

WEEDS TREES & TURF

Railroad Weed and Erosion Control

Wood Chips and Composting Provide Waste Solution

Florida Report Favors Chemical Control



1980
GREEN IN
BUYERS

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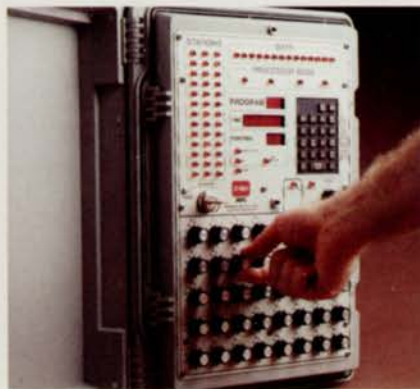


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IRRIGATION DIVISION

How Roundup® helped Jim Siegfried renovate this fairway in days, without closing it for one minute



Take a good look at this good-looking fairway.

Last fall, Jim Siegfried found a way to clean it up, without tearing it up—at the height of his club's busy season. With Roundup® herbicide by Monsanto.

Jim is the Greens Superintendent at Losantiville Country Club, Cincinnati, where bermudagrass had become a serious problem on the 18th fairway. To control it, Jim applied Roundup once—while the weeds were still actively growing—right at the start of the Labor Day weekend.

"That's really 'prime time' here," Jim told us. "But after we applied Roundup, we kept the fairway in play the whole weekend, and after. The members played right over it, with no problem."

Since Roundup has no residual soil activity, and won't wash or leach out of treated areas to injure desirable plants, Jim simply took normal precautions against spray drift—and didn't worry about damaging desirable vegetation along the fairway.

Even better, he was able to re-seed right into the dying bermudagrass only 7 days after applying Roundup—without loss of playing time or inconvenience to the membership.

Reinfestation won't be a big problem for Jim, either. He knows that Roundup destroyed the rhizomes of the treated weeds, helping prevent their regrowth.

Jim thinks he'll use Roundup again this year—and apparently some club members hope so, too. "As soon as they saw how good this fairway looks, some of the members started asking when I'm going to do the same for #10, where we have some more bermuda. I'll probably tackle that with Roundup this fall."

If controlling many tough emergent weeds and grasses is a problem for you, see your local Monsanto representative or chemical dealer soon for your supply of Roundup.

Roundup. It worked for Jim Siegfried. It can work for you.

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GREEN INDUSTRY NEWS

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Cover: Straw is crimped into slopes to reduce erosion while newly sewn wheatgrass gets established.



VIEWPOINT

Bruce F. Shank, Editor

What are rising fuel prices doing to your balance sheet? I'd like to compile remarks from all Green Industries on the affect of fuel prices. Please take a moment and jot down your remarks on this pressing subject.

To what extent will rising fuel prices reduce projected profits? Will they cause a loss? Are you forced to lay off employees to meet expenses? Are you having to refinance loans? Where are you cutting back?

After I've received your remarks,

I'll take them to a number of financial advisors for solutions. In November or December, the advise of these financial experts will be published in the magazine.

It is important to deal with these problems on both an individual and industry-wide basis. Solutions for service businesses will differ from businesses selling products. But the overall impact to the Green Industry should be collected and recorded and made known to government officials.

So please participate in this survey by mailing your remarks to Business Survey, Weeds Trees and Turf, 9800 Detroit Ave., Cleveland, OH 44102. The more responses, the better the impact and the more weight it will carry with officials.

Directory first ... on computer

After three years of index cards and tons of retyping, the Buyer's Guide is now stored in the memory of our computer. This will make corrections more certain and allows us to instantaneously obtain specific lists of manufacturers.

The directory is twice as large as last year as a result. We'll continue to improve and expand it to meet your needs. Phone numbers have been added to eliminate delays of mail information requests. Please use it to make buying decisions this fall. Let the manufacturers know you got their number from Weeds Trees & Turf.



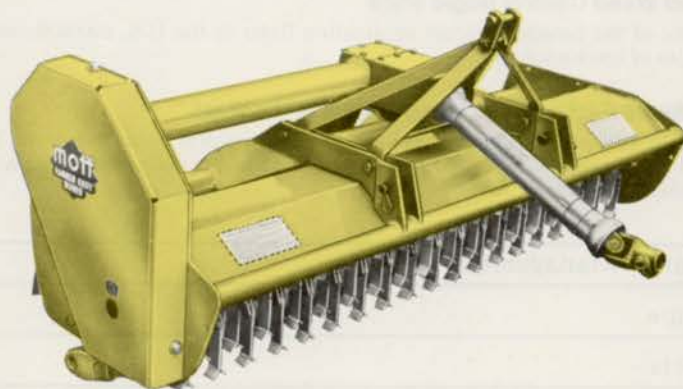
Computer operator Eileen Dring and I produce the first WTT computerized buyer's guide.

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Dormant turfgrass plants continue to produce rhizomes and roots, even though vertical growth has stopped. During this time nitrogen should be made available to the turfgrass plant as carbohydrates are naturally accumulating. Thus, scientists say, the optimum timing for nitrogen applications is during the fall and early winter months.

IBDU (31-0-0) is ideally suited for dormant nitrogen fertilization. Because of its slow release characteris-

tics based on hydrolysis, IBDU releases nitrogen later in the fall and earlier in the spring promoting better rhizome and root growth. A fall fertilizer program using IBDU should produce healthier more vigorous turfgrass plants and reduce the severity of several turfgrass diseases.

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GREEN INDUSTRY NEWS

Nurserymen discuss national issues in Atlanta

Small business consideration, national marketing impact, and participation in national reforestation and beautification programs were among the topics discussed during the joint American Association of Nurserymen and Southern Nurserymen's Association meeting in Atlanta in August.

More than 2,500 nurserymen participated in the educational and business sessions as well as the trade show. Exhibitors overflowed into hallways and extra exhibit space at the Atlanta Civic Center.

Milton Stewart, chief counsel for Advocacy at the Small Business Administration and John Lewis, president of the National Small Business Association, were featured speakers on the topic "Identifying the Enemy — Government Regulation."

Lewis told delegates small businessmen must unite to stop the trend toward oligarchy in the U.S. He said Congress and the White House need to be convinced that

there are major differences between small businesses and giant business. Form regulations and taxation levels discriminate against the small business which constitutes 98 percent of the businesses and 59 percent of the jobs in the U.S. Lewis urged two-tiering of corporate income taxes and the investment tax credit.

Stewart said one nursery in Indiana had to fill out 105 separate forms last year to meet government regulations. Stewart urged businesses below \$2 million in service to participate in SBA programs.

LEGISLATION

Weed-Eater loses case of trimmer patents

A federal judge has declared invalid the patents held by Weed-Eater, Inc., a Houston-based firm which manufactures nylon-line lawn trimmers.

The decision ended more than four years of legal action that involved charges by Weed-Eater against the Toro Co. of Minneapolis, K&S Industries Inc., Fort Worth, Texas, and Allied Industries of Garden City, Kansas.

Weed-Eater contended that the other companies had usurped its patents for the rotary head lawn trimmers, famous for their safe fishing line cutting edge. The other lawn trimmer companies claimed in turn that Weed-Eater had obtained the patents from the U.S. Patent Office by fraud.

U.S. District Court Judge George Templar, ruling on the case on July 27, stated that the patents obtained by Weed-Eater do not cover new developments but information that was known already in the business.

Templar, who heard the case for more than a month and a half, concluded that the improvements Weed-Eater made on the lawn trimmers were not sufficiently unique from several earlier trimmers to warrant a patent.

COMPANIES

Toro buys Barefoot; into lawn care service

The Toro Co. has purchased Barefoot Grass Lawn Service, Inc., a five-year-old, Columbus, Ohio-based company, for an undisclosed amount of cash.

Barefoot Grass started as a subsidiary of O.M. Scott & Sons, but since 1975 it has operated independently. Sales this year are expected to be approximately \$3 million.

"We believe the lawn care service business is a logical diversification for our traditional lawn and turf equipment business," says Toro chairman David T. McLaughlin. "We are convinced that the company has both the systems and products to emerge as a leader in the fast-growing lawn care service industry."



Professor Dennis Ryan of the State University of New York at Farmingdale instructs an employee of a National Arborist Association firm during a pilot field training program in Ohio. The three-day program will be offered four times a year and covers all arborist basics such as pruning, climbing, knots and classroom instruction.

Weeds Trees & Turf FREE INFORMATION

Want free information on products and services advertised and featured in this issue? Use this card. Circle the numbers on which you want information and mail today.

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My question or comment to the editor is . . .

Weeds Trees and Turf is glad to answer your questions or publish your comments on any green industry topic. Questions will be answered by industry experts in the Vegetation Management or Proscape columns. Comments will appear in the Letters or Viewpoint columns.

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B

Barefoot Grass, unlike many others in that industry, uses granular instead of liquid products for lawn care. The company currently operates in 12 U.S. metropolitan areas with primary emphasis in Ohio.

McLaughlin says that the acquisition is an investment opportunity, and is expected to have no significant impact on earnings over the next two years.

Strategies for marketing and promotions have not been decided at this point.

WEEDS

Plant specialists discuss problem weeds

About 240 aquatic weed scientists from throughout the world attended speeches which concerned major aquatic weed problems and research being conducted on them at the 19th annual meeting of the Aquatic Plant Management Society.

Much of the discussion at the meeting, held in Chattanooga, Tenn., June 15-18, focused on the Eurasian watermilfoil and hydrilla, two threatening weeds.

The first paper was given by Arnett C. Mace, director of the Aquatic Weed Research Center at the University of Florida, Gainesville. His topic was: "The Aquatic Weed Research Center: Objectives and Approach," in which he stressed university involvement with aquatic weeds.

The second paper was "The Tentative Water Resources of the Tennessee Valley," given by Dr. Ralph Brooks, assistant director of aquatic resources at the Tennessee Valley Authority.

A large group of people from other countries contributed to the international session with talks from England, Canada, the Sudan, Australia, Mexico, and others.

All the foreign members attended a scientific field tour, hosted by the TVA after the three-day meeting. The two-day tour of TVA lakes and facilities included stops at Nickajack, Guntersville, and Wheeler Reservoirs.

"We looked at some control technologies, such as various chemical treatments and some of the screened barrier tests which are in other places of the country," said Leon Bates, TVA biologist. "It gave the foreign members a good opportunity to see some of the weed problems in this part of the south and to discuss mutual aquatic weed problems."

Landscape Contractor News

Three ALCA programs set for November

A seminar for landscape contractors on personnel and organization development has been scheduled for November 5-7 at the Riviera Hotel in Palm Springs, Calif.

The Associated Landscape Contractors of America and the California Landscape Contractors Association are sponsoring the seminar, entitled "How to get more profit and productivity from your people through effective communications." A nationally-recognized expert in the field, Jim Hooker of Jim Hooker & Co. in Chicago, will conduct the three-day event.

On November 5-9, the ALCA Landscape Maintenance Symposium will be held at the Red Carpet Hotel in Milwaukee. The meeting will feature a dual program — one for owners, executives, and managers, and a concurrent, separate program for mechanics and shop managers.

"The Development of the Design/Build Landscaping Firm" will be the overall theme for the 1979 ALCA Design/Build Symposium held on November 28-30 at the Kansas City, Mo., Marriott Hotel. The program will cover a variety of topics and include informal discussions.

Complete information and registration materials for the 1979 seminar and symposiums are available from: ALCA, 1750 Old Meadow Road, McLean, VA 22102.

Plants expert cited for superior teaching

Edward R. Hasselkus, horticulture and landscape architecture professor at the University of Wisconsin-Madison, recently received the 1979 L.C. Chadwick Award of the American Association of Nurserymen at its convention in Atlanta, Ga.

Hasselkus currently serves as extension horticulturist in landscape plants, and teaches and conducts research in landscape plant evaluation. He is a member of the UW Arboretum Committee, and also curator of the Longnecker Horticultural Gardens.

The award recognizes outstanding horticulture instructors who have shown superior performance in teaching, guiding, and motivating their students.

Pallet program nets \$2,000 for 1984 Olympics

The landscape industry in Southern California is helping Los Angeles Mayor Tom Bradley in his drive to bring the 1984 Olympics to this city.

A sod grower in Camarillo, Pacific Green Corp., a subsidiary of Pacific Sod Farms, delivers rolled-up sod to landscape sites on wooden pallets, which are usually left behind at the landscape site when the job is completed.

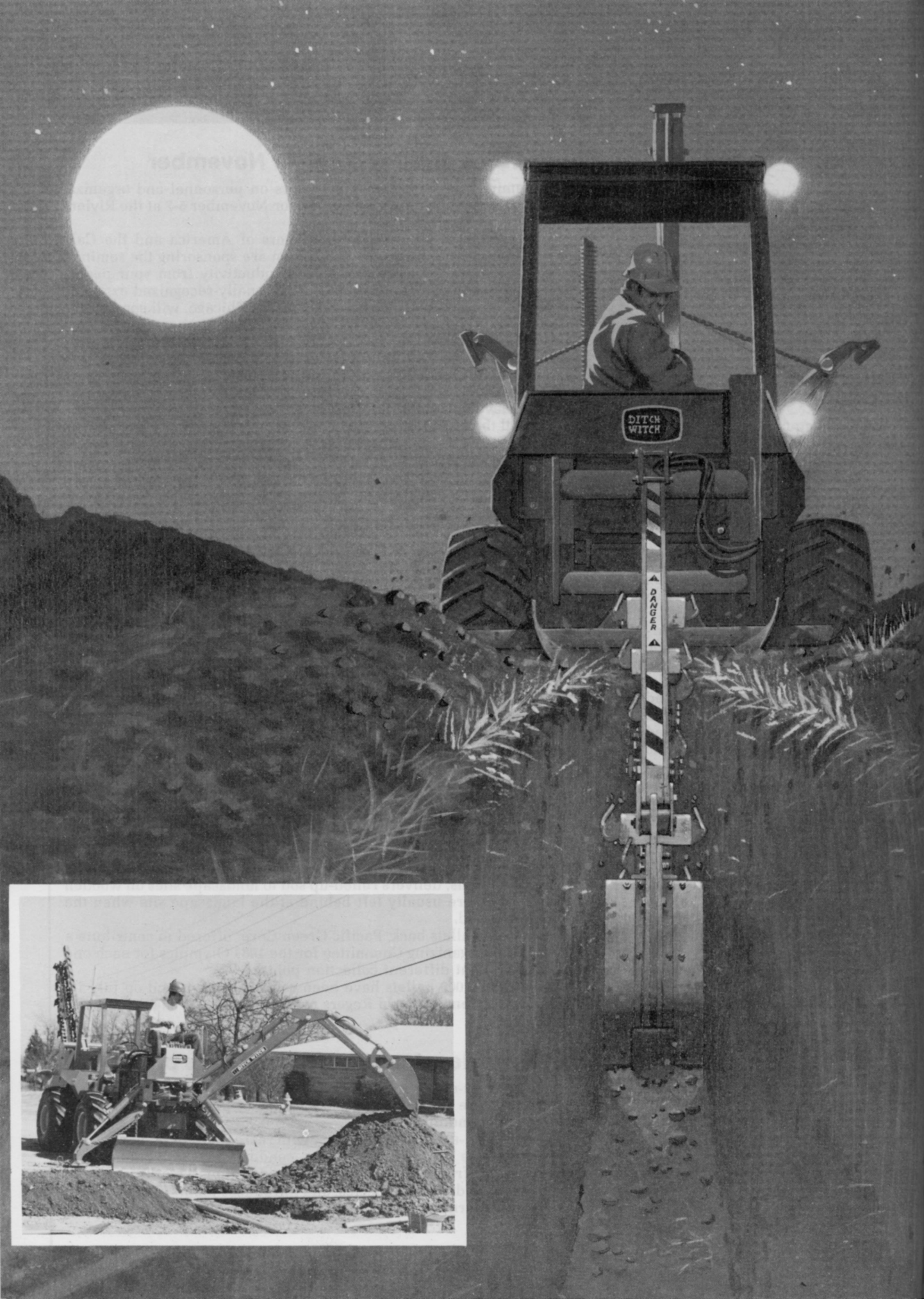
To get the Pallets back, Pacific Green Corp. offered to contribute a dollar to the Organizing Committee for the 1984 Olympics for each one returned to eight different collection points.

More than 2,000 pallets have been returned so far, and on July 13, Pacific's president, Richard Rogers presented a \$2,000 check to Mayor Bradley.

Arboretum develops hardy landscape plants

The 31-year-old Los Angeles County Arboretum in Arcadia has introduced more than 85 different varieties of plants to the Southern California community.

The hundred-acre plant paradise, with recreations of plant environments from five different continents, conducts research studies and displays plants from all over the world. In addition, it works to protect and preserve endangered species, and introduces plants suitable to the Southern California climate.



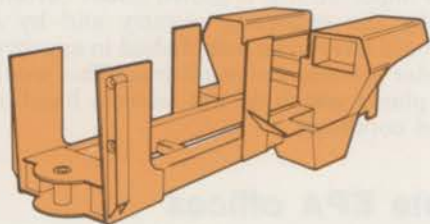
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SOD

ASPA tops attendance; elects new officers

Record crowds viewed a wide range of equipment, seed, and chemicals at the 13th Annual Summer Convention and Field Days of the American Sod Producers Association held in Columbus, Ohio, from July 18-20.

Over 500 sod producers and their families from the United States, Canada, England, Saudi Arabia, and Israel gathered for exhibits, tours, and demonstrations of the latest sod industry developments around the world.

Tours included the O.M. Scott and Sons facility with acres of test products and a nearby seed testing laboratory. Sod growers met and talked with many of the company's research and turfgrass experts.

There was also a drive-through tour of Princeton Manufacturing Co. and onto Eastside Nursery, who hosted the field day demonstrations. Almost every type of sod equipment from harvesters to netting was demonstrated along with some new and innovative equipment first revealed.

The convention also elected new officers for the 1979-1980 year. E. John Hope, Manderley Turf Farms Limited, North Gower, Ontario was elected president; Chris Beasley, Tuckahoe Turf Farms, Canton, Mass., was elected vice-president; Woodrow Wilson, Eastside Nursery Inc., Groveport, Ohio, was elected secretary; and Theodor Mund, Alboa Co., Meedville, Texas, was elected treasurer (serving a second term).

Hope replaces Charles Lain, as past president for the present fiscal year.

Newly elected to the board of trustees are Stephen T. Cockerhan, Rancho Verde Turf Farms, Perris, Calif.; Raymond A. Johnson, Shamrock Turf Nurseries Inc., Hanna, Ind.; and Glenn Markham, Green Hills Sod Farm, Berthoud, Colo.



Princeton Mfg. General Manager Roger Osborne shows new preplugger during ASPA Field Days in Columbus.

Nursery quarantine changes proposed

The U.S. Department of Agriculture may substantially revise the basic quarantine regulations that restrict the import of nursery stock, plants, and seeds from foreign countries.

This is the basic quarantine that protects the U.S. from foreign plant diseases and pests in nursery stock. It affects the nursery industry, plant importers, freight forwarders, customs brokers, international freight carriers, hobbyists, and others concerned with the importation of plant propagative materials.

The proposal, made by the department's Animal and Plant Health Inspection Service (APHIS), will make a number of changes in the kinds of permitted and prohibited items and the countries from which they come. It will affect certain plants in approved growing media.

Major changes include:

- Many kinds of palms, including coconut, may not be imported.
- Strawberry, sweet potato, chrysanthemum, and cassava plants may not be imported from a number of countries.
- Cactus cuttings less than 4 feet long, without roots or branches may be imported.
- Carnation plants from England may be imported, under certain prescribed conditions. Carnation plants from most other countries must be grown under post-entry quarantine agreement as a condition of entry.
- Stem cuttings with leaves, roots, sprouts, or branches 4 inches or less in diameter and 6 feet or less in length, may be imported.

Also, the proposal would permit any herbaceous plant or shrub not otherwise prohibited to be imported if it is grown under certain strict conditions and certified by the exporting country and by APHIS inspectors. The material would have to be established in approved growing media and grown under greenhouse conditions. This would provide for more imports of plants which do not tolerate handling and shipping in the bare-rooted condition.

Budget cuts hit state EPA offices

State EPA programs are feeling the pinch of reduced regional staff caused by cutbacks by the Carter Administration. Simultaneous budget hikes for waste disposal site inspection and enforcement are causing some confusion as to priorities of older programs. The problem of regional EPA office cutbacks was reported by the State FIFRA Issues and Research and Evaluation Group in July.

Gas conservation tips published by EPA

EPA has published a 32 page "Guidelines for Adjustment of Gas Burners for Residential and Commercial Space Heating and Water Heating". It lists measures to reduce gas use by such burners. Copies of the guidelines are available from the Technical Information Service, Mail Drop 64, Industrial Environmental Research Laboratory, Research Triangle Park, NC 27711. Requests should refer to EPA Report 600/8-79-005.

Construction hazards is OSHA topic

The first of six meetings scheduled by the Occupational Safety and Health Administration to discuss hazards to workers at construction sites was held in Washington, D.C. in August.

The OSHA Advisory Committee on Construction Safety and Health is holding the hearings to thoroughly review current OSHA health standards as they relate to construction.

The hearings make input by the landscape industry possible by contacting Ken Hunt, OSHA Information, Third St. and Constitution Ave., N.W., Washington, d.c. 20210.



RON GIFFEN

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WOOD CHIPS AND SLUDGE FORM RICH COMPOST MIX

by John A. Kerr

Conservationists of trees and wood by-products will see the day, if they haven't already, when their wood becomes a vital resource for a multitude of applications. In the last few years, researchers with the U.S. Department of Agriculture have found that wood chips mixed with sewage sludge produce a rich form of compost. Cities around the country are starting to make and market the compost and its reaction from users has been very favorable.

Problems of sewage disposal have forced cities to look for new methods. Legislation has imposed strict limitations on incineration (Air Quality Act of 1967), fresh water dilution (Water Pollution Control Act Amendments of 1972), and ocean dumping (Marine Protection, Research and Sanctuaries Act of 1972). Moreover, the cost of these methods has tremendously increased as has the amount of sludge production. Thus, scientists working on the problem discovered that composting the sludge with wood chips was a viable alternative.

A team in Beltsville, Maryland, used a wind-row method, which proved suitable for composting digested sludge, but unacceptable for composting undigested sludges because of their higher number of malodors. The answer to disposal of the undigested sludge resulted in an aerated pile method of composting, developed by Dr. Eliot Epstein, a research soil scientist at the time with the USDA.

The sludge is mixed with wood chips and then composted in a stationary aerated pile for 21 days. Sludge at this moisture content (78 percent water) will not compost aerobically alone because sufficient air cannot penetrate the biomass, either by diffusion or forced aeration. The chips, acting as a bulking material, provide the necessary texture, structure, and porosity for aeration; lower the moisture content of the biomass to about 50 or 60 percent; and provide an additional carbon source for micro-organisms to ensure rapid composting.

Once the sludge/wood chip combination is homogenous, a front-end loader lays the mix over perforated plastic pipes which are connected to a blower that draws air through the pile. The effluent air stream is conducted into a small pile of cured compost where odorous gases are absorbed. After the initial 21 days, the sludge is stabilized by the rapid decomposition of volatile organic solids and must be cured another 30 days. Curing allows dissipation of any phytotoxic gases and offensive odors, and ensures more complete destruction of pathogens. The compost is then ready for use.

Applications vary as much as each community's style of composting. Epstein thinks its best potential use is in sod and turf. "Instead of 16 to 18 weeks (an average time for a sod crop), sod can grow six to eight weeks on the compost, and it is light weight without the turf," he says. It also works well for revegetation of strip mines and gravel pits where it doesn't get into the food chain. Thus, permits are easy to obtain because health is no question, Epstein says.

Close-up of cured compost

shows the rich qualities created from the combination of sewage sludge and wood chips. Heat underneath the surface of the pile reaches 170°.



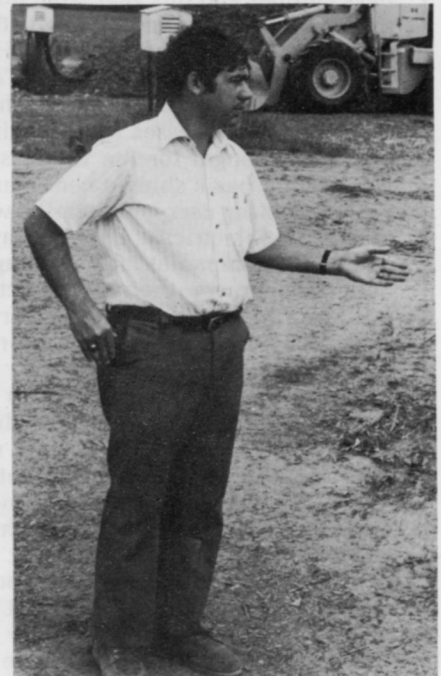
Questions of health, system operation and maintenance, cost, and climatic impacts still had to be resolved and the Environmental Protection Agency initiated a composting project in 1975 in Bangor, Maine, to obtain answers. At the same time, Ralph Mishou, superintendent of waste water treatment in Bangor, and his assistant, Tom Ham-brock, were considering the increased cost of fertilizer and all the sludge they were hauling to dump. The EPA's request to use their city as an experimental station turned thought into action.

With EPA's financial and technological backing, the Bangor crew built its first pile in August, 1975. By the end of July, 1979, they had built 201. "It's a shoestring operation," says Ralph Mishou, "hardly mechanized. We only use a front-end loader for mixing and tearing down piles to operate at minimum cost." Mishou figures they get back almost half of what it costs to make the compost, about \$11 a cubic foot.

