

# WEEDS TREES & TURF

ONE DOLLAR • JANUARY 1977



## Irrigation

# The Pennfine Challenge.

Name another turfgrass that delivers all these advantages.

**Mowability.** Pennfine was specifically bred for soft fibers that take a smooth, clean cut.

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**Disease Resistance.** In trials, Pennfine showed good to excellent tolerance to major turfgrass diseases. In actual use, its disease resistance has been even stronger.

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**Texture.** University trial data indicates that Pennfine has the finest texture of any perennial ryegrass.

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You're invited to compare Pennfine Perennial Ryegrass, benefit for benefit, with any other improved turfgrass.

We're betting you won't find anything that measures up to Pennfine.

In five years of rapidly-expanding use, Pennfine has been put to the test on golf courses, athletic fields, sod farms, parks, cemeteries and public grounds from Maine to California. We've yet to hear of a real weakness.

Other breeders have tried to duplicate Pennfine's qualities; we've yet to see another fine-leafed

perennial ryegrass that can match Pennfine's performance record. Of course, you're the ultimate judge of what's best for your needs. All we ask is this. Before you select a turfgrass, compare it—benefit for benefit—with Pennfine. For more information, write:

Pennfine, P.O. Box 923,  
Minneapolis, MN 55440.



*If it has a weakness,  
nobody's found it yet.*

# WEEDS TREES & TURF®

JANUARY 1977, Vol. 16, No. 1

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**ON THE COVER:** This month the emphasis is on irrigation, an all-important aspect of the Green Industry.

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# TO OUR READERS —

December was a busy month for the WEEDS TREES & TURF staff. On the 8th, I headed for Columbus for the Ohio Turfgrass Conference and Show while Assistant Editor Eric Friedman went East to New Jersey Turfgrass Expo 76.

Going to these conferences and shows has got to be one of the most rewarding aspects of the job. It's here where we really get to meet our readers and contributors face-to-face. Communication is open, uninhibited.

The show in Columbus was a fantastic success. Nearly 1200 people attended the three-day series of seminars and exhibits. Among the notables was Dr. Robert Schery, director of the Lawn Institute. Dr. Schery was the author of our article on cultivars (October 1976). A friendly, personable man, he said feedback has been excellent and has promised to do another piece for us.

Among the many seminars I attended was one presented by Steven Kennedy, superintendent of the Columbus Country Club, on buying an irrigation system. Kennedy's talk was well received, and since our focus this month is irrigation, I got it all on tape. We present his straight-from-the-hip advice on page 15. Unfortunately, we could not transcribe his humor which struck familiar chords with many in the audience.

Friedman tells me his experience at the New Jersey Expo was "most edifying." He was hosted by Dr. Henry Indyk, the tireless, paternal chairman of the conference. In summing up the conference, Dr. Indyk told WEEDS TREES & TURF that a major objective was to bring together the total turfgrass industry.

"The format of the New Jersey Turfgrass Expo 76 effectively provided an opportunity not only for the dissemination of useful infor-

mation on a wide range of topics, but also as an attractant for the unification of the heterogeneous mix which comprises the total turf industry."

Even more importantly, he added, than the attendance figures, which totaled more than 800, were the diverse turfgrass interests that were attracted for the pursuit of a common objective — increased knowledge for better turf. "It was Green Power in the true sense of the phrase."

After Expo 76, Friedman went west to La Jolla, California, to interview irrigation consultant Don Burns. Because of the hectic pace that Burns maintains, he was not the ideal subject for a fireside tete-a-tete. Friedman stalked him from the serene, coastal refuge into the desiccated flatlands of the Palm Desert where an omnipresent sun and the Santa Ana winds bake the picachos and breathe quick warmth into the desert bowl. How does Don Burns irrigate a barren wasteland? Find out on page 28.

More travel as that is the name of the game. We'll be heading west in January for the annual meeting of the Associated Landscape Contractors of America and to Dallas for the Southern Weed Science Society. We'll also be at the Golf Course Superintendents Association of America convention in Portland in February. WEEDS TREES & TURF will have an exhibit booth. Stop in and talk with us. We need to hear from you.

Now we must get a bit more somber. As we put together our

irrigation issue we were constantly reminded of man's incredible indifference to his own well being.

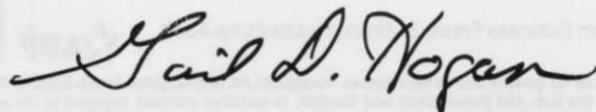
In the past year we have witnessed drought-like conditions reminiscent, perhaps, more of an episode from the "Twilight Zone" than of days we can recall. Water has become a priceless commodity.

Data compiled by the Agricultural Climatology Service Office of the Departments of Agriculture and Commerce in Washington yield the conclusion that the eastern Dakotas, Minnesota, northern and western Iowa, eastern Nebraska, and portions of Missouri suffered drought patterns similar to the record drought of the 1930s. Irregular rainfall patterns across the United States caused a multitude of drought-drainage problems. These were compounded by high temperatures and stiff winds, resulting in extensive turf damage.

For some reason, complacent folks that we are, we respond with alarm to crisis situations, but we fail to make ongoing provisions for addressing the source of the problem once the furor has waned.

We are extremely fortunate to possess the caliber of technology which can attempt to balance some of the mysterious inequities of the ecosystem. The highly evolved state of our irrigation systems and products is a tribute to our ingenuity. We must, however, learn as a nation that an inordinate sense of economic well being and technological prowess coupled with indulgent overuse of our natural resources is a formula for disaster.

In the coming year we must necessarily measure our uses of water against our own stringent guidelines for need.



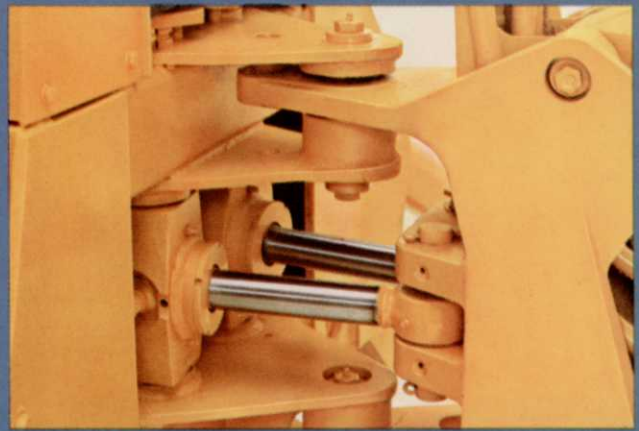
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The detachable 9250-A Backhoe with 2-lever control gives you nearly 13 feet 8 inches of digging depth and a 17-foot 5-inch reach. Its dual swing cylinders reduce the number of moving parts in the swing linkage, to aid sidecutting ability and positive swing, even on uphill grades. There are fewer daily grease points, too.

The integral loader has heavy reinforcing at vital stress points. Front mounting of loader is designed for horizontal float so shock loads can be absorbed in the rear axle mounting pads.

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The 9250-A Backhoe utilizes dual swing cylinders that provide 11,083 foot-pounds of swing torque.



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**For trees, ornamentals, and turf.**

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This broad-spectrum control with SEVIN® carbaryl insecticide takes some of the chance out of your job.

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the need for a large chemical inventory.

Why use an array of different brands with different instructions, if you can do the job effectively with a single product? You'll enjoy less nozzle changing, chemical switching and tank flushing. All good reasons to rely on dependable SEVIN.

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And many SEVIN formulations are compatible with most commonly used fungicides, miticides and other insecticides.

With the increased awareness and concern for protecting the environment, it's nice to know that SEVIN carbaryl is biodegradable. It does not build up in the soil or in plant and animal tissue.

Also, when compared with many other insecticides, SEVIN ranks low in toxicity to people, animals, birds and fish.

There's another advantage to using SEVIN in parks, golf courses and other recreational areas—even home yards and gardens. Short re-entry time. Treated areas can be re-entered as soon as the spray dries or dust settles.

PLANTS	INSECTS CONTROLLED
<b>HERBACEOUS ANNUAL, BIENNIAL AND PERENNIAL PLANTS</b> such as carnation, chrysanthemum, gladiolus, iris, peony, zinnia, etc.	blister beetles, boxelder bug, flea beetles, Japanese beetle, June beetles, lace bugs, leafhoppers, leafrollers, mealy bugs, plant bugs, psyllids, rose aphid, thrips (exposed).
<b>SHRUBS, TREES AND WOODY PLANTS</b> such as ash, arborvitae, azalea, barberry, beech, birch, boxwood, catalpa, cedar, cypress, dogwood, elm, euonymus, fir, ginkgo, hackberry, hawthorn, holly, honeysuckle, hydrangea, juniper, lilac, magnolia, maple, oak, pine, redbud, rose, spruce, sycamore, tulip-tree, etc.	apple aphid, bagworms, birch leaf miner, boxelder bug, boxwood leaf miner, cankerworms, catalpa sphinx, Cooley spruce gall aphid, Eastern spruce gall aphid, elm leaf aphid, elm leaf beetle, elm spanworm, eriophyd mites, gypsy moth, Japanese beetle, June beetles, lace bugs, leafhoppers, leafrollers, mealy bugs, mimosa webworm, oak leaf miner, orange striped oakworm, orange tortrix, periodical cicada, plant bugs, puss caterpillar, rose aphid, roseslug, saw flies (exposed), scale insects, spruce needle miner, tent caterpillars, thorn bug, thrips (exposed), webworms, willow leaf beetles, yellow poplar weevil.
<b>LAWNS, TURF</b>	ants, bluegrass billbug, chiggers, chinch bugs, cutworms, earwigs, European chaffer, fall armyworm, fleas, green June beetle, leafhoppers, millipedes, mosquitoes, sod webworm (lawn moths), ticks.

NOTE: SEVIN will injure Boston Ivy, Virginia Creeper, and Maidenhair fern.

Make a quick check of the plants and insects for which SEVIN carbaryl is registered. See how many problems it can solve for you. In all there are over 160 pests on more than 100 plants. This broad registration minimizes the problem of drift to adjacent areas.

This year, ask your pesticide supplier for SEVIN carbaryl—the insecticide with a proven performance record in fighting plant pests.

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UNION CARBIDE  
CARBARYL INSECTICIDE  
**STILL THE ANSWER.**

SEVIN and SEVIMOL are registered trademarks of Union Carbide Corporation for carbaryl insecticide. Union Carbide Corporation, Agricultural Products Division, P.O. Box 1906, Salinas, CA 93901.

# Government News

EPA proposes to cancel BHC, a chemical used in pesticides manufacture, and asks for public comment on risks and benefits of pesticides containing benzene hexachloride. Despite the fact that BHC for use in other pesticides is no longer being made, some 58 U.S. firms are still employing old BHC stocks to produce some 86 different pest control products.

Scientists at the University of Wisconsin will study feasibility of transferring chloroplasts from one plant species to another, under a cooperative agreement with the USDA. USDA Agricultural Research Service will provide \$59,918 for the two-year study.

The USDA made three changes in the citrus blackfly quarantine: 1) replaced emergency regulations on the recent Florida outbreak with more formal citrus blackfly quarantine; 2) extended the regulated area in Florida to two additional counties; and 3) added two articles to the list of restricted items.

Three national parks and three national forest areas are the first to be officially recognized as Biosphere Reserves in the U.S. The Biosphere Reserve Project is an effort of the international Man and the Biosphere Program to protect representative segments of the world's natural regions as major centers for animal and plant preservation, environmental research, and education.

The six designated areas are: Coweeta Experimental Forest, N.C.; Great Smokey Mountains National Park, Tenn. and N.C.; Hubbard Brook Experimental Forest, N.H.; Everglades National Park, Fla.; Virgin Islands National Park, V.I.; and Luquillo Experimental Forest, P.R.

Use of Mirex for fire ant control is to be discontinued by June 28, 1978. EPA Administrator Russell Train accepted the cancellation plan proposed by the state of Mississippi to end all use of the pesticide in the South. Train agreed to gradually phase out federal permission for Mirex production and use. Airplane applications against fire ants will end December 31, 1977. Ground treatment ends six months later. During the phase-out, more environmentally acceptable Mirex 10:5 will be substituted for current 4X bait.

Further increases in minimum wage become effective January 1, 1977. Seasonal exemptions will be eliminated. The minimum wage for agricultural employees becomes \$2.20/hour on January 1, and \$2.30/hour for other employees covered by law.



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## "They cut down a lot on labor costs!"

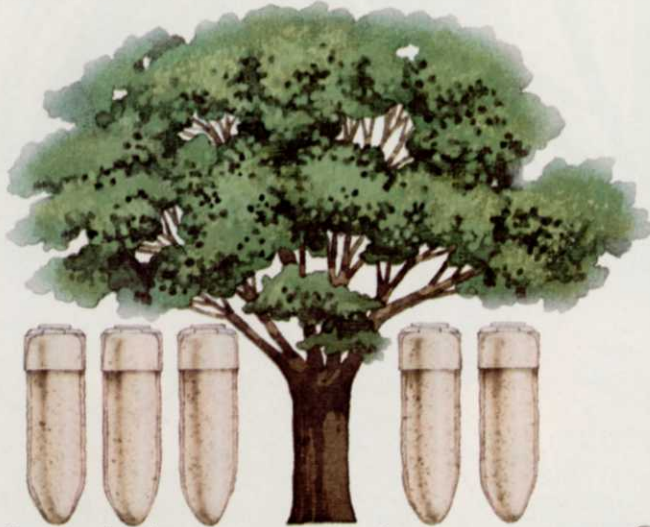
Tony Kimball, Superintendent, Deerwood Country Club, Jacksonville, Florida



"We put Jobe's Spikes out in no time at all. We bought the first cases on an experimental basis, and we're really pleased with them. We'll continue with the Spikes. "We can afford to feed a lot more trees now because we can do it in a lot less time."

### It makes dollars and sense to feed trees with Jobe's.

You can expand your tree feeding business and take better care of the trees you're now responsible for with Jobe's® Tree and Shrub Spikes. A 5' tree needs 5 Spikes, and it takes just about 5 minutes to get the job done. How long would it take to feed that 5" tree by drilling? About 30 minutes? With the cost of labor these days, you can see it makes dollars and sense to feed trees with Jobe's.



