Chlordane–what are the alternatives?
Selecting soil amendments for improved turf

WEEDS TREES & TURF

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WEEDS TREES & TURF®

AUGUST 1977, Vol. 16, No. 8

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ON OUR COVER — A Purr-Wick is installed at Knollwood Golf Club in Granada Hills, California. For the full story, see page 12.

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TO OUR READERS

Parsons at Lake Arrowhead

This week marks my first anniversary as editor of WEEDS TREES & TURF. It has been a most enlightening and enjoyable year, thanks, in large measure, to you.

I have been most fortunate to meet many of you at conventions and conferences and through letters and telephone calls as well as through story assignments. And Assistant Editor Ron Morris and I plan even more travelling in the months ahead.

Morris has just returned from St. Paul and the Sod Producers Association annual meeting. Full coverage will appear in next month's issue. "After the three-day meeting, I felt like I knew a little about the sod business and that the people who knew a lot had learned even more," he says. What more can we say about the success of this record attendance convention.

The Pennsylvania Allied Nursery Trade Show in Hershey was a similar success. We had the pleasure of introducing our new publication, LAWN CARE INDUSTRY, there, which was received most enthusiastically. Many of those who attended from all over the country were regular WEEDS TREES & TURF readers.

On page 12 you'll find the results of another conference in "Conserving water with Purr-Wick." Morris, who wrote the story, met Don Parsons, the enthusiastic and articulate superintendent of Knollwood Golf Course, who has had very successful results with this system following Parsons' presentation at the Turfgrass Sprinkler Irrigation Conference at Lake Arrowhead, Calif. last month. But read the story for yourself.

Drought and what to do about it, was the theme of the meeting. A report of other highlights appears on page 34.

Art Spomer, associate professor of plant pathology in horticulture at the University of Illinois, updates the principles of soil physical amendments on page 26.

Special thanks go out this month to the four men who are assisting us in the selection of winners in the WEEDS TREES & TURF First Annual Outstanding Achievement Awards to be announced next month. They are: Dr. Ray Freeborg, research agronomist at Purdue University; Dr. Henry Indyk, extension specialist in turfgrass management at the College of Agriculture and Environmental Science, Rutgers University; Dr. Fred Grau, executive director, emeritus, of the Pennsylvania Turfgrass Council, and Dr. David Martin, extension agronomist and assistant professor at Ohio State University. For more about these prominent men in the turfgrass field and more about the awards, please see page 16.

Next we head for Philadelphia for the International Society of Arboriculture Annual Convention, incidentally, covering this convention last year in St. Louis, was my first assignment for WEEDS TREES & TURF. I look forward to seeing many of the friends I met in St. Louis again. If you plan to attend, please stop by the WEEDS TREES & TURF booth. We appreciate your comments.

Gail D. Hogan

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Government News

The FIFRA certification amendment of S1678 may be revised. The anticipated revision would provide that EPA would "consult" with state governors in initiating federal applicator certification. As adopted by the Senate Agriculture, Nutrition and Forestry Committee, the amendment would provide for federal certification of applicators only if requested by state governors.

The question of whether the state applicator certification program is proceeding "as envisioned" will be studied by the Council on Environmental Quality (CEQ), under a $180,000 cooperative agreement with the EPA.

CEQ will let a contract to one of six proposed firms to do the actual study. The evaluation will look at the need for the certification training program "from the standpoint of cost effectiveness, benefit to applicators themselves and to society in general and to clarify the impact of re-registration classification and labeling determinations," according to the interagency agreement.

The evaluation will determine whether training courses, training materials and certification programs need to be improved. Variations in quality between state examinations and the value of continuing education programs as a condition of recertification will also be assessed.

Section 5 experimental use permits issued recently by the EPA included one to the Forest Service for use of 25,460 baits of synthetic beetle pheromone to suppress bark beetles in a Dutch elm disease control program. The program is authorized in Calif., Colo., Conn., Del., D.C., Ill., Mass., Mich., Minn., N.Y., N.C., R.I., S.C., Vt., Va. and Wis. The permit is in effect from May 18, 1977 to May 18, 1978.

A permit was also issued to Aldine Products Co. to allow the use of 1,800 pounds of the fungicide dichlorpohene on trees to evaluate control of Dutch elm disease. That program involves 711 trees in Ill., Ind., Maine, Mich., Ohio, Pa. and Wis.

The EPA's "expedient, but unjust" pesticide hazard evaluation policy "will certainly result in the banning of highly beneficial compounds and uses for which the risk to man is, at best, hypothetical," according to a paper prepared by the National Agricultural Chemicals Association's (NACA) toxicology committee.

The NACA paper, in summary, had three recommendations for EPA to adopt as solutions to the problems: (1) Publicly acknowledge the inadequacies of the tests for cancer and be willing to defer action when the data are not clear; (2) return the authority for decisions on hazard evaluation to qualified scientists within the agency, being guided by a uniform national cancer assessment policy; and (3) after insuring that the experimental studies were properly done, let the data set the course of action: to permit, to ban or to defer without prejudice."

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Industry News

EPA approves elm disease fungicide

EPA has approved a new fungicide, 'Arbotect' 20-s, for the control of Dutch elm disease.

Manufactured by Merck, Inc., the fungicide is recommended as part of a comprehensive program to combat the disease. According to Dr. Ronald Landis, manager of agricultural chemical development for Merck, the fungicide is helpful in preventing the spread of the disease and can also help control the disease in newly-infected trees, "as long as the disease isn't too far advanced."

Irrigation home study course is published

The Irrigation Association and the University of Nebraska-Lincoln have announced the publication of a new correspondence course on basic irrigation techniques.

The course was developed at the University of Nebraska through a grant from the Irrigation Association. Planning and development, which took two years, was carried out by University personnel working with the Association's correspondence course committee.

For more information write to the Irrigation Association, 13975 Connecticut Ave., Silver Spring, Md. 20906.

Black vine weevil project progresses

First year findings of the Ohio Agricultural Research and Development Center's black vine weevil control program show success in developing techniques designed to discover the life cycle of the insect.

OARDC entomologists also carried out the first stages of insecticide screening aimed at finding replacements for the chlorinated hydrocarbon insecticides.

The goal of the three-year program, funded by the Lake County, Ohio Nurserymen's Association and the Ohio Nurserymen's Association, is to provide nurserymen with a black vine weevil control recommendation that is safe and effective. The project is limited to the use of conventional pesticides.

NACA is cited for public relations

The National Agricultural Chemicals Association was named winner of the Public Relations Society of America's Silver Anvil Award for the most outstanding public relations program during 1976 in the public service category.

The national Silver Anvil Awards are presented to public relations programs which demonstrate professional performance, sound public relations objectives and philosophy, and the highest standards of production, presentation, execution and results.

Costle, Bush discuss pesticide problems

EPA Administrator Donald Costle met recently with representatives of agricultural pesticide users, including Ray Brush of AAN. The purpose of the meeting was to express industry concerns, problems and suggestions for improvement. "Specialty use" registration of pesticides, EPA's interpretation that the "label is in the law," and the need for a scientifically-based national cancer policy were among the topics noted by Costle for review.

Scholarship offered for landscape design

The National Council of State Garden Clubs, Inc. has announced a $25,000 endowed national scholarship in landscape design in honor of Robert H. Rucker, professor of horticultural sciences at Texas A&M University.

The new Rucker scholarship will be awarded for the first time in May 1978, as the eleventh continuing scholarship provided by the National Council in the amount of $1-500 each. Students from all states are eligible to compete and a screening committee will make final selections.

OMC to discontinue Pioneer Chain Saws

Outboard Marine Corp. announced that the manufacture of Pioneer Chain Saws will be discontinued when the present production schedule is completed this fall.

OMC President Charles D. Strag said "in this increasingly competitive price market, we have determined that it is unlikely that we can achieve sufficient volume to generate adequate earnings."

Sales of chain saws and parts constituted only 3.3 percent, or $19,-108,000 of OMC's 1976 total sales of $582 million, and the company has reported losses from chain saw operations in most of its recent years.

Canadian firm OK'd for Toro production

Toro has licensed Outdoor Product Mfg. Ltd., a subsidiary of NOMA Industries, Ltd., of Scarborough, Ontario, to manufacture for the Canadian market selected Toro products.

The licensing agreement was announced by John C. Norton, Toro executive vice president-international/distributing, and in Toronto by Thomas Beck, NOMA's president and chief executive officer. NOMA Industries, Canada's largest manufacturer of flexible wire products, acquired Outdoor Products Mfg. three years ago.

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People on the Move

The Associated Landscape Contractors of America's new Executive Director is **John S. Shaw.** Shaw holds a B.A. degree in design from Wesleyan University, did graduate work at George Washington University, and holds a M.B.A. degree in association management from Florida Atlantic University. He is general manager of the Screen Printing Association, International in Vienna, Va.

B. Cleve Larson is the president of Oregon Toro Distributors of Tigard, Ore. Larson, formerly vice president and marketing manager, has been with Oregon Toro two years. He holds a B.A. degree cum laude from Whitman College in Walla Walla, Wash.He also holds an M.A. with honor from the University of Washington.

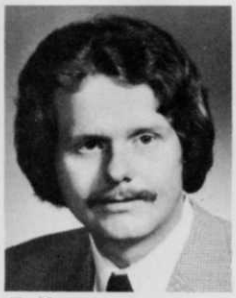
William G. Adams is the 26th president of the Florida Nurserymen and Growers Association. He operates Adams Citrus Nursery in Florida. Adams received the Butler-Odenkirk Award for Outstanding nurserymen of the year in 1975.

Sam Terry has been promoted to branch manager of the Little Rock distribuution center at Thompson-Hayward Chemical Co. Terry will be responsible for the sale and administration of the company's complete line of products. He has been with Thompson-Hayward for 11½ years.

Joseph A. Dietrich has retired after thirty years as Director of Parks and Recreation for the city of Greenwich, Conn. Dietrich was past president of the New England Parks and Recreation Association and also of the International Shade Tree Conference.

Dr. Roy Mecklenburg has been appointed president of the Chicago Horticultural Society and director of the Chicago Botanical Gardens. Mecklenburg is currently professor of landscape horticulture at Michigan State University. He holds a B.S. degree from Michigan State and an M.S. and Ph.D. from Cornell University.

Adams



Bell

Cvetkov

Simpson

Terry

F.J. Calderoni has been promoted to manager of market research in the agricultural chemical division of Stauffer Chemical Co. He will be responsible for coordinating divisional market research activities for new and existing agricultural products and services. Calderoni has been with Stauffer since 1968.

Dr. O.V. Simpson has been appointed to senior market analyst and **A.G. Cvetkov** has been promoted to market analyst in the agricultural chemical division of Stauffer Chemical Co. Simpson is responsible for the review and analysis of market potential for new and existing agricultural products, practices and services. Cvetkov is responsible for examining and evaluating pertinent market information relative to agricultural products.

Douglas J. Bell is assistant sales manager in charge of customer service and sales administration for Melnor Industries of Moonachie, N.J. He has attended Rutgers University and Paterson State College, majoring in business administration.

Amchem Products has appointed **Jerry D. Lavoy** associate national program director for Growth Regulators. He will work with Amchem's domestic and international field development groups and be responsible for projects relating to plant growth regulating compounds.

James D. Moore is Chevron Chemical's new manufacturing manager of the ORTHO Division. He will be responsible for manufacturing of domestic fertilizer, pesticides and insecticides in five U.S. plants. Moore has been with Chevron 36 years.

Dan Dunstan has been elected Secretary of Lakeshore Equipment and Supply. Credit manager for Lakesore for about two years, Dunstan holds a degree in accounting from Ohio State University. **John Horvath** will serve in the newly-created position of advertising and public relations manager for Lakeshore.

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Conserving water with Purr-Wick

by Ron Morris

As is becoming very apparent, water is a precious commodity that needs to be used efficiently. Water needs to be applied with thorough knowledge of where it's going, that it is going to be utilized by the plant, and that none of it is going to be wasted.

