

ALA

TURF RESEARCH IN THE '80s

TURFSEED MARKET REPORT



TECHNICAL FEATURES:
PTO VS. AUXILIARY:
A PUMP DRIVE UNIT COMPARISON
PROPER PESTICIDE APPLICATION TIPS
PLANT GROWTH REGULATOR
EFFICACY ON UTILITY TURFS



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Here's how: one-shot Roundup controls over 100 weeds right down to the roots, including poison ivy, poison oak and kudzu. One gallon of 2% spray solution can treat up to 30 tree rings for about a nickel each, or 1,000 feet of fenceline for less than \$2.00*.

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*Protected by U.S. Patent No. 3,726,338

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EPA EST. NO. 45639-MI-1

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ALA

JULY 1984
VOLUME 5 NUMBER 5

THE COVER

Turf research has been an ongoing endeavor for about 50 years now. In this month's cover story we take a look at how the nature of turf research is changing — for better or worse!

CALENDAR

July 23-25

International Lawn and Garden Power Equipment Expo, Kentucky Fair and Exposition Center, Louisville, KY Contact: Judy Wegenast, P.O. Box 37130, Louisville, KY 40233; 502/366-9592.

July 24-26

National Fertilizer Solutions Association 1984 Round-Up, Chicago, IL. Contact: Dennis Brown, NFSA, 8823 North Industrial Road, Peoria, IL 61615; 309/691-2870.

August 15-16

Penn State Field Days, Joseph Valentine Memorial Turfgrass Research Center, University Park, PA. Contact: Dr. Joseph M. Duich, Department of Agronomy, 21 Tyson Building, University Park, PA 16802, 814/865-9853.

Sept. 11

Ohio Turfgrass Field Day, Ohio State University Turfgrass Field Plots. Contact: Karl Danneberger, Department of Agronomy, Ohio State University, Columbus, OH 43210, 614/422-2001.

Sept. 18-20

Virginia Turfgrass Research Field Days, Virginia Tech, Blacksburg, VA. Contact: J.R. Hall, III, Agronomy Dept., Virginia Tech, Blacksburg, VA 24061, 703/961-5797.

Sept. 30-Oct. 3

Florida Turfgrass Association 32nd Annual Conference and Show, Hyatt Regency Hotel and Curtis Hixon Convention Center, Tampa, FL. Contact: FT-GA Executive Office, 302 S. Graham Avenue, Orlando, FL 32803, 305/898-6721.

Sept. 30-Oct. 3

Society of Municipal Arborists 20th Annual Meeting and Trade Show, Sheraton Gardens Hotel, Freehold, NJ. Contact: Dave Shaw, local

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Turf Research in the 80 s

All turf research does not take the same route to a common goal.

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Turfseed Market Report

For some varieties, the supply will not meet the demand in 1985!

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This article may change the way you power your pumps.

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Proper Pesticide Application Tips

Lloyd Hahn helps us bone up on some of the basics we may have forgotten.

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Effects of Edging Herbicide Treatments

Herbicides are a popular edging tool, but some are more effective than others.

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Plant Growth Regulator Efficacy on Utility Turfs

PGRs can save mowing expense, but there are a lot of questions to be answered.

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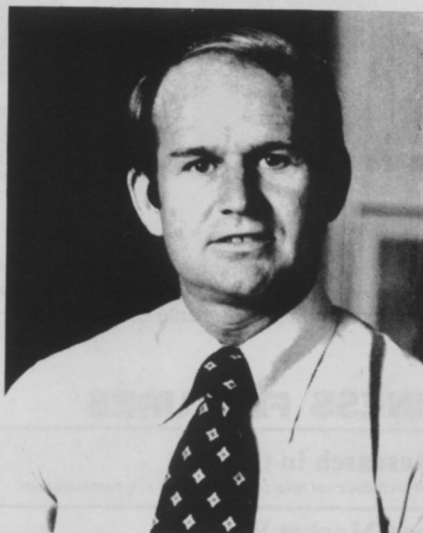
ALA PUBLISHER'S FEEDBACK

Our lawn care/maintenance industry is loaded with young, ambitious, imaginative "doers" — people who are not afraid to make decisions or take risks. Ninety percent of our readers fit this aggressive entrepreneurial mold, and as a general rule, they have built their businesses through deep involvement in all aspects of the business — from knocking on doors and servicing routes to doing the inside paperwork and cleaning the office afterhours.

If you are one of these "self-made" businessmen, your early years of business were filled mostly with concerns for the present. Cash flow, reaction to immediate new situations and quick feedback had high priority. Survival was the key concern.

As your confidence in the company's staying power increased, your focus shifted from present to future and more detailed planning.

Unfortunately, many "self-made" men and women who build their businesses to a secure, survivable stage of life, believe they must do it all them-



selves to do it right. In doing so, they stifle the important contributions of their best people and the long-term growth potential of their businesses.

I encourage all dedicated "doers" to step back from their day-to-day business activities on a regular basis. Take stock of your personal activities and the activities of those who work for you — with an eye out for the

"eager-to-learn" — the young "doers" who work for you. Teach them. Learn from them. And as your business gets bigger, be willing to delegate to other "doers" by establishing systems for doing things that will give you an accurate reading of what's happening within your business. Develop systems of reporting that encourage pride in performance. Work at building a team, each member of which has defined responsibility for a specific phase of profits.

Only by taking this step away from "doing," can the successful lawn care entrepreneur hope to move his business from small to large.

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A Rutgers University selection, low-growing, deep green Glade has improved resistance to most races of leaf rust, stripe smut and to powdery mildew in up to 60% shade. Because of its better than average resistance to most races of Fusarium blight, Glade Kentucky bluegrass is being used as a fortifying ingredient in many professional turfgrass mixes. It blends beautifully with the new, fine-leaved ryegrasses, fescues and other elite bluegrasses.

Specify Glade for your next turfgrass mix. You'll appreciate the split personality that thrives in both sun and shade.

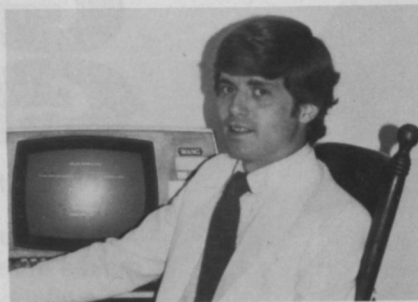


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ALA INSIDE STORY

This month's cover story takes a look at "Turf Research in the 80s." It may sound ridiculous to ask a turf researcher where he sees turf research heading because we all know it has been pursuing the same goal for 50 years — improving the quality of turfgrass. But when you look beyond the common end-goal of all turf research, you find that it may take very different routes for very different reasons to achieve improved turf.

Turf product manufacturers conduct research to improve upon turf products already in the field or to hit upon new and innovative products, but an acceptable profit margin is always the motivation for the work. Land-grant universities essentially do turf research for the public good and are remunerated for their efforts by turf organizations, government agencies and corporations. In recent years, lawn care companies have gotten into the turf research arena, in large part, because they have found a good many turf problems specific to their industry have not been addressed by the other research



disciplines. I think you will discover some aspects of turf research in this story and the accompanying sidebars that you may not have considered before.

There is some bad news of the usual kind in our "Turfseed Market Report." The turfseed harvest is nearly in and industry observers are predicting 1985 shortages and price increases for some varieties of Kentucky bluegrass. There seem to be shortages in some varieties virtually every year, but this time you can't say we didn't warn you!

Kicking off our offering of technical

articles, with "PTO vs. Auxiliary: A Pump Drive Unit Comparison," "Skip" Strong will attempt to convince you that auxiliary engines are more economical than PTO units for powering your spray rig pump. Though thoroughly convincing, Lloyd Hahn is more interested in reminding you of application basics in "Proper Pesticide Application Tips." If you are involved with landscape edging, you will want to check out "Effects of Edging Herbicide Treatments on Bermudagrass and Woody Ornamentals" by B.J. Johnson. "Plant Growth Regulator Efficacy on Utility Turfs" by M.T. McElroy, P.E. Rieke and S.L. McBurney is another look at the state of the art in PGRs.

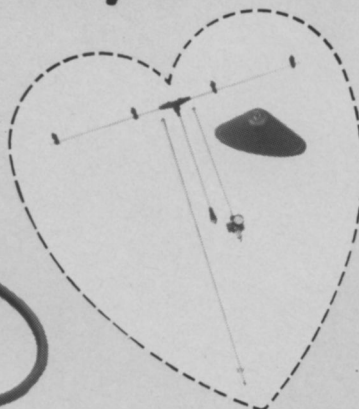
My Mistake. On page 50 of the June article "Selling Fungus Control is Difficult But Not Impossible," I mistakenly inferred that Mallinckrodt, Inc. is not actively marketing their line of fungicides to the lawn service industry. The company is indeed promoting their fungicides to this market, as evidenced by the advertisements they are currently running in this magazine. Please accept my apologies for this oversight.

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5 GAL. (20 K)
3½ GAL. (15 K)
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AT THE HEART—DURABILITY OF SERVICE

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Tank Capacity	2.6 gals.	3.9 gals.	5.2 gals.
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SCLEROTINIA DOLLAR SPOT



RHIZOCTONIA BROWN PATCH



FUSARIUM PATCH

Turn disease problems into profits with **CHIPCO® 26019** fungicide.

Selling disease control is a great way to boost profits and attract new customers.

And CHIPCO® 26019 is the ideal product to help you do both.

The selling proposition: a beautiful, disease-free lawn.

Everything you do for a customer is designed to create a beautiful lawn.

Turf diseases look bad...and that can make *you* look bad. A programmed approach includes an effective, long-lasting fungicide like CHIPCO 26019 keeps your customers satisfied.

CHIPCO 26019 is the only fungicide you need.

It can be used safely on all lawn grasses nationwide to control the major turf diseases like leaf spot, dollar spot, fusarium and brown patch. Highly effective and long-lasting, CHIPCO 26019 fungicide fits into your treatment schedule and reduces callbacks.

In short, when you've got CHIPCO 26019 on the shelf, you're ready for *business*.

Send for FREE booklet on how to sell disease control.

We've put together a booklet that details lots of effective techniques and tools for selling disease control to your customers...and delivering it with effective, long-lasting CHIPCO 26019 fungicide.

CHIPCO® 26019 TAKING CARE OF BUSINESS

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ALA LETTERS

ENJOYING ALA

I'm enjoying *ALA* magazine! I appreciate the detail and thoroughness of reporting! — it shows a good feel for our business and industry. I look forward to future issues and wish you success.

*Don Burton
President
Lawn Medic
Rochester, NY*

TIMELY COVERAGE

Thanks for sending me a copy of your May issue of *ALA* magazine. Your timely editorial coverage combined with the great technical input from Maureen's staff of experts has produced a publication to be counted on for great reading in future issues. We look forward to working with you.

*Herb M. Day
Sales Manager
Specialty Products
Stauffer Chemical Company
Westport, CT*

NEW STRENGTH

I enjoyed reading the May issue of *American Lawn Applicator*. The merger with *Lawn Care Professional* has provided new strength to a valued publication serving lawn care professionals. The National Fertilizer Solutions Association (NFSA) looks forward to working with you in the future. Please call whenever we may be of assistance.

*Dennis E. Brown
Vice President
Membership and Public Affairs
National Fertilizer Solutions Association
Peoria, IL*

GOOD JOB

Thank you for sending the March issue of *Lawn Care Professional*. You did a very good job with the article ("Building for Bucks"), and I am pleased to have been able to contribute information. Keep us posted, and if Helmut (Ullrich) or I may help with

future articles, just let us know.

*James Watson
Vice President
The Toro Company
Minneapolis, MN*

HELPFUL RESPONSE

I have recently written to your reader service in regards to herbicide prices and recommendations. Your response was very helpful and greatly appreciated.

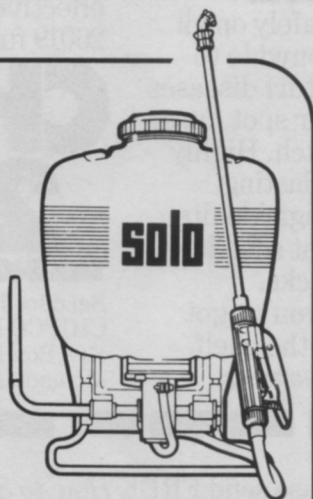
*Stephen Long
Evergreen Tree Service
and Landscaping
Dennis Port, MA*

If you would like to comment on anything you have read in the magazine or have observed in the lawn care field, write: *ALA*, 4012 Bridge Avenue, Cleveland, OH 44113. *ALA* reserves the right to edit letters for reasons of space or clarity.



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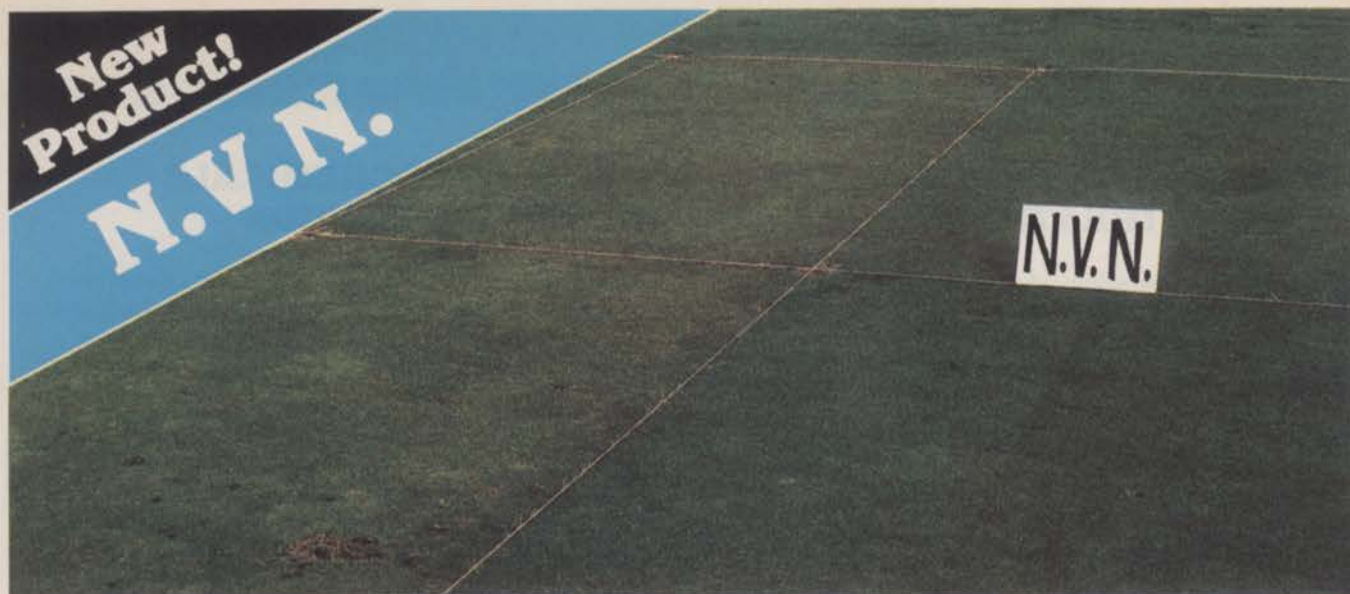
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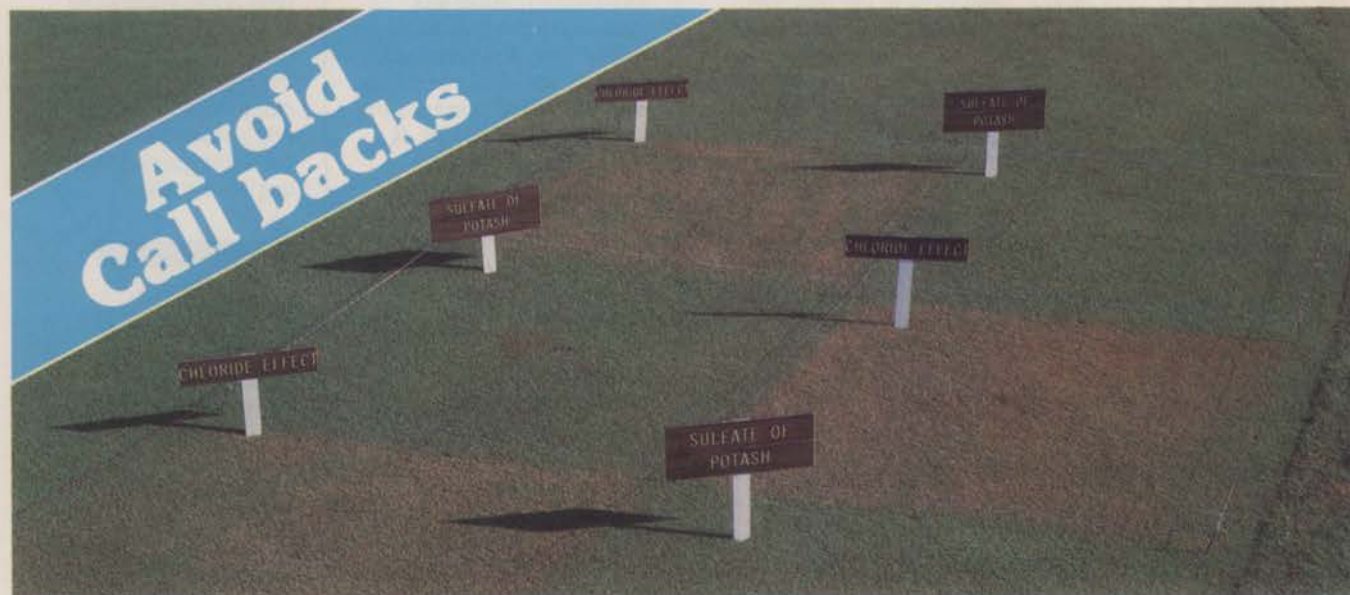
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Non Volatile Nitrogen (N.V.N.) is a new product specially developed for the professional lawn care industry. It provides for more efficient use of Nitrogen. Less **N.V.N.** can be applied than other forms of Nitrogen for the same results or the same

amount may be applied for keeping lawns green longer. GSL's **N.V.N.** is a Nitrogen stabilizer that turns lawns green, promotes good root and rhizome growth and has a low burn potential. (Compare N.V.N. vs. other Nitrogen products in photo.)



Sulfate of Potash is the safest and most effective potash money can buy! The trade has reduced or eliminated potash in summer applications because of the hazard of burn. **Sulfate of Potash** can be used at the recommended ratio with complete safety. We guarantee it!

Turf burn is a result of high salt index fertilizer, too much chloride and high summer temperatures. **Sulfate of Potash** is nearly chloride free and has a salt index of 0.85 vs. 1.94 for muriate of potash. Other sources of sulfur, such as ammonium sulfate, have salt indexes as high as 3.25. There is far less chance of burning turf and gardens if it is mistakenly over applied, spread unevenly or unexpected weather conditions favor damage.

In addition to K_2O , **Sulfate of Potash** contains 18% Sulfur in the sulfate form, which is the form preferred by lawns and gardens. **Sulfate of Potash** gives better disease resistance to Fusarium Patch, Ophiobolus Patch, Dollar Spot Fungus and Powdery Mildew. It is also effective in suppressing Poa Annua.

Use of Sulfate of Potash also results in better rooting, drought resistance, heat and cold tolerance and better wear resistance. And, its excellent potassium/sulfur ratio increases grass response to nitrogen, phosphate and other nutrients. Leading researchers recommend an N-P-K ratio of 3:1:2 for applications on turf. **Sulfate of Potash** can be included in the hottest months to provide vital potassium and sulfur without fear of damage to turf.



