizer costs.

In any event, the discovery of Ferromec can help a lawn care operator measurably increase his overall efficiency, and so we urge you to take a minute right now to understand why iron is such an

elusive nutrient, and how the Trimec® people have managed to harness it for you.

Ferrous Iron is Very Fragile.

As you know, the basic problem of supplying iron to turfgrass is its fragility in the Ferrous ++ State. Only Ferrous iron can be utilized by a plant and, *ironically*, almost as soon as Ferrous Sulphate is applied it turns to the non-usable Ferric +++ State. Once oxidized, the reversal with organic matter acting as a reducing agent is so slow there is a question if it would ever occur.



And thus it is that scientists devised chelating, which is intended to fix the iron molecule in the Ferrous state. If chelating is properly done, it is effective. But it is very expensive and so slow to release that it could be many weeks before a treatment of chelated iron could produce a significant color change in the grass.

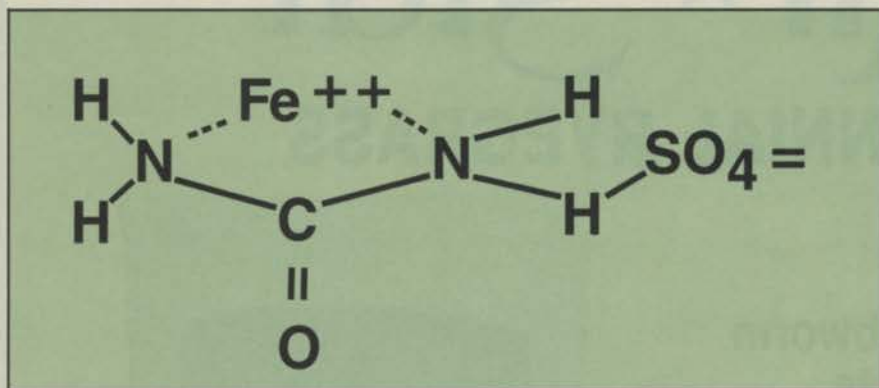
Ferromec Works Right Now!

At PBI/Gordon we have a patented process of bonding a Ferrous iron molecule to a molecule of urea, which stabilizes the iron in a Ferrous state. Notice the diagram on the opposite page of the Urea/Ferrous sulphate molecule which is called Ferromec.

Half of this green at Hodge Park Golf Course in Kansas City was sprayed with Ferromec and, within 24 hours, the color change was dramatic. Under normal growing conditions, visual response usually occurs between 8 and 48 hours after application. However, if moisture and temperature extremes exist, the response may be slower. Ferromec is also effective on trees, shrubs and herbaceous plantings.



Iron that Produces Within 24 Hours



This is the molecular structure of Ferromec. Note that ferrous sulphate is bonded to a urea molecule and will remain stable. Ferromec utilizes a

recombinant urea process to achieve the unique composition. It is classified as an organometallic compound.

Ferromec can be mixed with liquid fertilizer and Super Trimec[®], and it will not harm the equipment. The Ferromec is almost immediately assimilated so the color change occurs very rapidly. The Ferromec which reaches the ground is taken up by the root system because the grass has such a voracious appetite for the nitrogen content of Ferromec.

Use Ferromec door-hangers To Get New Customers

You can imagine what a powerful tool Ferromec can be to help you secure new customers... After all, every homeowner wants the beautiful, vibrant green color... right now!

Your PBI/Gordon distributor will supply you with door hangers which tell the exciting story of green-up in 24 hours. You can imprint them with your name and telephone number and use them in neighborhoods where you want to secure new customers. *Call or write for your free sample of Ferromec.*

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Inform us of bids to be let. We furnish detailed specs and names of distributors serving your area.

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Neal
Howell

Do you have any questions about iron?

Iron is definitely established as an essential micronutrient required by all plants. Yet, the amount required can vary dramatically depending on the pH of the soil, the composition of the fertilizer that is being used and the plant that is being fed.

Neal Howell, Director of Sales and Services of Soil Amendments for PBI/Gordon, is an authority on iron; he is as near as your telephone when you have questions.

You'll like Neal. He's a *real ironman* whose roots go back to the Iron Knights of the "Hell on Wheels" gang of the 2nd Armor Division from Fort Hood (that's General Patton's old bunch).

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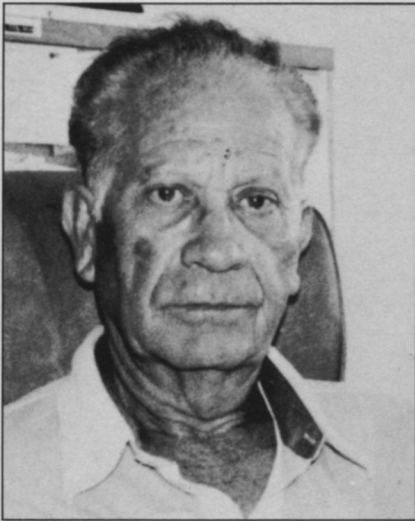
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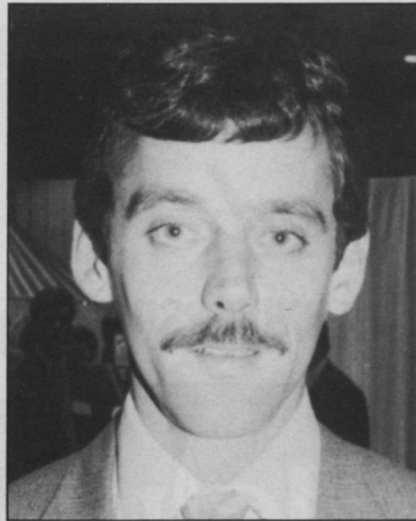
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VIEWS ACROSS THE LAWN CARE INDUSTRY

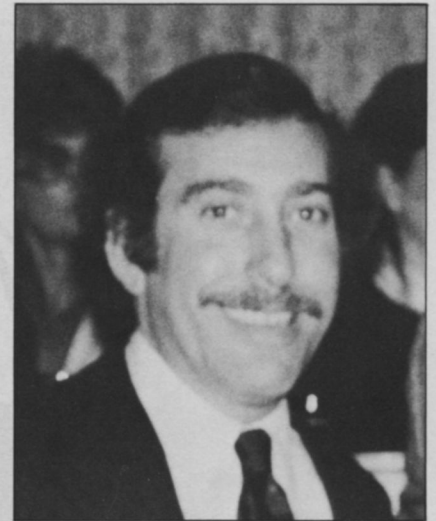
ARE YOU SATISFIED WITH YOUR CHEMICAL DISTRIBUTOR?



"I'm satisfied with them because we have no problems with deliveries or billing or anything of that nature. The distributor calls on us once a month and keeps us informed of anything that is new and price changes. We've been with him for thirty-some years now." - **Mac McKinney, A-A Exterminators, Coral Gables, Florida.**



"I guess I am. I don't have any particular objections to any of my distributors. I buy from a couple and I usually get prices from three or four. We buy mostly on a yearly basis. We contact our dealers in the winter and take delivery in the spring. Basically we get in our whole buy for the year at one time." - **Gene Horning, LawnPro, Mapleton, Minnesota.**



"I don't do the purchasing myself, but I'm sure we must be satisfied with our distributors or we wouldn't be buying from them. We expect our distributors to be responsive and professional in their attitude and actions and to give a good value for the dollar spent." - **Charles Racusin, Environmental Landscape Services, Houston, Texas.**

CALENDAR

Feb. 25-27

Western Pennsylvania Turf Conference and Trade Show, Pittsburgh Expo Mart/Marriott Hotel, Monroeville, Pennsylvania. Contact: Christine King, Pennsylvania Turfgrass Council, P.O. Box 417, Bellefonte, Pennsylvania 16823; 814/335-8010.

Feb. 27-28

ALCC's 9th Annual Landscape Industry Conference and Trade Show, Regency Hotel, Denver, Colorado. Contact: Diane Matt, ALCC, 3895 Upham Street, Suite 150, Wheat Ridge, Colorado 80033; 303/425-4862.

Mar. 2

Nortex Nursery Industries Open House, held at both Dallas, Texas locations. Contact: Don Gish, Nortex Nursery Industries, 7700 Northhaven Road, Dallas, Texas 75230; 214/363-6715.

Mar. 4

Professional Grounds Management Society Management Workshop on Basic Management Skills for the First Level Supervisor, Sheraton

Hotel, Valley Forge, Pennsylvania. Contact: PGMS, 3701 Old Court Road, Suite 15, Pikesville, Maryland 21208; 301/653-2742.

Mar. 5-7

Landscape Exposition, Valley Forge Convention Center, Valley Forge, Pennsylvania. Contact: Carole Dornblaser, HBJ Expositions and Conferences, P.O. Box 5555, 50 Washington Street, Norwalk, Connecticut 06854; 1/800/243-2815.

Mar. 6

Florida Turfgrass Association "Pesticide Laws and Factors Affecting Pesticide Performance" seminar, Hilton Inn Florida Center, Orlando, Florida. Contact: Bill Nass, Florida Turfgrass Association, 302 South Graham Avenue, Orlando, Florida 32803; 305/898-6721.

Mar. 12

Professional Grounds Management Society Management Workshop on Basic Management Skills for the First Level Supervisor, Richmond, Virginia. Contact: PGMS, 3701 Old Court Road, Suite 15, Pikesville, Maryland

21208; 301/653-2742.

Mar. 18

Professional Grounds Management Society Management Workshop on Basic Management Skills for the First Level Supervisor, Cincinnati, Ohio. Contact: PGMS, 3701 Old Court Road, Suite 15, Pikesville, Maryland 21208; 301/653-2742.

Mar. 24-25

Eighth Annual Athletic Turf Management Seminar, Providence, Rhode Island. Contact: Athletic Turf, P.O. Box 1936, Appleton, Wisconsin 54913; 414/733-2301.

Mar. 27-28

Ninth Annual Athletic Turf Management Seminar, Roanoke, Virginia. Contact: Athletic Turf, P.O. Box 1936, Appleton, Wisconsin 54913; 414/733-2301.

Apr. 9

PGMS Management Workshop, Holiday Inn, Denver, Colorado. Contact: PGMS, 3701 Old Court Road, Pikesville, Maryland 21208.

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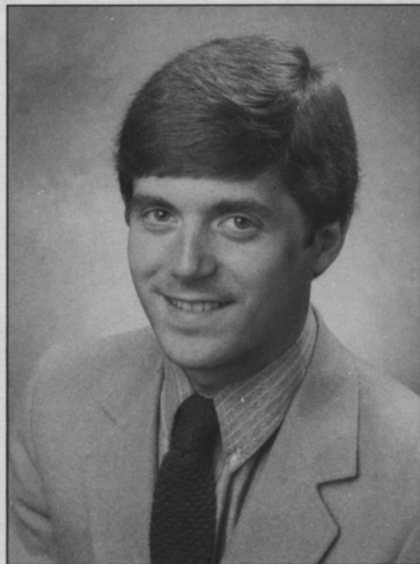
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INSIDE STORY

This month we have devoted a great deal of coverage to the topic of lawn care chemicals. Our cover story probes the state of the art in lawn care chemicals. Assistant Editor Vivian Rose contacted turf researchers around the country to find out how they felt about the present level of sophistication in lawn care pesticides and fertilizers. Then, she called on some of your peers to discover how the "man in the field" feels about the chemicals he is using. We think you will find that the end result provides interesting commentary on the chemicals used by this industry.

In conjunction with our cover story, we present the results of our third annual chemical buying survey. We sent out 300 surveys to lawn care operators picked at random from our subscriber list and asked them to describe to us their chemical buying habits. Once again, we think you will find the results interesting.

Finally, to round out our coverage of lawn care chemicals, we have a "Special Chemical Products Section" designed to



aid you in making out your shopping list for lawn chemicals. Obviously, we couldn't list every lawn chemical currently on the market because of space limitations, but we hope this listing will help

fill your needs for the 1986 lawn care season.

For those of you in the Ohio/Kentucky/Indiana region who couldn't make it to the recent Ohio Turfgrass Conference and Show, we have a report on the conference filed by our Assistant Editor Julie November.

We also have a brief description of a phosphate mine we visited in Florida last year while we were attending the nearby Professional Lawn Care Association of America conference.

And of course, we have our usual selection of interesting technical features. "Rinse Water Disposal" was written by K.W. Brown of Texas A&M University. "Trap Troubles" was submitted by F. Carter Gordon of the University of Kentucky. "Esters and Amines" comes to us from Greg Nickerson of Bader Rutter Associates, Inc. Happy reading! ■

Tim Weidner

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Tuflex offers you a full line of tanks to solve your pest control problems, big or small. The experts at Tuflex carefully research and analyze your needs and assist you in designing and engineering the right tank and pump system to your specific requirements. Anything less would be a compromise solution.

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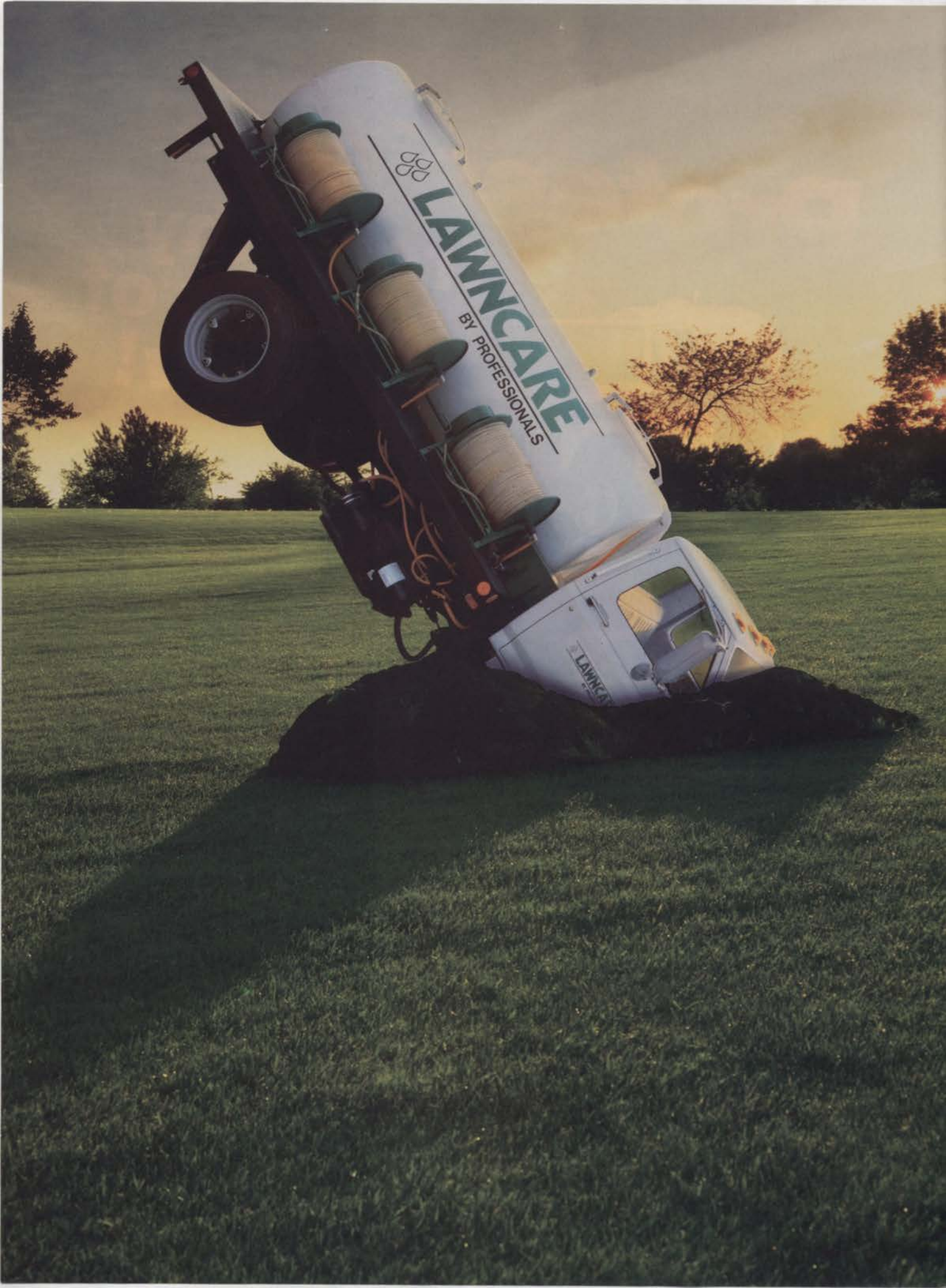
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Service calls running you into the ground?

It could be your herbicide.

Lazy products may not control all the weeds they should. They may miss wild violet, for example, or spurge, oxalis, ground ivy . . . or something else your customers may have. And there's no surer invitation to a profit-robbing service call.

Weed out lazy herbicides, and start using TURFLON® D, the herbicide that delivers really broad spectrum control of broadleaf weeds to keep your customers happy and maintain profits. It gets hard-to-kill weeds, and the easier dandelions, plantains and clovers as well . . . over 50 different annuals and perennials in all. And it doesn't injure established cool-season turf such as tall fescue, bluegrass and perennial rye.

TURFLON D herbicide has been thoroughly researched and proven in years of university testing and under Experimental

TURFLON
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Use Permits. And it's continuing its outstanding performance this season in day-to-day use on LCO route trucks across the country. A combination of triclopyr and 2, 4-D, TURFLON D is a low-volatile ester that is highly efficacious without causing off-target problems when professionally applied.

In addition to its broad spectrum control, TURFLON D has proven to be extremely cost-effective. Lawn care operators who have used it find that it does in one or two treatments what other products fail to achieve in three applications a year. And its overall performance can mean a significant reduction in service callbacks . . . plus a marked improvement in customer retention.

TURFLON D herbicide. It could be just what you need, if service calls are running you into the ground. Talk to your distributor today.



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NEWS IN BRIEF

SNOWOLF FILMS ITS SNOWTHROWERS IN ACTION

The Yard-Man Company recently put one of its new SnoWolf snowthrowers to the test while filming a television commercial in the Rocky Mountain region of Jackson Hole, Wyoming. Jackson Hole, which has seen over 96 inches of snow in the last year, is one of the snowiest areas in the United States. And true to its reputation, the Jackson Hole skies cooperated with the production crew by dumping a foot of new snow the night before the commercial shoot.

"The SnoWolf really chewed it up!," says Thomas Sly, an actor in the commercial. "It's nice to be involved with something that does what the advertising says it will do." The 30-second commercial, currently available for dealer use, is just a part of a complete promotion program planned to aggressively promote the new SnoWolf line.



Yard-Man SnoWolf snowthrower

MOBAY OPENS NEW BAYLETON PLANT

The Agricultural Chemicals Division of Mobay Chemical Corporation is now completing the final stages of a manufacturing plant dedicated exclusively to the production of Bayleton® systemic fungicide at its divisional headquarters in Kansas City, Missouri. The new facility, the first of its kind in the United States, is expected to help meet expanding demand for the popular fungicide, and to help reduce production costs.

According to Dieter Rappsilber, Mobay Director of Marketing, the completion of the new Kansas City plant late this year "should help to reduce both manufacturing and transportation costs of the sophisticated fungicide. We're hopeful that expanded product demand, combined with improved economy of production, will enable us to pass the savings along to our customers."

REGULATORY OPINION STATED IN OHIO

There is some good news for pesticide applicators in Ohio. Anthony J. Celebrezze, Jr., Attorney General of the State of Ohio, recently handed down an opinion to the

Ohio Department of Agriculture (ODA) on the legality of Ohio municipalities enacting their own pesticide ordinances. Following legislative protocol, ODA Director Dale L. Locker sought an opinion from Celebrezze on this controversy and Celebrezze responded in official Opinion Number 85 101 that municipalities are *without* authority to enact pesticide ordinances.

"It is, therefore, my opinion, and you are advised, that pursuant to R.C. 921.23 (C), a municipality is without authority to enact ordinances imposing registration,

notice or other requirements on persons who have been licensed as pesticide applicators under R.C. 921.06, R.C. 921.07, R.C. 921.08, or R.C. 921.12," stated Celebrezze in his written opinion. In his opinion, Celebrezze also cited numerous Ohio codes and court decisions which supported his position. We will have to wait and see how ODA Director Locker will act on Celebrezze's opinion.

SAFETY FILM AND A/V PROGRAM AVAILABLE

Kubota Tractor Corporation's 20-minute film about tractor safety is available to interested groups free of charge. Kubota expects the film to reinforce the importance of safe tractor operation. The film's message is delivered through dramatization of the most common tractor accidents. "With over 50,000 farm-related injuries reported in 1983, this industry must constantly readdress itself to safety issues with ever-increasing skill, knowledge, and passion," notes Jack Burke of the National Safety Council.

Three prevalent types of tractor accidents illustrate how novices, as well as experienced tractor operators, are equally likely to ignore or simply forget pro-

(continued on page 20)



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	Total 100%

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If on skin — Wash with (soak) and warm water.

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NOTICE TO FLYING — Contains a cholinesterase inhibitor. Use only in case of emergency. It is a white, long-acting, fast-acting, and highly effective insecticide. It is not a contact insecticide. It is not a contact insecticide. It is not a contact insecticide.

An advanced carbamate insecticide that roots out and ruthlessly destroys white grubs, chinch bugs, sod webworms, mole crickets and other lawn and turf "terrorists". This tough operator doesn't get trapped in thatch, thus assuring positive grub control. TURCAM[®] is odorless...works well in spray equipment...won't damage turf or ornamentals. You'll find that TURCAM packs a federally-approved nationwide label, too.

Powerful reasons for assigning TURCAM to your toughest pest control problems.

For more information on TURCAM, including full labeling and recommendations for use, contact your local distributor or write to:

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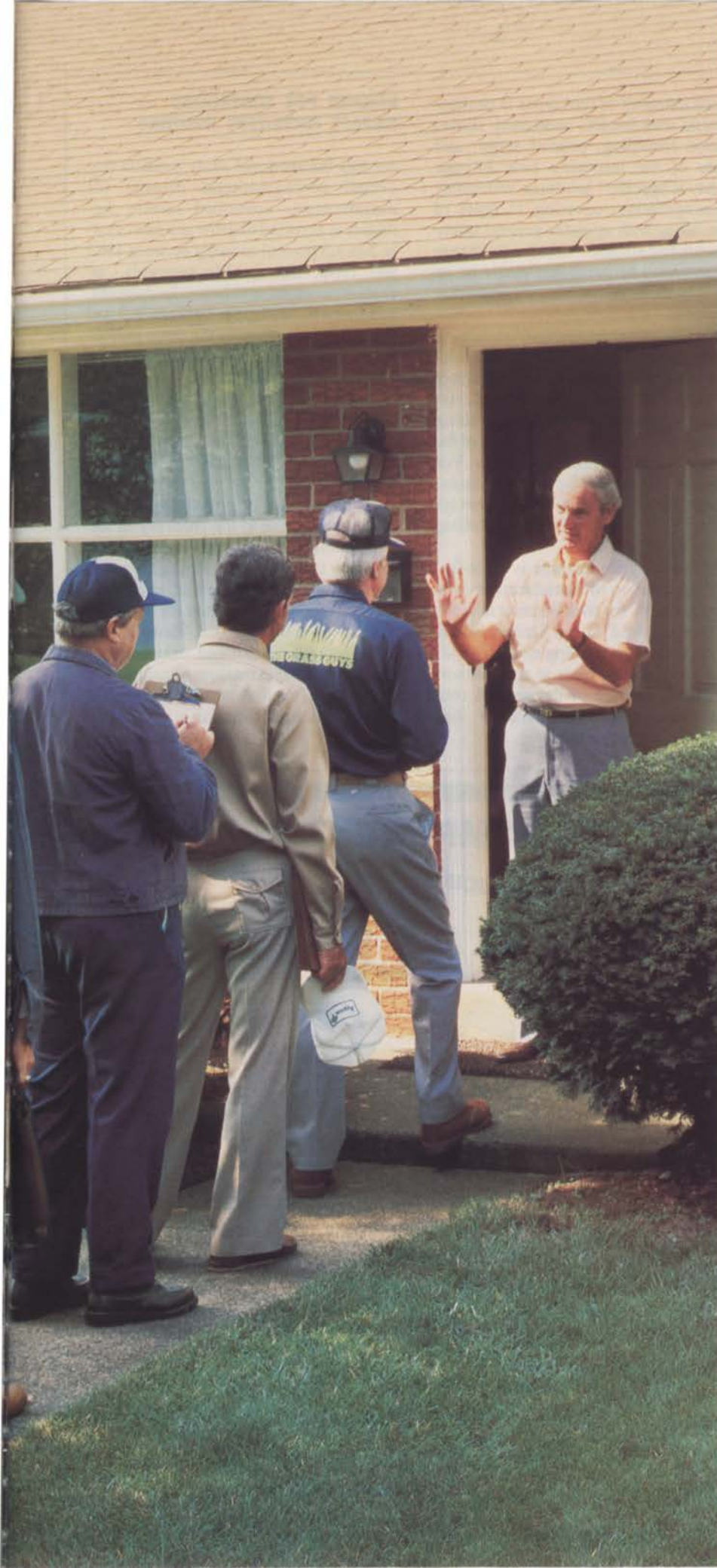
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It costs a lot to replace a lost customer. So you put together a complete lawncare program. Not just to keep customers' lawns looking good all season. But to keep your customers loyal.