### 5" trunk diameter, 5 Spikes.

"We use one for each inch of diameter. Figuring, say, a 5" tree, that's \$1.50 a tree. If we weren't using Jobe's Spikes, we would probably be using a slow-release, high-nitrogen fertilizer. Compared to that, the cost is drastically cut by using Jobe's Spikes."

### Now Jobe's offers Evergreen and Fruit Tree Spikes, too.

You can meet most feeding situations with Jobe's Tree and Shrub Spikes 16-8-8, Evergreen Spikes 12-6-8 or Fruit Tree Spikes 5-15-15.

They're as effective as drilled fertilizer because rainwater carries the fertilizer down to the root zone. (University leaching

studies have proved it.) Jobe's Spikes are better than surface-applied fertilizer because there's no danger of burning turf or excessive leaching.

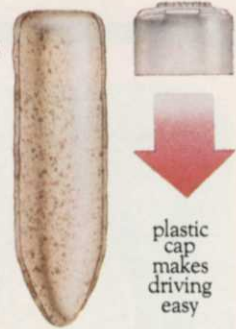
In every type of climate and every kind of soil from sand to heavy clay, Jobe's Spikes have proved their effectiveness.

### A hammer is all the equipment you need.



Jobe's Spikes use a patented binder so the fertilizer forms easy-to-drive spikes. A plastic cap is included to make driving the Spikes easier and to protect the Spike while you drive it.

You can forget about moving bulky drills from job to job. Forget equipment breakage... maintenance bills ... costly replacements.



### "You don't have to worry about anybody going out there and messing up!"

"You can't mess up with Jobe's Spikes. Until now we fertilized trees by drilling or by spreading fertilizer on the surface. With Jobe's you don't have to worry about burning. You don't have to worry about the bag splitting.

"Very handy and easy to install around trees. They cut down a lot on labor costs."

### Tony Kimball is saving time and making money with Jobe's.

### How about you?

Jobe's Evergreen Spikes 12-6-8 and Fruit Tree Spikes 5-15-15 are now available in bulk. They can be combined for shipping with Tree and Shrub Spikes.

Call your local Jobe's distributor or order direct. \$30 per case (105 Spikes) prepaid, 5 case minimum. 15 or more cases, \$25 per case. 36 or more cases, \$21 per case.

# Jobe's® TREE & SHRUB SPIKES

The easy method for professional tree care.  
International Spike, Inc., 462 East High St.  
Lexington, Kentucky 40508.





# Diazinon controls more any other major

Over twenty turf insects are listed on the Diazinon® label. More than any other major turf insecticide.

Granted, a turf manager must be able to recognize an insect problem. And know when to apply treatment for the most effective control.

But when you've got Diazinon, the one broad-spectrum turf insecticide with the label to prove it works for you, it sure makes things easier.

The insects: Lawn chinch bugs, Ants, Armyworms, Clover mites, Springtails (Collembola), Crickets,



# turf insects than turf insecticide.

Cutworms, Digger wasps, Earwigs, Frit flies, Lawn billbugs, Sod webworms (Lawn moth), Sowbugs, White grubs (such as Japanese beetle larvae), Brown dog ticks, Bermuda mites, Chiggers, Fleas, Leafhoppers, Millipedes, Rhodes-grass scales.

If you'd like to have a copy of the Diazinon label, pick up one from your local supplier.

Or write us.

Agricultural Division, CIBA-GEIGY Corporation, P.O. Box 11422, Greensboro, NC 27409

## Diazinon

# Industry News

## EPA establishes new toxic office

EPA Deputy Administrator John R. Quarles has announced the formation of a new office of Toxic Substances, headed by an assistant administrator as authorized by the new Toxic Substances Control Act of 1976.

Quarles said Kenneth L. Johnson, 47, EPA deputy regional administrator in Boston, has been named acting assistant administrator for Toxic Substances.

"We are establishing this office immediately in order to begin a sound and aggressive toxic substances program," Quarles said. He added that the existing Office of Toxic Substances, currently under the assistant administrator for water and hazardous materials, will be transferred to the new assistant administrator's office.

An internal study of the agency will be made to determine if other programs, such as the office of pesticide programs, should be transferred.

## Shell picks name for insecticide

Pydrin has been selected as the name for Shell Chemical Company's new synthetic pyrethroid insecticide.

Formerly designated as SD 43775, the new compound was extensively field tested in all major cotton growing regions of the United States during the 1976 season under an experimental use permit from the Environmental Protection Agency.

This past season, Pydrin (SD 43775) was tested by cooperating cotton growers. Effective control was demonstrated on such important insect pests as the tobacco bud-

worm, cotton bollworm, pink bollworm, cotton leaf perforator and boll weevil.

U.S. patent rights for this pyrethroid compound are held by Sumitomo Chemical Co., LTD. Development in the U.S. is being conducted by Shell under agreements with Sumitomo.

## UC tree book available

"Trees of the Berkeley Campus," one of the most popular publications of the University of California, has been reprinted and is now available to the public.

The publication describes hundreds of trees and shrubs on the Berkeley campus. Latin and common names are given as well as a description and information about each species. It also lists the location of plants by their proximity to buildings and landmarks.

To obtain a copy of "Trees of the Berkeley Campus," send a check or money order for \$5.00 plus sales tax, payable to The Regents of UC, to Agricultural Publications, 1422 South 10th Street, Richmond, California 94804.

## 39 states split forest profits

Checks totaling more than \$49 million have been distributed to 39 states and Puerto Rico as their share of more than \$195 million earned from the sale and use of national forest products and services in the fiscal transition quarter.

The USDA said the \$49,049,338 returned to the states represents 25 percent of the money collected by the forest service from the sale of timber, and from grazing, recreation, minerals, and other land use

charges on national forests between July 1 and Sept. 30 of this year.

## Velsicol continues registration fight

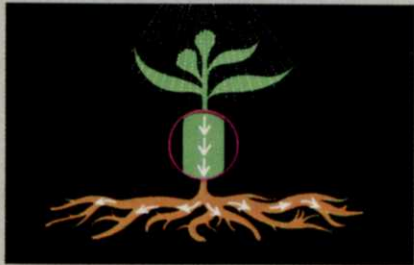
"Despite the disappointing results of Velsicol's appeal to the U.S. Court of Appeal concerning the suspension of certain uses of heptachlor and chlordane, Velsicol intends to continue its efforts to maintain the registrations of these pesticides through further efforts in the courts and the cancellation hearings being held by the EPA," according to Robert M. Morris, company president and chairman.

"We believe that the benefits from the proper use of these insecticides far outweigh any risk of exposure to man," said Morris, "and we will continue to support our belief and experience with these products."

## U.S. receives Bonsai trees

Fifty three rare bonsai plants have been presented to the American people by the Japanese government to commemorate the United States Bicentennial. The collection, which includes one specimen 350 years old, was described as an "extraordinary gift" by former Secretary of Agriculture Earl Butz at the dedication ceremony in Washington. The plants were presented by the Nippon Bonsai Association in Tokyo. Some were donated by private sources, including the Japanese Royal Family, and others were purchased by the Japan Foundation.

# There's never been a herbicide like this before.

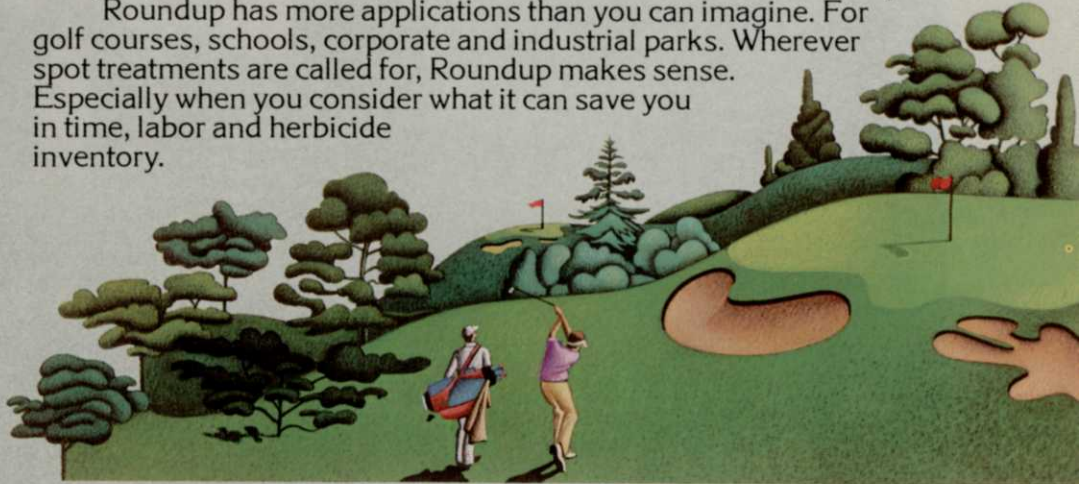


**"Translocation" is the key.**

Roundup is applied to the weed foliage, absorbed through the leaf surface, and "translocated" throughout the entire plant. In this way, Roundup effectively destroys most weeds—roots, rhizomes and all.

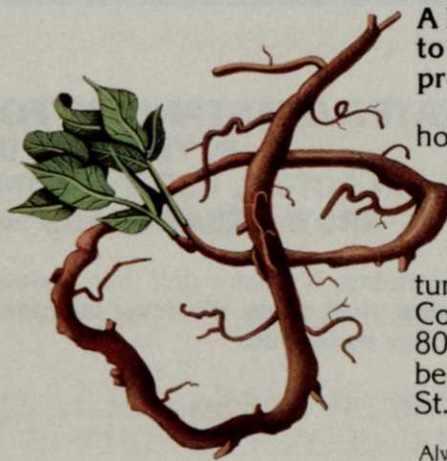
Roundup® herbicide by Monsanto is powerful enough to control many of the toughest annual and perennial weeds in one application. Once, several different herbicides and frequent repeat treatments were needed. Now, one man with a backpack or tank sprayer can handle many of your weed cleanup chores in one treatment with Roundup.

Roundup has more applications than you can imagine. For golf courses, schools, corporate and industrial parks. Wherever spot treatments are called for, Roundup makes sense. Especially when you consider what it can save you in time, labor and herbicide inventory.



**Roundup destroys most emerged annual and perennial grasses and weeds.**

Including bluegrass, bermudagrass, quackgrass, bindweed, johnsongrass, fescues, and vaseygrass.



**Roundup. A herbicide that gets to the root of the problem.**

To find out how to put Roundup at the root of your weed problems, write: Roundup, Monsanto Agricultural Products Company, C3NJ, 800 North Lindbergh Blvd., St. Louis, Mo. 63166.

Always read and carefully follow the Roundup label directions.



**Roundup has no residual soil activity.**

And you know what that can mean for your landscaping program. However, for seedling weed control, simply follow your Roundup treatment with an effective residual herbicide.

**Monsanto**



**FOR  
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AND  
WHITEY FORD,**

**Adelphi**  
KENTUCKY BLUEGRASS

(U.S. Plant Patent No. 3150)

**IS "A WHOLE NEW  
BALL GAME"**



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... IN YEARS OF UNIVERSITY TESTING  
... IN ACTUAL USE BY PEOPLE WHO KNOW GREAT GRASS,  
GROW GREAT GRASS and DEMAND GREAT GRASS.**

Nowadays it's more golf than baseball but Mickey Mantle and Whitey Ford know great grass. Whatever the game, "Adelphi" is the answer for them and it may be for you.

- **DARKER GREEN COLOR THE ENTIRE GROWING SEASON**
- **EXCELLENT DENSITY** • **GOOD DISEASE RESISTANCE**
- **TOLERANCE TO MODERATELY CLOSE MOWING**

**JOIN THE "ADELPHI" TEAM.  
IT'S "A WHOLE NEW BALL GAME" IN TURF.**



"ADELPHI" HAS BEEN CHOSEN by the Plant Variety Protection Office, U.S.D.A., AS A STANDARD FOR DARK GREEN COLOR to which all bluegrasses applying for plant protection will be compared for color classification.

(Use of this statement does not indicate any approval or recommendation of Adelphi by the U.S.D.A.)

FOR INFORMATION, CONTACT:

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Jamaica, N.Y. 11423

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Farmingdale, N.J. 07727

**NORTHROP, KING & CO., Inc.**

Minneapolis, Minn. 55413

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Canadian Inquiries: **National-NK Seeds Ltd.**, Box 485, Kitchener, Ont. • **Rothwell Seeds Ltd.**, Box 511, Lindsay, Ont.  
Other International Inquiries: **Northrup, King & Co., Inc.**, Minneapolis, Minn. 55413





## BUYING AUTOMATIC IRRIGATION

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*Greens are lush at Columbus Country Club in Ohio since the installation of a new irrigation system.*

*After 44 years with the same irrigation system, the Columbus Country Club decided to replace it. Here, Superintendent Steven Kennedy tells how he went about doing so and offers some advice to superintendents who plan to replace their systems.*

Once the decision to replace our irrigation system had been made, I took my notepad and camera and began traveling. I visited about 15 courses, studying their systems and asking questions. Generally everyone said they liked their present systems but when I asked about the kinds of problems they had, few would answer.

The difficulty was that very few people will admit to having made a mistake. Nevertheless, an educated eye can spot trouble. I also walked

around the maintenance buildings. If there were sprinkler parts there, it was an indication the system was not quite as good as it could be.

After the visits, I started investigating product lines. I looked at everyone's product carefully. I recommend taking them apart, watching them in operation, timing them to see which ones are accurate. This is the superintendent's job. He is the one who is going to have to live with the system.

Check to see if the system is easy to repair. Compare your replacement part availability and the cost of replacement. If the superintendent is not involved in the decision as to which system to purchase, I believe the club is making a big mistake.

Installation is all important. If the system isn't put in right, you're just kidding yourself. Many superintendents told me equipment is comparable but the installation makes the difference. If an installer won't give you a list of all of the jobs he's

*Continued on Page 18*



# How to protect your turf from the world's toughest critic: the golfer.

**With this formidable array of armament on your side, you have a broad spectrum turf management program that can ward off just about any attack from weeds or fungi or golfers.**

And you can manage it all with surprising economy. Chipco® products protect the green of your turf without straining the green in your budget.

Just try any one of them, and you'll want the entire arsenal. Because once you use a Chipco anything, you'll soon be using Chipco everything else.