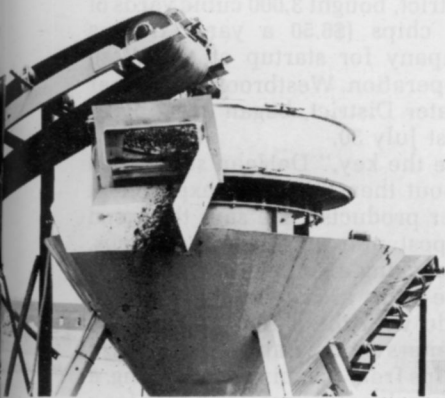
The city sells the compost and income goes back to the treatment plant's account. Going rate is \$5 a cubic yard for nurserymen and home gardeners and \$4, or the same cost of loam, for any municipal operation. Public works uses it with loam for reseeding and the parks department puts one application a year around shrubbery and trees. People in Bangor have found that a 50-50 mix of compost and loam produces a much better growth of grass than just loam. The nitrogen locked into the compost slowly releases for the seed.



Plastic pipes hooked up to a holding tank with a fan draw liquid waste and odors from compost piles.



George Crombie stands on the pilot project in Durham, NH, he helped engineer.



Screening the finished product removes bulky, unworkable matter, and also recycles many valuable wood chips.

Logs fed into this chipper are ground into wood chips and then trucked to composting sites.



Tree operation cultivates uses for wood chips

Two to three years ago, Jerry Osborne, owner of Osborne Brothers Tree Service in Mentor, Ohio, burned the trees he axed for site clearing. That was before he and many others knew the potential of wood chips. "We used to blow them into the ground," he says. But that was two or three years ago.

Since that time Osborne has purchased a Morbark chipper and this year from the first of April to the middle of July had chipped 100 90-yard loads, which fill a Bocat semi-trailer. He sells the majority of these loads to CertainTeed, a company about 80 miles from Mentor, which makes shingles. CertainTeed processes the chips into fiber, which provides strength for the shingles, and then adds tars for the basic shingle consistency.

Another big user is pulp mills which burn chips to generate electricity. Osborne says that in Michigan some companies are burning wood in huge boilers to power their manufacturing plants or utilities. "Since trees can be harvested every 15 years, they are a recoverable energy source — not like oil, gas, and coal," he says.

Many of the contractors who Osborne clears ground for with his National Hydro-Ax brush cutter ask that he leave the woody remains on site. They appreciate wood's nutrients blended with their soil. Otherwise, Osborne may mix the fine pieces with topsoil to make mulch for vines, trees, and plants and use it on the site.

Other sites which need landscaping may find Osborne's chips. One unique spot is along railroad tracks, where Osborne's crew built a sound barrier, topped with dirt. Over the slopes he plants crown vetch or ivy and on the top he plants evergreen or deciduous trees.

Since the larger trees can't be cut like brush, Osborne utilizes a Hydro-Ax with attached shearing blades to chop them. A Timberjack skidder bundles the trees and carries them to the chipper which has a hand-like claw that places the trees into feed rolls which automatically draw the trees in. The chipper fills a Bocat load weighing 25 to 30 tons in three to five hours.

The equipment involved is worth about \$750,000, according to Osborne. Yet there are more buyers than ever. Landscapers purchase a load for \$750. Osborne will sell a tandem load, which holds 20 yards, for \$150.

Not a chip gets wasted anymore. "The future is in wood chips," Osborne says. "We think they will be a good business."

Ralph Mishou, superintendent of wastewater treatment in Bangor, Maine, captains one of the original sludge composting operations.



"We sell everything," Mishou says. "Last year we were turning everyone away." And this was with virtually no advertising.

Although the economic considerations are important, income is not the overriding motive for composting. "You have to look at it as an alternative to sludge disposal," Mishou says. "You're recycling a product, it's environmentally safe, and cost effective compared to incineration and land-filling."

Wood chips presently come from arborists, landscape contractors, fence post makers, tissue manufacturers, and anybody else that's working with wood. Yet, even in Maine, the chips must be conserved, because many mills are starting to burn them for energy.

The Bangor project has proved that sludge composting is an effective means of turning an odorous eyesore into a marketable product. It also shows that the process can work in a cold, rainy climate. Other operations are beginning, one modern facility being 130 miles south of Bangor, near Portland, Maine.

Roger DeHaan, solids handling engineer for the Portland Water District, bought 3,000 cubic yards of high-quality wood chips (\$6.50 a yard) from a nearby paper company for startup of the Westbrook composting operation. Westbrook, a member of the Portland Water District, began aerating its first pile of compost July 30.

"Wood chips are the key," DeHaan says. "You can't compost without them. We may experiment with bark and other products." He says the wood chips keep a compost pile permanently porous, "like the effect of sucking air out of a sponge."

DeHaan says the chips are mixed by front-end loader in a 3-1 ratio with the sludge. He will be implementing screeners with $\frac{3}{4}$ and $\frac{1}{2}$ -inch mesh to recover larger chips from the mix for recycling, a technique Bangor occasionally uses. He hopes for a 50 to 75 percent return. With a larger mesh, the final product is best suited for lawns and around shrubs and trees, whereas a small mesh makes a finer mix for growing sod.

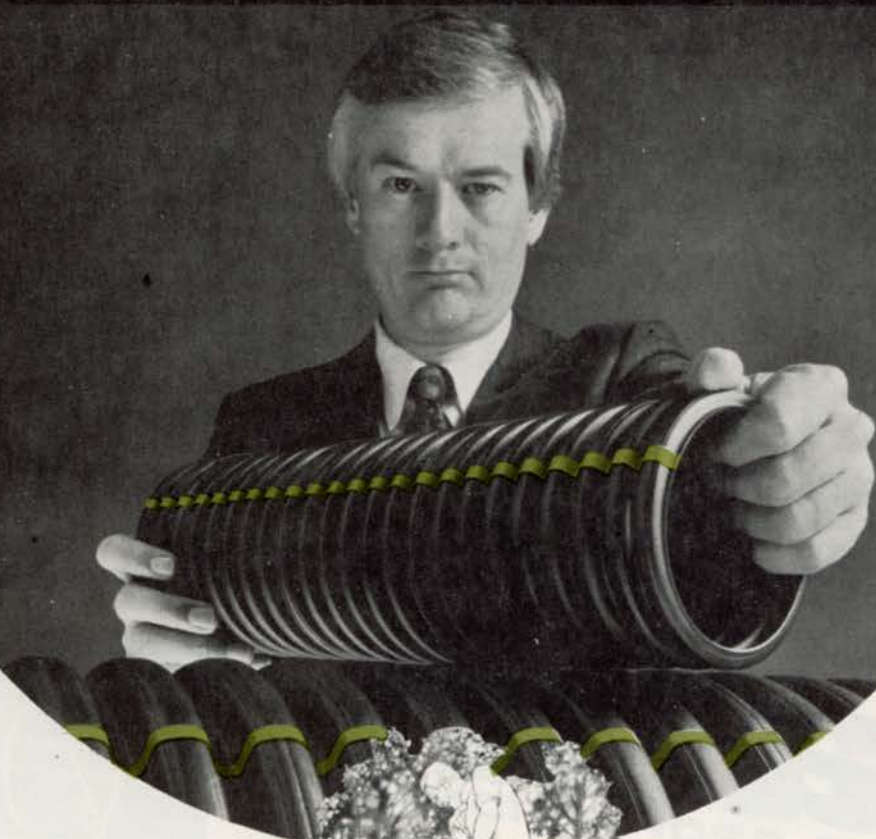
"We lose the fines in screening and this way we can use the good, clean chips over," DeHaan says. Eventually he would like to do his own chipping, which would operate in the woods among the birch, maple, hemlock, fir, ash, white pine, and oak of the area.

Experiments are being conducted on the Westbrook site, monitoring air for *aspergillus fumigatus* as well as checking the safety of the compost.

Continues on page 18

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DeHaan says there is no danger of pathogens in the compost after it has been aerated and cured because microbes in the wood chips and sludge produce natural bacterial action which increases temperatures in the pile from 160° to 170° F. The heat pasteurizes and kills pathogenic bacteria and thus the compost is suitable even for food-producing crops. DeHaan tells users about Maine's guidelines, which say the compost should not be used for food crops for 180 days after the sludge has been added.

DeHaan says the compost will be distributed for free on a trial basis when the first batch is ready some time in September. In Durham, New Hampshire, George Crombie, public works director and head of the town's composting operation, is doing the same. "We would like to market it," Crombie says. "So far we have put our efforts and energy into the operation."

It is easy to understand this when you see what is being constructed in the town of 20,000 — more than half students. Grabbing the eye, is a \$1,000,000 wastewater treatment plant/composting site, the first of its kind. Since the city needed a new treatment plant and its composting pilot program had been quite successful, it was granted the funds, only \$50,000 of which came from the city.

Durham is a model city for the use of sludge compost. Throughout the city — along sidewalks, in road medians, surrounding parking lots — 18,000 annuals are planted each year, all fed with the compost. In soccer fields and baseball fields it is integrated with soil as a soil conditioner for aera-

tion. It is mixed with loam on a number of projects. The state highway has used it for land reclamation.

Crombie agrees that the wood chips are essential to operation. He initially thought that New Hampshire would have an abundance of wood chips at a low price, but this was not the case. The paper mills in the state take all of the wood chips and have unloading platforms at the plants to automatically dump the 40-ft. trailers. An unloading dock had to be built and a bobcat loader used to unload the chips at the composting site.

During the search for chips it was found that the blades on the sawmill were set for ½-inch chips (which the paper mills required) and it was very difficult to induce a sawmill to change its blades for a ¾- to 1-inch chip for composting. Eventually, the chips were delivered to the site for a price which proved to be a major portion of the cost per pile of composting.

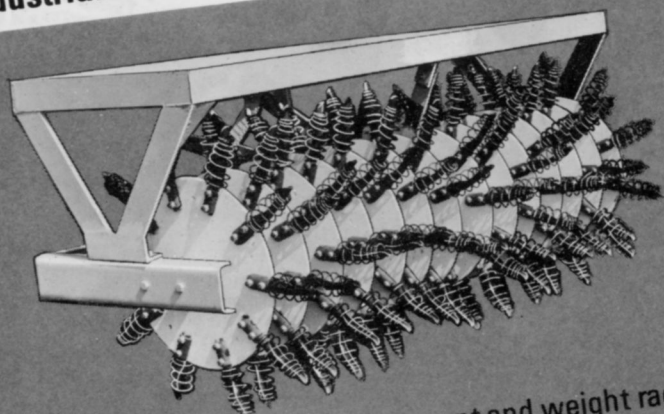
Crombie experimented with various sizes and ratios of wood chips before deciding on the best for the expected application. He found that to use as a top dressing for turf establishment, he needed to screen the chips through a fine mesh of ⅜ to ¼ inch. He could also use the small mesh in dry weather, but when it was wet the material needed a larger mesh to screen through.

A mixing of one part sludge to three parts wood chips gave the most consistent results for overall mix, especially during the winter. During summer months, a ratio of five parts wood chips to two parts sludge was satisfactory.

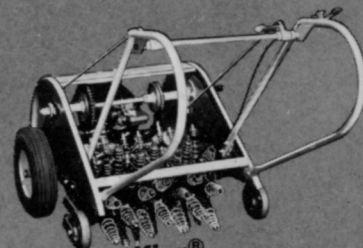
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Moisture and other climatic problems will not affect the new operation, which will be done completely inside. A conveyor will move the sludge to a pug mill where another conveyor will bring wood chips. All mixing will be done automatically.

Crombie says that a greenhouse may be built next to the treatment plant. If so, it is possible the greenhouse can be heated from the hot air being drawn out of the compost piles.

This won't be the first greenhouse in Durham. And it won't be the first greenhouse connected with sludge compost in some way. At the University of New Hampshire, Professor Douglass Routley from the Department of Plant Science is growing chalias, geraniums, chrysanthemums, and bedding plants in a greenhouse.

"I have received better results than with artificial commercial peat-lite mix," he says. "There are fewer disease problems." Routley says a major advantage of the material is that it never has to be sterilized since the composting itself is a sterilizing process.

"Many industrial communities can't use it for food crops because of a high metal content, but it is excellent for ornamentals, flowers, and nursery crops," he says. Another use, according to Routley, is as a top dressing on golf courses.

Routley, like many others working with the compost, sees immediate value for it with growing sod. He has grown it with a couple inches of compost on top of plastic. Since it does not have to be as thick as regular soil, it reduces the time of digging and cutting, also saving labor and space.

Routley thinks because of its darker color, it will absorb more energy and there's a possibility of growing two crops of sod a year in the spring and fall. Landscapers would then have a crop of sod for summer and spring.

The number of uses for sludge compost becomes even more illuminating with the seemingly infinite supply of bulking materials available. Wood chips may become too valuable as an energy source for composting. But experiments have already been done with other wood byproducts — paper cubes, bark, paper pellets, leaves, and licorice roots — with mostly successful results.

"Where the community is determines what waste materials can be used (for bulking)," says Eliot Epstein. He cites a list of wood and paper products in a bulletin from the Canadian Waste Materials Exchange. Certain regions in Canada have huge amounts of available wastes, such as 500 tons a day from sawmills, 25 tons a day from paper mills, 60 tons a week from demolition lumber, and 40 tons a week from publication paper. The list goes on for Canada and must be fairly similar for the United States.

Sludge composting may be one of the largest recycling efforts of the future. "I think it has tremendous potential for small treatment plants which serve up to 250,000 people," Epstein says. For larger cities, there are more challenges, but as they run out of room for land-filling and legislation prohibits other means of disposal, they too may be turning their sewage sludge into compost.

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WATER MANAGEMENT REPORT SUPPORTS INCREASED USE OF AQUATIC HERBICIDES

The South Florida Water Management District — the second largest public works project in the United States, second only to TVA — is justifiably proud of its successful aquatic weed control program. Its history is as interesting and important as its contributions to the people of the state of Florida. A 1979 report, prepared by Gordon E. Baker, plant control biologist for the district, discussed the program from its beginning.

According to the report, the concept of controlling or managing aquatic plants in south Florida, as well as the entire nation, had its beginning in the year 1884 in New Orleans, Louisiana. That year the water hyacinth was introduced to this country at a horticultural exhibit. Because of its unusual beauty and prolific growth, samples were given to many visitors. Within 10 years after its introduction the water hyacinth was a serious problem.

Some nameless Floridian found it so attractive that he placed some of the plants in a lawn fountain at his home on the banks of the St. Johns River, close to Palatka, Florida. As the plant multiplied rapidly, the excess was thrown into the nearby river. By 1896, the plant had spread at an alarming rate and was seen throughout most of the St. Johns River Basin. By 1900, hyacinths had taken over the river at Palatka to such an extent that steamboats and other craft were unable to reach docks or pass

through navigation openings of bridges. Since then it has spread in Florida from as far north as the Suwannee River to as far south as Florida's famous Everglades.

In 1949, the Central and Southern Florida Flood Control District was born and in 1972 the Water Resources Act changed its name to the South Florida Water Management District (SFWMD) and greatly expanded its responsibilities.

The SFWMD initiated new programs for a State Water Use Plan which have improved its capabilities in water management, conservation and quality control. The work of engineers, biologists, chemists and environmental planners is being directed simultaneously to projects that will protect the quantity and quality of fresh water resources from pressures imposed by population growth and the incumbent changes in land use.

The district presently covers an area of 19,930



Gordon Baker, plant control biologist for SFWMD.

Chelated copper
invert application
(right) on hydrilla.



District employee (left) spraying paragrass with Velpar, while maintaining bahiagrass. Hydout application (above) to control hydrilla.

square miles from Orlando to the Keys and includes all or parts of 16 counties. Within this area is a complex interconnecting system of canals, levees, lakes, water storage areas, pump stations, and water control structures, designed to provide a sufficient quantity and quality of water for all the diverse interests in South Florida. The district has over 1400 miles of canals, 16 pump stations, more than 125 water control structures, 1345 square miles of water conservation areas, and about 20 lakes; the largest of which is Lake Okeechobee (730 square miles).

The implementation of an aquatic weed control program in district canals was necessary both for flood water removal and to maintain proper water levels. With the warm sunshine and year-round growing season typical of Florida, aquatic weeds left unchecked would soon clog all primary and secondary canals, reservoirs and most waterways, and the entire water management system would cease to be functional.

In the rainy season, canals would back up and overflow. Weeds would clog intake gratings and halt the use of large pumping stations and cause possible damage to expensive equipment. Navigation of boats would be impossible in weed-infested canals. Waterways used by fresh-water fishermen would be blocked off. Recreational boating would be brought to a halt. Farmers would not be able to irrigate their crops, resulting in an economic disaster for the state.

An effective aquatic weed program was essential. The SFWMD's program operates on a year-round basis, following three basic steps:

- 1) Identification of Plants: The first step in an aquatic weed program is to determine what species or types of aquatics are in the canal facility or waterway. Basically, these include floating, submersed, emerged and ditchbank (including levee grasses and brush).



Diquat application on duckweed and water paspalum. Duckweed is almost completely covering the canal surface.

- 2) Methods of Treatment: This depends on the growth form of the plant—where it is located, the uses of the water body and the types of equipment available. The district uses four methods of control: mechanical, chemical, biological and physical (i.e., water-level fluctuation).

Mechanical control methods were used by the district primarily against submersed vegetation until about two years ago, when a transition to chemical methods was initiated.

In recent years, advances in chemical technology have allowed the uses of specific chemicals for specific needs in aquatic weed control. Baker said in his report chemical control methods are speedy, cost-effective and longer lasting than mechanical methods, realizing, of course, that there are certain environmental considerations inherent in the use of chemical control. For example, the application techniques are designed to place the chemicals on the target species and not on other weeds through equipment designed specifically for aquatic use and by the use of spray additives.

Before submersed weed control operations are begun, the district also determines certain parameters, such as the amount of dissolved oxygen in the water, wind velocity and general weather conditions.

Herbicides presently being used in the district's program are Banvel 720 (dicamba), 2,4-D, dalapon, diquat, chelated copper and endothol. For submersed weed control, two or three treatments are necessary following one mechanical removal during the first year. The second year, one or two treatments are necessary and, finally, one application per year.

Biological control is based on the fact that there are some organisms which feed on plants to the extent that the growth of the vegetation is reduced. The primary objective of biocontrol is not eradication of a species, but reduction of a plant's density to where it is no longer a nuisance. Advantages of this type of control are low program costs, ease of application, no special equipment, minimum training of personnel and relative permanence of treatment, once established. The main disadvantage is that initial results generally are too slow in coming, and usually necessitate the use of other methods of control in addition to biocontrol.

The district has cooperatively participated with the State Game and Fresh Water Fish Commission on lake drawdown projects (physical control) at Lakes Kissimmee and Tohopekaliga. While the primary purpose for these drawdowns was to enhance the fisheries resources, some degree of management of the obnoxious weed community emerged as a secondary result. In addition, the district, under the supervision of the Environmental Sciences Division, has initiated water fluctuation methods for the purpose of re-establishing native Everglades vegetation. A trial scheduled for mid-1979 is presently pending.

- 3) Cost and Economics: Aquatic weed control can be an expensive undertaking. Within the boundaries of the district, weed control maintenance of the primary waterway system is presently costing in excess of three million dollars. This is a considerable in-

crease over what the district spent six years ago (one-half million dollars). The magnitude of cost involved certainly generates a desire to find methods of control that produce results which act in harmony with the environment and, at the same time, reduce costly repetitive and expanded treatments. In this light, Baker concluded, the present technology base indicates superior results for submersed weed control through skilled application of herbicides as contrasted with mechanical control methods.

Baker pointed out some of the major works that

have been completed and their contributing value to South Florida:

- Three Conservation Areas — Almost 50 percent of the original Everglades is preserved in a wilderness state in Palm Beach, Broward and Dade counties. These water storage and wildlife areas cover 1,345 square miles. They are surrounded with levees, canals and water control structures. Excess water impounded here is diverted south to Everglades National Park.
- Everglades Agricultural Area — South of Lake Okeechobee, an area of 700,000 acres is

Target Species, Control Methods, Treatment Proposed

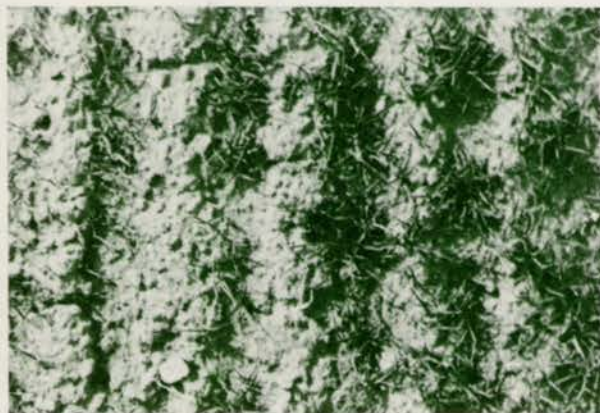
| Weed Type | Species | Control Method | Chemicals/Equipment | Scheduled Treatments (for year '78-'79) |
|-----------|------------------|----------------|------------------------------|---|
| DITCHBANK | Alligator Weed | Chemical | Banvel 720 - Dowpon C | As Needed |
| | Torpedograss | Mechanical | Dragline | |
| | Brazilian Pepper | Chemical | Banvel 720 - Dowpon C | |
| | Cattails | Mechanical | Mowing | |
| | Grasses | | | |
| | Giant Cutgrass | Chemical | Banvel 720 - Dowpon C | |
| | Phragmites | | | |
| | Spatterdock | | | |
| FLOATING | Willow | | | As Needed |
| | Napiergrass | Chemical | Banvel 720 - Dowpon C | |
| | Paragrass | Mechanical | Chipping/Mowing | |
| | Rubber Trees | | | |
| | Water Paspalum | Chemical | Banvel 720 - Dowpon C | |
| | Duckweed | Chemical | Diquat, Diquat Invert | |
| | Salvinia | | 2,4-D | |
| | Water Lettuce | | | |
| SUBMERSED | Floating Fern | Chemical | Diquat | 2 Times |
| | Water Pennywort | | | |
| | Hyacinths | Chemical | Diquat, Diquat Invert, 2,4-D | |
| | | Mechanical | Dragline, Towboat | |
| | Hydrilla | Chemical | Diquat - Chel. Copper | |
| | Pondweed | Mechanical | Invert, Hydout | |
| | Coontail | | Towboat, Dragline | |
| | Milfoil | Chemical | Diquat - Chel. Copper | 1-2 Times |
| EMERSED | Cabomba | Chemical | Invert | |
| | | Mechanical | Aquathol K - Chel. Copper | 2 Times |
| | | | Towboat, Dragline | |
| | Brazilian Pepper | Chemical | Banvel 720 - Dowpon C | As Needed |
| | Cattails | | | |
| | Giant Cutgrass | | | |
| | Grasses | | | |
| | Napiergrass | | | |
| | Paragrass | | | |
| | Phragmites | | | |
| | Duckweed | Chemical | Diquat | |
| | Hyacinths | | | |
| | Water Lettuce | | | |
| | Water Paspalum | Chemical | Banvel 720 - Dowpon C | |
| | | | Diquat | |
| | Torpedograss | Chemical | Banvel 720 - Dowpon C | |
| | | Mechanical | Dragline | |
| | Alligatorweed | Chemical | Banvel 720 - Dowpon C | |
| | | | Diquat | |
| | Spatterdock | Mechanical | Dragline | |
| | | Chemical | Banvel 720 - Dowpon C | |
| | | | Diquat | |
| | | Chemical | Banvel 720 - Dowpon C | |
| | | | Diquat | |
| | | Mechanical | Towboat, Dragline | |
| | | | | |

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mechanical burial and puts the furrows for natural seed burial much closer together. This produces a faster and more evenly distributed stand with no bare spots to fill in. **Which Saves Seed!** One healthy plant per square inch is all that is needed to produce an adequate stand of bluegrass. That's what the Meredith Seed Miser gives you. No waste, no seeds buried too deep to grow, and quality turf you'll be proud of (not to mention your delight at increased profits).

You can see for yourself. Just look at the difference between the two crops of turf pictured here. The picture on the left was taken of turf seeded by a conventional seeder. The picture on the right is turf seeded by the Meredith Seed Miser.



Turf seeded by Meredith Seed Miser.

I'm ready to get "miserly."
Please send me a free copy of the
"MISER" brochure.

MEREDITH SEED

NAME _____

ADDRESS _____

CITY _____

STATE _____

ZIP _____

PHONE _____



**WE'RE
JUST
A
DIAL
AWAY**

**WITH COMPLETE
ELECTRICAL
RUBBER TESTING
CAPABILITIES**

**PLUS
EQUIPMENT AND
SUPPLIES TO
COMPLETE ANY
TASK IN**

- Vegetation Management
- Utility Construction
- Tree Trimming
- Park & Grounds Maintenance
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- Bucket Work
- Industrial Maintenance
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leveed and pumped. About 400,000 acres of the total is now in agricultural production. There are 20 levees and seven pumping stations serving this land.

Seasonal rainfall patterns in South Florida annually create periods of flood and drought on land where surface slopes are as low as 0.7 feet per mile. Due to this flatness, a canal large enough to carry flood flows by gravity is impractical. Therefore, pumping stations must be provided to operate during the rainy season to remove excess water from the land and store it in such places as Lake Okeechobee and the three Water Conservation Areas in the Everglades. During the dry season, when water demands are high and supply is low, water is released out of the storage areas to meet the needs of South Florida.

- Lake Okeechobee — A major levee (the Herbert Hoover dike) has been constructed around the perimeter of the Lake, a distance of 100 miles. This levee prevents a recurrence of hurricane-driven wind tides, such as those that drowned 3,000 persons in 1926 and 1928. The levee also will make possible additional storage of water in the Big Lake, a major source of water for South Florida.
- The Caloosahatchee River — A 58-mile waterway project, between Lake Okeechobee and the Gulf of Mexico (at Fort Myers) has been completed. The River improvements serve a basin area of 1,200 square miles and also add discharge capacity for emergency releases from the Lake to tide-water when necessary.
- The Kissimmee River — A 58-mile channel, between Lake Okeechobee and Lake Kissimmee, was finished by mid-1971. The widened and deepened river is equipped with six large dam and spillway structures, operated by the SFWMD. Each structure has a navigation lock 30x90 feet, designed to pass vessels of 5½-foot draft. The river improvements serve a drainage area of 758 square miles and provide an outlet for excess water from the Upper Kissimmee Valley.
- Upper Kissimmee River Basin — To date, 15 canals, equipped with eight water control structures, have been constructed, linking 14 lakes in the Upper Kissimmee in central Florida.