Purr-Wick, a concept of building a green for total management, seems a likely answer.

Don Parsons, superintendent at Knollwood Golf Course in California thinks that it is the answer to a superintendent's greens headaches. Don has done a lot of record keeping with the one Purr-Wick green

Height of dividers key to efficiency

When Purr-Wick was conceived in 1968, the internal dividers were patterned after dikes in rice paddies. It started with four inches, then six inches, then eight and up to 14. "There were some problems that couldn't be explained," according to Dr. W. H. Daniel, turf specialist at Purdue University and one of the designers, "but we assumed that some barriers had holes in them. Thanks to questions from users, we have realized that it's a matter of the water siphoning over the vertical barriers through the sand."

When water is held at very low tensions it readily moves through the small capillaries created by the compacted sand. It siphons over the barriers much faster than was earlier thought. The end result is that the lowest outlet tends to be a spring, while the outlets of the upper levels show no reserve a few hours after rain, according to Daniel.

Since 1974, he has suggested higher internal dividers. He Now says "Build the dividers as high as practical."

On existing greens with lower dividers installed, it is strongly recommended that as soon as practical, the ends of the existing dividers be located and their entire distance be exposed. Place a putty or asphalt caulk along one side near the top of the installed divider and insert a strip of plastic sufficient to extend from along the divider up to the surface. Then backfill with the sand, replace the sod and topdress as needed.

"The target," emphasizes Daniel, "is to more completely isolate the compartments so that siphoning through the fine sand pores is minimized and the full potential of Purr-Wicks is realized."

that has been installed on his course and has compared it to a conventionally constructed green that is located near the Purr-Wick. According to Parsons, "It is a water conservation system that allows us to conserve and redistribute the water like no other system currently available to us."

Parsons, speaking at the 15th Annual Turfgrass Sprinkler Irrigation Conference at Lake Arrowhead in California said, "With a Purr-Wick, you have a constant moisture level within the system. There is a definite relationship between drying out or the lack of water in the system and the roots. This happens to us most generally in the summer. We allow an area to dry out, the root systems shorten up, and consequently from then on you're watering to that short root."

Purr-Wick, with its constant water table and moisture conditions in the growing media, prevents this. Roots are not lost to the dry areas because there are none.

Purr-Wick stands for Plastic Under-Root Reservoir system, with a wick action. The sand in a Purr-Wick system acts as a wick for water much the same as the wick in an oil lamp draws the oil upwards. Sand is

Continued on page 14

"With a Purr-Wick, you have a constant moisture level within the system."

Top left, sod is removed. Top right, barrier, eight inches below surface is exposed. Lower left, plastic attached to original barrier is brought to surface. Lower right, sand is replaced and tamped for replacement of sod.

PURR-WICK

Continued from page 13

the secret. And the larger the particle size of the sand, the less wick action it has. "Medium to small particle size with uniform distribution — that is what we're looking for," says Parsons. The entire system is enclosed by plastic which allows for zero tension with irrigation and constant redistribution of the water within the system. This graphically points toward a constant moisture level within the system.

In Indiana, where the system was designed, Dr. William H. Daniel, turf specialist, Purdue University, was seeing irrigation frequencies of only four times per year for Purr-Wick, while a normal green would require over 40. While not quite the case in California where the rainfall is not as great, Parsons, from his comparison, believes that Purr-Wick does require considerable less irrigation than a normal system. Why?

"With the ordinary open drain we put on one drop for the root tip, one drop for distribution and one for drainage. We may lose two of those out the open drain. With Purr-Wick you can put on one for the root and two others may go down through the profile, but they'll hit this plastic impermeable membrane and wick back up, so that you have total control over the water that you do put on."

"You have total control over the water that you do put on."

About 2-300 feet away from the Purr-Wick at Knollwood there is a conventionally constructed green composed of 60 percent sand and 40 percent organic matter. Both greens are irrigated with the same type of system. Parsons kept track of the number of times both greens were irrigated each month and the number of minutes of irrigation and calculated that down into gallons of water per thousand square feet.

In May, 1976, the conventional green used about 79 gallons a day and was irrigated 20 times. The Purr-Wick used 43 gallons per day and was irrigated eight times, a 47 percent water savings.

In June, 1976, there were two weeks of 100 degree weather with a high of 114, and there was still an eight percent savings with the Purr-Wick. "But we did an awful lot of watering just to stay alive during that particular month," Parsons added.

September was probably one of the better examples of water conservation. They had a four-inch rain early that month and consequently only watered the Purr-Wick four times. Parsons ended up with a 63 percent water savings for that month. "We are seeing it stay in the neighborhood of half the irrigations and half the water use through the normal months, unless it's extremely hot or there is rain."

In the five months that he kept total and complete records, Purr-Wick saved an average of 42 percent or 57 gallons a day per thousand square feet. That would be in the neighborhood of 200,000 gallons a year. Project that for 18 greens and two putting greens and there is a potential savings of 4 million gallons per year.

One of the idiosyncracies of the Purr-Wick system in the west, Parson believes, is interrupting the capillarity when you cut a cup. Because there are so many days between irrigations, the area around the cup tends to dry out. What happens then is that someone must carry a bottle of water or a hose and wet around the cup area, restarting the capillarity thereby eliminating the problem. "It isn't that much of a problem," according to Parsons. If you don't water the area for at least three or four days, it will tend to be a problem, but really doesn't need to be."

Parsons doesn't see salt accumulation as a problem with Purr-Wick. On a soil test of his Purr-Wick that had been going on for about 18 months, the ECE was .6. If it is a problem, he says, you just pull the plug, you have a sand green, and you can flush it."

Probably the only real cost difference between a Purr-Wick and a conventional green is the cost for the plastic and the barriers, each at about five cents a foot. One big factor is the source of the sand. Parsons cited one course that built 18 greens and two putting greens and were given the sand just to get it out of the way. However, sand in California is hard to come by. "It's just not available," he said. □

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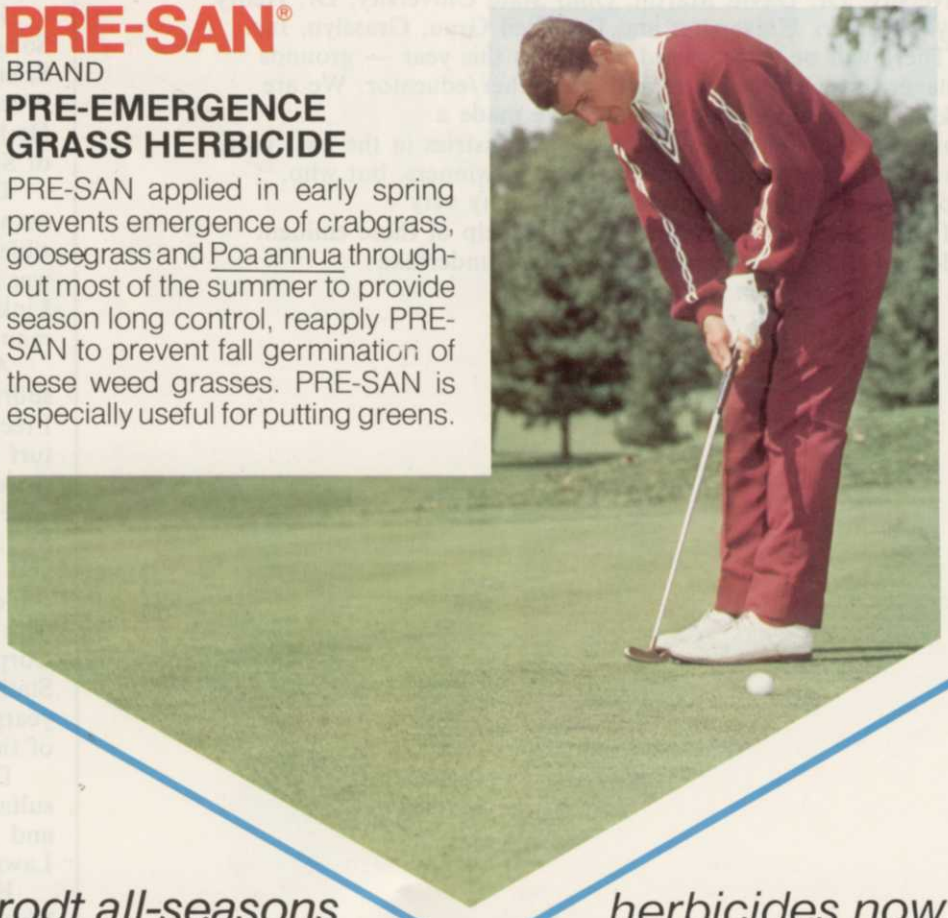

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Our 1977 WT&T awards committee

We are pleased to announce the advisory committee who will assist us in the selection of the first winners of the WEEDS TREES & TURF Outstanding Achievement Awards. Committee members include: Dr. Ray Freeborg, Purdue University; Dr. David Martin, Ohio State University; Dr. Henry Indyk, Rutgers University; and Dr. Fred Grau, Grasslyn, Inc.

There will be three award categories this year — grounds manager, grower/producer, and researcher/educator. We are looking to those individuals who have made a significant contribution to the Green Industries in the past year, individuals who are not the usual award winners, but who, through their initiative and leadership, may very well be in the next few years. With the help of these eminent leaders of the Green Industries, we shall undertake this difficult selection this month.

Dr. Freeborg

Dr. Ray P. Freeborg is a research agronomist at Purdue University with responsibilities in research, teaching and extension.

He is a member of the American Society of Agronomy, the Crop Science Society of America and the Weed Science Society of America. He has also been elected a member of Sigma Xi honorary society.

Dr. Freeborg served as sales manager for Links Nursery, responsible for sales and distribution. He was also associated with Mr. Linkogel in design, construction and management of golf courses.

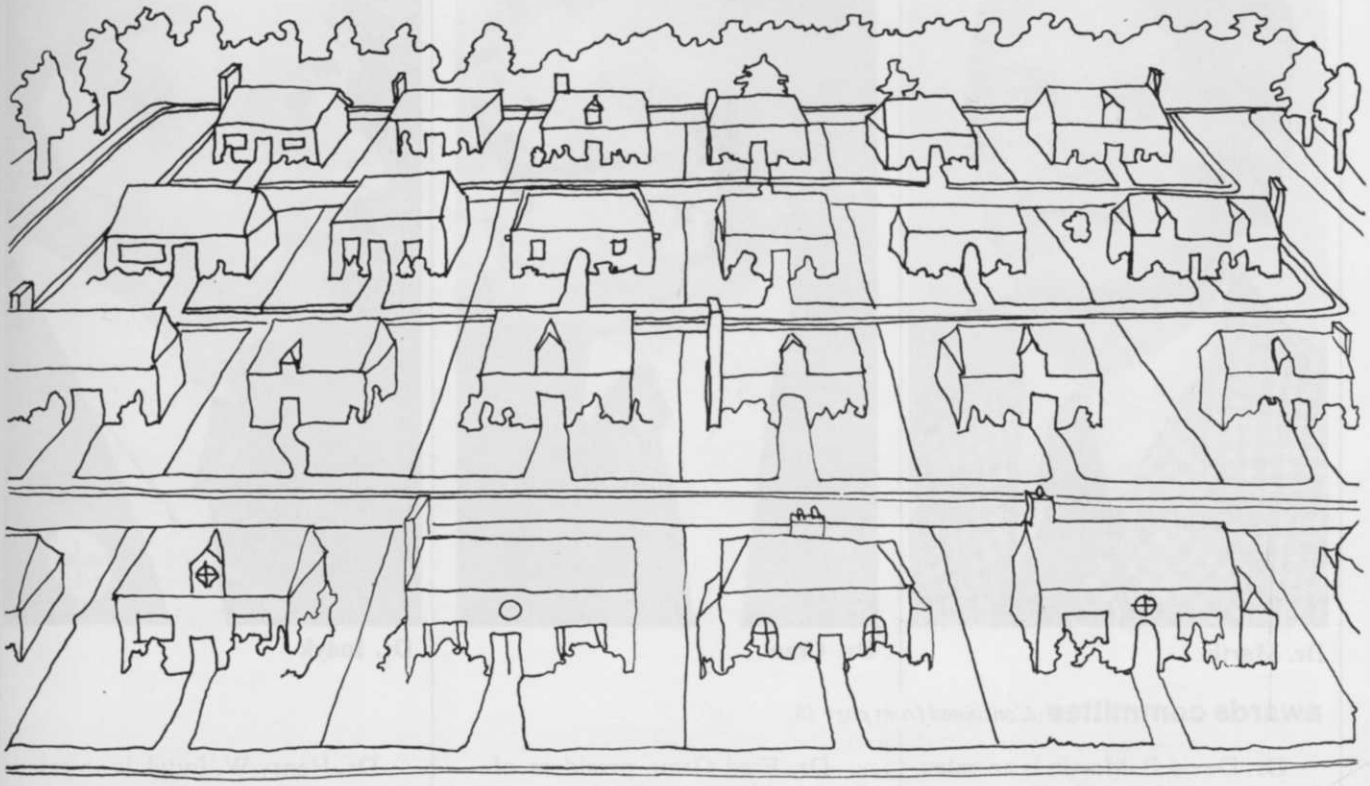
As a research associate at Missouri Botanical Garden, Dr. Freeborg was responsible for the turf program and adult education there.

