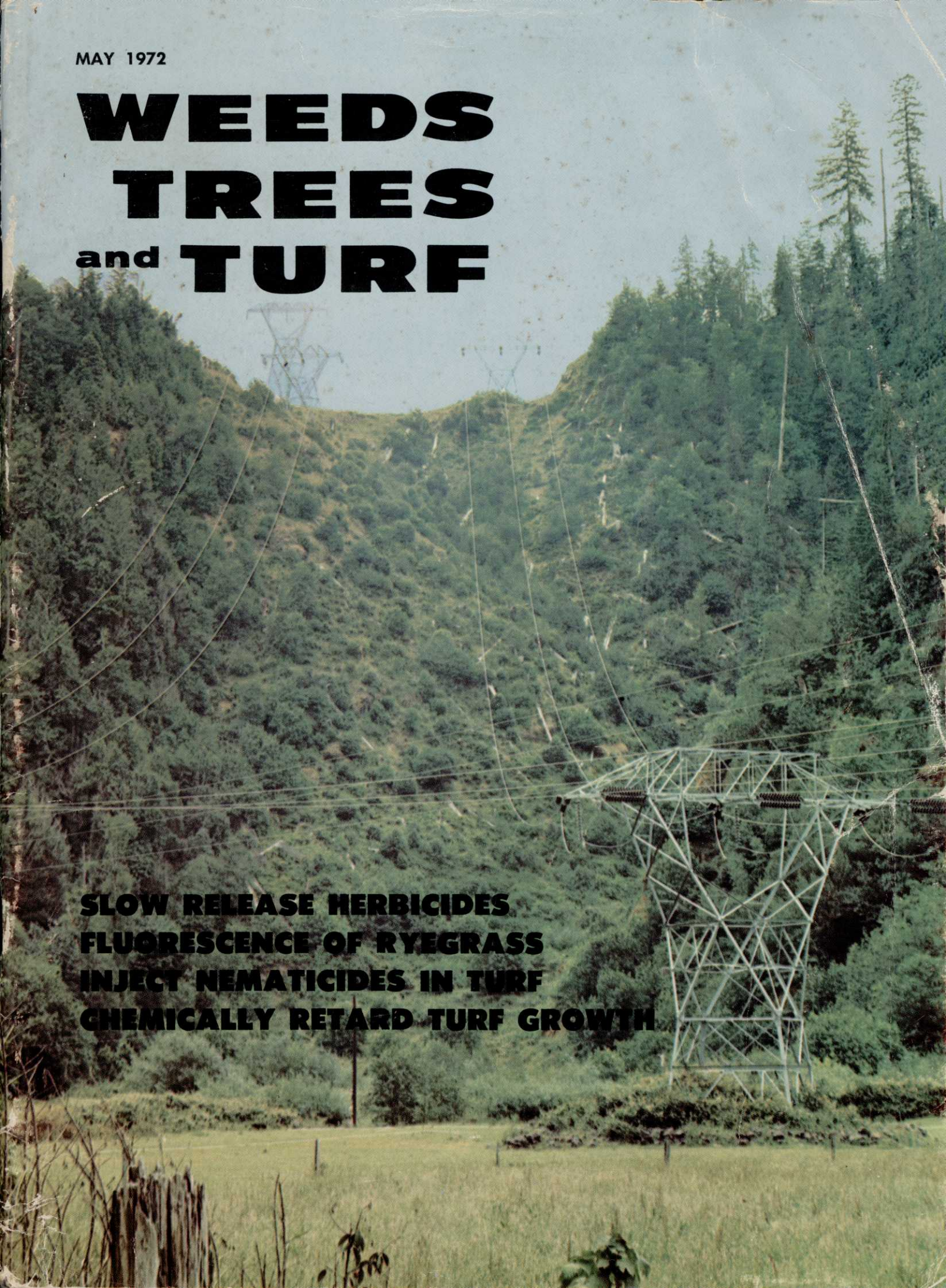
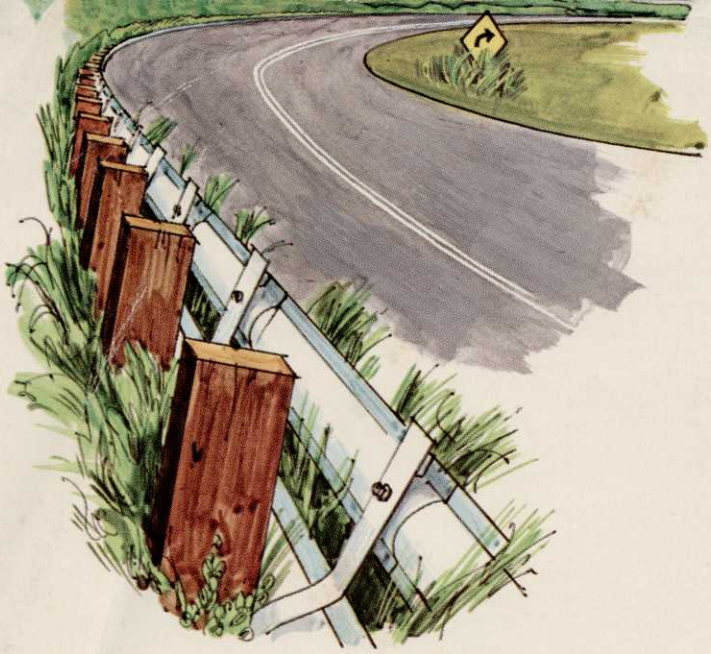
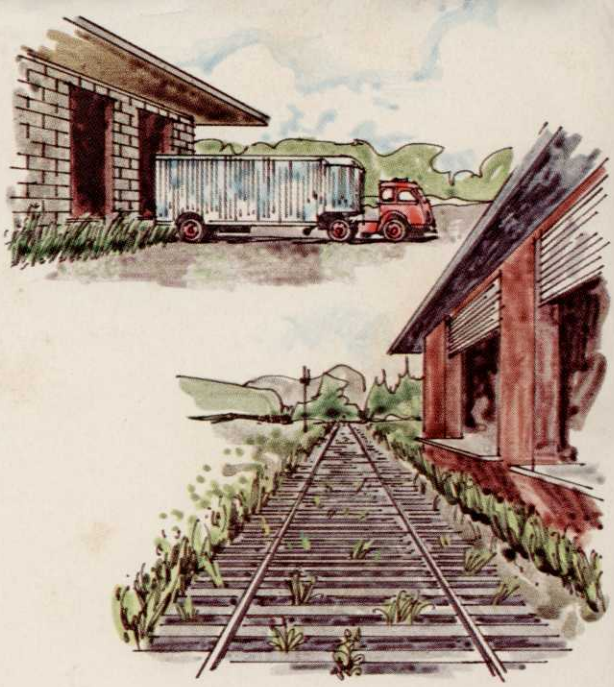
MAY 1972