**Chipco Bucril®** gives early control of broadleaf weeds in newly planted grasses for sod or seed production.

**Chipco Turf Herbicide MCPP** controls clover, chickweed, knotweed and other surface creeping weeds and is safe and effective for use on most bent grasses.

**Chipco Turf Kleen** is a broad spectrum herbicide that controls broadleaf and surface creeping weeds with a wide margin of safety around trees and shrubs.

**Chipco Spot Kleen** is a systemic fungicide for control of dollar spot, Fusarium blight, stripe smut, large brown patch and copper spot.

**Chipco Thiram 75** prevents and controls snow mold, large brown patch and dollar spot. Used with Spot Kleen, it offers a complete disease control program.

**Chipco Microgreen Liquid** prevents chlorosis which results in long lasting deep green color, more root growth and less desiccation.

**Chipco Turf Herbicide D** is a general purpose broadleaf herbicide ideally suited where economical control is desired.

**Chipco Spreader Activator** is a quality adjuvant to increase the efficiency and effectiveness of turf chemicals.

**Chipco Crab Kleen** gives economical and selective post-emergence control of crab grass, chickweed and other grassy weeds in established turf.



Rhodia Inc., Agricultural Division, Monmouth Junction, New Jersey 08852

# BUYING AUTOMATIC IRRIGATION

Continued from Page 15

done or won't take you to see jobs he has done, don't use him. Always check his reputation.

Another recommendation is to check your mains. Ours are cast iron. I had two engineers verify their condition before installation. Your

new system won't be successful if your mains aren't good.

Once we had made our decision to go with a RainBird system and selected our installer, everyone was pleased with the results. The pipe was pulled about 18 to 24 inches un-

derground with a vibratory plow with no trenching. We played all four rounds of our club championship while the work was being done without a single complaint.

Our greens are small and I decided to go with two heads in front and two in the back for each valve. You can literally do anything you want with automatic irrigation but if you get too complex you are just defeating your purpose.

Also in the new installation consider snap valves. We put in a snap valve at each green. This fall we planted 145 trees. They need water and now it is readily available. The valves are covered with a valve box that can be opened with a special tool quite easily but is otherwise tamper-proof.

Once your system has been customized to suit your needs and installation is completed, you should have a system you can be proud of. And one that makes your job easier.

*Steven Kennedy presented this report at the Ohio Turfgrass Conference and Show Dec. 8, in Columbus. More than 1200 people attended this most successful conference. WEEDS TREES & TURF will be publishing more topics covered at the conference in later editions.*



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ROCHESTER, N.Y., Thurs., Jan. 13 Hilton Inn on the Campus	_____	_____
FREMONT, NEBR., Tues., Feb. 8 Holiday Lodge	_____	_____
ST. LOUIS, MO., Thurs., Feb. 10 Holiday Inn—Riverfront	_____	_____
MILWAUKEE, WISC., Fri., Feb. 25 Hoffman House, 251 N. Mayfair Rd.	_____	_____
ELMHURST, ILL., Tues., March 8 Holiday Inn, 624 N. York Rd.	_____	_____
CHAMPAIGN, ILL., Fri., Feb. 11 Ramada Inn—University	_____	_____
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The foot operated hydrostatic transmission goes from forward to reverse without clutching or changing gears. Perfect for close-quarters work. Allows optimum power/speed combinations with hands free to operate hydraulics.

More than just a lawn and garden tractor, the HT-20 is powered by a 19.5 hp twin cylinder Kohler engine. The channeled steel frame, massive rear axle/differential and heavy duty front axle give a full day's work. Day after day.

Get more value from your big horsepower and expensive manpower. With the rugged HT-20. It fits right in-between. To save money on both ends.



## Bolens Mulching Mowers.™

They cut the grass and the workload. In one pass. When a Bolens Mulching Mower cuts the grass, it also cuts and recuts the clippings into tiny particles that are blown down into the turf. There, they disappear and quickly decompose. No clippings. No clean-up. No thatch build-up. The fine mulch actually feeds the turf while the crew moves on to other jobs.\*

3, 4 and 5 hp models are specially built for commercial and institutional use. Straight-thru steel axles, rugged all-steel deck, tough one-piece handle and positive cutting height adjustment. Bolens Mulching Mowers. Tough, economical answers to your continuing turf maintenance program.

\*For a free copy of a University study on nitrogen return, contact FMC Corporation, Port Washington, Wisconsin 53074.

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**FMC**  
Consumer  
Products

*The author, Don Davison, is an irrigation contractor in Cleveland, Ohio.*

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**T**oo much — too little — too late — These are the three big moisture problems which must be solved to acquire healthy plants through proper root structure.

As an irrigation contractor for over 13 years, Irrigation Supply has installed a great number of sprinkling systems to correct the latter two problems in lawns, shrub bed areas, cemeteries, golf courses, baseball and football fields, and wherever the lack of moisture was the basic problem. After some years, it became apparent that the first problem — too much — was far more important and of greater concern than the combination of the other two.

The supplying of adequate moisture to dry areas is purely academic and can be resolved by installing an engineered sprinkling system. However, the residual water from sprinkling, often supplemented by rainfall, will find isolated low areas and proper drainage of those areas must be provided if the plants are to survive.

Through a vast amount of research, plus trial and error with a

large number of differing sizes and styles of drainage systems, we determined that a one inch plastic pipe, with quarter inch holes drilled every 6 inches throughout the length, was part of the answer to this problem. We designed the tools with which to install this pipe and have made a multitude of installations during these past five years.

The vibratory plow, which we designed to pull the pipe through the soil at the desired depth of from 4 to 7 inches, is hydraulically controlled to conform to the contour of the terrain and achieve proper drainage. The right depth is determined by sampling to learn the composition of the soil and root structure.

The plow, attached to the machine by a cutter shaft, is hydraulically inserted into the soil to the desired depth before it is caused

to vibrate. This vibration compacts a one and a half inch tunnel into which the pipe is pulled by a 'Chinese Finger' attached to a hook on the plow, and it also shatters the soil to a radius of several feet from the plow.

On the surface, the only visible evidence of the installation is a small cut, approximately a quarter inch wide which will disappear after several waterings. But if immediate use without visible evidence of the installation is desired, the small slit can be dressed with coarse silica sand or other material.

One installation of interest might be the 13th green on the golf course of the Chagrin Valley Country Club. This green is in front of and at the base of a cliff-like rock area from which water would weep for several days following a heavy rainfall. During such periods, the green was either out of play or used only by those who were seriously devoted to the pleasures of golf.

Many plans to correct the problem were considered and discarded, since trenching and installation of conventional drain tile

## **A PULLED PIPE SYSTEM FOR DRAINAGE**

would have required several days. Instant Drainage was suggested and adopted.

Installation was started at 10 a.m. and just three and a half hours later the green was back in play. It has not been out of play since then due to excess water.

The initial root structure was measured at two and a half inches, and just three months later had deepened to four and three quarter inches. We have subsequently and successfully drained fairways and other problem areas on their course.

We have designed various attachments for our vibratory plows to enable the installation of the one inch pipe with a minimum of lawn damage and without digging. By using this size of pipe, we avoid mounding and install it to whatever depth is dictated by the desired root structure, usually just where the topsoil joins the clay or other subsurface material.

Not only does this drain off the

excess surface, water, instantly, but it also aids in the aerification of the soil, and it retards the compaction of the surface in heavily traveled wet areas. In addition, although the pipe has a positive siphonic action, it still retains enough subsurface moisture for root consumption as needed, thus making for a deeper and heavier root structure and healthier plants.

The twenty foot long sections of pipe are permanently bonded together to form whatever continuous lengths are required. We can pull a thousand feet of continuous length in compatible soil, and have installed 5,000 feet of pipe in a day using one machine and an operator.

Over a given area, we will install a greater quantity of Instant Drainage than is normal with four inch pipe, and this permits a greater percolation of water through the soil. Wet areas in which we have compacted tunnels only, without the installation of pipe, have retained

their inch and a half of compacted tunneling for several years.

Examination of 5-year-old installations of Instant Drainage reveals that the pipe is still clean, free of debris, and functioning well. Installation in sandy soil assures that soluble salts in the air can be washed away from the root structure of the grass and/or plants and thereby provide stronger growth.

We recently installed 20,000 feet of Instant Drainage at Cleveland Stadium, which has four season use as the home of a football and a baseball team. The field of this stadium is reportedly fifteen feet below grade and would remain very wet for several days after a downpour. Before the installation was completed, we were visited by a wet weekend during which almost 5 inches of rain fell throughout the area by Sunday evening. At 9 a.m. Monday morning, the field was wet, but by 1:30 p.m. that same afternoon, the field was dry. □

*Installation in progress at Cleveland Stadium.*



# GCSAA SHOW PREVIEW

## a week in Portland

The Pacific Northwest is the site for the 48th International Turfgrass Conference and Show, sponsored by the Golf Course Superintendents Association of America, Feb. 6-11 in Portland, Ore.

Over 5000 GCSAA members, exhibitors and speakers and representatives from allied associations, government, industry and education are expected to attend the Conference and Show in Portland's Memorial Coliseum.

This year more than 150 manufacturers and distributors attending the show will be allowed to take orders for their products as a result of the tax reform bill signed by the President. Prior to the signing exhibitors had been limited to displaying their products: order taking and floor sales were prohibited because of GCSAA's non-profit status.

Exhibits of turfgrass equipment and supplies will occupy 100,800 square feet of floor space at the Coliseum. Monday, Feb. 7, will be Distributor's Day. From noon until 5 p.m., manufacturers can show their exhibits to their dealers before the show opens to the public.

The exhibit hall will be open Tuesday and Wednesday, Feb. 8 and 9, from 9 a.m. to 5 p.m. and Thursday, Feb. 10, from 9 a.m. to 4 p.m. Tuesday, the opening day, traditionally has been reserved for superintendents only to view the show.

The continuous educational seminars with the trade exhibits are designed to familiarize superintendents with new methods, products and equipment that can contribute to improved and more efficient golf course maintenance practices. □

## 1977 PORTLAND EXHIBITORS

Advanced Drainage Systems, Inc.  
Advanced Engine Products  
Alpine Mfg.  
American Pelletizing Corp.  
American Society of Golf Course Architects  
Ametek, Inc. — Plymouth Products Div.  
Applied Biochemist, Inc.  
Aquatrols Corp. of America  
Atwater Strong Division  
Batrow Inc.  
Bogue Electric Mfg. Co.  
Briggs & Stratton Corp.  
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Dotech, Inc.  
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Elanco Products Co.  
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FMC Corp.  
Foley Manufacturing Co.  
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Lakeshore Equipment & Supply Co.  
Lawnmower Parts Mfg. Co., Inc.  
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Lely Pacific, Inc.  
LEWISystems, Menasha Corp.  
Lindig Manufacturing Corp.  
Linn-Benton Community College  
Little Giant Industries, Inc.  
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Lofts Pedigreed Seed, Inc.  
Mallinckrodt, Inc.  
Manhattan Ryegrass Association  
Milorganite Div. Milwaukee Sewerage Commission  
Monsanto Agricultural Products Co.  
Montco Products Corp.  
Moody Sprinkler Co., Inc.  
Moridge Mfg., Inc.  
Mott Corp.  
The F. E. Myers Co.  
National Chemsearch  
National Golf Foundation  
National Mower Co.  
L. R. Nelson Corp.  
Northrup King & Co.  
Nursery Specialty Products  
Occidental Chemical Co. (Best Prods. Div.)  
Oil Capital Valve Co.  
Oil-Dri Corp. of America  
Olathe Mfg., Inc.  
Onan, Division of Onan Corp.  
Onex Industries, Ltd.  
Oregon Fine Fescue Commission  
Oregon GCSA  
Oregon Ryegrass — Highland Bentgrass  
Par Aide Products Co.  
Pargo, Inc.  
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Stauffer Chemical Co.  
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Swift Agricultural Chemicals Corp.  
Taylor-Dunn Mfg. Co.  
Tee-2-Green Corp.  
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# Lescosan puts the pinch on crabgrass



"I've been using Lescosan 4E (Betasan\*) for pre-emergence crabgrass control quite successfully. Prior to using Lescosan 4E, I was using a wettable powder and making 2 applications with only moderate success. Lescosan 4E has considerably more longevity for controlling late germination."

A handwritten signature in cursive script that reads "James L. Seigfreid".

James L. Seigfreid  
Golf Course Superintendent  
Losantiville Country Club  
Cincinnati, Ohio

Try Lescosan 4E on your golf course or turf area for control of crabgrass and/or *Poa annua*. Lescosan is very effective on all grasses and many ornamentals and ground covers. It is available in a granular form, too.

You'll not only be surprised with the results, but you will be surprised at how economical Lescosan is. Of course, you'll find all LESCO products to be competitively priced.

If there is not a LESCO representative in your area as yet, write or call us collect at (216) 323-7544.

\*(Betasan—registered TM of Stauffer Chemical Company).

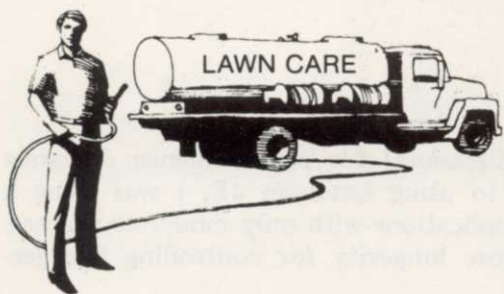


## LESCO PRODUCTS

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A Family of Fine Products:

Lescosan 12.5G — Lescorene — Lesco 4 — Lescobor — Lescopar — Lescopex — Lesco Non-Selective Herbicide  
Lesco MSMA — Lesco Thiram 75W — Lescozyme — Lakeshore Chinch Bug & Sod Webworm Control



# TURF

## Unrivaled control of

Kills these weeds, and others:

Common Chickweed  
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 Wild Lettuce  
 Bedstraw  
 Bindweed  
 Clover  
 Dandelion  
 Dichondra  
 Ground Ivy

Heal-All  
 Henbit  
 Knotweed  
 Mustard  
 Peppergrass  
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Special Bentgrass formula also available  
 TRIMEC is a registered trademark of PBI-GORDON Corporation, U.S. Patent No. 3,284,186

## Learn why Trimec efficiency gives you unparalleled economy:

TRIMEC today is the standard in weed control, offering unprecedented benefits.