He was executive director of the St. Louis Turf Research Foundation and received their award for outstanding research. He consulted with Civic Center Redevelopment Corporation on Busch Memorial Stadium and served three additional years as consultant on maintenance of the field.

Dr. Freeborg has served as consultant to several lawn care firms and is currently consulting for E-Z Lawn in Richmond, Ind.

He holds a MSA from Washington University in St. Louis, and a Ph.D. from Purdue University.

Continued on page 18



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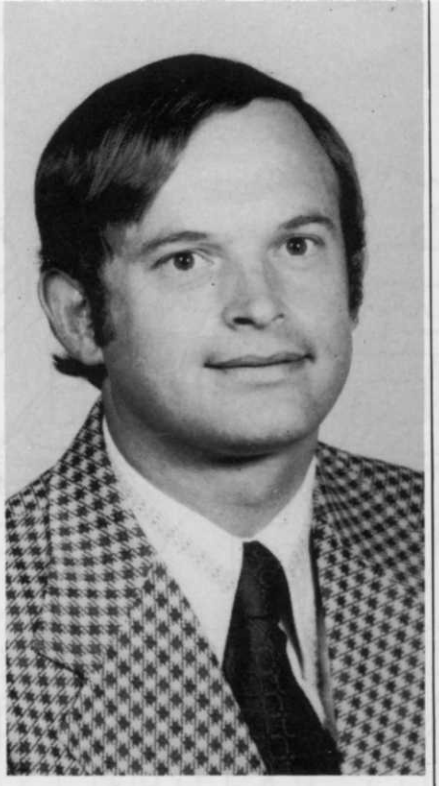

Dr. Martin

Dr. Grau

Dr. Indyk

awards committee

Continued from page 16

Dr. David P. Martin is an extension agronomist and assistant professor at Ohio State University. He is a member of the American Society of Agronomy and the International Turfgrass Society. He is executive secretary of the Ohio Turfgrass Foundation, chairman of the NCR-10 Turfgrass Research Committee (a committee of research personnel from the North Central region states) and secretary of the turfgrass division of the Crop Science Society of America.

Dr. Martin is co-author of TURFGRASS BIBLIOGRAPHY, a reference work cataloging over 16,500 turf references. He is also co-author of more than 30 technical, semi-technical and popular articles and bulletins. He has presented three papers at the annual meetings of the American Society of Agronomy.

Before coming to Ohio State University, Dr. Martin was turfgrass specialist and research associate at Michigan State University.

Dr. Martin did research for his Master of Science degree in thatch characterization and control and researched carbohydrate status in relation to growth cessation of cool season turfgrass at supraotimal temperatures for his Ph.D., both at Michigan State.

Dr. Fred Grau, president of Grasslyn, Inc., is a lifetime member and fellow of the American Society of Agronomy, the American Association for the Advancement of Science, and the Soil Science Society of America. He is executive director, emeritus, of the Pennsylvania Turfgrass Council, having held that position for 10 years before retiring.

Dr. Grau has received GCSAA's award twice and received the USGA award in 1969 while in Viet Nam consulting. He also helped to establish the Musser Foundation in that year and now serves as its president.

Dr. Grau, who was named director of the USGA Green Section in 1945, left to enter the commercial field in 1953. In 1965 he began to devote full time to the development of Penngift Crownvetch, which is said to be a living memorial to him.

In 1950, Dr. Grau helped develop and release Meyer zoysiagrass and Merion Kentucky bluegrass.

Dr. Grau helped write the 1948 USDA yearbook "Grass". In 1946 he aided in establishing the Turf Section in the American Society of Agronomy and helped set up turf conferences and research at several land grant colleges.

Dr. Grau received his Ph.D. from the University of Maryland.

Dr. Henry W. Indyk is an extension specialist in turfgrass management at the College of Agriculture and Environmental Science, Rutgers University.

Dr. Indyk is a member of the American Society of Agronomy, the Northeast Weed Science Society and the New Jersey Turfgrass Association.

Dr. Indyk currently serves as executive director of the Golf Course Superintendents Association of New Jersey and advisor to the executive committee of the New Jersey Turfgrass Association. He organized the Cultivated Sod Association of New Jersey and has served as its secretary since then.

Dr. Indyk initiated the Sod Certification Program in New Jersey, the first of its kind in the U.S. He was instrumental in organizing the New Jersey Turfgrass Expo and has served as general chairman since its inception in 1974.

He also served as a member of the Board of Directors of the Musser International Turfgrass Foundation and as guest editor of Brooklyn Botanic Garden Lawn Handbook and chief consultant of Time-Life book on Lawns and Ground Covers.

Dr. Indyk holds a Master's degree and Ph.D. in agronomy from Pennsylvania State University.

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Space-age technology for irrigation controls

Solid state technology, which has revolutionized communications, aerospace, finance, medicine and a host of other fields, has effected a major breakthrough in irrigation system controllers. For the first time, a controller, developed by Rockwell International for Johns-Manville, utilizes a microprocessor for regulating a wide range of irrigation processes and a calculator-type keyboard that, with a human input/output interface, feeds instructions, changes and programming to the controller. Also included is a digital display that indicates at a glance the time of day, the type of sequence, which station is operating, the time remaining and many other functions. The controller was deliberately designed with a "mushroom"-like appearance so that it blends with the environment in which it is utilized.

The solid state design of the Model KCS (Keyboard Controller Series) offers several important advantages over comparable electromechanical units. For example, reliability is better because less circuitry is needed, a feature that reduces the possibility of malfunctions. Due to the fact that the controller has one basic component, the microprocessor, instead of the multiple number of parts required in an electromechanical model, dependability is further enhanced.

Flexibility is another benefit offered by the controller. Despite its relatively small size, the transistorized microprocessor has the capacity for servicing up to 24 stations with a diverse number of functions. To illustrate, starting can be programmed in various ways — automatic, manual and even manual starting of a single station on a one-time basis.

Accuracy also is upgraded. The solid state design assures a station timing accuracy of ± .01 of a second. Water conservation is improved because the precise timing allows the operator to put down the exact amount of water required. For the same circumstances, the accuracy of electromechanical units can vary by as much as 20 percent.

Although station timing settings are normally regulated in minutes, the controller has the capability of switching to hour station times with the implementation of a toggle switch. Also, the time base is automatically compensated for the appropriate electrical frequency — 60 Hertz for domestic use, or 50 Hertz for foreign applications.

The microprocessor can handle four, 14-day schedules. Each station has the ability to operate with any one of the schedules. In this way, lawns and shrubs, as well as greens, tees and fairways, can be watered on completely different programs on the same or different days on the same controller.

Other programs that can be accommodated by the versatile controller include:

Skip Days — the irrigation cycle can be skipped from one to nine days, an ideal situation during rainy weather when irrigation is not necessary. The KCS will automatically resume the proper sequence at the conclusion of the skip period. The controller can be used in conjunction with a rain gauge whith tells how much rain has fallen, daily or year to date, to determine if irrigation is warranted.

Automatic Syringe — for cooling and disease control, a syringe cycle, with variable time, can be started independently of the normal irrigation program for all or preselected stations.

Multiple Repeat — the number of repeats after initial irrigation can be set from one through nine. A delay between repeats of up to 99 minutes can be selected when a single station is repeating. The number of repeats are common to all stations programmed for this cycle. This feature prevents run-off on steep slopes.

Other keyboard entries permit the controller to . . .

manually operate a station from .1 minutes to 99 minutes. This manual mode may interrupt a current sequence which shall resume without a time loss to the stations interrupted.

manually start or stop any sequence that would include all stations whether they are scheduled for that day or not.

manually start a sequence that would include stations scheduled for that day only.

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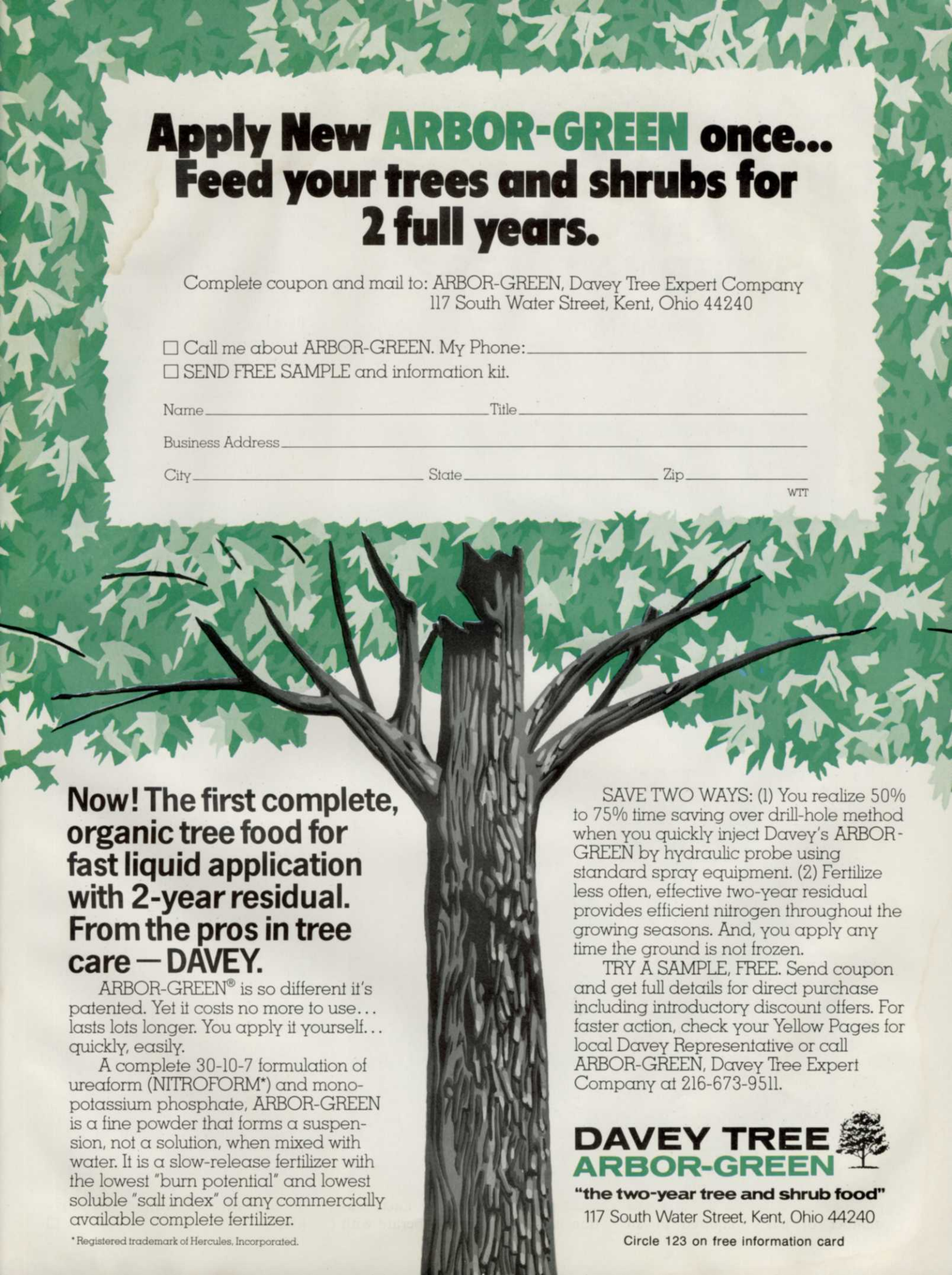