Great Salt Lake Minerals & Chemicals Corp.

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UNIROYAL GAINS STRENGTH IN SEED TREATMENT MARKET

For a number of years, the Crop Protection Division of the Uniroyal Chemical Group has been on a course to become stronger in the seed treatment seedling fungicide market, according to Jerry Zinn, advertising and product publicity manager. Part of the division's strategy to expand in this arena has included the acquisition of two companies' seed treatment products.

About a year ago Uniroyal bought Gustafson, Inc. of Dallas, TX. Zinn says purchasing Gustafson's equipment and marketing rights has strengthened Uniroyal's own fungicide product, Vitavax®, a systemic seed treatment.

Uniroyal's more recent acquisition, which finalized late last fall, involved the purchase of the Olin Crop Protection Division of Little Rock, AK. Uniroyal acquired the inventory, trademarks and marketing



rights to use Olin's Terraclor Terrazole® products on a worldwide basis. "The Olin acquisition gave us further penetration into the fungicide business and gave us the essential capability of in-furrow (a means of direct application to the soil)," Zinn says. "The Vitavax product was not able to be used in an in-furrow treatment." Now, he says, Uniroyal can offer the grower more options from their line of products.

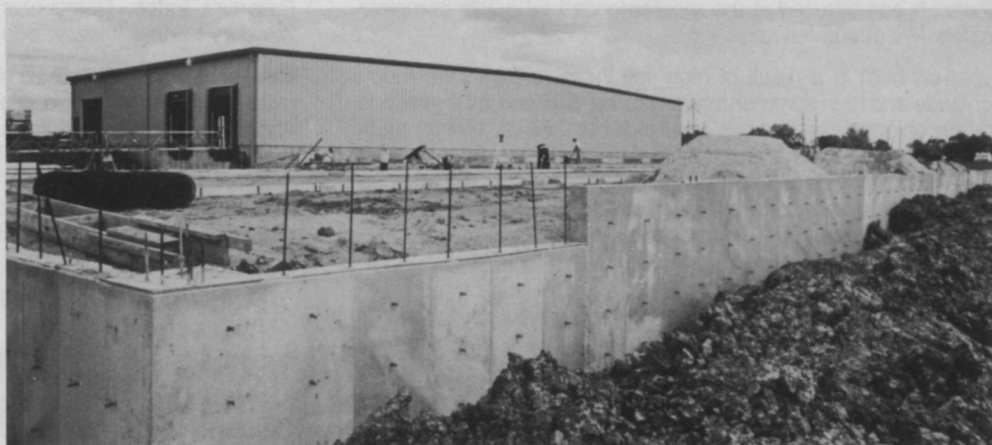
The Olin products have been added to the responsibilities of Uniroyal's crop protection manager, Dr. C.P. Yip.

EXMARK EXPANDS MANUFACTURING FACILITY

An 18,000-square foot addition will be added to Exmark Manufacturing Company, Incorporated's Beatrice, NB, facility in an announcement made by Robert Martin, the firm's president. The additional space will be used to support expanded manufacturing activities resulting from the expansion of the company's turf mower product line as well as a dramatic increase in the company's growth.

"We recently completed our new facility in Beatrice, and product demand by our distributor organization and their customers necessitates the immediate expansion of our facility," Martin says.

The expansion is expected to be completed by September of this year.



Construction work on newly expanded Exmark Manufacturing facility.

MAAG AGROCHEMICALS MOVES TO FLORIDA

Maag Agrochemicals, Inc. has moved its corporate headquarters from Tuscaloosa, AL to Vero Beach, FL. Research and development activities were established in Vero Beach in 1972. Management, marketing and accounting functions were recently moved to the Florida facility to consolidate Maag's United States operations under one roof.

A subsidiary of Hoffman-La Roche headquartered in Basle, Switzerland, Maag was founded in the U.S. to consolidate three product lines: agricultural chemicals with the parent research and production facility, Dr. R. Maag Ltd., located in Dielsdorf, Switzerland; a line of 8-Hydroxy Quinoline and derivatives with its research and production facility, La Quinoleine, located in Paris, France; and a line of Copper 8 Quinolinolate products formerly owned by Seymour Chemicals of Chicago, IL.

The consolidation of headquarters at Vero Beach is part of a planned strategy to vigorously pursue the agricultural chemicals market in the United States. At present, Maag's agricultural line consists of

Atrinal®, a plant growth regulator for the landscape and nursery markets. However, Maag plans to introduce a major new product called Logic®, an insect growth regulator for the biological control of fire ants. Approval for Logic by EPA is expected soon.

In addition to management, the Vero Beach headquarters is also staffed with a team of entomologists, toxicologists, plant physiologists, chemists, field coordinators and others. The 200-acre facility is equipped with state-of-the-art lab and field equipment for both new product development, customer service and quality control.

LAWN DISEASES SHOWING UP NOW

In a recent report in *Plant Pathology Notes*, Ohio State University's cooperative extension service newsletter, Dr. Philip Larsen, Department of Plant Pathology, OSU, tells

(continued on page 15)

NEWS IN BRIEF

(continued from page 12)

us a survey of central Ohio home lawns has turned up numerous cases of the diseases leaf spot, red thread and stripe smut. Larsen says these diseases seem to be most severe in areas that are beginning to show some drought stress as we move from a period of prolonged wet, cool weather into a dry, warm period.

You should be on the look out for the symptoms of these diseases in your customers' lawns. Leaf spot produces oval brownish spots on the leaf blades and lower stems. Red thread lends a pinkish tint to patches of turf and tiny pink thread-like fungus structures often extend from the ends of affected grass plants. Fine fescue and ryegrass lawns tend to be particularly susceptible to red thread, according to Larsen. Stripe smut symptoms include black elongate stripes running the length of the leaf blades and the leaf blades may be curled at the tips.

"At this time," Larsen



Philip Larsen

says, "application of fungicides for control of these diseases would not be advisable since they will probably cease to be active as the weather continues to get warmer." Lawn care operators should advise homeowners to raise their mowing heights to two inches or more and water turf areas so the soil is moistened to a depth of six inches to minimize disease damage. Effective fungicide applications should be made in the early spring when grass plants begin to grow actively, according to Larsen.

CHEMLAWN BRANCHES INTO EXISTING CUSTOMER BASE

A report in the "Corporate Closeup" of a recent issue of *Advertising Age* notes ChemLawn Corporation's strategy for multi-market success. ChemLawn has established itself as the leading lawn care entity, but the Columbus, OH firm also has its sights on the tree and shrub care, carpet cleaning and structural pest control markets through its Tree and Shrub Care, CarpetClean and PestFree divisions, respectively.

Elliott Schlang, an analyst who tracks ChemLawn for Prescott, Ball and Turben of Cleveland, OH, says the company's market expansions can be divided into three distinct phases. ChemLawn first establishes new markets, then saturates those markets and finally



CHEMLAWN
CORPORATION

cross-sells to its captive audience of existing customers. The company's increasing reliance on marketing reflects a changing focus from a service orientation to a market-driven philosophy.

The new emphasis on marketing has resulted in a \$4 million television lawn care campaign that peaks during the late-spring and early-summer season. A \$300,000 test advertising campaign will be running for ChemLawn's three

MOBAY CHEMICAL CORP. SUPPORTS 4-H CAMPAIGN

The Agricultural Chemicals Division of Mobay Chemical Corporation, Kansas City, MO, is among the first major corporations in America to make a five-year commitment to The Campaign for 4-H, Robert B. Gill, campaign chairman and vice president, J.C. Penney Company, Inc., announced. The goal of the five-year, \$50 million campaign, launched late in 1983, is to strengthen private support for 4-H in four major areas: enriching educational experiences for youth by expanding recognition programs and updating and developing educational materials; enhancing leadership development; increasing public awareness; and improving conference and training facilities at the National 4-H Center in Chevy Chase, MD. Nationwide, 4-H involves nearly five million boys and girls and 620,000 volunteer leaders.

Mobay, a supporter of

4-H for six years, sponsors the national 4-H entomology awards program, involving more than 87,500 youth annually. The support provides medals of honor for outstanding 4-H members in each county; a \$75 savings bond for a program winner from each state; 16



trips to National 4-H Congress and six \$1,000 scholarships to national winners. 4-H is the youth education program of the Cooperative Extension Service of the state land-grant universities and the U.S. Department of Agriculture.

newer services. The test spots will run for Tree and Shrub Care in Providence, RI and Omaha, NB; for CarpetClean in Hartford, CT and Indianapolis, IN; and for PestFree in Atlanta, GA and Orlando, FL.

The key to ChemLawn's marketing effort is the word "guarantee." To capitalize on the lawn care industry's growth potential of 25 percent per year — especially among the 20 million target households with incomes above \$25,000 — ChemLawn emphasizes its money-back guarantee in all advertising. The guarantees and the advertising blitz must be working since the company's direct mail response rate was increased by 50 percent last year. Total marketing expenditures, projected at \$24.5 million in 1984, have increased more than sixfold in the past five years.

WEATHER-MATIC MANUAL TO BENEFIT FOUNDATION

The Weather-matic division of Telsco Industries has established a donation program to benefit the Irrigation Association Education Foundation based on the sale of its Turf Irrigation Manuals. According to C.S. Putnam, vice president of sales, Weather-matic will contribute \$1 for each manual sold for the period of October 1, 1983 through September 30, 1984.

"It is our hope that this commitment will assist the foundation in providing greater educational benefits to our industry," Putnam

(continued on page 18)



Introducing a mower that won't break down every few yards.

The problem with most mowers is they spend too much time in the shop and not enough time on the job.

You won't find that with Toro's new 36" and 52" commercial walk rotary mowers. Because we build them with the same durability we build

in our commercial riding mowers.

For instance, we gave them an actual 4-speed transmission with neutral and reverse. So they won't lock into

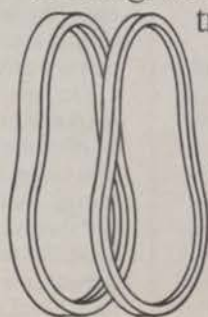
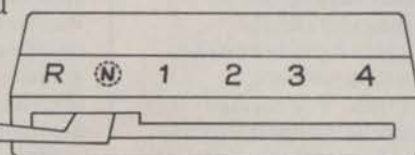
a single speed like some variable speed pulley systems.

And, knowing the continual

problems you have with belts breaking, we added a much wider traction belt that's

designed to last the life of the machine. We also eliminated an idler pulley on the deck drive belt, to make it last longer, too.

Even the





cutting spindles are engineered and protected to better withstand the shocks and jolts of everyday cutting.

While we were making our new commercial mowers tougher, we decided to make them more productive, as well.

We gave them a floating deck, same as our Groundsmasters®, so they'll follow the contours of the terrain while minimizing scalping.

We made it possible to change the height of cut in a minute by simply moving four pins.

And we came up with a

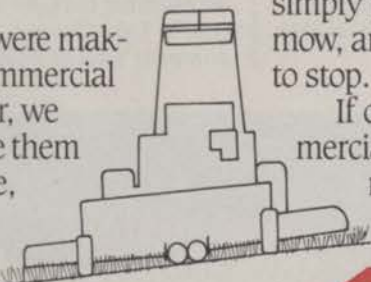
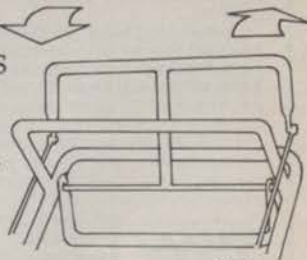
new steering design that makes it easier to maneuver around trees, shrubs and other obstacles. You simply push the steering bar to mow, and release it to stop.

If our commercial walk rotary

ever seen maybe it's because they are. Visit your

Toro distributor soon. He can fill you in on all the details.

Whichever one you choose, it'll keep you cutting yard after yard, year after year.



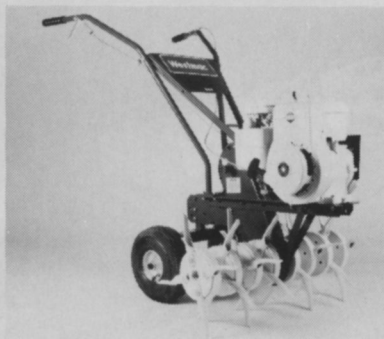
mowers are beginning to sound like no other walk rotary mowers you've



The professionals that keep you cutting.

The WESTMAC®

"Money-Making Machine"
pays for itself in 2 days...
then earns you \$44 per
manhour!



PLUG AERATOR
32 SPOONS
60 HOLES PER SQ. YD.
NEW 1984 MODEL
(World's Fastest)

AS A PLUG AERATOR...
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.**

AS A MONEY MAKER...
the Westmac allows you to make 4 visits, and get paid for 5 for a 25% increase in gross income!

Assuming two visits per manhour, it can pay back its low cost in only 2 days! After that, each Westmac you own can mean an **extra \$44 profit per manhour!** (Based on \$27 charge per visit and \$10/hour for labor and overhead).

And if you act fast, you can make this extra profit now and for years to come. Get all the details, without obligation. Use the Reader Reply Card, the coupon below, or phone Jim Gourley at (414) 552-8911 and

ask how Lawn Masters, Inc. successfully worked plug aeration into 98% of customers services.



Of course, we'd like to earn an extra \$44 profit per manhour. So rush all the details on the Westmac Plug Aerator to us, without obligation. (No salesman will call.)

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CITY _____
STATE _____ ZIP _____
PHONE(____) _____
No. of Trucks _____

Lawn masters
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Kenosha, WI 53141

NEWS IN BRIEF (continued from page 15)

commented. The donation check will be presented at the annual Irrigation Association Conference and Exposition in Kansas City next October.

Now in its fourth printing, the Turf Irrigation Manual is a key reference text in sprinkler system design and installation. With nearly 15,000 copies currently in use worldwide, the manual is used by contractors, designers, landscape architects, engineers, turf managers, colleges and state licensing boards. The manual, written by James A. Watkins, is available for \$22.95 plus shipping by writing: Weather-matic, P.O. Box 18205, Dallas, TX 75218.

ALABAMA STATION CREATES MUTANT CENTIPEDEGRASS

In the first issue of the *Alabama Sod Gazette*, Editor Dr. Kim Sheffer, extension horticulturist, Auburn University, Auburn, AL, reports on the creation of a new centipedegrass called 'AU Centennial.' This new turf was the result of research in which centipedegrass seed was irradiated with gamma rays from cobalt 60 to induce mutations. The seed was planted and individual plants were observed. Those plants which mutated and had desirable characteristics were vegetatively increased, planted into plots and observed further.

The selection now named AU Centennial is smaller, slower-growing and slightly darker green than common centipedegrass. Approximately 1,000 square feet of this turf now exists, and this is destined for further increase by the Alabama Crop Improvement Association before any will be available for production.

RHONE-POULENC FUNGICIDE ALIETTE IS REGISTERED

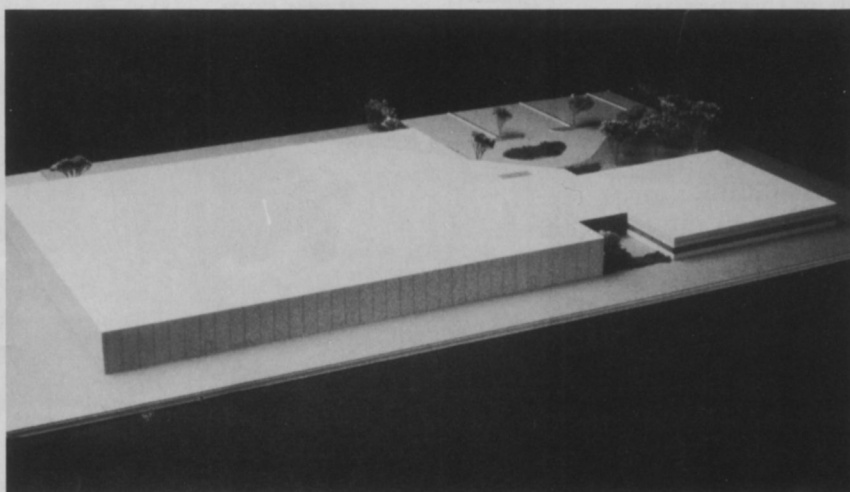
Aliette®80WP fungicide has received a federal registration for use on ornamentals to control Phytothphora root rot, according to the manufacturer, Rhone-Poulenc, Inc., Agrochemical Division.

The product may be applied as a drench or soil incorporated. The product is unique in that it has two-way systemic activity, showing both upward and downward translocation. Aliette has been used worldwide for six years without developing a single case of resistant fungal strains. For further information, contact Rhone-Poulenc, Inc., Aliette Product Manager, Scott Boutilier, P.O. Box 125, Monmouth Junction, NJ 08852, 201/297-0100.

ECHO ANNOUNCES MAJOR EXPANSION

Echo, Inc. has acquired a 17.5 acre site in Lake Zurich, IL, and plans to build a 90,000 square foot headquarters building there. Plans call for the new building to be ready for occupancy in spring, 1985. It will increase Echo's total manufacturing and warehouse space by about 30 percent.

Echo, an outdoor power equipment manufacturer, presently has facilities in Northbrook and Wheeling in Cook County, IL. The new site was selected to be conveniently near the company's current locations while taking advantage of land availability and accessibility to major traffic arteries in nearby Lake County, according to the company's spokesman.



Mark your calendar! You won't want to miss the green industry event of the year: the 1984 PLCAA Annual Conference and Show, Tampa, Florida, Nov. 12-15



PLCAA '84 Tampa

NOVEMBER 12-15

NEW LOCATION • NEW PRODUCTS • NEW SEMINARS • NEW SPEAKERS

The 1984 Annual Conference and Show of the Professional Lawn Care Association of America moves South to the heart of sunny Florida—Tampa! PLCAA/Tampa '84 is devoted exclusively to making you a better lawn care businessman. PLCAA/Tampa '84 is where you'll find an exciting blend of new products, new technologies, and new opportunities.

Join the hundreds of lawn care businessmen who will attend PLCAA/Tampa '84. Don't miss the outstanding lineup of workshops and seminars. Learn how to use the latest management and marketing techniques to make your business more productive and more profitable.



KEYNOTE ADDRESS

"SUCCESSFUL FAILURES"

JAMES A. LOVELL, Senior Vice President, Centel Corp.

Keynote speaker and former astronaut Capt. James A. Lovell will boost PLCAA/Tampa '84 into orbit on opening day (November 13, 1984). His topic is a provocative one: "Successful Failures". Don't miss this inspirational public speaker!

THE TRADE SHOW

Tampa's ultra-modern Curtis Hixon Convention Center plays host to the biggest gathering of lawn care suppliers, equipment makers, and manufacturers in the five-year history of the PLCAA Conference and Show. Exhibit viewing hours are

10:30 AM to 6:30 PM Tuesday and Wednesday. See the latest your industry has to offer!

EARLY BIRD REGISTRATION AND RECEPTION

Make plans to arrive Monday, November 12th, and take advantage of the Early Bird Registration and Reception Theme Party (6:30 PM to 8:30 PM). Pick up your badge and convention packet and be ready to go Tuesday morning when the Show opens.