Perhaps you know about its efficiency. What you may not appreciate is its economy. Actually, they're twin benefits — both remarkable, both from a common source. Here's the story:

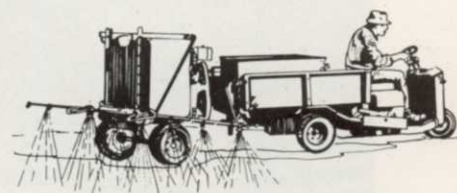
Synergism is the word frequently used to describe a truism — that certain chemicals combined in certain ways create a multiplying effect greater than the sum of their parts. Synergism is basic to Trimec's renowned success.

Trimec's active ingredients — 2, 4-D, MCPP and Dicamba — are synergistic. Precisely formulated, Trimec has tremendous power and high efficiency. It delivers great wallop with less chemicals. It's hard working. And that's the basis for yet another advantage —

### Trimec Economy

Comparisons show that Trimec costs less per acre for weed-free turf than any other herbicide. You use fewer gallons . . . you seldom need retreatment . . . your total cost is less . . . period.

Such economy/efficiency alone is reason enough to make Trimec your herbicide. And we haven't mentioned the third great advantage —



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 Santa Anna • Foster-Gardner, Inc.  
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 • Los Angeles Chemical Co.

#### COLORADO

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 • Pueblo Chemical & Supply

#### CONNECTICUT

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 • Emanuel Shemin Greenhouses & Nurs.  
 Hazardville • Old Fox Chemical, Inc.

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 • Swift Agricultural Chemicals Corp.  
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 • Drake-Scruggs Equipment, Inc.  
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 • Little Wheels, Ltd.  
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 • Rhodes Chemical Co.  
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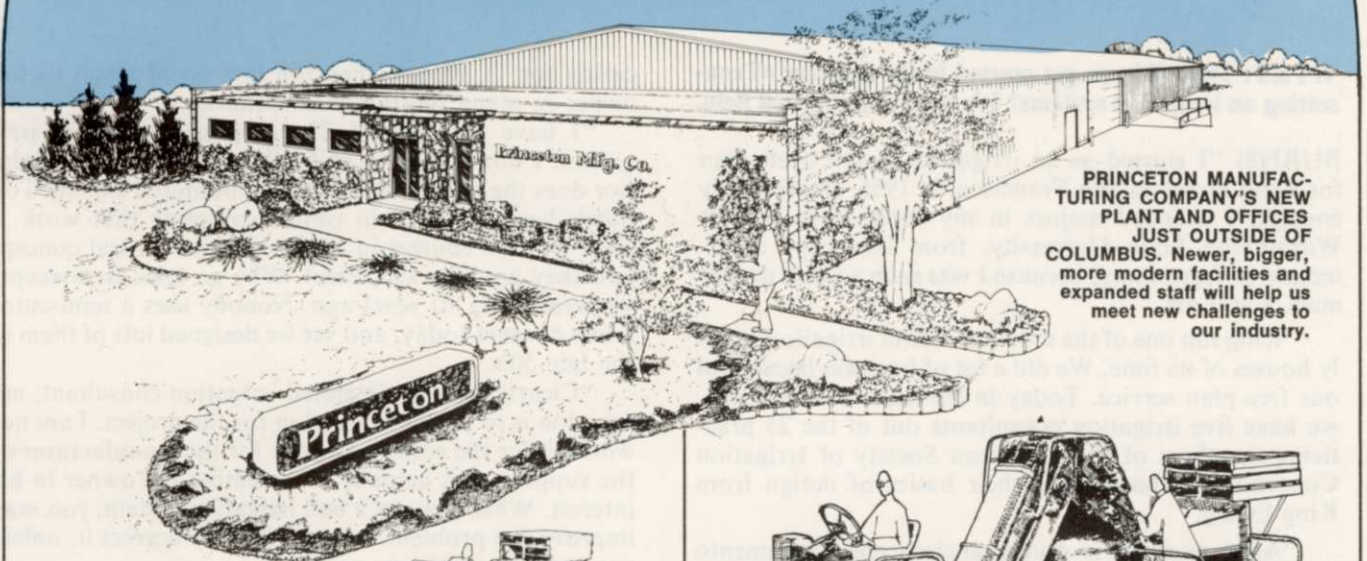
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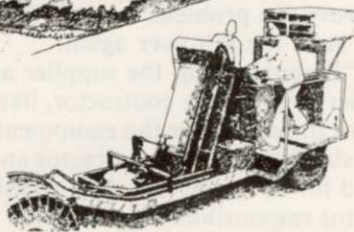
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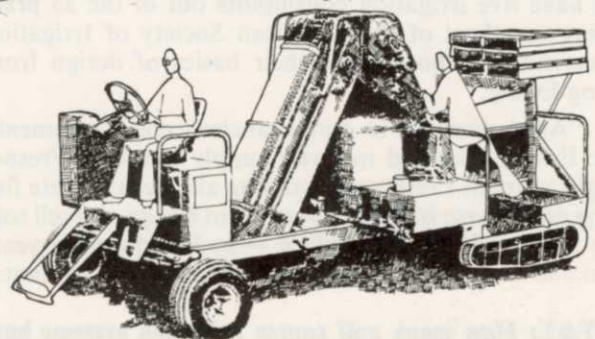
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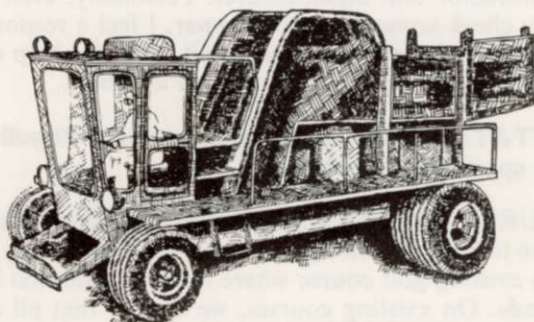
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# THE METICULOUS CONSULTANT

*Don Burns is a specialist by trade, and a perfectionist by nature. Through constant and often critical self-analysis, he has developed a modus operandi for designing irrigation systems which combines scientific thoroughness with the determination to excel.*

**WT&T: How did you get started in the business of consulting on irrigation systems? It's a very specialized field.**

BURNS: "I started as an irrigation design draftsman for King Ewing in San Francisco, in 1956. Interestingly enough, I changed majors in my sophomore year at Washington State University, from landscape architecture to Agronomy, because I was such a lousy draftsman. I still am.

"King ran one of the most successful irrigation supply houses of its time. We did a lot of business because of our free plan service. Today in the State of California, we have five irrigation consultants out of the 25 practicing members of the American Society of Irrigation Consultants, who learned their basics of design from King Ewing.

"After working in San Francisco and Sacramento for Ewing, I started my own supply house in Fresno. Eight years in Fresno and running all over the state finding golf course irrigation systems to design and sell told me I wasn't in the right place — so I sold out six years ago and moved to La Jolla as an irrigation consultant."

**WT&T: How many golf course irrigation systems have you designed?**

BURNS: "I'm sure over the past 21 years, I've designed well over 300 golf course irrigation systems — maybe more. In the supply business, we did a lot of designs that weren't installed. In the past 6 years as a professional, I have designed over 80 courses with some 50 completed and installed under our direction."

**WT&T: How do you see your role, as it relates to the golf course owner, the contractor and the superintendent, and how are these relationships defined on a given job?**

BURNS: "The owner spends \$200-300,000 and needs one person to act as a responsible party or as an authority and represent the owner in the decisions that are needed in such a large expenditure. Generally, the superintendent is not going to take that kind of responsibility. While my academic background may be strong in turf management, I would not take the responsibility of

cares for 18 greens when the loss could result to the owner in many thousands of dollars.

"I have had almost 22 years' experience in irrigation. I don't need to make the same mistakes again, nor does the owner need to get an outdated system. Too much has happened in central concepts that work. I have over 60 courses in the ground on central concept and they are very successful. Why go back to concepts we were using 10 years ago. Nobody uses a semi-automatic concept today, and yet we designed lots of them in the late 50's.

"Clearly, as a professional irrigation consultant, my function is to provide direction for the project. I am not working for the contractor, nor for the manufacturer or the supplier, but actually representing the owner in his interest. When you get a bad irrigation system, you may improve the problem, but you'll never correct it, unless you start the job over again.

"I would group the supplier and the contractor together, because the contractor, like it or not, is responsible to the owner for the equipment he installs. The relationship between the contractor and his supplier must be good for all concerned. Our specifications call for contractor responsibility and supplier responsibility. This is intended to get the service thing started right.

"Our position is to represent the owner, but you can see we sit somewhere in the middle when it comes to what's fair for all parties — owner-superintendent-contractor and manufacturer. Personally, even though my check comes from the owner, I feel a responsibility to all these parties — because it takes the help of all to get a good job. That's what it's all about."

**WT&T: What has been your experience with pulling pipe as opposed to trenching?**

BURNS: "I find it different with each contractor. Some like to pull everything they can — most will only pull on an existing golf course where a new installation is being made. On existing courses, we specify that all existing pipe, 2 inches and smaller, will be pulled. It is much less damaging to the course, and allows play to continue during the installation.

"On new golf courses, where the trench is not tearing

up anything, I find that most contractors would rather trench and backfill.

"Pulling pipe is here to stay, even on a course where rocks may be of concern. The chance of damaging the pipe during the pulling operation is worth it in comparison to the additional cost of open trenching and expensive backfill. Plus, there is a loss of revenue to clubs for closing holes when there are a lot of trenches open. This does not occur when pulling, because it's a much cleaner operation."

**WT&T: To what extent have you used effluent water and how do you see the future of this type of usage?**

BURNS: We are using effluent water on two jobs right now — the Royal Kaonapali in Maui and the New Molakai Beach course in Molakai. I feel we really should be considering using this water all over the world and not losing it by dumping it into the oceans and rivers. It has an ecological value in conservation and has added nutrition for plant life.

"Not all effluent water is usable, but if we can generalize, I would answer as above. If you are going to use effluent water, you must consider two points — (1) the quality of the original water sources; and (2) the renovation treatment. The dissolved salt content, the sodium absorption ratio which reduces soil permeability, the trace elements which are potentially toxic, the chlorine content, and, if course, the biological composition for health reasons.

I would recommend an analysis be made on any water from a soil and water testing laboratory."

**WT&T: How about drip irrigation?**

BURNS: "Our only use of drip irrigation has been as additional water for trees. It is very important in the desert that trees get more water than just that offered by the irrigation system. We run a manual system off the main with tubing supplying an emitter at each side of the tree. It has been very effective and inexpensive to install. The tubing can be pulled shallow after the trees are planted."

**WT&T: You seem to be a perfectionist in your design. It must be difficult to work with a contractor who feels the urgency of getting a job done more poignantly than the need for farsighted design.**

BURNS: "I don't feel many contractors will try to cheat, if the contract is reasonable. It must be fair for both the owner and the contractor. If the contractor is losing money, he will try to make it up.

"A contractor who specializes in golf course irrigation usually is pretty set in his thoughts of what is a good

irrigation system. He's usually pretty proud of his job record. I don't always agree with his concepts but we do find that in the end an agreement is made to the benefit of the owner. I try to help the contractor so he will help me — it gives the owner more for his money."

**WT&T: Can you explain why your approach to irrigation design is different from the other 25 consultants in California?**

BURNS: "In the first place, 95 percent of our work is golf course irrigation, which separates most of us. Of those who do do golf course irrigation, very few will do their own staking. After the normal preliminary and final design with complete sets of specifications and details, as performed by all irrigation consultants, our scope of work differs in that it extends to total responsibility of staking of all sprinkler heads, valves, and controllers. This personal staking allows changes in head location and programming of heads due to: construction changes, site conditions or contours, wind and soil conditions, and existing trees, sand traps, or cart paths.

"Following this staking, we must do another plan because of the changes. This plan becomes an 'As Staked Drawing' and is the guideline for the contractor during installation. When the contractor completes this phase of the installation, we do another drawing showing all corrections and changes in pipe and valve locations for a final 'As Built Drawing.'

"In the end, this means we made three drawings of each area and walked the same fairway four different times:

- (1) during staking
- (2) doing the 'As Staked Drawing'
- (3) while checking the 'As Staked' for corrections
- (4) a final walk-through with the 'As Built' drawing with the superintendent and contractor for check list to sell job.

"This involves over 30 days, or parts of days, on a site, over a period of 4 to 6 months. This is a lot of time on-site, but I know of no other way to assure the owner he is getting the best possible job."

**WT&T: Is business competitive among irrigation consultants?**

BURNS: "Generally I am competing with two or three other consultants and price doesn't necessarily determine how the owner makes his selection. Rather, the scope of work of a consultant and his past experience are the major factors. The selection of a consultant should be made independent of manufacturer or supplier presentations. There are two things you must get across to the owner and superintendent, when making your presentation: (1) you don't really care what brand of equipment they use, as long as two brands are

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# THE METICULOUS CONSULTANT

listed (I think it important that competition be involved in the equipment); and (2) you are open to their concepts of design as long as they will let you express your experience on your own concepts of design, and together come to a mutual acceptance.

"There are things I won't do and if I feel they are really wrong, I politely say I don't think they need me. If they have made a decision on a direction and it is not in agreement with what I know to be good practice, sometimes I have to allow them to go ahead and make their mistakes because they are paying the bills."

## **WT&T: Your design concepts are rather technical. Have you encountered any difficulties in presenting your ideas to owners and superintendents?**

BURNS: "I try to cover this in making the client understand what C.U. means. C.U. means the Co-efficient of Uniformity, which is a percentage figure, derived from the precipitation rates at various points of one sprinkler to another, totaled together and averaged out giving the efficiency of coverage.

"One thing I work on the hardest is a high C.U., and this comes only with the use of the right head at the right spacing. We use two size heads to accomplish this; to make the two areas fit together, one to the other, takes two size sprinklers. It is not possible to hold to a total equilateral triangular spacing like many plans are drawn. Drawing circles on a flat piece of paper is not the same as staking to site conditions. Our 'as staked' drawings relate to a custom design to the site conditions.