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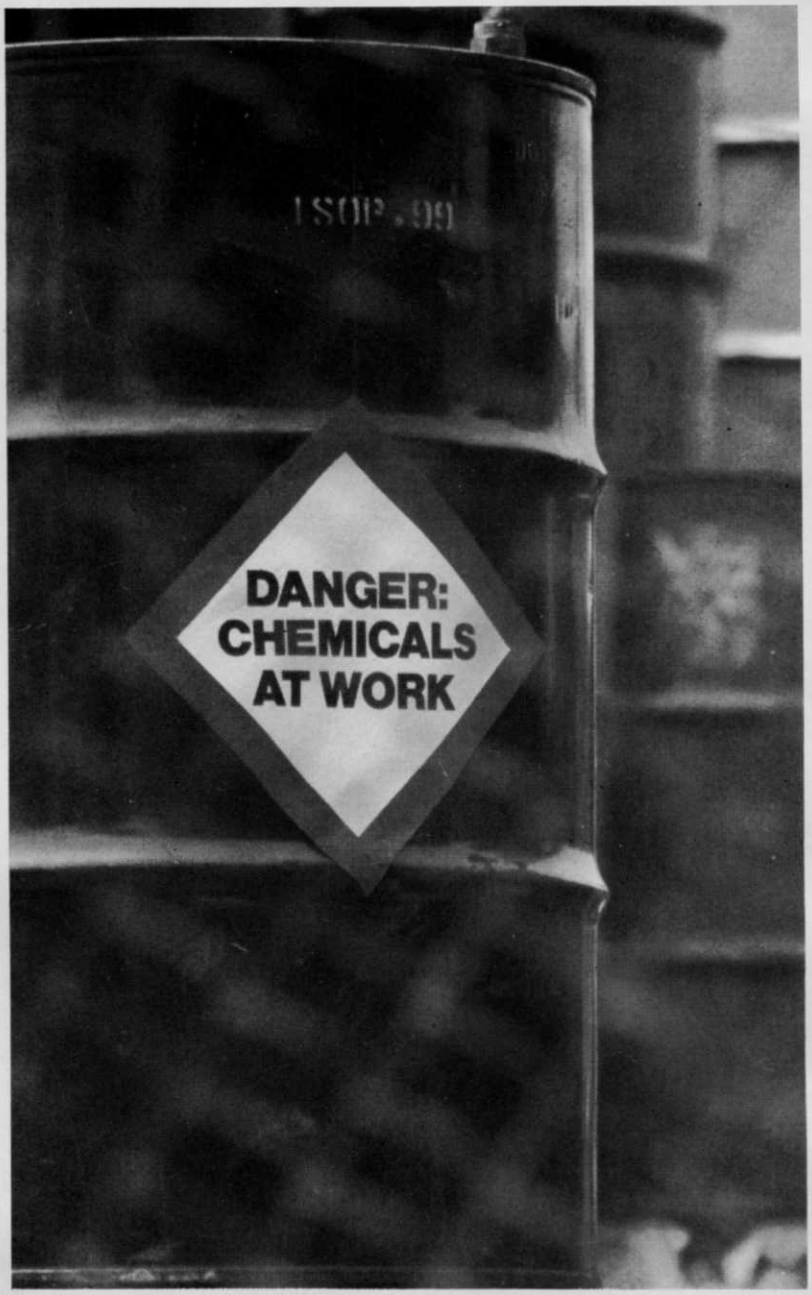
CHLORDANE—WHAT ARE THE ALTERNATIVES?

by Ron Morris



Environmental Protection Agency hearings on the chlordane issue are still rolling on, but all indicators point toward turf insect control without chlordane by sometime this fall.

"It (chlordane) probably won't go completely out of the picture," in the opinion of one EPA official, but will definitely be out for use on turf. The reason is potential human exposure. Chlordane will probably remain in use as a subterranean termite control because of its long persistence in the soil and, most likely, farmers will be allowed limited use provided applicators protect themselves with proper clothing.

In the past, when other chlorinated hydrocarbon insecticides were banned, substitutes came to light. For example, when aldrin, dieldrin and heptachlor were banned, chlordane came into use. Now chlordane is going and a substitute must be used.

Existing organophosphate insecticides, such as diazinon, chlorpyrifos (Dursban), and trichlorfon (Dylox or Proxol) can provide the answer if applied properly. Since organophosphates are not persistent, they need to be moved from the surface into the soil immediately to be effective.

"Thatch is a major factor limiting the effectiveness of insecticides in controlling soil inhabiting insect pests of turf," according to Dr. Harry Niemczyk, professor of turfgrass entomology at the Ohio Agricultural Research and Development Center.

Currently available organophosphate insecticides do not move freely through thatch, so it becomes an urgent necessity to move them. If rainfall doesn't do it, then irrigation is called for.

Experiments in Ohio have shown that one-half inch of thatch in turf can significantly reduce the effectiveness of the organophosphate insecticides.

Liquid diazinon, giving 90 percent or better control at 5.5 to 6 pounds AR/A (active ingredient per acre), was reduced to 52 to 60 per-

Continued on page 25

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CHLORDANE

Continued from page 22

cent effectiveness by one-half inch of thatch. Granular diazinon, giving 90 percent or better control also, was reduced to 69 to 74 percent control. Dursban at two and four pounds AI/A, controlling an average of 69 to 74 percent, respectively, was reduced to 21 and 26 percent control, respectively.

Experiments at the Ohio Agricultural Research and Development Center in Wooster, Ohio, concluded the reason was that the insecticides were becoming bound to the thatch and were simply not reaching the soil, the target area.

Chlorpyrifos was the most readily bound. Trichlorfon has a lesser tendency to bind, but results from it have been varied, according to Dr. Niemczyk. The reason for this variability is not known and must be better understood to ensure future control of soil-inhabiting insects.

One-half inch of thatch can reduce effectiveness of insecticides.

Two experimental insecticides, CGA-12223, a product of CIBA-GEIGY, and bendiocarb, a product of Fisons, have shown to be effective against grubs and are not prone to absorbtion by thatch.

CGA-12223, an organophosphate, has shown good activity against a broad spectrum of soil insect pests in corn, vegetable crops and turf. Broadcast at rates of one-half to two pounds AI/A, it has demonstrated effective control of Japanese beetle, European chafer, Southern masked chafer, June beetles, chinch bugs, sod webworms and mole crickets. Turf tolerance has been excellent with eight pounds AI/A showing no damage to a cross section of northern and southern turf species. It is being tested further for control of nuisance lawn pests such as ants and clover mites.

CIBA-GEIGY currently holds a one-year experimental permit from the Environmental Protection Agency for CGA-12223 and is planning to renew it for another year. They expect to submit a full label request soon.

The company is working with 2E and 5G formulations for commercial turf usage.

The 2E formulation contains two pounds AI/gallon. It is recommended for chinch bugs, cutworms, mole crickets, sod webworms and white grubs (dung beetle, European chafer, Japanese beetle, June beetle, Southern masked chafer) at the rate of two to four quarts per acre in a minimum of 25 gallons of water per acre. It is further recommended for grubs and mole crickets that the turf be thoroughly irrigated after application. For other insects, light watering is sufficient.

Five to seven gallons of the 2E formulation per acre in a minimum of 25 gallons of water will control cyst, ring, spiral, sting, stubby root and stunt nematodes.

CGA-12223 5G, a granular formulation containing 5 percent AI controls insects at the rate of 20 to 40 pounds per acre and nematodes at 200 to 300 pounds per acre. Watering is recommended for moving the formulation directly to the soil.

Fisons' NC 6897 experimental insecticide currently has EPA registration under the trade name FICAM for pest control operator use. Garvox is the proposed trade name for agricultural use and bendiocarb is the proposed common name.

NC 6897 is a carbamate compound and has been effective in controlling both larval and adult stages of May and June beetles, Japanese beetles, dung beetles and controls chinch bugs and sod webworms. There has been limited evidence to suggest that NC 6897 will also control billbugs, armyworms, cutworms and mole crickets. It is effective against many nuisance pests including ants, crickets, fleas, ticks, wasps and sowbugs.

NC 6897 is being tested against sub-soil pests in granular and wettable powder formulations at rates of one to four pounds AI/A. Thorough irrigation after application is recommended. It is being tested against surface feeders at rates of one-half to two pounds AI/A.

Fisons plans to take data from its experimental program this year and submit for registration sometime in late '78, hopefully in time for marketing in late 1979. □

PRINCIPLES OF SOIL PHYSICAL AMENDMENT

by Art Spomer

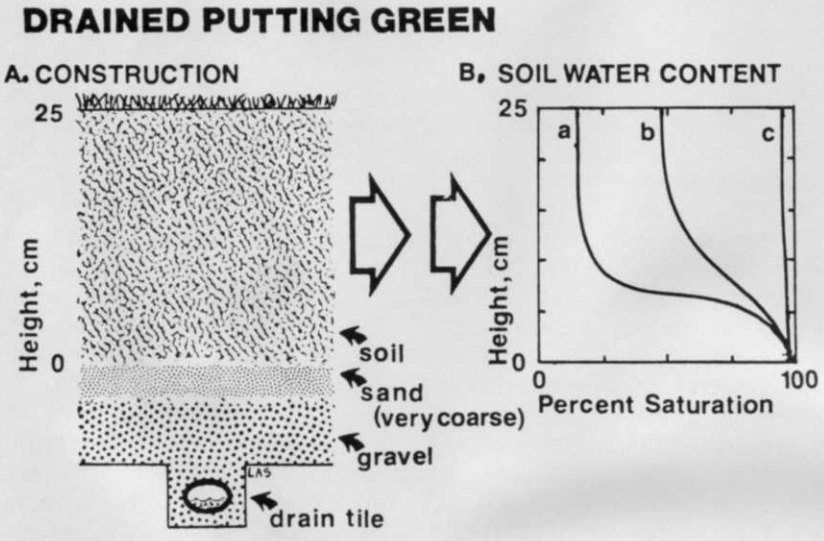

Figure 1. Water distribution pattern (B) for three different soils in a typical drained putting green (A). Soil 1 = coarse-textured sand; 2 = fine-textured sand; 3 = silty clay loam. All three soils are saturated at the drainage level (perched water table) and water content decreases with height above this level.