WEEDS TREES and TURF



SLOW RELEASE HERBICIDES
FLUORESCENCE OF RYEGRASS
INJECT NEMATICIDES IN TURF
CHEMICALLY RETARD TURF GROWTH





Needless maintenance costs are growing all around you.

Eliminate weeds from your facilities and you'll slash needless maintenance costs. Weeds trap moisture which makes equipment deteriorate faster. They also interfere with work crews...create fire and safety hazards...contribute to air pollution by releasing pollen.

The most effective way to eliminate weeds is a chemical control program based on Du Pont HYVAR bromacil weed killers, or formulated products containing bromacil. Sprayed on early in the spring, a single application of bromacil controls weeds all year long. No need for expensive cutting by hand or machine.

Such a program can be handled by your own maintenance staff. Or, better still, let a professional custom applicator handle the job. He's a weed control expert who will design and implement a program that fits your needs exactly.

Whichever way you go, do-it-yourself or custom application, the cost is much smaller than mechanical or hand-trimming methods.

Starting your program early is important. Call your Du Pont distributor or custom applicator now for complete details on Du Pont industrial weed control products and programs.

With any chemical, follow labeling instructions and warnings carefully.

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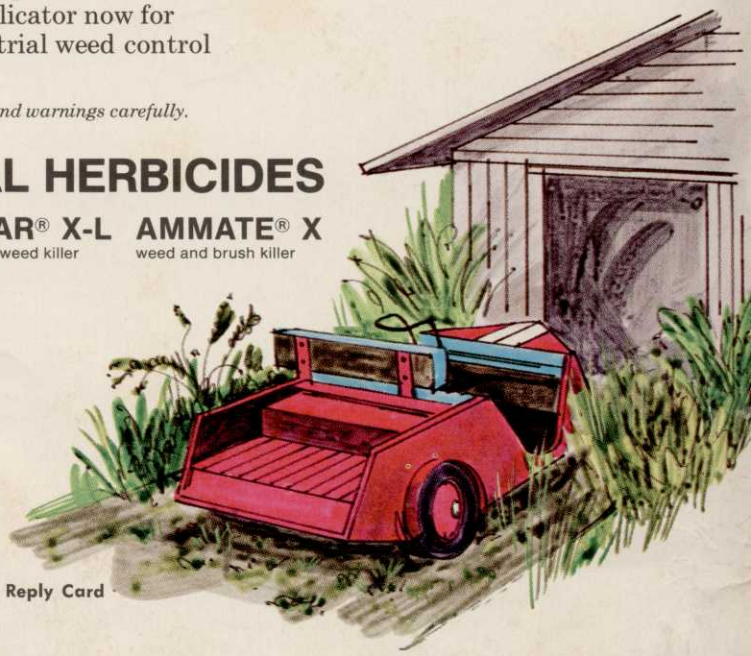
INDUSTRIAL HERBICIDES

HYVAR® X bromacil weed killer

HYVAR® X-L bromacil weed killer

AMMATE® X weed and brush killer



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Now! Because you asked for it! A small, super-power lightweight specifically designed for the professional cutter!