"One thing we will not tolerate is, if we are on a basically 70 foot spacing, and we jam heads in to make it cover where some heads are on 40 feet and some on 70 feet and some on 75 feet. We have destroyed the C.U. in this area obviously creating a wet spot or dry area. This must be corrected during staking. By using two sizes of sprinkler heads, it is possible. It is important that you understand the need to make the spacing correct all the way through.

"Back to the question, it's very hard to present these concepts, but it's a lot easier and a lot more understandable when you visit an existing job and see the heads in operation. In addition to the correct spacing, I feel our most important job is in establishing proper programming, often referred to as the heart beat of the system. Custom programming to conditions as found on site means programming to the drainage or contours as they are found on site.

"I am a total believer in the Master Central Controller concept. I have been responsible for over 75 installations of this type, and when properly used, they save labor, money in the waste of fertilizer and water, and improve the conditions of play by preventing wet spots and over-watering."

## **WT&T: I realize that this may be academic, but can you explain how you evaluate the irrigation needs of a particular site.**

BURNS: "Prior to design, we make a site visit for survey of (1) terrain; (2) soil; (3) water availability and requirements; (4) wind and how constant it is; then we follow this all up with input from the superintendent. We ask him to give us: programming time; number of hours we can water at night; and the spacing that he would like. Next I ask very pointed questions as to the supplier in the area who offers the best service. Then I ask what they expect the cost of the system to be. From this data, we do a preliminary design.

"A meeting is again held on site with the owner and the superintendent to go over these concepts and expected costs. From the feedback of this meeting, a final design is made with a complete set of specifications and details of the pumping plants.

"Variables that distinguish one design from another are: (1) owners' requirements — type of system, budget, how many hours we can operate per night, and how much water is required (1 inch a week, 1½ inches a week, etc.); (2) wind conditions — the head location must be in relation to the normal wind current; (3) soil conditions — heavy soil must have more control because wet spots will result if you aren't controlling the area (sandy soil has little or no lateral water movement so that consistent spacing is critical); (4) water supply — pump control, clean or dirty water, and whether we have to put up some sort of sand separation or purifying plant. Obviously all these things are going to make for extreme cost differences.

"We worked on contracts last year with a low of \$180,000 for 18 holes, and a high of \$520,000 on 18 holes.

"We are working on our eighth golf course in Hawaii and the high cost still amazes me. Next year we will be bidding on a job in 100 percent total lava. I'm still unsure of its cost or exactly how we're going to do it. This year we worked on Honolulu International Country Club. The total cost of the golf course, alone, is going to exceed \$12 million. They actually filled a lake to create the land.

"We are completing two other projects at this time — one is Oahu Country Club, which has a rainfall of 180 inches, and the other is Molakai Beach, with an average rainfall of less than 12 inches."

Every job is difficult in some way. Our concepts are always changing. We hope with improvements in equipment, they will continue to change.

## **WT&T: Where do you think the decision-making input should come from when specifying for designing an irrigation system?**





# Them. Us.

There are plenty of mono-filament trimmers on the market; all quite similar in appearance.

But before you buy, take a close look. Because one, The Green Machine—the country's best-selling gas-powered monofilament trimmer—is much more than just a great monofilament trimmer.

It's also a great brush cutter ...and a great tree and vine pruner.

The Green Machine's unique PowerStik™ design lets you work with maximum performance overhead, on the ground, and at all levels in between.

Using quick-change accessories, The Green Machine will trim, prune or cut just about everything in the yard. From the most delicate grasses, to three-inch thick tree branches. You'll replace a whole range of hand trimmers, pruners, clippers, edgers—even chain saws in most pruning and thinning operations.

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only other yard tool you'll need is a lawn mower.



Remember that The Green Machine is gas powered. There are no cumbersome electrical cords to worry about. The powerful, lightweight 22.5 cc engine gives you torque to do the full range of jobs without the stalling-out problem often found with electrical units.

But performance is only one reason to buy a Green Machine.

Quality is the other. The Green

Machine is engineered throughout for easy starting and long hours of trouble-free operation. Parts and service support are nation-wide.

So, don't settle for a tool that does only part of the job. Monofilament trimming is great. But for complete grounds care you need number one. Us. The Green Machine. The Trimmer-Cutter-Pruner.

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### Plus these great optional tools:

Hedge trimmer—Auger—Drill. All powered by the same interchangeable GM engine. Buy complete or in any combination.



Versatility makes it number one.

# The Green Machine™

## THE METICULOUS CONSULTANT

BURNS: "The superintendent should have the most to say. If he is qualified, he should get what he wants, with-in reason.

"I would prefer to interview for a job on a design basis, meaning, if an owner would give some nominal cost, have two or three consultants present a design on the same fairway and explain concepts and why."

**WT&T: Is your system dependent upon any particular line of products, or are you personally committed to any one manufacturer?**

BURNS: "No and I always ask for more than one brand be listed for competitive bidding. If the owner is satisfied he wants only one brand because of past relationship, I ask that the equipment price be negotiated as the contractor price is negotiated.

"Being in the supply business in past years myself, obviously I have a lot of understanding of pricing as to what is fair, and where a negotiated figure should be.

"I honestly don't feel any one manufacturer has an advantage over another. I do feel one supplier over

another is important. The service of the supply house is what we leave with the owner after the job is completed.

"Every manufacturer would like the designer to give him an advantage, but I think most manufacturers would rather see an equal shot for his products than be left out. This past year, I was commissioned for several designs by the manufacturers directly, (as a service for that manufacturer), by three of the four major irrigation equipment manufacturers. I feel this speaks highly for our independence."

**WT&T: Does every golf course need an irrigation system which is as elaborate as the systems which you design?**

BURNS: "No, but I disagree strongly on some of the jobs I see go in, especially in areas where irrigation becomes somewhat supplemental. The Midwest and Eastern States can get away with more inadequacies because rain covers up mistakes. Most of my work has been in the Southwestern United States and the State of Hawaii, but I continually run across work or re-do work that would not have cost any more if it had been done right the first time." □

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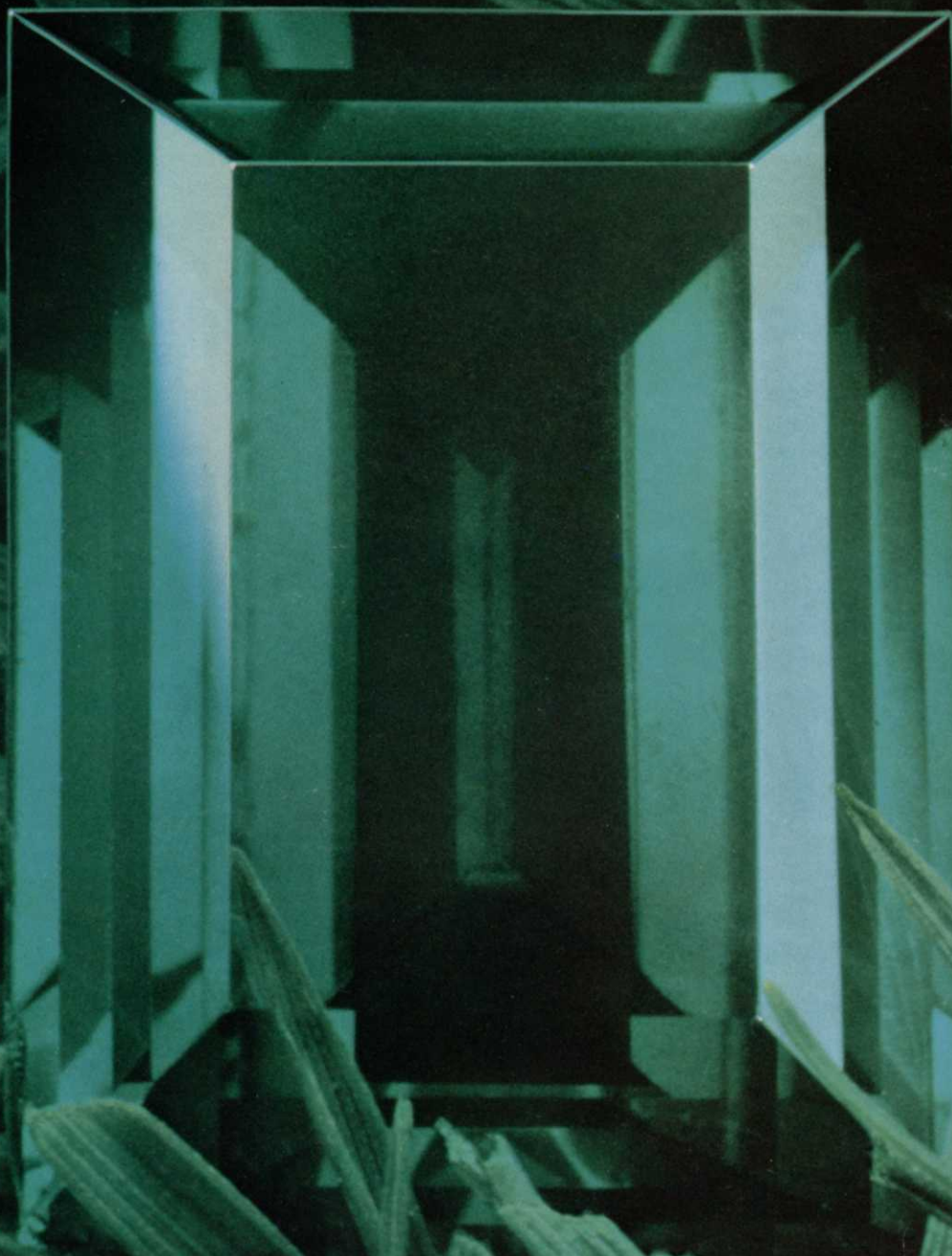


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But here's the pay-off: because Emerald is easier to produce, Emerald will cost you less per pound than the most popular bentgrass.

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Medium green in color, Emerald seeded on greens provides a welcome contrast in many cases to darker bluegrass aprons. And because each Emerald seed traces



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back to a single outstanding parent, Emerald is exceptionally uniform. There's less patchiness, less grain, a better playing surface for your club membership.

## Outstanding vigor.

In vast numbers of evaluations, Emerald has shown to be less aggressive under established conditions than the most popular bentgrass varieties. Yet Emerald still does an excellent job of crowding out weeds, including *Poa annua*, and self-heals divot wounds and cart tracks.

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The Ryan **Tracaire** is an economical, rigid axle aerator. It's available with 9 or



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TURF-CARE  
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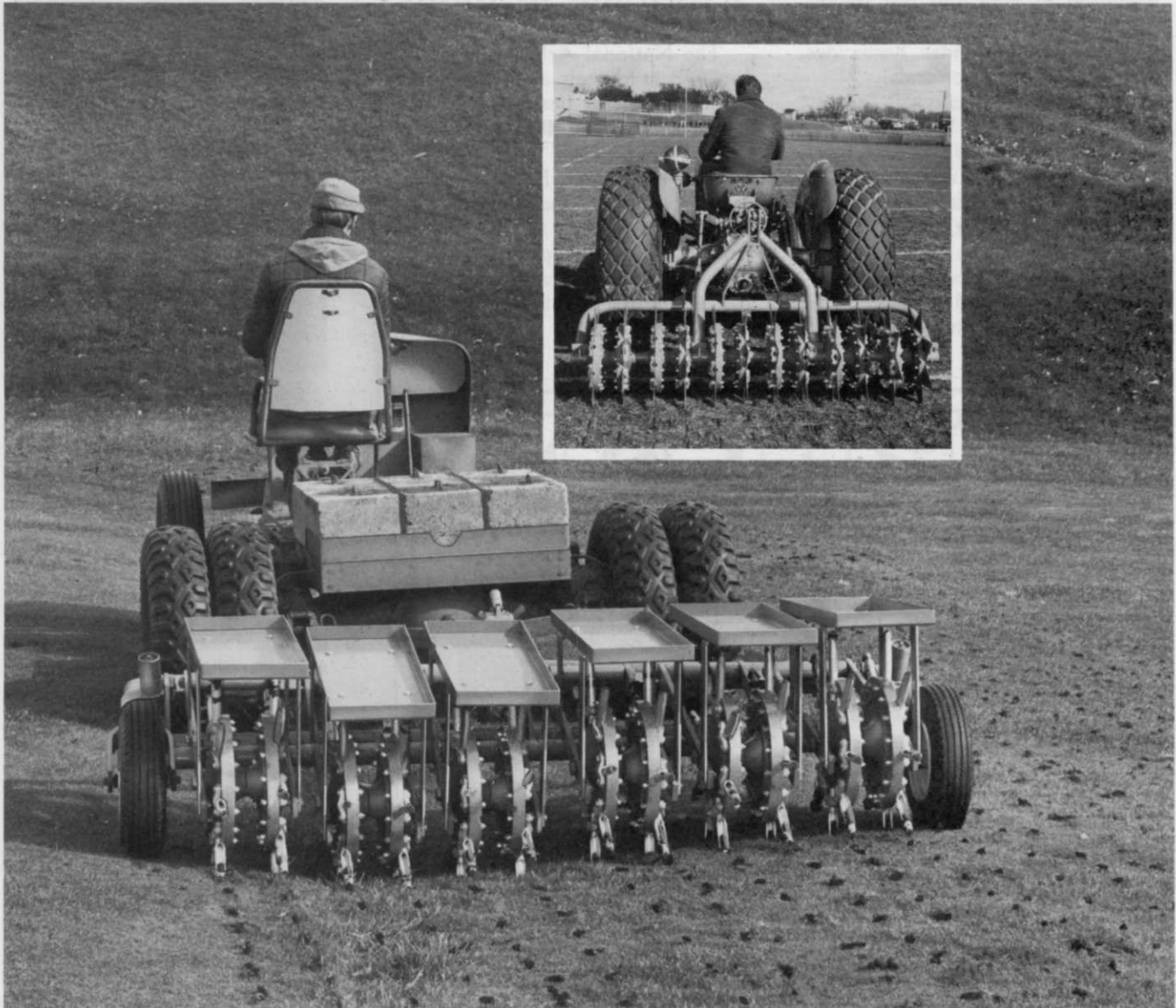
12 tine wheels and has a 3-point hitch to force the tines into the turf.

Both models are fast and easy to use. Each can be used with interchangeable open spoon, closed coring, and slicing tines. And you can order a 12' by 10' dragmat as optional equipment.