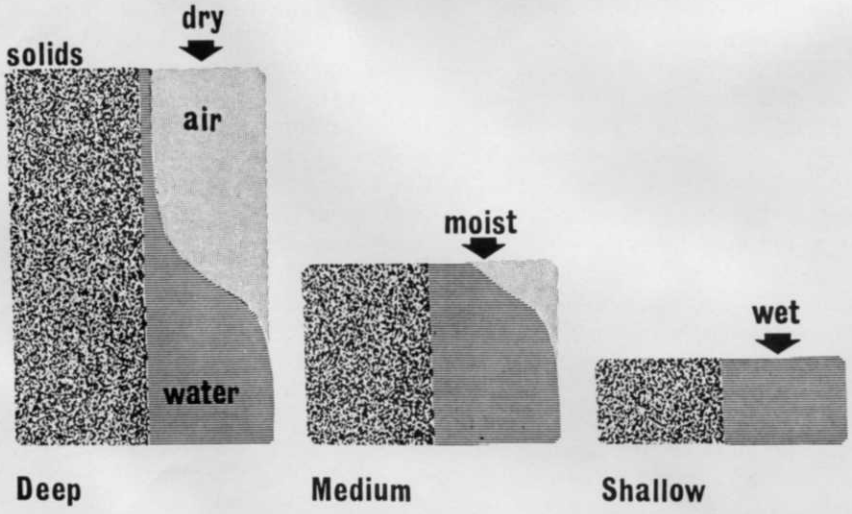

Figure 2. Effect of green drainage depth on soil water content. A shallower soil always has a greater water content following irrigation and drainage than a deeper soil.

Water is quantitatively the most important nutrient required for plant growth and survival. Actively growing grass tissue consists of about 90 percent water by weight.

Plants not only contain large quantities of water, they also usually require hundreds of times this amount during growth. This enormous amount of water contained and used by plants is more than just an inert filler, probably every plant growth activity is directly or indirectly affected by water. All of this water is absorbed from the soil through the plant's root system.

Since water is very essential for plant growth, and since all of the water used by plants comes from the soil, any factor affecting the absorption of water will, therefore, probably affect plant growth.

A number of biological, chemical and physical factors directly and indirectly affect either soil water retention and movement, or plant root growth and absorption. The primary soil physical factors affecting plant water absorption are soil water content and soil aeration.

Water content is important because it indicates how much water is potentially available for plant use.

Soil aeration (the exchange of oxygen and carbon dioxide between the soil and above-ground atmosphere) is important in maintaining a constant supply of the oxygen required for good root growth and absorption. Both aeration and water retention depend primarily on soil structure which is determined by the kind and arrangement of particles in the soil.

Most golf greens have two important features which distinguish them from other golf course turf sites:

1. They are subject to severe

Continued on page 28

THE INNOVATOR

"They copied all they could copy, but they couldn't follow my mind, and I left 'em sweating and stealing... a year and a half behind!"

As expressed by: Rudyard Kipling
in "The Mary Gloster"

SAFE-T-LAWN, INC.

MIAMI, FLORIDA

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Continued from page 26

foot and mower traffic, and

2. they are drained.

The effects of the traffic are obvious (soil compaction, poor root growth and absorption); however, the effects of the shallow drainage (excess soil water content, poor soil aeration) are less obvious but are generalized in Figure 1. A perched water table forms at the drainage level in such a green following irrigation and drainage. Under these circumstances, any good, medium-textured natural soil will likely be saturated throughout (Fig. 1-B) and grass growth will probably be poor.

Both problems are minimized in practice by amending the soil with coarse-textured materials (e.g. bark, calcined clay, gravel, perlite, sand, scoria, vermiculite, etc.) to increase the soil's resistance to compaction and to increase the amount of large aeration pores which drain despite the water table. Unfortunately, "too little" amendment reduces both soil aeration and soil water retention without increasing the soil's resistance to compaction and "too much" reduces water retention excessively.

The "optimum amount" of soil amendment should maximize soil compaction resistance and at the same time provide soil aeration and soil water retention which closely match those required for good turfgrass growth and water absorption.

This article briefly discusses the changes in soil physical properties when natural soils are amended with coarse-textured materials.

Soil Amendment — soil physical changes

Figure 4 "pictures" what happens as a coarse-textured amendment is mixed with soil in increasing proportions. Since soil mixtures are usually prepared from bulk quantities (e.g. bu. ft.^{3}, lit,m^3,yd^3 etc.), component and mixture quantities are herein expressed as

Continued on page 31

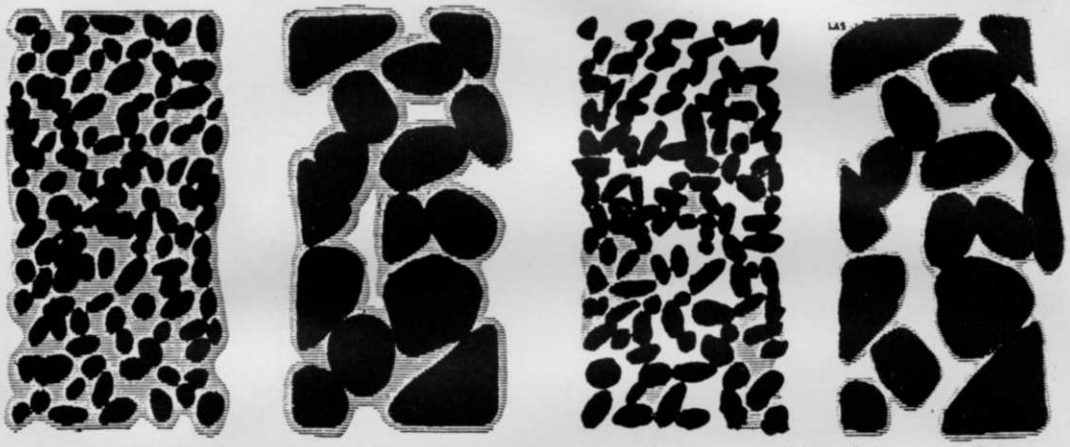

Figure 3. A drained green soil, left, is always wetter than that same soil in a fairway, right, following irrigation and drainage.

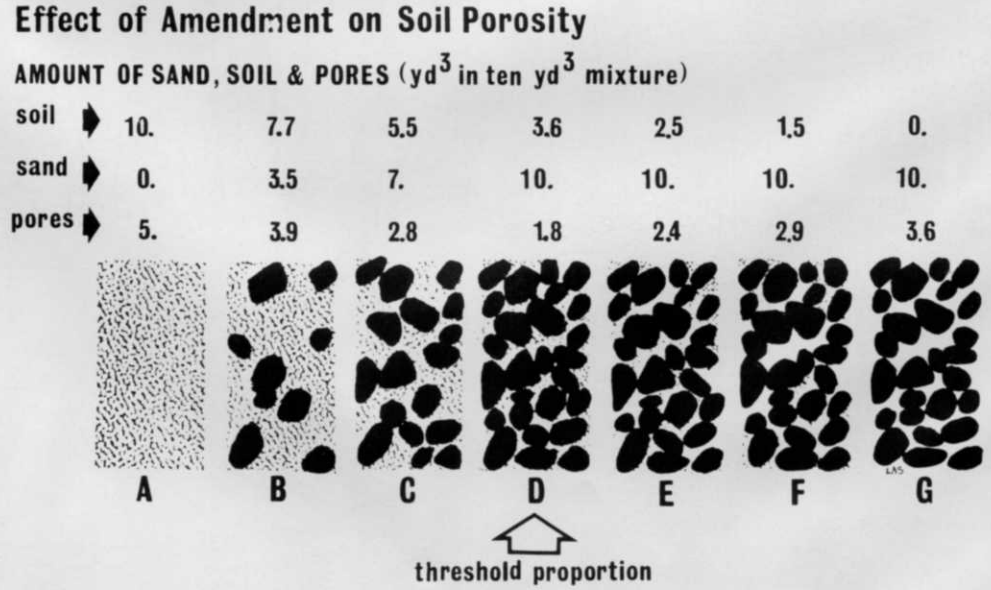

Figure 4. Microscopic "picture" of what happens to soil porosity as a coarse-textured amendment such as sand is added to the soil in increasing proportions.

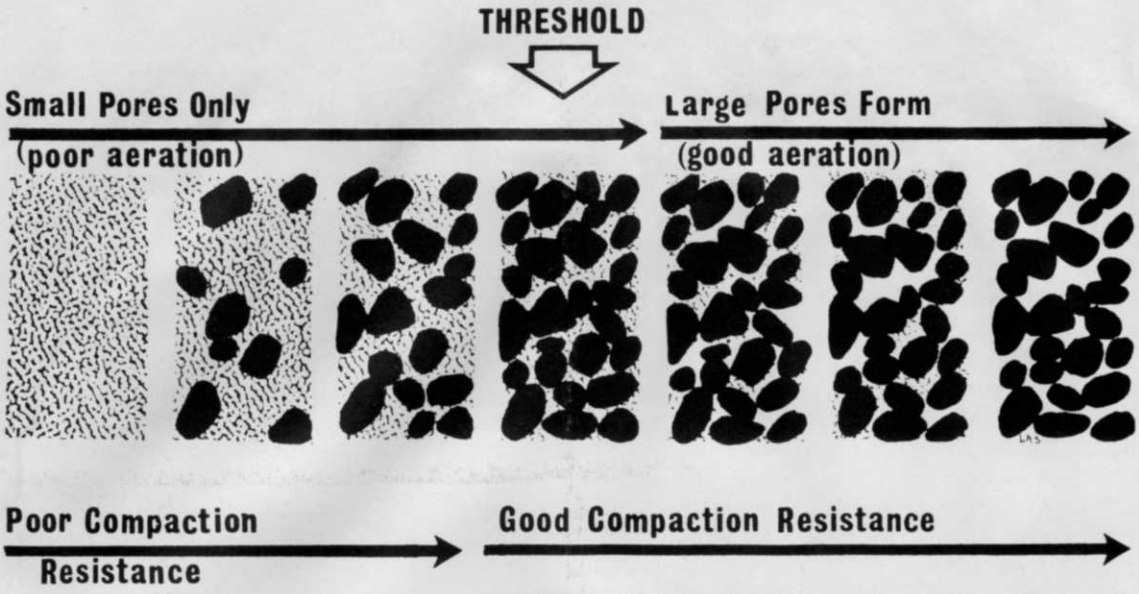

Figure 5. Generalization of what happens to soil porosity as a coarse-textured amendment is added to soil in increasing amounts (see Figure 3).

SOIL AMENDMENTS

Continued from page 28

bulk volumes. Bulk volume equals the total volume (solid + pore volumes).

Beginning with 100 percent soil (10 yd^3), mixture porosity first decreases then increases with the addition of sand in increasing proportions. Porosity initially decreases because the sand floats in the soil or excludes soil and soil porosity without adding any large pores.

The minimum porosity occurs at the threshold proportion which is the mixture in which the "mixing bin" or green excavation is exactly full of sand and the large pores between the sand particles are exactly full of soil. In other words, the threshold proportion is determined primarily from the amendment's interporosity. This is called the threshold proportion.

Since at the threshold proportion the amendment particles first exhibit particle-particle contact, this sets the limits for the amount of amendment required to improve the soil's resistance to compaction. As the proportion of sand is increased beyond the threshold, the large pores between the sand particles (amendment interporosity) become voided of soil and both total and aeration porosity increase (Figure 5).

A simple mathematical model can be used to predict mixture total and aeration porosities. This theo-

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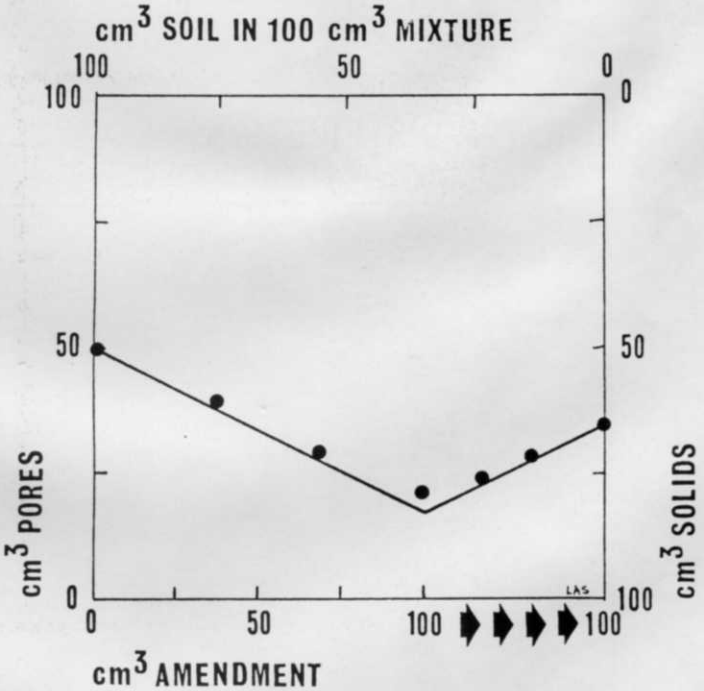


Figure 6. Theoretical (line) and actual (dots) porosity in soil mixtures containing different amounts of sand.