NEW! EARLY BIRD WORKSHOPS

Yet another reason to come early this year—two "Early Bird" workshops are scheduled for Monday, November 12th:

HOW TO GROW YOUR BUSINESS

Panel: LAWRENCE D. KOKKELENBERG, Ph.D., President, Kokkelenberg Corp.; JAMES SKELTON, MBA, Principal, Ross-Payne & Assoc., Inc.; ED T. WANDTKE, CPA, Assoc. Advisor, Advisor Associates, Inc.; and RICHARD I. LEHR, PA, PLCAA Attorney.

PROMOTIONAL TECHNIQUES FOR THE LAWN CARE MARKET

Panel: KATHY COPLEY, Editor, Grounds Maintenance; and RAYMOND L. GIBSON, President, Ohio City Communications.

SEMINARS AND TECH SESSIONS

An outstanding group of speakers and topics have been assembled for this year's educational sessions:

OUR CHANGING INDUSTRY

ROBERT EARLEY, Group Publisher, Harcourt Brace Jovanovich, Inc.

REGULATORY ASSISTANCE THROUGH THE PESTICIDE PUBLIC POLICY FOUNDATION (3PF).

DAVID H. DIETZ, Principal, David H. Dietz & Associates

THE OFFICE—ASSET OR LIABILITY?

TOM HOFER, Vice President, Spring-Green Lawn Care Corp.

STRESS MANAGEMENT; HIS, HERS, OURS

TOM JADIN, Director, Winnebago Mental Health Institute

REDUCING CANCELLATIONS

LAWRENCE D. KOKKELENBERG, Ph.D. President, Kokkelenberg Corp.

PRINCIPLES OF TREE & SHRUB FERTILIZATION

Dr. ROGER C. FUNK, Vice President, Davey Landscape

FERTILIZATION OF SOUTHERN ORNAMENTALS

Dr. ROBERT BLACK, Urban Horticultural Specialist, Florida Cooperative Extension Service, University of Florida

SOUND BUSINESS CONSIDERATIONS FOR MOWING /MAINTENANCE COMPANIES

ROD BAILEY, President, Evergreen Services Corporation

TURFGRASS RESEARCH UPDATE: WATER

Dr. JAMES B. BEARD, Professor of Turfgrass Science, Texas A & M University

THATCH: GENERAL CONSIDERATIONS

Panel: Dr. KIRK A. HURTO, Ph.D., Research Specialist, Chemlawn Corp.; Dr. A.J. POWELL, Turf Extension Specialist, University of Kentucky; JOHN C. PRUSA, Vice President of Operations, Lawnmark, Inc.; Dr. CHARLES PEACOCK, Turf Extension Specialist, University of Florida

HOW TO AVOID AND RESPOND TO UNION ACTIVITY

Panel: RICHARD I. LEHR, PA, PLCAA Attorney; PAUL DAVEREDE, President, Ever-Green Lawn Corp.; JAMES R. SACKETT, President, Ever-Green Lawn Care, Inc.

EXPANDING INTO THE COMMERCIAL LAWN CARE MARKET

IRVIN DICKSON, Vice President, Native Tree, Inc.

PLUS MUCH MORE!

SPECIAL SPOUSE PROGRAM...DISNEY WORLD SIGHT-SEEING...POST CONFERENCE CRUISE

One of the best things about visiting Tampa is that it offers a wealth of places to visit and things to do. This year's PLCAA Conference and Show offers a chance to take advantage of some exciting fun options for you and your spouse, including a special one-day "Spouse Program" tour of the Sarasota area, a pre-conference tour of Disney World and Epcot Center—even a post-conference Caribbean cruise! Indicate your interest on the return coupon and you will be supplied with costs and details.

YES! I'm interested in attending PLCAA's 5th Annual Conference and Trade Show. Send me more information on:

- ☐ REGISTRATION ☐ EXHIBITING ☐ MEMBERSHIP
☐ POST CONFERENCE CRUISE ☐ SPOUSE PROGRAM
☐ PRE-CONFERENCE DISNEY TOUR

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for insect control
on turf grasses.

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propan-1-ol (Cyfluthrin) 5.00%
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Suspend. From the 100-1000
EPA Reg. No. 100-1000
EPA Reg. No. 100-1000

Keep out of reach of children.

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LONG-LASTING OFTANOL HITS GRUBS WHERE THEY LIVE

Grubs. There is one product and only one product that stops them so completely for so long. ®OFTANOL turf insecticide.

It works.

OFTANOL provides the longest and most cost effective grub control available.

It works so well for so long because its low water solubility helps it resist leaching to keep it in the upper soil profile. Where the grubs feed.

OFTANOL comes in two formulations: OFTANOL 5% Granular and OFTANOL 2 in-

secticide, a liquid. Use recommended rates and follow label directions.

OFTANOL turf insecticide. It hits grubs where they live and then they're dead. See your turf chemicals distributor.



I TELL YA
I'VE TOLERATED A
LOT OF STUFF IN MY TIME
BUT I'M DEAD
AGAINST THIS.

AND THEN THEY'RE DEAD.

OFTANOL STOPS THEM COLD.

Applications of OFTANOL, properly timed, will control existing populations of sod webworm larvae, billbug larvae, chinch bugs, and Hyperodes weevil larvae. It works.

Billbug & Larva

Sod Webworm & Larva

Hyperodes Weevil & Larva

Chinch Bug

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The new

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can be tank-mixed with other standard lawn care materials.

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can be used as a nitrogen source in blended fertilizers.

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ALA PLCAA UPDATE

The Professional Lawn Care Association of America (PLCAA) is offering the first publication from their new "Management Monograph" series to members and nonmembers. *A Lawn Care Employer's Guide to Wage and Hour Regulations* is a 30-page booklet written by attorney Richard I. Lehr that provides in-depth answers to many employers' questions on the complications of these regulations.

The guide contains seven chapters that detail: statutory coverage, the standard work week, typical lawn care employer wage and hour trouble spots, minimum wage and/or overtime exemptions, sample pay systems, recordkeeping requirements and how to respond to a wage and hour investigation.

Specific chapters cover:

- Statutory coverage — explanations and definitions of coverage under the Fair Labor Standards Act.

- Standard work week — definitions of obligations and responsibilities toward regular hours, overtime and records.

- Typical trouble spots — paid or unpaid break time; unauthorized overtime; vacations, holidays or sick days; working "off the clock;" punching another employee's time card; and working through meals.

- Minimum wage and/or overtime exemptions — executive, administrative and professional employees; outside salesmen; employees engaged in interstate transportation; commission-paid employees in retail or service establishments.

- Sample pay systems — flat hourly rate, flat hourly rate plus incentive, fixed salary for fluctuating work week, Belo plan.

- Recordkeeping requirements — specific details on necessary records to be kept for various employee classifications.

- How to respond to a wage and hour investigation — correct and proper steps to help speed the process and minimize any problems in the investigation.

The first copy of this guide is available free to PLCAA members and additional copies cost \$10 each. For non-members the first copy is \$20, while additional copies are \$15 each. For more information on the guide or PLCAA, contact Jim Brooks, PLCAA, 1225 Johnson Ferry Road NE, Suite

B-220, Marietta, GA 30067; 404/977-5222.

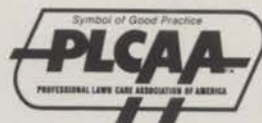
Convention discount. Lawn care business people and their families interested in attending the November 11-15 Convention and Show in Tampa, FL can now take advantage of a thirty percent discounted travel savings by flying Delta Airlines. This special deal is available for round trip, regular coach fares to Tampa for the show, provided the fares have not been previously discounted.

NEW

Safety Manual PLCAA

Professional Lawn Care Association of America

1225 Johnson Ferry Road, NE
Suite B-220
Marietta, GA 30067



You or your travel agent must call Delta *only* at these numbers for the discount:

Toll free: 1-800-241-6760 Continental United States

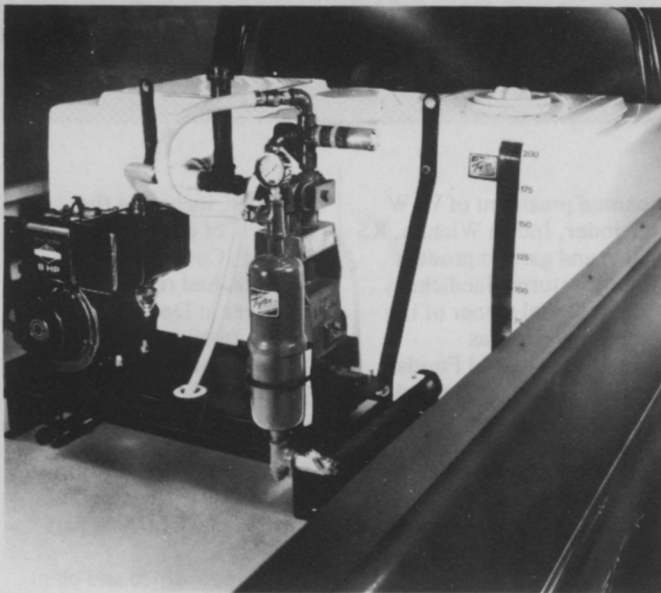
1-800-282-8536 Georgia only

Daily hours: 9 a.m. — 5 p.m.

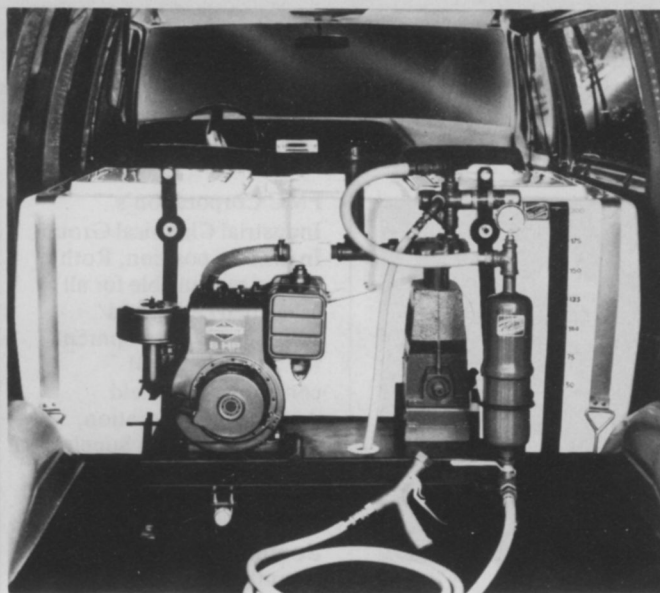
The discount applies:

- On round trip tickets via Delta.
- To originations in the continental U.S. only.
- For departures to Tampa, Nov. 11-13, 1984.
- For tickets purchased seven days in advance.
- To trips completed within 15 days.

In some cases, the overall 30 percent discount may not be the most economical fare, depending upon the routing and special promotional fares available. Delta will confirm you at the lowest Delta rate available.



PC200 gallon spray unit shown mounted in bed of pick-up.



PC200 gallon spray unit shown here through rear door of van.

On the move.

*PEST CONTROL SPRAY UNITS BUILT FOR
YOUR PICK-UP OR VAN.*

The experts at Tuflex are on the move to stay a step ahead of your pest control problems. Tuflex is the only manufacturer to specialize in seamless fiberglass spray tanks built specifically for the pest control and lawn care industry.

The Tuflex process allows a full five year warranty on all *handcrafted* seamless fiberglass tanks and our personalized service includes professional assistance in designing and engineering tank and pump requirements to fit your truck or van. Our tanks, from 100 gallon—1 200 gallon are ready to tackle your toughest challenges.

PC20810 200 gallon spray tank with Bean Piston Pump Sprayer (10 GPM 500 PSI). Also available as a 300 gallon sprayer and 200 gallon or 300 gallon split unit.

FIVE YEAR WARRANTY

The TUFLEX manufacturing process allows a full five-year warranty on all handcrafted Seamless fiberglass tanks.

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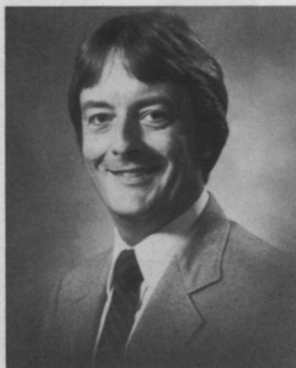
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Mike Schaefer

F.D. Kees Manufacturing Company announces the appointment of **Mike Schaefer** to national sales manager. Schaefer has been a salesman for Kees since 1970. During the past five years, he has been principally involved in field sales. In his new position, he will be responsible for the sales of all Kees products. The company is a manufacturer of commercial lawn and turf equipment, as well as electrical equipment and contract metal fabricating.

Charles Silcox has joined Fairfield American Corporation, Newark, NJ as staff entomologist. Silcox comes to Fairfield from Rutgers University, where he collaborated in research projects on vegetable insect pest management. Prior to that, he was with the Beneficial Insects Research Lab. A graduate of the University of Delaware and Rutgers with a doctorate in entomology, he is a member of the Entomological Society of America.

Edwin Roth has been named director of marketing for American Oil and Supply International, Inc., Newark, NJ. Previously director of commercial development, Roth joined AOSI in July, 1983 after 17 years in a variety of marketing and technical positions with

FMC Corporation's Industrial Chemical Group. In his new position, Roth will be responsible for all sales, marketing and commercial development for the three AOSI companies: Fairfield American Corporation, American Oil and Supply Company and Frenchtown American Corporation.

Jerome Eisele has recently been named National Fertilizer Solutions Association vice president, marketing and meetings. Eisele now moves into an expanded role within an organization composed of members dedicated to the advancement of the use of fluid fertilizer. He joined the staff in April, 1979. Prior to that he served as superintendent of the Civic Center at Waterloo, Iowa.

John Jaedicke has been

named president of W-W Grinder, Inc., a Wichita, KS lawn and garden product manufacturer. Jaedicke is also a partial owner of the company. He was president of Dold Foods, Inc., a Wichita meat packer, for 16 years. He is a graduate of the University of Kansas. Jaedicke's appointment as president is part of a program to increase W-W Grinder's sales through an expanded product line and increased dealer network.

This effort to increase sales also encompasses the addition of three new sales staff personnel. **Robert Coyer** has been appointed director of sales, **Carla Butterfield** as dealer service manager and **Kevin Clinton** as sales service coordinator.

Coyer has 21 years of management and marketing experience in the meat

industry, including the position of director of sales at Thies Companies, Wichita, and regional sales manager at Dold Foods, Inc. Butterfield returns to W-W Grinder with five years experience as customer service manager. Clinton joins the company from Clinton Production, Inc., an oil field equipment firm in which he held part ownership.

Two new office and plant managers have also been added to the W-W Grinder staff. **Charlotte Farrar** has been named office and accounting manager and **Richard Gelvin** has been appointed plant manager in charge of all production. Farrar joins the company from Jamco Enterprises, Inc., a commodity trading firm. Gelvin comes from Wichita's Dold Foods, Inc. where he was a plant manager for 12 years.



Don Long (left) and Gary Settles (center), H.D. Fowler Company, Bellevue, WA, receive the 1983 Weather-matic Distributor of the Year Award from C.S. Putnam, Weather-matic vice president of sales. The plaque accompanies a limited-edition Windburg print.

TURF RESEARCH IN THE '80s

If you ask a turf researcher where research in his field is heading, he will tell you it is heading in the same direction it has always been heading — toward the development of better turf. But after you ask some more specific questions, you will find the topic not quite so simplistic.

BY TIM WEIDNER

If you ask a turf researcher where research in his field is heading, he will tell you it is heading in the same direction it has always been heading — toward the development of better turf. But after you ask some more specific questions, you will find the topic not quite so simplistic.

The turf care industry is relatively young, and turf research is also young, relative to research in other fields. By all counts, turf research has been conducted for about 50 years. In that time, researchers have developed innovations in turfseed and cultural practices that have changed the way turf areas are prepared, planted and cared for. It is true that all turf research is devoted to the development of better turf, but all research does not take the same route to reach that goal.

Corporate research. Depending upon who does the research, there can be considerable variation in how and why the research is being done. When a chemical company does turf research, they are looking for a chemical formulation that will control a particular turf problem better than competitors' formulations already on the market. This type of research is basically a search for improvements upon existing formulations, but chemical companies conduct much of their research at a more basic level.

Companies like Monsanto Chemical Company with corporate headquarters in St. Louis, MO have literally hund-

reds of research scientists who do nothing but randomly synthesize chemicals in search of compounds that show activity for any saleable purpose. Formulations created by these researchers are sent to other researchers who test the formulations on potential control targets. "Once they see an activity in a particular chemical," says Domingo Riego, Monsanto's industrial product development manager, "then they

"Of all the things you can put on a horticultural farm, there is nothing that takes more intense care than a turf operation. It is the most chemical- and people-intensive research you will find on the university research farm." — Dr. Clinton Hodges, Iowa State University

pursue screening."

The screening process encompasses a three-fold product development program, according to Riego. At one level, university researchers conduct tests, at a second level, in-house researchers conduct research and product development, and at a third level, test marketing is conducted to evaluate the potential product's performance in the field. MON 4621, a plant growth regulator, is a typical example of a Monsanto product that has graduated from

the chemical synthesis phase into the three-fold product development phase.

"At the university level we are trying to zero-in on the variety of response of different species of turfgrasses to 4621," Riego says. About 20 universities are involved in 4621 testing, according to Riego. The scale of each university study may vary dramatically. Some universities may be geared-up to test the product against many grass species, while others may test only a few. Each university is given an outline of the most important research points Monsanto wants investigated, but the company encourages an open discussion to get input from university researchers on testing parameters they may want to include.

At the second step in the product development phase, (as in the case of MON 4621) in-house research and product development people work with turf professionals to test application timing and combinations with fertilizers and fungicides. Finally, a test market program is implemented in several geographic areas. "The objective of the test marketing is to put the product into the hands of the people who will actually use it," Riego says. The test marketing defines the areas where Monsanto thinks the product will fit technically and commercially.

The research and marketing development of any product is long and expensive "If you have a product that works in 1984," Riego says, "you can't put it into the market until 1989 or 1990." A good deal of the research time is spent satisfying the Environ-

(continued on page 26)

mental Protection Agency's product registration requirements. Monsanto has to spend roughly \$20 million on each potential product before it ever reaches the marketplace, according to Riego.

University research. Like chemical company research, university turf research also follows certain development steps. However, universities undertake research for different reasons; their ultimate goal is not product sales. Universities work with products supplied by chemical companies to test their effects on turf, but they are not involved in the chemical formulation process. Universities essentially gain knowledge for knowledge's sake and are supported in their efforts by the entities that can benefit most from that knowledge: government agricultural agencies, turf product manufacturers, sod growers and state and national turf-related associations.

To get state and federal funding for turf research projects, universities must satisfy certain guidelines. At Louisiana State University in Baton Rouge, LA, agricultural research like turf projects are subject to departmental peer review within the university. "All (potential projects) go to the experimental statisticians and they put a 'rough' on the experimental design of these things, not knowing what you are going to get into," says Dr. A.D. Oliver, Department of Entomology, Louisiana State.

The experimental blueprints drawn up for Oliver's projects are relatively open-ended since there are so many plants and pest problems under his jurisdiction that could play a role in his research projects. "In this department, each member of the experiment station staff is responsible for a certain commodity," Oliver says. "In my case I am responsible for not only turfgrass, but shrubbery and shade trees."

Oliver's department is primarily involved in evaluating new chemical products for control of new insect pest species. He is currently working on synthetic pyrethroids for control of various turf insect pests and says the compounds have shown promise. "Since this is a subtropical area, we are continually fighting introduction of new pest species," Oliver says. "Secondly, we evaluate new chemicals for effectiveness to find the minimum

effective dosage — data that can be disseminated to the extension service people who go out to the users."