A complete program includes preventative disease control. And only one lawn care fungicide — the market leader — keeps your customers satisfied, fits into your schedule, and improves your profitability.

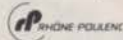
That product is CHIPCO® 26019 fungicide. Because it does *its* job without complicating *your* job.

CHIPCO 26019 is a low-toxicity product that controls all the major lawn diseases: Helminthosporium Leaf Spot and Melting Out, Fusarium Blight, Brown Patch, Dollar Spot, and Red Thread.

It's the only fungicide that provides this control long enough to get you from one scheduled round to the next, reducing costly callbacks.

Protect your turf and build your profits. Make CHIPCO 26019 a part of your lawncare program.

Rhône-Poulenc Inc., Agrochemical Division, Monmouth Junction, NJ 08852.



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NEWS

(continued from page 16)

per safety precautions. Along with showing the causes of these accidents, the film cautions viewers about other types of common operator errors which can lead to injury. "We are extremely pleased with this film," says S. Egusa, President of Kubota. "It is not just educational, but it's also very moving. It really makes the viewer stop and think about the effects of careless operation." The film, produced under strict safety standards, is available by writing to: Public Relations Department, Kubota Tractor Corporation, 550 West Artesia Blvd., Compton, California 90220.

Kubota isn't the only source of equipment safety programs. The Power Tool Institute has produced an audio/visual program titled, "Safety is Specific," in cooperation with the American Hardware Manufacturers Association. A total of 427 action slides make up the entire program. Four separate presentations, based on power tool categories, are contained within the program.

One category of particular interest to the lawn care industry, "Outdoor, Lawn and Garden Tools," consists of 62 slides.

Each category of tool types is packaged in its own binder, containing slides, cassette recording, printed script, and copies of the Institute's new 24-page "Safety is Specific" brochure, with safety recommendations covering 21 types of tools, along with up-dated general safety recommendations. Each program category may be purchased singly on an at-cost basis, or in combination with other categories.

This extensive, detailed information on specific safety recommendations has been reviewed and contributed to by experts in the fields of safety, government, insurance, education, vocational/apprentice training, labor, and safety expertise of the Institute's manufacturing members. For complete details on the programs' costs, contact: Safety Training, Power Tool Institute, 5105 Tollview Drive, Rolling Meadows, IL 60008.

The Power Tool Institute is a not-for-profit association of manufacturers who are responsible for over 90 percent of the power tools sold in the United States. Safety, education/training material is offered on an at-cost basis as a public service in the interest of the general consumer, employees in the industry, services, and the government.

DEMAND FOR CONTROLLED RELEASE FERTILIZERS GROWING

An SRI International study predicts that overall non-agricultural demand for manufactured, controlled release fertilizers is expected to grow at a rate of only 2 to 3.5 percent annually between 1983 and 1988. But specific segments, including nurseries, sod farms, landscapers, and forestry, will grow between 4.5 and 7 percent per year over the same period.



The higher rate of growth expected in these areas is due to the recovery in the U.S. housing construction industry that began in 1983. In 1983, nonagricultural markets, such as home lawns, nurseries, and landscaping, accounted for about 93 percent of the total U.S. demand for manufactured, controlled release products. These same markets accounted for 87 percent of the total of processed natural organic fertilizer materials.

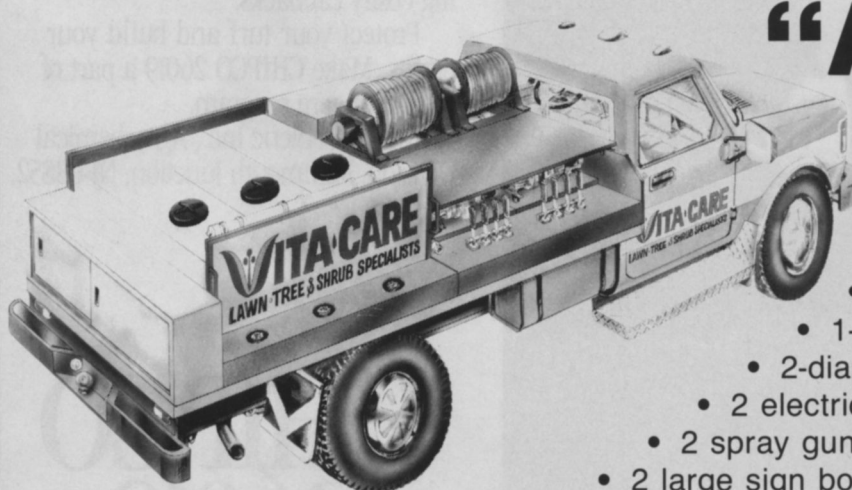
(continued on page 22)

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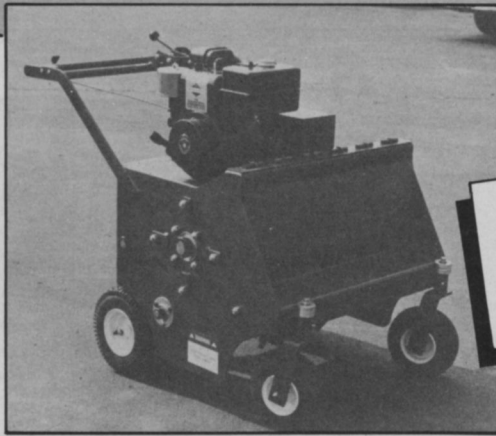
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Capable of aerating 20,000 sq. ft. per hour	25,800 sq. ft. per hour	Above Average
Should have hole pattern of 12 holes per sq. ft.	16 holes per 13½ sq. inches	Above Average
Should have hole depth of between 2½" and 3"	3" deep	Above Average
Type of tine should be Coring	Coring	Average
Should aerate 11 6,000 sq. ft. lawns per day	12 to 16 per day	Above Average
Should weigh less than 350 pounds	300 pounds	Above Average
Down time of work should not exceed 3 hrs. per 100	3 hrs. per 100	Average
Repair cost should not exceed 2-4% (of gross income derived from machine)	2-4%	Average
Should be a walk-behind type	walk-behind	Average

This survey was compiled from 500 Lawn Care Companies. It was done by ALA Magazine to find out what **you** want in an aerator, and does it exist? We say Yes...Salsco 30-6 is that machine.

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NEWS

(continued from page 20)

Manufactured, controlled release products, such as urea-formaldehyde products, IBDU, and products coated with sulfur or polymers, accounted for about 11 percent of the total volume of fertilizer used in nonfarm markets in this country in 1983. Processed natural organic materials like sewage sludge, leather tankage, and dried manure represented 16 percent of the total nonfarm fertilizer market.

Nitrogen, the nutrient required by plants and applied by professionals in the greatest volume, is subject to substantial losses by leaching and volatilization. Controlled release fertilizers and nitrification inhibitors reduce nutrient losses to plants, nitrogen toxicity, and the number of fertilizer applications required.

LEBANON CHEMICAL CONSTRUCTS NEW WAREHOUSE

Lebanon Chemical Corporation broke ground for a new facility to warehouse turf products. The new warehouse is



Lebanon's management team (left to right): Paul Mengle, Manager Professional Turf and Garden Sales; Kendall Tomlinson, Vice President and Chief Operating Officer; Vernon Bishop, President and Chief Executive Officer; and Jim Kuhle, Plant Production Manager.

located in Lebanon, Pennsylvania, and will dramatically increase the company's storage capacity. When completed, the building will house over 52,000 square feet of space. The warehouse will be able to store approximately 5,000 pallets. The new warehouse is scheduled for comple-

tion in May of this year.

The new facility will complement the existing four warehouses currently at Lebanon, which offer 234,000 square feet of combined storage space for over 22,000 pallets of finished goods. Lebanon

(continued on page 24)

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This offer also applies to any formulation of Lescosan®, Presan®, or Betamac®.

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NEWS

(continued from page 22)

has been steadily building a national network of storage facilities to better serve turf professionals across the country. Four other Lebanon plants which warehouse turf products are: Jamesport, Long Island, New York; Dayton, New Jersey; Danville, Illinois; and Richmond, Virginia.

Lebanon Chemical believes that "quick manufacturing" to meet seasonal demand is the wrong approach, since quality cannot be maintained. "This additional storage capacity will allow Lebanon to fully service turf professionals during peak seasonal demands without sacrificing our production standards," concluded Vernon Bishop, Lebanon President.

TRAILMATE BUILDS NEW HEADQUARTERS AND PLANT

Trailmate, Inc. has completed the move of its corporate staff to a new 60,000-square-foot facility in Sarasota, Florida. Plant operations for its United States manufacturing activities will also



Exmark President Robert Martin presides at the company's expansion dedication ribbon cutting ceremony.

be located at the same address. The company's lawn equipment lines include industrial mowers and edgers.

Plant expansion, a new corporate identity, and an increased budget for research and development reflect Trailmate's strategy for expanding existing product lines as well as creating new products. Newly installed at the plant is an automated coating and finishing line that heats powdered paint pigments into final glossy surfaces that are more durable than traditional wet applications. New production machinery has also been added to enhance the company's U.S. manufacturing capacities.

EXMARK EXPANDS PRODUCTION FACILITY

A 15,000-square-foot addition has been added to Exmark Manufacturing Company's Beatrice, Nebraska facility. Exmark President, Robert Martin, dedicated the 60- by 260-foot addition at a ribbon cutting ceremony and luncheon. The addition, which will be used for warehousing and unloading, is the second expansion since Exmark completed their original facility in the summer of 1983. Completed in the fall of 1985, this addition increases Exmark's manufacturing space to 50,000 square feet.

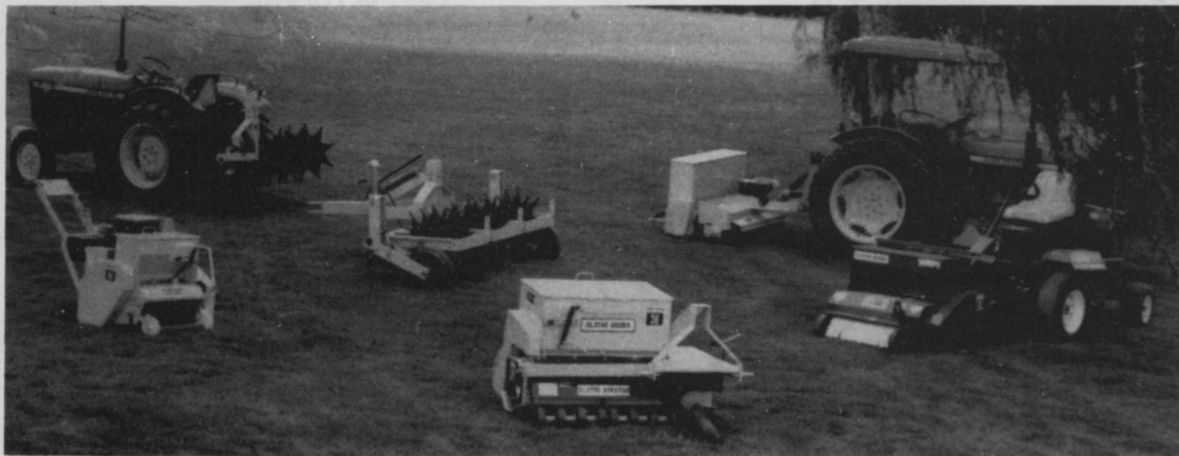
An 18,000-square-foot addition was completed in 1984. Both additions result from the expansion of Exmark's product lines as well as a dramatic increase in the company's growth.

MARYLAND UPDATES TURF RESEARCH FACILITIES

The University of Maryland has recently revitalized their turf research facilities, both in the field and in the laboratory. Construction will begin this fall on

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buildings at the new 37 acre Turfgrass Research and Education Facility in Silver Spring, Maryland. Turf was initially established on the new site in 1982, and since that time, the site has been enclosed with a security fence, roadways have been put in, and woods have been cleared for the construction of buildings.

Two buildings will be erected; an office/equipment storage building (40 by 100 feet), and a pesticide/fertilizer storage building (40 by 20 feet). Construction began last fall and should be completed by March, 1986. Also planned for the facility is an irrigation system for field research areas. Designs are currently being considered at this time and the system should be installed by the summer of 1986.

The Maryland Turfgrass Council and the Maryland Agricultural Experiment Station have recently cooperated in purchasing an environmental monitoring system for conducting research dealing with environmental stress of turfgrass. The system includes an electronic weather station, an array of 60 thermocouples for monitoring turfgrass temperatures, and a computer for processing and summarizing data. Cost for the system was \$28,000 with the Maryland Turfgrass Council and the Maryland Agricultural Experiment Station providing matching funds. The Maryland Turfgrass Association, representing sod producers and installers in Maryland, also provided \$1,000 for this system.

Such a system is unique to the Mid-Atlantic region and is the most advanced system in use in the country. In fact, only three other systems of this type are operational in the United States. Con-

sidering the environmental extremes which exist in the Mid-Atlantic transition zone, this system will undoubtedly prove invaluable to turf research. The support which Drs. Peter Dernoeden and Mark Welterlen have received from the Maryland turfgrass industry and the Maryland Agricultural Experiment Station has provided the impetus to become one of the leading turfgrass research facilities not only in the U.S., but world-wide.

UNDERWATER LAWNMOWERS?

Underwater lawnmower is the term Sun City Center, a Florida retirement community, uses to describe a Manchurian carp specially bred to keep its ponds clean of weeds. The fish, genetically altered so they can't reproduce, cost about \$7.50 each. At that price, some lawn care operators might be willing to don snorkels and compete with those carp in the aquatic weed control business!

SWISS FIRM CHOSEN TO MARKET CUSHMAN EQUIPMENT

Orag Inter Ltd., headquartered in Baden, Switzerland, has been appointed by Cushman®/OMC Lincoln to handle Cushman vehicles and products. Orag markets turf maintenance equipment throughout Europe, and presently handles OMC Lincoln's Ryan® line of turf maintenance equipment.

Under the new agreement, Orag will

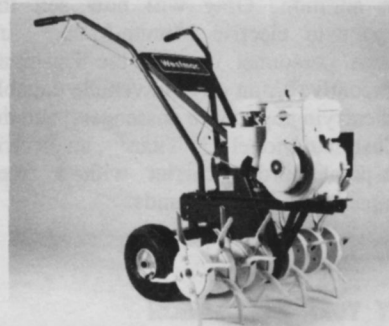


Guido Lustenberger (left) directs industrial equipment sales for Orag International Ltd. Walter Kuhnen (right) heads up turf equipment sales. Hans Wust (center) is general manager and CEO for the firm.

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the Westmac cores up to 4", depending upon soil conditions leaving 60 holes per sq. yd. so water, air and fertilizer can penetrate through thatch to reach the roots immediately, to help build and expand the root system.

Very maneuverable, easy to operate and equipped with large pneumatic tires, the Westmac has a 5 HP Briggs & Stratton engine, with a chain and bearing transmission. It can plug aerate a typical 5,000 sq. ft. lawn in just 15 minutes - or less (straight runs -750 sq. ft. per minute). Release the dead-man's clutch, and the Westmac stops instantly, without coasting. Extra weight can be added.



WESTMAC "TRAIL-HITCH" PACKAGE . . .

Also available is the Westmac "Trail-Hitch" that enables the Westmac to be plugged into the back bumper of any vehicle for towing plus backing up without jack-knifing. Once plugged into a vehicle, a high speed swivel-wheel drops down from the Westmac for safe transportation.

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handle additional Cushman turf equipment and will also sell Cushman utility vehicles to the industrial/commercial market in Europe. The Cushman equipment to be handled by Orag includes both the three-wheel and four-wheel Cushman Turf-Truckster®, along with the full line of turf-care accessories that can be mounted on the Turf-Truckster chassis. In addition, Orag will now sell the Cushman electric Minute-Miser® in-plant personnel carrier; the Cushman Executive®, an electric vehicle capable of carrying up to four passengers; and the Cushman Model 335 Titan®, an electric in-plant burden carrier with a rated capacity of 2,400 pounds.

NY TURF ASSOCIATION ELECTS OFFICERS, OFFERS SLIDES

The New York State Turfgrass Association held elections during its recent record-breaking conference in Syracuse, New York. Newly elected officers include Jack Sloane, Director of Oakwood Morningside Cemetery, Syracuse; William B. Stark III, Superintendent of Bellevue Country Club, Syracuse; and



NYSTA Board of Directors (left to right): Rick McGuiness, Gene Bowler, Steve Smith, William B. Stark III, Janet Dudones, Jack Sloane, Ann Reilly, Joe Laubenstein, Tom Charnock, Norm Hummel. Not pictured: J.R. Brundage, Jim Girard, Rich Canale, Ted Horton, and Steve Moffett.

Steve Smith of I E Supply, Montgomery. They will serve as President, Vice President, and Treasurer, respectively.

Newly elected members of the Board of Directors are JR Brundage, Owner of Brundage Lawn Maintenance, Medina; Tom Charnock, Superintendent at Brookfield Country Club, Clarence; Jim

Girard, Owner of Jim Girard Landscaping, Glens Falls; and Rick McGuinness, Superintendent at the Woodmere Club, Woodmere.

The Association has now made available three different 35 millimeter slide sets; one each on insects, diseases, and weeds of turfgrass. These slide sets are a useful tool in the identification and

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diagnosis of turfgrass problems, and are of value to turfgrass professionals.

The 66-slide set on turfgrass diseases, compiled by Dr. Richard Smiley at Cornell University, pictures the characteristics and effects of snow mold, leaf spot, dollar spot, rust, red thread, slime mold, striped smut, mildew, fairy rings, brown patch, melting out, fusarium, and pythium.

The 76-slide set on insects of turfgrass in the Northeast, compiled by Dr. Haruo Tashiro at the New York State Agricultural Experiment Station, pictures a variety of chafers, beetles, weevils, sod webworms, and chinch bugs, and the damage they do to turf.

The 80-slide set on weeds, compiled by Dr. Arthur Bing and Robert O'Knefski at Cornell University, features line drawings and identifying photos of 16 common weeds, including annual bluegrass, crabgrass, goosegrass, tall fescue, nutsedge, wild onion and garlic, wood-sorrel, clover, dandelion, ground ivy, plantain, chickweed, knotweed, and black medic.

Each slide set is \$30 for NYSTA members and \$45 for non-members, and includes a written key, handling, and third class postage. Add \$1.50 per set for first

class postage. If membership in NYSTA is desired with the slide set order, send an additional \$25 and pay the member price for the slides. Send your check made payable to NYSTA to the New York State Turfgrass Association, 210 Cartwright Blvd., Massapequa Park, NY 11762.

MINNESOTA LAWN CARE ASSOCIATION FORMED

Members of the rapidly expanding lawn care industry in Minnesota have organized the Minnesota Professional Lawn Care Association. According to a news release from the new association, leaders in the profession recognized the need to organize an association to provide for the education of the public and members, advocate professional lawn care for homes, commercial, and industrial property, and to encourage professionalism within the industry.

Serving MPLCA as officers are: President Tom Mann, The Greenskeepers, Inc.; Vice President Charles Glossop, Green Masters, Inc.; and Secretary/-Treasurer John Peckham, ChemLawn Services, Inc. In addition to the above of-

the above officers, also serving as Board of Directors are: Steve Hoogenakker, The Lawn Doctors and Del Michaud, Fertilawn, Inc. These officers and directors will serve through 1986, until elections are held at the first annual meeting in October, 1986. For membership information, contact: Minnesota Professional Lawn Care Association, P.O. Box 41222, Plymouth, Minnesota 55441; 612/454-8881.

NEW PGRs EXCITE INTEREST OF INDUSTRY AND HOMEOWNERS

ICI Americas, Inc. has been hard at work on a line of plant growth regulators (PGRs) and the company is excited about the results. This year, an unnamed manufacturer of lawn and garden products will begin test marketing a turfgrass PGR known to ICI Americas as Paclobutrazol, according to a report in ICI's newsletter.

There was also mention in the report of a certain unnamed "nationwide lawn service company" that is considering Paclobutrazol as an addition to its home lawn application schedule for 1986. Very interesting. ■

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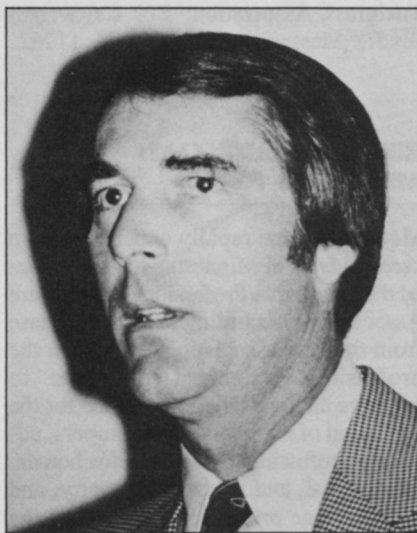
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PLCAA UPDATE

The Board of Directors of the Professional Lawn Care Association of America voted unanimously to create the new position of Director of Technical Services at their January meeting. "The growing public concern regarding environmental safety issues was a primary factor in deciding to establish the new position. The Association needs a staff person who can effectively work with the increasing number of technical issues facing the PLCAA and the industry," says PLCAA Executive Vice President James R. Brooks.

The director of Technical Services will play a key role in the future growth and development of the Association. Besides the primary responsibility for developing safety and technical education programs, this person will work closely with state agencies on certification/recertification programs. The new director will establish a national certification program for PLCAA members. The position will also call for a strong liaison relationship with university and industry scientists, the



Jim Brooks, PLCAA Executive Vice President

Public Issues Alert Committee, the Public Relations Committee, the Pesticide Public Policy Foundation (3PF), and other allied associations. Finally, the director will

represent PLCAA at seminars.

"This is going to be a very important, challenging, and exciting job at PLCAA," says Brooks. "We are looking for a qualified individual who has at least a master's degree in agronomy; preferably field experience in the lawn care industry; very good verbal, written, and interpersonal communication skills; proven organizational, administrative, and management capabilities; and a willingness to relocate to the Atlanta metro area."