SOIL AMENDMENTS

Continued from page 31

retical model is compared with actual, total and aeration porosities of selected sand-soil mixtures in Figure 6. This data demonstrates that the theory accurately predicts the mixture's physical properties.

A simple graphic method for predicting soil total and aeration porosities from component individual porosities and bulk volumes has also been developed by the author and will be published at a later time.

The effect of pore size on soil water distribution in a drained putting green is illustrated in Figure 1-B. In general, soils with smaller pores (soil) retain more water in the upper levels than those with larger pores (sand). The effect of different amounts of soil amendment on soil water distribution in a drained area is illustrated in Figure 7.

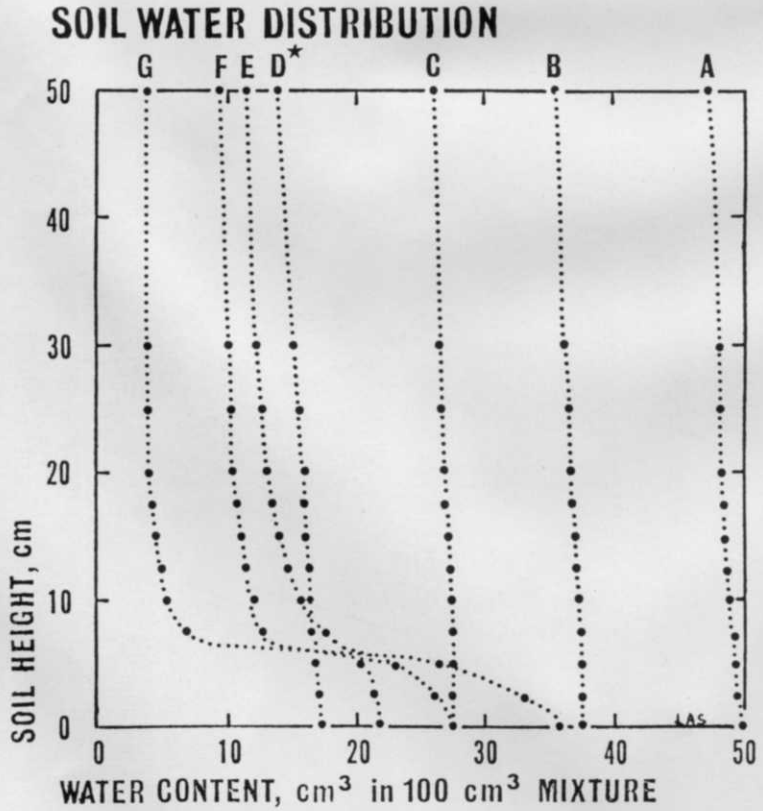
The addition or amendment (sand) up to the threshold proportion has no effect on the water distribution pattern, it merely decreases the total porosity. However, when more amendment than the threshold is added, the water distribution pattern changes to that typical of the sand indicating that large pores have been formed and that aeration should increase. As amendment particle size decreases, the soil water distribution pattern shifts towards the upper soil levels.

When selecting an amendment, it is usually best to use one which has a relatively narrow range of particle sizes. Well-graded amendments with large amounts of fine-textured particles should be avoided because they are generally less efficient (larger amounts are usually required to produce soil physical improvement). Particle shape also affects amendment efficiency, but is much less important than size and size distribution.

This article does not recommend any specific putting green soil mixture, but briefly describes what happens when an amendment such as sand is added to a soil. The "take-home" lesson is that a certain minimum proportion of amendment, the threshold proportion, is required before soil physical improvement is affected and this amount is usually quite high (75-90 percent of the total bulk volume of components).

The optimum soil mixture depends on soil, amendment, climate, drainage depth and plant species and is therefore difficult to determine without professional assistance. □

Art Spomer is associate professor of plant pathology in horticulture at the University of Illinois, Urbana.



BULK VOLUME, cm^3 in 100 cm^3 MIX

soil	sand	pores	mix
100	0	50	A
77	35	39	B
55	70	28	C
36	100	18	D*
25	100	24	E
15	100	29	F
0	100	36	G

*THRESHOLD

Figure 7. Water distribution patterns of different sand-soil mixtures in a drained putting green.

Take a knife to your grass. You may find it's choking itself.

Take a knife and cut out a small section of turf. Then take a look at the brown, dead material over the top of the soil around the blades of grass. This is thatch. And it may be choking your grass.

A small amount of thatch is desirable to protect tender shoots from the sun and hold moisture in the soil. But if you have more than a one-half inch build-up, it can keep air, water, and fertilizer from reaching the root zone.

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Water shortage theme of irrigation meeting

Maintaining grass and shrubs with scant water was the subject of the recent 15th annual Turfgrass Sprinkler Irrigation Conference at Lake Arrowhead, Cal., sponsored by the University of California Cooperative Extension and the sprinkler irrigation industry.

The theme was "Irrigation Technology for Tomorrow (and Today's Drought)". With golf courses in some areas cut to as little as 50 percent of the water they were using before, and Mayor Tom Bradley of Los Angeles calling for a 10 percent mandatory cutback in water use over the summer, the situation is becoming more and more serious in California.

William Wood, Jr. and Jewell Meyer, University of California, and Don Brooks of the Metropolitan Water District put California's water situation into perspective.

Planning that has taken place in southern California the last 50 to 75 years has resulted in four aquaducts bringing water into that area. Because of the drought, two of these are out of operation completely, a third has been cut back half or more, but the fourth is running at a capacity higher than even originally planned, according to Brooks.

California uses about 37 million acre feet of water a year, Brooks said. This is only about half of its actual water resources. With the other half locked up in wild river status, questions about land use planning are coming to bear. Public interest will play an important role in California's future land use laws, according to Wood.

Meanwhile, agronomists are showing how to become more water efficient. Don Parsons, Knollwood Golf Course, described the watersaving potential of Purr-wick greens.

Correct installation and performance of irrigation equipment was emphasized. This is very necessary in order to ensure efficient water use. How to manage with insufficient water was another key topic.

By showing how to look ahead to design for water shortages and using turfgrass cultural practices related to this, California extension service is educating its professional people to cope with drought now and to be prepared should it occur again. □

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 rhizome and root system. A dense, low-growing, leafy turf, Glade has an attractive medium to dark green color.

Glade Kentucky bluegrass is your guarantee of physically pure and genetically true seed. You won't be seeding annual bluegrass (*Poa annua*), short-awned foxtail or bentgrass when you plant Glade. Specify this healthy little beauty in your next lawn seed mix. It blends beautifully with fine fescues and other elite bluegrasses, persists in shade when many others weaken. Glade Kentucky bluegrass is available at your local wholesale seed distributor. Insist on Glade in your mix.

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Glade

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U.S. Plant Patent 3151

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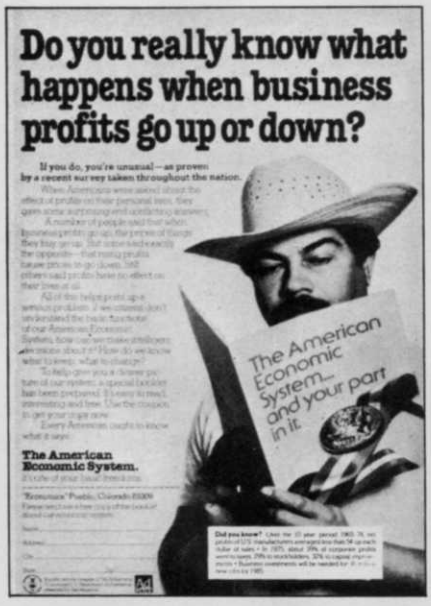

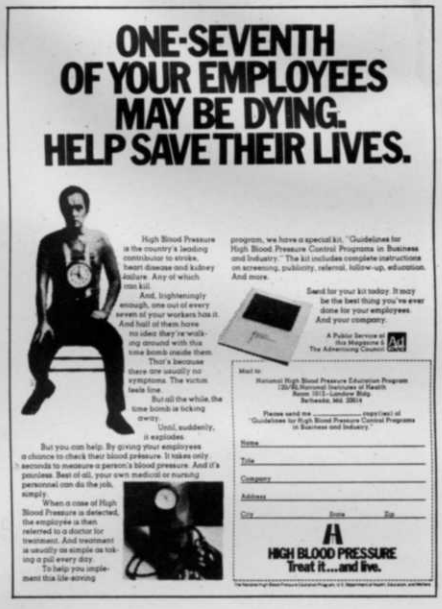

The Advertising Council is the biggest advertiser in the world. Last year, with the cooperation of all media, the Council placed almost six hundred million dollars of public service advertising. Yet its total operating expense budget was only $914,683, which makes its advertising programs one of America's greatest bargains . . . for every $1 cash outlay the Council is generating over $600 of advertising.

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The cost of preparation of this advertisement was paid for by the American Business Press, the association of specialized business publications. The space was donated by this magazine.

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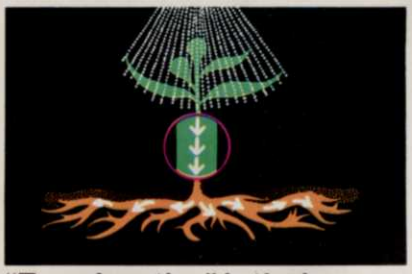

"Translocation" is the key.
Roundup is applied to the foliage of actively growing, emerged weeds. It's absorbed through the leaf surface and "translocated" throughout the entire plant. In this way, Roundup effectively destroys many weeds, including their roots and rhizomes.

Roundup® herbicide by Monsanto offers grounds maintenance management a tool that is powerful enough to destroy many of the toughest annual and perennial grass and broadleaf weeds in one application. And, with no soil activity.

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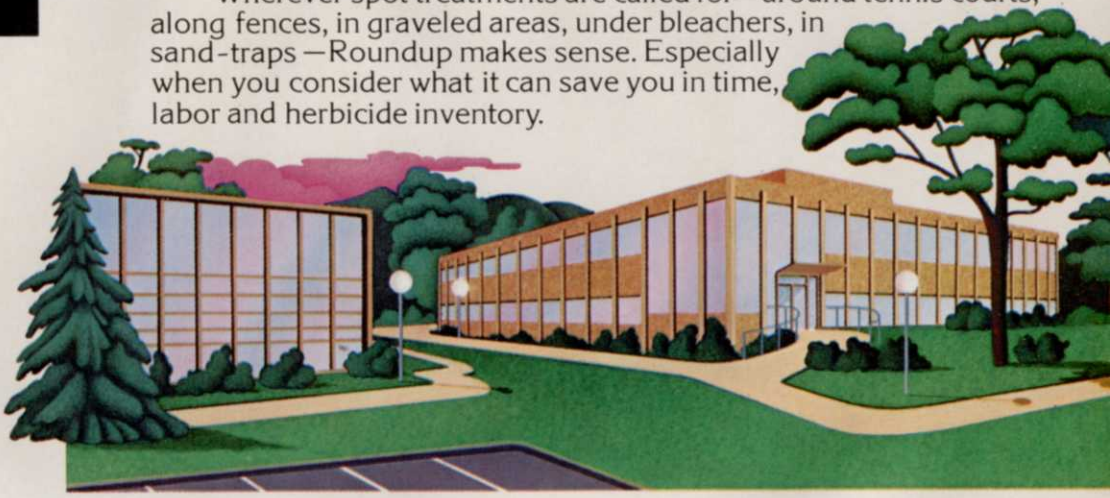

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Roundup. The herbicide that gets to the root of the problem.
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RINST 6/7

Roundup is well-suited to sensitive areas.
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LETTERS

Rebuttal

We are writing with regard to the first item reported in the "Government News" section of your February issue.