The large area aerators from Ryan. We've designed them simply to work well. And built them to stay that way. For more information see your Ryan distributor or write: OMC-Lincoln,

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## The large area aerators.



## Researchers tell story of aerial application

The Wright Brothers really started something in 1903 according to Connie J. Streeter and Dr. Orvin Burnside, weed scientists at the University of Nebraska-Lincoln Institute of Agriculture and Natural Resources.

The UN-L researchers, reporting at the 1976 North Central Weed Control Conference held here Dec. 7-9, said the Wrights' airplane flight at Kittyhawk, N.C., has been followed by the use of aircraft for sport, transportation, war, transportation of mail and fast freight. More recently, planes have been used to apply pesticides, herbicides, and fire fighting chemicals.

The first use of aircraft for pest control occurred in 1922 when they were used for dusting catalpa trees. Military aircraft were used because of their availability and the military did much experimentation in that era to aid the agricultural industry, the Nebraskans explained.

Ms. Streeter said that later outbreaks of the cotton boll weevil,

locusts, and other devastating insect plagues did much to spur the development of the aerial application industry. Other successful agricultural uses for aircraft came into use such as sowing seed, fighting forest fires, and the application of herbicides. Helicopters as well as fixed-wing aircraft have become important in the aerial application industry since about 1946.

## Arborists to meet

The National Arborist Association will hold their annual meeting at the Don CeSar Beach Resort Hotel, St. Petersburg Beach, Florida, Feb. 13-17.

Robert Lederer, Executive Vice-President of the American Association of Nurserymen will be the featured speaker in a program which will explore avenues for environmental improvement and beautification.

## Double up, America.



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- PLUS...variable reel speed, cable-driven reels, superb visibility.
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# Hahn

# U.S. pesticide consumption rate slows down

U.S. consumption of synthetic organic pesticides increased at an annual rate of nine percent between 1970-1975, but a decrease in consumption is anticipated by 1980, reports Stanford Research Institute (SRI).

In a series of reports on pesticides published as part of SRI's Chemical Economics Handbook

(CEH), domestic consumption, the Institute estimated, was 1.3 billion pounds last year and is expected to reach 1.5 billion pounds by 1980. This represents a slowing of the rate of consumption to an average two to four percent per year — primarily as a result of a leveling off of herbicide demand.

"Pesticides have emerged as a

large, rapidly growing chemical industry, both domestically and abroad," says Jeanie Ayers, the primary author of the reports.

Herbicides and insecticides account for 68 percent of total pesticide consumption while fungicides are 19 percent and fumigants and nematicides are 13 percent.

Ayers says that herbicides and insecticides are expected to continue to dominate pesticide sales but growth is expected to decrease in some key agricultural markets. The outlook for the U.S. pesticide market depends on factors related primarily to the production of corn, cotton, deciduous fruits/nuts and soybeans.

The high degree of maturity of the herbicide and insecticide markets for corn and cotton and approaching maturity of the soybean herbicide market will see future consumption more sensitive to annual acreage fluctuation. Opportunities for foliar fungicide use in the soybean market are expected to develop into a growth market for these products.

SRI also predicted these developments:

—U.S. policies that will affect domestic and international agricultural commodity demands.

—Government regulation will continue to apply pressure against selective pesticides that are considered risks to health and safety.

—Marketing abilities of pesticide manufacturers will play an important role in the product mix of future pesticide consumption as competition increases in saturated markets and as key patent expirations encourage entry by new suppliers.

—International agricultural and pesticide policies will influence the volume and type of pesticide exports from the U.S.

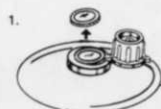
The SRI Pesticide series is available as separate reports or as a complete 540-page series of five pesticides reports covering Fumigants and Nematicides, Fungicides, Herbicides, Insecticides, and a Pesticide Industry overview.

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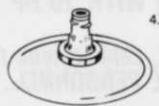
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Catcher/Compactor



Heavy duty 72" deck



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Snow thrower & ROPS Cab



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**DIRECTORY APPENDIX**

The following equipment listing was inadvertently omitted from our 1977 Managers Guide to Equipment and Supplies:

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- Pumps: fiberglass spray tanks  
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- Irrigation Field Storage Tanks (Fiberglass)
- Sprayers: Complete power unit jet or mechanical agitation
- Hopper-Spreader type (Fiberglass)
- Custom production-Fiberglass items

**ALCA Convenes**

The Associated Landscape Contractors of America will hold their annual meeting at the Riviera Hotel in Palm Springs, California, Jan. 23-28.

Peter F. Drucker will be the featured speaker in a program to be entitled "Focus on Management."

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- Water soluble—readily absorbed after rainfall or sprinkling.
- Quick action—down to the root zone.
- 98% active ingredients (1 to 3 lbs. per 100 sq. ft.)

Product	Movement in Soil	Control		Comparative Longevity	Comparative Product Feature
		Annuals	Perennials		
Monobor-Chlorate	Low	Excellent	Good	Long	Most economical. Excellent under asphalt paving.
Monobor-Chlorate + Diuron (Weed and Grass Killer)	Low	Excellent	Good	Longer	Economical, double action, for sustained annual weed control.
Ureabor	High	Excellent	Excellent	Longest	Strong control of deep-rooted perennial weeds.
Borocil IV	High	Excellent	Excellent		Use where chlorates not desired.
Hibor C	High	Excellent	Excellent		Excellent for retreatment programs.

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WTT

# BLACK CUTWORM CONTROL

by D. K. Pollet

As with many insects, the immature or larval stage of an insect is the most damaging. This is particularly true in the case of butterflies and moths, where the larval stage causes damage and the adult beautifies the surroundings with its presence. One particular group of moth larvae, the cutworms, cause problems and sometimes severe damage to crops, vegetable plants, and turf.

Cutworms are a serious pest in the south on grasses on the home lawn as well as the golf course. They produce multiple generations each year and can be a problem from the time the weather warms up until it frosts in the fall.

The abundance of a given species of cutworms is greatly affected from year to year by rainfall conditions which may prevent the adult moths from laying their eggs or by flooding which will force the larvae to the surface where they become food for birds or other predatory insects or animals.

The cutworm overwinters in the larval or pupal stage although a few hibernate as adults in the soil or under trash or in clumps of grass. The larval stage burrows into the soil beneath the turf and comes out to feed at night. This cutworm is cosmopolitan and has a pernicious habit of cutting off several plants while satisfying its appetite.

Their eggs are laid singly and occasionally two or three together on the blades and stems of the turf. The larva is a greasy gray to dark

*Continued on page 44*

## Evaluation of New and Standard Materials for the Control of Black Cutworms on Bent Green Putting Surfaces<sup>1</sup>

Turf Varieties	Seaside			Emerald							
	Count <sup>2</sup>	Interval	Hours	0 <sup>3</sup>	24	48	120	0	24	48	120
<b>Treatment<sup>4</sup>/Rate</b>											
Proxol 80SP 3 oz/1000 sq. ft.	5	0	0	0	6	0	0	0			
Dursban 2E 1.5 oz/1000 sq. ft.	8	0	0	0	13	0	0	0			
Velsicol 4283-4EC 1 lb ai/A	7	2	1	1	6	5	2	0			
Velsicol 4283-4EC 3 lb ai/A	3	0	0	0	11	0	0	0			
Velsicol 3883-90WP 1 lb ai/A	9	0	0	0	5	0	0	0			
Velsicol 3883-90WP 3 lb ai/A	7	1	0	1	7	0	0	0			
Diazinon 8 oz/1000	9	0	0	0	7	0	0	0			
Proxol 80SP + Tuco S8314											
3 oz/1000 + 1 pt/100	2	0	0	0	5	0	0	0			
Dursban 2E + Tuco S8314											
1.5 oz/1000 + 1 pt/100	2	0	0	0	4	0	0	0			
Orthene 75S 2.5 lb ai/A	3	1	0	0	5	2	0	0			
Orthene 75S 7.5 lb ai/A	7	1	0	0	5	0	0	0			
U.C. 51762-75WP 0.5 lb ai/A	8	0	0	0	10	0	0	0			
U.C. 51762-75WP 1.0 lb ai/A	9	0	0	0	6	0	0	0			
Dursban Plus 3 oz/1000	5	0	0	0	6	0	0	0			
Control (water only)	9	5	4	6	4	7	5	12			

<sup>1</sup>Plots — 90 sq. ft. each

<sup>2</sup>Counts — each represents a total of 2 — 1 sq. ft. areas

<sup>3</sup>Counts made with use of Diagnostic aid 8/18/76

<sup>4</sup>Plots were treated with 1.5 gallons water, applied by hand — one application

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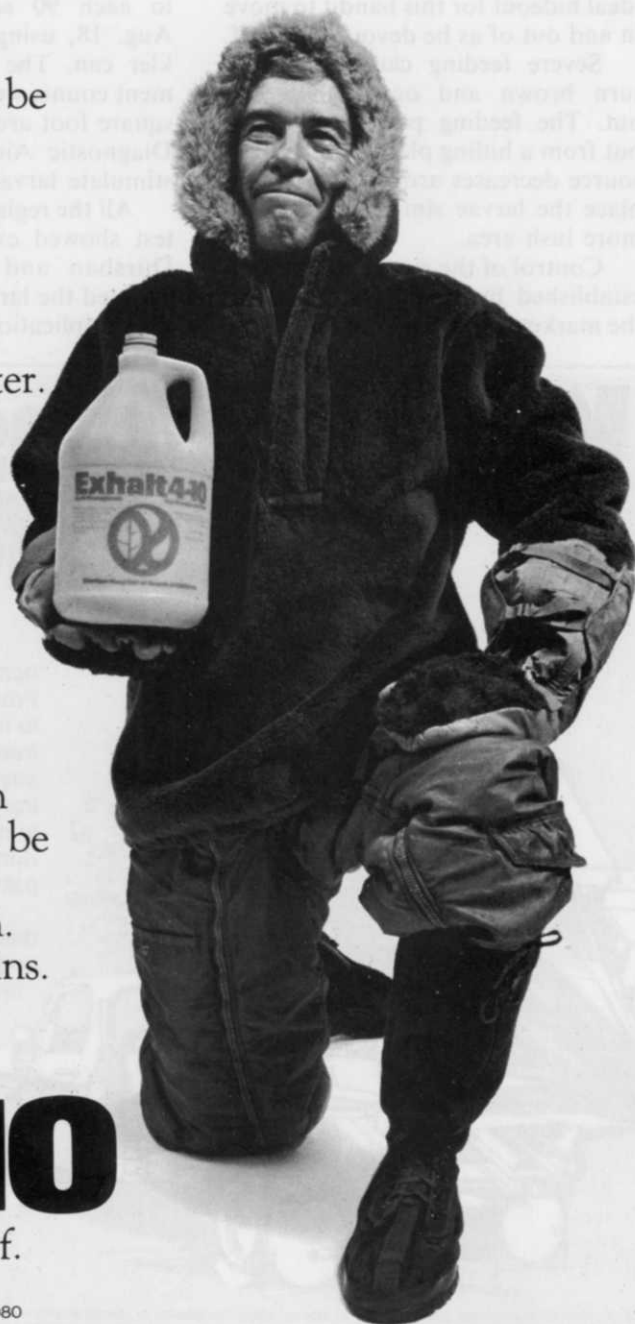
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JANUARY 1977/WEEDS TREES & TURF 43



# BLACK CUTWORM CONTROL

Continued from page 42

brown and occasionally black color with faint stripes.

The black cutworm takes advantage of the cultural practice of aeration of golf greens. A course may not have a bad cutworm infestation, but as soon as the greens are aerated in come the cutworms. These little aeration holes or pockets make an ideal hideout for this bandit to move in and out of as he devours the turf.

Severe feeding causes areas to turn brown and occasionally die out. The feeding patterns radiates out from a hiding place. As the food source decreases around one hiding place the larvae simply moves to a more lush area.

Control of the cutworm has been established by several materials on the market: Dursban, Dursban Plus,

Diazinon, Proxol, Dylox and Sevin. In addition to these, new materials coming on the market show good cutworm control potential.

These tests were made on bent green varieties Seaside and Emerald at the turf plots on the Simpson Experiment Station in Clemson. A single application was made by hand to each 90 square foot plot on Aug. 18, using a 1.5 gallon sprinker can. The pre and post treatment counts were made on two one-square foot areas in each plot using Diagnostic Aid as an adjuvant to stimulate larval movement.

All the registered materials in the test showed excellent control. The Dursban and Proxol treatments agitated the larva within 15 minutes after application as they were noted

squirring on the surface. Orthene 75S and U.C. 51762-75WP showed good and consistent control of the larvae. The Velsicol materials Vel-4283-4EC and Vel-3883-90WP were a little erratic but did give good control. In no instance did any of the materials cause any phytotoxic symptoms on the plots.

Between the materials on the market and the new materials coming, cutworm control as well as other turf pest, should be no problem on the golf course or in the yard providing the applicator uses the materials properly. □

*D. K. Pollet is an assistant professor of entomology with Clemson University College of Agricultural Sciences.*

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## From the campus

# Scientist's device measures nitrogen loss

Agricultural scientists in the past reported substantial volatilization losses of nitrogen from surface-applied urea. But 1976 studies conducted by Dr. David E. Kissel of Texas A&M University, utilizing a new collection device he designed, indicate some former test conclusions may be wrong.

Experiments carried out by Dr. Kissel in 1974 and 1975, using traditional methods, confirmed earlier nitrogen volatilization loss data. Dr. Kissel, however, was not satisfied that measuring techniques were appropriate for natural field conditions. In fact, he noted that the traditional measuring equipment actually created an artificially adverse environment that greatly induced nitrogen volatilization readings.

During the winter of 1975, Dr. Kissel, working closely with Texas A&M and U.S. Department of Agriculture engineers, developed an accurate new collection device that would not create conditions of artificial temperature, relative humidity and soil water content. He believed these conditions were responsible for limiting reliability of previous data.

Then in 1976, he conducted a series of experiments on coastal bermudagrass sod using his new measuring device, which did indeed confirm his opinion that some earlier volatilization data had been incorrect.