In Oliver's department, the impetus for research projects is provided in the form of problems encountered by producers of the commodities Oliver is responsible for. In the case of turf, many research ideas come from area sod growers. "Any insect problem they may have with turf that they have no answer to is my responsibility," Oliver says.

The bulk of Oliver's research funding comes from the Louisiana State Department of Agriculture, while turf care product manufacturers provide lesser grants. "Chemical company grants are usually \$500 to \$2,000 — those are small peanuts," Oliver says. However, those "small peanuts" grants do add up, but not with any regularity. Some large corporations that should be able to afford big grants give very little, while some little companies have given Oliver sizeable research grants. "Some give a lot of support, some, I won't name them, want a lot of work done and think it should come free."

Still, the turf industry has been steadily attracting more and more financial support from government agencies and the private sector. "I have been project leader of this project since 1960," Oliver says. "It was not until the early 1970s that we got adequate

Hodges sees a lot of politics being played in the conception of turf research projects today. He says too often researchers are looking for projects that will not be criticized or will be attractive to industry groups offering grant money.

state support." Oliver has voiced his needs to local golf superintendents and sod growers and they have used their political clout to lobby the state legislature for more turf funding.

The researchers at the University of Tennessee in Knoxville face pretty much the same quest for funding as

Oliver in Louisiana. However, most of the University of Tennessee's turf research money comes from the federal government through the United States Department of Agriculture (USDA) rather than the state department of agriculture. These grants are referred to as "hatch" funding because they give the university the financial wherewithal to get research started. To get hatch funding, the USDA must first be convinced that a research project is worthy.

Potential projects at the university must go through a fairly complex approval circuit before any money is handed out. Lyle Klostermeyer, assistant professor of entomology and plant pathology at the University of Tennessee says projects are first written-up in an outline, submitted for review by his peers in his department, sent for approval to the school's dean and then go to USDA in Washington D.C. for final approval and funding allocations.

Like Louisiana State University, the University of Tennessee also has sources for less significant funding. "We are getting some money for graduate student help from the Tennessee Department of Agriculture," Klostermeyer says. "We occasionally get small grants from chemical companies to test some of their chemicals."

Dr. Clinton Hodges, Department of Horticulture, Iowa State University in Ames, IA, is involved with basic turf research. Basic turf research studies the mechanics of the turfgrass community at the cellular level, as opposed to applied research which studies specific turf problems like mowing or nutrient requirements. Hodges says the money he gets from state or federal hatch funding plays "a major role" in financing the type of basic research he does, but it is generally too little to operate an applied research project, which has to seek aid from outside organizations like state turfgrass associations and chemical companies. Hodges' work requires less money than applied research involving more salaried people, equipment and time in the field.

"You have a lot of payroll in terms of maintaining turf areas, setting up plots and collecting data — it is a very costly activity," Hodges says. "That type of research in many respects is more costly than some of the basic research because the basic programs are usually



"The most significant change that has occurred in the last five years, related to turf research, has been an awareness by chemical companies that specialty products for turf and ornamentals is already a large market and potentially a huge market." — Dr. Tom Watschke, Penn State University

less people-intensive and we usually do less work on field plots." Hodges knows of applied research projects that have cost as much as \$160,000 per year to operate. Because of the expense, he says applied researchers must "beat the bushes" to get chemical company funding from several sources. University-sponsored events like "golf days" are another way to raise funds for expensive field work.

"Of all the things you can put on a horticultural farm," Hodges says, "there is nothing that takes more intense care than a turf operation. It is the most chemical- and people-intensive research you will find on the university research farm." Hodges says his average project will employ two doctorate level students and one masters level student, while the average applied research project will employ about two to three masters level students and one or two doctorate level students.

Hodges claims his type of basic research work is at a disadvantage in terms of attracting grant money. "State associations and chemical companies are not too interested in funding that kind of research because they don't see the immediate application of it," Hodges says. "We don't fare well when we apply to the federal government or competitive agricultural grants because they look at the area of work and they say, 'That's not food or fiber so it is not important'."

Hodges sees a lot of politics being played in the conception of turf re-

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search projects today. He says too often researchers are looking for projects that will not be criticized or will be attractive to industry groups offering grant money. "It is not that it is all bad, but if that becomes the guiding light, you end up with a lot of superficial research," Hodges says. "Someday the turf industry must decide to what extent they need basic information and to what extent they are really just interested in

today: the immediate, the expedient."

In the future, Hodges would like to see turf research join the rest of the plant sciences in generating more basic information about turf problems. "We have been trying for the last 35 years to cure everything with fertilizer or pH and after awhile it gets a little silly. You begin to realize there are more complex, involved problems that we simply cannot solve by spraying some-

thing on a grass plant."

"If the trend doesn't change somewhat, we are going to become a lot of people carrying research titles, but in effect we are going to be functioning like (cooperative) extension men." Though Hodges believes more basic research is needed overall, he says there is currently "more aggressive" work being done in some areas, such as disease control where new dis-

IN-HOUSE LAWN CARE RESEARCH

Universities and corporations do not have an exclusive on turf research. Some of the larger lawn care companies have developed in-house research facilities to get answers to lawn care questions they feel the universities and corporations have not or cannot address. One such company is ChemLawn Corporation, headquartered in Columbus, OH.

"We try to cover the three major disciplines: fertility problems, insect management and weed control," says Dr. Kurt Hurto, research agronomist, ChemLawn. "We have three full-time research scientists who coordinate those projects." Those three researchers coordinate the activities of 24 full-time employees who work on projects at facilities in Columbus, OH; Atlanta, GA; and West Palm Beach, FL. The Chemical Research and Development Department was initiated in 1973 when Dr. Robert Miller was hired by ChemLawn founder Dick Duke to provide agronomic expertise to the company, according to Hurto.

ChemLawn's commitment to turf research was recently reaffirmed with the completion of a \$1.5 million Research and Support Center near Delaware, OH. Approximately 20 acres of the 109 acre complex are currently being developed for turf and five acres for woody ornamental research. The main support building consists of 10,000 square feet of office and laboratory space for the ChemLawn Chemical Research and Development Department, the ChemLawn Diagnostic Laboratory and the ChemLawn Clinical Laboratory (cholinesterase testing).



ChemLawn research facility

ChemLawn's research is designed to find answers to problems their applicators face on the job every day. "Our function is to try to optimize our programs given the available compounds or actually work with chemical manufacturers who make basic pesticides and fertilizers," Hurto says. The research team works on registration of unregistered pesticides and also makes formulation improvements on pesticides based on the company's field-use conditions.

Hurto says the universities are not providing the data they need because more than half of university research is attuned to the special requirements of golf courses and sod growers. "We are not trying to duplicate that research and we are not involved in basic research," Hurto says. "That is better left to the universities that have a lot more equipment available to them and a lot more disciplined support areas."

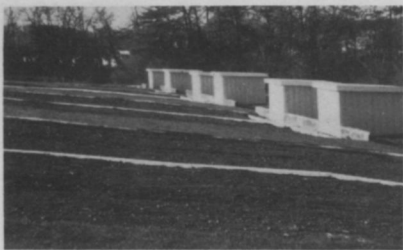
Like ChemLawn, Tru-Green Corporation, East Lansing, MI, also conducts research to deal with problems specific to lawn care in its market. Tru-Green does some in-house lawn product evaluation in conjunction with chemical companies and also sponsors research grants at universities. Dr. Al Turgeon, vice president/Research at Tru-Green, echoes Hurto's sentiments on wanting to avoid duplication of uni-

versity research.

"We monitor very carefully what the universities are doing," Turgeon says. "We also draw what information we can from various industrial sources to get information we need regarding product performance. We try to either confirm or complement what's going on in the academic arena as well as the industrial community."

Turgeon sees university research as largely golf-oriented and would like the emphasis to shift somewhat towards lawn care applications. He says certain aspects of turf care like mowing height and irrigation which follow the golf course model in university tests have little relevance to the home lawn situation. "Universities should perform certain types of evaluations and research under conditions that more accurately approach that which we find typically in the lawn," Turgeon says.

Some university researchers are gathering data that has no relevance to their constituents in the turf industry simply because of a lack of communication, according to Turgeon. The lawn care industry should take a lesson in communication from the golf course industry. "There is a lot of room for improving the communication between lawn service industry people and university people." — *Tim Weidner*



Developing Penn State University runoff research area. The small buildings are built over catch basins at the bottom of the slopes. The facility is designed to monitor water quality after application of nutrients and pesticides.

eases are being identified and old diseases are being reinterpreted.

But a much greater threat than questionable research orientation may lie ahead for the future of turf research. Hodges fears that if universities are forced to tighten their belts, if student numbers drop, if the recession rears its ugly head again, research in non-food or fiber commodities like turf will be the first to get the ax in university budget cuts. "Economics could be the real killer," Hodges says. His department has already gotten a taste of what the future may hold when they encountered considerable difficulty in filling the vacated post of a colleague. The university wanted to "freeze" that position and thus eliminate that payroll expenditure.

Ongoing research in all turf disciplines can, in large part, thank the golf industry for its livelihood, according to Hodges. Golf course superintendent groups have been very vocal in their support of turf research. "They have been willing to beat on the doors of deans and say, 'We want somebody in the university who represents our interests.' That is really what has kept it alive. In the future, I wonder if making noise is going to carry enough weight."

At least one turf researcher has a different outlook for the future of turf research. Dr. Tom Watschke, professor of Turfgrass Science, Department of Agronomy, Penn State University in University Park, PA, sees the professional lawn care industry taking a new role and prominence in turf research.

"The success and development of the professional lawn care industry in the last five to eight years has brought their problems into focus," Watschke says. "Work at experiment stations has also involved solving some of their problems."

Impetus for lawn care research has come from two directions, according to Watschke. First, there is research work being done specifically designed to correct problems of the lawn care industry. Second, some of the research has originated with chemical companies that have perceived this industry as a hot new marketplace for their products. "The most significant change that has occurred in the last five years, related to turf research, has been an awareness by chemical companies that specialty products for turf and ornamentals are

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UNIVERSITY OF RHODE ISLAND RESEARCH

BY RICHARD J. HULL

What follows is an outline of turfgrass research currently in progress at the University of Rhode Island, Kingston, RI. Those studies most related to lawn care problems are emphasized in this listing, but others are included to provide a comprehensive overview. Principal investigators for each project are listed and they may be contacted for additional information.

- Evaluation of growth retardants to reduce mowing and conserve water on lawn turf. Disease susceptibility of retarded turf is being investigated.

..... J. Jagschitz and N. Jackson

- Pre- and post-emergence herbicide evaluation for smooth crabgrass control in lawn turf, including turfgrass tolerance to herbicides. Also pre-emergence control of annual grasses in bentgrass putting green turf is under investigation..... J. Jagschitz
- Turfgrass evaluation of newer varieties of Kentucky bluegrass, red fescue, perennial ryegrass, tall fescue and hard fescue. Some of these are part of national or regional performance trials.

..... R. Skogley and T. Duff

- Selection, breeding and evaluation of turfgrasses for reduced maintenance. Major effort is on the fine fescues and bentgrasses, but perennial ryegrass, Kentucky bluegrass, tall fescue and



sweet vernal are also being studied.

..... R. Skogley

- Nutrient use efficiency of turfgrasses with emphasis on the identification of physiological traits which contribute to lower nutrient needs. Nutrient management for greater efficiency through the use of nitrification inhibitors or slow release fertilizer formulations is being studied.

..... R. Hull, R. Skogley and A. Gold.

- Evaluation of experimental and commercial fungicides for disease suppression on turf. Disease management on lawn turf is also being studied as is the basic biology of several turfgrass pathogens..... N. Jackson

- Allelopathic interactions between

turfgrasses and between turfgrasses and weeds are being studied with the hope of improving lawn renovation and establishment practices..... T. Duff

- The establishment, maintenance and evaluation of turfgrasses for roadside plantings..... R. Wakefield

- The impact of management and environmental stresses on the energy distribution within lawn turf.

..... R. Hull and T. Duff

- Chemical renovation of lawn areas including seasonal influences on total kill chemicals..... J. Jagschitz

Richard Hull is professor of plant science in the Plant Science Department at the University of Rhode Island.

TURF RESEARCH

(continued from page 29)

already a large market and potentially a huge market," Watschke says.

The chemical companies watched O.M. Scott and Sons take an early lead in providing turf products to the home lawn market and decided Scotts had already cornered this market. In the last five years, turf product manufacturers have become aware of the immense acreage serviced by professional lawn care operators and have realized what they have been missing. "You are seeing chemical companies that have not had people in the area of specialty crop development, beginning to think about that as something they should be doing," Watschke says. "That trickle effect comes down to universities in the form of institutional grants."

Limited university grant money is coming directly from individual lawn

care companies, according to Watschke, but their contributions are really necessary and turf product manufacturers are becoming more and more willing to carry some of the freight. The chemical companies are supplying money to universities to support lawn turf research so they can continue to supply product line.

It is not so much the case that manufacturers are developing products from scratch specifically for the lawn care market, this industry is not *that* big. Rather, Watschke believes chemical companies are beginning to take another look at formulations that did not pan out for food or fiber crops, in the hope of discovering lawn care applications they had never considered when the original formulations were developed.

On the question of basic research versus applied research, Watschke sees no danger of an imbalance between the two. "As long as there are enough research dollars around to keep the graduate programs viable at the land grant

institutions where there are turf programs, it is pretty much a fail-safe that there is a good blend between basic and applied." There are a certain number of turf problem brushfires that must be put out with applied research, according to Watschke, which gives an applied bent to most research programs. "I don't see any erosion of the basic work that should be done."

Extension research. The universities' perception of the value of cooperative extension work is very good. However, more test demonstration work could be supported so extension faculty would be free to do more test demonstrations to provide a vehicle for passing turf information on to the homeowner.

"In most states, the county extension staff are not trained in turf and they have to deal with all the enormous problems of the farm community," Watschke says. "So when the problems of the urban or suburbanite comes to

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TURFSEED MARKET REPORT

BY TIM WEIDNER

Plant commodities in general are tough markets to follow, but the turfseed market in particular is subject to a good deal of fluctuation from year to year. Any number of maladies can befall a turfseed crop still in the field which will affect pricing and availability of that seed when it reaches the market a year after it is harvested. Some years the soil conditions are too dry, too wet, too cold, too hot or a combination of these variables and others. It seems like every year there are production shortages and price hikes for certain varieties because of snags in the field-to-market cycle.

Seed being harvested this month by turfseed growers in the fields of the Pacific Northwest will be bagged and in the hands of your suppliers in time for the 1985 lawn care season. Those involved with the turfseed production process already have a pretty good idea of how the 1985 market is going to shape up. Dr. Rich Hurley, product manager, Lofts Seed, Inc., headquartered in Bound Brook, NJ believes 1985 seed prices will remain pretty much the same as in 1984.

Lofts Seed. In terms of specific varieties, Hurley looks for a more than adequate supply of turf-type perennial ryegrasses. "As far as the turf-type tall fescues," Hurley says, "there is increasing production. The supply is better than it has been in the past and the pricing will remain pretty stable." Still, Hurley anticipates the turf-type tall fescues to be sold out by late spring to early summer of 1985. For bluegrass

(continued on page 32)



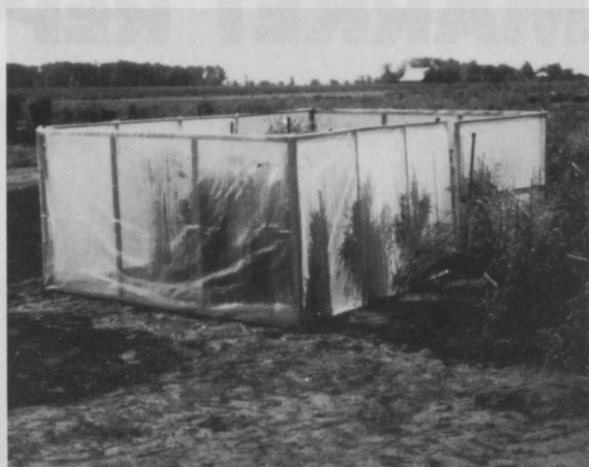
Lofts Seeds, Inc. 'Mystic' (P-141) foundation field.



Dr. Richard Hurley, Lofts, inspects University of Maryland tall fescue trials.



International Seeds, Inc. 'Vantage' production field.



Isolation box for pollinization, International Seeds.

production, Hurley says the field will be mixed with some varieties in short supply, while others will remain readily available. "If anything, bluegrass prices will be a little higher."

Right now, ryegrasses are in big demand because they are relatively easy to establish, according to Hurley. "They are attractive and persistent and a lot of the newer varieties on the market have performed quite well in a variety of situations," Hurley says. This year Lofts has a couple new varieties with characteristics lawn care businessmen are looking for. This is the first year for Repell ryegrass, which is insect-resistant by virtue of an endophytic fungus. The company also has a new Kentucky bluegrass called Nassau which has dark green color and excellent fall, winter and spring color, according to Hurley. For the 1986 turfseed market, Hurley is currently working on an improved version of Rebel turf-type tall fescue called Rebel II.

Pioneer/Hi-Bred. Scott Patterson, product manager of Turf Products, Pioneer/Hi-Bred International, Inc. of Savage, MN, concurs with Hurley on the opinion that prices for Kentucky bluegrasses will rise. "The amount of increase is difficult to establish right

now until they get done with harvest," Patterson says. The turfseed harvest is usually completed by the end of July. For the other varieties, Patterson predicts a "slight" price reduction for perennial ryegrasses and ryegrasses in general. Fescues in general will remain stable because "...that is kind of a weak

might have established." The fields were either not burned or inadequately burned because the ground was too wet, according to Patterson. The soil that was improperly prepared last fall has resulted in sparse Kentucky bluegrass seedheads this summer. This development will also strain common Kentucky bluegrass varieties which are plagued by wet fields right now.

Jacklin Seed. Harry Butler, vice president of Marketing at Jacklin Seed, Post Falls, ID, also has gloomy predictions for Kentucky bluegrass pricing and production. "It's not a rosy story," Butler says. "We estimate common Kentucky bluegrass production will be down about 30 to 35 percent of normal, which will reflect in higher prices." Production of proprietary bluegrasses may be even lower than common Kentucky bluegrasses, according to Butler. "If I had to put a figure on it, I would say proprietaries will be down in production from normal by about 50 percent."

Butler also cites improperly burned fields last fall caused by wet conditions, but he says cold weather was also a factor. "Our ground temperature got too cold and the fertilizer didn't have a chance to affect the plants." Price increases for the proprietary bluegrasses should be a mixed bag, but Butler predicts an overall 1985 price increase of 30 percent for these varieties.

Pickseed West. Price increases for Kentucky bluegrasses are also predicted by Gerry Peppin, director of research for Pickseed West, Tangent, OR. However, Peppin looks for 1985 turf-type tall fescue prices to "remain steady," perennial ryegrasses to "come down a bit" and common bluegrasses will "remain quite cheap."

In the turfseed business, production difficulties of years past can haunt present marketing decisions. "The private varieties are contracted for a period of

In the turfseed business, production difficulties of years past can haunt present marketing decisions. "The private varieties are contracted for a period of years, so you try to get a balance between what you think you will be selling one, two and three years out, with a projected production for those years as well."
— Gerry Peppin, director of research, Pickseed West

market, if there is any reduction or increase it will be slight."