The facts in this instance are quite different than you imply. We give you below a summary:

1. Nowhere in the entire file does the word "inferior" appear; this is evidently the result of perfunctory literary license. The fact is that the people of The United States received $8.92 excess value in the seed lots concerned.
2. The actual amount of the settlement attributable to the Maryland instance was $305.56; not $2,750.00.

Inasmuch as The United States and Seaboard — and I quote "consented to the entry of this final judgment herein without trial or adjudication of any issue or fact or law herein and without admission of any liability on the part of said defendent in respect of any such issue" it would seem the item was published with questionable intent, rather than as information of use and interest to your readers.

Also, we are completely puzzled by your publishing this item without any attempt to contact us prior to publication in order to determine the veracity of the statements contained therein.

Alan Henry Hirch
Vice President—
Marketing
Seaboard Seed Co.
Bristol, Ill.

Ed. Note: Our apologies. It is never our intention to misconstrue the news. Obviously, there was an error made in interpretation by our reporter.

Thanks

I have received copies of your publication for which please accept my thanks. I have found it most helpful, and especially enjoyed your article in the April issue "OSHA-EPA."

Vito Russo
Landscape Superintendent
Cresthaven Enterprises, Inc.
Pompano Beach, Fla.

Error

An error occurred in my recent article "Understanding Slow-Release Nitrogen," which may lead to confusion. The caption for Figure 2 states IBDU was applied at 6 lb/N100 ft.^{2}. This is incorrect and should read 6 lb./N1000 ft.^{2}

James F. Wilkinson, Ph.D.
Director of Research
ChemLawn Corp.
450 W. Wilson Bridge Rd.
Columbus, Ohio

Another strong case for Standard

Now — Standard's highly popular 'Professional' model 4-golf-ball washer is available in 2 types of durable cases: **A new cast aluminum case — and the present Cycolac® case.**

The new case is of rugged cast aluminum with rust-proof, corrosion-resistant fuse coating.

It has the same basic design (matter of fact, the cases are interchangeable), the same ultra-modern good looks — and is available in the same 6 beautiful colors as the Standard Cycolac® case.

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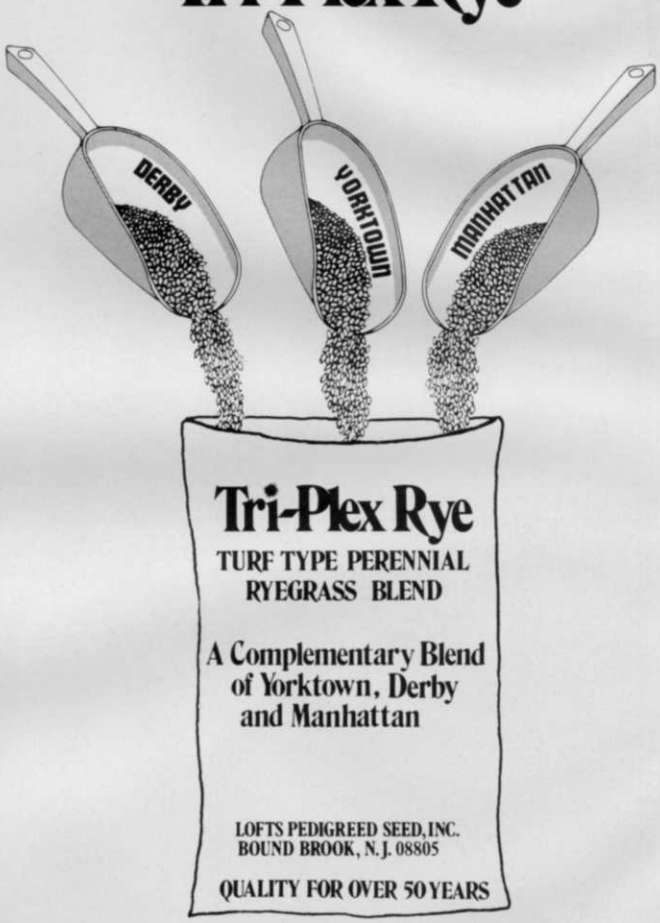

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Winter's toll on bermudagrass established

The past winter was one of the most severe on record, especially from the standpoint of turfgrasses, bermudagrass in particular. Some assessments of injury in the northern most limits for successful bermudagrass culture have estimated damages as high as 20-50 percent winterkill.

Many turf areas were either exposed to cold dry winds or were covered with a layer of ice. The exposed areas tended to suffer winter dessication while the ice covered turf may have suffered from ice encasement. Some ice related damage was observed on several golf course greens as a result of gouging the turf in an attempt to remove the ice cover.

Adequate levels of potassium and phosphorus are important in the winter survival of bermudagrass. Many areas sampled showed a deficiency. Soil tests also indicated that winterkill was greatest where the pH was lowest. When the pH drops below the optimum 6.5 for turf, the availability of potassium, phosphorus and other plant nutrients is effected.

When nitrogen was applied late in the fall to keep the grass green longer, winter hardiness was decreased. High nitrogen applied thusly stimulates plant growth at the expense of tissue hydration and decreased carbohydrate levels. Past winters have been relatively mild and dangers have been minimal. Not so this past winter!

Exposure also contributed greatly to the winterkill. The greatest amounts were observed on northern slopes where little or no snow accumulated. Heavily trafficked areas were obsered to suffer more damage than adjacent areas with little or no traffice.

Up until the middle of May it was very difficult to determine the extent of injury to a bermudagrass stand. In many cases, recovery of the bermudagrass comes from crowns or rhizomes instead of from stolons. This takes longer and resulted in extremely slow spring green-up in some areas. □

ARS releases findings from Beltsville Center

Bermudagrass mutagens

Mutagenic breeding techniques applied to bermudagrasses have resulted in 120 new mutagens. These are undergoing tests for winter hardiness, differential phytotoxicity to herbicides, differential mineral soil responses and other tests of turf quality and propagation characteristics.

Bluegrass hybrids

Three Kentucky bluegrass hybrids, selected for seed increase after second year test data, are being tested further. Open-pollinated progeny of 230 fineleaf fescues and 190 tall fescues are being evaluated under turf management conditions.

Chinch bugs

Methods for rearing and storing chinch bugs in the laboratory for evaluating turfgrasses for resistance have been developed. Preliminary tests are being conducted with several Kentucky bluegrass cultivars to determine the most efficient and reliable screening procedures. So far, these tests have shown that a large reduction in top growth occurs before other visible symptoms of injury appear.

Crabgrass control

Plots established in a 10-year old turf in 1974 were preemergently treated three successive years for crabgrass control. The turfg was mainly red fescue with a little Kentucky bluegrass. Seven herbicidal treatments controlled crabgrass adequately. These included benefin, bensulide, butralin, DCPA, profluralin, and prosuffalin. Stands of turfgrasses appeared to be somewhat thinner and/or slight discoloration was noted in some years within a month after treatment with bensulide, butralin, and profluralin. The proportion of Kentucky bluegrass by September of the third year increased from 3 percent in the check plots to 30 to 45 percent in plots treated with benefin, butralin, DCPA, and profluralin.

A trend toward increases of Kentucky bluegrass in other treatments was observed, but was not statistically significant.

Winter hardiness

Arizona common, Tufcote, Tifgreen, and Midiron bermudagrasses are being evaluated to determine winterhardiness and turf quality as related to two potash levels and three nitrogen rates and sources. Treatments consist of 3, 6 and 9 lb. N/M applied as NH_4NO_3 (1 lb. N/M May-June-July, and 1 or 1½ lb. N/M each month from May to October) or 9 lb. N/M as UF or IBDU in May. Muriate of potash is added according to soil test results to maintain a high (140-160 lb. K_2O/A) and a low (60-80 lb. K_2O/A) potassium level. Potassium applications are made in late summer when night temperatures became cooler but before the first frost.

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Meeting Dates

Fourth Annual Southeastern Fluid Fertilizer Conference, Myrtle Beach Hilton, Myrtle Beach, S.C. Aug. 17-18.

National Hardware Show, McCormick Place, Chicago, Ill., Aug. 22-25.

OSU Turfgrass Field Day, OSU turfgrass research plots, Columbus, Ohio, Aug. 24.

URI 46th Annual Turfgrass Field Day, URI Turfgrass Research Farm, Kingston, R.I., Aug. 24.

Texas Society of Landscape Architects Annual Awards and Seminar, Stouffer Hotel, Houston, Tex., Aug. 27.

International Pesticide Applicators Association Convention, Thunderbird Motor Hotel, Jantzen Beach, Portland, Ore., Sept. 7-9.

1977 Mid-Atlantic Fluid Fertilizer Conference, Host Inn, Harrisburg, Pa., Sept. 14-15.

GCSA of New Jersey Annual Turfgrass Equipment, Irrigation and Supplies Field Day, Hopewell Valley Golf Club, Rt. 518 Spur, Hopewell, N.J. Oct. 4.

Northwest Turfgrass Conference, Salishan Lodge, Glenedon Beach, Ore., Oct. 5-6.

5th Transworld Home Horticulture Exhibit, Chicago Expocenter, Chicago, Ill., Oct. 14-17.

Southern California Turfgrass Council Annual Turfgrass Equipment & Materials Educational Exposition, Orange County Fairgrounds, Costa Mesa, Cal., Oct. 19-20.

Washington-North Idaho Seed Association Convention, North Shore Motor Hotel, Coeur d'Alene, Idaho, Oct. 28-29.

ALCA Maintenance Contractors Symposium, Northlake Hilton Inn, Atlanta, Ga., Nov. 3-4.

American Society of Agronomy, Crop Science Society of America and Soil Science Society of America Joint Meeting, Los Angeles Bonaventure and Hilton Hotels, Los Angeles, Cal., Nov. 13-18.

Association of Physical Plant Administrators of Universities and Colleges Convention, Radisson Hotel, Minneapolis, Minn., May 21-24.

Stanford Seed has your winter wonderwear.

This winter, overseed with Pennfine. We call it our Winter Wonderwear overseeding program, because Pennfine is the fine-textured ryegrass that stays with you all winter, making your golf course more attractive and more playable.

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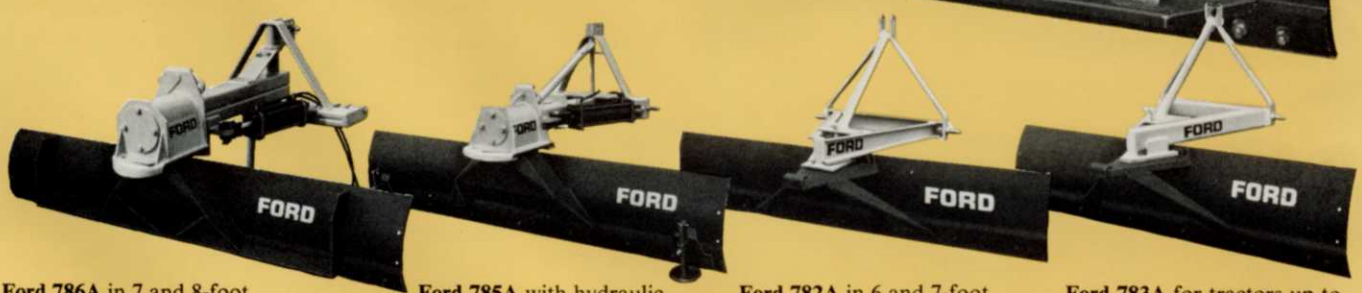
Ford 788A—8 and 10-foot widths with swing offset for tractors up to 150 drawbar horsepower. Optional swing, tilt and angle hydraulics from tractor seat.



Ford 786A in 7 and 8-foot widths is designed for tractors up to 90 drawbar horsepower. Seven angle settings and manual swing offset standard. Hydraulic swing offset optional.