"We hope to have the position filled no later than June 1, 1986," says Brooks. "The salary level for this position will depend on the successful candidate's background and experience, but will be very competitive with similar responsible management positions in the marketplace." Interested candidates for the position should send a written resume no later than April 15, 1986, to: Search Committee, PLCAA, 1225 Johnson Ferry Road NE, Suite B-220, Marietta, Georgia 30067. No telephone calls please. ■

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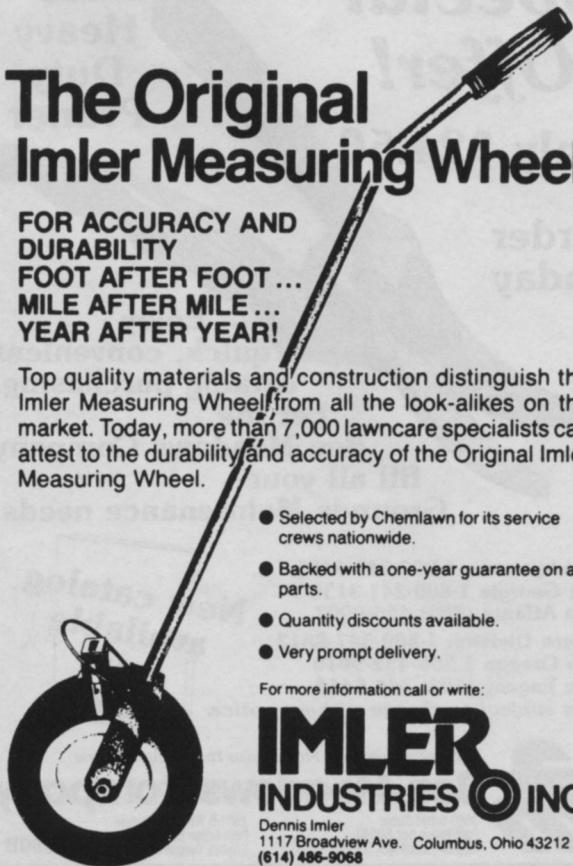
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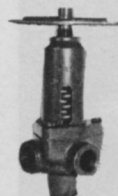
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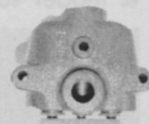


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PEOPLE

Judith L. Pollock has been appointed as sales representative for the south central territory of Mobay Chemical Corporation, Specialty Products Group Division. Her territory includes Kansas, Oklahoma, Colorado, New Mexico, Texas, and part of Missouri. A seven-year veteran of the company, Pollock has a degree in horticulture from the University of Missouri.



Judith Pollock

Rhone-Poulenc, Inc. has appointed **Bill Riden** as Chipco® Turf and Ornamental Product sales specialist, covering eastern Pennsylvania and New York State. Riden joins Rhone-Poulenc from Mobay Chemical Company. Previously, he was with Cleary Chemical Company and O.M. Scott and Sons.

The Hershey Nursery has promoted **David A. Warren** to Landscape Sales Manager. He will be responsible for commercial and residential landscape gardening sales and landscape architecture, bidding and estimating jobs, and overseeing



Scott Turner

job scheduling and fulfillment.

Warren previously served as a landscape designer/salesman at the nursery. Prior to that, he was the landscape job leader at Kenes Landscape, Mechanicsburg, Pennsylvania, and a photographer for West Virginia University's National Transition Center.

Warren is a member of the Pennsylvania Nurseryman's Association and the American Association of Nurserymen.

LESCO, Inc. has initiated LESCO Truck

sales service in a second California territory. **Scott Turner**, former LESCO of Philadelphia salesman, has begun calling on customers in the San Diego-Long Beach area. Turner will sell LESCO equipment, parts, accessories, fertilizers, and chemicals to golf courses in the southern California territory. Customers will be served on a regular route basis with calls coming from the main office a day in advance to advise customers of schedule and specials.

Turner has worked for LESCO since June, 1982. Before joining the company, has was an agronomist with the Maryland Department of Agriculture and a former assistant manager with a major grass seed company. Turner holds a bachelor of science degree in agronomy from California Polytechnic University, San Luis Obispo, California.

OMC Lincoln has appointed **Tony Tredente** new district sales manager for Cushman and Ryan turf products in the south central United States. Tredente

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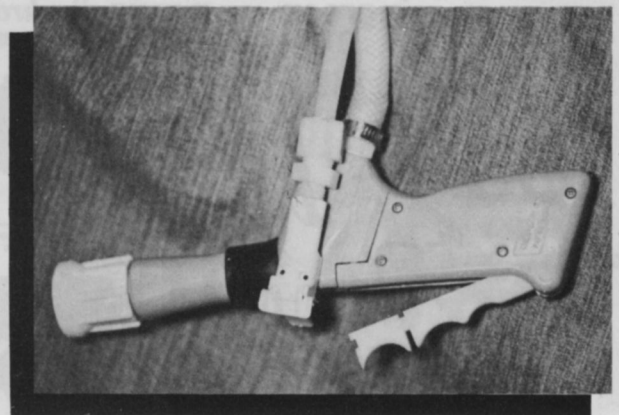
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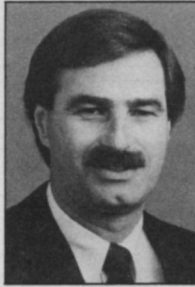
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will be responsible for working with Cushman and Ryan dealers in Texas, Louisiana, Arkansas, Oklahoma, western Missouri, and Kansas. He will be headquartered in the Dallas/Ft. Worth area.

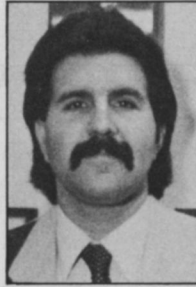
A native of Cleveland, Ohio, Tredente attended Bowling Green State University in Ohio, and received an associate degree in turf management from Michigan State University in 1970. Before joining OMC Lincoln, he was a sales representative for Spartan Distributors, Sparta, Michigan. While there, he won a regional sales award for sales achievement. He is also a member of GCSAA.

Joel Anthony Casoria has been named co-op advertising manager for Snapper Power Equipment. He had previously worked for superstation WTBS (Turner Broadcasting Network) during 1985 as a production manager. From 1979 to 1984, Casoria was employed by Trinity Broadcasting Network, Los Angeles, where he worked his way up to production manager. As a producer and director, he has worked with both Cable News Network (CNN) and ABC-News on special features.

In other personnel news at Snapper,



Tredente



Casoria

Randall S. Carter has been named Regional Sales Manager based in Chicago. Carter will cover the states of Illinois, Michigan, and part of Indiana. He previously held the positions of Branch Manager, Tanco, in Illinois; Regional Marketing Director for Tanaka; Regional Sales Manager for Flymo; sales man for Impossible Equipment Company of San Francisco; salesman for Occidental Chemical Company; salesman for O.M. Scott and Sons; stockbroker for Bache and Company; claims adjuster for Safeco Insurance; and held the rank of Captain in the United States Army.

The Nebraska Professional Lawn Care Association (NPLCA) announces officers

for the 1986 year, which include: President **Dale Amstutz**, Northern Lawns, Inc. of Omaha; Vice President **John Skomal**, Custom Lawns of Omaha; and Secretary-Treasurer **Richard Penn**, Lawnco Lawn Service of Lincoln.

At the first annual meeting of the NPLCA, held on January 15, 1986 at the Holiday Inn in Omaha, members elected the following Board of Directors: One-year-term: **Terry Anderson**, Lawnscape Grounds Maintenance of Lincoln; **Gary Carstens**, World of Green of Lincoln; **John Skomal**, Custom Lawns of Omaha. Two-year-term: **Ross Bauman**, Bauman Agri-Service of Beatrice and **Rich Mulder**, UAP Special Products of Omaha. Three-year-term: **Dale Amstutz**, Northern Lawns, Inc. of Omaha and **Richard Penn**, Lawnco Lawn Service of Lincoln.

The Nebraska Professional Lawn Care Association was organized in July of 1985 to serve the rapidly expanding lawn care industry in the State of Nebraska. Leaders in the lawn care profession recognized the need to form an association to provide for the education of the public and members, advocate professional lawn care, and encourage professionalism within the industry. ■

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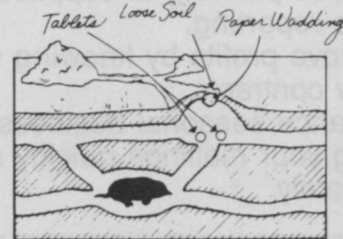
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THE 18th ANNUAL PROFESSIONAL TURF AND PLANT CONFERENCE



The 18th Professional Turf and Plant Conference sponsored by the Nassau-Suffolk Landscape Gardeners Association and Cooperative Extension will be held on Monday, February 24, 1986 at the Colonie Hill in Hauppauge, Long Island, New York. This one day conference is the largest educational program and trade show in the nation for the "Green Industry" professional.

The attendance at the 1985 conference was over 2,500 and the 1986 conference is expected to be larger, with a 250 booth trade show.

The program will be highlighted by Dr. Joseph Vargas of Michigan State University speaking on lawn renovation through proper cultural practices; Maria Cinque of Cornell Cooperative Extension talking on Irrigation Practices for Lawns, Trees, and Shrubs; Carl Totemeier of the New York Botanical Garden on Trees and Shrubs for Long

Island; Dr. Norman Hummel from Cornell University presenting Fertilizer and Pesticide Formulations, Mixing, and Applications; Dr. George Good, also from Cornell, giving us Landscape Mulches as a Final Touch, and many more. The Conference will have a new dimension in that Dr. Rudd McGary and Edward Wandtke from All-Green Management Associates will present a business viewpoint to the landscape industry. Certified Pesticide Applicators will receive credits toward their license for attending this conference.

For further information on attending or exhibiting at the Professional Turf and Plant Conference contact: The Nassau-Suffolk Landscape Gardeners Association at 59 Orinoco Drive, Brightwaters, New York 11719. Phone: (516) 665-2250.

**MONDAY
FEBRUARY 24, 1986**

**COLONIE HILL
1717 Motor Parkway
Hauppauge, Long Island, New York**

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LAWN CARE CHEMICALS

Are currently available lawn care chemicals meeting the needs of the industry? Or are lawn care businessmen hoping that new turf chemical research will bring improvements to the industry? Many industry observers believe turf chemical research has yet to reach its prime, anticipating that the next decade will bring even more innovations in lawn care chemicals than the previous one.

Your stockroom shelves are packed with a lot of different bottles, jugs, and canisters, but does that mean there are chemicals in your arsenal to meet all of your lawn care needs? Do the available preemergent and postemergent herbicides last long enough? Are the industry insecticides as effective as they could be? Is there too much debris in bags of granular products? *American Lawn Applicator* talked with several industry research specialists and lawn care businessmen to see what they had to say about the performance, price, safety, and future of today's lawn care chemicals. Although the industry has come a long way over the years, researchers and applicators tend to agree, there's always room for improvement.

One lawn care businessman says, comparing today's turf products with those of a decade ago is like compar-

One lawn care businessman says, comparing today's turf products with those of a decade ago is like comparing the Stone Ages to the 20th century.

ing the Stone Ages to the 20th century. And indeed, progress has been made. Over the last 10 years, the industry has seen the development of slow-release fertilizers, liquid formulations of fertilizers with low burn potential, pesticides formulated and packaged for more convenient use by the lawn care applicator, and the advent of plant growth regulators.

But some of those areas could still use some improvement. According to Dr. Chuck Darrah, Director of Technical Services for ChemLawn Corporation, Columbus, Ohio, "We need improved sources of nitrogen to custom-tailor lawn care operations to grass types and geographical areas or climates. In the pesticide area," he says, "we need to have continued formulation improvement to increase the safety of handling concentrates. For example, any pesticide available in a wettable powder should also be available in a flowable liquid or water-dispersible granule. Wettable powders create a dust —

a safety hazard and an exposure hazard for the applicator."

Of course, Darrah says, the industry can use improved performance on any pesticide. "I think anybody you'd talk to would say, 'I want it (the pesticide) to work better.'" Colleague Bill Rowland, President of Leprechaun Lawns, Topeka, Kansas, agrees. "Considering the nature of our business and the fact that we're always trying to improve what we do or the results that we can give to our customers, we can never be satisfied. We're always looking for a better approach." However, he adds, "Looking at the products that we currently have available to us, I think manufacturers have been pretty aggressive in trying to give the lawn care operator the best materials that they can."

UNCONTROLLABLE VARIABLES. Ronnie Zwiebel, President of Green Care Lawn Service, Birmingham, Alabama, says, "The problem we have found down here is not whether the chemicals are effective or not, it's whether Mother Nature and our customers interfere with the effect of the chemicals by doing things (they're not suppose to do)." For example, Green Care Lawn Service tested the herbicide pendimethalin in early 1985 on two neighboring lawns. "We had two yards right next door to each other, sprayed them out of the same tank, by the same person, at the same time, and one yard got results and the other yard didn't," explains Zwiebel. "I can't blame that on the chemical, but I don't know what to blame it on other than something the homeowner might have done."

The weather also influences the efficacy of turf chemicals, he says. Yet chemical manufacturers cannot compete with the uncontrollable variables of wind, rain, and drought. "If the product is applied in ideal conditions, then you get ideal results," says Bill Rowland. If a rainstorm drenches your customer's lawns shortly after you've finished a round of fertilizing, chemical breakdown is going to occur.

Illustrating the weather's influence, Rowland looks at one of the industry's effective grub controls. "Oftanol® in the past has shown all the signs of an extremely good performer. Last year was questionable, so what was that?" he asks. "We also had one of the strangest years as far as our weather conditions. So is it the product, or

is it the weather, or is it the bug?" Although he doesn't know the answer, Rowland understands the variables chemical manufacturers and applicators have to deal with.

A LOOK AT HERBICIDES. Crabgrass is another problem that's not controlled as easily as turf chemical applicators would like. Lawn care operators have probably been searching for an effective preemergent crabgrass control since the evolution of lawn care. But Rowland doubts the industry will ever see a sure-fire cure for killing this invincible weed before it pops up in turf. "I think we will get close, but I don't think Mother Nature can be fooled quite as easily as we sometimes think," he says. "I think we're always going to be looking at that preemergent crabgrass control as a pain in our sides."

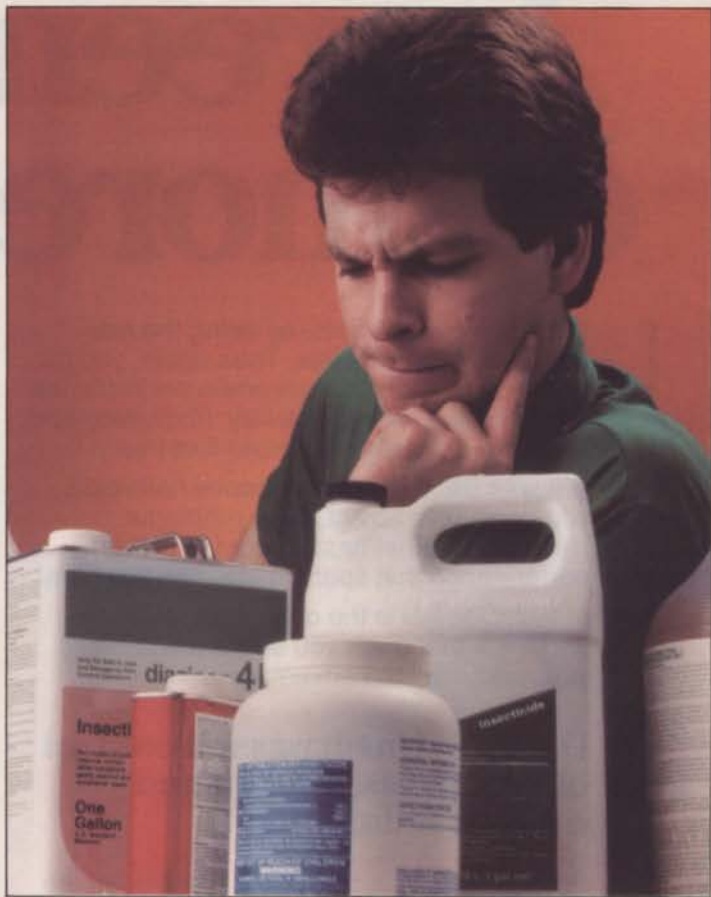
However, Rowland looks at that pain as an advantage to the industry. "If we didn't have that kind of pain, then maybe we wouldn't have the opportunity to go out and service customers," he explains. "I think it's something that we just have to learn to live with. It's like weather — there's nothing that you can totally do as far as controlling it. As long as you have variables of heat, cold, rain, and drought, as well as the homeowner's cultural practices, I don't think you'll ever totally cure a crabgrass problem. I don't care what the problem is," he says. "So what we try to do is our best."

Dr. Nick Christians of the Department of Horticulture at Iowa State University, Ames, Iowa, thinks differently. Although not in the immediate future, he believes chemical manufacturers will come up with compounds for better control of preemergent and postemergent crabgrass and other annual grasses, as well as a product that has long residual effect on some of the late germinating species and is safe to use on turf. "It's all a matter of dollars, research, and time," Christians explains. "We're seeing more dollars for research now because of the increased interest in the lawn care area. I would expect much more improvement in the next 10 years than we've seen in the last 10 years."

In fact, Christians believes a major setback occurred in the lawn care industry during the last decade — the loss of Silvex®, an effective compound for treating difficult-to-control weeds. According to Christians, Silvex was related to the compound 2,4,5-T, a major component of Agent Orange, and it was removed from the market at the same time the controversial chemical began to make news headlines. "Up until that time, Silvex was one of our most widely used compounds," he says. "The loss changed weed control considerably."

However, Christians adds, the industry is recovering from its loss. "Over the last five years, we've seen some improvements in formulations and compounds to substitute for Silvex." Trimec® and Turflon-D® are two such examples, he says. Yet, Christians still believes there is room for better herbicides. "One of our major problems is that the materials we use for weed control will also kill landscape plants. We don't have any selectivity," he explains. "So if we had materials developed sometime in the future that would be selective for the type of weed we're trying to control and safe for landscape plants, then that would be a big advance. There's nothing in the immediate future of that kind that's going to be released," he says, "but we definitely have room for advancement there."

Dr. Bruce Branham of the Department of Crop and Soil



Science at Michigan State University, East Lansing, Michigan, suggests another area of improvement for herbicides. "It would be very nice to have a preemergent broadleaf herbicide you can apply at the same time you apply your grass herbicides and get good control of the germinating broadleaf weeds," he says. "You still have a problem of picking up any perennials that survive, but presumably after a year or two you can get rid of the perennials and then rely on a preemergent broadleaf herbicide."

Branham would also like to see the development of a long-lasting preemergent herbicide that could be applied in the fall and still get good control of crabgrass the following spring. "I think that would help the lawn care companies shift some of their costs from the spring, when it's real expensive, to the fall. Plus," he adds, "I think the fall is a more natural time to begin a lot of your programs anyway. That's the best time to control broadleaf weeds, the best time to fertilize."

GRANULAR PURITY. When a lawn care operator purchases a bag of granular fertilizer, it's not totally surprising for him to see corn or soybean spill out of the sack along with his turf product. "Dry fertilizers are the biggest culprit in terms of containing extraneous material," says Chuck Darrah of ChemLawn. "Granular pesticides are very clean. They're specialty chemicals manufactured, stored, and bagged under clean conditions for the most part. Fertilizers, on the other hand, are commodity chemicals and move in the commodity market along with corn, soybeans, coal, and what have you. They can be

(continued on page 36)

A preemergence do more than just

Sure, you can cut costs by using the new pendimethalin products. Then again, you get what you pay for. Like uncertain performance due to limited testing. Volatility. Photodecomposition. And possible turfgrass root injury.

But with Dacthal preemergence herbicide, you don't have any of those problems. Because Dacthal has a record of proven performance that spans more than 20 years.

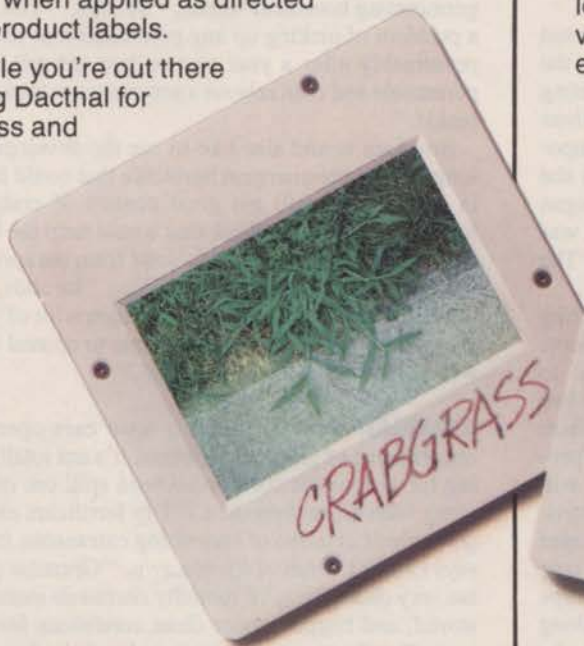
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Herbicide	Rate (lbs.ai/A)	Roots (mg)	Shoots (mg)	Density (Shoots/Pot)
Dacthal® (SDS Biotech)	12	167.7	527.0	9.3
Balan® (Elanco)	2	20.8	23.5	0.8
Betasan® (Stauffer)	12	11.8	20.3	0.5
Ronstar® (Rhone-Poulenc)	2	5.3	17.5	0.3
Untreated	—	170.3	604.3	11.3

With Dacthal, there was no serious turf injury due to root inhibition. But research suggests that's not the case with other commonly used herbicides. And since the new pendimethalin products have had only limited testing, they may be risky too.

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Always follow label directions carefully when using turf chemicals.



Dacthal® Preemergence Herbicide

LAWN CARE CHEMICALS

(continued from page 33)

contaminated.”

For example, Darrah explains, “A lot of the urea in this country today has come from Europe in a freighter and has been unloaded onto a barge which may have carried coal. And then maybe it was dumped onto a dock, and the last thing on that dock was corn. Then it was loaded off that dock into a truck and the last thing in that truck was soybean. Then it’s loaded into a bin somewhere. By the time the product gets into a bag, it’s full of extraneous material.”

However, lawn care operators who purchase quality fertilizers from quality manufacturers will rarely have that problem, Darrah notes. Debris in granular products is a quality control problem at the supplier’s end and it can be corrected, he adds.

Many lawn care operators believe the purity of granular fertilizers has increased considerably over the years. “I think it was worse years ago,” says Bill Rowland of Leprechaun Lawns. It’s improving as the manufacturers find that the lawn care segment is as strong a buyer as the agricultural segment, he explains. “Fertilizer manufacturers are going to want to purify their product and make it more acceptable for us. At one time we had to buy whatever was available. We were the little buyer. And I think as we become more dominant in their market, then manufacturers are going to refine their product and it’s going to be a better product for us to use,” he notes. “It’s a supply and demand situation.”

Many complain that chemicals don't last long enough. Turf professionals would like to see longer residual chemicals return to the marketplace, but they might find their wants denied for environmental reasons.

And of course, as far as lawn care businessmen are concerned, the purity of a granular product has the competitive edge.

IMPROVING INSECTICIDES. Insecticides available to the lawn care operator today have much shorter residual effects than those compounds available in the '60s and early '70s. Before the lawn care industry was banned from using chlorinated hydrocarbons, compounds such as chlordane were widely used for insect control. According to Nick Christians, the chlorinated hydrocarbons had long residual effects and a very broad spectrum of control.

Although new insecticides have come

on the market since then, Christians, along with many other industry specialists, believes there is still a need for a good grub control. According to Dr. Martin Petrovic, Assistant Professor of turfgrass science at Cornell University, Ithaca, New York, the biggest insect problem in the Northeast is grubs. In some cases, existing compounds work effectively, he says, in others they do not. Consequently, he would like to see researchers concentrate their efforts on new materials in the insecticide area.

Bill Rowland of Leprechaun Lawns thinks the lawn care industry is still in an “infancy stage” when it comes to insecticides. Despite the gains made in insect control over the years, he does not believe “our solution is here yet.”

“Obviously chemical manufacturers are working every day trying to perfect a better product for us, just like we’re trying to offer a better service to our customer. So as we progress towards our goal, I believe they’re going to progress toward their goal,” he says.

But the lawn care operator’s biggest complaint over insecticides, as well as herbicides, is that they don’t last long enough. And it looks like that problem may be out of the chemical manufacturers’ hands. As much as turf professionals would like to see longer residual chemicals return to the marketplace, they might find their wants denied for environmental reasons. “If a pesticide has any lengthy persistence in the environment, the chance of it being registered today is pretty limited,” explains Petrovic. “Generally, most things that have been registered in the last 10 years have pret-

ty short periods of activity. They control a specific pest and then they don’t stick around for any length of time after that.”

Dr. J.R. Hall, III, Extension Turf Agronomist at the Virginia Polytechnic Institute (VPI) Extension Service, Blacksburg, Virginia, agrees with Petrovic. The lawn care industry is seeing shorter residuals than days gone by because of the “apparent link or negative correlation between length of residual and safety.”