At application rates ranging from 50 to 400 pounds of actual nitrogen per acre, Dr. Kissel was unable to measure greater than a 3 per-

cent loss of nitrogen from any treatment, and that occurred only at the 50-pound per acre application level. Losses of only one, 0.5 and one percent respectively, were measured at the 100, 200 and 400 pound application rate levels. Calcium nitrate, dry urea, Uran nitrogen solution spray and uran applied in narrow bands on the soil surface were tested. Dr. Kissel said the average of test results for two seasons indicated nitrogen uptake by the crop was "close to the same for all N sources."

"Because this conflicted with the previous data," Dr. Kissel explained, "we then recreated the experiment in the laboratory using former equipment, and found that our volatilization losses ranged as high as 39 percent."

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48 WEEDS TREES & TURF/JANUARY 1977

# Meeting Dates

**Mid-Atlantic Nurserymen's Trade Show**, Hunt Valley Inn, Cockeysville, Md., Jan. 17-19.

**Pennsylvania State University Turfgrass Conference**, Keller Conference Center, University Park, Pa., Jan. 17-20.

**Landscape Ontario Congress**, Sheraton Centre Hotel, Toronto, Ont., Canada, Jan. 18-20.

**International Florist, Growers and Nurserymen Trade Show**, Civic Center, El Paso, Tex., Jan. 23-25.

**Associated Landscape Contractors of America Trade Exhibit and Annual Meeting**, Riviera Resort Hotel, Palm Springs, Calif., Jan. 23-28.

**Colorado Nurserymen's Association and the Rocky Mountain Chapter of the International Society of Arboriculture, Colorado Nursery and Shade Tree Conference**, Denver Merchandise Mart, Denver, Col., Jan. 31-Feb. 2.

**International Society of Arboriculture, Midwestern Chapter Meeting**, Pfister Hotel, Milwaukee, Wis., Feb. 1-3.

**New England Nurserymen's Association Annual Convention**, Copley-Plaza Hotel, Boston, Mass., Feb. 7-10.

**American Sod Producers Association Mid-Winter Conference**, Sheraton Harbor Island Hotel, San Diego, Cal., Feb. 9-11.

**American Society of Consulting Arborists Annual Meeting**, Don CeSar Hotel, St. Petersburg Beach, Fla., Feb. 10-12.

**The Irrigation Association Annual Irrigation Conference**, Salt Lake Hilton Hotel, Salt Lake City, U., Feb. 13-15.

**National Arborist Association Annual Meeting**, Don CeSar Hotel, St. Petersburg Beach, Fla., Feb. 13-17.

**Canadian Nursery Trades Association Conference and Trade Show**, Edmonton Plaza Hotel, Edmonton, Alta., Canada, Feb. 16-18.

**American Institute of Landscape Architects 20th Annual Convention**, South Coast Plaza Hotel, Costa Mesa, Cal., Feb. 17-19.

**National Landscape Association and Garden Centers of America Joint Management Clinic**, The Galt House, Louisville, Ky., Feb. 20-23.

**American Society of Golf Course Architects 31st Annual Meeting**, Hilton Head, S.C., Feb. 20-25

**Midwest Regional Turf Conference**, Purdue University, West Lafayette, Ind., Feb. 28-Mar. 2.

**Canadian Golf Superintendents Association 28th Annual Turfgrass Show**, Calgary Inn, Calgary, Alberta, Canada, Mar. 14-16.

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# People on the Move

**Gary Holland** has been named general manager of the Whirl Trim division of **The Toro Co.** He will be headquartered in Eden Prairie, Minn. Holland graduated from the University of Missouri as a mechanical engineer. He also holds an M.B.A. from Purdue University.

**Doyle C. Jones** has been elected president of the **Florida Turfgrass Association.** A landscape superintendent at Walt Disney World, Jones has served as director, secretary-treasurer and vice president.



**Doyle Jones**

He will serve a one-year term as president.

**Randy F. James** has joined the Chemagro agricultural division of **Mobay Chemical Corp.** as a sales representative. He received a B.S. from the University of South Dakota.

**Joseph Gent** has been promoted to branch manager of the Minneapolis distribution center of the **Thompson-Hayward Chemical Co.** In his new position, Gent will be responsible for the sale and administration of

the company's line of agricultural, industrial and textile supplies.

**Thomas W. Dlugos** has been promoted to northern regional sales manager of the agricultural business group of **Velsicol Chemical Corp.** He received his B.S. in biology/conservation from Wisconsin State University.

**Ronald S. Leafblad** has been named president and general manager of **Ag-Chem Equipment Co., Inc.** Leafblad's experience includes his most recent position with Toro as group vice-president-outdoor equipment group. Previously he served as division president and vice president of marketing for White Motor Corp.

Joining the agricultural division of **Ciba-Geigy Corp.** as field sales representative in northwest Missouri is **Dennis Gray.** Gray was a district sales manager with Columbiana Seed Co. He holds a B.S. in agricultural mechanization from the University of Missouri.

**John Stark** has been appointed marketing manager of the outdoor power equipment division of **J I Case Co.** Stark, who attended the University of Wisconsin, was formerly a materials manager for that division.

**Gary Custis, Dick Evenson** and **Gregg Deegan** have been named technical representatives for the ProTurf division of **O. M. Scott and Sons.**

Custis recently earned a master's in agronomy from Virginia Polytechnic Institute and State University. Evenson comes to ProTurf after 25 years in the Air Force. A member of the Air Force Golf

Course Council, he most recently supervised the golf course at Dover AFB, Del. Deegan is a former golf course superintendent.



**Dick Evenson**

**Bob Miller** has joined **Lakeshore Equipment & Supply Co.** as eastern manager for the company's LESCO line. A Clemson University graduate, Miller is a specialist in agronomic fertilizer and turfgrass management.

**Robert DeCicco** has been promoted to marketing manager for the agricultural chemical division of **Thompson-Hayward Chemical Co.** In his new capacity, DeCicco will plan and coordinate the overall marketing plan for proprietary agricultural chemicals.

**Diamond Shamrock Corp.** has named **Charles E. Osgood** as commercial development technical representative for the northwest territory. Osgood will be responsible for coordinating university, state and inhouse field development activities for the company's agricultural chemical products in the northwest. He holds a B.S. in Entomology from the University of Maryland and is working toward a master's in entomology at Oregon State University.

## EPTC in starch form is more persistent

Losses of the herbicide EPTC in or on the soil surface can be greatly reduced when used in a new starch encapsulated form, research at Purdue University shows. EPTC (S-ethyl dipropylthiocarbamate) is used to control many grass and broadleaf weeds.

Findings in the study, which sought to establish the effectiveness and persistence of the starch form of EPTC, were presented recently by Dr. Marvin M. Schreiber, Agricultural Research Service-U.S.D.A. plant physiologist at Purdue.

Speaking to the North Central

Weed Control Conference, Dr. Schreiber pointed out that EPTC has some drawbacks in the emulsifiable concentrate (EC) liquid form.

"Because of its volatility in the liquid form, EPTC must be immediately incorporated into the soil after application," says Schreiber. "Furthermore, it is readily lost if applied to wet soil surfaces or if the soil becomes wet immediately after its application."

Research at Purdue demonstrated that EPTC in double starch encapsulated granules was six times as effective as an equivalent amount

of the liquid form and three times as effective as twice as much of the emulsifiable concentrate, when applied three pounds to the acre.

The plant physiologist noted that excellent control of all vegetation (in the experimental plots) was obtained 105 days after treatment, using six pounds per acre of the double starch form.

Schreiber concluded that "the effectiveness and persistence of this new formulation may be extremely valuable in treatment for weeds that germinate over extended periods of time."

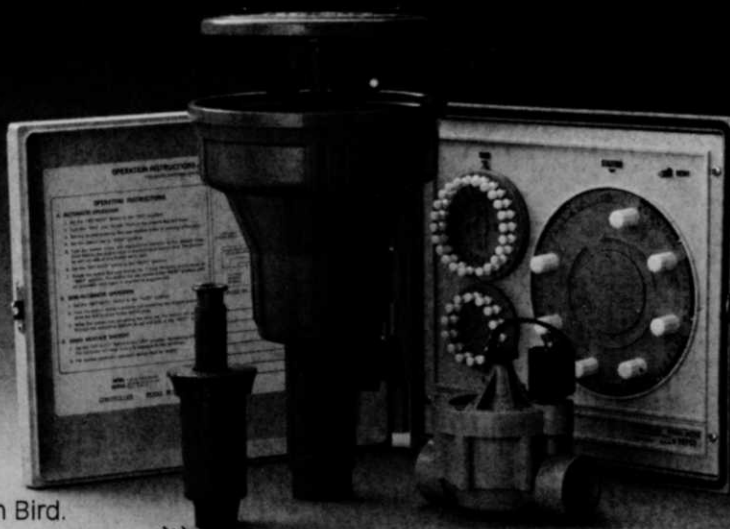
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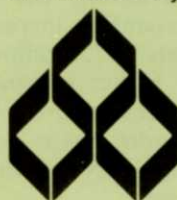
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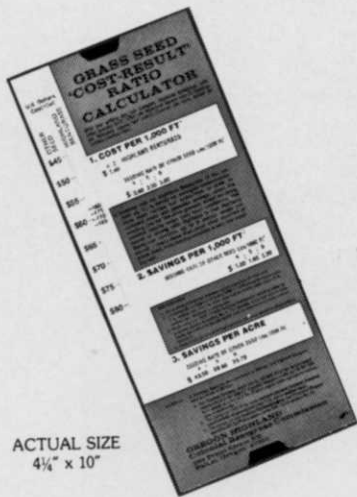
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## Repairing irrigation pumps can increase your profits

Repairing worn irrigation pumps is a profitable move, according to U. S. Department of Agriculture researchers.

Research on a well at Texas A&M University Research Field at Etter proved this beyond a doubt. Having pumps in good repair was good business before high priced energy, but is now a necessity say Dr. Arland Schneider, Agricultural Research Service Engineer, and Dr. John Shipley, Texas Agricultural Experiment Station Economist, from the USDA Research Center at Bushland.

They carefully measured pump efficiency and cost and found that replacing a worn-out pump bowl assembly decreased electricity cost from \$22.48 to \$15.69 per acre-foot. Calculations showed that reduced electricity cost will pay for the repairs in the 1977 pumping season.

The old pump at the Etter Research Field was installed in 1964, and pumped 1,000 gallons per minute until 1972. Then it started pumping erratically and dropped to 500 gallons per minute by 1976, according to Dr. Shipley.

That was not enough water to carry out experiments at the Research Field. Rather than just change the pump, Shipley took the problem to Dr. Schneider. They decided to do a thorough study on the pump to determine both energy cost and efficiency of operation. With good information in hand, the scientists could then calculate the profitability of making repairs.

The worn-out pump produced 500 gallons per minute, and lifted water 290 feet, but the pump operated at only 49 percent efficiency. Installing the new pump bowl assembly increased the pumping rate to 750 gallons per minute. With a higher pumping rate, drawdown increased and total lift was 325 feet. Under these conditions, pumping efficiency was increased to 79 percent.

Repairs cost \$3,228.00, but the scientists figured that repayment would take only 143 days of pumping.

The researchers point out that water cost can be calculated rather easily. Pumping rate, energy consumption, and energy cost must be known or determined. Accurate pumping rates can be measured with an inline propeller-type meter.

Water meters can be equipped with quick couplers and placed anywhere in a surface irrigation pipe. The meter records the number of gallons of water passing through the pipe. Keeping records for one hour gives an accurate output for a well. "A meter costs about \$400.00 but would be a good investment," Dr. Schneider says. "Knowing the amount of water being applied to crops is just good business," he continued.

Keeping track of natural gas or electrical energy use for at least 2 hours on company meters gives an accurate measure of energy consumption. The cost of fuel or electricity must be known also. An acre-inch of water is 27,000 gallons. With these figures in hand, a little arithmetic gives the cost of an acre-foot of water.

The following calculations were made by Schneider and Shipley before repairing the well at Etter. It took 64.8 kilowatt hours of electricity to run the pump one hour. Electricity cost 3.2 cents per kilowatt hour. Multiplying the two figures gives a pumping cost of \$2.07 per hour. At 500 gallons per minute, the well produced 30,000 gallons an hour. Dividing 27,000 into 30,000 gallons shows that the well pumps 1.11 acre-inches per hour. Water cost per acre-inch is \$2.07 divided by 1.11 or \$1.87. Multiplying \$1.87 by 12 shows that cost per acre-foot of water is \$22.44.

Calculating pump efficiency is more complicated and the two scientists suggest obtaining outside help.



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## Dept. of Roads

### Neb. weed control plan works well

Richard W. Gray Jr., agronomist for the Nebraska Department of Roads, reported on the "largest" single weed control program in Nebraska at the 1976 North Central Weed Control Conference Dec. 7-9.

Weed scientists from 14 states and three Canadian provinces participated in the conference.

Gray stated that the Nebraska Department of Roads controls noxious weeds such as musk thistle on the land adjacent to 10,000 miles of roads comprising some 180,000 acres of right of way.

The department's right of way management policy has been effective in greatly reducing the time and money spent on the control of noxious weeds, Gray said. The program consists primarily of seeding to native and adapted grasses combined with a limited mowing policy.

When necessary, such a system is augmented by spraying contracts with some 78 of the 93 county weed control authorities. Most of the spraying utilizes the 2,4-D Amine and the more toxic chemicals are avoided, he said.

The seeding and limited mowing policy has been widely acclaimed by conservationists, bird lovers and wildlifers because of its effectiveness in providing undisturbed nesting and loafing cover for upland game birds. The department has received at least two awards from wildlife organizations for its efforts in this direction.

Though the department has made great progress in lowering weed control costs, every farmer, rancher and lawn owner is aware that it does cost real money. The department spends about 60¢ per acre annually or a total of \$90,000 to \$120,000.

Gray summarized the program as based on good turf maintenance, proper management, judicious use of chemicals and continuous cooperation with county weed control authorities and the department's thousands of "neighbors."



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# Radiation may be key to better turfgrasses

Radiation treatment can be used to overcome genetic barriers to the future improvement of turfgrasses, according to Dr. Jerrel B. Powell, a research geneticist with USDA's Agricultural Research Service (ARS).

In tests conducted at ARS's Beltsville Agricultural Research Center, Beltsville, Md., Dr. Powell used gamma radiation to induce genetic mutations in commercial varieties of bermudagrasses.