Working within the boundaries of the rising costs of maintenance and restrictions of the Environmental Protection Agency, the SFWMD has managed to meet the objectives set forth in their original establishment with more than a little success.

The success of SFWMD's aquatic weed control program is the culmination of an effective planning and coordination effort. The impact of this effort has affected South Florida by protecting the quality and quantity of fresh water resources and enhancing public recreational facilities. More importantly, the district has protected the health and safety of the people of the state of Florida.

WTT

WEEDS TREES & TURF

1980



**Manager's Guide
to Equipment,
Chemicals, Supplies
and Distributors.**

**"Why am I
so strong on service?
Because Jacobsen customers
say they expect it."**



When you buy a piece of turf equipment from your Jacobsen distributor, he knows that the sale doesn't end with delivery.

In fact, it's just beginning. The rest of it depends upon his ability to give you fast service whenever it's needed. He knows that when your equipment is out for service, it's like having no equipment at all.

That's why your Jacobsen distributor goes out of his way to offer you the best service in the business. From normal maintenance to emergency repairs.

And he's been going out of his way for a long time. Our distributors have been with us for an average of 25 years. And their service managers have been with them for an average of 11 years. That's one heck of a lot of experience.

But Jacobsen distributors don't rest on laurels. Every year they send their service managers and key people to our Racine Product Training Center for comprehensive training sessions.

To stay up-to-date on new products and modifications.

To attend workshops on subjects such as the latest advances in hydraulics and transmissions. And to attend seminars on parts, service and management training.

Not only that, Jacobsen distributors hold field seminars and offer training to those customers who handle their own routine maintenance.

Fast service. Done by professionals who are thoroughly trained.

That's what you said you expect.

And that's why we feel that the sale is really completed in the service department.

Next time you get a chance, ask your Jacobsen distributor to tell you about his service philosophy.

The more you listen to what he has to say, the more you'll know he's been listening to you.

We hear you.

JACOBSEN
TEXTRON

Jacobsen Division of Textron Inc.

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Rodale Resources

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Safway Steel Prod.
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Sturdisteel

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Atwater Strong
Echo Inc.
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HMC, Green Machine
Jacobsen Mfg. Co., Div. of Textron Inc.
John Deere & Co.
Toro Co.
Vandermolen Corp.
Yard Vac

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De Bourgh Mfg. Co.
L. B. Foster
OME Inc.
Standard Golf Co.
Western Wood Structures

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John Deere & Co.
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Solo Motors Inc.
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Echo
Hinds International Inc. Equip. Div.
Homelite Div., Textron
Husquavarna Inc.
John Deere & Co.
Massey-Ferguson
McCulloch Corp.

Continues on page 30

THE CASE FOR "BUYING AUDIT"

We seem to forget, or fail to realize, that a good many years ago we did not have independent verification of publication circulation. Some publishers swore to circulation figures that had no possible relation to fact. Soon, all publisher circulation figures were suspect. No advertiser or agency could be sure of what it was buying.

Leading publishers and advertising buyers finally revolted. They acted to establish independent, tripartite bureaus to authenticate publication circulation.

With regret, we must report that the fight is far from over. That unaudited publications are still added to media schedules can only be because buyers of advertising do not realize what a Pandora's box they open when they deny the audited circulation principle.

Without audited circulation, the advertising agency cannot develop a media schedule with any feeling of confidence that all figures on coverage are valid. The advertising manager cannot defend his market coverage data with the sure knowledge that all statistics are accurate. In other words, without audited circulation, the buyer of advertising would be forced to use unverified claims as data or set up an expensive system to determine if full value for the advertising dollar is being delivered.

Why is any publication not audited?

One reason is, of course, that the publication is so new that it is not yet able to meet the re-

quirements of the audit bureaus. That need not concern us.

It is perhaps true that a publication which has absolutely no competition need not supply verified data—if there is such a publication. Publications owned or operated by a society or association may consider an audit unnecessary since "the publication is sent to all members." An association's roster cannot be accepted automatically, however, as a basis for buying advertising. Experience has shown that sometimes substantial differences in total numbers and individual characteristics exist between an association's roster and its journal's distribution.

The reason most frequently cited for lack of an audit, however, is that costs of an independent audit are too high. In fact, auditing charges are generally not much more than the price of just one page of advertising in the publication!

Ah, yes, the argument runs, but it is not the cost of the audit itself; it is the expense and effort to maintain circulation records which is "too expensive." If the condition of a publication's records isn't good enough to meet the discipline of an audit, how can the advertising buyer have confidence in the quality of the circulation list?

In fact, all of these reasons for lack of audit do not reflect the real reason why unaudited publications survive. The real reason is that not enough buyers of advertising care enough to insist on a publication's being audited. These buy-

ers refuse to recognize that audit reports contain meaningful and valuable information not elsewhere available and that they are essential to advertisers and agencies in the proper evaluation of publications.

And what is ABP's interest in this subject? Since it was first formed, ABP has championed the cause of audited publications. It is a requirement for ABP membership that a publication must submit to the discipline of an independent audit. Clearly stated in ABP's Code of Publishing Practice, to which members must subscribe and which they must uphold, is this forthright statement:

□ "As a condition precedent to membership and as a condition for the continuation of membership, each member of American Business Press, Inc. agrees:

"To submit its publications to regular circulation audits by an independent, non-profit, tripartite auditing organization, and to encourage similar auditing practices by all presently unaudited business publications."

ABP believes that all good publishing will gain, as will the buyer of advertising, when higher standards become a must. We rise to ask if buyers care.



American Business Press, Inc.
205 East 42nd Street
New York, N.Y. 10017
212 661-6360

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FMC, Outdoor Power Equip. Div.
Gruendler Co.
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Morbark Ind. Inc.
Olathe Mfg. Co. Inc.
Piqua Engr. Inc.
Royer Foundry & Machine Co.
Safety Test Inc.
Spartan Tree Equip. Co.
Strong Mfg. Co.
Vandermolen Corp.
Vermeer Mfg. Co.
Woodchuck Chippers

Cranes

Auto Crane Co.
Baker Equipment Eng. Co.
Cascade Corp.
Dayton Electric Mfg. Co.
Dountz Equip. Co.
Ideal Crane Co.
Reach-All Mfg.

Cultivators

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Atlas Tool Mfg. Co.
Brillion Iron Works
Derby Tiller Co.
Ferrari Int.
FMC, Outdoor Power Equip. Div.
Ford Motor Co., Tractor Operations
Fuerst Brothers Inc.
Giant Vac Mfg. Co.
Honda Power Equip.
Howard Rotavator Co. Inc.
John Deere & Co.
Lambert Corp.
Massey-Ferguson
McDonough Power Equip.
Rhino by Athens & Servis, Austin Prod.
Satoh Agric. Mach. Mfg. Co.
Union Fork & Hoe Co.
Wheel Horse Prod.
White Farm Equip.

Dethatcher

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Hahn Inc.
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Thatch-Away Mfg. Co.
Vemco Corp.
Yard Vac

Dozer

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John Deere & Co.
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Drainage Tubing

Advanced Drainage System
Francesville Drain Tile Corp.
Hancor Inc.
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Drills

Milwaukee Electric Tool
Robinson Ind., Limb Lopper
Stanley Hydraulic Tools

Dusters

Buffalo Turbine Ag. Equip.
D. B. Smith & Co.
HMC, Green Machine
H.D. Hudson Mfg. Co.
Root Lowell
Vandermolen Corp.

Edgers

Bunton Co.
Excel Industries
John Deere & Co.
K-D Mfg. Co.
Turfco Prod. Co.
Weed Eater Inc.
Yard Vac
Kurb Dresser
Sand Trap

Engines

Allis-Chalmers
Briggs & Stratton Corp.
Clinton Engines Corp.
Detroit Diesel Allison, Div. GMC
Honda Power Equip.
Kawasaki Motors Corp.
Kohler Co.
Onan
Suzuki
Tecumseh Prod. Co.
Teledyne-Wisconsin Motor

Forklifts

Dynamic Industries Inc.
Foxcroft Dev. Assoc.
International Harvester
Massey-Ferguson
Princeton Mfg. Co.

Generators

Allis-Chalmers
Baker Equipment Eng. Co.
Homelite Div., Textron
Honda Power Equip.
John Deere & Co.
Kohler Co.
Stanley Hydraulic Tools
Wheel Horse Prod.

Greenhouses

Archway Greenhouses
Atlee Burpee Co.
Cloud Co.
Enclosures Inc.
Environmental Dynamics
Filon Home Greenhouse
Hansen Weatherport
J. A. Nearing Co.
Lord & Burnham
National Greenhouse Co.
Reliable Greenhouses
Sturdi-Built Mfg. Co.
Sunglo Greenhouses

Texas Greenhouse Co.
Vegetable Factory
Verandel Co.
Water Works Garden Houses
Weber Systems Inc.

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Dountz Equip. Co.
Flexitube Ind. Corp.
FMC, Agric. Mach. Div.
Minnesota Wanner Co.
F. E. Myers Co.

Irrigation, Drip

Aquatic Irrigation Systems
Drip-Eze
Drip-Igation Co.
Raindrip Inc.

Irrigation, Mobile

Ag-Rain Inc.
Consolidated Pipe & Tube
Greenfield Traveling Sprinklers
Hydro Engr.
Pringle Mfg. Co.
Travelrain

Irrigation, Systems & Supplies

Ag-Rain Inc.
Agtronics Mfg. Co.
Ametek/Plymouth Prod.
Aqua Dial
Aqua Turf
Aquatic Irrigation Systems
Batrow Inc.
Champion Sprinkler Equip.
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Drip-Eze
Drip-Igation Co.
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Griswald Controls
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Hydro Terra Corp.
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King Bros. Ind.
Lakos
Lumenite Electronic Co.
Melnor Ind. Inc.
Microdot Prod.
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Nelson LP Corp.
Pringle Mfg. Co.
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Rain-O-Mat Sprinklers, Inc.
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Skinner Irrigation Co.
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Groundsmaster 72.[®]

We engineered this Professional to mow up to 3.7 acres an hour without losing its cool.

Power to spare from a water cooled, 4 cylinder engine.

Clean, uncluttered operator station for maximum visibility.

Hydrostatic drive for smooth, one pedal control of forward/reverse.

An optional rear discharge cutting unit which directs clippings down between the wheels is now available.

Donaldson air cleaner for longer engine life.

Deck offset 18" for mowing under limbs, trimming near fences, trees.

If you're responsible for large areas of turf, you have grounds to buy our Groundsmaster 72[®].

In fact, Toro engineered this rugged 72" rotary specifically for your needs.

We built-in plenty of power for all types of cutting conditions.

We made its engine water cooled to give you longer service life.

We designed it to trim close to fences, walls, buildings and trees.

And we added versatility. With optional accessories including a 48" snowthrower, V-plow, rotary broom, roll over protection

system (ROPS), and cab with ROPS.

Want a demonstration of the Groundsmaster 72[®]? Or our Groundsmaster 52[®] that mows like a garden tractor and trims close like a walk mower? Call your Toro distributor. Or, mail the coupon.

TORO[®]

The Professionals[™]

Tell me more, Toro.

I'm interested in a free demonstration of the Groundsmaster 72[®]. Please have my distributor call me.

Name

Company

Address

City County

State Zip

Phone area code number

Mail coupon to: The Toro Company
Commercial Marketing Dept. WTT-099
8111 Lyndale Ave. S., Minneapolis, MN 55420

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Lighting Systems

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Landscape Forms
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Mexico Forge-Kilgore
Milroy Mfg. Inc.
Plastic Ommium Inc.
R. J. Thomas Mfg. Co.
Rosenwach Inc.
United Metal Rec. Corp.

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Erickson Corp.
Ford Motor Co., Tractor Operations
Giant Vac Mfg. Co.
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J I Case, Davis Div.
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R & R Prod. Inc.
Schwartz Mfg.
Sperry New Holland
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White Farm Equip.

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Giant Vac Mfg. Co.
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John Deere & Co.
Lindig Mfg. Corp.
Piqua Engr. Inc.
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Carlson Co.
Decratrend
Fox Valley Marking Systems
Richway Industries Ltd.
Trusco Mfg. Co.
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FMC, Agric. Mach. Div.
HMC, Green Machine
Root Lowell

Mowers, Flail

Brillion Iron Works
Excel Industries
FMC, Agric. Mach. Div.
Ford Motor Co., Tractor Operations

Hefty Tractor Co.
Hesston, Woods Div.
International Harvester
John Deere & Co.
Mathews Co.
Mott Corp.
Vemco Corp.

Mowers, Reel

Brouwer Turf Equip. Ltd.
Cushman OMC-Lincoln
Dayton Electric Mfg. Co.
National Mower Co.
Roseman Mower Co.
Roxy-Bonner Inc.
Toro Co.

Mowers, Rotary

Allis-Chalmers
Ariens Co.
Atlas Tool Mfg. Co.
Billy Goat Ind.
Bolens Div. FMC Corp.
Bunton Co.
Bush Hog Implements
Continental Belton Co.
Dayton Electric Mfg. Co.
Excel Industries
FD Kees Mfg. Co.
FMC, Agric. Mach. Div.
FMC, Outdoor Power Equip. Div.
Ford Motor Co., Tractor Operations
Goodall
Grasshopper Co.
Gravely
Heckendorn Mfg. Co.
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Honda Power Equip.
Howard Price Turf Equip.
John Deere & Co.
Kut-Kwick Corp.
Massey-Ferguson
McDonough Power Equip., Snapper
OME Inc.
Pen-Gro Sales Co.
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Ryan Turf Equipment/OMC Lincoln
Sarlo Power Mowers
Sensation Corp.
Simplicity Mfg. Co.
Smithco
Terrain King Corp.
Toro Co.
Wheel Horse Prod.
Wisconsin Marine Inc.
Yazoo Mowers

Mowers, Sickle Bar

Allis-Chalmers

Mulchers, Hydraulic

Bowie
Erocon, Div. Electric Tech. Corp.
Finn Equip. Co.
Reinco
Strong Mfg. Co.

Net Layers

Robark Inc.
Western Cascade Inc.

Netting, Erosion Control

American Enka Co.
Conwed Corp.
Gulf States Paper Corp.
Turfibre Prod., Enkamat

Nozzles & Accessories

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Continental Belton Co.
Delavan Corp.
F. E. Myers Co.
Minnesota Wanner Co.
Safe-T-Lawn
Spraying Systems Co.
Walsh Mfg. Co.

Parts

Aladdin Mfg., Mower, Aerator
Dayco Corp., Belts
Omark Ind. Inc., Saw Chains
R & R Prod. Inc., Mower, Aerator
Sabre Saw Chain, Saw Chain

Picnic Tables

American Playground Device Co.
Belson Mfg. Co.
Chadwick Mfg. Co.
Columbia Cascade Timber Co.
Dentin Mfg. Co.
Game Time Inc.
General Playground Equip.
Gerber Mfg. Inc.
Giant Mfg. Inc.
Howmet Aluminum Corp.
J. E. Burke Co.
Jamison Inc.
Kay Park-Rec Corp.
L. A. Steelcraft Prod.
Mexico Forge-Kilgore
Midwest Mfg. Co.
Milroy Mfg. Inc.
Patterson-Williams
R. J. Thomas Mfg. Co.
Recreation Equip. Corp.
Sargent-Sowell Inc.
Stadiums Unlimited
Sturdisteel
Trojan Playground Equip.
Vee Ent.

Play Structures

Action Prod. Inc.
American Playground Device Co.
Big Toys
Blue Valley Ind.
General Playground Equip.
N. American Rec. Conv.
Park Structures Int.
Patterson-Williams
Playworld Systems

Plow, Sand Trap

Dedoes Ind., Inc., Sand Pro
Turfco Prod. Co.

Post Hole Diggers

Allis-Chalmers
Continental Belton Co.
Dayton Electric Mfg. Co.
Erickson Corp.
Ford Motor Co., Tractor Operations
John Deere & Co.
Massey-Ferguson
Rhino by Athens & Servis, Austin Prod.
Union Fork & Hoe Co.

Pressure Washers

Allis-Chalmers
Broyhill Co.
Citation Mfg. Co.
Continental Belton Co.

Continues on page 36

Introducing

RAM I

KENTUCKY BLUEGRASS



-a shade better...and better in the shade.

RAM I was found growing on the ninth putting green at Webhannet Golf Club in Maine. There it grew vigorously though consistently mowed at $\frac{1}{4}$ ". It was selected by Mr. Ernest W. Brown, superintendent, in consultation with Alexander M. Radko, National Research Director, USGA Green Section. The original plant was submitted to Dr. C.R. Funk at Rutgers University for further evaluation and testing. University testing proved this new variety to have superior qualities.

Having been selected and tested by two of the leading turf specialists, RAM I is now brought to you by two leading seed companies.

Available through your nearest Lofts or Jacklin distributor.

Test results available on request.

- Thrives, even in the shade.
- Gives faster spring green-up when compared with other Kentucky bluegrasses.
- Is very competitive against *Poa annua* even when mowed under $\frac{3}{4}$ ".
- Has improved disease resistance — especially to stripe smut and powdery mildew.



**Lofts
Pedigreed Seed, Inc.**
Bound Brook, New Jersey 08805

Jacklin Seed Company

17300 Jacklin Avenue, Post Falls, Idaho 83854

Circle **148** on free information card

Canadian Distributor:
Otto Pick & Sons Seed
Richmond Hill, Ontario
(416) 884-1147



RAM I Kentucky bluegrass is in no way connected with RAM of the Colorado Sports Group of Companies.

How to choose the right iron.



Choosing the right golf club is a serious matter. You need one that's just right for the shot you have to make. You should take into account the distance, wind, lie, and obstacles.

At Kubota, we feel that you should devote the same careful attention to choosing a tractor.

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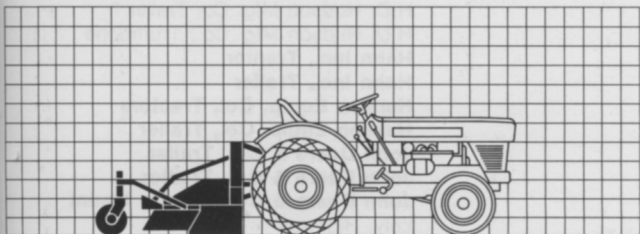
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Continues on page 38