The anticipated increase in 1985 bluegrass prices can be blamed on production problems which occurred last fall. "Normal procedure is to burn the fields after harvest," Patterson says. "It has various benefits, number one, to shock the plants back, number two, to destroy diseases and weeds that

years, so you try to get a balance between what you think you will be selling one, two and three years out, with a projected production for those years as well," Peppin says. "These are all perennial crops and they are going to be in for a number of years, so you have to be careful to keep supply and demand in a pretty good balance."

That is one of the reasons turfseed

producers like Pickseed West look for good seed production as an important characteristic in any turf variety. Other key characteristics are improved turf performance and better disease resistance. "Those are the same objectives we have had for 10 years," Peppin says. "You always get better and better — better seed production, better disease resistance and better turf quality."

One characteristic breeders are working to develop in certain varieties is the presence of endophytic fungi, which is the case with Lofts' ryegrass Repell. Pickseed is also doing work with endophytes in perennial ryegrass and tall fescue. "We won't have any seed this year, but next year we anticipate having a large amount of seed that will be very high in the endophyte and



Planting tillers for research, International Seeds.

should have good insect resistance," Peppin says. The insect-resistant variety Peppin is referring to has not yet been given a trade name, but it will be a perennial ryegrass. He says so far the endophyte has shown no advantage or disadvantage when incorporated in the turf-type tall fescues.

International Seeds. Peppin notes that the endophyte is actually bred out of the grass types used for livestock forage. In the perennial ryegrasses the endophyte has provided insect-resistance, but is harmful in forage grasses. "Endophyte will cause problems with weight loss in beef cattle," says Harry Stalford, vice president/product development, International Seeds, Inc., Halsey, OR.

International is doing endophyte work, but they are also interested in less exotic turfseed characteristics like rust resistance and seed yield. An important part of the screening process is carried out in regional testing programs designed to isolate turf problems specific to the various regions of the country. "The people in the east breed for brown patch and they have diseases we don't have out here," Stalford says. "But if you really want to breed for

An important part of the screening process is carried out in regional testing programs designed to isolate turf problems specific to the various regions of the country.

seed yield and rust resistance, you have to bring it to Oregon. We have an exchange program going on with everybody."

As mentioned by other turfseed experts, Stalford says the turf-type perennial ryegrasses and turf-type tall fescues are the "hot" varieties right

now. "The perennial ryegrasses are quick germinating; you can expect germination in five to 10 days," Stalford says. He notes that these varieties have good heat tolerance and mix well with Kentucky bluegrass. Drought tolerance has become a more important

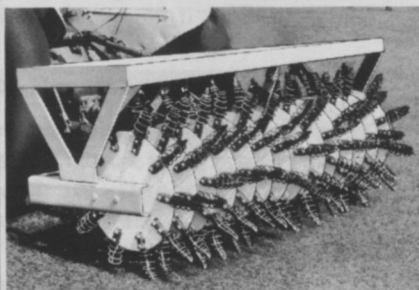
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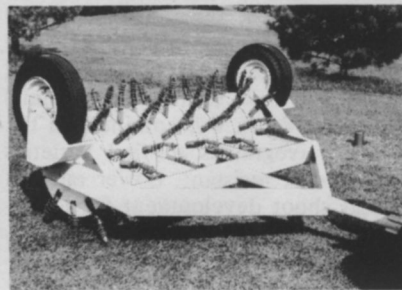
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MARKET REPORT

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Seed being harvested, International Seeds.



Plants to be studied for research, International Seeds.

characteristic in light of the droughts of recent years and turfseed researchers have met the demand by improving the appearance of the tall fescues which have good drought tolerance.

In the future, Stalford foresees the development of new turf-type tall fescues that form more dense turf and have finer blades. He says these tall fescues will look more like perennial ryegrasses. Work will continue on the perennial ryegrasses to find varieties that are rust resistant. Lower rates of vertical shoot development for lower-growing turf is also sought.

The search for drought-tolerant spe-

cies has taken International Seeds researchers out of the realm of grass plants. The company is currently working with a strawberry clover called Fresa which was developed at New Mexico State University for drought-tolerant lawns. "If you want a natural

ning on the part of turfseed producers. Stalford says the term "long-range planning" sounds good on paper, but the realities of a fluctuating economy and other stumbling blocks make it difficult for this industry to do the kind of long-range planning it should. "Say we are going to produce 500 to 1,000 acres of a perennial ryegrass," Stalford says. "You just don't get into it one year and out of it the next year. It takes many years to get a variety to the marketplace — five to eight years to develop a new variety from scratch."

The development of a new variety can cost a seed company \$200,000 to \$300,000. "The company that develops it is entitled to a return on that product. We plan a life expectancy for varieties of five to 10 years." However, variety life expectancies are shifting upward, according to Stalford. There are currently varieties on the market more than 10 years old which still command a large market share.

Conclusions. Stalford advises the smart lawn care businessman to keep an eye out for new turfseed varieties. He says a lot of people who have come to like the results they are getting with a particular variety are hesitant to try a new variety. "It is hard to beat success," Stalford says. "It is getting harder and harder to sell varieties against the old standard varieties." Even so, he says lawn care people should be constantly looking for ways to improve lawn green-up, drought tolerance, etc., to keep their competitive edge. New turfseed varieties are one weapon in the battle against the competition.

It looks as though lawn care operators' arsenals may be lacking some varieties of Kentucky bluegrass in 1985. The growing field conditions of late 1983 have affected the growth of the 1984 turfseed crop which will hit

The search for drought-tolerant species has taken International Seeds researchers out of the realm of grass plants. The company is currently working with a strawberry clover called Fresa which was developed at New Mexico State University for drought-tolerant lawns.



Seed in storage, International Seeds.

vegetation cover for your lawn that will be green, you kind of throw out the rule book and go after all species of plant material that will be acceptable," Stalford says. This clover is low-growing and searches for water with a tap root that may extend two to four feet downward, depending on soil types, according to New Mexico State.

The development of turf species like the strawberry clover involves a great deal of research and long-range plan-

the shelves in 1985. Prices may be steep and availability poor for some Kentucky bluegrasses, so businessmen should start thinking about ordering their seed supplies early or substituting other varieties in their lawn seeding programs for 1985. In other words, it will be business as usual in 1985, since there are seed supply problems every year. "There will be shortages of certain varieties," Stalford says, "but that is nothing new."

PTO VS. AUXILIARY: A PUMP DRIVE COMPARISON

BY J.H. "SKIP" STRONG

In the past 10 years there has been an extreme amount of conversation about how lawn care spray units should be driven. In this article I will attempt to prove that from an economic standpoint, the auxiliary engine drive should be your best choice.

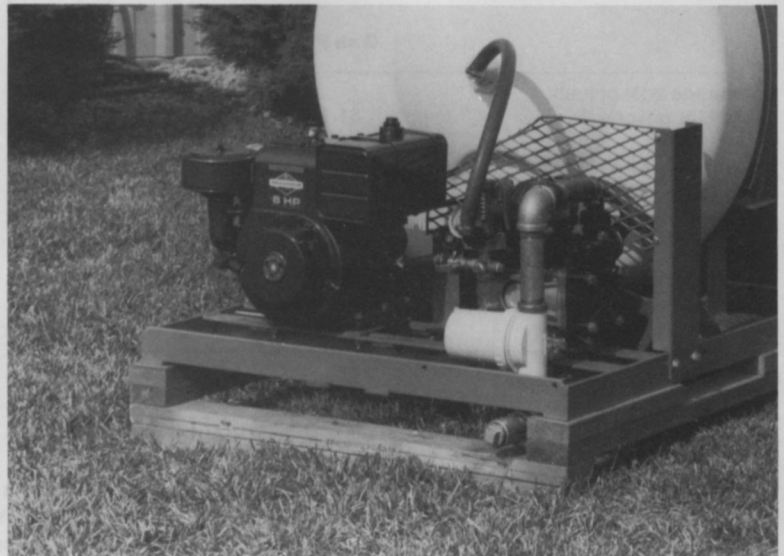
There have been many comparisons of diesel trucks with gas-powered trucks and the savings of one over the other in fuel and maintenance costs. These comparisons have been published in many national lawn care trade publications. It has been proven without a doubt that a diesel truck with PTO (power take-off) drive is far more economical in maintenance and fuel costs.

What does the spray unit cost to operate when the sprayer has arrived on the job and is now at idle with the PTO in gear and operating the pumping unit? What can the small lawn care operator do to save fuel and operating costs when he cannot afford to purchase a diesel truck?

Let's first look at the basic diesel engine, for example, in an over-the-road freight carrier truck. The average engine in such a truck will travel 200,000 miles before needing any type of overhaul work. In that time, and in most cases, the engine will only require normal oil and filter changes. By the same token, a gasoline-powered vehicle will need at least a valve job by the time it has about 60,000 miles logged on it. To use a fair average, let's say the normal lawn care unit travels 20,000 miles in one year's time. Take a look at the comparisons in Chart A to see how long that truck could operate with each type of engine before requiring its first major overhaul.

We have established that by traveling at an average of 20,000 miles per year without running the PTO, the gasoline engine will last three years before needing a top-end overhaul. The diesel engine will last 10 years. In Chart B we will compare diesel and gasoline engine wear when both units are also powering PTO systems.

When driving the pumping system of your lawn care unit, the gas engine will need a top-end overhaul every year and the diesel engine will need the same repairs every 3.3 years. It is common knowledge in the trucking business that when you are operating a PTO for a long



	Miles before top-end overhaul	Time periods (years)
Gas engine:	60,000 divided by 20,000 miles per year	3
Diesel engine:	200,000 divided by 20,000 miles per year	10

CHART A

	Miles before top-end overhaul	Actual miles	Time period
Gas engine:	20,000 (on odometer) X 3	60,000	1 Year
Diesel engine:	66,666 (on odometer) X 3	200,000	3.3 Years

CHART B

period of time, you should multiply the miles on the odometer by three to get an estimated actual miles. This comparison is based on the estimate that in an eight hour day, the operator spends five hours spraying, two hours in traveling time and one hour for lunch. The five hours of spraying and operating the PTO on a daily basis is a considerable amount of time. This also provides justification for multiplying the odometer

(continued on page 36)

PTO VS AUXILIARY

(continued from page 35)

mileage by three.

Now that we have compared diesel and gasoline engine lives, let's see what happens to the fuel cost and life of the engines in Chart C when the PTO drive is removed and an auxiliary engine is installed.

Looking at Chart C, we see a total savings of \$1,582 in the operation of an gas-powered auxiliary engine over a gas-powered PTO. If you are a small operator with one vehicle you are saving \$1,582 per year. If you have five lawn care units you will be saving \$7,912 per year. One of our clients has 30 units working yearly and is saving \$47,475 annually.

If you are a northern lawn care operator, you

are probably spraying only nine months of the year, so your savings would translate into \$1,186.88 per unit per year. Our computations are based on Florida's year-round working conditions.

So, if you are using a PTO on your gas-powered vehicle, you can expect it to last only one year before a top-end overhaul is necessary. Using an auxiliary engine to power your spray rig will extend your gas engine's life to three years between overhauls. If you are using a PTO on your diesel-powered vehicle, you can expect it to last 3.3 years before a top-end overhaul is necessary. Using an auxiliary engine to power your spray rig will extend your diesel engine's life to 10 years between overhauls.

As you can see, an auxiliary engine powering your pumping system will triple the life of your truck's engine — whether it is gas- or diesel-powered. If you take into consideration the savings in truck engine maintenance and reduced fuel consumption, you will be saving even more. Also keep in mind that a one cylinder gasoline auxiliary engine is a lot more economical to repair than an eight cylinder gas or diesel truck engine that would otherwise be doing the auxiliary engine's work. It should be clear by now that the auxiliary engine drive for your pumping unit is the best choice.

Skip Strong is the president of Strong Enterprises of Miami, builders of tank truck spray rigs. If you like more information about PTO versus auxiliary power, contact Skip at Strong Enterprises, 4240 SW 72nd Avenue, Miami, FL 33155; 305/264-5525.

	Gas PTO	Gas auxiliary engine
Average cost of fuel per U.S. gallon	\$1.15	\$1.15
Gallons used per day while operating	7.5	2
Fuel cost per day	\$8.63	\$2.30
Working days per year	250	250
Total cost per year	\$2,157.50	\$575.00

CHART C

TURF RESEARCH

(continued from page 30)

him in the shape of a turf or ornamental problem, he may not have much more to draw upon than an extension circular that was sent to him by the turf extension specialist for the state." Watschke proposes that university extension people have time set aside for regional field days to instruct homeowners in lawn maintenance.

Watschke's suggestion hinges on some of the unique characteristics of university extension research. While similar to the field work-intensive nature of non-extension applied research, extension research has some features unique to itself. "In some cases it will not necessarily follow the rigorous research approach that even applied or basic research will follow," says Dr. John Street, extension agronomist, Department of Agronomy, Ohio State University, Columbus, OH. Extension researchers do not necessarily have to adhere to the exacting experimental design generally followed in applied and basic research, according to Street.

Extension research is also generally on-site work rather than experiment

station field work or laboratory work. "The extension agent may work with lawn care companies in attempting to solve on-site problems," Street says.

But like the research disciplines, extension work is not without pitfalls.

The chemical companies watched O.M. Scott and Sons take an early lead in providing turf products to the home lawn market and decided Scotts had already cornered this market. In the last five years, turf product manufacturers have become aware of the immense acreage serviced by professional lawn care operators and have realized what they have been missing.

Street perceives a certain amount of difficulty in competing with food and fiber crop agricultural research for funding. "Since we are a non-food commodity, it is a problem where we are in competition with food crops for grants from

various types of agencies," Street says. An ability to go with the changing needs of turf research may be this research discipline's saving grace in the face of future challenges.

"We're tending to emphasize low maintenance type grasses today because of the problems we are having with resources," Street says. Today's research is moving toward analysis of maintenance practices that will support lower maintenance, lower water-use programs without sacrificing a tremendous amount of turf quality, according to Street. There is also research afoot at Penn State University to discover if lawn care chemicals are contaminating the environment. "We don't believe we are, but it is hard to defend your position if we don't have information to support it," Street says.

Conclusions. Turf research in general has hardly reached a state of utopian stability. Most researchers would like to see an aspect or two of their field changed, but all agree that turf research has made remarkable strides forward in sophistication in recent years. University agricultural departments and chemical company research divisions that previously had no facilities or personnel for turf research are reevaluating this industry. Most ex-

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PROPER PESTICIDE APPLICATION TIPS

BY LLOYD HAHN

THE COST OF THESE CHEMICALS AND THE HAZARD OF MISAPPLICATION MAKE IT IMPERATIVE THAT THE OPERATOR APPLY THEM ACCURATELY.

Over the last few years, a number of new chemicals have become available to lawn care operators for controlling insects, weeds and diseases. The cost of these chemicals and the hazard of misapplication make it imperative that the operator apply them accurately. While this article is directed primarily toward boom spraying, most of the suggestions described will also apply to hose and gun application.

First of all, forward speed must be uniform regardless of the mode of application. Many turf areas are on uneven terrain. A vehicle's speed will decrease when climbing a hill and increase when traveling downhill, resulting in uneven application. We have found that manual transmissions will allow you to maintain a more steady rate of speed than hydrostatic transmissions.

It is also helpful if the engine speed is set at an RPM of at least three-quarters of the engine's rated top speed. If the sprayer does not have a speedometer, the speed should be checked against a measured distance. For general turf spraying, a speed of three to four miles per hour is most practical.

Another factor in application is uniform nozzle output. It is not unusual to find a boom sprayer with nozzles on the ends of the boom which put out 50 percent less spray volume than the nozzles in the center. This is caused by a hose or a boom pipe which is too small. Nozzle output can easily be checked by putting a gauge on the end of the boom to compare this pressure with the pressure registered on the gauge at the spray rig control center. The two readings should be similar.

There have been some definite improvements in nozzles in the past few years for the reduction of drift. A couple companies have produced low pressure, fan-type nozzles that have considerably reduced drift. If you want to use check valves on the nozzles to eliminate dripping when you turn at the end of a lawn, be sure to use the diaphragm-type since the ball-type check valves are not satisfactory. It is also important that the pressure regulating valve be of ample size and the pressure should be set at the machine at operating speed. The gauge should be located so it is easy for the operator to see at all times.

Your spray rig strainer should be checked every day before starting out. Remember that most wettable powder materials are difficult to use in boom-type sprayers. The tank should have adequate agitation to keep wettable powders in suspension. The return hose from the pressure regulator is usually not adequate for

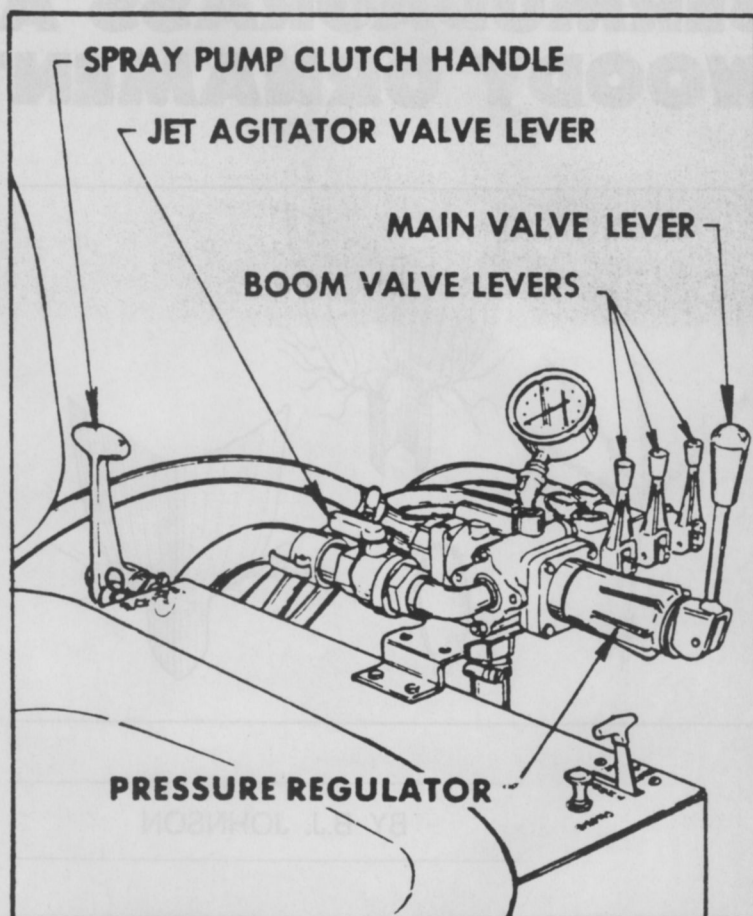


Diagram of a spray rig control center manufactured by Hypro Manufacturing Co.