"Bermudagrass hybrids are the mules of the grass world," Dr. Powell said. "They are sterile and can have no further offspring because of their particular chromosome makeup, resulting from their diverse and mixed parentage."

Mutation breeding is one way out of this genetic dead end. The

technique involves exposing the root stems of bermudagrasses to gamma radiation. The radiation treatment causes the chromosomes of the sterile grasses to break up, and the genetic material to be rearranged, producing combinations that would be rare in nature.

"Radiation speeds up the mutagenic process. Within a single year you can obtain many hundreds of mutations rather than the one or two that you might get from an untreated natural populations," Dr. Powell said.

From these mutants, those grasses showing desirable traits such as dwarfism, deep green color, or winter hardiness, can be selected for development as a new variety. Because the bermudagrasses are sterile, it would be impossible to br-

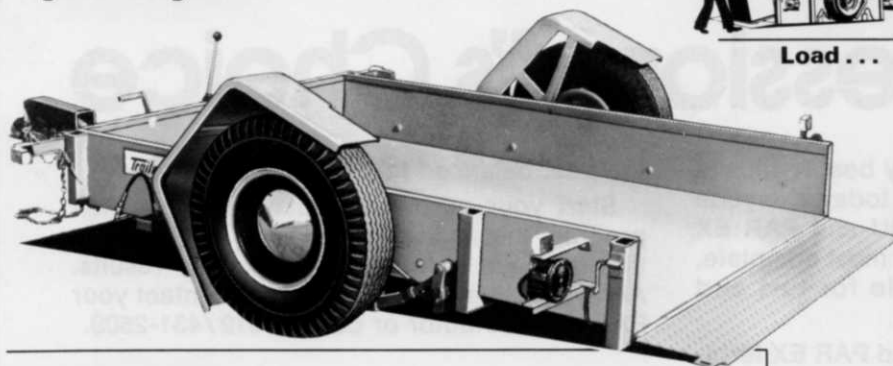
ing out these traits with conventional breeding.

Bermudagrasses make good sod. They can be mowed close and can withstand heavy wear. They are relatively resistant to diseases, insects, drought and high temperatures. Because of these many desirable traits, bermudagrasses are widely used on golf courses, athletic fields, lawns, and highway rights-of-way throughout the southern region of the United States.

Mutation breeding technology has already been used by European researchers to develop new varieties of potatoes, ornamentals, fruits and cereals. With the exception of sugarcane, however, it has not yet been extensively applied to grasses such as bermudagrasses which reproduce form sprigs or sod.

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## Capillary watering economical for container stock irrigation

Capillary watering, commonly used in Europe, and now becoming popular with florists in this country is a method of crop irrigation which offers the nurseryman an easy, economical way of irrigating container stock.

Expenses are lowered because a smaller initial investment is required to establish the system vs. other methods and considerably less water is needed. Furthermore, sub-irrigation lowers the incidence of foliar diseases thus less spraying is required.

The procedure requires a level bench or ground bed, a layer of poly film placed over the bench or bed and a capillary mat on the poly along with a means of irrigating the mat.

The bench or ground bed must be level to support the mat evenly to prevent puddling.

Plywood, snow fence, close spaced slatted bench material, or fairly compact gravel can serve as a base.

Polyethylene of any color and thickness is placed over the base to serve to retain the water and permit it to spread sideways under the mat. The capillary mat is located over the poly and plants placed on the mat.

Mats are kept moist with irrigation through spaghetti tubes or more commonly Chapin's twin-wall or DuPont's Via-Flo tubing. Since it is necessary to keep the mat at or near saturation, the water can be allowed to run all day or put on a time clock operating a solenoid valve. Typically no more than 5-6 pounds pressure is needed with Via-Flo or Twin wall tubing.

At Ohio State University a study was initiated in the container nursery to evaluate the growth of Royal Beauty Cotoneaster produced in 2 container types, 2 container sizes, on several capillary mats on a bench and ground bed.

The plants were potted and placed outside on the mats April 23, and evaluated for vegetative growth Oct. 8, 1976. The growing media was Metro Mix 300 fertilized with

Osmocote 18-6-12. One-half of the plants were grown on an expanded wire, 18" raised bench 48' long by 4' wide covered with clear poly.

The remaining plants were placed on a 3-inch gravel ground bed of similar dimensions leveled and covered with clear poly. The mats evaluated on the bench were: Water-Mat (Pellon Corp.), Vattex-P (U.S. Vattex), Simtrac No. 202 (Simtrac, Inc.) Jednak Thick (not commercially available), Weedchek (Certain-Teed) and Eddymat (F. R. Young Co.) All of the mats except Simtrac and Jednak Thick were evaluated on the gravel bed.

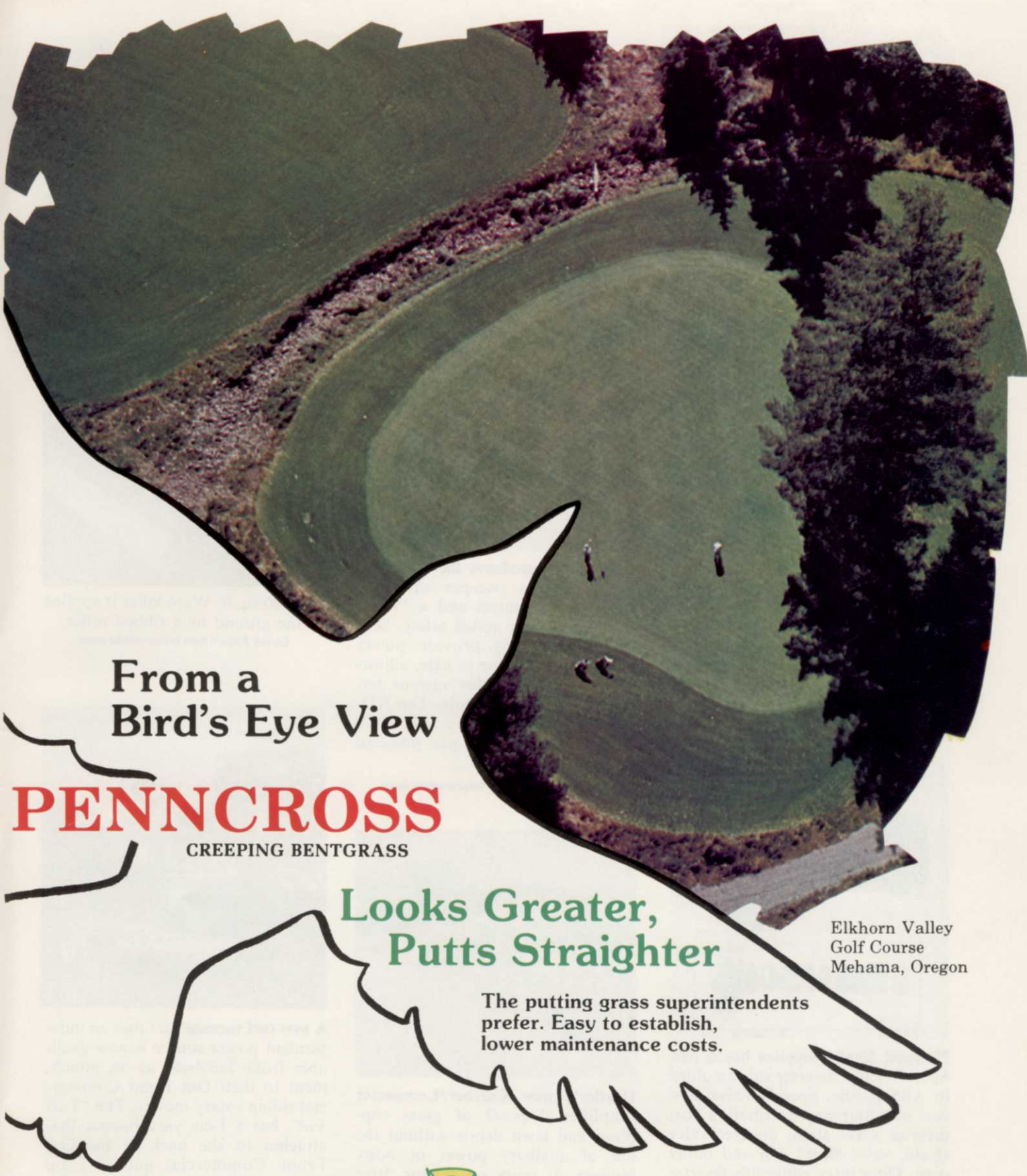
The mats were kept moist via Via-Flo tubing with 2 lines per 4' wide bench or bed operated at 4 to 6 hours per day from a time clock. However, this did not supply all the water needs and plants were watered on an average of once a week from overhead.

The cans were Zarntainer No. 300 (1 gal.) and No. 800 (2 gal.) with holes along the base and one in the underside. Also used were Polytainer No. 1 (1 gal.) and No. 2 (2 gal.) with holes only along the base. Ten 1-gal. Cotoneaster dammeri 'Royal Beauty' and 6 2-gal. cans per container type and size were placed on each mat on both the bench and gravel bed.

Royal Beauty Cotoneaster was selected because it is a rapid growing plant with a greater water requirement than many other plants. Liners from 1975 summer cuttings were placed in all containers. All plants were irrigated thoroughly from above at the time of placement to initiate capillary action throughout the media and mat.

In summary, capillary mats can be satisfactorily used as an aid in the production of container grown Royal Beauty Cotoneaster. The mats were kept moist for 4-6 hours per day (4 hours when the plants were smallest) utilizing time clock controlled Via Flo tubing together with approximately weekly supplemental overhead irrigation.





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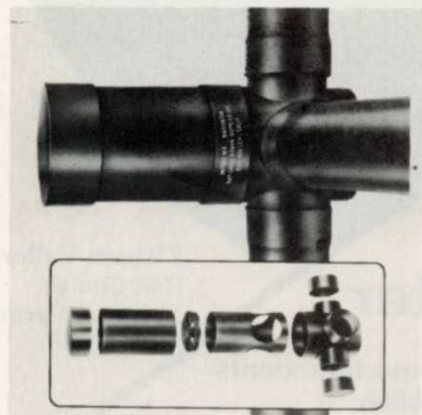
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# Products



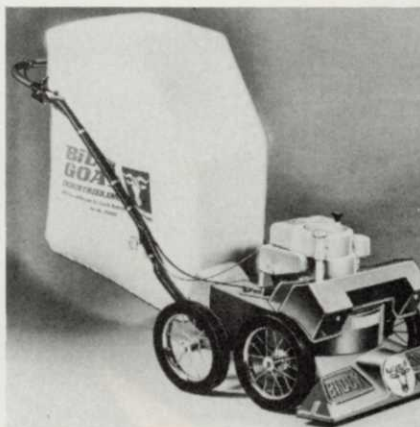
**Massey-Ferguson introduces** the new-from-the-grass up MF 1450 and MF 1650 tractors. Both are designed for a wide variety of lawn care jobs. A 650 lb. capacity, 3-point hitch and rear PTO are available as options. At 14 and 16 hp, they come with hydraulic implement lift and front belt-driven implement device.

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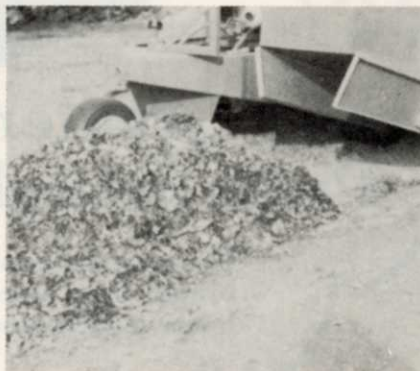
**National Drain Supplies** has a new Spee-D-Valve diverter valve molded in ABS plastic. Spee-D-Valve consists of a four-way distribution box, diverter valve stem, diverter valve shield, valve shield cap and outlet caps. Three interchangeable diverter valve stems permit positive flow control from the distributor box to any combination of one, two or all three outlets. For use in irrigation and drainage systems as well as septic tank leach field control.

Circle 702 on free information card



**Billy Goat introduces the KD-50SP** model suction sweeper with free wheeling in neutral and a "dead-man" clutch for added safety. Self-propelled chains provide power takeoff from engine to axle, adjustable height levels for various terrain, handlebar controls. The KD-50SP is powered by a 187 CC's Briggs and Stratton gas powered engine.

Circle 703 on free information card



**Hustler's new Catcher/Compactor** simplifies disposal of grass clippings and lawn debris without the use of auxiliary power or noisy blowers. It relies on tractor drive wheels for paddle conveyor power.

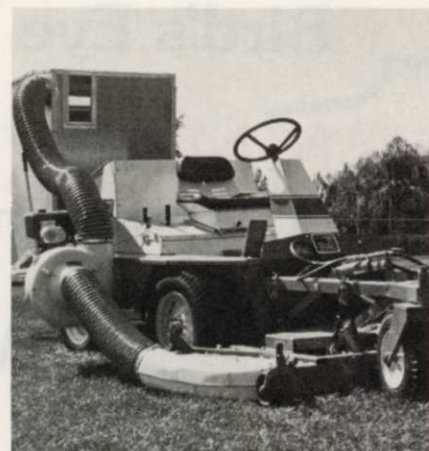
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**Vandermolen Corp. announces** a new 27 in. DRIFTMASTER with 5.5 gal. capacity to allow coverage of 5



to 6,000 sq. ft. Weed killer is applied to the ground by a ribbed roller.

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**A new turf vacuum** that uses an independent power source is now available from Jacobsen as an attachment to their Out Front Commercial riding rotary mower. The "Turf Vac" has a 1-cu. yard hopper that attaches to the back of the Out Front Commercial and a 7 hp Kohler engine that attaches to the machine's right side. Power is ample for picking up small debris as well as clippings and leaves. Noncorrosive materials are used wherever moisture might be a problem.

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# Healthy little beauty likes shade!

What a beauty little Glade Kentucky bluegrass has turned out to be! A fine, healthy specimen, Glade has a higher level of resistance to powdery mildew, and performs better than many other Kentucky bluegrasses in up to 60% shade as well as open sun. Glade, a Rutgers selection (nationally tested as P-29), has improved resistance to stripe smut and leaf rust. Midwestern and Northeastern university tests indicate that Glade has better than average resistance to Fusarium blight.

Glade is one of the fastest germinating bluegrasses, quickly forming a thick rhi-

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# Glade



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