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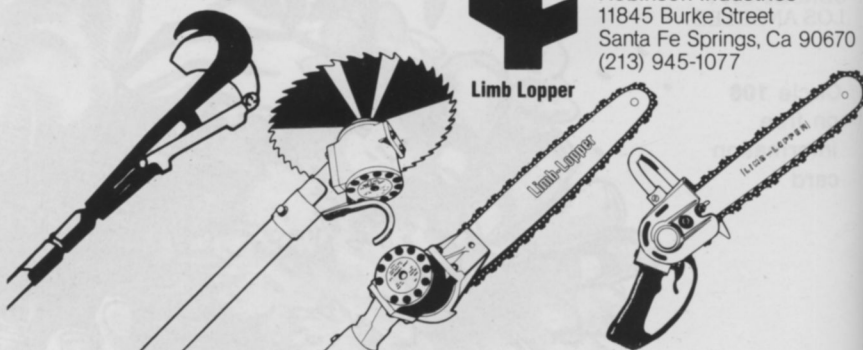
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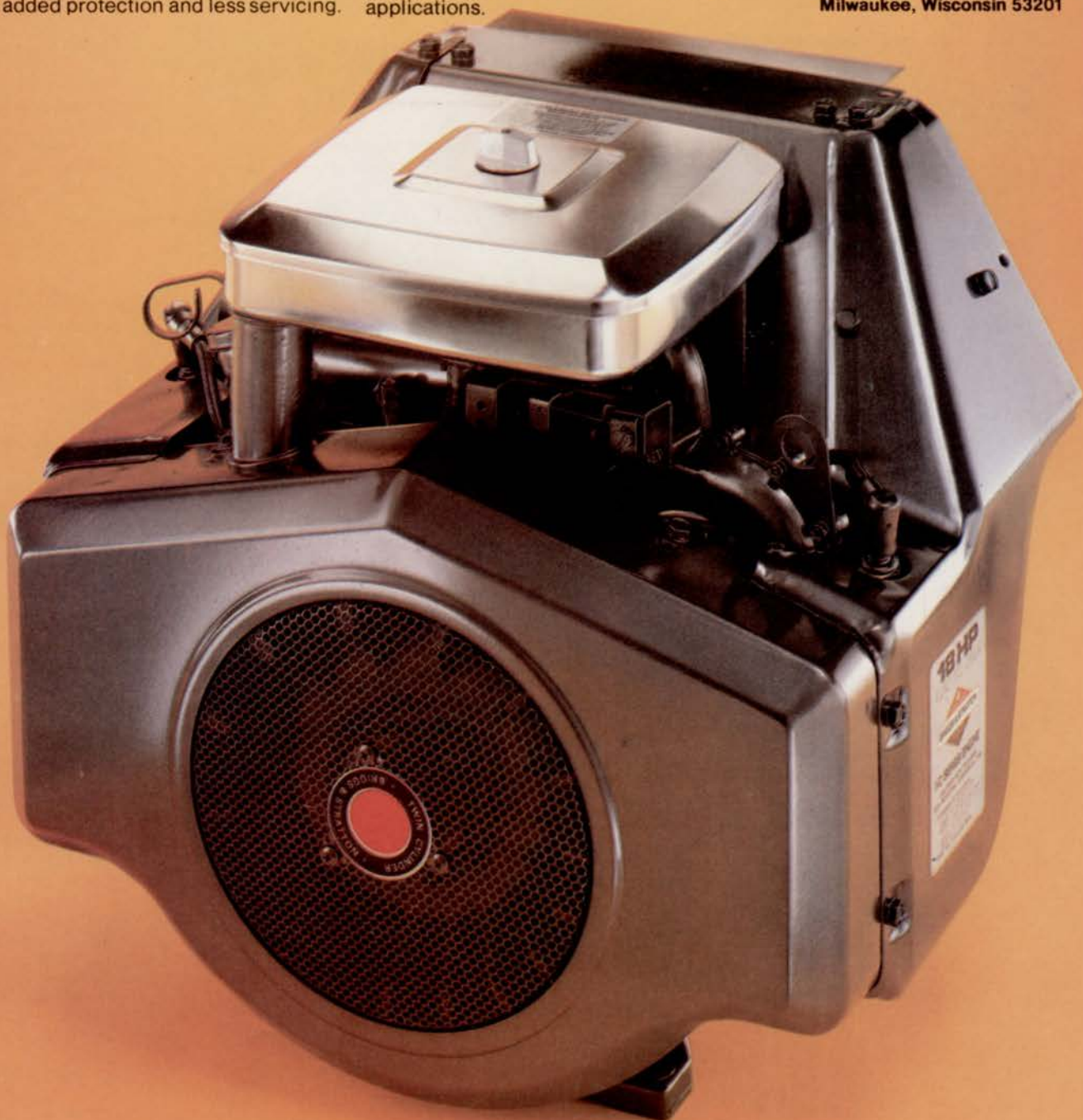
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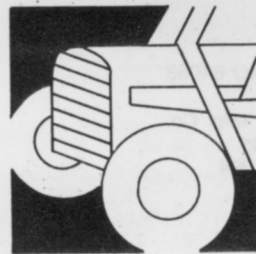
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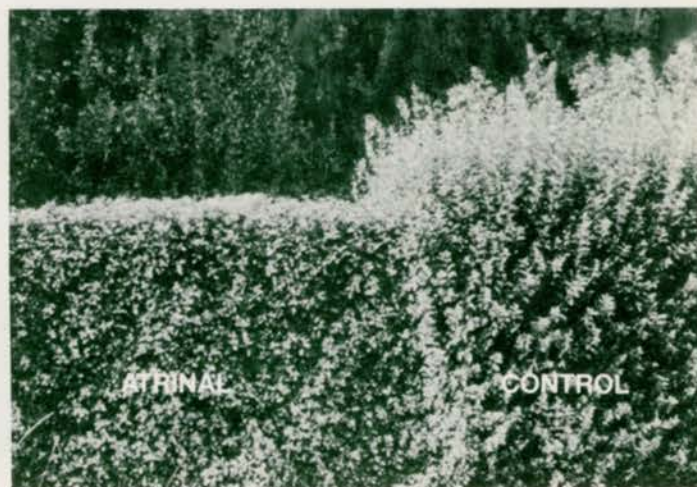
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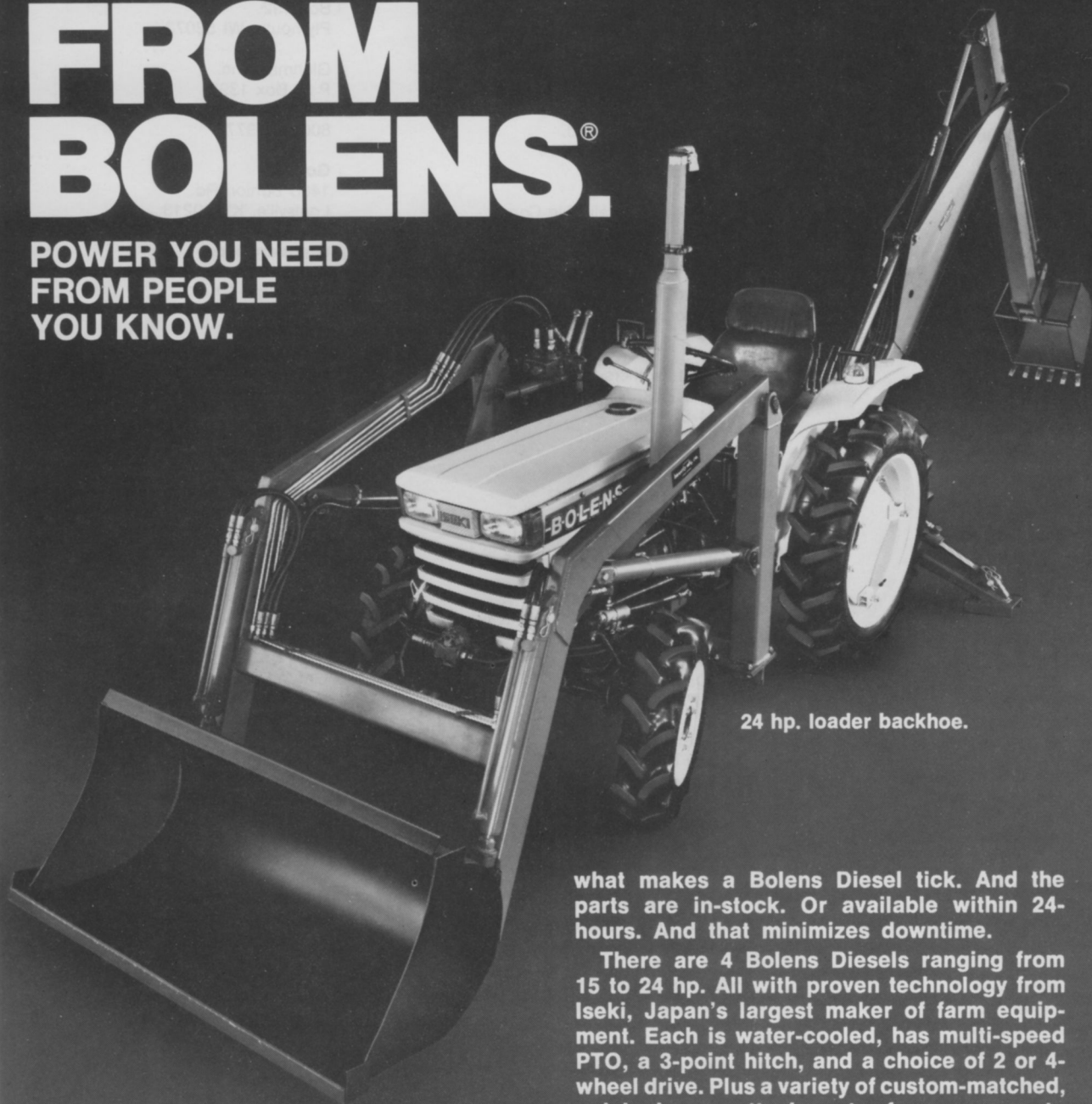
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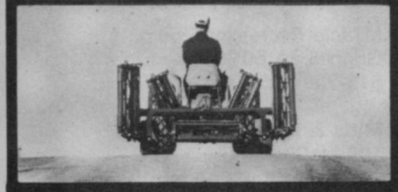
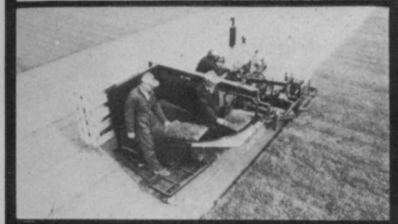
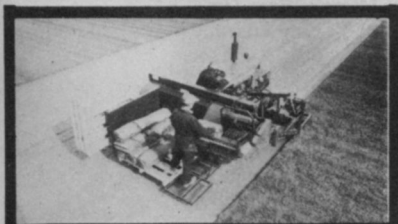
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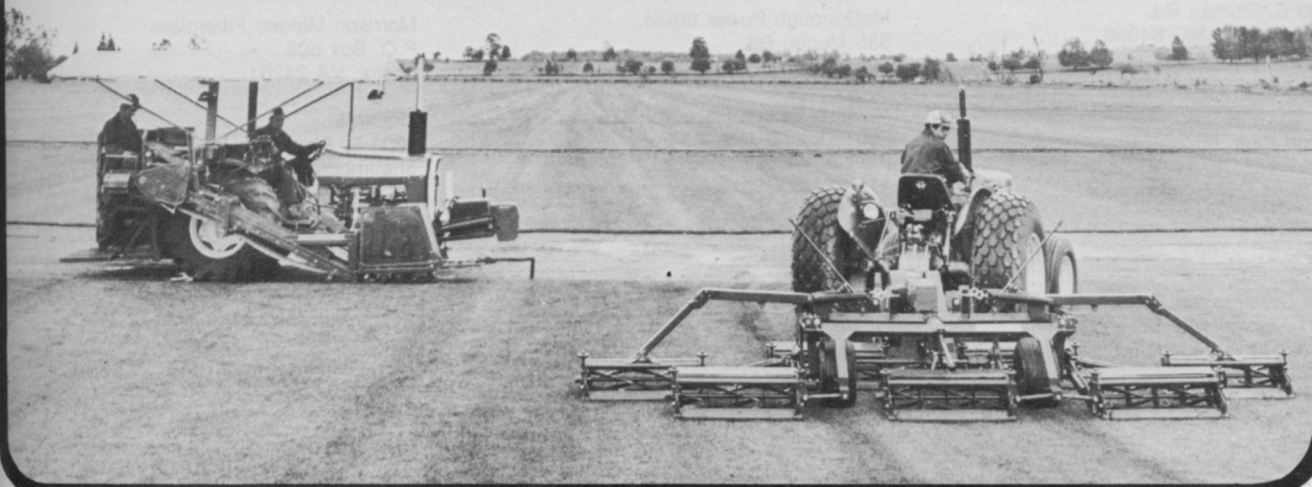
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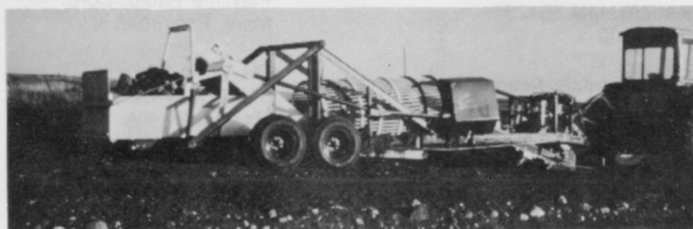
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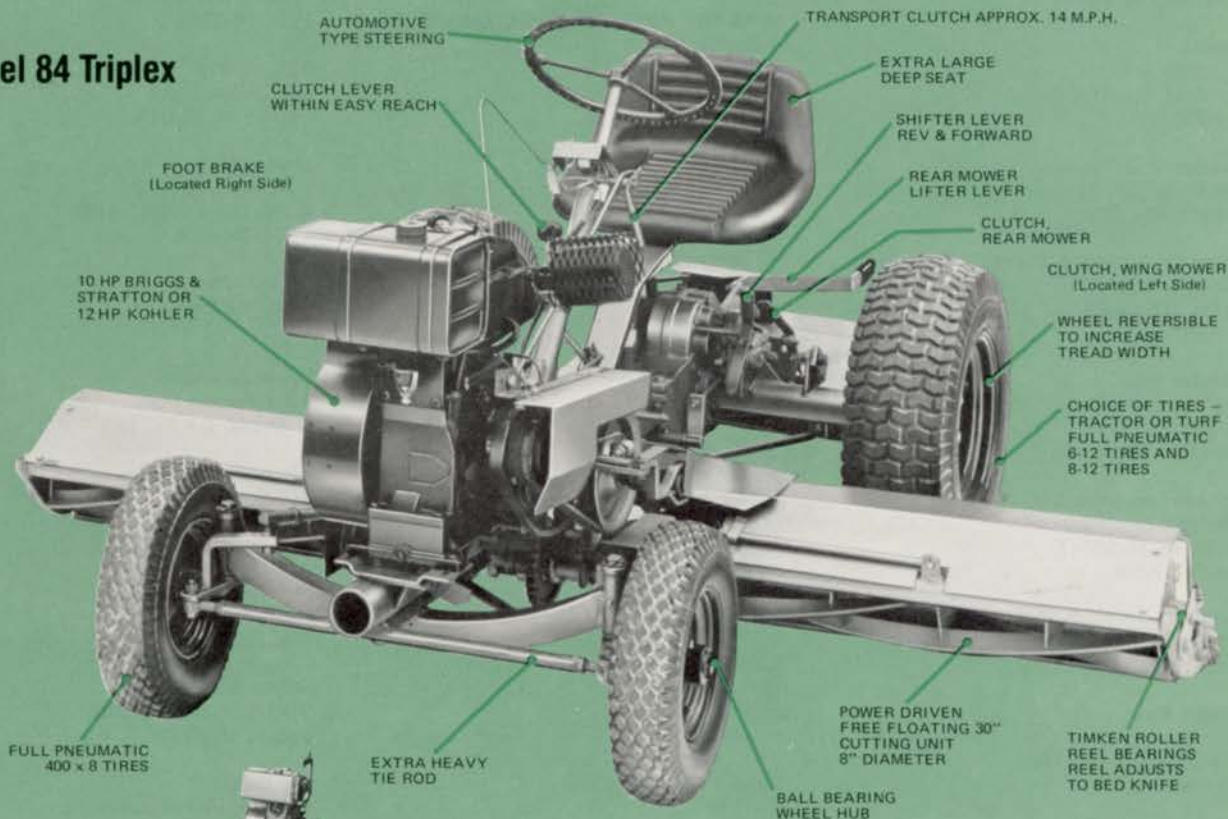
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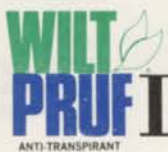


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515-276-5377

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New York, NY 10017

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Worcester, MA 01601

Vermeer Mfg. Co.
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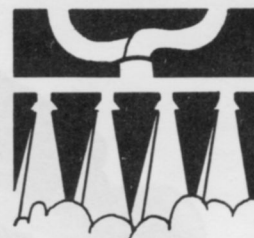
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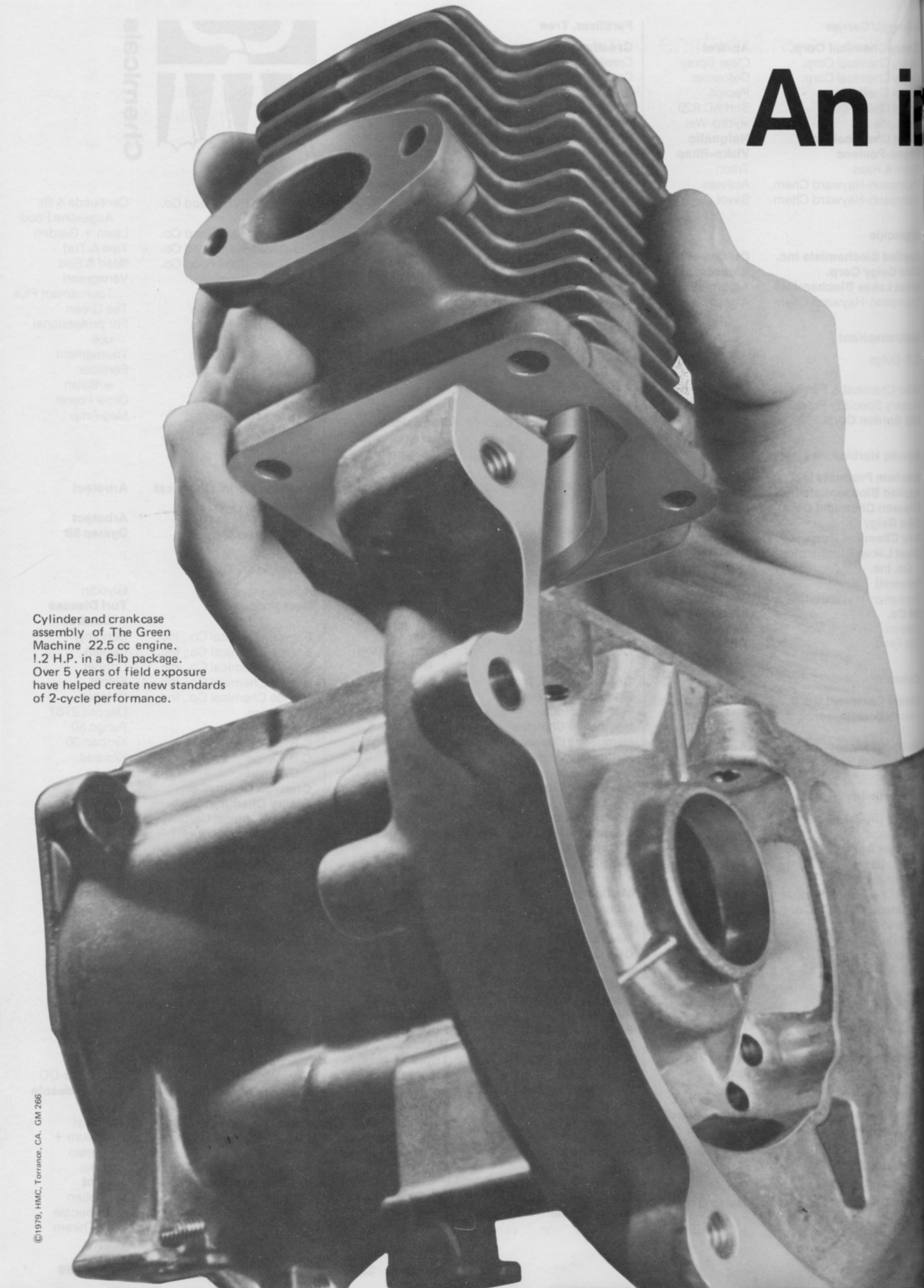
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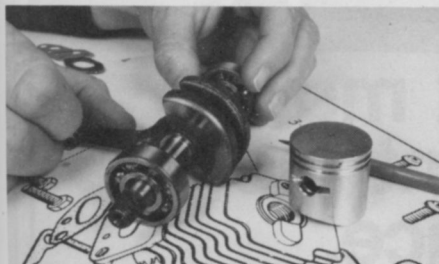


Cylinder and crankcase
assembly of The Green
Machine 22.5 cc engine.
1.2 H.P. in a 6-lb package.
Over 5 years of field exposure
have helped create new standards
of 2-cycle performance.

The Green Machine trimmer-pruner-cutter. side look at a classic.

In 1972, The Green Machine introduced a gas-powered string trimmer employing a new concept—extreme light weight combined with amazing torque. It proved the ideal tool for high production weed and grass trimming, as well as brush cutting and tree pruning. From the start, Green Machines set new industry standards for quality—and new records for time-saving and money-making. The reasons are basic: ingenious design and a fanatic devotion to excellence.

For instance, The Green Machine



model 3000 engines have been dynamometer tested—at full throttle and full load—for 200 hours. That's equal to 600 hours of field operation. Actual field operation of 1000 to 1500 hours is common-place.

Chrome and hone

To understand what's behind Green Machine performance, just take a look inside a model 3000 engine.

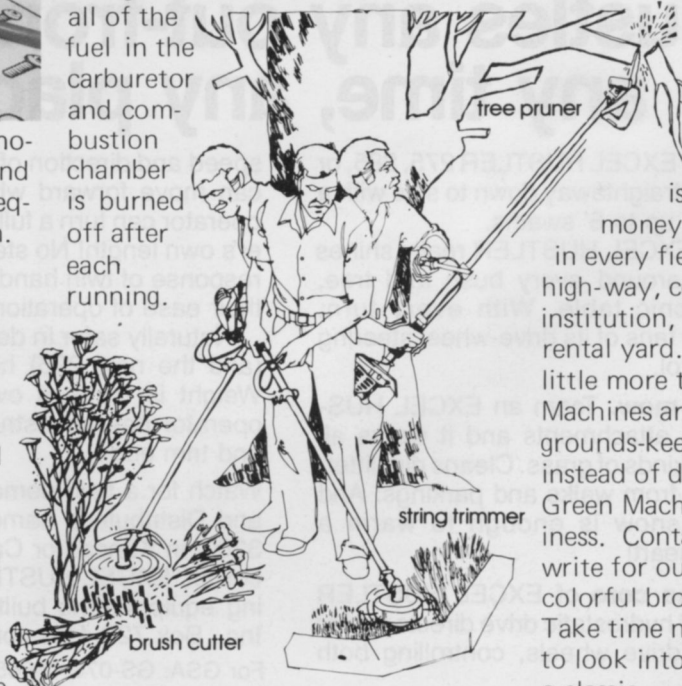
You'll see a precision die-cast cylinder with polished chrome-plated bore—plus such refinements as piston-ported fuel timing and almost five square inches of scavenge porting. Running inside that chrome-protected cylinder, you'll see a precision die-cast aluminum piston, micro-honed and fitted with double,

positively-located rings.

You'll also see a crankshaft and rod assembly of high-carbon steel, precision-machined, and aligned to $\pm .001$ -inch tolerances, running with high-speed ball-type main bearings and needle-type rod journal bearings.

Easy starting with P.F.S.

Long engine life is a recognized Green Machine virtue. So is easy starting. Thanks to a proven, reliable fuel pump and carburetor design. Plus an important Green Machine exclusive: Positive Fuel Shut-off. Engine "kill" is accomplished by stopping the fuel supply to the engine, rather than by cutting the ignition. This means that all of the fuel in the carburetor and combustion chamber is burned off after each running.



Fresh fuel is used for each start. Conventional "ignition kill" allows the fuel and oil mixture to remain in the chamber and carburetor where it can become

stale and even, with time, create a residue that prevents starting.

Nine heads and blades

Green Machine introduced the first professional-quality Tap-For-Cord automatic string-feed head. A total of five different string trimmer heads are now offered as well as four quick-change blades.

A string trimmer...and more

The Green Machine is a great string trimmer—and a great brush cutter, and tree pruner. With accessory metal blades, one man can clear up to an acre of brush a day, cutting easily through vines up to $\frac{3}{4}$ -inch thick. Tree branches up to three inches thick can be sliced through easily—in a single stroke.

See what's in it for you

The Green Machine is saving time and making money for thousands of users in every field: park and municipal, high-way, cemetery, estate, golf course institution, landscape, farm, school, rental yard. Crews equipped with little more than mowers and Green Machines are completing massive grounds-keeping chores in hours, instead of days. See what The Green Machine can do for your business. Contact your dealer or write for our new, colorful brochures. Take time now to look into a classic.

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The Green Machine®

A yard-care classic.



An EXCEL HUSTLER mower out-hustles any out-front mower any time, any place.

And does it mow! EXCEL HUSTLER 275, 285, or new 295 cuts the straightaway down to size with a smooth, even cut, up to 6' swaths.

But where the EXCEL HUSTLER really shines is turning neatly around every bush and tree, signpost and picnic table. With every turn, operators turn into fans of its drive-wheel steering and fingertip control.

Does more than mow. Team an EXCEL HUSTLER tractor with attachments and it works all year long. Cuts all kinds of grass. Cleans dirt, litter, sand, leaves, etc. from walks and parkings. And what it does to snow is enough to warm a groundskeeper's heart!

The tractor is the core of EXCEL HUSTLER performance. Dual hydrostatic drive directs power independently to drive wheels, controlling both

speed and direction of travel. Because one wheel can move forward while its mate reverses, the operator can turn a full 360° circle within the mower's own length! No steering wheel can match the response of twin hand levers, nor even approach their ease of operation.

Naturally safer in design, both the 275 and 285 (and the new 295) have low center of gravity. Weight is focused over the drive wheels, and operator has unobstructed view of the front cut and trim edge.

Watch for a field demo or write for free literature and Distributor's name. Call toll-free (800) 835-3260; in Kansas or Canada, call (316) 327-4911 collect. EXCEL HUSTLER turf and groundskeeping equipment is built right by Excel Industries, Inc., Box 727, Hesston, Kansas 67062.

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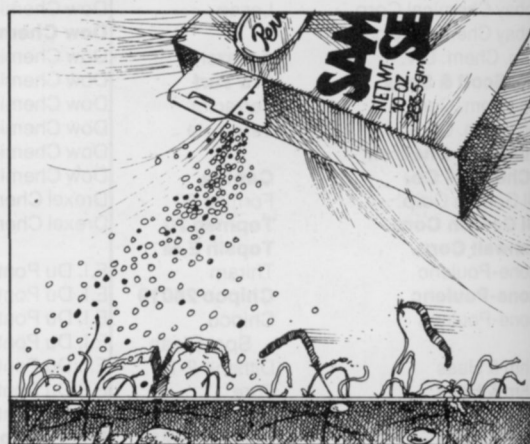
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Spray Roundup® on the turf area to be renewed.

With just one application of Roundup® herbicide by Monsanto, you can control or destroy most unwanted vegetation. Including stubborn intruders like annual bluegrass, bermudagrass, quackgrass, johnsongrass, tall fescue, and kikuyu grass.

In a matter of days, Roundup circulates throughout these weeds. Even into the below-ground roots, destroying the entire plant. Yet Roundup has no residual soil activity. That means there is no injury to new seedlings planted after application.



Spread Pennfine Perennial Ryegrass seed over the area treated with Roundup.

After applying Roundup, seed with fast-growing, fine-leaved Pennfine Perennial Ryegrass. Pennfine was developed by Dr. Joe Duich at Pennsylvania State University. Pennfine has been proven to germinate quicker, grow denser, and resist disease better than traditional ryegrasses. And it penetrates compact soil, sending its roots to depths of 12 to 18 inches. These qualities make Pennfine an excellent choice for turf renewal and help to explain why it's used by turf professionals from coast to coast. In a short time, you'll see the proof for yourself.