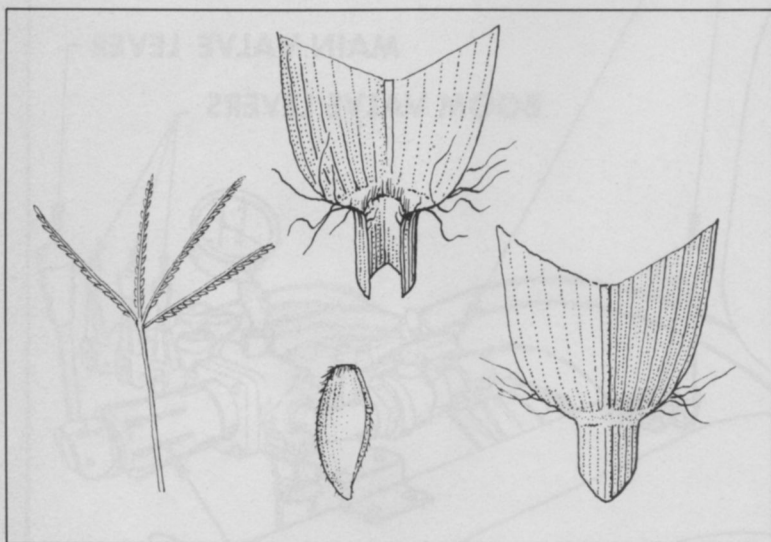
agitation. The unit should have a special hydraulic agitation line from the control center.

It is also important to know the hardness and pH of the water you use. If the water is more than seven grains hard, a spreader sticker tank additive should be used. Many of the chemicals used today break down rapidly if the water has a pH higher than six. For my own personal use at home, I add a small amount of battery acid to my spray water to lower the pH to five. Benlate®, for example, breaks down rapidly if the pH is above seven.

Liquid fertilizers and pesticides can greatly improve your customer's lawns, but they must be applied at the proper rate in a uniform manner. A little extra care on the part of the applicator can make a great deal of difference in your customers' satisfaction.

Lloyd Hahn is the chairman of Hahn, Inc., Evansville, IN.

EFFECTS OF EDGING HERBICIDE TREATMENTS ON BERMUDAGRASS AND WOODY ORNAMENTALS



BY B.J. JOHNSON

Bermudagrass is an important grass for lawns throughout the United States where warm-season grasses are grown. However, because it grows and spreads rapidly, it creates a problem along sidewalks, curbs, fences and around ornamentals. Therefore, it is desirable to control bermudagrass with herbicides in these lawn areas without injuring woody ornamentals.

Glyphosate and dalapon effectively control bermudagrass and are often used for renovation of old bermudagrass lawns. Even though glyphosate and dalapon controlled 90 to 95 percent of bermudagrass for two months⁴, bermudagrass in adjacent, untreated areas spread back into the treated area. Glyphosate did not injure bermudagrass when applied to dormant turf^{3,5}, but injured non-dormant turf⁵. Therefore, to obtain highest bermudagrass control with glyphosate, the grass must be green at the time of treatment.

Paraquat severely injured bermudagrass for two to three weeks after treatment, but the grass

was fully recovered after two months⁴. Therefore, chemical edging treatments of paraquat are required more frequently than glyphosate or dalapon treatments.

Within recent years, glyphosate has been used for weed control on a large number of woody ornamentals^{1,2,6,7}. The method of glyphosate application has varied from directed spray with shields to prevent spray contact on plants² to spraying directly over the tops of plants^{1,6}. Rates of glyphosate which control associated weeds occasionally cause slight injury to woody ornamental plants. Glyphosate injury to red tip photinia (*Photinia X frazieri*) varied from none⁸ to moderately burned leaf tips⁷.

Glyphosate treatments did not injure Japanese holly (*Ilex crenata* Thunb.)^{2,7}, Helleri holly (*Ilex crenata* Craig/Rehd.)², Hicks yew (*Taxus media* Rehd.)^{1,2}, andorra juniper (*Juniperus horizontalis* Rehd.)^{1,2} and Hetz junipers (*Juniperus chinensis* L.), but slightly injured burfordi holly (*Ilex cornuta* Lindl.)⁶. Perry and Knowles⁶ reported that Japanese holly was injured slightly more from glyphosate treatments than burfordi holly, although neither was permanently injured. Frank and Simon² reported that andorra juniper, Japanese yew (*Taxus cuspidata* Sieb.) and Japanese holly were larger when treated with selected glyphosate treatments than untreated plants.

Glyphosate apparently does not cause severe injury to most woody ornamentals, but information is limited or not available on the response of many woody ornamentals to paraquat or dalapon. Because these herbicides have post-emergence activity on bermudagrass, studies were conducted to determine the efficiency and number of applications of each herbicide needed for bermudagrass control in edging experiments, and response of eight woody ornamentals to the herbicide treatments.

Materials and methods. Three herbicides, glyphosate at 2.2 kg ai/ha, dalapon at 11.2 kg gi/ha and paraquat at 0.6 kg ai/ha were applied to the same plots in two experiments over a three-year period at Experiment, GA. Glyphosate and dalapon were applied in three applications during the first year and four applications during the following two years. Paraquat was applied in five ap-

(continued on page 40)

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EFFECTS OF EDGING

(continued from page 38)

plications during the first year and seven applications during the following two years. Dates of herbicide treatment were the same in both experiments.

A surfactant (alkylarylpoloxyethylene glycols free fatty acid isopropanol) was applied with paraquat at 0.5 percent (v/v). All herbicides were applied broadcast in 375 L/ha of water. The herbicides were applied to the foliage of common bermudagrass in the first experiment for chemical edging control and directed under the foliage of eight woody ornamentals in the second experiment. The woody ornamentals were andorra juniper, flowering dogwood (*Cornus florida* L.), red tip photinia, dwarf burfordi holly 'Burfordi Nona', Japanese holly 'Hetzi', Yaupon holly (*Ilex vomitoria* Ait. 'Schillings'), pyracantha (*Phyrcantha coccinea* Roem. 'Graberi-red') and flowering cherry (*Prunus yedoensis* matsum. 'Yoshino').

In the bermudagrass edging experiment, herbicides were applied to 30 centimeter by three meter plots, replicated four times. A 60 cm untreated bermudagrass strip separated all treated plots. Herbicides were repeated when bermudagrass control was reduced approximately 50 percent either by encroachment from untreated turf or regrowth from crowns and rhizomes that survived herbicide treatment within the plot. When each herbicide was applied in the edging experiment, it was also applied in the ornamental experiment. The ornamentals were planted 90 cm apart in 1978 with four plants/pot, replicated three times.

Each of the ornamental species was planted in alternating rows. The ornamentals were small (approximately 30 cm in height) at planting. Immediately after the ornamentals were planted, common bermudagrass seed were uniformly planted throughout the test area. Herbicide treatments were initiated in 1979 after the ornamentals were established. Herbicides were applied across the rows (i.e., perpendicular to the rows)

as a spray directed under the foliage to the base of the plants. The herbicides were applied in a 30 cm spray width pattern on both sides of each ornamental plant. Bermudagrass in both experiments was mowed at weekly intervals during spring and summer. Clippings were removed in the edging experiment, but not in the ornamental experiment.

The bermudagrass and ornamentals were fertilized at 500 kg/ha of 10:4:4:8.3 (N:P:K) in April of each year. In addition, N at 50 kg/ha was applied to bermudagrass at monthly intervals during spring and summer. Irrigation was applied as needed to maintain optimum growing conditions. Both experiments were conducted

These results show that glyphosate, dalapon and paraquat treatments are safe to apply directly under the foliage for edging around the woody ornamental species included in this study.

on Cecil (Typic Hapludult) sandy loam with 18 percent clay, 16 percent silt, 66 percent sand and 1.0 percent organic matter.

Bermudagrass control ratings in the edging experiment were based on 0 = no control and 100 = complete control and were made at various time intervals during spring, summer and early fall. Growth index ratings (height + width/2) for the ornamentals were made in June and October each year. The ornamentals were pruned uniformly after the ratings were made. Early spring growth ratings of ornamentals were made in March or April and based on 1 = no growth and 5 = normal growth. Plant counts of ornamentals within each plot were made prior to the first herbicide treatment in 1979 and seven to eight months after final treatments were made in 1981.

Treatments in the bermudagrass edging experiment were arranged in a complete randomized block design. Each ornamental type in the ornamental experiment was analyzed separately in a complete randomized block design. All data were analyzed statistically and differences were compared using LSD at 0.05 level. The data reported from the ornamental experiment are an average of three years. However, due to a herbicide treatment by year interaction, the data are reported for separate years in the bermudagrass edging experiment.

Results. The control of bermudagrass (June 1) one week after the first treatment with glyphosate, dalapon, or paraquat in 1979 was poor (Figure 1). The activity of dalapon was lower on bermudagrass at this date than were the activities of glyphosate or paraquat. However, by June 21, dalapon resulted in the highest activity with 92 percent control. This chemical maintained an acceptable control (above 80 percent) with two applications (May 25 plus July 13) until August 24. After a third dalapon application August 28, bermudagrass control improved to 84 percent when final ratings were made October 15.

Bermudagrass control with glyphosate or para-

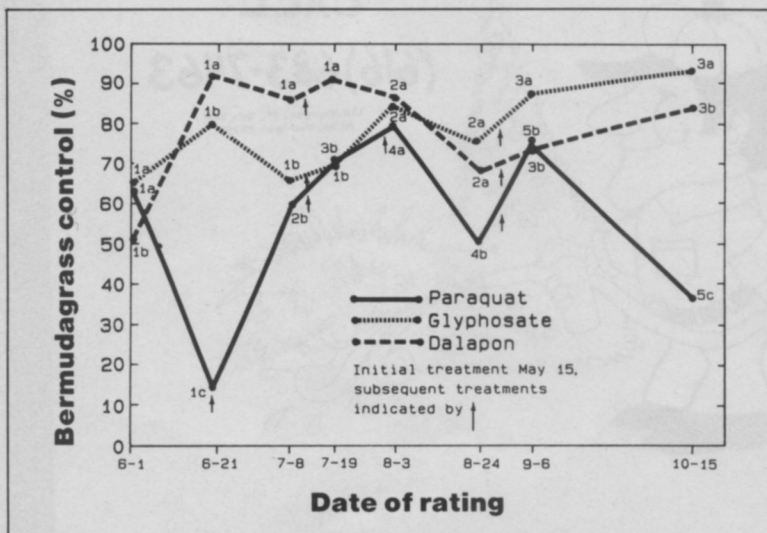


Figure 1. Influence of herbicide treatments on bermudagrass control in edging experiment in 1979. The numbers at data points represent the number of applications of each herbicide made to the plots. The letters at data points represent significance of comparisons of herbicide treatments for each date.

quat was not as good as with dalapon during June and throughout July (Figure 1). The control with paraquat was unacceptable until August 3 after four applications had been made. However, the residual activity of paraquat on bermudagrass was short and the control after August 3 was not consistent for the remainder of the summer and early fall. Dalapon activity on bermudagrass was superior to that with glyphosate in July, but the control was equal from the two herbicide treatments in August. However, during September and October, glyphosate controlled a higher percentage of bermudagrass than dalapon.

These results show that the level of edging control from herbicides applied during the first year varied with herbicide treatment. None of the herbicides controlled bermudagrass completely during the year. The control with paraquat throughout the first year was not as good as with glyphosate or dalapon. Only twice was the control with paraquat equal to the highest control obtained with either glyphosate or dalapon. Bermudagrass control with dalapon was higher than glyphosate in late June and July, equal to glyphosate in August, but less than glyphosate in September and October.

Paraquat failed to control bermudagrass effectively (80 percent or higher) throughout the spring and summer during 1980 (Figure 2). The control was finally increased to 80 percent by October 3 after a total of seven applications applied during the summer. Dalapon and glyphosate resulted in excellent bermudagrass control

in May from a single application, but the control was reduced in June without additional treatment. A second application increased bermudagrass control to an acceptable level for both herbicides by July 8.

The residual control from two applications
(continued on page 42)

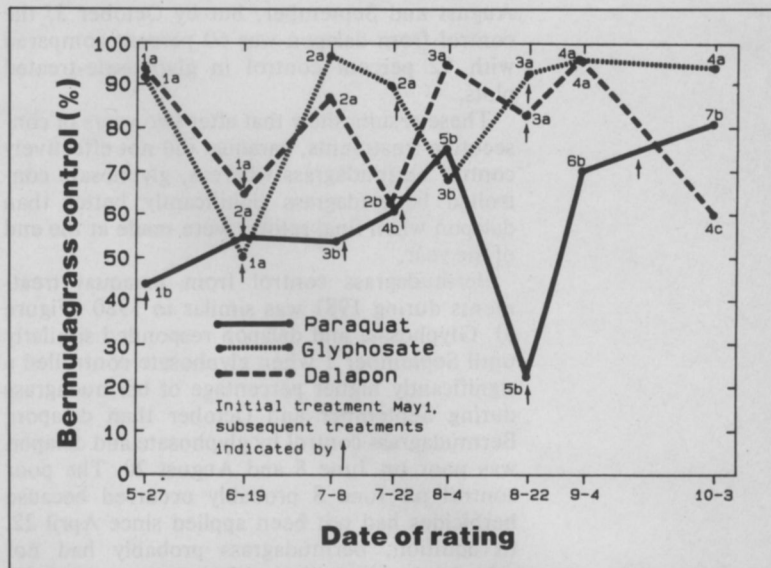


Figure 2. Influence of herbicide treatments on bermudagrass control in edging experiment in 1980. The numbers at data points represent the number of applications of each herbicide made to the plots. The letters at data points represent significance of comparisons of herbicide treatments for each date.

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EFFECTS OF EDGING

(continued from page 41)

was higher July 22 from glyphosate than dalapon. However, dalapon responded quicker to a third application than did glyphosate when ratings were made August 4. The control from glyphosate and dalapon was similar during late August and September, but by October 3, the control from dalapon was 60 percent compared with 92 percent control in glyphosate-treated plots.

These results show that after two years of consecutive treatments, paraquat did not effectively control bermudagrass whereas, glyphosate controlled bermudagrass significantly better than dalapon when final ratings were made at the end of the year.

Bermudagrass control from paraquat treatments during 1981 was similar to 1980 (Figure 3). Glyphosate and dalapon responded similarly until September 1 when glyphosate controlled a significantly higher percentage of bermudagrass during September and October than dalapon. Bermudagrass control by glyphosate and dalapon was poor on June 8 and August 20. The poor control on June 8 probably occurred because herbicides had not been applied since April 22. In addition, bermudagrass probably had not completely greened-up when treatments were made in April. The poor control on August 20 probably occurred because 0.5 cm of rain fell during the day of treatment and herbicides had not been applied since July 7. Therefore, it was necessary to repeat treatment of glyphosate and dalapon to maintain effective bermudagrass control.

Conclusions. In summary, even though there was a year by herbicide treatment interaction for bermudagrass control in the edging experiment, these results show that paraquat will not effectively control bermudagrass when applied as many as seven applications per growing season. These results with paraquat agree with an earlier study where the chemical gave only temporary bermudagrass control⁴. To obtain optimum ber-

mudagrass control with glyphosate or dalapon, treatments must be applied at approximately four-week intervals. When repeated applications are delayed for a longer period, bermudagrass control was rapidly reduced. Neither glyphosate nor dalapon was consistently better than the other in controlling bermudagrass during the spring and summer. However, the control with glyphosate was higher than dalapon in two of three years when ratings were made in September and in all years when ratings were made in October.

Glyphosate, dalapon or paraquat treatments did not injure any of the woody ornamental species included in this study. There was no herbicide treatment by year interaction in growth for any of the ornamentals. In most instances, the plants were larger in treated plots than in untreated plots. Frank and Simon² reported that selected ornamental species were larger in glyphosate-treated plots when compared with plants in untreated plots. This was probably due to the elimination of the competition from bermudagrass and weeds.

Paraquat delayed the initiation of growth of flowering cherry and flowering dogwood, while dalapon delayed the growth of only flowering dogwood. The growth of the other ornamentals was not affected by any of the herbicide treatments. However, new growth of andorra junipers, Japanese holly and Yaupon holly was higher when treated with glyphosate or paraquat when compared with untreated plants. Similar response occurred with Japanese holly and Yaupon holly when treated with dalapon. Spring growth ratings were not made in 1982 for pyracantha due to severe winter damage.

None of the herbicide treatments reduced the number of plants per plot in this study throughout the three-year period (data not shown). These results show that glyphosate, dalapon and paraquat treatments are safe to apply directly under the foliage for edging around the woody ornamental species included in this study.

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B.J. Johnson is a professor of agronomy at the University of Georgia, Experiment, GA. This article was reprinted with the author's permission from Weed Science, 1983, Volume 31:707-711.

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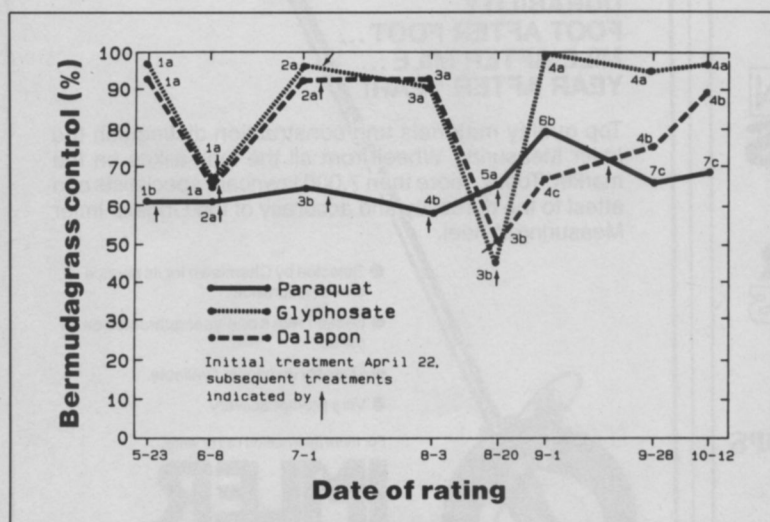


Figure 3. Influence of herbicide treatments on bermudagrass control in edging experiment in 1980. The numbers at data points represent the number of applications of each herbicide made to the plots. The letters at data points represent significance of comparisons of herbicide treatments for each date.

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citing of all, for lawn care businessmen, is the news from Dr. Watschke that this industry in particular is beginning to at-

tract research attention from universities and turf product manufacturers alike.

The golf course market has been a research testing ground for potential turf products for much of the last 50 years, but now universities and industry are beginning to turn to the lawn care

market. The lawn care industry, with an estimated three million turf acres currently being serviced (double the size of the golf market's acreage), and a 30 percent annual growth rate, is rapidly becoming the prime target for turf product marketing efforts and research priorities.

EPA AND TURF RESEARCH

Millions of dollars and numerous years of research go into the *ultimate* formulation of turf products. However, it's rare for a company to develop a brand new chemical just for use on turf. "Primarily because the money's not there," says Jay Ellenberger, pesticide product manager for the Environmental Protection Agency's (EPA) office of registration. Because of the substantial investment of time and money, "most turf pesticides are spin-offs of agricultural pesticides."

According to Ellenberger, by the time most new compounds reach the market for the first time, a company already has about 10 to 15 years of research and \$20 to \$25 million invested. In order to get an economic return on their investment, "they have to be looking for a very large potential market," he explains. "Normally turf won't do it."

The process of taking a chemical from test tube to commercial label begins with initial screening of chemical activity in a laboratory. Those materials showing promise in the lab are then expanded to greenhouses and small plots on research farms for testing of chemical performance under field conditions. The product is applied at varying rates with different application techniques, then monitored for any effect rainfall, soil type, soil structure or any other field condition might have on the

compound.

Early investigation of a material also includes toxicological screening to determine the potential toxic effects of the compound on animal systems. Preliminary testing shows what happens if the product is accidentally swallowed, spilled on the skin or splashed in the eyes. A quick, short-term bacterial screening, called an "Ames test" after its developer, Dr. Bruce Ames, Department of Biochemistry, University of California-Berkeley, is often included in this stage of testing to determine whether the material has any damaging genetic effects.