“The general trend has been to move toward safer materials, which has necessitated less residual in most cases,” Hall explains. “But I think we have accepted that as a necessary evil. We’re going to have to put up with less residual

at the cost of safety.”

Can a delicate balance between chemical effectiveness and safety be reached? It appears to be a Catch-22 situation. The turf industry wants chemicals that are more effective, but the more effective chemicals tend to be “hotter” compounds. And the hotter compounds create a safety risk for the public, so we’re back to using shorter residual products which aren’t as effective.

The situation may not be as bleak as it appears. Hall expects research to make great strides in the next 10 years. “I think the chemical industry has realized that lawn service is an important segment of agriculture and that there is real money to be made in the generation of more effective chemicals.” Along with that, he believes the Environmental Protection Agency is realizing a benefit/risk ratio exists that has to be accepted. After all, every time a person gets behind his car’s steering wheel, Hall says, every time he drinks a beer, or smokes a cigarette, he’s taking a risk.

TURF PRODUCT SAFETY. Lawn care professionals and industry research specialists are confident when it comes to the safety of turf chemicals. “I don’t think there’s any question about the safety of our chemicals,” says Ronald Webb, President of Liqui-Chem Lawn Care, Ocean Springs, Mississippi. “I think that just the word *chemical* scares some people. Our rule of thumb is — if the benefit obtained by the use of the chemical exceeds the possible injury of the chemical, then use it. But if the benefits you achieve are not greater than the risk involved, you don’t use it.”

Hal Burgiss, Vice President of Carefree Lawns, Inc., Louisville, Kentucky, also believes there is a “gross over-reaction” to chemicals, particularly by the press. “I feel a large part of the problem is that people just don’t understand chemicals and their toxicity, and how they affect the environment.” He would like to see chemical manufacturers, as well as the media, play a greater role in educating the public on lawn care chemicals.

As would Chuck Darrah of ChemLawn. He believes lawn care chemical manufacturers and the Professional Lawn Care Association of America (PLCAA) must be more aggressive in getting the chemical safety message across to the public. “The chemical industry as a whole is really taking it on the chin lately because of some accidents,” he says. “You very rarely see the safety of chemicals played up in the general media. When no accidents happen, it’s not newsworthy.”

It’s often wondered if turf chemical odors influence the public’s chemophobia. Although low odor or

odorless products might benefit the industry, Burgiss doubts they'll make the problem of chemical fear go away. Like most lawn care operators, he gets few odor complaints from his customers. It's those homeowners who do not opt for lawn care service that cry the loudest.

"Odor is a false reading on the relative toxicity of a compound, but to the public it's a way for them to note toxicity," according to Martin Petrovic of Cornell University. "Odor probably adds to some people's misconception of how toxic a material is." He believes lawn care professionals can benefit from applying less odoriferous products, and that manufacturers should address this issue.

"In some cases it might be the (chemical) carrier that's being used or the formulation of the pesticide (that has a strong odor)," Petrovic explains, "and manufacturers may be able to manipulate it. But if it's the active compound itself, then it's going to be quite difficult (to change)."

Lower odor pesticide formulations would be beneficial in terms of public acceptance, agrees Darrah, but *no* odor formulations may cause some unintended exposure problems. "With no odor you tend to generate some complacency." If a lawn is sprayed and there is no odor, a person might walk onto the turf before he should, he explains, adding that a little bit of an odor will remind the homeowner that his lawn was just sprayed and that the label directs him to stay off the grass until it's dry.

The odor issue aside, lawn care professionals seem to unanimously agree — more communication and education needs to take place between the chemical industry and the public. Public relations efforts by turf product manufacturers, such as Dow Chemical Company's chemical safety door hanger, have been well-received by lawn care businessmen, according to Bill Rowland of Leprechaun Lawns. Although very valuable, the literature provided by chemical manufacturers for lawn care customers is not enough. "It only reaches the people that we currently deal with, and most of those people are on our side," Rowland notes. "I think there's a vast majority of the public that's still concerned. And at this point, we've kind of missed them."

Attempts to reach the public through press releases to local newspapers is important, Rowland says, "but we're still relying on the local newspapers to run those articles. And then we're relying on the people to read them."

He would like to see the chemical industry join forces with PLCAA to develop a television and radio campaign that stresses the benefits of lawn service and the safety of turf products. Rowland knows that the majority of lawn care

businessmen cannot afford to produce a television commercial and pay for air time. But he believes groups of operators in a given market could afford to jointly sponsor an existing, "generic" lawn care commercial.

NEW INNOVATIONS. Despite environmentalists' outbursts on chemical safety, scientists have remained active in their research labs. And perhaps one of the most unique areas of study has involved plant growth regulators. To date, lawn care operators primarily use plant growth regulators for control of utility turf along highways, airport roadways, and other industrial areas. But several industry research specialists expect plant growth regulators to become more sophisticated

The odor issue aside, lawn care professionals seem to unanimously agree — more communication and education needs to take place between the chemical industry and the public.

and effective, and consequently find a better niche in the lawn care market. And some lawn care professionals are eager for that to occur.

Several years ago, Rowland says, he made the following statement: "If they ever perfect this stuff, I'm rich!" Of course, the *stuff* he was talking about was plant growth regulator compounds. "If I can make customers' grass green and then if I can keep them from mowing it, I'm in real business," he says. However, Rowland is still skeptical of the reliability of currently available plant growth regulators.

"The liability on the way the product works and the unpredictability of it right now does not really lend itself to (home) lawn care as much as it would industrial care," he says. "So until the reliability of that product is totally proven, I don't think we'll be able to use the plant growth regulator as extensively in the lawn business as we'd like to." But Rowland's not discouraged. He's hopeful new plant growth regulator chemistry will be developed.

Perhaps his dreams will come true. According to Dr. John Kaufmann, a research specialist for Monsanto Agricultural Company, St. Louis, Missouri, the future of plant growth regulators looks bright. Over the years, he has seen better handling and use of chemicals on the part of lawn care applicators, which is critical to the successful use of plant growth regulators, he says. "We are going to have to rely on good application techniques for the proper use of these chemicals. And that's why it's very, very encouraging to know that better and bet-

ter application is taking place out there."

One reason why plant growth suppressors have yet to be used extensively on home turf, Kaufmann says, is because most of today's compounds have been based on foliarly-absorbed chemistry — the type of chemistry that composes many of the standard turf growth regulators used on roadsides. "When you get into lawns, you don't have as much foliage available for uniform uptake," he explains. And consequently, there's often a problem determining the proper application rate of the chemical. "If you don't get the plant growth regulator on quite heavy enough, then there will be a few plants that don't have enough leaves to absorb it," he says. "And then if you apply too high of a rate, other plants start get-

ting too much."

One technical advance that Kaufmann sees on the horizon is the use of root-absorbed chemistry. "When you start working with root-absorbed growth regulators, which I believe are a step forward in the quest for growth suppression in lawns, I think these root-absorbed ones are more easily and uniformly absorbed by the plant. And therefore, you get a more uniform growth suppression."

Although such growth regulators are not yet available to the lawn care operator, other advances are being made since the introduction of the growth suppression chemistry. "We are at the point now where regulators are being tested that do not cause injury to the turf," Kaufmann says. If that's true, then why does discoloration still occur sometimes? "It's a result of secondary effects that are due to slow growth," according to Kaufmann. But he adds, they do not harm the plant.

"One of the key things that happens with slower growing grass is that it does tend to give diseases a little more time to develop symptomology. That doesn't mean you're going to lose the grass," he says. "What it means is that the grass gets a chance to develop those symptoms which make it go off-color. Then once the regulator wears off, the grass recovers. The grass is not going to die, but it will look a little off-color."

Apparently, the use of fungicides will reduce secondary effects such as discoloration. But Kaufmann hopes future research can develop anti-senescent agents that are capable of protecting the plant. "One of the reasons why slower

(continued on page 78)

RINSE WATER DISPOSAL

Current federal and state laws require those who generate hazardous wastes to search for disposal options. Lawn care businessmen may want to consider the following method of pesticide rinse water disposal.

Recent federal legislation has resulted in the classification of anyone who has more than 100 kilograms (200 pounds or about 30 gallons) of pesticide solution or rinse water to dispose of each month as a hazardous waste generator. The reauthorization of the Resource Conservation and Recovery Act PL 98-6 includes a provision that such wastes must be treated as hazardous waste and must be stored and disposed of only by approved methods. Since many of the commonly used pesticides are on the Environmental Protection Agency's list of toxic substances, all surplus spray solutions, container rinsate water, spray equipment rinsate,

Once the solutions are collected, they may be containerized, perhaps in Department of Transportation approved 55 gallon barrels, and shipped to EPA approved facilities.

solutions resulting from spill cleanup, and misformulated solutions are hazardous wastes and must be dealt with accordingly.

Thus, nearly everyone who does a significant amount of spraying, including those involved in turfgrass or landscape maintenance operations, will need to find safe, economical, and approved methods of reducing the amount of waste they generate. They will also have to come up with disposal methods for the remainder.

In the past, the common practice has been to wash the excess spray and rinse water down the drain and into the sewer or allow it to run off into adjacent drainage ways. In some states, notably California, some operators were encouraged to install soil-lined pits or disposal mounds similar to those used for septic tank effluent. These practices will now likely be banned or abandoned because of the adverse impact on the environment when the pesticides flow or leach from such systems into surface or underground water sources.

WHAT CAN BE DONE. There are several things that can be done to reduce the amount of waste. First of all, care should be taken to mix only the amount of pesticide which is needed so that there is little excess. Empty pesticide containers must be triple rinsed before disposal. The best approach is to use this rinse water to make up the pesticide solution being prepared.

Another approach to reduce the volume that needs to

be dealt with is to have areas available where any excess mixed pesticide can be applied at the recommended rates. It may even be possible to add rinse water to the spray apparatus after it is empty and to spray that over an appropriate field, thus rinsing the apparatus and simultaneously disposing of the rinse water. Care must be taken, however, not to exceed recommended application rates.

Several manufacturers, e.g., Ag Robotics of Childress, Texas, are now developing metered injection devices, which add the pesticide to the stream of water just behind the spray nozzle. The system allows the concentrated pesticides to be kept in small chambers, while the make-up water is transported in a large container that does not need to be rinsed. While these systems will be used increasingly in the future, they are more complex and, thus, more expensive than conventional spray apparatus. D.L. Richard and T.L. Ladd have written an article on pesticide injection published in the Transactions of the American Society of Agricultural Engineers (V. 26, 1985, pp. 683 - 686) which gives more details on recent advances.

It may also be possible to collect the excess solution and the rinse water and hold it in tanks to be used as make-up water when the next solution is made. Such an approach is difficult, however, when a variety of pesticides are used. In addition, there is no way to know how much residue is in the solution being stored, thus interfering with accurate formulation. Microbes are likely to grow in the stored solution, producing slime that may plug spray systems.

Even if one or more of these approaches is implemented, there are still likely to be small quantities of pesticide solutions and rinse water that will need to be disposed of. Once the solutions are collected, they may be containerized, perhaps in Department of Transportation approved 55-gallon barrels, and shipped to EPA-approved disposal facilities. The cost is typically \$250 per barrel, which is far too expensive for many operators to support.

A second disposal option is to filter the solution to remove suspended solids by running it through an adsorption media, such as activated charcoal. While there is some data on adsorption of pesticide on charcoal, there are no comprehensive studies available which would indicate how a filter would respond to the mixtures of pesticides that are likely to occur. Adsorption columns would need to contain several hundred pounds of charcoal, and frequent tests of effluent would be needed to assure that the adsorption capacity has not been exceeded.

Once such filters are saturated, they would likely need to be disposed of in EPA-approved hazardous waste

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It might be a good idea to construct a wash-down pad where rinsate can be collected and contained.

facilities. Thus, this option is also likely to be very expensive, since one must purchase and later dispose of the filter material, in addition to conducting repeated analyses of effluent, which typically cost \$500 per sample.

Since the major component of the waste is water and since the pesticides in use today are degraded by soil microorganisms, evaporative pits or enclosed soil disposal beds may be considered. However, any system that is in contact with the soil surface such that leaks cannot be observed will need to be monitored by wells drilled to the water table to demonstrate that the pesticides are not migrating to the groundwater.

Even the use of concrete, metal, or plastic lined pits or soil beds does not eliminate the need for as many as four groundwater monitoring wells for each facility when the bed or pit is in contact with the soil. In addition to the cost of several thousand dollars to install each well, samples will need to be collected and analyzed for pesticides, probably on a quarterly basis, at costs similar to those described above. Therefore, this system is also likely to be very expensive.

Several other possibilities exist which have not been fully explored or developed. These include small scale waste water treatment plants, which may require carefully selected microorganisms to degrade the pesticides, and ultraviolet light treatments or chemical treatments, which would destroy the active ingredients of the pesticide formulation. While these approaches are each effective for selected pesticides, no information is available on how effective these treatments would be for the diverse mix-

tures of pesticides that must often be handled.

A final option, which may be feasible, is to use an enclosed bed of soil in a container above the soil surface to evaporate and degrade the pesticide. Containerized soil disposal systems have been used with success at the Iowa State University research farm for over a decade.

Junk and Richards (1984) report that some 144 kilograms of active ingredients of pesticides had been applied to a 100 m² plot in a two-year period without significant residue build-up. They also tested vapor concentration in the air above the facility and reported most pesticides were below detection levels, likely indicating that they were being degraded rather than vaporized. The Iowa system consists of a concrete lined pit and a mechanically activated roof, which covers the soil during precipitation events to exclude rain water. Thus, there is some evidence that such a system may be used to evaporate pesticide solution and degrade the residues.

Unfortunately, as pointed out above, in-the-ground systems will require monitoring wells. Thus, it is suggested that another option would be to assemble a similar system in above ground containers. The ideal system would consist of a covered concrete slab equipped with a drainage system to collect spill, rinse water, and wash water in a sump. The collected waste would be pumped into a specifically designed tank which has a lower liquid storage container and an upper layer of soil. The tank would need to be constructed of materials that are resistant to the waste and possess sufficient strength to main-

(continued on page 79)



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TRAP TROUBLES

Japanese beetle traps collect large numbers of the insect, but have never been proven to reduce defoliation when used near plantings. However, a University of Kentucky study has shed some doubtful light on this approach to beetle control.

Japanese beetles, *Popillia japonica* Newman, (Figure 1) have been a pest of concern ever since their introduction early in this century. They were first discovered in New Jersey in 1916 and have since expanded their range throughout most of the eastern United States. The beetle is known to feed on over 300 species of plants, including crabapple, Lombardy poplar, rose, American elm, American linden, grape, and willow. Defoliation by these adult insects is so severe in part because of their habit of feeding together in large groups. Extensive Japanese beetle feeding may reduce a plant's foliage to only the leaf veins. Feeding damage by these beetles is common from June to August.

The immature stage of the Japanese beetle is a white grub, which can also be a very damaging pest. The grubs live in the soil, especially under turfgrass, where they feed on the tender roots. They are present in the soil from about August through May. The actual dates will vary depending on the area's climate.

Many control methods have been attempted against the Japanese beetle, ranging from standard insecticides to sterilization of adults. The Japanese beetle trap (Figure 2), is one of the most commonly implemented control methods. These traps are baited with chemical attractants, usually a combination of the female sex pheromone with a chemical lure containing essences found in some of the beetles' most preferred host plants.

Traps have been used for many years by state and federal agencies as a population monitoring tool, however, in recent years traps have been marketed to the private sector. Little research has been performed to evaluate the protection the plants provide for nearby vegetation or to determine if grub populations are altered near trap locations.

However, the instructions for locating the traps from one company, conflict with those of another major manufacturer. One recommends placement of the trap 10 feet upwind of plantings, while the other company advises placement of their trap 30 feet downwind of plantings. The instructions for usage of the commercially available traps imply that a trap properly located would



capture the insects and therefore keep them from damaging plantings.

Three questions are raised:

1. Do traps protect valuable plants?
2. What is the most effective trap location?
3. Are Japanese beetle grub populations affected?

Several experiments were conducted by the University of Kentucky, Department of Entomology, in an attempt to answer these questions.

PROCEDURE. A commercially available Japanese beetle trap baited with their standard lures (a sex attractant bait and a food-type lure containing eugenol and 2-phenethyl propionate) was used in all the experiments. The test plants used to evaluate beetle damage were potted French hybrid grape plants about 4 feet tall. Trap placements were based on the presumption of a prevailing southwest wind.

Two experiments were performed to evaluate the effect of single traps on test plants, one at Lakeside Golf Course, Lexington, Kentucky, and the other in several home landscapes in Lexington. The major objective of these experiments was to determine if the traps, when used as directed, would result in reduced defoliation to the grape plants.

In the golf course experiment, the golf course was divided into three areas. Five grape plants were placed in each area with at least 200 meters between plants.

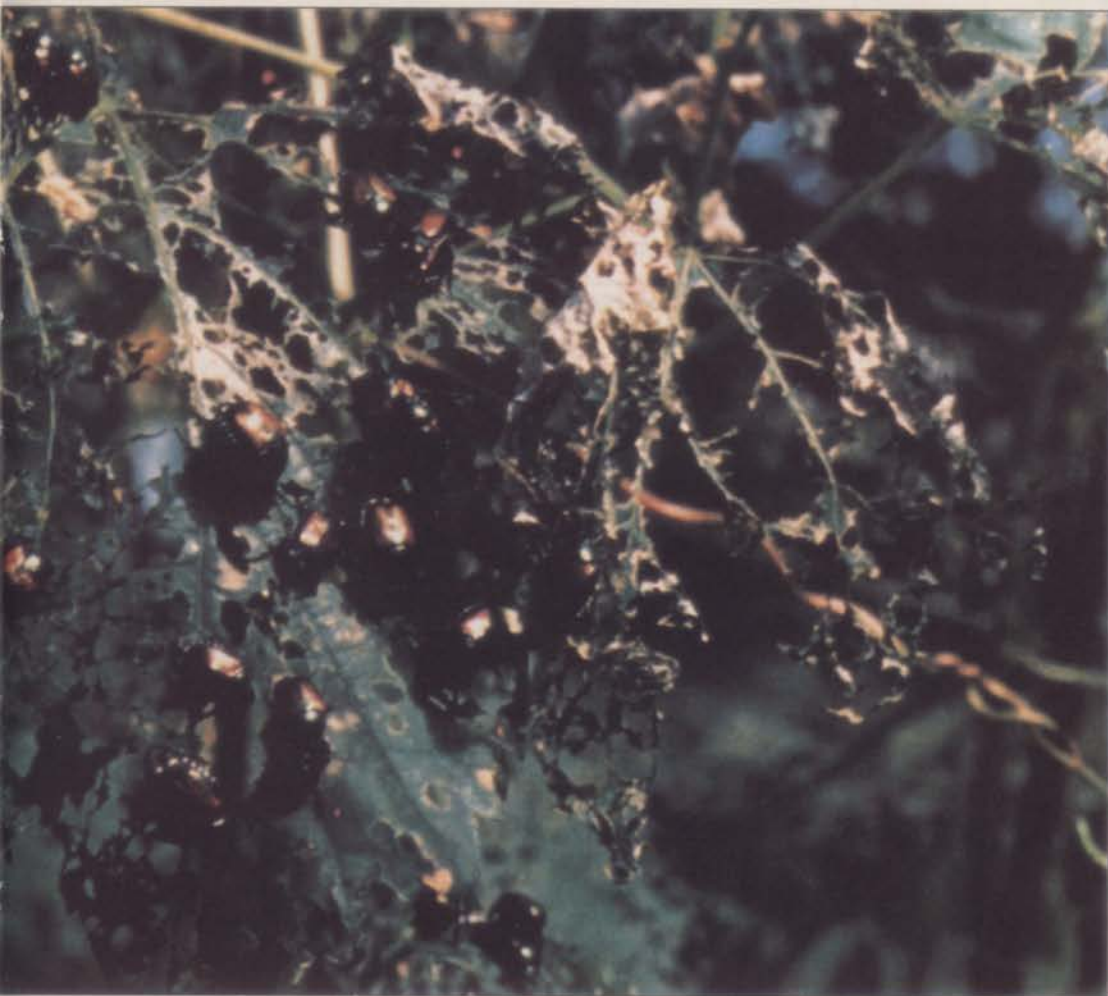


Figure 1 (left). Japanese beetle. Figure 2 (below). Japanese beetle trap.



Japanese beetle traps were oriented to the test plants in the following ways: one, 10 feet upwind; a second, 30 feet downwind; a third, 10 feet downwind; and a fourth, 30 feet upwind. The remaining plant received no trap ('unprotected' check) so that it could act as an indicator of damage to plants without the 'protection' of traps.

These arrangements of traps and plants were placed in the field on June 29 and the experiment was concluded on July 4. The number of beetles feeding on each plant and the number captured in each trap were counted daily throughout the study.

The cumulative percentage of defoliation was estimated on each test plant daily. At the end of the fifth day a more accurate estimate of the total defoliation was taken by estimating the percentage of leaf material removed from each leaf. These estimates were used to develop an estimate of defoliation for the whole plant. This experiment was conducted again between July 4 and July 9.

The design of the home landscape exposures was very similar to that used at the golf course. The lawn sites were selected from 25 lawns that had been monitored based on trap catches at each location. All were randomly assigned with the following treatments:

1. A trap 30 feet downwind of a test plant.
2. A trap 10 feet upwind of a test plant.
3. A test plant alone.

The traps and plants were located in direct sunlight whenever possible.

The numbers of beetles on the plants and beetles captured in the traps were counted five days after the plants and traps were set out. The final percentage of plant defoliation was estimated in the same way as in the golf course experiment. This experiment ran from July 11 to July 16 and a second trial was run immediately afterwards, from July 16 to July 21.

From July 18 to July 19, another experiment was performed at Lakeside Golf Course to test the ability of multiple traps to protect plantings. Ten sites were selected around the golf course, each receiving a test plant. Five of these plants were surrounded by three Japanese beetle traps. Each of the three traps was 30 feet from the plant and equidistant from each other. The five remaining plants acted as checks. The percent defoliation of the plants was estimated the day after the experiment was set up.

Another experiment was performed, but this was to determine if traps affected the number of grubs that would be found in the immediate vicinity of the trap. Eight traps were placed at Lakeside Golf Course on July 12, before Japanese beetle flight began, and were operated through the period of adult activity. Sites to serve as check or 'no-trap' areas were designated by driving a stake into the ground 100 feet away from each trap in a direction perpendicular to the southwest prevailing wind.

In late August, at the time when young Japanese beetle grubs were present in the soil, both the trap and check sites were sampled for grubs. This was done by remov-

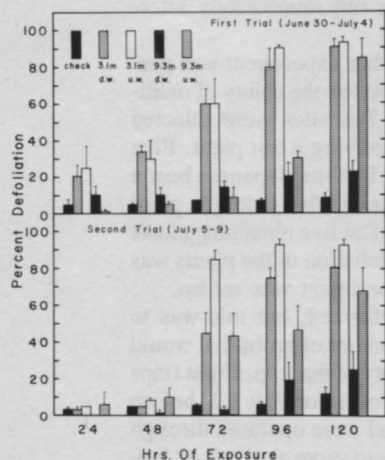
ing turf/soil cores with a 6-inch diameter 'cup cutter' at 3.3-foot intervals out to 23 feet on both sides of the trap or check stake, parallel with the prevailing wind direction. The cores were broken apart by hand and the grubs counted.

RESULTS. The cumulative per day percent defoliation on the test plants with single traps at the golf course is shown in Figure 3. In both trials the defoliation increased most rapidly on plants with traps 10 feet away, both upwind and downwind. After 72 hours, '10-foot' plants were 50 to 90 percent defoliated. Although the plants with traps 30 feet upwind were not damaged as quickly as the '10-foot' plants, they did suffer significant defoliation by the end of the experiment.

The least damaged plants in the experiment were the 'unprotected' check plants. The reduced feeding damage observed after the first 48 hours in the second trial was attributed to rainfall and cool temperatures. Note, however, that after 120 hours, the defoliation of each treatment was nearly identical for both trials.