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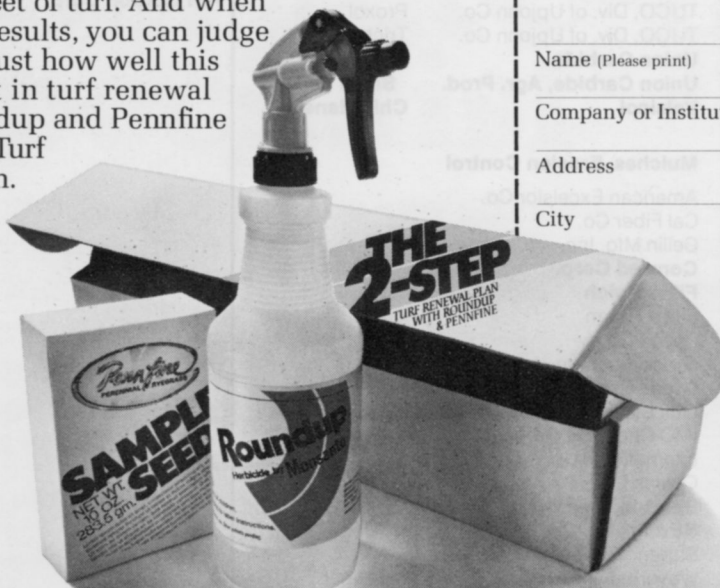
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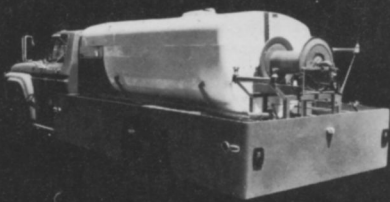
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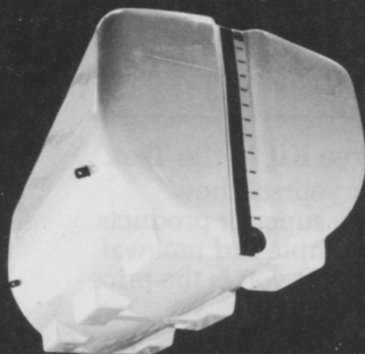
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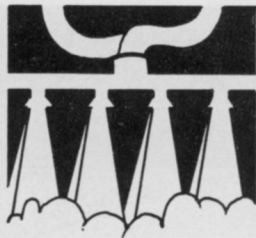
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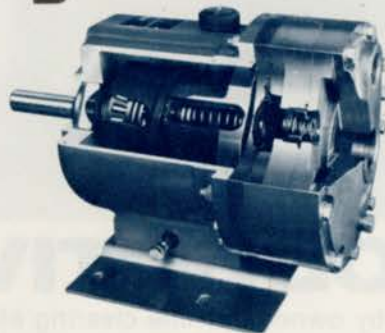
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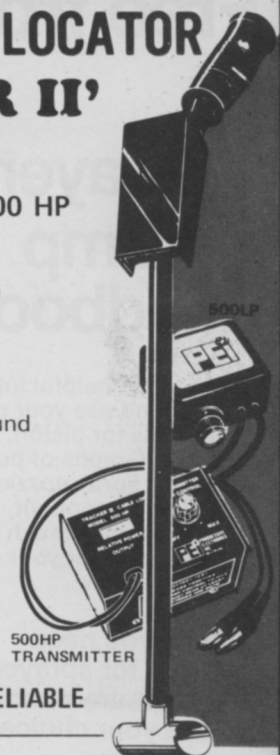
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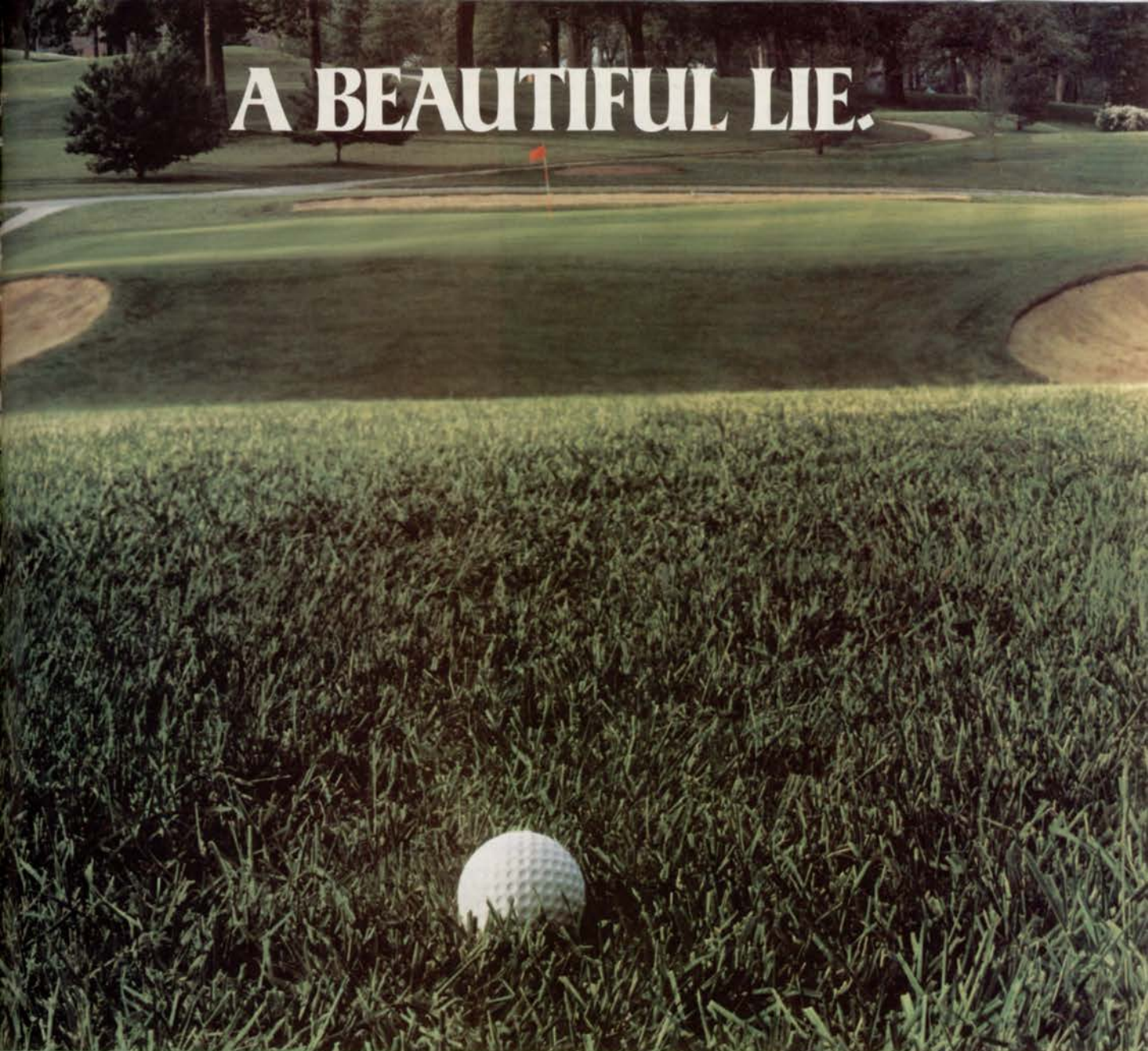
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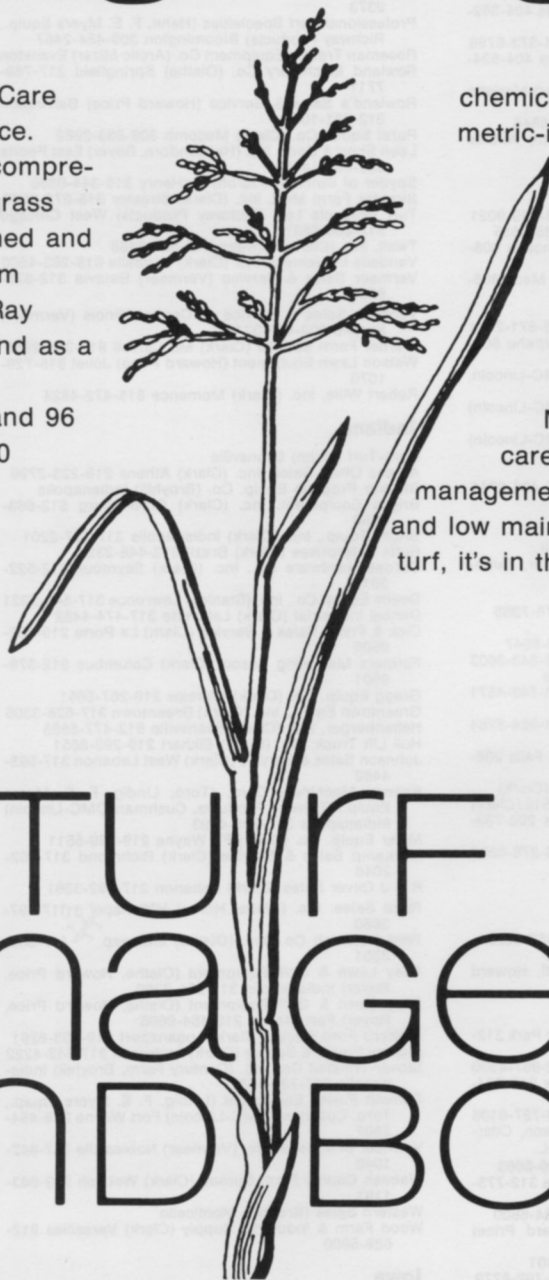
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 Wood Farm & Industrial Supply (Clark) Versailles 812-689-5800

Iowa

Ahrendt & Clark, Inc. (Clark) Sibley 712-754-3741
 All Wheel Drive Co. (Clark) Sioux City 712-255-5018
 B. Batcheller Farm Store (Broyhill) Sioux City
 Big Bear Turf Equipment (Howard Price, Richway Products) Des Moines
 Bill Bone Motors (Clark) Oskaloosa 515-673-8283
 Joe Bradley Equip. Co. (Clark) Algona 515-295-2421
 Brakke-Wollums Implement, Inc. (Clark) Mason City 515-423-2412
 Brayton Chem., Inc. (Broyhill) W. Burlington
 Broken Equip. (Clark) Monticello 319-465-5422
 Broken Supply (Broyhill) Fort Dodge
 Burg Implement (Clark) Monticello 319-465-5422
 Capital City Equip. Co. (Clark) Waukon 319-568-4571
 Central States Turf Equipment & Supply Co. (F. E. Myers Equip., Hahn) Des Moines 515-277-8500
 Central Tractor Parts Co. (Broyhill) Des Moines
 Clay Co. Equip., Inc. (Clark) Spencer 712-262-5870
 Cline Truck & Equip. (Clark) Iowa City 319-338-9455
 Corky's Corner (Clark) Marcus 712-376-4812
 Creston Implement Co. (Clark) Creston 515-782-8436
 Da-Mar Implement, Inc. (Clark) Orange City 712-737-4838

Davis Farm Equip. Co. (Clark) Tipton 319-886-6175
 Davis Implement Co. (Clark) Vinton 319-472-4701
 The Gordon Fennell Co. (Century Farm) Cedar Rapids 319-362-2177
 Industrial Supplies, Inc. (Cushman/OMC-Lincoln) Des Moines 515-288-7446
 Little Wheels, Ltd. (Heckendorn) Iowa City 319-354-1357
 (Cushman/OMC-Lincoln, Broyhill, Royer)
 Mid-States Equip. (Broyhill) Lake View
 Morrison Equipment, Inc. (F. E. Myers Equip.) Des Moines 515-244-2868 (Olathe)
 Nevada Farm Center (Rhino) Nevada 515-382-6533
 RPW, Inc. (Kohler Engine) Des Moines 515-265-8151
 P. W. Stanke Co. (Sato) Wheatland 319-374-2311
 Tri-State Toro (Lindig, Cushman/OMC-Lincoln, Toro) Davenport 319-326-4416
 Vermeer Sales & Services (Vermeer) Pella 515-628-2000

Kansas

Briggs Turf Farm (Foxcroft) Stilwell 913-681-2500
 Champion Turf Equipment, Inc. (F. E. Myers Equip.) Wichita 316-943-0283 (Cushman/OMC-Lincoln)
 Cisco (Broyhill) Salina
 Fairbank Equip., Inc. (Broyhill) Wichita
 Kerr Implement Warehouse (Rhino) Garden City 316-276-3441
 Landsco Corp. (Lindig, Hahn) Salina 913-825-0578
 The Lee Co. (Broyhill) Salina
 Medart Engines & Parts of Kansas (Kohler Engine) Lenexa 913-888-8828
 Murphy Machinery Co. (Olathe) Wichita 316-942-8381
 Vermeer Sales & Services (Vermeer) Olathe 913-782-3655

Kentucky

Ag Spray Equip., Inc. (Broyhill) Hopkinsville
 Brentom Corp. (Lindig, Howard Price) Louisville 502-491-0865
 Brinley-Hardy Co. (Century Farm) Louisville 303-744-6371
 Bunton Seed Co. (F. E. Myers Equip., Broyhill) Louisville 502-584-0136
 Jack Dayton & Son, Inc. (Cushman/OMC-Lincoln, Olathe, Broyhill, Royer) Louisville 502-582-2505
 Ellingsworth Co. (Kawasaki), Louisville, KY 502-585-5055
 Ky-Inna Turf Supply Co., Inc. (Heckendorn, Hahn) Louisville 502-491-8400
 Torco Equip. Co., Louisville 800-626-1818
 Vermeer South Central Sales & Service (Vermeer, Olathe) Bowling Green 502-842-8461

Louisiana

Emery Equip. Sales & Rentals, Inc. (Stanley) Baton Rouge 504-293-0541
 Emery Equip. Sales & Rentals, Inc. (Stanley) Shreveport 318-425-7434
 Grayson Co. of Louisiana, Inc. (Kohler Engine) Shreveport 318-222-3211
 Gulf Shore Turf Supply (Lindig) Baton Rouge 504-293-6763
 Hydradyne Hydraulics, Inc. (Stanley) Belle Chasse 504-394-7250
 Reliable Distributors (Royer) River Ridge 504-737-9690
 Southern Specialty Sales Co., Inc. (Heckendorn, Richway Products, Royer, Cushman/OMC-Lincoln) New Orleans 504-486-6101
 Vermeer Sales & Service (Vermeer) Baton Rouge 504-355-4421
 Wilbanks Farm Equipment (Broyhill) Shreveport

Maine

FHP Engine Service (Kawasaki), Lewistown, ME 207-784-5938
 Yerxa's, Inc. (Lindig, F. E. Myers Equip., Toro) South Portland 207-799-2241

Maryland

Adams Equipment (Lindig, F. E. Myers Equip., Cushman/OMC-Lincoln) Baltimore 301-668-0500
 Adams Equipment (Cushman/OMC-Lincoln, Lindig, F. E. Myers Equip., Broyhill, Toro) Silver Spring 301-585-1322
 Agrotec Services, Inc. (Broyhill) Salisbury
 S. M. Christhoff & Sons (Arctic Mizer) Timonium
 Cornell Chemical (Richway Products) Baltimore
 G. L. Cornell Co. (Heckendorn, Cushman/OMC-Lincoln, Royer) Gaithersburg 301-948-2000
 C. V. Foster Equipment Co. (Kohler Engine) Baltimore 301-235-3351
 General Supply & Equip. Co. (Olathe) Baltimore 301-235-6300
 Lyons & Lyons Sales Co., Inc. (Howard Price) Glen Arm 301-665-6500
 Vermeer Sales & Service (Vermeer) Annapolis Junction 301-498-5200

Michigan

Burke Rental Service, Inc. (Royer) Sterling Heights 313-939-4400
 Buryl Hill, Inc. (Foxcroft) Farmington 313-478-1000
 Calumet Industrial Equip. (Arctic Mizer) So. Holland
 Ellis Sales, Inc. (Cushman/OMC-Lincoln) Kalamazoo 616-375-3535
 Ferguson's Lawn Equipment (Heckendorn) Traverse City 616-946-2440
 Golf Car Distributors (Cushman/OMC-Lincoln) Pontiac 313-338-0425
 Lawn Equipment Corp. (Heckendorn, Hahn, Howard Price) Royal Oak 313-398-3636
 Leckler's, Inc. (Lindig) LaSalle 313-242-2344

W. F. Miller Co. (F. E. Myers Equip., Mott Corp., Royer, Olathe) Birmingham 313-647-7700
 W. F. Miller (F. E. Myers Equip., Royer) Grand Rapids 616-241-4481
 Northern Contractors Equip., Inc. (Olathe) Traverse City 616-946-8220
 Spartan Distributors, Inc. (Lindig, Cushman/OMC-Lincoln, Toro) Sparta 616-887-7301
 Turfgrass, Inc. (Richway Products) South Lyon
 Vermeer Sales & Service (Vermeer) Jackson 517-750-3783
 Walker Hydraulic Tools (Stanley) Garden City 313-525-0163
 Wilkie Turf Equipment Co. (Cushman/OMC-Lincoln, Toro) Pontiac 313-372-8800
 Floyd Wanser Supply Co. (Century Farm) Battle Creek 616-979-1151

Minnesota

Air Hydraulic Systems, Inc. (Stanley) Minneapolis 612-377-2342
 Allied Farm Equipment (Broyhill) Eagan
 Carl A. Anderson, Inc. of Minn. (Kohler Engine) St. Paul 612-452-1450
 Coffey's Power Equip. Co. (Arctic Mizer) Hopkins
 Cushman Motor Co., Inc. (Cushman/OMC-Lincoln, Broyhill) Minneapolis
 John Deere Co. (Deere Co.) Minneapolis 612-887-6200
 Falls Equipment, Inc. (Rhino) Red Lake Falls 218-253-2002
 Fowler Electric Co. (Kawasaki), Bloomington, MN 612-884-5401
 R. L. Gould & Co. (Lindig, Cushman/OMC-Lincoln) St. Paul 612-484-8411
 Itasca Equipment Co. (Arctic Mizer) Minneapolis
 Kromer Co. (F. E. Myers Equip., Heckendorn, Hahn, Howard Price) Mound 612-472-4167
 Lindsay Brothers Co. (Century Farm, Howard Rotavator) Minneapolis 612-339-1441
 Midland Cooperative, Inc. (Broyhill) Minneapolis
 Minnesota Toro, Inc. (Toro, Broyhill, Royer) Minneapolis 612-475-2200
 Truck Utilities Mfg. Co. (Olathe) St. Paul 612-484-3305
 Vermeer Sales & Service (Vermeer) Burnsville 612-890-6144
 Watkins Products, Inc. (Broyhill) Winona
 Zeco Co. (Arctic Mizer) Minneapolis

Mississippi

Farmers, Inc. (Broyhill) Greenville
 Pedigo Equip. Corp. (Stanley) Jackson 601-939-6970
 Vermeer Sales & Service (Vermeer) Pearl 601-932-3226

Missouri

Austin Products, Inc. (Rhino) North Kansas City 816-474-6119
 Beckmann Turf & Irrigation (F. E. Myers Equip., Lindig, Toro) Chesterfield 314-532-3649
 Causco, Inc. (Stanley) Independence 816-254-9850
 Causco St. Louis (Stanley) St. Louis 314-987-5990
 Champion Turf Equipment, Inc. (F. E. Myers Equip., Toro, Cushman/OMC-Lincoln) Kansas City 816-333-8000
 Champion Turf Equipment, Inc. (F. E. Myers Equip.) Springfield 417-869-2551
 John Deere Co. (Deere Co.) Kansas City 816-361-4000
 Farmland (Broyhill) Kansas
 Fox Vehicles (Cushman/OMC-Lincoln) St. Louis 314-726-3260
 Carl E. Kelsner (Broyhill) Stafford
 Klughart-Thornhill Machinery Co. (Century Farm) Kansas City 816-421-6296
 Landsco Corp. (Lindig) Grandview (no phone)
 Links Nursery, Inc. (Hahn) St. Louis 314-432-8592
 Medart Engines & Parts (Kohler Engine) St. Louis 314-652-2200
 Outdoor Equipment Co. (Olathe, Heckendorn, Royer, Cushman/OMC-Lincoln, Broyhill) Maryland Heights 314-569-3232
 Ozark Farm Equipment (Howard Price) Cuba
 Dick Proctor Imports, Inc. (Sato) St. Louis 314-487-2085
 Robison's Lawn & Golf (Heckendorn, Broyhill, Richway Products, Royer, Olathe, Howard Price) Grandview 816-765-3333
 Vermeer Sales & Service (Vermeer) Manchester 314-227-2211

Massachusetts

Balher Corp. (Heckendorn, Arctic Mizer) Billerica 617-667-2171
 Clapper Co. (Lindig, F. E. Myers Equip., Toro, Cushman/OMC-Lincoln) West Newton 617-244-7900
 W. J. Connell Co. (Kohler Engine) Newton Upper Falls 617-332-3630
 O. R. Cote Co. (Arctic Mizer) Springfield
 Doering Equip. Corp. (Stanley) Westborough 617-366-8271
 Griffin Greenhouse Supplies, Inc. (Royer) Tewksbury 617-851-4343
 Industrial Engines (Kawasaki) Wakefield, MA 617-246-2483
 The Magovern Co., Inc. (Cushman/OMC-Lincoln, Royer) Pittsfield 413-443-4459
 R. F. Morse & Sons, Inc. (Hahn) W. Wareham 617-295-1553
 Sawtelle Bros., Inc. (Olathe, Howard Price, Royer, Cushman/OMC-Lincoln) Swampscott 617-599-4856
 J. S. Woodhouse Co., Inc. (Howard Rotavator) W. Springfield 413-736-5462

Montana

Agricultural Mgmt. Serv. (Broyhill) Great Falls
 Agro Supply (Broyhill) Billings
 Automotive and Industrial (Royer) Billings 406-245-6443

Horvick Mfg. Co. (Broyhill) Moorhead
 Midland Implement Co. (Howard Rotavator, Century Farm, Lindig, Sato, Toro, Cushman/OMC-Lincoln) Billings 406-248-7771
 Original Equipment, Inc. (Kohler Engine) Billings 406-245-3081
 Parker-Montana Co. (Rhino) Billings 406-245-6627
 Turf-Aid Distributing Co. (Cushman/OMC-Lincoln) Billings 406-656-8008
 Vermeer of Montana (Vermeer) Billings 406-248-7710

Nebraska

Asche Sales (Howard Price) Creston 402-285-0260
 Big Bear Equipment (Lindig, Richway Products, Arctic Mizer, Cushman/OMC-Lincoln) Omaha 402-331-2220
 Dultmeier Sales (Master) Omaha 402-333-1444
 Heinzman Engineering, Inc. (Hahn) Grand Island 308-382-8020
 J-Mac Corp. (F. E. Myers Equip., Howard Price) Omaha 402-331-5121
 Jiridon Agri Chemicals, Inc. (F. E. Myers Equip., Broyhill) Gering 308-436-2166
 Jiridon Agri Chemicals, Inc. (F. E. Myers Equip., Broyhill) Morrill 308-247-2129
 Jiridon Agri-Chem (Broyhill) Morrill
 Kearney Farm Service (Broyhill) Kearney
 A. H. Lock Co. (Century Farm) Lincoln 402-432-1445
 Midwest Ag. Warehouse (Broyhill) Fremont
 Midwest Toro (Cushman/OMC-Lincoln, Toro, Broyhill, Royer) Omaha 402-331-0500
 McShane Corp. (Arctic Mizer) Omaha
 RPW, Inc. (Kohler Engine) Omaha 402-339-4944
 Vermeer Sales & Service (Vermeer) Papillion 402-331-7755

Nevada

Cartania, Inc. (Cushman/OMC-Lincoln) Las Vegas 702-735-6141
 The Norton Corp. (Lindig, Broyhill, F. E. Myers Equip., Cushman/OMC-Lincoln) Las Vegas 702-876-8330

New Hampshire

John L. Cyr (Royer) Windham 603-893-8003
 R. N. Johnson, Inc. (Century Farm) Walpole 603-756-3321
 Turf Specialties, Inc. (Hahn) Hooksett 603-436-8202

New Jersey

Caldwell Tractor & Equipment (Lindig) Fairfield 201-227-6772
 Double Eagle Golf Products (Cushman/OMC-Lincoln) Jamesburg 201-521-2500
 The Durham Co., Inc. (Kohler Engine) East Brunswick 201-238-3200
 Ferti-Soil Co. (Richway Products, Hahn) Rahway 201-388-0100
 Jep Sales (Lindig, Howard Price) Yardville 609-585-2300
 Lawn-A-Mat of Mountainside (Broyhill) Millington
 Lebara Equipment Co., Inc. (Mott Corp.) East Brunswick 201-238-3322
 Wilfred Mac Donald, Inc. (Olathe, Howard Price, Broyhill, Cushman/OMC-Lincoln) Clifton 201-471-0244
 Matcha Machinery Co. (Arctic Mizer) Fairfield
 Wm. Potter & Son (Howard Price) Middletown
 L. D. Sealy Co. (Arctic Mizer) Wamamassa
 L. D. Sealy Co. (Olathe) Ocean 201-531-8511
 Sherwood Chemical (Tufflex) Westerville 609-848-6811
 Storr Tractor Co. (F. E. Myers Equip., Toro, Royer, Cushman/OMC-Lincoln) Westfield 201-232-7800
 Vermeer Sales & Service (Vermeer) Mount Holly 609-267-6600

New Mexico

Bell Co., Inc. (Cushman/OMC-Lincoln) Albuquerque 505-243-7841
 Solr Rig Sales & Service (Stanley) Hobbs 505-393-9544
 Southwest Toro (Lindig, F. E. Myers Equip., Toro) Albuquerque 505-344-2356
 Southwest Toro New Mexico, Inc. (Cushman/OMC-Lincoln, Broyhill, Royer) Albuquerque 505-345-8676
 Spitzer Electrical Co. (Kohler Engine) Albuquerque 505-247-4233
 Vermeer Sales & Service of New Mexico (Vermeer) Albuquerque 505-344-5141

New York

Abele Tractor & Equipment Co., Inc. (Hahn) Albany 518-438-4446 (Howard Price)
 Allied Farm Equip., Inc. (Broyhill) Syracuse
 Brooks Gravelly Co., Inc. (Howard Price) Rochester 716-424-1660
 Bruedon Corp. (Cushman/OMC-Lincoln) Chester 914-469-2275
 Byrne Compressed Air Equip. (Stanley) Bronx 212-292-7726
 John Deere Co. (Deere Co.) Syracuse 315-432-9300
 Eaton Equipment Co. (F. E. Myers Equip., Toro, Royer, Cushman/OMC-Lincoln) Hamburg 716-649-2020
 Grassland Equipment & Irrigation (Toro, Lindig, F. E. Myers Equip., Cushman/OMC-Lincoln) Latham 518-785-5841
 Griffin Greenhouse Supplies, Inc. (Royer) Albany 518-489-8419
 Haverstick Golf & Tractor, Inc. (Royer, F. E. Myers Equip., Toro, Cushman/OMC-Lincoln) Syracuse 315-457-9271
 J & G Equipment (Master) No. Bellmore
 Wm. Kroemer & Sons (Lindig, Hahn, Howard Price) Hicksville, L.I. 516-931-0500
 Levalley McLead (Arctic Mizer) Birmingham
 Lindstrom Electric Corp. (Stanley) Syracuse 315-437-2538



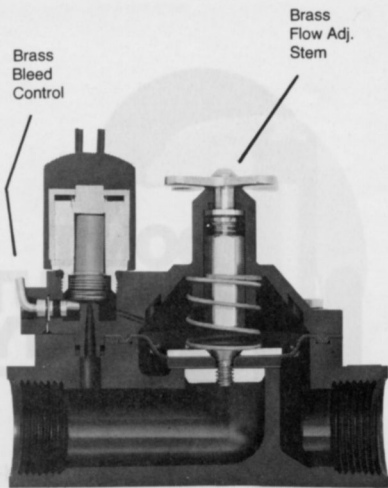
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S. V. Moffet (Heckendorn, Cushman/OMC-Lincoln) Rexford 518-370-4054
S. V. Moffet (Heckendorn, Lindig, Richway Products, Cushman/OMC-Lincoln, Broyhill) West Henrietta 716-334-0100
National Farmers Elevator (Master) New York
Orag Inter Ltd. (Olathe) Flushing 212-353-8699
Howard Premo, Inc. (Royer) Massena 315-769-2377
Seneca Supply Co. (Arctic Mizer) Ithaca
Storr Tractor Co. (Cushman/OMC-Lincoln, F. E. Myers Equip., Royer) Ronkonkoma 516-981-5222
Tri-Lakes Equip. Co. (Arctic Mizer) Cazenovia
Tudor & Jones (Century Farm) Weedsport 315-834-6661
Uebler's (Rhino) Oneida 315-363-4510
Vermeer Sales & Service (Vermeer) Castleton 518-732-7201
Vermeer Sales & Service of Western N.Y. (Vermeer) Cheektowaga 716-634-0944
Vermeer Sales & Service (Vermeer) East Moriches, L.I. 516-878-4000
Vermeer Sales & Service, Inc. (Vermeer) East Syracuse 315-437-7095
West Putnam Tractor Corp. (Lindig) Baldwin Place 914-628-6262
Ira Wickes, Inc. (F. E. Myers Equip.) Spring Valley 914-354-3400
York Chemical Co., Inc. (Tuflex) Garden City Park, L.I. 516-741-4301

North Carolina

Automotive Electric Assoc., Inc. (Kohler Engine) Charlotte 704-377-6991
Baker Equip. Engr. Co. (Stanley) Charlotte 704-372-2040
Eastern Turf Equipment, Inc. (Hahn) Fayetteville 919-483-0179
Engine Service Products (Master) Charlotte
Porter Brothers (Lindig, Broyhill, Olathe, Cushman/OMC-Lincoln, Mott Corp., F. E. Myers Equip., Richway Products, Heckendorn) Shelby 704-482-3424
Revels' Tractor Co., Inc. (Howard Price) Fuquay-Varina 919-552-5697
E. J. Smith & Sons Co. (Sato, Cushman/OMC-Lincoln, Toro, Royer) Charlotte 704-394-3361
Smith Hardware Co. (Century Farm) Goldsboro 919-735-6281
Vermeer Carolinas Sales & Service (Vermeer) Charlotte 704-333-4647
Vermeer Carolinas Sales & Service (Vermeer) Fayetteville 919-484-5438