According to a booklet published by the National Agricultural Chemicals Association (NACA), *Agricultural Chemicals: From Laboratory to Commercial Label*, for one reason or another, most compounds fail the initial evaluation and screening process. NACA says, "Indeed, it is estimated that 10,000 or more candidates enter the screening program for every product that emerges successfully."

Because of those odds, the goal of early research is to provide sound scientific data for determining whether or not a company should try to commercialize the chemical compound. Before making its decision, a company needs to look at the product's adaptability, safety, market potential and patent protection. If the proposed product does not provide the necessary pest control, if it is harmful to the user,

environment or wildlife, if it can't be manufactured at a cost low enough to make its development profitable or if an adequate period of patent protection is not available, then it would be wise for the company to curtail further commercialization efforts.

Once a company does decide to commercialize its product, the major testing phase for EPA approval gets underway. EPA registration requirements include extensive short- and long-term toxicological studies which are conducted in the laboratory and out in the field. Their purpose is to look for damaging effects the use of the product might have, such as cancer, birth defects or mutations. Investigations are done to test potential environmental and public health effects as well.

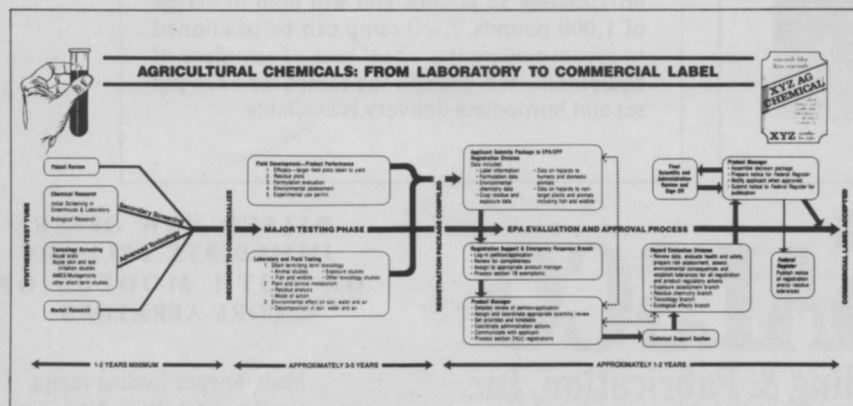
Before large-scale field studies begin, an experimental use permit (EUP) must be granted by EPA. The applicant must request the EUP by submitting data from toxicological tests conducted in the laboratory, in the greenhouse and from small test plots, as well as the proposed test program and label for use.

As previously mentioned, turf products are usually developed from existing EPA-approved agrichemicals. By the time a company would file an application with EPA to use a chemical on turf, it's likely that most of the scientific data has already been developed, says Ellenberger, so the amount of additional data a company would need to generate will be minimal compared to the amount of research done for approval of the original agrichemical.

When it comes to turf products, the EPA is "very much interested in a very full profile of the chemical's toxicity. What happens if applicators spill pesticide on their arms when they're pouring it out of the bottle, or splashes some in their eyes, or, for whatever reason, drinks some?," Ellenberger asks. "These are one-time exposure poisonings. We want to know if it will take a drop to kill a person or if it will take a whole bottle."

Ellenberger estimates that the registration process for a turf product, based on a chemical that's already been registered for other uses with EPA, takes "a

(continued on page 58)



Courtesy of the National Agricultural Chemicals Association, *Agricultural Chemicals: From Laboratory to Commercial Label*.

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PLANT GROWTH REGULATOR EFFICACY ON UTILITY TURFS

BY M.T. McELROY
P.E. RIEKE AND S.L. McBURNEY

Michigan State University has been involved in plant growth regulator (PGR) research on turfgrasses since the early 1960s. Dr. James Beard studied several "first generation" turfgrass PGRs which are no longer used, but were chemically similar to the PGR compounds we use today. However, there have been very significant refinements over the last 20 years. Dr. John Kaufmann continued with turfgrass PGR research in the late 1970s, using improved PGR compounds. Responses were still inconsistent, but sufficient to encourage researchers to continue their study of the complex activity of these PGR compounds.

Today, PGRs offer greatly improved reliability in their response although there is still much to learn about their use. Our current PGR research is in cooperation with the Michigan Department of Transportation, emphasizing development of a PGR management system for roadside grasses. Michigan State University will be investigating several parameters in pursuit of a feasible PGR system. We have designed six studies to help develop practical recommendations. Four studies will be located at highway roadside sites and two others located at university research facilities on campus.

For specific PGRs we will be determining 1) effective and economical rates of application 2) and the "window of activity" which is the time span in calendar weeks during which any particular PGR compound must be applied for maximum effectiveness. 3) There are differential response characteristics among the common roadside grass species with each PGR compound. We will evaluate PGR mixtures on several grasses. 4) We will evaluate seeding combinations designed to yield a plant community which is responsive to an integrated PGR management program. 5) We will evaluate methods to control the volunteer grasses and broadleaf weeds which typically give irregular response to PGRs. 6) Finally, we will work on programs to reduce the mowing energy input.

Our ultimate goal is to be able to make practical recommendations and give sound counsel to

those interested in PGR application regardless of their management emphasis. In addition to uses on roadside and utility turfs, there is potential for effective application on higher quality turfs.

Research results. DOT 1, PGR application timing study Sp82. Embark® was applied at 0.19 kg ai/ha on four dates — 4/27/82, 5/10/82, 5/25/82 and 6/17/82. This study is located at highway site 1 which is predominantly Kentucky bluegrass and fine fescue. Vertical vegetative growth, seedhead height, seedhead density and visual color response were evaluated on several dates.

(continued on page 50)

PGR	Formulation	Rate of Application	Cost/ hectare as applied
Embark	2 lb. ai/gal ¹	0.14 Kg ai/ha ²	\$9.26
Eptam	10 G ai/gal	6.7 Kg ai/ha	\$59.28
EL-500	50 WP ai/gal	1.7 Kg ai/ha	N/A
PP-333	50 WP ai/gal	1.7 Kg ai/ha	N/A
Glean	75 WP ai/gal	0.14 Kg ai/ha	\$76.57

¹ ai/gal: active ingredient per gallon
² ai/ha: active ingredient per hectare

Table 1. Cost per hectare of PGRs as applied in our studies.

Treatment	Clipping Weight, gm	
	Fresh	Dry
Embark (1/16#)	71ac ¹	16.0ad
Embark (1/8#)	87ad	19.3ae
EL-500 (1#)	113ce	25.9be
EL-500 (2#)	63ac	14.5ac
PP-333 (1#)	31ab	4.7ab
PP-333 (2#)	21a	2.5a
EL-500 (3/4#) and Embark (1/16#)	87ad	20.1ae
PP-333 (1/2#) and Embark (1/16#)	157de	36.9de
Check	124ce	31.0ce

¹ Statistical significance comparing means in columns using DMRT (5%).

Effect of three PGRs and two PGR combinations (IDW) on regrowth clipping weights of "Enmundi" Kentucky bluegrass on 9/16/82. Treatments applied 7/15/82.



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PLANT GROWTH REGULATOR

(continued from page 46)

The 5/25/82 application gave the best vertical vegetation control. A growth reduction of three centimeters (1-1/4-inches) was statistically significant by our tests. It should be understood that most fine grass species fall horizontally once they have reached 10 to 13 cm (four to five inches in height), therefore this response is actually insignificant in a roadside situation.

Seedhead height and density are a primary concern in a roadside situation due to their more upright growth habit. We found fewer and shorter seedheads on the plots treated 4/27/82 and 5/10/82. Practical significance is found with these parameters on fine grasses because it is the seedheads and seedstalks which give an unkempt appearance.

Color enhancement was seen on plots treated 4/27/82 and 5/10/82. The mechanism of this response is unknown and will be discussed further in another section of this report. We consider this a positive response, because from a turf manager's perspective, greener grass is desirable in most situations.

Roadside PGR study. DOT 2, roadside PGR compound evaluation study Sp82. Chemicals applied were: Embark (0.14 kg ai/ha) from 3M/Ag Products, Eptam® (6.7 kg ai/ha) from Stauffer Chemical Co., PP-333® (1.7 kg ai/ha) from ICI Americas, Inc., EL-500® (1.7 kg ai/ha) from Elanco Products Co., Glean® (0.14 kg ai/ha) from DuPont Chemical Co. and Experimental ffl from 3M. All compounds were applied 5/8/82. This study is located at highway site 2 which is primarily Kentucky bluegrass and fine fescue with some coarser grasses (i.e. orchard grass, redbud, tall fescue and quackgrass) randomly mixed throughout.

Vertical vegetative growth, seedhead height,

Our ultimate goal is to be able to make practical recommendations and give sound counsel to those interested in PGR application regardless of their management emphasis.

seedhead density and visual color response were evaluated on several dates. Nearly all compounds on each evaluation date showed statistically significant vegetative growth inhibition with five to 10 cm (two to four inches) less growth than the control. Again, a growth reduction of this magnitude is not practical under highway conditions.

As in DOT 1, seedhead height and density are the most important factors to be considered. Embark application reduced seedhead density by 33 percent, Eptam gave a 75 percent density reduction. PP-333 actually increased seedhead density. Fine grass (i.e. bluegrasses and fescues) seedhead height reduction ranged from 10 to 26 cm (four to 10 inches) with Embark, Eptam, PP-333 and EL-500. Coarser grass responses were much more varied and therefore, statistically insignificant. These initial seedhead repres-

Treatment

Clipping Weight, gm

	Fresh	Dry
Embark (1/16#)	126a ¹	43a
Embark (1/8#)	145a	52ab
EL-500 (1#)	202ac	69ad
EL-500 (2#)	258bc	81cd
PP-333 (1#)	216ac	71bd
PP-333 (2#)	216ac	70bd
EL-500 (3/4#) and Embark (1/16#)	163a	56ac
PP-333 (1/2#) and Embark (1/16#)	190ab	66ad
Check	426d	124e

¹ Statistical significance comparing means in columns using DMRT (5%).

Effect of three PGRs and two PGR combinations (IDW) on clipping weights on 8/12/82 from "Enmundi" Kentucky bluegrass. Treatments applied 7/15/82.

sion responses are strong evidence for the potential development of PGR management systems. Vegetative color enhancement was also seen in this study. Embark, Eptam and Experimental ffl gave improved green color.

Supplementary study. IDW, supplementary bluegrass PGR study Su82. Embark, EL-500 and PP-333 were each applied at two rates, combinations of EL-500 with Embark and PP-333 with Embark were also applied. All treatments were applied 7/15/82. This study was conducted at the Hancock Turfgrass Research Center on "Enmundi" Kentucky bluegrass with regular automatic irrigation.

Clippings were collected and weighed on 8/12/82, 28 days after treatment. All compounds, rates and mixtures gave statistically significant response with 40 to 70 percent lower yield by clipping weight. Relative regrowth ratings, 12 days after mowing, showed that all compounds and mixtures were still actively inhibiting plant growth. The PP-333 with Embark combination showed the least regrowth on this date.

On 9/16/82, 36 days after the first mowing, two months after treatment, final clipping weights were taken from both uncut and previously cut plot areas. Total growth inhibition and regrowth inhibition was evaluated by this method. All but one of the previously uncut plots were exhibiting statistically significant growth reduction. Clipping weights from the PP-333 with Embark plots showed very significant growth reduction on uncut plot areas for both dates. The final clipping weights taken from the previously cut plots showed that several PGR compounds had affected regrowth, but only the two rates of PP-333 had given statistically significant growth inhibition. The PP-333 with Embark treatments were not significantly different from our check.

Color response was observed, but was not significant for all compounds when compared to the control. The PP-333 with Embark combination gave the highest and most consistent color enhancement response.

Data analysis from the Kentucky bluegrass study (IDW) has led us to propose one theory to

(continued on page 52)

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**HOW TO AVOID SLEEPLESS NIGHTS
DURING PYTHIUM WEATHER.**

SUBDUE

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PLANT GROWTH REGULATOR

(continued from page 50)

explain the color responses seen in all of the studies. Briefly stated, the observed response is the result of a continued production and storage of photosynthates within the artificially regulated plant. It is thought that these PGRs work in a way which inhibits cell elongation and/or meristematic activity (growth). However, these chemicals do not appear to affect the photosynthetic process, therefore, the photosynthetic products are stored by the turfgrass plant, thus

Timing of application is critical. PGR compounds have a "window of activity" which is the time span in calendar weeks during which the compound must be applied for maximum effectiveness. Clearly, a wider "window of activity" would be an advantage for the persons in charge of PGR application.

the color enhancement response.

It appears that as a result of the first mowing, the plant was taken out of its chemically dormant state and resumed active growth. Upon resumption of growth, a rate increase was observed, theoretically resulting from the plants' use of the stored photosynthates. This response is very interesting and will be further investigated next season.

Conclusions. • There are species-specific effects with some of the PGR compounds. We need to categorize these differences, then propose solutions.

• Timing of application is critical. PGR compounds have a "window of activity" which is the time span in calendar weeks during which the compound must be applied for maximum effectiveness. Clearly, a wider "window of activity" would be an advantage for the persons in charge of PGR application.

• Soil active PGRs have a broader "window of activity" for plant uptake, and more predictable response. Soil variability may alter efficacy.

• Foliar active PGRs are less consistent in response. Varying weather conditions alter efficacy.

• It must be realized that although statistically significant vegetative growth reduction was found, leaf blade growth of most highway grass species commonly exceeds the plants' ability to support itself vertically. Evaluation of vertical vegetative growth is much less important when the primary grasses (bluegrasses and fine fescues) have fallen into a horizontal orientation.

• Seedhead height and density become the largest concern for roadside managers due to their upright growth habit. We found excellent response for both parameters with some of the PGR compounds.

• Color enhancement is considered a positive response. Greener color is sought after by most turfgrass managers. It is thought that the plant has continued its photosynthetic activity and

that color enhancement is indicative of storage within the plant of the photosynthates.

Factors to consider. • The site must be an area where traffic and wear are minimal.

• Is control of vegetative growth or seedhead development more important in your management program?

• Continued PGR application may result in an accumulation of senescent plant tissue, reduced turf density, discoloration, weed encroachment and increased disease susceptibility. These parameters are affected by the timing of PGR application, the initial vigor of the grass plants themselves and a variety of soil and moisture factors under which the grasses are surviving. Damage symptoms will not be masked by continued plant growth. Would this be acceptable?

• If increased weed or disease problems result, are you willing to consider additional chemical controls? Will the efficacy of pest control chemicals be changed when PGRs are used?

• Will a PGR program be cost effective? How could this affect your management options? (see Table 1)

• What grass species would you like to control through the use of PGRs?

• Is the critical timing of application feasible in your situation?

The information in this article was first presented by M.T. McElroy, P.E. Rieke and S.L. McBurney of the Crop and Soil Sciences Department at Michigan State University at the 53rd Annual Michigan Turfgrass Conference, January 18-19, 1983.

Treatment	Visual color rating 1 to 9 (9 = greenest)	
	7/30	8/27
Embark (1/8#)	6.0c ¹	4.9cd
Eptam (6#)	7.6a	6.8a
PP-333 (1.5#)	4.6f	4.8cd
EL-500 (1.5#)	5.1ef	4.4d
Glean (1/8#)	5.3df	4.8cd
EXPTL 1	5.8cd	5.0cd
Check	5.0ef	4.4d

¹ Statistical significance comparing means in columns using DMRT (5%).

Effect of recommended rates of six PGRs (DOT II) on visual color ratings on roadside turf populations.
Treatments applied 5/8/82.

Treatment	Relative Seedhead Density 1 to 9 (9 = most dense)
	7/30
Embark (1/8#)	4.0d ¹
Eptam (6#)	1.4e
PP-333 (1.5#)	6.9a
EL-500 (1.5#)	6.5ab
Glean (1/8#)	6.5ab
EXPTL 1	5.5bc
Check	6.0ac

¹ Statistical significance comparing means in columns using DMRT (5%).

Effect of recommended rates of six PGRs (DOT II) on relative seedhead density, all species combined.
Treatments applied 5/8/82.

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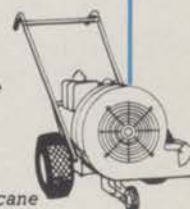
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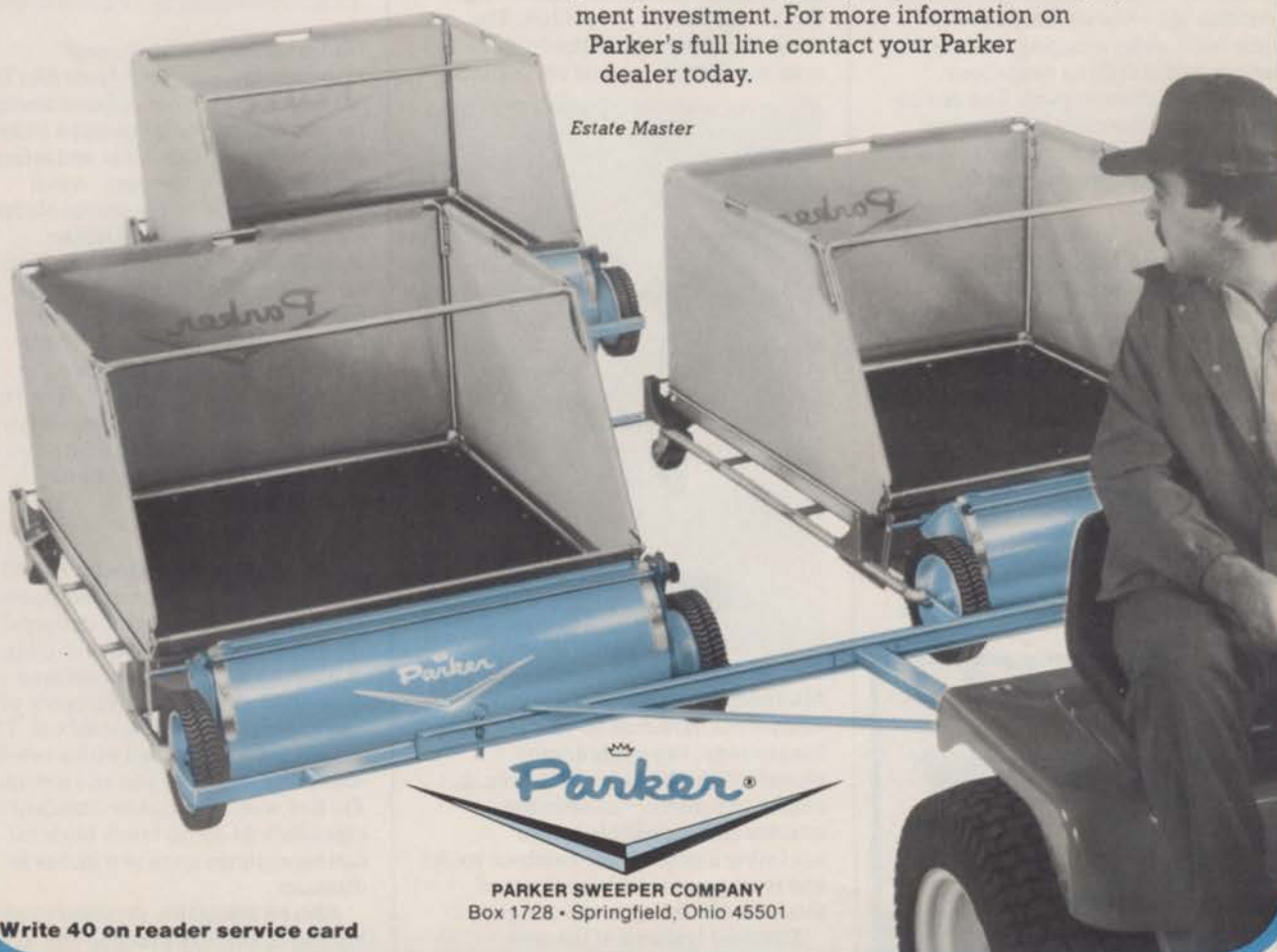
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Fuerst Brothers, Inc., has a new Harrow Lift now available for easier transporting of their Fuerst Flexible Tine Harrow®. The lift attaches easily to a three-point hitch. In the raised position, it suspends the entire harrow from the rear.