The final percentages of defoliation estimates were analyzed from both trials to determine if significant differences between the trap placements existed (Table 1). 'Unprotected' check plants and those with traps 30 feet downwind were the least damaged and the percentage of defoliation of the two was not significantly different. None of the trap placements reduced the amount of defoliation and three of the placements (30 feet upwind and both 10-foot placements) resulted in significantly increased defoliation.

The results of the experiment in home landscapes were nearly identical to those of the golf course experiment. Plants with traps located 10 feet upwind and 30 feet downwind had significantly greater



Mean cumulative percent defoliation of test plants for each treatment and check during both trials at Lakeside Golf Course, Lexington, Kentucky. Traps were positioned downwind (DW) or upwind (UW) from the test plants. Brackets represent standard errors.

Trap position relative to plant	Mean percent defoliation (+ SE)		
	Trial 1 (30 June to 3 July)	Trial 2 (4 to 8 July)	Combined
3.1 m upwind	97.0 ± 1.9	96.8 ± 2.0	96.9 ± 1.2 a
3.1 m downwind	91.8 ± 4.0	84.3 ± 12.5	88.1 ± 6.2 ab
9.3 m upwind	86.0 ± 12.8	56.6 ± 14.5	71.3 ± 10.9 b
9.3 m downwind	36.0 ± 10.5	46.1 ± 20.1	41.0 ± 10.4 c
Check (no trap)	25.6 ± 5.5	19.1 ± 4.9	22.4 ± 1.2 c

Means followed by the same letter are not significantly different at the $p = 0.05$ level (Duncan's [1955] new multiple range test).

Table 1. Evaluation of four trap placements for preventing defoliation of test grape plants by *P. japonica* at Lakeside Golf Course, Lexington, Kentucky.

Trap position relative to plant	Mean percent defoliation (+ SE)		
	Trial 1 (11 to 15 July)	Trial 2 (16 to 20 July)	Combined
3.1 m upwind	96.6 ± 2.7	99.7 ± 0.3	98.1 ± 1.4 a
9.3 m downwind	21.2 ± 8.1	45.8 ± 18.5	33.5 ± 10.5 b
Check (no trap)	16.7 ± 8.3	3.0 ± 1.0	9.8 ± 4.6 c

Means followed by the same letter are not significantly different at the $p = 0.05$ level (Duncan's [1955] new multiple range test).

Table 2. Evaluation of two manufacturer recommended trap placements for preventing defoliation by *P. japonica* in suburban home landscapes in Lexington, Kentucky.

defoliation than 'unprotected' check plants (Table 2).

Results from the multiple trap experiment were conclusive enough to end the experiment after only one day. The plants that were surrounded by traps were almost completely defoliated, averaging 94 percent. The plants that had no traps associated with them averaged only 5.5 percent defoliation.

In the experiment examining grub numbers around trap sites, it was found that trapping Japanese beetles did not increase or decrease the number of grubs near the traps. Grub densities around trap sites averaged 34.7 grubs per m², and 36.1 per m² in the 'unprotected' check sites. It was also found that grub densities were not significantly different between upwind and downwind sides of the traps, and that their numbers were unaffected at increasing distances from the traps.

DISCUSSION. The results demonstrate that the operation of a Japanese beetle trap is ineffective in preventing or reducing defoliation of plantings. In fact, the use of a trap or traps probably will result in nearby plantings being more heavily defoliated than if no traps were used. These traps do not capture the total beetle population that is drawn to the trap site.

The lack of plant protection afforded by single Japanese beetle traps is not overcome by the use of several traps to pro-

tect an area. The one multiple trap design tested in this study not only failed to protect against defoliation, but resulted in severe defoliation of test plants in an even shorter period of time.

A different multiple-trap arrangement than the one tested here may provide some degree of protection to plantings and this is under investigation.

The operation of Japanese beetle traps was not found to increase the grub population near a trap, which would indicate the absence of one potential negative side effect.

There may be some merit to mass trapping of Japanese beetles in an isolated area of infestation. In this situation, the beetle population may be more easily reduced and lower defoliation rates could occur. This idea has a limited scope of application and is probably impractical in the home landscape situation as most every homeowner in the infested area would need to purchase and deploy traps. At this time, Japanese beetle traps cannot be recommended for use to protect against defoliation inflicted on plantings by Japanese beetles. -- F. Carter Gordon

The author is a research technician and graduate student at the University of Kentucky, Lexington, Kentucky, who performed this research in cooperation with Dr. Daniel A. Potter. Figure 3 and Tables 1 and 2 are reprinted by permission from the *Journal of Economic Entomology*.

AMINES AND ESTERS

If you are interested in your herbicide's performance, you need to know about esters and amines to compete in today's lawn care market.

What do esters and amines have to do with operating a lawn care business? They have more to do with this business than you might realize at first glance. They offer two different approaches to formulating postemergence broadleaf herbicides which, in turn, affects performance and phytotoxicity.

Modern-day lawn care demands that you not only be a good businessman, but a part-time chemist as well. Pesticides have become an integral part of this industry and that makes it extremely important to have a basic understanding of what goes into the products you are using. Armed with that knowledge, you can go out and improve your weed control program, which means more satisfied customers.

So let's take a specific look at postemergence broadleaf weed control and the role esters and amines play.

EFFICACY VERSUS TOXICITY. It is useful to think of esters and amines as a continuum with efficacy on one end and phytotoxicity (damage to desirable plants) on the other. Due to their chemical structure, esters have proven to be more effective on many of the hard-to-control weed species. Amines, on the other hand, have non-volatile chemical properties, which means less potential for damage to non-target ornamentals.

Simply put, there are trade-offs on this continuum. Esters often trade slightly higher phytotoxic properties for the upper hand in efficacy. Meanwhile, amines may give up a slight degree of efficacy for lower phytotoxicity potential. That's the art of herbicide formulation. It's a constant "give and take" process to come up with a product that is effective, but can be used with less fear of causing damage to non-target, desirable plants.

ESTERS AND PENETRATION. When it comes to postemergence broadleaf weed control, ester formulations do a better job of penetrating the waxy cuticle often found in perennial weed species. That

provides quicker control and better performance on hard-to-control species.

Dr. Bruce Branham, turf specialist at Michigan State University, East Lansing, Michigan, explains: "In order for a herbicide to do the job right, it must move through the leaf cuticle, which is a thin waxy film on the surface of the leaf. Hard-to-control weeds are often protected by this waxy surface. The esters are simply more effective at absorbing into those difficult weeds because their chemical structure allows better penetration of the waxy cuticle."

That doesn't mean amine formulations are ineffective. Remember the continuum we talked about earlier. Whether you apply an amine or an ester formulation of

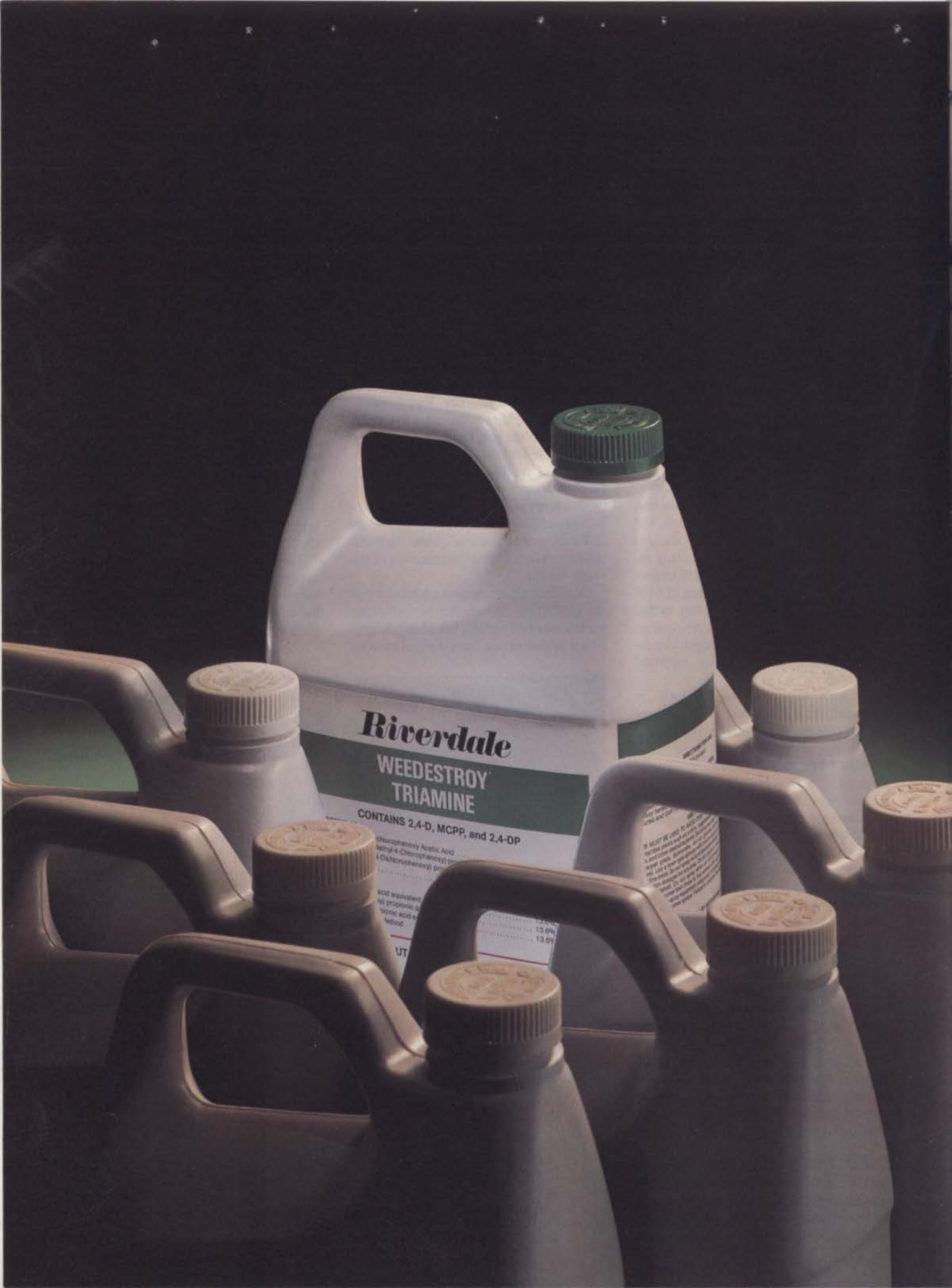
2,4-D on dandelions will make no discernable difference. Either one provides good control. It is on the more difficult-to-control species, such as wild violets and spurge, that the esters shine. And that is because they get past the waxy cuticle and move into the weed's nutrient and water transport system to provide a more effective kill.

"If you want the best control on the largest variety of weeds, then esters are the choice," according to Branham. "However, you need to be careful when applying esters because of their more volatile properties." Which leads us into the other end of the chemical continuum: phytotoxicity.

(continued on page 51)



It is important to know proper herbicide application procedures. Spray volume, wind speed, air temperature, and several other factors have an effect on performance and phytotoxicity.



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AMINES AND ESTERS

(continued from page 47)

VOLATILITY VERSUS DRIFT. When the subject of damage to non-target plants is brought up, a distinction must be drawn between the two main causes of phytotoxicity: spray drift and volatility. They are totally different factors. Here is how Tony Hall, Product Development Manager for turf herbicides at The Dow Chemical Company, defines volatility and drift.

"Volatility is the ability of a chemical, after it has been applied to a surface, to evaporate (volatilize) off that surface. Spray drift, on the other hand, is the airborne movement of small droplets of spray solution before they reach the target surface."

Here is why that is such an important distinction to understand. Whether you use an ester or amine makes no difference if spray drift occurs. Either formulation will cause damage to non-target species. Volatility is a different story.

Amine formulations have very little volatile action. In fact, they are considered practically non-volatile. Esters, on the other hand, have a more active chemical structure and therefore additional care must be taken when applying these formulations. However, herbicide manufacturers have made progress in reducing the volatility of esters. Nearly all commonly used postemergence herbicides now contain what are termed "low-volatile" esters.

Hall says the low-volatile formulations were designed because the very first esters were found to be too volatile. "In the early days of 2,4-D, back in the 1950s, those esters had short carbon chains with low boiling points, which caused the high volatility," explains Hall. "What manufacturers have done is lengthen the carbon chain and raise the boiling point, which reduces volatility." The result? Products which, when applied properly, can be used on a broadcast basis with lower risk of injury to non-target plants.

Dow Chemical introduced its ester formulation, Turflon® D herbicide, in 1985, and Hall reports no major problems with non-target damage. "We had a few isolated reports of injury, but after examination it was determined that spray drift was the problem in nearly every case."

That points out the importance lawn care operators should place on correct application techniques to reduce spray drift and volatility.

HANDY TIPS. What can be done to reduce the possibility of non-target damage to desirable plants? Here are some helpful tips to keep in mind. First a look at the



Be careful to minimize overlap onto hot surfaces such as sidewalks and driveways when using an ester-based broadcast herbicide.

steps that can be taken to reduce volatility:

- Use a low-volatile ester herbicide. Products such as Weedone® DPC, Super Trimec®, and Turflon D are low-volatile esters.
- Do not apply esters when the air temperature is hot. It is difficult to pinpoint an exact figure, but 85 degrees Fahrenheit and up is commonly cited as the point where use of ester formulations should be curtailed.
- Be careful to minimize overlap onto hot surfaces such as sidewalks and driveways.

The following are some additional steps which will reduce both volatility and spray drift:

- Use sufficient spray volume. Dow recommends no less than 32 gallons per acre or 3/4 of a gallon per 1,000 square feet when applying Turflon D.
- Use equipment that delivers large spray droplets and apply at low pressure.
- Apply when winds don't exceed 5 to 10 miles per hour.
- Use smooth motions when applying herbicides.

GOOD WEED CONTROL FACTORS. That was a short course in esters and amines and what they mean to the lawn care operator. Both formulations have their place in your weed control program, but it is important to recognize the differences in efficacy and phytotoxicity.

Effective weed control, however, does require more than an understanding of the roles amines and esters play. Here are some other factors which play an important role in ensuring a successful postemergence program:

Systemic herbicides must be applied to actively growing weeds. However, young

immature weeds have most plant fluids moving upward, which can reduce downward herbicide movement. In addition, young weeds have greater ability to outgrow the herbicide's effectiveness. Developed weeds nearing maturity, on the other hand, provide more downward movement and interception of herbicide droplets since they have more leaf tissue present. Also, during times of extreme heat, drought or reduced growth activity, the plant "hardens off" and will not translocate enough chemical to the roots to provide an effective kill. The foliage will be merely burned back, resulting in chemical "mowing" rather than effective weed control.

Apply herbicides at the recommended label rates. Too much chemical can cause the exact opposite reaction you would expect. The top part of the weed is killed off before sufficient herbicide is translocated to the rest of the plant to provide total control.

Proper applicator training is essential. Any chemical can cause damage when it is misapplied and that is most often the reason for injury to desirable species of plants. Investing time and money in training will pay big dividends in the long run.

By understanding what goes into the herbicides you are using, you will be better able to serve your customers' needs. Improved weed control means more satisfied clients and that's why a basic understanding of herbicide chemistry is so important. -- Greg Nickerson ■

The author is Account Supervisor, Public Relations Group, Bader Rutter and Associates, Inc., representing Dow Chemical Company.

CHEMICAL BUYING SURVEY REPORT

Once again, we are happy to present the results of our Third Annual Chemical Buying Survey. We have tracked the chemical buying habits of your peers and projected their 1986 buying intentions.

Last month we sent out 300 surveys to a random sampling of our readership to gauge their chemical buying habits. This third annual survey consisted of eight fill-in-the-blank type questions directed specifically toward lawn chemical buying.

Of the 300 surveys mailed, 85 were filled out and returned before our deadline. That is slightly better than a 28 percent rate of return, more than double what is considered necessary in order to obtain statistically valid results.

In the first question, readers were asked to rank five buying decision variables in the order of their importance. They were instructed to signify the most important variable with a one, the least important with a five and use each number, one through five, only once. The five buying decision variables they were asked to rank were: chemical price, dealer service, location of distributor/dealer, product performance (past performance or reputation), and advertising or trade press product information.

Answers to this question have remained consistent for the last three years. By far the most important influence on buy-



dealer service, location of the supplier, and finally, least important, was advertising.

We asked our readers to list their primary source of lawn care chemicals. Not surprisingly, a strong majority of 79

percent of our respondents now say they buy directly from the manufacturer. Only five percent buy from suppliers not specializing in lawn care products.

Respondents were also asked approximately how much they spent annually on granular lawn care products and liquid lawn care products. By noting the number of returns listing figures for both types of products or only one type of product, we could also calculate the percentage of operators who use both granular and liquid products, only granular products and only liquid products: Eighty percent use both granular and liquid, 12 percent use liquid only and only eight percent restrict themselves to granular use only. We also found that although most operators don't restrict themselves to one type of chemical, they do tend to show a definite preference for one application format over the other. On the average, our readers

By far the most important influence on buying decisions is product performance, with 75 percent of our respondents placing it first. Performance was rated as the second most important consideration and chemical price was chosen as the third most important.

ing decisions is product performance, with 75 percent of our respondents placing it first. A further 12 percent placed performance as the second most important consideration. Chemical price was chosen second by 54 percent, followed by

percent once again listed distributor/suppliers specializing in lawn care chemicals as their primary source. This percentage is down slightly from last year's 81 percent, and direct sales from the manufacturer picked up the extra percentage

bought 2.2 times more of one chemical type than the other. In other words, an operator that spent \$1,000 on liquid chemicals might spend \$2,200 on granular products.

Our readers were asked to list the percentage of their approximate total annual expenditures made in fertilizers, insecticides, fungicides and herbicides over four three-month periods: January-March, April-June, July-September and October-December. The responses to this question indicated a variety of chemical buying habits. Many people spread out their purchases over the entire year, while others buy their materials in lump purchases at various times of the year, but it is possible to draw some general conclusions about chemical buying habits.

The summer months are the most popular time for large chemical purchases, particularly insecticides and fungicides. Fourteen percent of our respondents said they made all of their fungicide purchases in the period of April through June, and 26 percent made more than 75 percent of their insecticide purchases in this period. Fertilizer and herbicide purchases tend to be spread more evenly throughout the year, and less than three percent of our readers buy a majority of these chemicals in any three month

WHICH BUYING INFLUENCES ARE MOST IMPORTANT?

(1 is Most Important; 5 is Least Important.)

RATING	1	2	3	4	5
Price	19%	54%	22%	4%	1%
Service	4%	25%	56%	13%	2%
Location	1%	6%	13%	62%	18%
Product Performance	75%	12%	8%	5%	0%

period.

The sixth question asked what percentage of gross annual revenues are spent on fertilizers, insecticides, fungicides and herbicides. Averaging the responses, we weren't surprised to find the biggest expenditure was on fertilizers at 9.7 percent, then came herbicides at 6.3 percent, insecticides at 3.2 percent and fungicides at .9 percent.

Our final questions dealt with how

much our readers spent on chemical supplies during the 1984 and 1985 seasons. We also asked how much they intended to spend in 1986. Our respondents ranged from large operators who spend hundreds of thousands of dollars each year on chemicals through to small "one-truck" operators who counted their purchases in the hundreds of dollars. One of the more striking things that came out was the sheer growth involved in the lawn care

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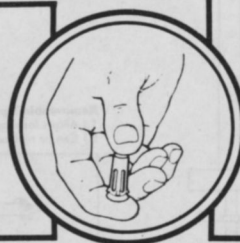
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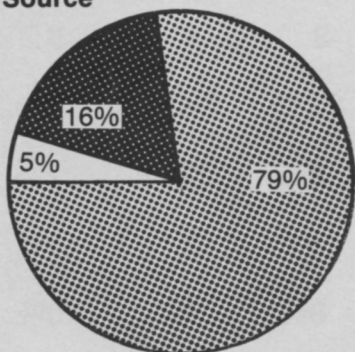
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LIST YOUR PRIMARY SOURCE OF LAWN CARE CHEMICALS.

Primary Supply Source



Seventy nine percent of respondents buy primarily from lawn care suppliers, 16 percent buy direct from the manufacturer, and 5 percent buy from suppliers not specializing in lawn care products.

the herbicides currently available. They wanted materials with greater treatment longevity, broader spectrum of target pests, less sensitivity to weather and improved performance overall. Another strong concern was consumer and operator education. Many operators wanted more help from the manufacturers and suppliers in answering customer fears about chemical safety. One person wrote that, "awareness needs to be increased as to how safe our applications are. If we

One respondent wants "better directions on mixing and better containers." Another would like to see more information on labels, such as LD50 numbers, the freezing temperature of the product, and the shelf life of the product. Along the same lines, another respondent wants "more precise mixing rates, broken down into gallons."

If you have any comments on how your buying habits compared to our respondents, we'd like to hear from you.

Many took the opportunity to comment on improvements they would like to see in lawn care chemicals. Almost half of those responding were dissatisfied with the herbicides currently available. They wanted materials with greater treatment longevity and a broader spectrum of target pests.

business. Only eight of our 85 respondents spent less in 1985 than 1984, and only seven felt that they would spend less in 1986 than they did in 1985.

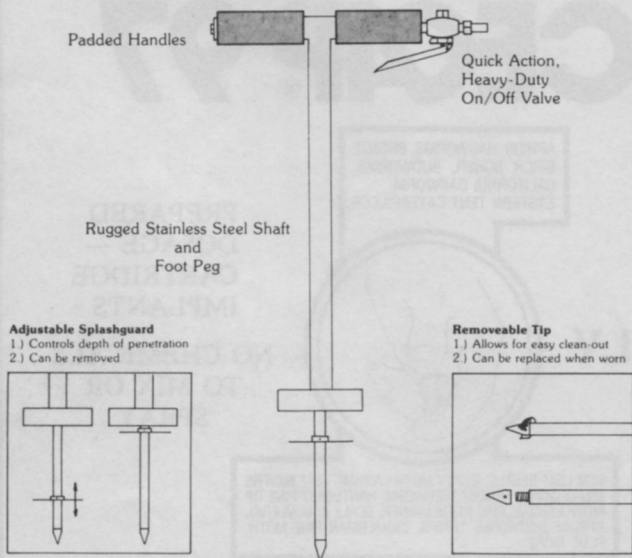
Many took the opportunity to comment on improvements they would like to see in lawn care chemicals. Almost half of those responding were dissatisfied with

could present them (the customer) with an information piece when a question of safety occurred...it would improve relations." More low odor chemicals were also requested, as well as regional seminars on product use and standardization of field testing information.

We hope you found our annual survey of the industry's chemical buying practices interesting, and will join us again next year. - Amy Sheldon

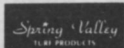
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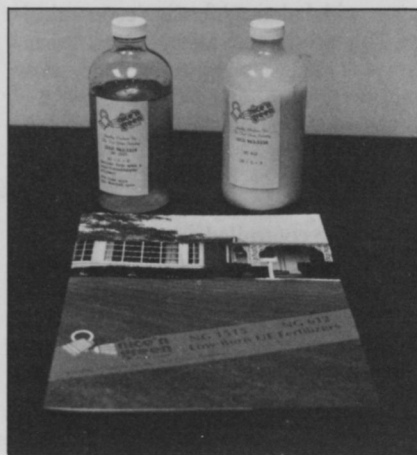
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SPECIAL CHEMICAL PRODUCTS SECTION

It's that time of year again! If you haven't done so already, it is time to get out your checkbook and make your chemical purchases for the 1986 lawn care season.

FERTILIZERS

Nice 'n Green Plant Foods has recently marketed some new liquid fertilizer products. NG 1515 (30-0-0) is a clear liquid solution specially formulated for use on turf. The product has a low burn potential, quick green-up, and prolonged growth response properties. NG1515 contains 15 units of nitrogen from reacted



urea formaldehyde molecules composed of methylene/methylol-ureas.

NG 612 (18-0-0) is a milky white, light fertilizer suspension formulated for use on turf during extremely high temperature stress conditions. NG 612 contains 6 units of nitrogen from urea and 12 units of nitrogen from reacted urea formaldehyde molecules composed of methylene and polymethylene ureas. NG 1515 and NG 612 can be used in combination with other sources of nitrogen, phosphorus, and potassium to provide an economical and safe source of fertilizer for the turfgrass industry. These fertilizers are also compatible with most pesticides.