North Dakota

Butler Industrial Products & Irrig. (Cushman/OMC-Lincoln) Fargo 701-235-6454
Butler Irrigation & Indust. Div. (Cushman/OMC-Lincoln) Bismark 701-223-0890
Dixie Sales Co. (Kawasaki), Greensboro, NC 914-273-6964
Minot Coleman Dist. (Broyhill) Minot
Mon-Dak Chemical & Supply, Inc. (F. E. Myers Equip.) Minot 701-852-1268
Vermeer Sales & Service (Vermeer) Turtle Lake 701-448-2593
Westland Oil Co. (Broyhill) Minot

Ohio

ABS Contractors Supply Co. (Stanley) Cincinnati 513-825-5400
Allied Farm Equipment (Broyhill) Columbus
Allied Farm Equipment (Broyhill) Youngstown
Austin Products, Inc. (Rhino) Columbus 614-276-4828
Baker Vehicle Systems, Inc. (Cushman/OMC-Lincoln) Macedonia 216-467-2250
Brooklyn Tractor & Mower (Lindig, Howard Price) Cleveland 216-661-2220
Century Toro Dist., Inc. (Cushman/OMC-Lincoln, Richway Products, Toro) Toledo 419-476-7503
Century Toro Dist., Inc. (Cushman/OMC-Lincoln, Richway Products) Cincinnati 513-563-2460
Century Toro Dist., Inc. (Cushman/OMC-Lincoln, Richway Products) Columbus 614-294-1631
Earl J. Crane (Lindig) Tiffin 419-447-8313
Dayton Ford Tractor (Lindig) Vandalia 513-898-1352
John Deere Co. (Deere Co.) Columbus 614-276-6171
Flack Equipment Co. (Olathe) Dayton 513-461-5610
Gardner, Inc. (Kohler Engine) Columbus 614-488-7951
Globe Chemicals (Broyhill) Toledo
Hayward Distributing Co. (Sato) Columbus 614-221-5323
Howard's Sales, Inc. (Cushman/OMC-Lincoln) Columbus 614-443-4613
Krigger & Co., Inc. (Heckendorn, Royer, Cushman/OMC-Lincoln) Macedonia 216-467-2176
Lakeshore Equip. & Supply Co. (Broyhill) Elyria 216-323-7544
Lee Road Nursery (Broyhill) Shaker Heights 216-561-3786
Mitchell Equipment Co. (Howard Rotavator) Dublin 406-248-7771
Moon Equipment Co. (Heckendorn, F. E. Myers Equip., Royer, Cushman/OMC-Lincoln) Cincinnati 513-771-1200
Moon Equipment Co. (Heckendorn) Columbus 614-443-7673
Neinberg Supply Co. (Broyhill) Glandorf
Schaefer Turf & Irrigation (Toro) Solon 216-248-2990
Stark Equipment (Howard Price) N. Canton 216-499-5454
Stove-Winsted Co., Inc. (Century Farm) Columbus 614-276-5331

Thompson & Hamilton, Inc. (Wheel Horse) Columbus 614-486-2993
Toledo Turf Equipment Co. (Heckendorn, Howard Price, Cushman/OMC-Lincoln) Toledo 419-473-2503
Toro Distributing (Richway Products) Solon
J. J. Turner, Inc. (Royer, Olathe) Cleveland 216-481-9308
Universal Cooperatives, Inc. (Master) Alliance
Van Atta Seed & Implement (Lindig) Cincinnati 513-541-2051
Vermeer Sales & Service (Vermeer) Findlay 419-422-3404
Water Supplies, Inc. (F. E. Myers Equip.) Ashland 419-322-1565

Oklahoma

Alva Vet Supply (Broyhill) Alva
Paul Blakeney Co. (Richway Products, Royer) Oklahoma City 405-528-7577
Dixon Distributors, Inc. (Century Farm) Oklahoma City 405-232-8348
Justice Golf Car Co., Inc. (Cushman/OMC-Lincoln) Oklahoma City 405-634-8444
Mico, Inc. (Kohler Engine) Tulsa 918-627-1448
Muskogee Seed Co. (Broyhill) Muskogee
The Rubber House of Oklahoma City, Inc. (Stanley) Oklahoma City 405-947-6741
Turf Equipment (Richway Products) Tulsa
Vermeer Sales of Oklahoma (Vermeer) Moore 405-794-6644
Wait Sales Co. (Lindig, Cushman/OMC-Lincoln, Toro) Tulsa 918-584-3334
R. A. Young & Co. (Stanley) Tulsa 918-835-4404

Oregon

Ackley Hydraulic Tool Co. (Stanley) Portland 503-281-8991
Baltz & Son Co. (Cushman/OMC-Lincoln) Portland 503-256-1453
Columbia Equip. Inc. (Olathe) Portland 503-288-6981
John Deere Co. (Deere Co.) Portland 503-667-1191
Farmaterials, Inc. (Broyhill) Baker
Farmers Coop Oil (Broyhill) McMinnville
Farmland (Broyhill) Pendleton
I-D, Inc. (Century Farm) Portland 503-226-7966
Lucky J.T. Dist. Co. (Kawasaki), Portland, OR 503-234-0717
Oregon Toro (Lindig, F. E. Myers Equip., Toro, Cushman/OMC-Lincoln) Tigard 503-639-7602
Pacific Supply Cooperative (Broyhill) Portland
Truck and Industrial Equip. Co. (Kohler Engine) Portland 503-234-8401
R. M. Wade & Co. (Sato, Howard Rotavator) Beaverton 503-641-1865

Pennsylvania

Baker Equipment Eng. Co. (Stanley) Pottstown 215-323-8000
Brawley Distributing Co. (Wheel Horse) New Cumberland 717-938-1831
Cambria Tractor & Equipment (Lindig) Ebensburg 814-472-7300
Dingfelder Sales & Service (F. E. Myers Equip.) North-east 814-725-4494
E. C. Geiger Inc. (Lindig) Harleysville 215-256-6511
Gran-Turk Sanitation Equip. Co. (Royer) Warrington 215-674-0600
E. H. Griffith Inc. (Lindig, Toro) Pittsburgh 412-271-3365
Hamilton Equipment, Inc. (Master, Century Farm) Ephrata 717-733-7951
Krigger & Co., Inc. (Broyhill, Olathe, Heckendorn, Cushman/OMC-Lincoln) Pittsburgh 412-931-2176
Lawn & Golf Supply Co., Inc. (F. E. Myers Equip., Royer, Olathe) Phoenixville 215-933-5801
Pascoe Equipment Co., Inc. (F. E. Myers Equip.) Export 412-468-4646
Pascoe Equipment Co., Inc. (F. E. Myers Equip.) Oakdale 412-923-2544
Philadelphia Toro Co. (Toro) Doylestown 215-345-7200
Pitt Auto Electric Co. (Kohler Engine) Pittsburgh 412-766-9112
Plack & Crandall Ford Inc. (F. E. Myers Equip.) Edinboro 814-734-1616
Rhodes Equipment Co., Inc. (Howard Price, Heckendorn, Hahn, Cushman/OMC-Lincoln) Southampton 215-677-6000
Stull Co. (Sato) Coraopolis 412-262-1405
Turf & Garden Equipment Co. (Howard Price) Hershey 717-534-2590

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 (Elanco, Mallinckrodt, PBI-Gordon, Velsicol), Homestead, 305-247-8800
 Bingham Seed Company, (Elanco, PBI-Gordon, Velsicol), Jacksonville, 904-768-1503
 Chase & Company, (Elanco, PBI-Gordon, Velsicol), Sanford, 305-322-4552
 Gulf Shore Turf Supply, Inc., (Mallinckrodt, PBI-Gordon, Velsicol), Pensacola, 904-968-2183
 Hector Agr. Export, Inc., (Mallinckrodt), Miami, 305-621-7581
 So. Agr. Insecticides, (Mallinckrodt), Palmetto, 813-722-3285
 Southern Chemicals, Inc., (Elanco), Sanford
 Southern Mill Creek Prod., (Mallinckrodt), Miami
 (Elanco, Fisons, Mallinckrodt, Velsicol), Tampa, 813-626-2111
 Stephenson Chemical Co., (Velsicol), Jacksonville, 904-355-4901
 Superior Fertilizer & Chem. Co., (Elanco), Tampa
 Swift Chemical Company, (PBI-Gordon, Velsicol), Winter Haven, 813-293-3147
 Thompson Hayward, (Thompson Hayward), Sanford, 305-322-5716
 Tieco Gulf Coast, Inc., (Elanco, Mallinckrodt, PBI-Gordon), Pensacola, 904-434-5475
 Universal Enterprises, (Elanco, Mallinckrodt), Pompano Beach, 305-941-0600
 USS Agri-Chemicals, (Elanco), Davenport
 Woodbury Chemical Company, (Elanco, Fisons, Velsicol), Princeton, 305-247-0524
 (Fisons), Mt. Dora, 904-383-4181

Georgia

Chemscope, Div. of Chemlawn, (Creative Sales), Norcross, 404-448-2963; 800-241-6520
 Dettelbach Pesticide Corporation, (Fisons), Atlanta, 404-237-1862 (0077)
 Georgia Golf & Garden Supply Co., (Elanco, Mallinckrodt, PBI-Gordon), Doraville, 404-448-1410
 Gold Kist, Inc., (Elanco), Atlanta
 Graco Fertilizer Co., (Elanco), Cairo
 Grund Industries, Inc., (Elanco), Zebulon
 Lawn & Turf, Inc., (Elanco, Mallinckrodt, PBI-Gordon), Conyers, 404-483-4743
 Regal Chemical Company, (Elanco, Mallinckrodt, PBI-Gordon, Velsicol), Dunwoody, 404-394-0475
 Southern Mill Cereals Products, (Velsicol), Atlanta, 404-355-6583
 Stephenson Chemical Co., (Elanco, Fisons, PBI-Gordon, Velsicol), College Park, 414-762-0194
 Thompson Hayward, (Thompson Hayward), Albany, 912-436-5787 (Thompson Hayward), Americus, 912-924-6191 (Thompson Hayward), Atlanta, 404-351-0654
 404-394-7538 (Velsicol), Atlanta, 404-355-6583
 (Thompson Hayward), Camilla, 912-336-5638
 (Thompson Hayward), St. Gabriel, 504-642-8391
 Toro Distrib., Atlanta, (Mallinckrodt), Atlanta
 USS Agri-Chemicals, (Elanco), Albany (Elanco), Atlanta
 Woolfolk Chemical Works, Inc., (Elanco, PBI-Gordon), Fort Valley, 912-825-5511

Hawaii

Brewer Chemical, (Elanco, Mallinckrodt), Honolulu, 808-533-4411
 C. T. Enterprises, Inc., (Velsicol), Honolulu, 808-841-5958
 Frietas Enterprises, (Creative Sales), Makawao, 808-877-5979
 Occidental Chemical Co., (PBI-Gordon), Hilo (Elanco, Honolulu (PBI-Gordon), Kahului (PBI-Gordon), Lihue
 Occidental Chemicals Hawaii, Inc., (PBI-Gordon), Honolulu

Idaho

Steve Regan Company, (Best Prod., Elanco, PBI-Gordon), Boise, 208-375-1042
 Western Farm Services, (Fisons), Jerome, 202-734-3838
 Wilbur-Ellis Company, (Fisons), Caldwell, 208-459-1631

Illinois

George J. Ball, Inc., (Elanco, Mallinckrodt), West Chicago, 312-231-3500
 Behm & Hagemann, Inc., (Creative Sales, Elanco), Peoria, 309-674-5153
 Chicago Toro-Turf-Irrigation Co., (Elanco, Mallinckrodt), Itasca
 Arthur Clesen, Inc., (Elanco, PBI-Gordon), Wheeling, 312-537-2177
 George A. Davis, Inc., (Elanco, Mallinckrodt, PBI-Gordon, Velsicol), Chicago, 312-763-6363
 Drake-Struggs Equipment, Inc., (PBI-Gordon), Springfield, 217-753-3871
 Fister/Warren, (Creative Sales), Des Plaines, 312-296-4450
 Florist Products, Inc., (Elanco, Mallinckrodt), Des Plaines, 312-437-5103
 C. D. Ford & Sons, (PBI-Gordon), Geneseo, 309-944-4661
 Illinois Lawn Equipment (Mallinckrodt), Orland Park
 Geo. Keller & Sons Co., (Creative Sales), Quincy, 217-222-3161
 Lake Cook Farm Supply Co., (Creative Sales, Elanco), Des Plaines, 312-824-6665

W. B. McCloud & Company, (Elanco), Schaumburg, Olsen Distributing Co., (Creative Sales, PBI-Gordon), Barrington, 312-381-9333
 Paarlberg Chemicals, (Elanco), South Holland
 Permalawn, Inc., (Creative Sales), Evanston, 312-864-5045
 Planter's Aide, Inc., (Creative Sales), Melrose Park, 312-345-4390
 Professional Turf Specialty, (Elanco, Mallinckrodt, PBI-Gordon), Bloomington, 309-829-5031
 Scruggs-Drake Equipment, Inc., (PBI-Gordon), Decatur
 Leon Short & Sons, Inc., (Elanco, Mallinckrodt, PBI-Gordon, Velsicol), E. Peoria, 309-694-1493
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 Toro Distributing, (Velsicol), Itasca, 312-773-2110
 Turf Management Supply, (Creative Sales, PBI-Gordon), Rockton, 815-624-7578
 USS Agri-Chemicals, (Elanco) Chicago Heights (Elanco) East St. Louis
 V-G Supply Company (Elanco, PBI-Gordon, Velsicol), Morton Grove, 312-965-3400
 Vaughan's Seed Company, (Elanco, Mallinckrodt, Velsicol), Downers Grove, 312-969-6300
 Weeds, Inc., (Elanco), Palos Heights

Indiana

Cory Orchard Supply Company, (Creative Sales, Elanco, PBI-Gordon), Indianapolis, 317-634-7963
 Desco Chemical, (Creative Sales, Mallinckrodt), Indianapolis, 317-293-8183 (Elanco, Creative Sales, PBI-Gordon), Nappanee, 219-773-7781
 Indiana Seed Company, (Elanco), Noblesville
 Kenney Machinery Corp., (Elanco, Mallinckrodt, Velsicol), Indianapolis, 317-293-4793
 Kova Fertilizer, (Elanco), Greensburg
 M.G.R. Feed Co., Inc., (Creative Sales), Hammond, 219-932-4588
 Riley Lawn & Golf Equipment, (Elanco, Mallinckrodt, Velsicol), Indianapolis, 317-291-2280 (Velsicol), Fort Wayne, 219-484-9605
 Seedkem, Inc., (Creative Sales, Elanco, Mallinckrodt, PBI-Gordon), Evansville, 812-424-2401
 Thompson Hayward, (Thompson Hayward), Indianapolis, 317-357-8436
 Turf Specialties, (Mallinckrodt), Fort Wayne
 USS Agri-Chemicals, (Elanco, Velsicol), Jeffersonville, 812-282-0471

Iowa

Aidex Corporation, (Elanco), Council Bluffs
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 Baer Ag Supply, (PBI-Gordon), Waukee, 515-987-4763
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 Big Bear Turf Inc., (Velsicol), Des Moines, 515-243-1271
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 Hawkeye Seed Company, Inc., (PBI-Gordon), Cedar Rapids
 Leisure-Aid, (PBI-Gordon), Council Bluffs, 712-366-2441
 Little Wheels Ltd., (Elanco, Mallinckrodt, PBI-Gordon, Velsicol), Iowa City, 319-354-1357
 Mann Chemical & Orchard Supply Co., (Elanco), Woodbine
 May Seed & Nursery Co., (Creative Sales), Shenandoah, 712-246-1020
 Meyer Equipment Co., (PBI-Gordon), Elkader
 Mount Arbor Nurseries, (Elanco), Shenandoah
 Rest Haven Turf Service, (Elanco, PBI-Gordon), W. Des Moines, 515-279-8861
 Thompson Hayward, (Thompson Hayward), Davenport, 319-322-3511 (Thompson Hayward), Des Moines, 515-266-1191
 Tri-State Toro, (PBI-Gordon), Davenport, 319-326-4416
 Trusty Supplies, (Creative Sales), Council Bluffs, 712-322-2539

Kansas

Bartels & Shores, (PBI-Gordon), Wichita, 316-262-5141
 Champion Turf Equipment, Inc., (PBI-Gordon), Wichita, 316-943-0283
 Chem-Trol, Inc., (Elanco), Kansas City
 Landco Corp., (PBI-Gordon, Velsicol), Salina, 913-825-0578
 Rhodes Chemical Co., (Creative Sales, Fisons, PBI-Gordon, Velsicol), Kansas City, 913-432-2424
 Swecker-Knipp, (Creative Sales, PBI-Gordon), Topeka, 913-234-5652
 The Industrial Fumigant Co., (Fisons), Olathe, 913-782-7600
 Thompson Hayward, (Thompson Hayward), Kansas City, 913-321-3131 (Thompson Hayward), Wichita, 316-263-1244
 Robert Wise Company, (Creative Sales, PBI-Gordon), Wichita, 316-838-1474

Kentucky

Bunton Seed Company, Inc., (Elanco, PBI-Gordon), Louisville, 502-584-0136
 Calvert Tree & Landscaping, Inc., (Creative Sales), PeWee Valley, 502-425-0838
 Jack Dayton & Son, (Mallinckrodt), Louisville
 George W. Hill & Co., Inc., (Creative Sales, Elanco, Mallinckrodt, PBI-Gordon, Velsicol), Florence, 606-371-8423
 Ky-Inna Turf Supply Company, Inc., (Elanco, Mallinckrodt, PBI-Gordon), Louisville, 502-491-8400
 Premium Seed Company, (Mallinckrodt), Louisville, 502-582-3897

Louisiana

Johnnie Bayles Supply Co., Inc., (StaGreen), West Monroe
 Burlap Sales Company, (Elanco), New Orleans
 Chem-Ag, Inc., (Elanco), Lafayette
 Savvy Chemical Company, (Velsicol), Metairie, 504-835-5926
 Southern Specialty Sales Co., Inc., (Elanco, Mallinckrodt, PBI-Gordon), New Orleans, 504-486-6101
 Tammany Turf & Supply, Inc., (PBI-Gordon), Covington, 504-892-5011
 Thompson Hayward, (Thompson Hayward), New Orleans, 504-866-3601 (Thompson Hayward), Shreveport, 318-424-7723
 USS Agri-Chemicals, (Velsicol), Covington, 504-892-2955
 Al Wyche Distributor (Elanco), Plain Dealing
 Wyche Golf Course and Specialty Co., (PBI-Gordon, Velsicol), Baton Rouge, 504-925-2986 (PBI-Gordon, Velsicol), Plain Dealing, 318-226-4484

Maryland

Adams Equipment, Inc., (Mallinckrodt), Baltimore (Mallinckrodt) Silver Spring
 Ag-Chem, Inc., (Elanco), Girdletree
 Agrotec, Inc., (Mallinckrodt), Salisbury, 301-749-8496
 Cornell Chemical & Equipment Co., Inc., (Elanco, Mallinckrodt, PBI-Gordon, Velsicol), Baltimore, 301-247-1525
 G. L. Cornell Company, (Elanco, Mallinckrodt), Gaithersburg
 Meyer Seed Company, (Elanco), Baltimore
 Summit Chemical Company, (Elanco), Baltimore
 Vaughan-Jacklin Corporation, (Elanco, PBI-Gordon), Landover

Maine

Yexas, Inc., (Elanco, PBI-Gordon), South Portland, 207-799-2241

Massachusetts

Jas. P. Brown Company, (Mallinckrodt, Velsicol), Worcester, 617-757-7462
 Bruckman, Inc., (Elanco), Lawrence
 The Clapper Company, (Elanco, Mallinckrodt, PBI-Gordon, Velsicol), West Newton, 617-244-7900
 Tom Duffy, (Creative Sales), Norwood, 617-769-4300
 Farm Bureau Association, (Elanco, Mallinckrodt, PBI-Gordon), Waltham
 Griffin Greenhouse Supplies, Inc., (Elanco, Mallinckrodt), Tewksbury, 617-944-0519
 Grounds Equipment Company, (PBI-Gordon), Newton Center, 617-244-7541
 Tom Irwin Company, (Elanco, Mallinckrodt, Velsicol), Burlington, 617-273-0143

Magovern Company, (Mallinckrodt), Pittsfield
 R. F. Morse and Son, Inc., (Elanco, PBI-Gordon), West Wareham, 617-295-1553
 Railroad Weed Control, Inc., (Elanco), Westfield
 Richey & Clapper, Inc., (PBI-Gordon), Natick, 617-235-6568

Michigan

AgriCo Chemical Company, (Fisons), Saginaw, (517) 323-2125
 American Horticultural Supply, (Mallinckrodt), West Bloomfield, (313) 626-2623
 Billings Feed Store (Elanco) Royal Oak
 Burdick Seed Company (PBI/Gordon) Saginaw (517) 753-3406
 J. J. Dill Company (Elanco, Mallinckrodt, PBI/Gordon, Velsicol) Kalamazoo, (616) 349-7755
 Fergusons Lawn Equipment (PBI/Gordon, Mallinckrodt), Traverse City, (616) 946-2440
 Grower Service Corporation (Fisons), Saginaw, (517) 323-2125
 Haviland AgriChemical Company (Elanco), Grand Rapids L & E Chemical Company (Elanco), Royal Oak
 Lawn Equipment Company (PBI/Gordon, Mallinckrodt), Royal Oak (313) 398-3636
 W. F. Miller Company (Elanco, PBI/Gordon) Birmingham, (313) 647-7700
 J. Mollema & Son, (Creative Sales, Elanco, Mallinckrodt, PBI/Gordon), Grand Rapids, (616) 245-0533
 Parmender & Andre (PBI/Gordon, Velsicol), Grand Rapids, (616) 458-1546
 Smith-Douglas (Elanco), Holland
 Terminal Sales Corporation, (Elanco, PBI/Gordon, Velsicol), Detroit, (313) 491-0606
 Turf Supplies, Inc., (Creative Sales, Elanco, PBI/Gordon), Taylor, (313) 291-1200

Minnesota

Agricultural Services, Inc. (Elanco), Minneapolis
 The Castle Chemical Co., Inc. (PBI/Gordon), Minnetonka, (612) 890-1083
 R. L. Gould, Inc. (Elanco, Mallinckrodt, PBI/Gordon, Velsicol), St. Paul (612) 484-8411
 Habco, Inc., (Elanco) Hopkins
 Johnson Floral Supply, Inc. (Elanco), St. Paul
 Johnson Wholesale Florists (Mallinckrodt), Minneapolis (612) 781-2686
 Minnesota Toro, Inc., (Mallinckrodt, PBI/Gordon), Minneapolis, (612) 475-2200
 Northrup King & Company, (Elanco, Mallinckrodt), Minneapolis (612) 781-8011
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Thompson Hayward (Thompson Hayward), Greenville, (601) 335-3395; Jackson, (601) 969-3177
The Was Company (Elanco), Amory

Missouri

Bartels & Shores Chemical Company, (Elanco, PBI/Gordon, Velsicol), Kansas City, (816) 471-0727
Beckman Bros., Inc., (Elanco), Olivette
Beckman Turf & Irrigation Supply Company, Inc., (Elanco, PBI/Gordon, Velsicol), Chesterfield, (314) 532-3649
Champion Turf Equipment, Inc., (PBI/Gordon, Mallinckrodt), Kansas City, (816) 333-8000; (PBI/Gordon), Springfield, (417) 681-2551
Crown Chemical Company, (Creative Sales, Elanco, PBI/Gordon, Mallinckrodt, Fisons, Velsicol), St. Louis, (314) 533-0999
J. C. Ehrlich Company, (Elanco), St. Charles
A. H. Hummert Seed Company, (Elanco, Mallinckrodt), St. Louis, (314) 771-0646
Kitten & Bear Chemical Company, (Elanco, Fisons, PBI/Gordon), St. Louis, (314) 865-2000
Landscop, (PBI/Gordon, Velsicol), Grandview, (816) 765-4777
Link's Nursery, Inc., (Elanco, Mallinckrodt, Velsicol), St. Louis, (314) 432-8592
Outdoor Equipment Company, (PBI/Gordon, Mallinckrodt), St. Louis, (314) 966-3911
Patterson Chemical Company, Inc., (Creative Sales), Kansas City, (816) 842-8211
Pest Control Supplies, (PBI/Gordon, Fisons), Kansas City, (816) 421-4696
Robison's Lawn & Golf, Inc., (Elanco, PBI/Gordon, Mallinckrodt), Grandview, (816) 765-3333
Standard Seed Company, (PBI/Gordon), Kansas City, (816) 842-3838
Stuppy Greenhouse Supply Company, (Elanco, Mallinckrodt), North Kansas, (816) 842-3071
Thompson Hayward, (Thompson Hayward), St. Louis, (314) 389-4740
Veatch Chemical Company, Inc., (Fisons), St. Louis, (314) 832-0056

Montana

Midland Implement Company, (Mallinckrodt), Billings
Mr. Turf, (PBI/Gordon), Helena
Turf Aid Distributing Company (PBI/Gordon), Billings, (406) 656-8008