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Ford 782A in 6 and 7-foot widths is designed for tractors up to 35 drawbar horsepower. Five angle settings. Reversible cutting edge.

Ford 783A for tractors up to 45 drawbar horsepower is offered in 6 and 7-foot widths. Five angle settings.

FORD TRACTORS

Ford

Circle 121 on free information card

DDT alternative shows promise

Ever since the publication of Rachel Carson's now famous book, "Silent Spring," and the subsequent government ban on DDT, scientists have been looking for a substitute for the insecticide which would satisfy both agriculturists and environmentalists, i.e. one which would effectively control pests but have minimal side effects on the environment.

Brigham Young University Professor Gary Booth thinks he's as close as anybody to helping find the substitute. For the past seven years, Dr. Booth has experimented with the insectidice known as Dimilin and he says it could replace significant uses of the now outlawed DDT with little environmental effect.

According to Dr. Booth, the chemical appears to give excellent control on at least 30 species of insects, including several species of mosquitoes, cotton boll weevil, cabbage butterfly, Colorado potato beetle, tussock moth, cabbage loopers, stable fly, horn fly, house fly, hemlock looper and several soybean insects.

The Environmental Protection Agency has already granted registration of Dimilin for use on the gypsy moth, one of the serious defoliators of America's northeastern forests. Petitions to use Dimilin on soybeans, cotton and mosquitoes are now pending before the EPA. Dr. Booth is hoping for approval sometime this year.

Dimilin is a relatively simple compound as far as insecticides go. It was discovered by scientists in the Phillips-Duphar labs in Holland who were trying to put two very effective herbicides together to make a topnotch weed killer. The results wouldn't kill a single weed, but proved to be very effective on insects.

Dimilin acts by interfering with the synthesis and desposition of chitin, a structural substance that is one of the main components of insect exoskeletons. As a chitin inhibitor, Dimilin interferes with the formation of the larva's cuticle. At the time of molt, the treated insect's cuticle is improperly formed, which results in death from rupture of the new malformed cuticle. The insect simply starves to death.

In the United States, Dimilin is being developed by the Thompson-Hayward Chemical Company. Dr. Booth has been responsible for about 85 percent of the environmental research on Dimilin.

He was able to speed up the research required by the EPA on new insecticides by testing Dimilin in miniature ecosystems, a revolutionary procedure he helped develop during his post-doctoral work at the University of Illinois under the direction of Dr. Robert L. Metcalf, who conceived the model ecosystem concept.

The miniature nature systems with land and water surfaces, were set up in small aquariums. Then plants and animals were treated with Dimilin and introduced to start a miniature, seven-step food chain similar to what is found in the environment. After 30 days, measurement were taken to determine how much of the insecticide was dissolved and excreted, which organisms were likely to be affected by Dimilin and how degradable the new material was.

"It takes only 30 days in the laboratory to find out what a new insecticide will do to the environment," Dr. Booth explained. In contrast, DDT was used 20 years before mankind began to realize it was doing more to the environment than killing pests.

After Dimilin passed the safety tests in the model ecosystems, Dr. Booth began field tests. During his seven years of research with Dimilin, he has conducted numerous studies on the environmental effects of the insecticide and he says it is the safest compound he has ever studied.

Many water animals were tested, including the blue claw and fiddler crab and grass shrimp, with no bad effects. Extensive tests were also

Continued on page 52

DDT substitute being studied

Continued from page 51

conducted on quail, frogs and snails and no negative results were found.

Dimilin was also tested on forests around Le Grande, Ore. to determine its effect on the tussock moth, which is deadly to douglas fir trees, and on Utah Lake to observe its effects on nesting birds. Again, the results were negative.

Dr. Booth explained that Dimilin has minimal environmental effect because it breaks down very rapidly in soil and water, unlike DDT which was banned because it remains virulent for years and can be passed up the food chain from plant to animal to man and even from mother to child. He found that half of the Dimilin which was placed in the soil and water was gone in less than two weeks.

Chemically speaking, Dimilin, known also as diflubenzuron, breaks down into difluoro benzoic acid, plus p-chlorophenyl urea, plus p-chloroaniline, none of which are persistent nor are there any known problems with any of them. On the other hand, DDT breaks down in the environment into DDE which causes egg shell thinning in some raptor birds. DDE is also very stable.

Environmentalists have been concerned about the effects Dimilin will have on non-target organisms. At normal use levels, between .1 and 1.0 parts per million, Dimilin results have been favorable.

Dr. Booth says Dimilin is safe on humans. Since he could not test the insecticide on humans, he ran tests on pregnant mice, which are warm-blooded like man, and he found no transfer of Dimilin through the mother to the babies.

Dimilin has not affected the yield of any crops that have been studied except to increase the yields because the insects were controlled. Crops currently being investigated extensively are cotton, soybeans, corn, cabbage and apples.

Dr. Booth admits that there are some disadvantages to Dimilin. One is that it doesn't act the same on all insects. For example, it is effective on tussock moth but ineffective on spruce bud worm. However, he noted that there is no compound made that is effective on all pests.

Also, Dimilin is not as persistent as he would like. For example, it is gone in water in a couple of days. Therefore, more sprayings are necessary.

However, Dimilin does appear to have long-lasting effect on insect control because it prevents the deposition of egg masses which are the source of the following year's infestation. □

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Effective
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Products

A 3000 BTU output propane catalytic aerial bucket heater is now available from the T. A. Pelsue Company. The new model 1575 "Stratalytic" heater can quickly be mounted anywhere around the top rail of any aerial lift bucket. It is fueled by a truck-mounted propane bottle, or from an optional disposable day bottle. The heater meets every safety requirement with A.G.A. approved regulator, safety valve and thermocouple control.

Circle 701 on free information card

The new Model 697-A Soil Tester by Hellige provides quick, accurate tests and soil treatment instructions for the 14 most important chemical soil elements. The scientific test methods were devised by Prof. E. Truog, chairman, dept. of soils, University of Wisconsin.

Reagents and all necessary equipment are provided for making phosphorus, potassium, pH, calcium, magnesium, chlorides, nitrates, ammonia sulfates, aluminum, humus, manganese, nitrite nitrogen, ferric iron and plant tissue tests. Full instructions are given for correcting improper soil conditions.

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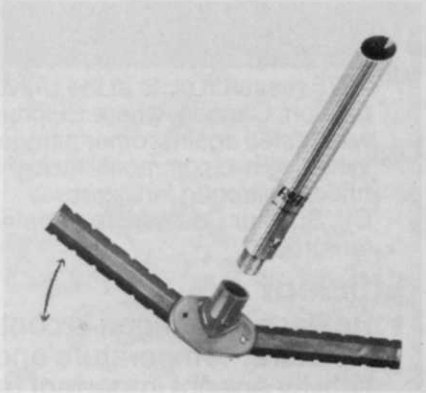

Kee Manufacturing Co. has introduced a hand-operated "Underwater Weed Cutter". The specially designed blades pivot forward and backward each time you change the direction of movement of the cutter. This allows the uncut weeds to slip off the ends of the blades and avoids fouling the cutter.

Circle 703 on free information card

Homelite has introduced a gasoline-powered chain saw model with triaxial anti-vibration system, deluxe safety hand guard and single

♦ For ad on preceding page circle 101 on free information card

trigger with safety-interlock.

The VI Super 2 saw is equipped with a powerful 1.9 cubic-inch displacement engine. The new model features Homelite's exclusive Safe-T-Tip anti-kickback device that fits over the nose section of the guide bar. It has a 14-inch cutting attachment.

Circle 704 on free information card

Omega, a fine-leafed perennial ryegrass variety, is now available through Garfield Williamson Inc.

Combining the deep green appearance of a bluegrass with the rapid germination of a ryegrass, Omega is recommended for upgrading established turf and seeding bare spots, slope, traffice areas and other hard-to-grow places.

Although optimum performance occurs in medium to full sun, Omega is also an excellent component of heavy shade mixtures, blending uniformly with other desirable lawn grasses. Omega also has qualities of drought and disease resistance, cold hardiness, minimum maintenance and adaptability to a wide range of growing conditions.

Omega is available in 25 and 50 lb. emblem bags. Blue tag certified — *Poa annua* free.

Circle 705 on free information card

A new TrueLine pressure spray-type striper developed by Trusco Mfg. Co. uses CO_2 pressure and has a 7-gal. paint tank for striping large parking areas, traffic lanes, and all athletic fields. The paint and pressure tanks are mounted on welded chassis that ride on four ball bearing wheels.

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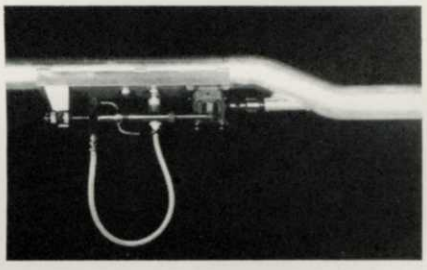

A water-powered chemical injector for injecting liquid and soluble fertilizers and pesticides into an existing or new irrigation system has been introduced by Clearwater Engineering.

The unit has a variable-capacity positive displacement pump, which is powered by the water flowing through an irrigation line. Since the volume and pressure of the flow of water controls the speed at which the injector operates, constant water-to-chemical ratio is maintained.

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2 — 50' AERIAL BASKETS — 65 Aerial basket, 2 Asplundh brush chippers. 1 Vermeer tree mover, 1 Vermeer stump cutter. Small hydraulic crane, 2 John Bean sprayers, ten ton tri-axle trailer, 1 Prentice log loader, tractor with front end loader and Bobcat loader, Parkway Tree Service, 120626 W. Cherry, Wauwatosa, Wis. 414 257-1555.

1964 ASPLUNDH aerial bucket truck, 55' working heights; 1700 International Load Star; 5 speed box with Hi and Lo range, 4-wheel drive with built in 12" chipper and hyd. dump box, also built in air compressor and aux. engine, excellent condition. 1966 and 1970 F350 Ford with chipper dump box and side tool boxes. 1969 GMC split dump chipper truck. 1960 Ford with built in chipper and hydraulic dump bed. H & M Tree, pictures available. Phone: 707 459-2013.

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JOHN BEAN 100-E Roto Mist, excellent condition. Ideal for shade tree spraying-mosquito control. $2500. Smith Tree Service, 1809 Washington Ave., Portland, Maine 04103. Phone 207 797-4769.

FOR SALE: Used hydro-ax's, skyworkers and Servi-Lifts, all heights. Call P. C. Gould Sales Company, 203 767-1636 and ask for Jeff or Phil Gould.

FOR SALE 1973 Bowie, 1500 gallon, hydro-mulcher, excellent condition, low hours. Call Flowerland Garden Center, 4181 West 120th Ave., Broomfield, Colorado 80020, 303 466-6761.

FOR SALE Several 40 to 50-foot Skyworkers. One 32-foot working height Sky-jacker and truck. Phone: Aerial Lift Repair, Inc. 203 878-0695.

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The BROADMOOR
Colorado Springs, Colorado

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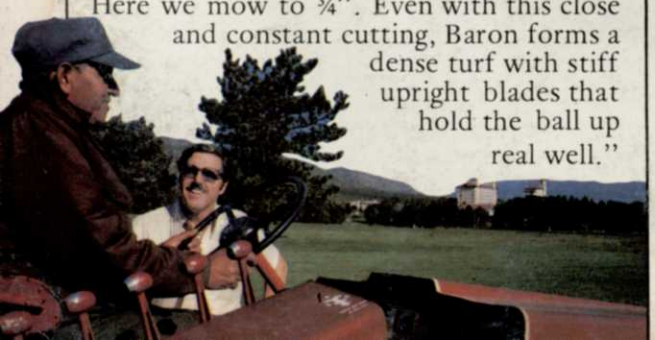

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*The South Course at The BROADMOOR was designed by Edwin B. Seay with Arnold Palmer as Consultant.

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