Write 108 on reader card

Reville gypsum pellets from **American Pelletizing Corporation** is the first new pelleted "now" sulfur source with bonus

calcium. This product is ideal for alkaline soil reclamation and hard clay soil reclamation. Western type alkali soils have high sodium levels which prevent turf development. Calcium will replace the sodium in the soil and soluble sodium compounds are formed which can be leached below root levels. Thus alkali soils can be returned to productivity. Clay type "gumbo" soils often contain high magnesium levels and little organic matter. The soil particles seem to be glued together and air and water cannot penetrate.

Calcium sulfate additions bring about an ion exchange which results in dramatically improved soil friability and tilth; thus greatly improving water and air penetration and permitting root growth where it was previously impossible. Reville gypsum supplies approximately 15 to 17 percent sulfur in the sulfate form — which means immediate availability; it also provides 22 percent calcium.

Write 110 on reader card

Milorganite 6-2-0 fertilizer from **Milwaukee Metropolitan Sewerage District** will help establish deep green grass of uniform color and growth. Each particle is a distinct granule, so Milorganite does not cling to vegetation. It is clean, dustless, and free-flowing, too. Hence, it is easy to apply, even on a windy day. Milorganite never cakes or hardens during storage, and does not rot in the bags, according to the manufacturer. Any portion not used immediately can be stored indefinitely for future use.

Soluble fertilizers may act more quickly than Milorganite because they are rapidly assimilated by plants. Usually this is a disadvantage rather than an advantage, because the effect on plant growth is shortlived. Furthermore, too rapid growth weakens plant structures. Milorganite promotes steady, healthy, uniform growth because its water-insoluble organic



nitrogen is released slowly, and it's converted into available plant food as needed.

Write 109 on reader card

The **Parker Fertilizer Company** offers a complete line of fertilizer blends under the trade name "Sta-Green." Sta-Green 16-4-8 fertilizer with 3.6 percent Betasan® (25 percent) effectively controls crabgrass (smooth and hairy), goosegrass, annual bluegrass, barnyardgrass, redroot pigweed, lambsquarters,



shepherdspurge, and deadnettle (henbit) as they germinate.

This product also provides a complete analysis fertilizer feeding. It features controlled release nitrogen from sulfur-coated urea. This product does not control established weeds or grasses. Sta-Green Crabgrass Preventer with 26-4-12 (25 percent) fertilizer feeds lawns with high

analysis, slow release nitrogen and other essential nutrients, and at the same time effectively controls crabgrass, foxtail, barnyardgrass, and goosegrass as they germinate. It does not control established weeds or grasses. Twenty-five percent of the nitrogen is derived from sulfur coated urea.

Write 111 on reader card

Agri-Plex 4X (0-4-4-4S) from **RGB Laboratories, Inc.** is one of the most complete and highly concentrated chelated plant nutrients available in liquid form. It is a result of a technological breakthrough based upon a patented phosphate-citrate complex.

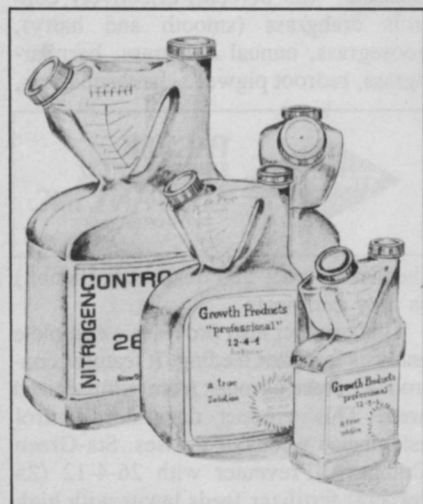
The product supplies the eight plant nutrients which are responsible for maintaining green color in turfgrass without excessive use of nitrogen. It provides protection against winter desiccation, enhanced tolerance to and recovery from stress conditions, and increased resistance to diseases. The product is formulated to supplement a sound fertilizer program and application of 4X is recommended in combination spray treatments with pesticides when turfgrass is under stress.

Agri-Plex is compatible with most liquid pesticides and prevents alkaline degradation of pesticides in the spray tank mix. It is a non-staining composition which can be rinsed off driveways and sidewalks.

Write 112 on reader card

Growth Products' professional fertilizers are the only liquid fertilizers available that contain controlled release nitrogen (CRN) in the form of methylene diurea and water insoluble nitrogen (WIN). Unlike other sources of controlled release nitrogen, which are granular or powdered, Growth Products' fertilizers are true solutions. They are totally miscible in water and provide a clean, consistent, and reliable source of nutrients for plant growth.

The unique packaging provides a simple, easy method of measuring the desired



amount of fertilizer with no mess, and no extra measuring equipment. If too much or too little is transferred into the measuring tip, adjustments can be made without risk of messy spills or wasted material. Unlike fertilizer bags, the Growth Products container can't be torn or damaged by moisture.

Growth Products' Nitro-26 CRN contains an exclusive liquid controlled release nitrogen. Because of reduced volatilization and leaching, methylene diurea is the most economical source of nitrogen when compared with granular fertilizers. It does not require mixing or agitating and it can be used in concentrate form through any spray system. It exhibits excellent agronomic characteristics, including low phytotoxicity and good nitrogen residual.

Write 113 on reader card

WGM/Hydro will be marketing "Turf Royale" 21-7-14 (S) fertilizer under the Viking Ship brand name. The new product supercedes the company's 3-1-2 ratio "Hydro Prills" product. The product



contains 42 percent primary plant food, plus 5 percent sulfur. Its 21 percent nitrogen content combines nitrate nitrogen for quick response and ammonium nitrogen for longer term feeding.

Phosphate content is 7 percent in highly soluble form. Potash content is 14 percent derived from chlorine-free potassium sulfate.

Write 100 on reader card

Extra Iron from **W.A. Cleary Chemical Corporation** is a clear liquid micro-nutrient and secondary nutrient solution containing 4 percent iron, specially chelated and formulated for quality turf applications. When used according to label directions, Extra Iron can promote a deep green color in turfgrass without excessive use of nitrogen. It also can

enhance tolerance to and recovery from stress conditions. The manufacturer also claims Extra Iron will strengthen turf to resist disease and protect from winter desiccation.

Write 101 on reader card

Lebanon Chemical Corporation now offers lawn care professionals one of the widest selections of fertilizers and chemical control products available today. Lebanon Pro products are formulated with high quality CIL sulfur-coated urea.



Because they are more uniformly rounded, CIL's prills release nitrogen more evenly, giving you a more even green-up and color. Just one application is all it takes to keep your customers' lawns looking great for up to three months or more.

Lebanon Pro 33-2-5 is a two-step homogenous fertilizer which provides lawns with balanced feeding economically. This product gives turf a fast green-up plus long-lasting color and slow uniform growth. One 50-pound bag fertilizes 16,000 square feet.

Lebanon Pro 32-4-8 (12 CRN) has an excellent balance of N-P-K for today's high quality turf requirements, combined with the controlled release features of SCU. Its uniform, free-flowing granules are easy to spread. Formulated to give quick response, plus extended feeding, all of its nitrogen is available the first year it is applied. A 50 pound bag covers 16,000 square feet.

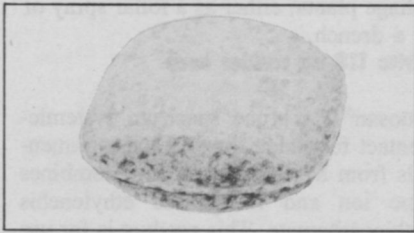
Lebanon Pro 30-5-10 is a special blend of straight urea with CIL sulfur-coated urea to give a quick turf growth response and rich color as well as long lasting feeding and greening. High in potash, it helps improve wear resistance and protects turf from drought, disease, and winter damage. A 50-pound bag will cover 15,000 square feet.

Write 102 on reader card

The new Woodace 14-3-3 with IBDU from **Estech, Inc.** has characteristics especially suited to nursery operations, tree planting, and other landscaping operations. Woodace offers not only a source of long-lasting nitrogen, but long-lasting sources of phosphorus and potash, too. New advances in technology have allowed the combination of IBDU with slowly soluble phosphorus and potassium silicate in a compressed tablet form. Since all major ingredients are slowly soluble,

there's no "honeycomb" effect.

New Woodace briquettes offer you all their advantages economically. Each briquette is approximately 16 grams and briquettes are packed in a 33-pound case.



Each case contains approximately 940 briquettes.

Roots will actually surround and even penetrate the briquette to draw off the slowly released nutrients. This cocoon effect not only emphasizes the safety of the briquette, but its high efficiency as well. **Write 103 on reader card**

From Knox Fertilizer and Chemical Company, Inc. comes Shaw's 23-4-10 Professional General Use Turf Fertilizer. This product is a premium fertilizer that will not burn turf when used as directed, according to the manufacturer. Shaw's 23-4-10 contains quick and slow release nitrogen, a perfect combination for fast green-up.

The primary plant foods in this product are derived from triple phosphate, urea, and muriate of potash. Potential acidity is equivalent to 1,050 pounds of calcium



carbonate per ton. This granular fertilizer is packaged in 50-pound bags which cover 12,500 square feet.

Write 104 on reader card

In a single application, Par-Ex Slow Release Fertilizer, Weed and Feed provides uniform continuous feeding for

lawns while it kills many broadleaf weeds by contact and systemic action. For best results, apply when weeds are actively growing and when soil moisture is adequate. If adverse low moisture conditions exist, weeds are in a poor state of growth, or if an area is heavily overrun with weeds, retreatment may be necessary. Make a second application in approximately 30 days.

This product may be used on bluegrass, fescue, rye, Bermudagrass, and zoysiagrass lawns. Do not apply to bentgrass, carpetgrass, St. Augustinegrass, or dichondra lawns, as injury may result.

Apply the contents of one bag to 15,000 square feet. Advise customer to mow the lawn to normal height one or two days before application. The lawn should be watered thoroughly one day before application to ensure adequate soil moisture. Customer should wait one day after application before watering the lawn again. **Write 105 on reader card**

The Anderson's Lawn Fertilizer Division offers one of the most extensive, field-proven lines of turf care products in the industry. Tee Time formulations provide



all the performance flexibility and in-stock selection needed for fast and accurate response to the toughest turf challenges.

The company offers such fertilizers as 28-3-10, formulated from 1.2 percent ammoniacal nitrogen and 26.8 percent urea nitrogen, as well as ammoniated phosphate and muriate of potash. The 30-3-5 blend is derived from 1.2 percent ammoniacal nitrogen, 22.8 percent urea nitrogen, and 6 percent C.S.R.U.N. The Anderson's 10-15-30 combination is formulated from 5.9 ammoniacal nitrogen and 4.1 urea nitrogen.

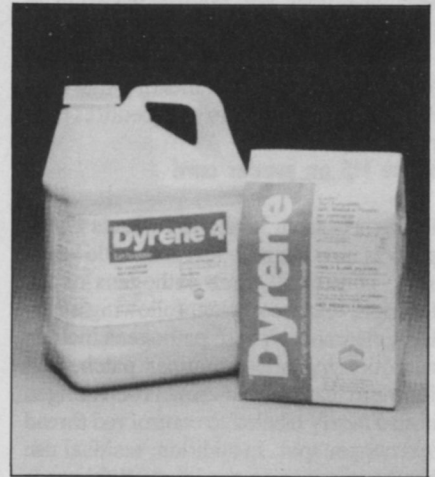
Write 107 on reader card

Vertagreen® fertilizer with Balan® and Surflan® 14-4-6 from USS Agri-Chemicals will control crabgrass, foxtail, goosegrass, and most other annual weed grasses in established warm season turf. The product is designed for use in established bahiagrass, Bermudagrass, centipedegrass, St. Augustinegrass, zoysiagrass, and tall fescue.

This product fertilizes grass and controls smooth and hairy crabgrass, goosegrass, barnyardgrass, green and yellow foxtail, and annual bluegrass. For annual bluegrass control, this product must be applied in late summer or early fall, one to two weeks prior to the expected germination of annual bluegrass. **Write 142 on reader card**

FUNGICIDES

The problem of ornamental diseases and how to control them by using Bayleton 25® turf and ornamental fungicide is discussed in a new brochure from Mobay Chemical Corporation. The full-color



brochure describes what ornamental diseases are, what some of these diseases look like, and where and when the diseases are most likely to occur. Close-up photos of diseases help the reader to identify various fungi damage.

The problem of leaf spot and how to control it by using new Dyrene 4® turf fungicide is also discussed in a new Mobay brochure. The brochure emphasizes the use of Dyrene as the solution and explains how it works for control of leaf spot, dollar spot, brown patch, copper spot, snow molds, and rust. Recommended rates and application procedures are also outlined.

Write 114 on reader card

W.A. Cleary Chemical Corporation's Spotrete® contact thiram turf fungicide has received amended EPA approval for animal repellency. Spotrete Flowable and Wettable Powder used according to label directions, protects nursery stock, shrubs, and ornamentals from rabbit, deer, and rodent depredation. One application will protect treated parts from one to three months, depending on weather conditions. Spotrete is also useful as a repellent in deterring deer migration onto airport runways.

Write 116 on reader card

Chipco® Aliette® fungicide from Rhone-Poulenc, Inc. has received label approval from the Environmental Protection Agency for control of pythium blight on turfgrass.

Chipco Aliette features a unique systemic mode of action which provides both upward and downward movement within the plant. It is applied as a foliar spray, providing outstanding disease control while demonstrating a high safety

level to turfgrass.

The fungicide is recommended for use at a rate of 4 to 8 ounces per 1,000 square feet, providing an application interval of 14 to 21 days, depending on the rate used. It should be applied using 1 to 5 gallons of water carrier per 1,000 square feet, and does not require watering in following application.

Chipco Aliette carries only a caution advisory on its label, indicating that only routine precautionary procedures are required.

Write 115 on reader card

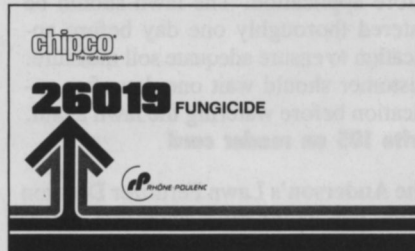
Rubigan® from **Elanco Products Company** is now the only turf fungicide labeled to control all three pathogens of the fusarium blight complex, following a new EPA clearance. These pathogens include necrotic ring spot, summer patch, and fusarium leafspot and crown rot. Rubigan is also newly labeled to control red thread and copper spot. In addition, residual use has been added to the label. Rubigan is a systemic fungicide introduced broadly in 1985 for control of dollar spot, large brown patch, fusarium blight, stripe smut, and pink and gray snow mold. The product has been used successfully on all types of perennial cool-season and warm-season turf.

This fungicide can be mixed with other

fungicides commonly used to control other diseases such as leaf spot, melting out, and pythium. Working by locally systemic action, Rubigan is fully effective even if washed off by rain or irrigation after it dries on the leaf surface. It has multi-site inhibiting action on disease organisms. The product is available in one-pound disposable containers of 50W wettable powder.

Write 117 on reader card

Chipco 26019® from **Rhone-Poulenc** is a fungicide for the prevention and control of many diseases of turfgrass and ornamentals. The product is a foliar-applied fungicide. When used in conjunction with good turf management practices, Chipco



26019 is effective in controlling the following diseases: dollar spot, brown patch, fusarium blight, helminthosporium leafspot, red thread, melting out, fusarium patch, and gray snow mold.

The product can also be used on field and greenhouse grown ornamentals. Chipco 26019 is a broad spectrum fungicide that may be applied safely to a wide range of ornamental flowering and foliage plants, either as a foliar spray or as a drench.

Write 118 on reader card

Duosan®, a broad spectrum systemic-contact fungicide for turf and ornamentals from **Mallinckrodt, Inc.** combines zinc ion and manganese ethylenebis dithiocarbamate. This product is for use on bentgrasses, bluegrasses, fescues, Bermudagrasses, ryegrasses, and St. Augustinegrass. It is labeled for control of dollarspot, anthracnose, brown patch, copper spot, fusarium patch, leaf spots, red thread, and rust.

Apply after mowing or avoid mowing for 12 hours after application. Apply in sufficient water to obtain thorough coverage, usually 5 gallons per 1,000 square feet of turf area. Under conditions of severe disease, apply every five to seven days.

Write 120 on reader card

Nor-Am Chemical Company has several fungicide formulations labeled for turf applications. Their Acti-dione Thiram broad spectrum lawn fungicide is labeled for use

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on bentgrass, Bermudagrass, bluegrass, fescue, ryegrass, and St. Augustinegrass. It is designed for the control and prevention of brown patch, dollar spot, fading-out, gray leaf spot, helminthosporium leaf spot, melting out, pink patch, powdery mildew, and snow mold.

Nor-Am's Acti-dione TGF is an antibiotic fungicide effective for the prevention and control of certain fungus diseases of turf grasses and ornamental nursery plantings. The company's Acti-dione RZ is another broad spectrum turf fungicide for use on bluegrass, bentgrass, Bermudagrass, fescue, ryegrass, and St. Augustinegrass. This product will prevent or control brown patch, dollar spot, fading out, grease spot, gray leaf spot, leaf spot, melting out, powdery mildew, and rust. It is also labeled for azalea petal blight.

Write 119 on reader card

Manzate® 200 Flowable fungicide from E.I. Du Pont De Nemours and Company is labeled for many cash crops as well as turf. On turfgrasses, Manzate will control algae, copper spot, fusarium blight, red thread, slime molds, dollar spot, pink snow mold, leaf spot, rhizoc-



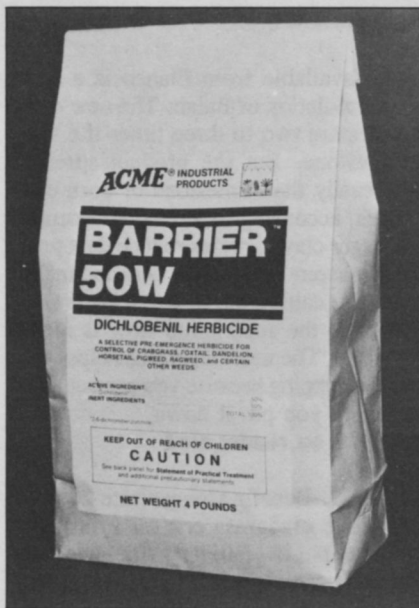
tonia brown patch, pythium blight, and leaf, stem, and stripe rust. On conifers, the product is labeled for control of lophodermium fungi.

Write 121 on reader card

HERBICIDES

Acme Barrier 50W Pre-Asphalt Herbicide from PBI/Gordon Corporation gives many years of protection against weed and root punctures in newly paved streets, parking areas, walkways, tennis courts, running tracks, playgrounds, or any asphalt surface. There is virtually no risk of injury to nearby trees and shrubs from this chemical, when properly used, according to the manufacturer.

The active ingredient, dichlobenil, locks onto soil particles, and being relatively insoluble, is not subject to significant leaching. Unlike some soil sterilants which affect control through root uptake of the chemical and thus may injure or kill nearby desirable plants or those whose roots may later grow into the treated soil, Barrier 50W acts by simply interfering with cell division in the growing tips of plants. This not only inhibits weed seed germination, but also prevents



roots and shoots from growing into the treated zone.

PBI/Gordon has also expanded its line of Acme Professional Strength Products. The company offers Professional Strength Weed-No-More®, other Professional Strength formulations include Betasan® and Dursban®. The Weed-No-More product is a broadleaf weed killer containing Trimec® herbicide, the number one choice of the lawn care industry. This high efficient turf herbicide controls the widest spectrum of broadleaf weeds and gets hard-to-kill species, usually with one application.

Professional Strength Turf Ester is a broadleaf weed killer specially formulated for cool season grasses, producing rapid visual effects and thorough control. Gets hard-to-kill species, such as spurge, ground ivy and oxalis, without repeated applications. The product is effective even in cool temperatures in early spring or late fall, and during hot, dry periods.

Professional Strength Betasan is a selective herbicide applied as a liquid on home lawns for the control of crabgrass, annual bluegrass, barnyardgrass, and other annual weeds, including several broadleaf species. It may be applied in fall or early spring if desired.

Write 122 on reader card

The problem of unwanted grasses in bermudagrass and how to control them by using Sencor 75® turf herbicide is discussed in a new brochure from Mobay Chemical Corporation. The full-color brochure explains what unwanted grasses are, what grasses invade bermudagrass, and why unwanted grasses are difficult to control. The brochure emphasizes the use of Sencor as the solution and outlines preemergent and postemergent application procedures for control against grassy weeds in actively growing Bermudagrass and for broadleaf weed control in dormant

Bermudagrass. The brochure lists additional weeds that Sencor controls when tank-mixed with MSMA.

Write 123 on reader card

Fight appearance of crabgrass, goosegrass, foxtail, annual bluegrass, and barnyardgrass while feeding your turf with Lebanon Chemical Corporation's new Country Club 19-4-6 Fertilizer and Crabgrass Preventer with TEAM®. This new combination of benefin and trifluralin is impregnated on a premium 19-4-6 homogenous fertilizer with 25 percent WIN (water insoluble nitrogen), which gives effective control and a quality feeding, more economically than separate applications of straight materials.

Country Club 19-4-6 can be used on both northern and southern turfgrasses for all season control of germinating annual grasses. It is available in a 40-pound bag which treats 10,000 square feet.

Write 125 on reader card

The toughest preemergent weed control for turf is now available from the ProTurf Division of the O.M. Scott and Sons Company. Produced in two versions, the two new products — one primarily for northern grass use and the other specifically for southern grasses — have pendimethalin as the active ingredient.



Both provide unmatched, effective preemergent control of six grassy weeds (crabgrass, goosegrass, foxtail, barnyardgrass, fall panicum, and *Poa annua*) and seven broadleaf weeds (chickweed, cudweed, hop clover, henbit, oxalis, evening primrose, and prostrate spurge).

This product is labeled for use on all established cool- and warm-season turf, except bentgrass, dichondra or where *Poa annua* is the desired turf. An application in the spring controls weeds sprouting at the time, although control of goosegrass requires a second application.

ProTurf Southern Weedgrass Control is formulated for use on warm season turf only (St. Augustinegrass, bermudagrass, centipedegrass, zoysiagrass, and tall fescue). It will control all listed weeds

with a single application and is especially effective and economical for goosegrass control.

Write 124 on reader card

A new EPA clearance allows all common warm-season turf grasses to be treated with **Elanco Products Company's** Surflan® herbicide for annual grass control. Cleared earlier for Bermudagrass, this preemergence herbicide can now be used also on these established warm-season turfgrasses: bahiagrass, centipede grass, tall fescue, St. Augustinegrass, and zoysiagrass. Surflan is a sprayable herbicide well suited to the needs of professional lawn applicators and professional turf managers.

A single application in the spring controls crabgrass, goosegrass, other annual grasses, and certain summer broadleaf weeds. A fall application controls *Poa annua* and certain winter annual broadleaf weeds. Available for the first time on turf in 1985, Surflan was tested by universities and lawn care companies who reported excellent turfgrass tolerance and season-long control. The herbicide was found to be compatible in the spray tank with most fertilizers, insecticides, and other herbicides.

At about \$30 to \$35 per acre, Surflan is one of the lowest-cost preemergence

herbicides now available for warm-season turf.

Also available from Elanco is a new clay formulation of Balan. The new clay particles are two to three times the size of limestone. But the product spreads more easily than limestone or corn cob carriers, according to the manufacturer. The larger clay particles reduce dust problems inherent in other carriers and make equipment calibration easier. Clay is also lighter, so the application flow is more controlled. The new Balan size helps prevent overlapping because you can actually see where you put it down.

Write 126 on reader card

Pel-Tech® Benefin Concentrate 20 pre-emergence crabgrass control from **The Andersons** is labeled for use on bluegrass, ryegrass, fescue, bahiagrass, Bermudagrass, centipede grass, St. Augustinegrass, and Zoysiagrass. The product will control *Poa annua*, smooth crabgrass, hairy crabgrass, goosegrass, watergrass, and yellow and green foxtail. It will not control established weeds. For preemergence control of crabgrass, foxtail, barnyardgrass, and goosegrass in northern grasses, apply in early spring, prior to annual weed grass germination.