Nebraska

Big Bear Equipment, Inc. (PBI/Gordon, Velsicol), Omaha, (402) 331-0200
Central Chemical (Creative Sales), Kearney, (308) 234-1326
Cornbelt Chemical Company (Elanco, PBI/Gordon), McCook, (308) 345-5057
John Housley Nursery Sales (Creative Sales), Elkhorn, (402) 289-2626
Jirdon Agri-Chem, Inc., (Creative Sales, Elanco, PBI/Gordon), Morrill, (308) 436-2166
Leisur-Aid (Creative Sale, PBI/Gordon), Omaha, (712) 366-2441
Midwest Toro (Elanco, PBI/Gordon, Mallinckrodt), Omaha, (402) 331-0500
Pioneer Chemical Company, (Creative Sales), North Platte, (308) 532-5867
Simplot Soil Builders (Elanco), Waterloo
South of Sugar Factory (Fisons), Scottsbluff, (308) 632-4155
Thompson Hayward (Thompson Hayward), Omaha, (402) 331-4525
Tri Valley Corporation (Elanco, PBI/Gordon), Omaha, (402) 334-7211
The Yard Company, (PBI/Gordon), Omaha, (402) 333-7576

Nevada

Clark County Wholesale Mercantile Co., (Best Products, Elanco, PBI/Gordon), Las Vegas, (702) 382-7700
Las Vegas Fertilizer Company, Inc. (PBI/Gordon), No. Las Vegas, (702) 649-1551

New Hampshire

Turf Specialties, (Mallinckrodt), Greenland
Turf Specialty, Inc., (PBI/Gordon), Hooksett, (603) 485-7866

New Jersey

Blanken Industrial Weed Company, (Elanco), Maplewood
Chamberlin & Barclay, (Elanco), Cranbury
Ferti-Soil Company, (Elanco, PBI/Gordon, Mallinckrodt, Velsicol), Rahway, (201) 843-6655
D. Gangeri & Son, Inc. (Elanco), Englewood
Green Hill Turf Supply, Inc., (Elanco, PBI/Gordon, Velsicol), Freehold, (201) 462-2349
Good-Prod. Sales, Inc., (Creative Sales, Elanco), Kenilworth, (201) 245-5055
JEP Sales, Inc., (Elanco, PBI/Gordon), Yardville, (609) 585-2300
Johnson Products, Inc., (Elanco), Linden
Lawn King Morris/Passaic Counties, (Elanco), Pine Brook
Levitt's Plant Food Supply, (Elanco), Pine Brook
Lofts Pedigreed Seed Company, Inc., (Elanco, PBI/Gordon), Bound Brook, (201) 356-8700
McLaughlin, Inc., (Elanco), Medford
Meskers, Inc., (Elanco, Mallinckrodt), River Vale, (201) 573-1212

Orange Garden Supply Company, (Elanco), Orange
Pierson's Mill Company, (Elanco, PBI/Gordon, Mallinckrodt, Velsicol), Maplewood, (201) 763-6633
Raycroft Distributors, (Elanco), Shrewsbury
Reed & Perrine, (Elanco), Tennent
Residex Corporation, (Elanco, Fisons), Clark, (201) 381-6200
Rockland Chemical Company, (Elanco, PBI/Gordon, Velsicol), West Caldwell, (201) 575-1322
Simmons & Mount, (Elanco), Cranbury
Storr Tractor Company, (Elanco), Westfield, (201) 232-7800
The Terre Company, (Elanco, PBI/Gordon, Velsicol), Saddlebrook, (201) 843-6655
Turf Products Corporation, (Elanco, Mallinckrodt, Velsicol), Pine Brook, (201) 227-1581
Vaughn-Jacklin Corporation, (Elanco, PBI/Gordon, Mallinckrodt), Bound Brook, (201) 356-4200
Andrew Wilson, Inc., (Elanco, Mallinckrodt, PBI/Gordon), Mountainside, (201) 654-5800

New Mexico

Agricultural Products Company (Elanco), Mesquite
Albuquerque Chemical Company, Inc., (PBI/Gordon, Mallinckrodt), Albuquerque, (505) 247-2321
Custom Weed Control, Inc., (Elanco), Hobbs
Layman's Landscaping (Creative Sales), Albuquerque
Roswell Seed Company, Inc., (PBI/Gordon), Roswell, (505) 622-7701

New York

Abalene Spray Service, Inc., (Elanco), Poughkeepsie
J. L. Adikes, Inc., (Elanco, PBI/Gordon, Velsicol), Jamaica, (212) 739-4400
Agway, Inc., (Elanco, PBI/Gordon), Syracuse, (315) 477-6332; (Mallinckrodt), Milton, (Mallinckrodt), Sodus
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American Horticultural Supply, (Mallinckrodt), New York, (212) 874-0200
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Chemical Sales Corporation, (Velsicol), Buffalo, (716) 885-5100
Eaton Equipment Corporation, (Elanco, Mallinckrodt, PBI/Gordon), Hamburg, (716) 649-2020
Fleco Chemical Products Co., Inc., (Elanco, Velsicol), Geneva, (315) 789-8110
Fred C. Gloeckner, (Elanco, Mallinckrodt), New York, (212) 679-6460
Grassland Equipment & Irrigation Corporation, (Elanco, Mallinckrodt), Latham, (518) 785-1111
Haverstick Golf & Tractor, (Mallinckrodt), Syracuse
Herbst Brothers Seedsmen, Inc., (Elanco), Brewster
Island Golf & Turf, Inc., (Elanco, Mallinckrodt, PBI/Gordon, Velsicol), Dix Hills, (516) 667-2110
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Slater Supply Company, (Mallinckrodt), Farmingdale, (516) 249-7080
Sterling Bag & Supply Company, (Creative Sales), Lackawanna, (716) 826-1991
R. P. Squires Company, (Mallinckrodt), E. Norwich
Turf Specialists Corporation, (Elanco), Holbrook
Wagner Seed Company (Halco Chemical Division), (Elanco, PBI/Gordon, Mallinckrodt, Velsicol), Farmingdale, (516) 293-6312
Wayne Floral Company, Inc., (Mallinckrodt), Newark
Westchester Turf Supply Company, (PBI/Gordon, Mallinckrodt), Lincolnale, (914) 937-6523
E. H. Worthington Company, (Mallinckrodt), Saranac Lake
York Chemical Corporation, (Fisons), Long Island, (516) 741-4301

North Carolina

Brawley Seed Company, (Mallinckrodt), Mooresville, (704) 333-0196
Byrum Seed Company, (Sta-Green), Charlotte
FCX, Inc., (Elanco), Raleigh
Forshaw Chemicals, Inc., (Elanco, Fisons, Velsicol), Charlotte, (704) 372-6790
Goltra, Inc., (PBI/Gordon, Mallinckrodt, Velsicol), Winston-Salem, (919) 724-7419
McNeary's Arborists, Inc., (Creative Sales), Charlotte, (704) 597-1331
Porter Brothers, Inc., (Mallinckrodt, PBI/Gordon), Shelby, (704) 482-3424
Seedmen, Inc., (PBI/Gordon), Charlotte, (704) 333-0196
E. J. Smith & Sons Company, (Elanco, Mallinckrodt), Charlotte
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Thompson Hayward (Thompson Hayward), Fayetteville, (919) 484-3181
U.S.S. Agri-Chemicals, (Elanco), Greensboro

North Dakota

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Grand Forks Seed Company, (Fisons), Grand Forks, (701) 8183
Mon-Dak Chemical Company (Mallinckrodt), Minot

Ohio

Alfco, Inc., (Velsicol), Marietta, (614) 373-1394
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Chem-Trol Chemical Company, (Elanco), Gibsonburg
Earl J. Crane, Inc. (PBI/Gordon), Tiffin, (419) 447-8313
Davey Tree Expert Company, (Creative Sales), Kent, (216) 673-9511
Desco Chemical (Div. of Deisch-Benham, Inc.), (Creative Sales), Findlay, (419) 424-0151
Sidney L. Dryfoos Company, (Elanco, PBI/Gordon, Mallinckrodt, Velsicol), Cleveland, (216) 439-4363
G/S Supply Company, Inc., (Creative Sales), Dayton, (513) 252-5641
W. R. Grace & Company, (PBI/Gordon), Columbus, (614) 294-4413
Great Lakes Growers, Inc., (Mallinckrodt), Oberlin, (216) 775-1411
I. G. Harmon & Sons, Inc., (Creative Sales), Canton, (216) 456-4725
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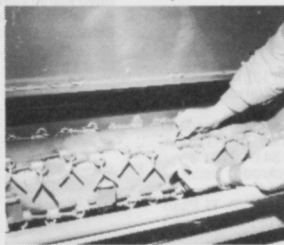
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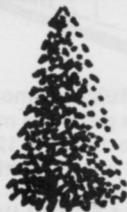
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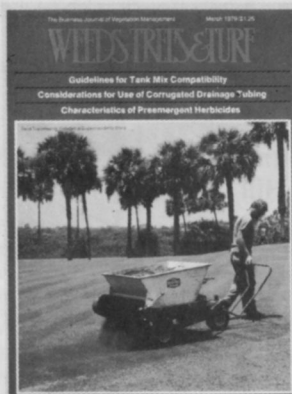
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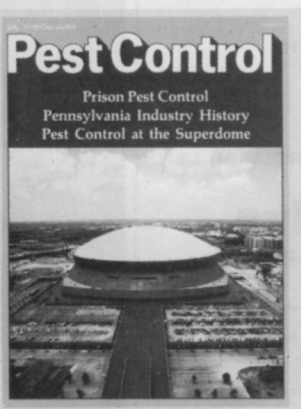
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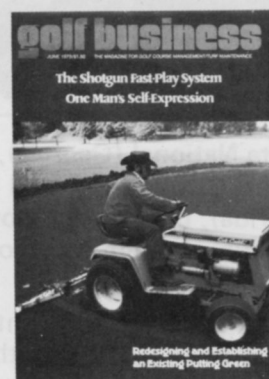
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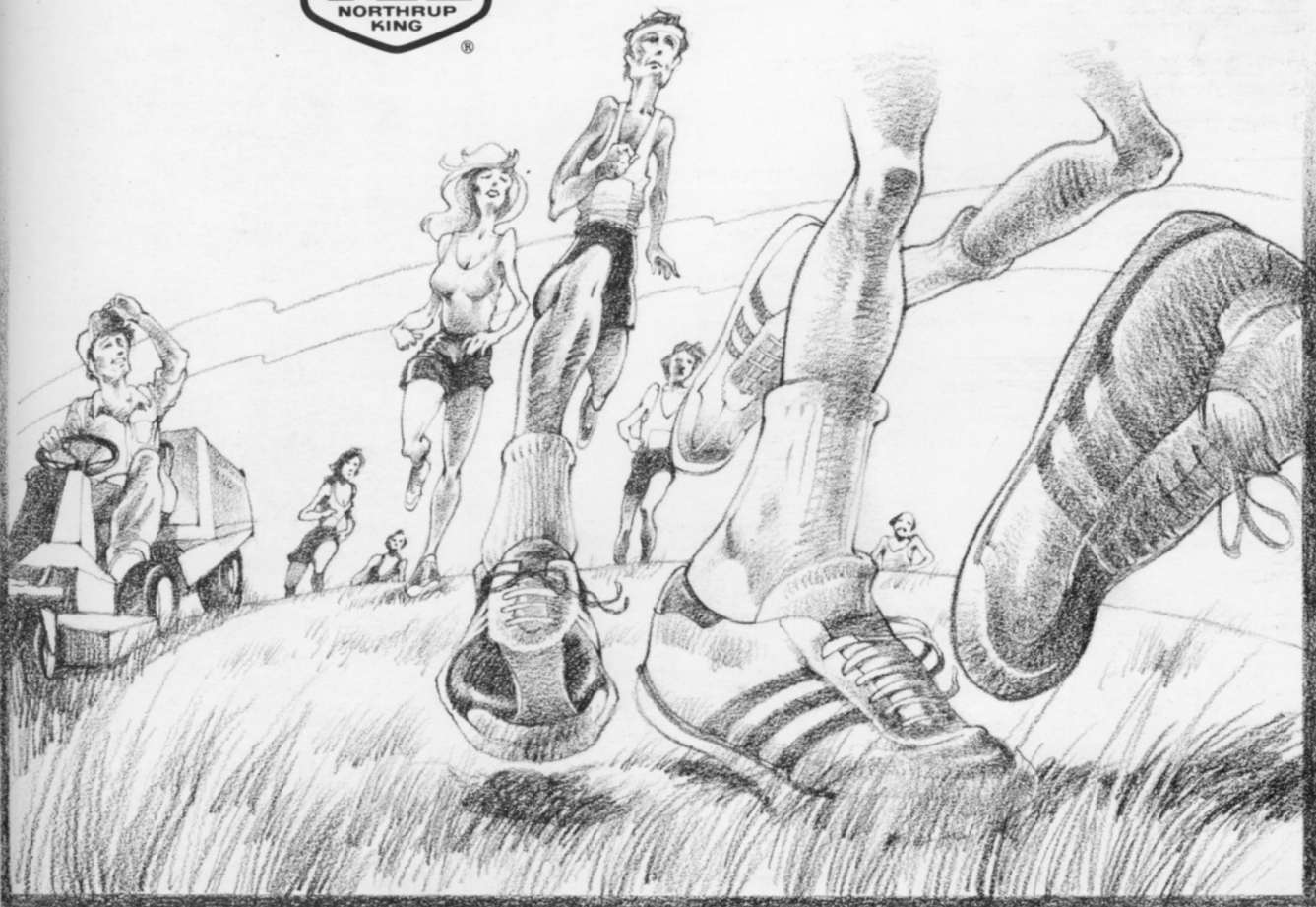
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CHALLENGES OF RAILROAD CONTROL ARE LONG DAYS AND CONSTANT CARE

Each occupation within the Green Industry has its special challenges. In railroad weed control they are long days on spray trains, constant monitoring of application rates, and prevention of drift damage to agricultural crops alongside the tracks.

Perhaps you have seen a railroad spray unit, a short train slowly being pushed down the tracks by a single engine. Two lead cars and five tankers are pushed at a snail-like 15 miles per hour pace across thousands of miles of track each year. Each train has an engine pushing from the rear, tank cars carrying herbicide mixes, a supply car and a lead car to scout ahead and to control two sets of spray booms.

These trains are operated by R.H. Bogle Co., a firm with more than 30 years experience in railroad weed control. As many as 25 railroad companies hire Bogle to clean up weeds along their right-of-ways. This type of weed control provides railroad companies with a more efficient working image, prevention against hazardous right-of-way fires, preservation of wooden ties, and improved visibility at road crossings.

Effective control of the grasses and broadleaf weeds found along railroad tracks necessitates the use of both contact and residual herbicides. And in many instances, field crops such as cotton, tobacco and soybeans are situated very close to the tracks. Consequently, drift control is an extremely important consideration.

According to Bogle Service Engineer Red Shetron, their spray crews avoid crop damage by altering the herbicide spray pattern when necessary. For example, Shetron and his crew frequently spray a mixture of Ortho Paraquat CL and Karmex 80W from one set of booms, and from a second set they apply a mixture containing 2,4-D. When the train is within close range of a farm field, how-



Shetron's crew was on the road for 165 days in 1977. In good weather, they run seven days a week, 15 hours a day. Their goal is 125 miles of track per day.

Chemicals are mixed at the beginning of each day.

Shetron at controls in front of train spots for nearby crops and vegetation.



ever, Shetron turns off the 2,4-D application (because of its high drift potential) and relies solely on the Paraquat and Karmex.

"While we're running, I'm situated in the front car, constantly spotting nearby crops and vegetation along the tracks," Shetron explained. "From there I can cut the 2,4-D when I need to, or even quit spraying entirely if we're too close to susceptible crops. I also stop spraying if there are no weeds to knock down.

"I have two men working with me — J. D. Brown and Dennis Edney," he continued. "They mix the chemicals before we leave in the morning and run the booms while we're applying. In addition to spotting vegetation and crops, I also monitor application pressure and take meter readings at each mile post to see exactly how much material we're applying."

An average of four railroad representatives also man the train, including a roadmaster, engineer, conductor and brakeman.

Bogle spray crews have had relatively few drift problems while doing an effective job of controlling right-of-way vegetation, largely due to the sophisticated equipment now available for railroad weed control.

John McIntosh, representative at the company's head office in Alexandria, Virginia, also emphasized that point. "Our application equipment once consisted of a single, high volume system. Now our

trains have multiple systems. The difference is that with the old system we could only spray one chemical at a time. But now we can apply three chemicals at one time . . . and at different rates.

"There are naturally different weed problems along a railroad track," McIntosh continued. "There are heavy grasses along the side of the track, while in the tie area where there isn't as much dirt, late annuals are more prevalent. Consequently, we don't need to apply as much chemical in the tie area as we do on the shoulder of the track.

Shetron explained that his spray booms cover a 16-foot swath; there are two parallel booms on each side of the train — the outside one used for applying herbicides like Paraquat and Karmex. The system is powered by two Hale centrifugal pumps: a V-4 Wisconsin and a 318 Chrysler. And the total tank capacity of his train is 53,000 gallons (two 10,000 gallon cars and three 11,000 gallon cars).

"We've been applying 2,4-D at a rate of one gallon per acre, diluted in 49 gallons of water," Shetron said. "We also use Nalco-Trol drift control agent with the 2,4-D, and it works very well.

"The Paraquat is sprayed at a rate of 1½ pints per acre, diluted in 50 gallons of water," he continued. "And the Karmex is applied at a rate of six pounds per acre."

He explained that 2,4-D is primarily used for control of vines and other tough perennials. Karmex is applied as a preemergence material, used

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for control of annual weeds and grasses, and Paraquat is applied for immediate knock-down of both perennial and broadleaf weeds. Paraquat is frequently used for right-of-way weed control, along both railroad tracks and highways, and is desirable because of its fast contact action and broad-spectrum effectiveness.

Keeping a railroad spray train running smoothly is no simple trick. Maintenance of equipment is a daily routine, and an important one; breakdowns can be extremely expensive. And the physical demands of the job are exhausting.

"Our train usually covers about 15,000 miles in a year," Shetron said. "We usually start on the West Coast, then as the weather permits, work our way across the country."

To cover those miles, his crew must stay on the road for approximately 165 days. When weather conditions are favorable, they usually run seven days a week and work as much as 15 hours a day. By the time they mix the chemicals and get started in the morning, it usually takes that long to cover the desired 125 miles.

McIntosh added that Bogle's ten spray trains covered a combined total of approximately 75,000 miles of track in 1977. It is, indeed, a big change from the time back in the 1920's when that company first strapped a pressurized tank on a flat car to spray for right-of-way weeds.

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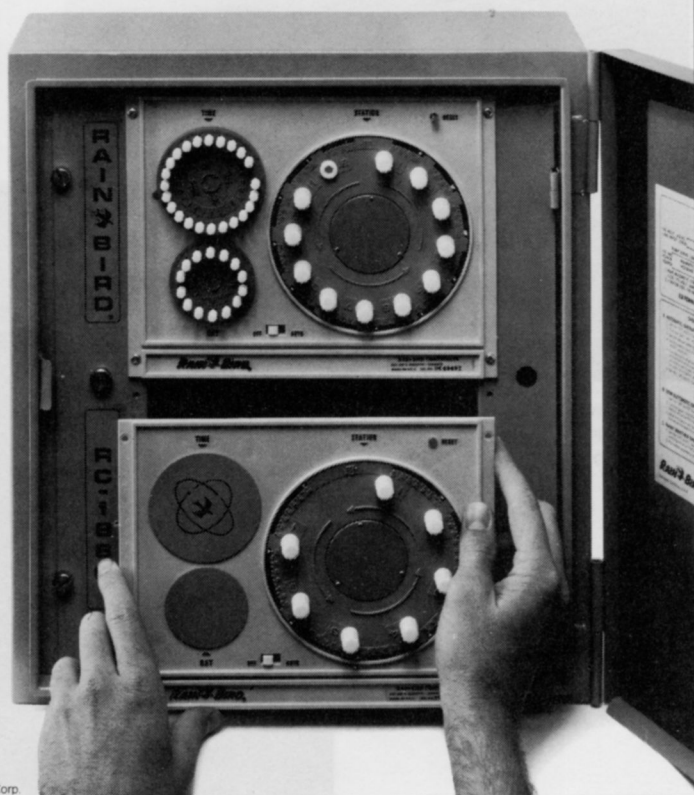
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RAILROAD RECLAMATION RESTORES INDIAN LAND

This spring the Blackfeet Indians turned their livestock out to graze near Spotted Robe, Montana, on thick, tall wheatgrass grown in defiance of constant winds up to 70 miles per hour. The wheatgrass was successfully planted alongside Burlington Northern's new railroad tracks and it will provide pasture for cattle, prevent erosion, and reduce snow drifts blocking the tracks in the winter.

Such reclamation is little known, but a routine aspect of railroad construction today. When work gangs cut a new track route through the countryside, reclamation crews follow right behind to restore land and vegetation disturbed by the work.

In this instance, the reclamation crews had 116 miles on both sides of a new track from Orin, Montana, to Gillette, Wyoming, to reseed, fertilize and protect through establishment.

At Spotted Robe, reclamation stemmed, curiously enough, from an effort to help the wild winds blow even more freely. Explains Linus L. Tumbleson, BN's director of agricultural development:

"The railroad had long ago built a snowshed there, a kind of wooden tunnel, to protect the track from heavy snow drifts. But the wood had deteriorated, so the structure was dismantled and the hills on each side were leveled to let the snow blow freely and not drift on the tracks."

But that constant wind, which can hit 70 miles per hour, was the big difficulty when it came to reclamation, Tumbleson said.

New tracks and banks of wheatgrass on both sides. Winds whip across the area at 70 mph.



"Our task was to get the vegetation started before the wind could blow it away," he said. "The natives told us we probably couldn't do it. But we did, by spreading two tons of straw mulch per acre over the entire 100 acres, after laying grass seed. To insure that the mulch would stay in place, a chisel plow was used to crimp the hay into the soil and form ridges to hold the moisture for better germination."

Two years after that 1976 seeding, "grass was belly high to grazing cattle," Tumbleson said. "Of all the projects we have done, I suppose I am proudest of that."

Tumbleson, who earned his agricultural degree at the University of Minnesota, supervises land reclamation throughout BN's 19-state operating region, from company headquarters in St. Paul.

"Anywhere we disturb the land, we will reclaim it," he said. Since the program began in 1972, BN has spent \$413,000 restoring 2,374 acres, not counting a special project which renewed an old strip-mine area in Montana.

Restoration begins with the excavation:

"At that time, we take the topsoil and stockpile



Before and after establishment of wheatgrass. Straw was crimped into soil to fight wind erosion.





it," Tumbleson said. "Later, we will replace that to a depth of six inches, so we use the original soil for seeding."

Meantime, soil samples are sent to a scientific laboratory, such as at Montana State University, for analysis. The analysis determines the best type of grass to sow and what fertilizer will work best, among other things.

"This helps us to get the grass established as soon as possible, and we usually get better grass than was there before," Tumbleson said.

Seeding is done in several ways: by tractor-

drawn seeder, by hydraulic mulchers from railroad flatcars if the land is too steeply banked for a tractor, or by plane if the area is really rugged. A combination of wood fiber mulch, seed and fertilizer is used for hydromulching.

A third of the new Orin-Gillette line has been seeded and the rest will be done as construction is completed. The line, being built to carry coal trains out of the Powder River Basin to meet the country's increasing coal needs, is to be finished this fall. One six-mile stretch of the new route, comprising a total of 200 acres, was seeded by just three workers in 2½ weeks, Tumbleson said.

One of the largest and most successful reclamation projects was at Colstrip, Montana, where huge "spoilbanks" were created by strip mining between 1923 and 1958. The goal was to create an improved habitat for native game and birds, to stabilize ground cover with good forage grass and encourage recreation. A mixture of wheatgrass, alfalfa and sweet clover was planted over the 1,000 acres, along with 2,300 trees, of 14 different species. The three-year, \$660,000 project was so successful that BN recently was given the "Top Industry Award" of Keep America Beautiful, Inc., for "an outstanding voluntary effort to improve the environment and quality of life in a locale within which it operates."

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VEGETATION MANAGEMENT

By Roger Funk, Ph.D., Davey Tree Expert Co., Kent, Ohio

Q: My supervisor and I have a difference of opinions as to fertilizing newly planted trees. In the past I have fertilized, while planting with 10-6-4 or 10-6-4 Fe. As our department is seriously understaffed, I feel it would be more beneficial to fertilize during the planting process than to put it off indefinitely. What is your opinion?

A: We have considerable research and field experience that demonstrates the benefits of fertilizer applied to newly planted trees. However, plants are more sensitive to overfertilization during the establishment period because of their limited root systems.

Traditional fertilizers used in the tree care industry are soluble and apt to injure some roots that contact the fertilizer granules or are close enough to the granule that the soil solution is saturated with nutrient salts as the granule dissolves. With most trees that are established, this loss of a few actively absorbing roots is more than compensated for by the stimulation of new roots. A newly transplanted tree, however, has already lost a significant amount of active roots. Additional root losses

through overfertilization may seriously injure or even kill the plant.

The use of slow-release fertilizers or a reduction in the recommended amount of soluble fertilizers will reduce the risk of overfertilization while at the same time stimulating new growth and reducing the time required for establishment. I suspect that the reluctance of some people to fertilize newly transplanted trees is the result of their experience with overfertilization.

Q: Besides conventional deep-root feeding and pruning, what can be done for oaks suffering from soil compaction due to construction?

A: Periodically test the moisture in the root zone and water whenever necessary or, if applicable, install drains.

Construction can cause a disruption in the natural flow of ground water, particularly with the installation of foundations and with grade changes, which may cause the root systems of existing trees to be subjected to unaccustomed levels of soil moisture as water is diverted either toward or away



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from the root areas. In addition, compaction can interfere with water penetration and drainage.

Q: Can you recommend a machine or system to fertilize a large number of trees in an industrial park?