The new lift does not interfere with the harrow while in operation, so it can continue to flex to cover the ground while harrowing, dragging, smoothing, floating and scarifying operations, according to the company. The device fits all Fuerst Hercules and Peerless eight-, 10- and 12-foot models.

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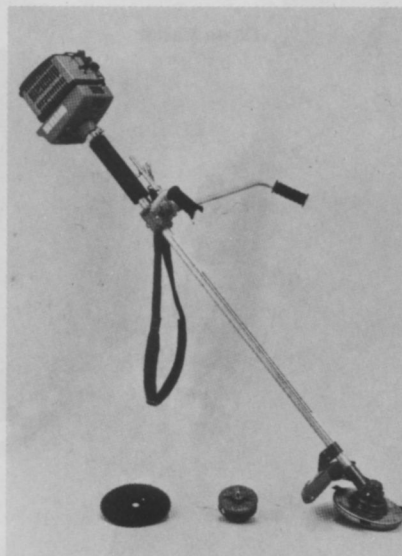
OMC Lincoln has published a new color brochure on the Ryan Ride-Aire®, the company's new riding aerator introduced to the market in 1983. In addition to engine and operating specifications, the brochure illustrates the 3-1/2-inch by 3-1/2-inch coring pattern produced by the machine with each 21-inch swath. The owner has the choice of 2-1/2-inch or three-inch core tines, depending on the turf conditions. The Ride-Aire is capable of core aerating at the rate of 12,250 square feet per hour, according



to the company. The new brochure includes illustrations of the turf cores, showing the thatch build-up that characterizes many established lawns which Ride-Aire is designed to correct.

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Solo, Inc. introduces a new straight shaft brushcutter, Model 109. The design incorporates all the features required for commercial applications.



The brushcutter 109 is part of the Solo Multimot Program®, an array of power equipment, powered by a single 1-1/2 horsepower, two-cycle engine manufactured by Solo. Switching this engine to a number of different attachments is possible by just activating a single lever (without tools) and is accomplished in a matter of seconds, according to the company.

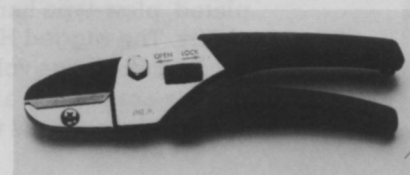
Standard features of the new brushcutter are a heavy duty straight

steel drive shaft, bevel gear drive, AV handles, adjustable cushioned carrying strap and mowing head protection shield. A choice of heavy-duty monofilament head, three-knife mowing blade and circular saw blade are offered. The brushcutter is lightweight — only 10 pounds.

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The **Ames Lawn and Garden Tools** line of anvil pruners for 1985 features new improvements in design, function and appearance as well as highly competitive pricing. New this year is the No. 23-119 Professional Anvil Pruner® with replacement blade and anvil and precision cutting blade.

Ames includes three price points in its anvil pruners with Teflon-S®-coated

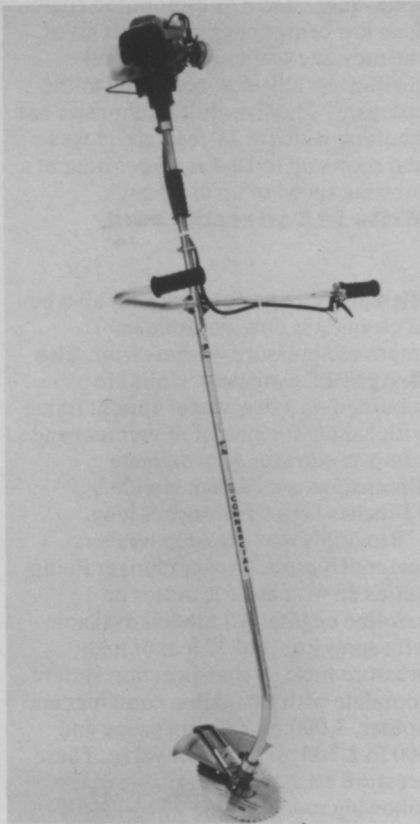


blades that prevent rust, ease maintenance and extend tool life. The latch on these pruners adjusts blades for two cutting positions and a locked position, giving flexibility and safety, according to the company. Anvil pruners with Teflon-S-coated blades include the No. 23-086 Deluxe eight-inch Anvil Pruner® with high carbon steel blade and replaceable blade and anvil. The No. 23-039 Standard eight-inch Anvil Pruner features a bevel-ground blade and lightweight aluminum anvil. The No. 23-050 Promotional seven-inch Anvil Pruner completes the new line-up.

Write 103 on reader card

Hoffco, Incorporated's PC380 Genie is a 14-1/2-pound high-powered brushcutter/power scythe designed for the stress of day after day trimming and cutting, according to the company. This unit falls under the category of commercial and professional use. The PC380 comes equipped with a two-line monofilament head and an eight-inch Tri-Kut weed blade. Also standard is an eight-inch 44-tooth brush blade for cutting saplings up to two inches in diameter.

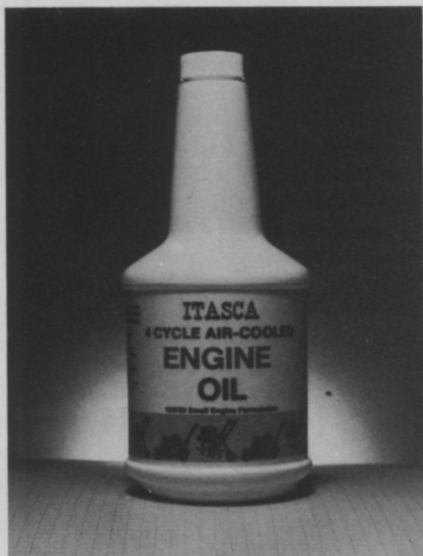
Also an adjustable shoulder strap and hip pad to eliminate fatigue and to place the operator into Hoffco's Guardian



Triangle, the area which, when using the shoulder harness and handlebars, properly keeps the operator's feet away from the cutting head at all times. The PC380 Genie has a 22.5cc engine with a 1.7:1 reduction drive to deliver maximum power for cutting, pruning or trimming.

Write 104 on reader card

A new four cycle engine oil has been developed under the Itasca® label from **Specialty Oil Company** for the lawn and garden industry. Blended specifically for air-cooled four cycle



engines, this lubricant meets or exceeds warranty requirements for Briggs and Stratton, Tecumseh and

other engine manufacturers. The additive mixture allows the 10-W-30 oil to resist small engine high-heat breakdown, as well as permit year round use in ambient temperatures ranging from -25 to 100 degrees Fahrenheit, according to the company.

The funnel spout design, which allows for convenient adding of oil, is a pre-measured package of 20 fluid ounces for complete oil changes in most popular four cycle engines. Because most engines in this category have a crankcase capacity of around 20 fluid ounces, this oil container was developed to avoid waste.

Write 105 on reader card

C.X. Products is now marketing its unique new Automatic Fuel Spout®, a fuel spout with a no-spill, no-overfill tip that eliminates all of the problems associated with standard fuel spouts. Designed as a replacement for all other spouts and to fit 1, 2, 2-1/2, 3 and 5 gallon gasoline and kerosene cans, the Automatic Fuel Spout has a variety of features that make it a perfect accessory for the lawn care businessman.

The tip automatically opens and closes in the tank to prevent spills and overfills. The spout also seals fuel cans air-tight when not in use to prevent



evaporation and to keep dangerous fumes from escaping. The spout screws onto any standard (1-3/4-inch) threaded can opening. Already, more than 200,000 of these devices have been sold and sales volume is rapidly growing.

Write 106 on reader card

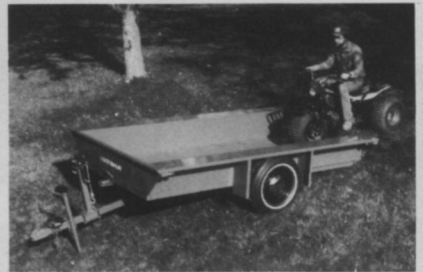
A black, woven, poly fabric called Weed Gard® from **Eaton Brothers Corporation** has been referred to as "instant mulch." The product controls weeds, conserves water by reducing evaporation, controls wind and water erosion of soil, moderates soil extremes in summer and winter and increases water percolation, according to the company.

The obvious advantage of Weed Gard over solid plastic sheeting is that it breathes. Woven tight enough to stop weed and other growth, it lets water seep through and lets soil breathe to avoid mold. Professionals have used

this material for years. Even exposed to the sun it will last for several seasons. Covered lightly with bark, stone or peat, it lasts even longer. It is available in rolls three feet wide with staples and instructions for use.

Write 107 on reader card

A new line of utility trailers featuring a wide range of sizes and features to match individual operator needs has been introduced by **The Donahue Corporation**. Both tandem wheel fixed-bed and single wheel tilt-bed models are available in the new utility trailer line. Carrying capacities range from 3,500 pounds GVW single axle models to 7,000 pound GVW in the tandem model.



The trailers are available with straight or offset tongues to match the bumper height of the towing vehicle. Standard features include two-inch ball coupler with safety chain, stake pockets, clearance lights and combination stop, turn and tail lights. Popular options available in the new line include loading ramps for fixed bed, and a 1,400 pound telescoping hand winch with 3/8-inch nylon rope, hook and mounting bracket for tilt-bed.

Write 108 on reader card

Spraying Systems Company is introducing the TwinJet spray tips for applications requiring a penetrating spray, with thorough coverage. The spray tip with two orifices is specially



designed to direct one flat spray pattern 30 degrees in the forward direction and another flat spray pattern 30 degrees to the back.

This spray performance provides front and rear surface coverage of the target without sacrificing spray distribution uniformity. The TwinJet

(continued on page 56)

PRODUCTS

(continued from page 55)

tip is ideal for post-emergent herbicides, according to the company. Available in 65, 80 and 110 degree spray angle series in a choice of capacity. Brass or stainless steel construction which fits all TeeJet nozzle assemblies.

Write 110 on reader card

The Toro Company has introduced its new hydraulic-driven five-unit Reelmaster 350-D®. This model features a 50 horsepower, four cylinder diesel engine governed to 38 hp to power it through the toughest mowing conditions. The two outside reels have individual hydraulic lift. This allows quick narrowing of the mowing path for maneuvering around obstacles without slowing the mowing pace.

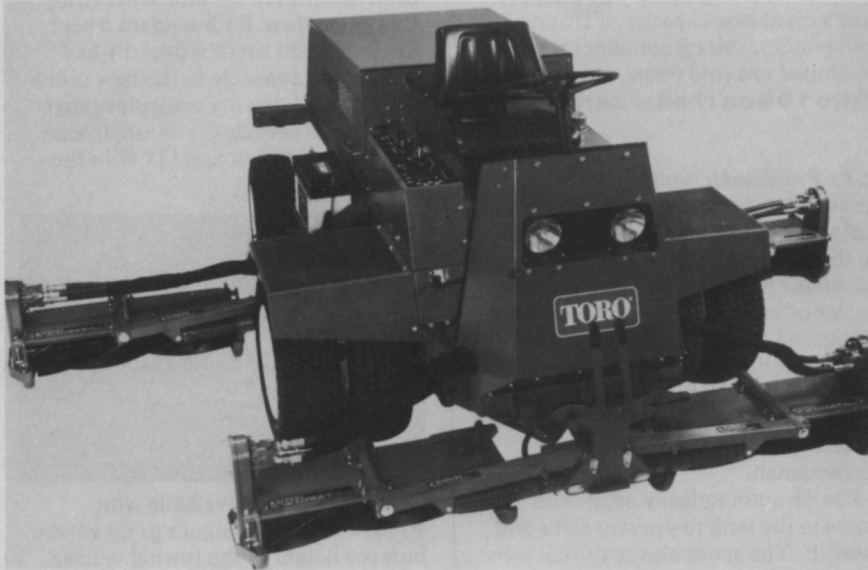
The 350-D is also designed with a

wide-stance and a mid-mounted engine for a low center of gravity. This gives the mower excellent traction and stability on hillsides, according to the company. The five-unit Reelmaster has a cutting width of 11-feet, six-inches and mows up to 10.4 acres per hour at a mowing speed of up to 7.5 mph.

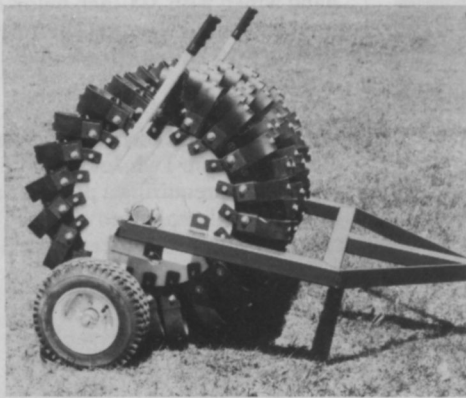
Write 112 on reader card

High pressure performance for all types of cleaning is now available in improved pressure washers from **The Broyhill Company**. Units are mounted on a two-wheel upright frame with handle for ease of movement and compact storage. Approximate dimensions are 26-inches wide by 42-inches high by 14-inches long.

Broyhill's new pressure washers feature Hypo's Triplex Plunger Pump Series 88 with electric motor or gasoline engine. All models available with spray gun and 30 feet of high pressure hose. A soap injection system complete with two gallon container and holder, 3,000 psi glycerin gauge and 500 to 2,100 psi unloader valve. These pressure washers are available in the following models: Item 2210-1300E - 3.7gpm at three h.p. with 1,300 psi at 1740 rpm. three h.p. electric motor, single phase, 220 volt, 16 amp. Electric



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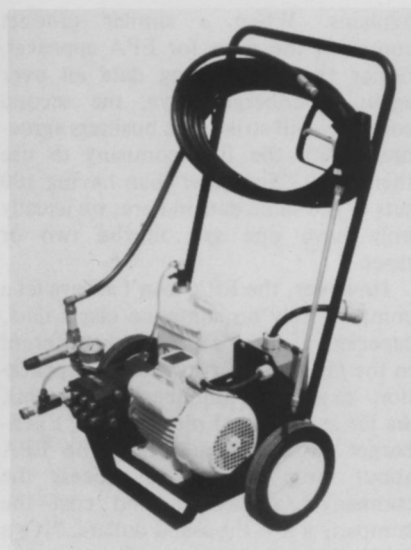
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JULY 1984

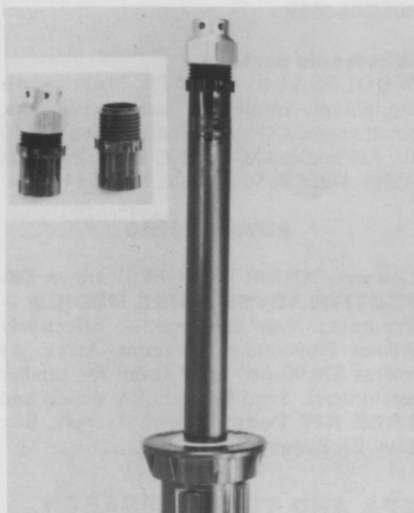


motor version contains weatherproof starter switch with overload protection.

Rain Bird now has an adapter that allows Rain Bird 1800 series pop-up sprinklers to accept any standard 1/2-inch female threaded mister, bubbler or shrub head. The PA-80® adapter can screw directly on the pop-up stems of the company's 1800 series two-inch, four-inch, six-inch or 12-inch high-pop spray heads leaving a

1/2-inch male threaded connection to accept a wide variety of sprinkling hardware.

With the new adapter and the 1800 series high-pops, misting heads, bubblers and shrub heads can pop-up



above the plant material for unobstructed distribution and a visual check of operation. After watering, the heads retract down among the plants, providing vandal resistance and enhancing the aesthetics of the landscape.

Write 109 on reader card



Streator Specialties is excited about a new lawn and garden product called the Guard-N-Grow®. This is a wind-proof spreader designed to roll on liquid applications. Spread liquid fertilizers, herbicides or insecticides without worry about wind drift. Work close to flower beds, trees or evergreens without damage, according to the company. Guard-N-Grow can be operated either by hand or behind a riding mower.

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EPA AND TURF RESEARCH

(continued from page 44)

minimum of about six months and a likely maximum of 12 months."

Although the number of additional tests required for EPA approval will depend on the specific pesticide proposed for registration, Ellenberger says additional data will probably include more toxicology work, costing the company about \$15,000, and more fish and wildlife studies, costing approximately \$20,000. However, he says it is difficult to provide general dollars and cents information since it varies from case to case.

If a chemical has already been approved for use on turf and a company wants to register a new turf product, the registration process becomes more administrative than scientific, Ellenberger says.

"The law says the data requirements have to be equal for every product regardless if you're the first product or the one hundredth product," he

explains. When a similar product comes in the door for EPA approval, rather than duplicating data all over again, Ellenberger says, the second company will strike up a business agreement with the first company to use their data. "So rather than having 100 sets of the same data in here, we usually only have one set, maybe two or three."

However, the EPA won't always let a company rely on someone else's data, especially if there's something different in the product's formulation or application exposure, Ellenberger explains. As far as time and money goes, Ellenberger says, it would take the EPA about three months to process the company's application and cost the company a few thousand dollars. "It's a much abbreviated process."

Once a turf product is federally approved, it must be state-registered as well. "State registrations vary drastically," Ellenberger explains. "Essentially, you've got 50 different ways."

The EPA periodically audits research projects, including studies done in the past as well as those in progress, to check on the implementation of Good Laboratory Practices (GLPs). The EPA's function is to set and evaluate regulatory standards and procedures, not to do research itself. Whether a company researches and develops its own material or contracts a private research lab or university to do its studies, all laboratories are responsible for meeting the EPA's GLP standards.

According to Ellenberger, most of the products submitted for registration are "outstandingly similar or identical to ones already on the market." He guesses that 90 percent of turf product applications are approved and done so within a year.

How does the future look for EPA registration requirements? They evolve constantly, Ellenberger says. "And there's no reason to believe they won't continue to evolve, because as science changes, as social concerns for pesticides change, as Congress changes—all these different things have an effect on the way pesticide registration is carried out." — Vivian Fotos

(Calendar from page 5)

chairman, 20 Court Street, Freehold, NJ 07728; 201/431-7903, or Robert Miller, exhibits chairman, 7447 Old Dayton Road, Dayton, OH 45427; 513/854-1338.


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Professional Grounds Management Society 1984 Annual Conference and Trade Show, Marriott Hotel, Worcester, MA. Contact: PGMS, 7 Church Lane, Suite 13, Pikesville, MD 21208; 301/653-2742.

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