For preemergence control of annual bluegrass, apply in late summer to early

fall (mid-July to mid-September), or in early spring, prior to annual bluegrass germination. For preemergence control of crabgrass, foxtail, barnyardgrass, and goosegrass in southern grasses, apply in late winter or early spring, prior to annual weed grass germination.

A second application may be made 4 to 6 months after initial treatment for continued control of annual weeds which may germinate into the summer or early fall. For preemergence control of annual bluegrass, apply in late summer to early fall, prior to annual bluegrass seed germination. Additional applications at the same rate can be made four to six months later in early spring, prior to soil warming and subsequent germination, in areas heavily infested in thin turf areas.

Write 127 on reader card

Nothing outperforms Dacthal W-75® in the fight against crabgrass, according to the manufacturer, **SDS Biotech Corporation**. What is more, it is the only preemergence herbicide labeled to control troublesome spurge. Dacthal W-75 is just as effective against goosegrass, *Poa annua*, and 20 other annual grasses and broadleaf weeds. Dacthal kills weed seeds as they germinate.

Since the product is not water soluble, it will not leach during wet weather. Dac-



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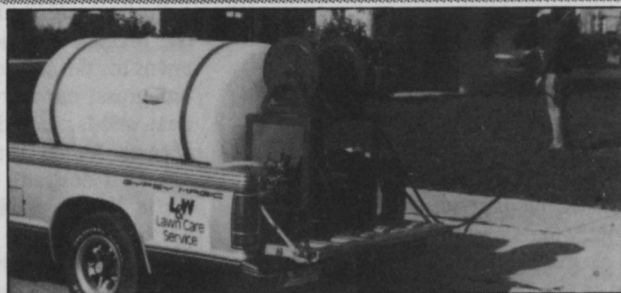
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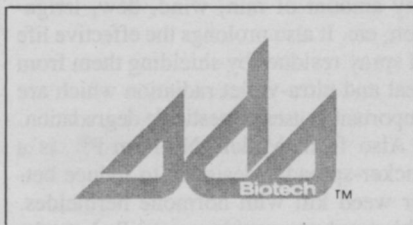
Broyhill's Economic TP Series Skid Sprayers Are . . . Ideal For Lawn Care Professionals, Interstate Spraying, Fire Fighting, Ditch Spraying or Most Mobile Spray Applications. Convenience and adaptability are the plus marks of these skid units. The mode allows higher transportation speeds between jobs or between supply refills and allows the trucks to be easily converted to non-spraying uses. Gallonages from 150 to 400 gallon and pumping systems include diaphragm, piston, centrifugal and roller. Unit capacities from 5 to 1000 gallons.

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that application prior to initial weed seed germination is critical. Once the seedling weed has pushed through the soil surface, a Dacthal application will not be effective, although such an application will control weeds that have not yet germinated. If



there is not sufficient rain to move the product into the zone of weed seed germination within several days of application, irrigation should be used.

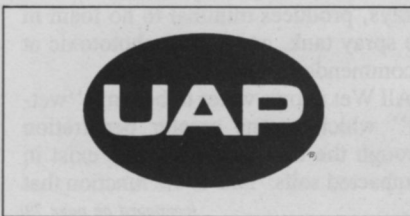
Write 128 on reader card

Rockland Chemical Company offers several formulations of popular turf herbicides. Professional Super Dacthal 686 is a 6.86 percent Dacthal-coated corn cob granular product. A 35-pound bag treats 10,000 square feet. Professional Crabgrass Preventer with Dacthal is a 4.8 percent Dacthal-coated corn cob granular for preemergent control of crabgrass and other annual weeds and grasses in established turf and ornamental plantings. A 25-pound bag treats 5,000 square feet.

Balan 25 Plus Turf Food 38-0-3 is a combination crabgrass control and fertilizer. Professional Super Tupersan is a 7.66 percent Tupersan-coated corn cob granular for preemergent control of certain annual weeds and crabgrass. Professional Crabgrass Preventer with Tupersan is a 4.57 percent Tupersan-coated corn cob granular which is an effective preemergent control for crabgrass and other annual weeds.

Write 129 on reader card

UAP Special Products offers formulations of Betasan, Mec Amine, and Dacthal 75 percent under their "Clean Crop" line of products. Clean Crop Betasan controls 10 major annual turf weeds, including, annual bluegrass, barnyardgrass, henbit, fall panicum, goosegrass, hairy crabgrass, lambsquarters, redroot pigweed, shepherdspurge, and smooth crabgrass. The product can be used safely on the following turf species: bahiagrass, bentgrasses, perennial bluegrasses, Bermudagrass, centipedegrass, fescues, Pensacola bahia, perennial ryegrass, *Poa trivialis*, St.



Augustinegrass, red top, and zoysiagrass.

A single application of Clean Crop Betasan at 7-1/2 to 10 pounds of active ingredient per acre usually gives season-long control of crabgrass, according to the manufacturer. A total of 25 pounds of active ingredient per acre per season can be applied without damage. The product is available as a 4-pound emulsifiable liquid and 3.6, 7, or 12.5 percent granular formulation.

Clean Crop Mec Amine provides fast control of more than 30 broadleaf weeds. The combination of 2,4-D amine, MCP (mecoprop), and Banvel® (dicamba) provides faster control than individual applications of the same herbicides at higher rates. This product works best when temperatures encourage weed growth, but it should not be applied at temperatures above 85 degrees Fahrenheit. Mec Amine controls bedstraw, black medic, buckhorn, burdock, chicory, chickweed, clover, dandelion, dock, ground ivy, heal-all, henbit, knotweed, lambsquarters, lespedeza, mallow, morning glory, peppergrass, pigweed, plantain, poison ivy, poison oak, purslane, ragweed, sheep sorrel, shepherdspurge, speedwell, spurge, wild carrot, wild garlic, wild lettuce, wild onion, and yarrow.

Clean Crop Dacthal 75 percent WDG gives the ultimate in preemergent control of annual weeds, according to the manufacturer. This product controls 23 major grasses and broadleaf weeds. Repeated use, even on thin or thatchy turf will not result in root injury or thinning of bluegrass. This formulation is dust-free and disperses easily into solution with no premixing. WDG does not require heated storage and there are no problems with a liquid that will settle-out.

Write 130 on reader card

Stauffer Chemical Company manufactures Betasan 2.9-E, 4-E, 3.6-G, 7-G, and 12.5-G. Betasan formulations control crabgrass, *Poa annua*, and other weeds in turf with greater safety to grass varieties than any other selective herbicide, according to the manufacturer. Betasan 2.9-E contains 34.8 percent bensulide and contains 2.9 pounds of active ingredient per gallon. Betasan 4-E contains 46 percent bensulide and 4 pounds of this active ingredient per gallon. Betasan 3.6-G contains 3.6 percent bensulide and 3.6 pounds of this active ingredient per 100 pounds.

Write 131 on reader card

Although still under EPA experimental use permit restrictions, Acclaim! 1EC herbicide from **American Hoechst Corporation** is an emulsifiable concentrate formulation containing 1 pound of active ingredient per gallon. This herbicide is

used for postemergence control of annual and perennial grassy weeds in several established turfgrass species.

This product does not control broadleaf weeds or sedges. Since Acclaim! is absorbed primarily through the foliage, thorough coverage is necessary. Visual injury of the grassy weed is evident approximately four to 10 days after application (dependent upon environmental conditions), but control of the grassy weeds will take 12 to 21 days.

Visible effects begin as a general chlorosis (yellowing) and reddening of the leaf surface followed by death of the weed. Acclaim! only controls grasses which are emerged at the time of spraying. Young actively growing grassy weeds are more easily controlled than the larger grassy weeds. For optimum activity, spray this product when maximum leaf area is present.

Do not mow treated areas for at least 48 hours to allow time for penetration and translocation into the grassy weeds. The effectiveness of Acclaim! is reduced when grass clippings interfere with thorough spray coverage of the target weeds.

Write 132 on reader card

INSECTICIDES

Problem insect populations and how to control them are discussed in a series of new brochures from **Mobay Chemical Corporation**. One full-color brochure explains the development of Oftanol® and Mobay's ongoing product research. It



also gives detailed instructions on how to apply liquid and granular Oftanol for optimum preventative and/or curative control of grubs, mole crickets, sod webworm larvae, chinch bugs, billbug larvae, flea beetles, and *Hyperodes* weevil.

Another Mobay brochure explains the problem of nematodes and how to control them by using new Nematicur® 3 turf nematicide and Nematicur 10 percent turf and ornamental nematicide. The brochure also describes what nematodes are, and how and where they damage turf. Close-up photos of nematode damage help the reader to identify nematode injury.

The problem of aphids and mites and

how to control them by using Metasystox-R2 ornamental insecticide is discussed in a third new brochure from Mobay. The brochure describes what aphids are, what damage they cause, and what other pests prey on trees. Recommended rates and application procedures for use as a soil injection, foliar spray, and soil drench also are outlined.

Write 133 on reader card

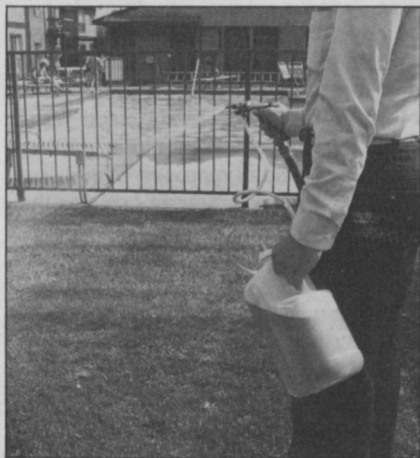
LESCO, Inc. 24-4-12 with 1.5 percent Oftanol has received federal EPA approval and is now being distributed by LESCO, Inc. Application of this product eliminates many common insects while providing a safe, long-lasting, slow-release fertilization. The product is also available in LESCO 24-4-8 Plus 1.5 percent Oftanol with iron and manganese for southern turfgrasses and other formulations.

A straight control product, LESCO 1.5 percent Granular Oftanol, is also available. LESCO Fertilizer Plus Oftanol is labeled for grub larvae (such as Japanese beetle) and hyperodes weevil. It is designed for use by commercial applicators on commercial and residential turf.

Write 134 on reader card

Dichloron® L.O. low odor insecticide provides complete contact and residual pest control in parks, recreational areas, and other outdoor areas where insects create a nuisance or possible health problems. **National Chemsearch**, an international specialty maintenance company, developed this product to kill ants, chiggers, ticks, fleas, clovermites, and other insects with an effectiveness that lasts up to three times as long as other insecticides. Powerful, new-generation Dursban helps Dichloron L.O. protect against pests for up to three months where treatment is unaffected by traffic or water washing.

This product is less toxic than other insecticides containing the same amount of diazinon or Baygon®, according to the manufacturer. Because it has no linger-



ing insecticide odor, treated areas can be reentered immediately.

Write 135 on reader card

Dymet®, a versatile insecticide for turf and ornamentals, comes to us from **Mallinckrodt, Inc.** This combination of methoxychlor and diazinon is proving useful for controlling a wide range of insects. Among the advantages is the probability of less resistance in populations as frequently encountered with single active ingredient products.

On turf, apply 1-1/2 to 3 fluid ounces in 5 gallons of water per 1,000 square feet for control of bluegrass billbugs, southern chinchbug, hairy chinchbug, sod webworm, and black and dingy cutworms. Apply 6 to 12 fluid ounces in 5 gallons of water per 1,000 square feet for control of white grubs and crane fly larvae. Irrigate to insure penetration of sod. Spray thoroughly to runoff. Begin applications when insects first appear and repeat at 7 to 14 day intervals, as needed.

Write 136 on reader card

Union Carbide Agricultural Products Company, Inc. offers three formulations of its popular Sevin® brand carbaryl insecticide. The Sevin formulations control over 545 different insect pests. They are registered on over 120 sites, including most agricultural crops, fruit, nut, and shade trees, turf, garden vegetables, and ornamental flowers and shrubs. Sevin is biodegradable and leaves virtually no odor. The products are an effective control of most turf pests by contact and ingestion.

Sevin brand SL is a convenient, easy-to-handle flowable insecticide recommended for control of over 100 turf, tree, and shrub pests. A water-based formulation insures easy dispersion, even when tank-mixed with other insecticides, fungicides, and fertilizers. SL is non-corrosive and compatible with virtually all types of application equipment.

Sevin brand 50W wettable powder is recommended for use with conventional spray equipment. It's available in 5-pound bags, packaged 10 per case. Sevin brand 80S is a microfine 80 percent sprayable powder that readily disperses in water for liquid application by pressure sprayers, mist blowers, and low gallonage ground equipment. This product is available in 10-pound bags purchased five per case, and in 50-pound containers.

Write 137 on reader card

WETTING AGENTS

The Pratt-Gabriel Division of the **Miller Chemical and Fertilizer Corporation** offers an extender-sticker-spreader called Nu-Film-17®. This product is a

superior sticking-extending spray adjuvant to control the life of pesticide chemicals. The product increases spray deposit, which means more pesticide is actually deposited on the spray target. It protects spray residues from loss due to any amount of rain, wind, dew, irrigation, etc. It also prolongs the effective life of spray residues by shielding them from heat and ultra-violet radiation which are important causes of pesticide degradation.

Also from Miller, Nu-Film-P® is a sticker-spreader designed to induce better weed kill with hormone herbicides. This product provides controlled uptake of hormones into plant tissue for maximum effectiveness. Nu-Film-P is a superior sticking agent for most pesticide sprays, but does not have the extender properties of Nu-Film-17. It is excellent with broadleaf herbicide applications to lawns and other turfgrasses and with the low recommended rates of Round-Up®.

Write 138 on reader card

Aqua-Gro® soil wetting agent from **Aquatrols Corporation of America** moves water by lowering its natural tensions, ensuring more uniform water penetration and drainage through all soils, thatch, and growing media. Aqua-Gro gets to the root of your water-related problems!

Write 139 on reader card

Frigate® agricultural adjuvant from **SDS Biotech** contains 6.6 pounds per gallon of fatty amine ethoxylate. Frigate is recommended for use with Round-Up (glyphosate) when the use of a nonionic surfactant is recommended on the Round-Up label. Frigate is recommended for use with Round-Up to improve wetting of foliage, enhance uptake of glyphosate, and permit Round-Up to provide more consistent control of quackgrass and johnsongrass.

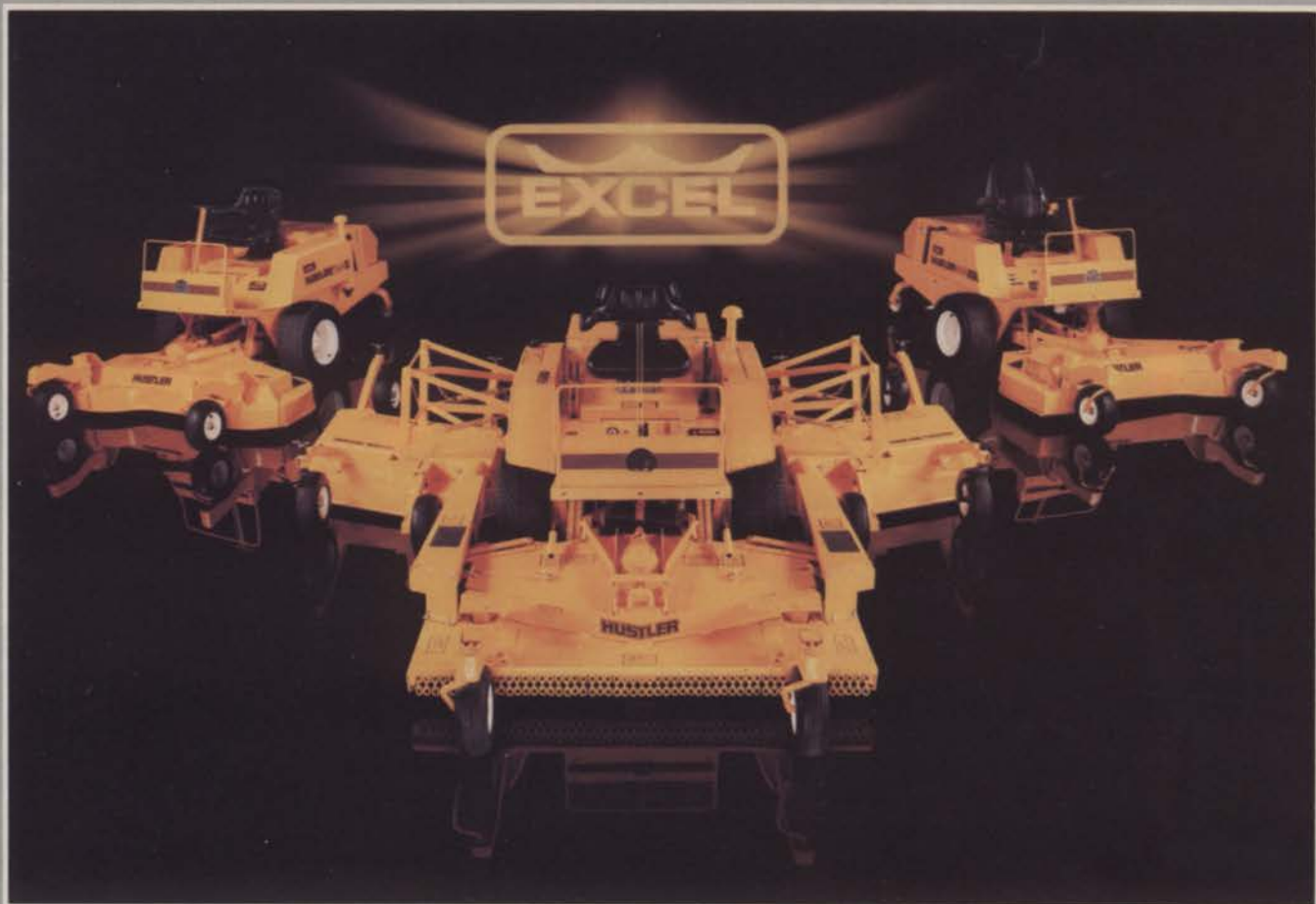
Use of Frigate with Round-Up will also enhance Round-Up's control of annual weeds in non-crop uses, such as turf applications.

Write 140 on reader card

Super Wet® and All Wet® are both nonionic wetting agents from **W.A. Cleary Chemical Corporation**. Super Wet penetrates thatched and compacted areas which enhances water, fertilizer, or pesticide spray efficiency. The product also acts as an activator to enhance the permeability of pesticide and fertilizer sprays, produces minimal to no foam in the spray tank, and is non-phototoxic at recommended rates.

All Wet allows water to become "wetter" which means greater penetration through the fine capillaries that exist in compacted soils. This is the function that

(continued on page 79)



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They're the new generation of self-propelled rotary mowers from Excel and they've established quite a track record in the short year they've been performing. The competition, quite simply is no competition. The rugged, new diesel-powered HUSTLER 320 and 340 as well as the powerful new 400, with its gasoline engine, offer top power and better value. They're a smarter investment too, because they work day in and day out in heavy usage.

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And, all three of the new generation HUSTLERS have the famous HUSTLER dual-hydrostatic pumps, direct drive wheel motors and twin-lever steering that give them true zero-degree radius turning. Total control of speed, forward, reverse, turning and braking, are all in the palm of one hand. Visit your HUSTLER distributor today and find out just how well the new generation could perform for you.

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and downey mildew their just
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SUBDUE

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PHOSPHATE: FROM THE MINE TO YOUR LAWN

Most lawn chemicals are mined from the earth, but most lawn care professionals probably have no idea how chemicals like phosphate get from the ground to the bags they purchase.

Have you ever wondered where lawn fertilizer components, such as phosphate, originate? You may have assumed that they are mined from the earth like coal, but you probably have no idea what the actual mining and refining process entails. During the recent Professional Lawn Care Association of America conference in Tampa, Florida, *American Lawn Applicator* visited nearby phosphate production facilities in central Florida. After touring the phosphate complex, we gained a new appreciation for the technology which brings us the lawn care phosphate we take for granted.

The phosphate mine, which began operation in 1978, produces approximately 1 million tons of phosphate rock each year. The company we visited entered its phosphate mining venture with the purchase of 20,000 acres of pastureland in central Florida. Prospecting and sample drilling on the reserves revealed the presence of an estimated 100 million tons of recoverable phosphate rock. The rich



The view from the top of the cab of the giant dragline in Hardee County, Florida.

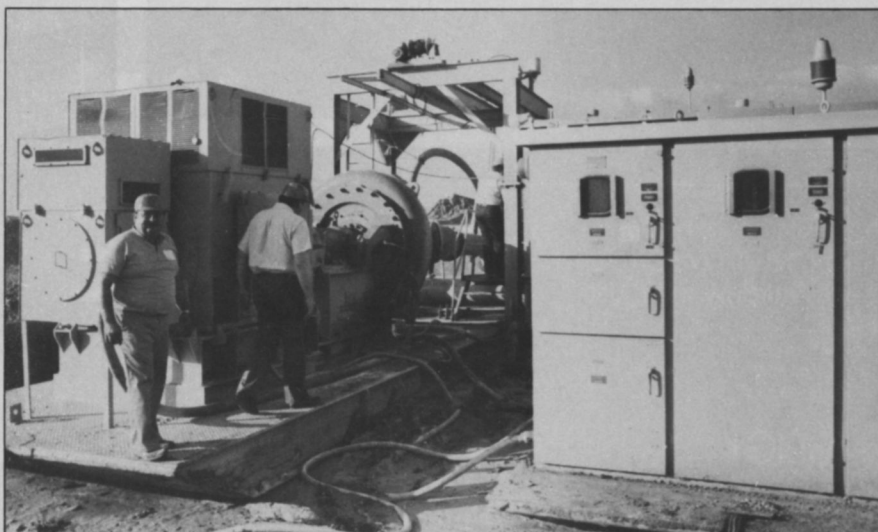
beds of phosphate ore found there were formed when mineral phosphorous settled with sand, clay, and bones from sea animals on the ocean floor 15 million years ago.

Phosphate rock is mined by giant draglines, which lift more than 30 tons of earth in a single carry. Using detailed geological maps which reveal where and how deep the ore beds lie, the dragline operator first removes the surface layer of "overburden" and digs into the "matrix" containing phosphate rock. Typically, the matrix is made up of phosphate rock, mixed with sand and clay.

To prepare the rock for chemical processing, these impurities must be removed. At the mine site, matrix is dumped into collecting wells where high-powered water jets pound the ore into a fluid slurry. The slurry is then pipelined to the beneficiation plant for processing. At the beneficiation plant, incoming slurry is washed and screened repeatedly and run through a floatation process in order to separate the two types of phosphate rock; the larger pebble rock and smaller phosphate concentrate; and to remove sand and clay.

Although the beneficiation process is simple in principle, it takes 9 million tons of overburden and matrix to produce 1 million tons of phosphate rock. Phosphate is shipped north by rail to another refining plant. This phosphate plant is able to turn raw phosphate rock into 1.6 million tons of finished fertilizer products each year. Sulfuric acid produced from elemental sulfur is chemically reacted with the rock to form phosphoric acid.

The combined annual phosphate production capacity of this plant and a sister facility exceeds 3.1 million tons. -- *Tim Weidner* ■



The pumping station which powers the water jets used to make the phosphate ore into a slurry.

The author is Managing Editor of ALA magazine.



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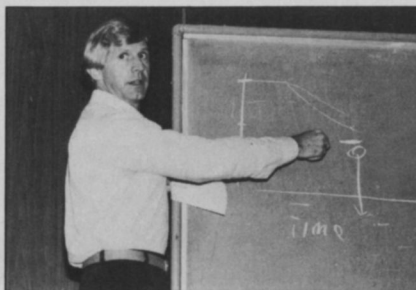
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OHIO SHOW REVIEW

The Ohio Turfgrass Foundation sponsored another successful conference and show, once again breaking previous attendance records.

They did it again! For the third year in a row, the Ohio Turfgrass Conference and Show has managed to break its past attendance record. About 2,620 total registrants turned up at the Convention-Exposition Center in Cincinnati, Ohio, Dec. 2-5, while 160 exhibitors manned 318 booth spaces. "It's the most we've ever sold," says Dr. John Street, Executive Secretary of the Ohio Turfgrass Foundation and Professor of Agronomy at Ohio State University. "Our conference is becoming more and more popular, and as a result, we have more people wanting to exhibit. We seem to be gathering a tremendous amount of interest from states other than Ohio."