A: Applying soluble or suspension fertilizers with a soil injector is the most efficient and economical system for fertilizing large numbers of trees in a lawn situation. If a suspension fertilizer is used, mechanical (paddle) agitation in the tank is recommended to prevent settling. We have found that a foot plate on the soil injector prevents much of the arm and shoulder strain normally experienced with liquid injection.

Q: Textbooks say that red fescues are excellent for shaded areas, but now I find that research has developed Kentucky bluegrasses which are better. Can you comment on this?

A: All turfgrasses will grow better in sun than in shade but some are more tolerant of shade than others. The red fescues are the most shade-tolerant of the common lawn grass species. A few of the newer Kentucky bluegrasses such as 'Glade' and 'BenSun' will tolerate 60°-65° shade and have performed very well in our shade test plots. However, they did not outperform the red fescues.

Q: I have an American elm that is 80'-90' in height and 3'-4' in diameter. I don't want to lose this tree, but I would like to put young tulip and basswood

trees in this wood lot. Is there a possibility that Dutch elm disease could be brought in on the young transplanted trees?

A: Tulip trees and basewood are not susceptible to nor are they carriers of Dutch elm disease. However, if your proposed woodlot planting would in any way weaken your American elm (for example, planting injury or increased competition) you may want to reconsider. Tests have demonstrated that some bark beetles are attracted to weakened trees and Dutch elm disease is spread by a bark beetle.

Q: What would cause the lower outer bark to split on newly transplanted trees? These trees are approximately 12'-14' tall and have a diameter of four inches. How would I eliminate this problem?

A: Winter injury and certain herbicides have been reported to cause bark splitting near the base of trunks of certain species. Both of these factors could cause injury of a general nature (as was apparently the case with your trees) or affect specific trees. Without knowing the species or situation, diagnosis is pure guess work.

Herbicides should be used sparingly and with caution or not at all.

For prevention of winter injury, the young trees might be wrapped with burlap or other tree wrap in late fall.

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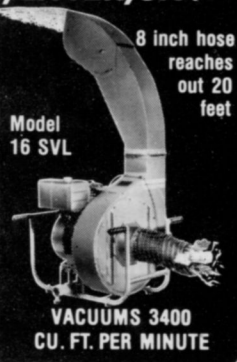
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PROSCAPE

By Michael Hurdzan, Ph.D., golf course designer and consultant

Q: How can a home owner really have a turf disease program — self applied — with such complexities of identification, fungicide availability, and almost an after-the-fact situation? S. G. E., Allentown, PA.

A: Properly diagnosing and treating turfgrass diseases is perhaps one of the most perplexing tasks for a professional turf manager, let alone the average homeowner. This problem is becoming more acute as plant pathologists learn more about specific organisms, fungicide resistant strains, and pathogenic complexes involving more than one organism.

At a recent Turfgrass Pathological Symposium, a speaker showed several slides of what appeared to be the same disease symptom and then explained that the typical 'frog-eye' spots were caused by 4 distinctly different fungi. The point he made so dramatically was that physical symptoms are not a reliable means of identifying the causal organism. It has been known for sometime that identification by symptoms alone has weaknesses, thus, more recently it has become vogue to attempt identification by examining diseased tissue under a microscope.

Through microscopic inspection one is able to see and identify fungal organisms by characteristics of the mycelial mass or it's fruiting bodies. However, even this technique has limitations for it presupposes if a certain organisms is present or identified, it may be the causal agent. In fact the identified agent may only be causing a secondary infection to the already weakened plant.

The only certain way to identify a disease is to isolate the probable causal factor in the laboratory and then reinfect healthy plants under the same conditions that existed during the initial infection and see if the disease re-manifests itself. Obviously this is time consuming, expensive, and requires a great number of trained people and laboratory equipment. In time, short cut methods of disease identification will be developed so that the person in the field can make positive identification.

At this point you may be asking why should one be so concerned about such specific identification when all you really want to know is which chemical should you apply to stop the disease. The reason is certain chemicals are more effective against certain diseases than are others, and by having a specific identification of the target population, one may apply the proper chemical at the proper rate, under the proper conditions. This makes sense monetarily, ecologically and in terms of general overall efficiency. Thirdly, more fungicide-resistant strains of common disease are being identified so that the problem of applying the right chemical is critical. The fungicide that worked last month may be completely ineffective this week. With proper identification the resistant strain may be properly treated.

The professional turf manager should train himself and his crew to recognize the earliest

symptoms of the diseases, to verify on a secondary basis that the suspected organism is present by microscopic inspection, and then to send a sample of the diseased tissue to a diagnostic lab. If time permits wait for the lab results. If the disease is active, the turf manager must evaluate the evidence he has and make a decision about which chemical to apply. If the disease stops, then all is well but should not be forgotten.

The professional turf manager will use the lab results to check himself and his diagnostic techniques. Thus each infection becomes a learning experience and soon his ability to make more accurate identification will improve. In addition, records should be kept on the specific disease identified, the chemical applied and it's rate, the weather conditions, and notes on the progress of the disease. With the marvel of computer science and a large number of carefully kept records, perhaps plant pathologists could develop a model that would aid in disease identification, occurrence and treatment.

For the homeowner, who was the point of this question, the problem is even more complex for he has neither the time, money, or education to properly implement a self-applied disease program. In addition, most of the fungicidal chemicals are legally unavailable to him. (Perhaps one day we will have lawn doctors who will have office hours to look at diseased samples of turf, write a prescription for a chemical cure that is filled at a garden store pharmacy, so the homeowner may legally get the fungicide for application to his sick lawn.) Therefore the homeowner must attempt to reduce incidences of home lawn diseases by practicing a total management system of preventative maintenance. These include controlling thatch by de-thatching and topdressing, planting disease resistant varieties of lawn grass, keeping fertility levels at balanced and adequate levels, controlling soil water by installing drainage and/or using proper irrigation practices, and following accepted mowing practices.

The homeowner may also employ a professional and licensed company to apply fungicide on either a preventative basis or on an emergency curative basis. But it is assumed that this company will use the same process described above for the professional turf manager and not just take the shotgun approach. Remember Murphy's Law that says "what we abuse today, will be restricted tomorrow; especially chemicals." **WTT**

In the August issue, the editor chose to remove an unscientific part of my answer on locating pipes under the soil surface. Upon my request, Shank finally broke down and agreed to print the portion of my answer which follows. If you have had any success with the art of divining, write my skeptical friend and let him know it works.

But, the easiest and fastest way of finding lost

plastic tile or pipe is to use "magic" and witch them. Most of us scoff at dowzers who claim to be able to find underground water sources using a forked stick; but don't laugh until you at least try the following method for finding tile and pipe. Take 2 pieces of steel wire (coat hangers work well) that are about 18" long and form them into a L shape by putting a 90° bend in each wire about 6" from the end. Now hold one wire in each hand by the 6" section with your hands comfortably in front of you with the palms facing each other and the 12" section of wire pointing to your front. Loosely hold the wires so that they are free to twist in your hands. Now go to a known location of a tile or water line and holding the wires as described, start back about 15 feet from the know line and walk at right angles to it. As you slowly approach the line the wires should turn freely in your hands and will cross when you are directly over the known line. Back away from the line and the wires should uncross, reapproach it again and they should again cross. Practice a couple times to get the feel of it and then set off to find illusive tile and water lines. After using the wires to find the general location,

now I usually use a steel probe and I probe on 1-2" center where the wires crossed to find the lost pipe or tile. **WTT**

I always reserve the last word. There are many respected dowzers in the world, and there are many hacks. Science just makes it easy to tell the difference. If you want to try this "magic" yourself, that's certainly your business. Just be careful when hiring someone to do it for you. Also, be careful when probing with a metal rod. Most irrigation lines also lay next to electrical lines. Older wires may not be insulated like when they were new. I hate to lose subscribers. The skeptical editor.

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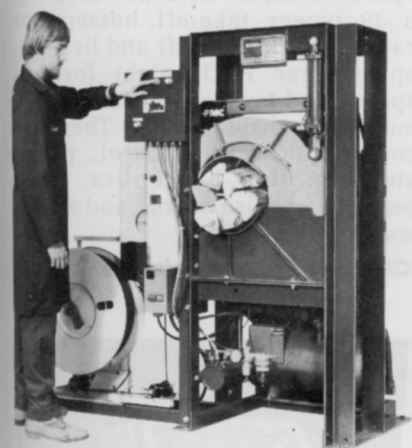
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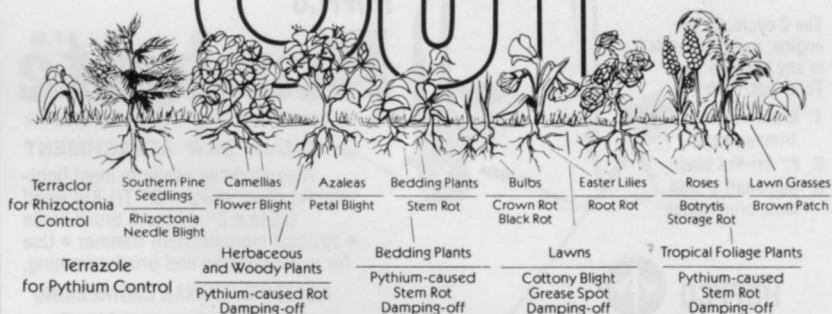
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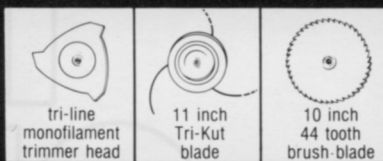
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FERTILIZER

Amount of cadmium limits sludge fertilizer

Excessive cadmium in sewage sludge, a potentially dangerous metal in the food chain, hinders development of a sludge-fertilizer industry in Pennsylvania, say soil chemists at Penn State.

"A worthwhile goal is to develop such a fertilizer industry from sludge containing low amounts of cadmium, no more than 20 to 50 parts per million of cadmium in sludge," says Dr. Dale E. Baker. He describes 50 parts per million of cadmium as equal to 50 pounds in 500 tons.

According to Ann M. Wolf, graduate assistant in agronomy, cadmium in soil must be kept at very low levels since it remains within the plow layer and increases the plant and food chain concentrations of cadmium. Sewage sludge applied to Penn State test plots at 10 dry tons per acre for seven years increased soil test levels of cadmium from less than 1/2 pound per acre to 5 pounds an acre, an excessive level.

On properly limed soils, farmers can apply up to 30 tons per acre of low cadmium sludge without increasing levels of cadmium above 3 pounds per acre, Baker says. From this 30 tons an acre, farm crops will take on valuable nutrients, especially nitrogen and phosphorus.

EMPLOYMENT

Arborists speak on employee incentives

Two owners of large tree service firms specializing in private tree care spoke about employee incentives at a recent meeting of the National Association of Arborists.

Warren Tamke and Jerry Osborne have both implemented successful incentive programs, and in different ways. Both seem to be returning profits to their own company.

"We know how to make money in the tree business so we decided that our own corporation was our best investment," Tamke says. To follow through with this and motivate employees, Tamke says "an employer must set up a system to permit an employee to earn more money, share in profits, grow with a company, and have security."

Tamke's firm has used an ESOP, an Employee Stock Option Plan. This

is a government approved profit sharing plan which permits a company to contribute stock and cash in amounts up to 15 percent of the gross pay of all of the eligible employees to a trust fund.

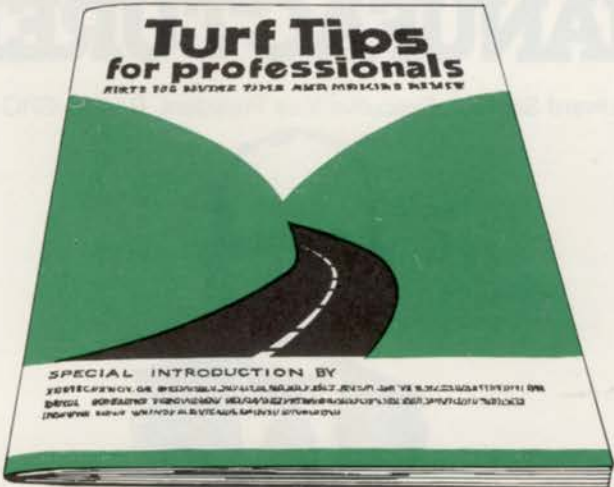
Government approval is necessary, Tamke says, because at the end of the year you are taking taxable profits, purchasing stock, and then giving the stock to or putting the stock in trust for the employees.

"In our case the fund is primarily invested in the stock of our corpora-

tion so that the employees who are eligible will become owners of the corporation," Tamke says. "We can also invest the money in bonds, saving accounts, purchase other companies, insure the life of key employees, and even purchase real estate. Whatever we do is funded totally by the corporation."

Advantages of an ESOP, according to Tamke, include improved productivity and morale, personal involvement for each employee, and security.

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Osborne started a profit sharing plan in 1970 which grows through investment and is compounded, independent of earning from physical labor.

"We have invested the proceeds in real estate and banks but now we invest in ourselves," says Osborne. "Sometimes instead of contributing cash to the plan at the end of the year, the company will contribute a piece of equipment and then lease it back. We also make car loans to the employees at 1 percent per month."

Pride in their job and equipment plus a friendly work atmosphere are also motivating factors for employees in Osborne's opinion.

His crew keeps their trucks clean and in top repair. Trucks and offices are all equipped with radios for communication among personnel. Tool boxes are well equipped for repairs.

Osborne also believes in company picnics and self-improvement programs. The company pays employees \$100 to complete each series of the NAA's Home Study Program.

"We also use our own operation for self improvement," says Osborne. "Climbers become bucket operators. Tree workers transfer to our landscape division or clearing operation. Instead of moving to another company, an employee can try something else within our own company."

Backgrounding the speeches is the difficulty the arborist industry has in attracting recruits and retaining those who have been trained.

A wage comparison from 1968 to 1978 shows that a groundman making \$2.26 an hour was raised to \$3.12 for a 38 percent increase in ten years; a climber making \$2.82 was raised to \$4.68 for a 66 percent increase; and a foreman making \$3.28 was making \$5.27 in 1978 for a 61 percent increase. Inflation figures show that today's dollar is worth only half as much as 10 years ago and the industry is not keeping pace.

WOOD

Wood makes alcohol; raw material for fuel

The use of wood to make alcohol for gasohol production could hike the nation's transportation fuel supply by at least 10 percent before 1985, says a wood industry executive.

Norval Morey, president of Morbark Industries, Inc., Winn, Mich., says through existing technology and government incentives, wood alcohol (methanol) can be produced at 34 cents a gallon for making gasohol. This proven technology is the cheapest way to make gasohol, an alcohol-gasoline blend.

Morey says methanol is the most feasible energy source for making alcohol fuel because wood is the nation's most abundant, renewable, alternate energy resource. He called "a tragic and monumental waste" the fact that vast quantities of wood now rot and die in the nation's forests.

"There is enough wood going to waste on private and public lands in this country, that if we were to use only one-third of this wood, it could provide gasohol for all the automobiles in this country," he says.

In another development, a new project at Georgia Tech's Engineering Experiment Station is teaching Georgia's industry how to use wood waste for fuel.

Carol Aton of the EES says the Department of Energy has provided almost \$1 million to push wood as an alternate energy source in Georgia.

AN OPEN MESSAGE TO LAWN AND GARDEN MANUFACTURERS

From C. Edward Scofield, Executive Vice President, RA-PID-GRO Corporation



“I've helped the lawn and garden industry to grow to an \$11 billion giant! It has been my privilege to frequently be a part of some of the great new changes and developments. I've also experienced my share of disappointments and mistakes. Without strong trade organizations, dedicated pioneers and competent leaders our industry would only be a fraction of what it is today. Your business would still be struggling, your outlook uncertain, were it not for the great work done by many trade organizations. Now we need one strong, overall lawn and garden association to knit manufacturers, producers and growers into a cohesive group. As President of LAGMA, I promise any time and money you invest in this association will pay off handsomely.**”**

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LAGMA

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"We are trying to stimulate the use of wood waste because of the current energy situation," says Aton. "Many forest-related industries are already using their wastes for fuel."

In this project EES engineers are looking at industries that have little or no experience with wood fuel. They have chosen the textile, food, carpet, and mineral-processing industries.

RECYCLING

Waste recovery creates huge service market

The recovery of municipal, industrial, and agricultural wastes for use as fuel and raw materials will give rise to a \$13 billion equipment and engineering services market over the next two decades, according to market research specialists.

In a 252-page study, researchers Frost & Sullivan, Inc., in New York City, say recent restrictive legislation on landfills will greatly increase their costs and such sites will disappear in the United States.

Only a few of the many competing solid waste recovery technologies will survive the test of time, the study says. These include Refuse Derived Fuel (a high-bulk density fuel that is easily transported and stored) and pyrolysis (the conversion of refuse to gaseous and liquid fuels).

Energy, one of the most coveted resources to be recovered from solid wastes, would only account for 2 percent of the U.S. energy need. Nevertheless, the study says, increasing energy prices plus long-range mineral shortfalls will spur the use of resource recovery.

SOD

Reed canarygrass: best crop on effluent land

"Reed canarygrass stands alone among eight forages tested as the species best suited for removing nitrogen from sewage effluent and for producing the most protein per acre," says Gordon C. Marten, research agronomist with the U.S. Dept. of Agriculture.

The three years of trials compared two rates of effluent application per week on alfalfa (Agate), smooth brome grass (Fox), orchardgrass (Nordstern), Kentucky bluegrass (Park), tall fescue (Kentucky 31),

timothy (Climax), reed canarygrass (Rise), and quackgrass.

Three harvesting patterns — two, three, and four cuttings per season — were evaluated. Marten, soil chemist Charles E. Clapp, and soil scientist William E. Larson checked the forages for persistence, yield, crude protein, and digestible dry matter.

Root rot problems limited alfalfa on the effluent treated plots, Marten said, and timothy and smooth brome grass failed to persist very well.

Tall fescue and Kentucky bluegrass failed under the high nitrogen applications when cut only twice per season, but did excellently when they were cut four times per year.

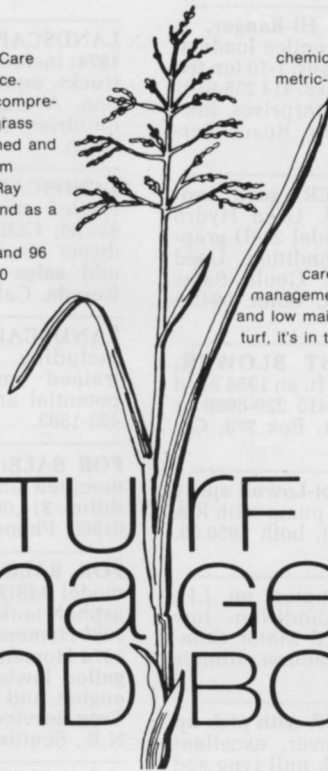
The average yields of all eight species, after three years, was 4.7 tons of dry matter per acre under the 4-inch per week effluent treatment and 4.5 tons per acre from the conventionally treated plots receiving well water and commercial fertilizer.

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chemical applications, and extensive metric-imperial conversion. Business and technical aspects of turfgrass management are covered in this 424-page Planning, purchasing, hiring, construction, and plant selection are put together for easy on-the-job reference. Markets covered include lawn care, sod production, golf course management, cemeteries, athletic fields, and low maintenance areas. If it concerns turf, it's in the Turf Managers' Handbook.

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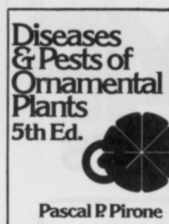
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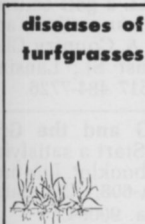
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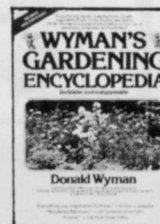
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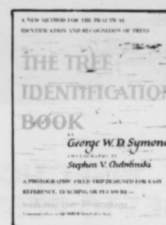
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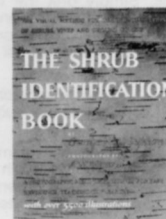
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International Society of Arboriculture (Mid-Atlantic Chapter), Potomac Sheraton Hotel, Gaithersburg, MD, **October 7-9**. Contact Ervin C. Bundy, executive director, P.O. Box 21 — 5 Lincoln Square, Urbana, IL 61801. 217/328-2032.

Florida Turf-Grass 27th Annual Conference and Show, Holiday Inn Central and Curtis Hixon Convention Center, Tampa, FL, **Oct. 14-17**. Contact FT-GA Executive Office, 1520 Edgewater Drive, Suite E, Orlando, FL 32804. 305/425-1581.

Turf Irrigation course, San Diego, CA, **Oct. 16-18**. Contact the Irrigation Association, 13975 Connecticut Ave., Silver Spring, MD 20906. 301/871-8188.

International Society of Arboriculture (New England Chapter), Sheraton Islander Inn, Goat Island, Newport, RI, **October 21-23**. Contact Ervin C. Bundy, executive director, P.O. Box 71 — 5 Lincoln Square, Urbana, IL 61801. 217/328-2032.

Environmental Management Association National Educational Conference, Caribbean Gulf Hotel, Clearwater Beach, FL, **October 21-25**. Contact Harold C. Rowe, 1701 Drew Street, Clearwater, FL 33515. 813/446-1674.

National Institute on Park and Grounds Management 9th Annual Conference, Opryland Hotel, Nashville, TN, **October 28-November 2**. Contact National Institute, Box 1936, Appleton, WI 54913. 414/733-2301.

Washington State Weed Association 29th Annual Conference, Town Plaza Motor Inn, Yakima, WA, **Nov. 7-9**. Contact the Weed Science Society of America, 113 North Neil St., 311 Illinois Bldg., Champaign, IL 61820. 217/356-3182.

International Society of Arboriculture (New York Chapter), Holiday Inn (downtown), Syracuse,

NY, **November 11-13**. Contact Ervin C. Bundy, executive director, P.O. Box 71 — 5 Lincoln Square, Urbana, IL 61801. 217/328-2032.

North Carolina Recreation & Park Society Annual Conference, Civic Center, Raleigh, NC, **Nov. 11-14**. Contact William J. Scott, President NCRPS, PO Box 1668, Laurinburg, NC 28352.

Southern Turfgrass Conference, Little Rock Convention Center, Little Rock, AR, **November 18-21**. Contact Southern Turfgrass Association, Drawer CP, Mississippi State, MI 39762. 601/325-3138.

Appropriate Horticulture II: Planting Out workshop, Vacation Village, San Diego, CA, **November 19**. Contact University Extension, University of California, Davis, CA 95616. 916/752-0880.

Center Pivot Irrigation course, Lincoln, NE, **Nov. 27-29**. Contact the Irrigation Association, 13975 Connecticut Ave., Silver Spring, MD 20906. 301/871-8188.

Tidewater Shade Tree Conference, Norfolk Botanical Gardens, Norfolk, VA, **November 29**. Contact Roger R. Huff, city arborist, Municipal Center, Virginia Beach, VA 23456.

International Society of Arboriculture (Kentucky Chapter), Holiday Inn South, Fern Valley Road, Louisville, KY, **December 3-4**. Contact Ervin C. Bundy, P.O. Box 71 — 5 Lincoln Square, Urbana, IL 61801. 217/328-2032.

National Agricultural Aviation Association Convention & Exposition, Las Vegas, NV, **Dec. 10-13**. Contact Sue Shaffer, registration chairman, suite 459—National Press Building, Washington, D.C. 20045.

Northeastern Weed Science Society 34th Annual Meeting, Grossinger Hotel and Country Club, Grossinger, NY, **January 8-10**. Contact J. V. Parochetti, USDA SEA-Extension, Room 5535 South Bldg., Washington, D.C. 20250.

Mid-Am Trade Show, Rosemont, IL, **Jan. 20-23**. Contact Mid-Am Trade

Show, 4300-L Lincoln Ave., Rolling Meadows, IL 60008. 312/359-8160.

Pumps and Pump Controls course, Denver, CO, **Jan. 22-24**. Contact the Irrigation Association, 13975 Connecticut Ave., Silver Spring, MD 20906. 301/871-8188.

Landscape Ontario Annual Congress & Trade Show, Sheraton Centre Hotel, Toronto, **January 22-24**. Contact Bob Cheesman, Landscape Ontario Show Manager, 416/276-6177 or Landscape Ontario Congress, 3034 Palstan Road, Suite 103, Mississauga, Ontario L4Y 2Z6.

Mid-Atlantic Agricultural Chemical & Equipment Trade Show, Richmond Arena, Richmond, VA, **January 23-24**. Contact N. D. Thomson, publicity chairman, Virginia Pesticide Assn., Rt. 1, Box 126, Providence Forge, VA 23140.

Massachusetts Horticultural Congress, Dunfey's Hyannia Resort, Cape Cod, MA, **January 23-24**. Contact Deborah Fanning, 715 Boylston Street, Boston, MA 02116. 617/266-6800.

Annual Turf & Landscape Conference, Tappan Zee Inn, Mountain View Avenue, Nyack, NY, **January 30**. Contact Frank Claps, 136 Laurel Avenue, Larchmont, NY 10538. 914/834-6846.

ALCA Annual Meeting and Trade Exhibit, Town and Country Hotel, San Diego, CA, **February 3-8**. Contact ALCA, 1750 Old Meadow Rd., McLean, VA 22102.

Associated Landscape Contractors of America 1980 Trade Exhibit and Equipment Demonstration, Town & Country Hotel, San Diego, CA, **February 5-6**. Contact ALCA Trade Exhibit, 1750 Old Meadow Rd., McLean, VA 22102.

Weed Science Society Annual Meeting, Toronto, Canada, **February 5-7**. Contact WSSA, 113 North Neil St., Champaign, IL 61820.

Wastewater Irrigation course, Denver, CO, **Feb. 5-7**. Contact the Irrigation Association, 13975 Connecticut Ave., Silver Spring, MD 20906. 301/871-8188.



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