Street says the turf show's yearly ex-



Dr. Roger Funk, Davey Tree Expert Company.

pansion can be linked to the lawn care industry's growth, and an attempt to appeal to a wide range of professionals. The recent conference was expanded an extra day and, as it has in past years, included

educational seminars in three categories: golf course, professional lawn service, and grounds and maintenance. "We also had a 1-1/2 day irrigation workshop, which proved extremely popular," says Street. "We haven't had much on irrigation for quite a few years, but we'll probably look toward covering that area more in the future."

Conference organizers can also chalk one up for a trade show big on quality. "Everybody we visited with said they were really pleased," says Street. "They thought the educational seminars and speakers were super, and our general feeling from the exhibitors was that the traffic was excellent."

(continued on page 70)



A view of the trade show floor.



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OHIO SHOW

(continued from page 68)

The upcoming Ohio Turf Show is slated for December in Columbus, Ohio. Although the event has traditionally been hosted either there, or in Cincinnati, there remains the possibility that it might run elsewhere in future years. "Toledo has requested some of their people to visit with us about that," Street says.

Attendees at the last conference were able to choose from a wide selection of lawn care seminars, including the "Turfgrass Insecticide Update" by Dr. Harry Niemczyk of Ohio State University. "Some (unknown) things happen to insecticides when they move through the soil to reach their target; something beyond just simple binding to the thatch," Niemczyk told his workshop audience.

Niemczyk says "resistance" is the least likely possible answer, but that rainfall and irrigation are both important factors influencing effectiveness. The object is to get the pesticide to the grub as fast as possible, he says. Changes occurring in the thatch may also be significant because the greatest concentration of microbes appear there. "Some organisms do have a bearing on the longevity of the material in this zone," says Niemczyk. He added that during application, it's necessary to distribute the proper amount of material onto the area. In some situations, granular doesn't provide as good control as liquid.

Soil type, timing, and treatment history are also influential matters. "However, in regard to pesticides, don't expect 100 percent with anything," Niemczyk says. "I hope you never get it, because we'd be creating some deserts out there. If your insecticide doesn't work, consider another, but don't turn your back on the grubs; watch them, monitor them. It's also possible to re-treat in late July or August when the grubs are there."



Jim Betts



The Ohio Turfgrass Foundation Board of Directors.

Jim Betts, Executive Director of Ohio Pesticide Applicators for Responsible Regulation (OPARR), spoke on current regulation in a workshop titled "Legislative Acts Affecting Pesticide Use in Ohio." During the seminar, Betts cited examples of municipalities that have considered or adopted ordinances which impose mandates on lawn care application. In Lakewood, Ohio, council members voted 6-0 in favor of such legislation. In addition, the Ohio Department of Agriculture recently distributed a discussion paper that proposed every licensed lawn application be followed by adequate notification.

"Frankly, our industry is under attack by a small number of emotionally motivated individuals who are anti-pesticide environmentalists," says Betts. "They want to bring our industry to the point where we can't function because our customers can't get the benefit from our products."

However, OPARR has been busy attempting to protect the lawn care industry and has recently tried to appeal Lakewood's decision to the attorney general, he says.

Betts encourages all lawn care

operators to lobby their state legislators. "A lot of people feel the word *lobbyist* has a bad connotation. Yet everyone should assume that role. It's got to be an integral part of what you do and think about on a daily basis."

Another trouble spot, liability insurance, was the focus of a session led by Jim Brooks, Executive Vice President of PLCAA. Brooks says the situation doesn't concern only the green industry. "It's really a growing problem for all of us in American business."

Brooks pointed out that "mismanagement" by insurance companies, which are now trying to eliminate large underwriting losses, is partially at fault for skyrocketing rates. Another part of the problem involves the judicial system, he says. "The courts have taken a very liberal position on liability claims, particularly in areas of chemical use, pollution, and product liability. They've taken a deep pocket philosophy. Unless we get some reform, this will continue to be a long-term problem. We're heading down a very dangerous road in terms of insurance."

American business has also helped bring on the problem with abuses such as turning in claims that should have been absorbed by the company, and taking "too low" deductibles, says Brooks.

He added that in seeking a policy, an operator should be certain the agent has a complete listing of the chemicals his firm handles.

Brooks also advocates conducting a thorough risk assessment. "This should be high on your priority list," he says. "Make your employees aware of the insurance problem. They're part of the team and should continue to do everything to minimize risks and accidents."

Communicating concerns to state and federal legislators is also important, says Brooks. "As an industry, we must get more involved, in the political process."

— Julie November



Dr. Harry Niemczyk

The author is Assistant Editor of ALA magazine.

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PRODUCTS

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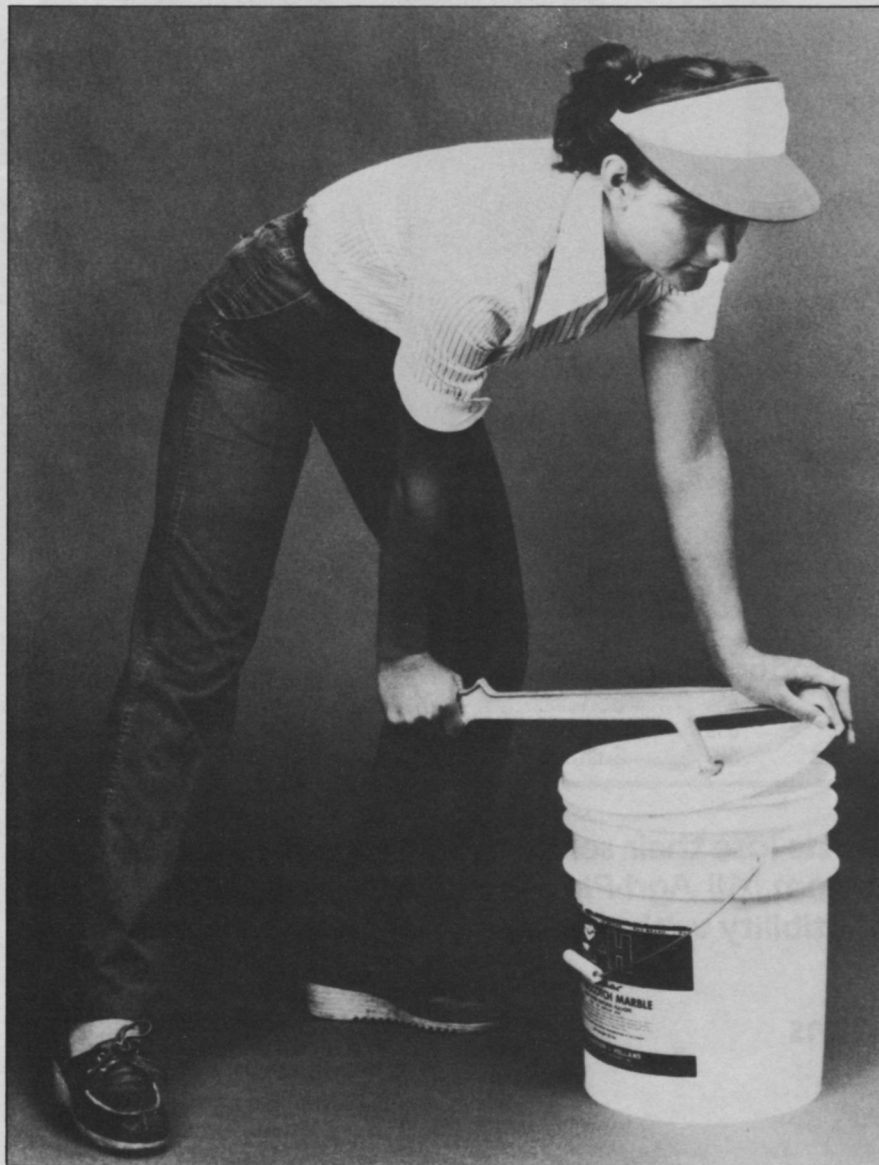
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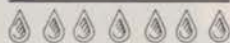
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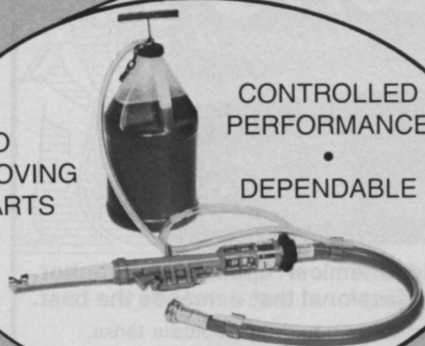
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LAWN CARE CHEMICALS

(continued from page 37)

growing grass ends up being more susceptible to certain diseases is the fact that the leaves you are looking at are aging. You're asking the existing plant to last longer than you normally ask it to last, because you've slowed down the regeneration of new tissues." However, Kaufmann believes the development of a special agent to protect the plant from aging is a long way off.

Extension Turf Agronomist J.R. Hall, III, of VPI, would like to see the development of plant growth regulators with a wider window of application. "Most of the plant growth regulators are pretty specific right now. You need to get them down within a 30-day window at the most. And that really tightens up a company trying to get everything treated in 30 days," he says. "So we need growth inhibitors that have a little more forgiveness with regard to time of application."

In addition, he says, "We need growth inhibitors that have a very broad spectrum. There isn't a lawn in the United States that's a monoculture. You're go-

ing to find something in some part of that lawn that's not the same as the rest of the plant."

Despite any improvements that are made in plant growth regulators, Ronald Webb of Liqui-Chem Lawn Care doubts the chemistry will ever have a major niche in the lawn care industry. "I think industry is out to promote the health and vigor of lawns rather than to decrease the maintenance of them as far as chemical lawn care goes. If you use the growth regulators, occasionally you can retard the plant's ability to come back from stress such as drought, insect disease, and injury," he says. "Most homeowners are wanting the prettiest lawn that they can have. If you decrease the growth and the plant's ability to return from stress, then the lawn's never going to be as pretty as it would be otherwise."

For now, the person who wants a high quality lawn will probably continue to mow his own turf, because the slight discoloration that may occur in spring will not be acceptable. However, Kaufmann believes there is a niche for plant growth regulators that turf professionals can profit from right now. "For homeowners that have a slope in the backyard that's always

been tough to mow, or a lot of trees to trim around, I think they're going to find these growth regulators very attractive."

CONCLUSION. The last decade proved that the lawn service industry is an area of tremendous potential for the use of turfgrass pesticides, capturing the interest of many chemical manufacturers. It also illustrated the impact environmental concern has had on the evolution of turf chemicals. Several industry compounds have fallen by the wayside, necessitating the development of new products. And although the majority of funds and research are directed toward chemical control, emphasis has increased on the development of biological controls.

Lawn care professionals and research specialists are hopeful that the industry will continue to plow new ground in chemical research. Although well stocked with a varied selection of fertilizers, herbicides, insecticides, and fungicides, it's doubtful there will ever be *too many* good products in their chemical arsenal.

— Vivian Rose

The author is Assistant Editor of ALA magazine.

CONTRIBUTING TECHNICAL AUTHORS

T. Abernethy, Ohio State University
James Beard, Texas A&M University
Prasanta C. Bhowmik, University of Mass.
Don Blasingame, Mississippi State University
Jacqueline Boucher, Ohio State University
Bruce Branham, Michigan State University
Cynthia L. Brown, Tru-Green Corporation
Edward A. Brown, University of Georgia
Stephen Brown, New England Green, Inc.
Nick E. Christians, Iowa State University
Patricia P. Cobb, Auburn University
H.L. Cromroy, University of Florida
Karl Danneberger, Michigan State University
Peter H. Dernoeden, University of Maryland
Glenn Dudderar, Michigan State University
Gary A. Dunn, Michigan State University
John H. Dunn, University of Missouri
Thomas W. Fermanian, University of Illinois
Melissa Craven Fowler, Cornell University
Ray Freeborg, Purdue University
T.E. Freeman, University of Florida
Stephen G. Fushtey, Agriculture Canada
Robert Green, Oklahoma State University
Austin Hagan, Auburn University
Jean E. Haley, University of Illinois
John R. Hall, Virginia Polytechnic Inst.
Marc C. Hirrel, University of Illinois
Clinton F. Hodges, Iowa State University
Neal Howell, Iron Man Fertilizer Specialties
Richard J. Hull, University of Rhode Island
Norman W. Hummel, Jr., Cornell University
Noel Jackson, University of Rhode Island
John A. Jagschitz, University of Rhode Island
B.J. Johnson, University of Georgia
Keith Karnok, University of Georgia
John E. Kaufmann, Monsanto Ag Company
Keith Kennedy, ChemLawn Corporation
James E. King, Purdue University
E.L. Knake, University of Illinois
K.N. Komblas, Louisiana State University
Lauren S. Lanphear, Forest City Tree Protection
Phillip Larsen, Ohio State University

Leon T. Lucas, North Carolina State University
Eugene W. Mayer, O.M. Scott and Sons
M.T. McElroy, Michigan State University
M.D. McGlamery, University of Illinois
Michael C. McKee, New England Green, Inc.
Landon C. Miller, Clemson University
William Mitchell, University of Delaware
James Nau, Ball Seed Company
Harry D. Niemczyk, Ohio State University
A.D. Oliver, Louisiana State University
Robert E. Partyka, Chemscape
Sandra Perry, Tru Green Corporation
A. Martin Petrovic, Cornell University
Daniel Potter, University of Kentucky
C.C. Powell, Ohio State University
Richard C. Rathjens, Davey Tree Expert Co.
Paul E. Rieke, Michigan State University
David Roberts, Michigan State University
Eliot C. Roberts, The Lawn Institute
W.H. Robinson, Virginia Polytech Inst.
Patricia L. Sanders, Penn State University
Wayne Scheppele, Deere and Company
E. (Dick) Schmidt, Virginia Polytech Inst.
Mark Sears, University of Guelph
R.C. Shearman, University of Nebraska
D.E. Short, University of Florida
John F. Shoulders, Virginia Polytech Inst.
Malcolm Shurtluff, University of Illinois
C.R. Skogley, University of Rhode Island
Richard Smiley, Cornell University
Elton M. Smith, Ohio State University
Jana S. Stewart, University of Wisconsin
Tom Storey, Ohio State University
John R. Street, Ohio State University
Herbert T. Streu, Rutgers University
Mike Tolley, Ohio State University
W.A. Torello, University of Massachusetts
J.R. Vaccaro, Dow Chemical Company
Joseph M. Vargas, Michigan State University
Patricia Vittum, University of Massachusetts
T.L. Watschke, Penn State University
Gayle L. Worf, University of Wisconsin

Richard J.W. Foster
Publisher

Maureen Mertz
Associate Publisher

Tim Weidner
Managing Editor

Vivian Rose
Julle November
Assistant Editors

Charlotte Goerss
Art Director

Fran Franzak
Reader Service

Amy Sheldon
Circulation Manager

ALA
4012 Bridge Avenue
Cleveland, Ohio 44113
216/961-4130
Editorial Office

Maureen Mertz—Sales Manager
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RINSE WATER DISPOSAL

(continued from page 39)

tain structural integrity and minimize the potential for leaks. For the present, coated metal tanks offer the best alternative.

While the size of the liquid storage volume and soil evaporative surface vary depending on the climate and the volume of waste to be treated, a typical tank would contain a 1-meter (3-foot) deep liquid storage chamber with a 30-centimeter (12-inch) deep layer of carefully selected soil suspended above it on a perforated floor. A sump pump would be used to apply daily doses of the accumulated liquid to the soil surface via a surface distribution system.

Rectangular tanks could conveniently be made from 4 by 8 foot sheets of plate metal in units which are 4 by 8, 8 by 8, 12 by 8, 16 by 8 foot or larger if necessary. They will need to be supported at least 20 centimeters (8 inches) above the ground to facilitate visual inspection for leaks and to eliminate the need for groundwater monitoring wells and associated sampling and analyses. This could be done by constructing the tanks on skids and placing them on blocks.

While moveable covers would be ideal, a more practical solution would be to use a stationary fiberglass roof, which would allow radiation to evaporate the water but eliminate precipitation. With proper construction and maintenance, a soil digester as described above should be useful for several decades. If the experience in Iowa is borne out, the soil will be sufficiently decontaminated in perhaps one or two years after the system is taken out of operation. Then the soil could be disposed of by spreading it on an adjacent field. If it must be treated as a hazardous material, its volume will be much smaller than that of the pesticides that were disposed of.

While there is obviously still more to be learned, it appears that aboveground soil disposal beds may provide an environmentally safe and economical means of pesticide solution, rinse, and wash water disposal. The author is presently constructing several systems as described here for further testing. — *K.W. Brown*

The author is employed at the Texas Agricultural Experiment Station, Texas A&M University, Soil and Crop Sciences Department, College Station, Texas.

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(continued from page 62)

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Although this special chemical products section contains many products currently available to the lawn care industry, it is by no means an all-inclusive listing of available products. Space limitations restrict us from attempting to list descriptions of all current lawn care chemicals.

We hope, however, that this listing has perhaps assisted you in your chemical buying decisions. Each year we attempt to bring you some of the latest lawn care chemical products that we have gleaned from various trade shows around the country.

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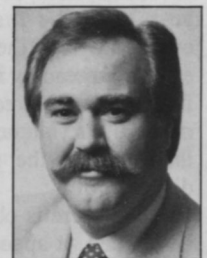
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Tanks are available in stainless or mild steel with the option of a single or multiple compartmented spray unit. All tanks are baffled and double welded to guard against cracking.

SPECIAL BEDS:

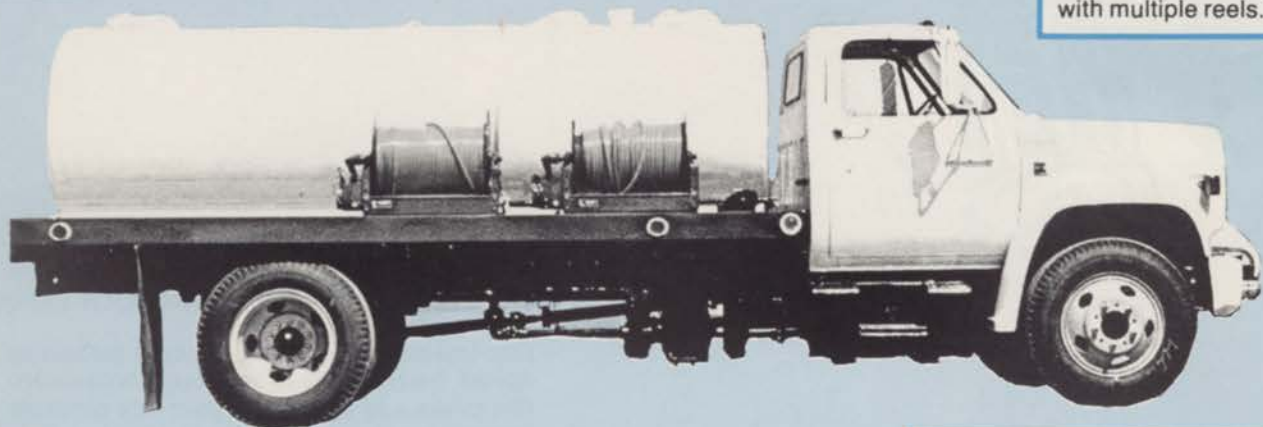
Specially treated wooden beds assure long life. Our bed rails are fully enclosed channel to minimize rust and corrosion.

REMOTE THROTTLE:

A remote throttle control and tachometer allow the applicator to set his pressure and volume accurately and conveniently.

HOSE REELS:

Heavy duty electric hose reels complete with 300 foot of hose allow for easy unrolling and winding. Standard units are equipped with single reels; however, units may be built with multiple reels.



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You no longer need to haul bags of dry material. The rear compartment may be equipped to haul bulk granular products. A handy hopper is located in back to allow your applicators to fill their spreaders with one pull of a lever. Now you can spread and spray at the same time with your dry material protected.

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HIGH VOLUME PUMP:

Our dual stage centrifugal pump, is durable, requiring little maintenance. It is capable of pumping and suspending granulated materials such as IBDU® or powders. However; this system is so versatile that high pressure pumps may be added for tree work or units may be equipped to spray both trees and lawns from separate compartments and hose reels.

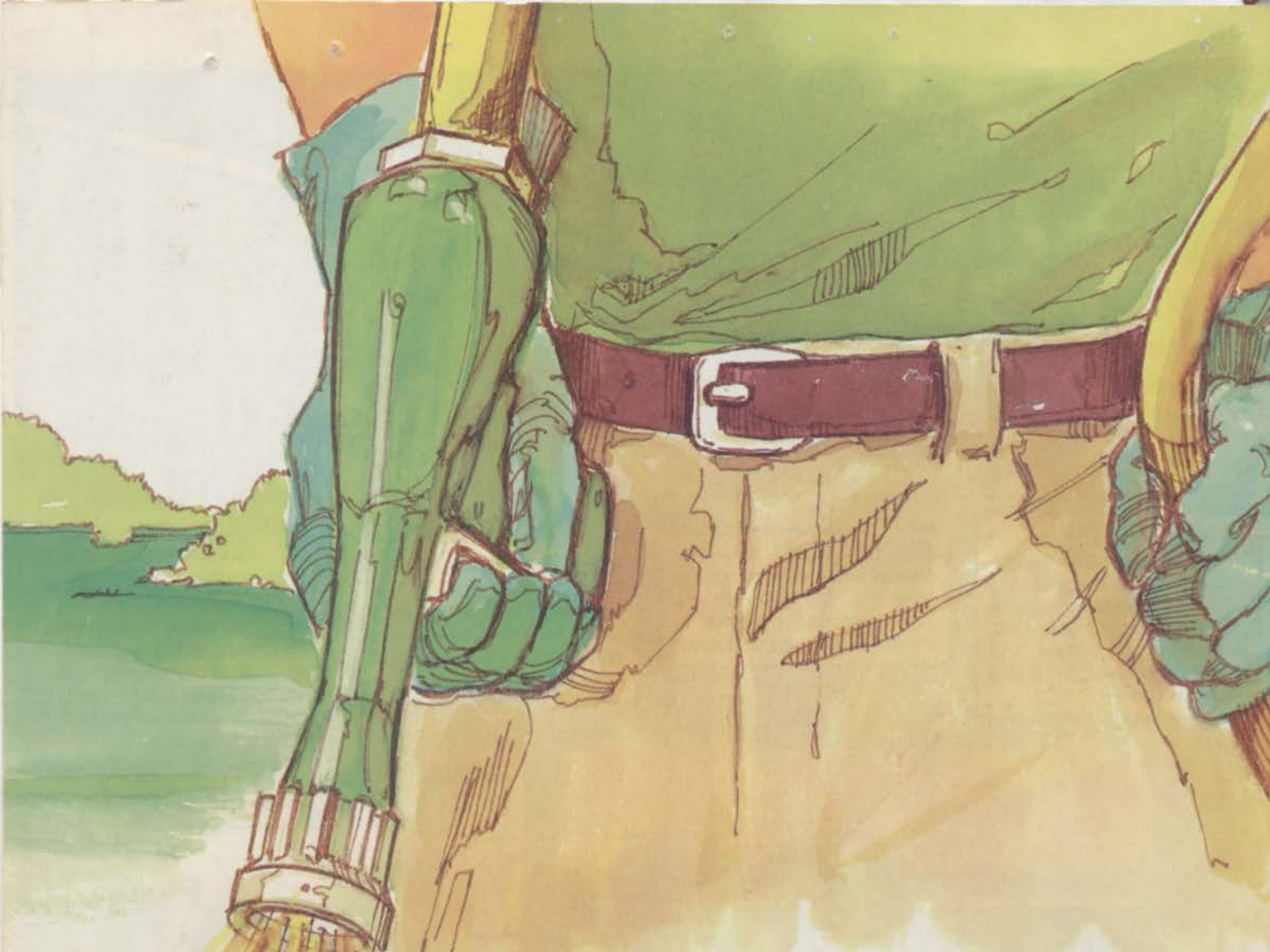
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