STIHL 031 AV

According to recent production figures, we can now add

"World's largest Chain Saw Manufacturer"

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"World's First and Finest Chain Saws"

and much of this growth is due to you . . . the "professional" cutter.

Your insistence upon STIHL quality, performance and dependability has been reflected in our constantly growing chain saw sales through-out the world.

When it became obvious that you wanted a small, handy "powerpacked" lightweight, our engineers used their experience and skills to bring you the new STIHL 031 AV. Designed and built for the professional cutter!

Like our larger models, it includes our patented STIHL AV anti-vibration system for longer, easier cutting with less muscle fatique, a "lifetime" cylinder, all-position carburetor, automatic chain oiling and many other fine features.

Come try the new STIHL 031 AV and see how close we have come to giving you just what you wanted in a lightweight.

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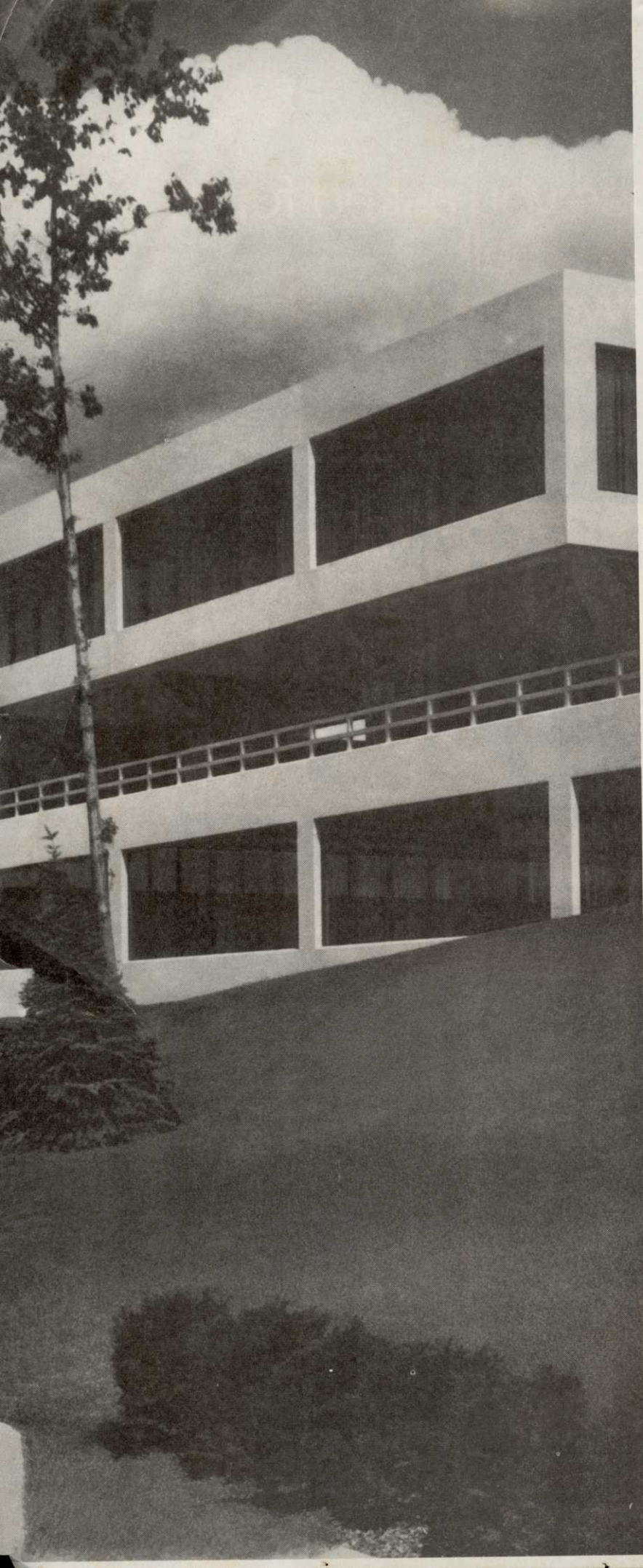
STIHL®



Now lower-cost, better, safer crabgrass control with Betasan®

Selective Herbicide

Betasan is the leader for sure crabgrass control with one early application on your turf. Safer to use than many herbicides, without any turf burn, Betasan at this year's new, low price saves you $8 to $10 per acre.

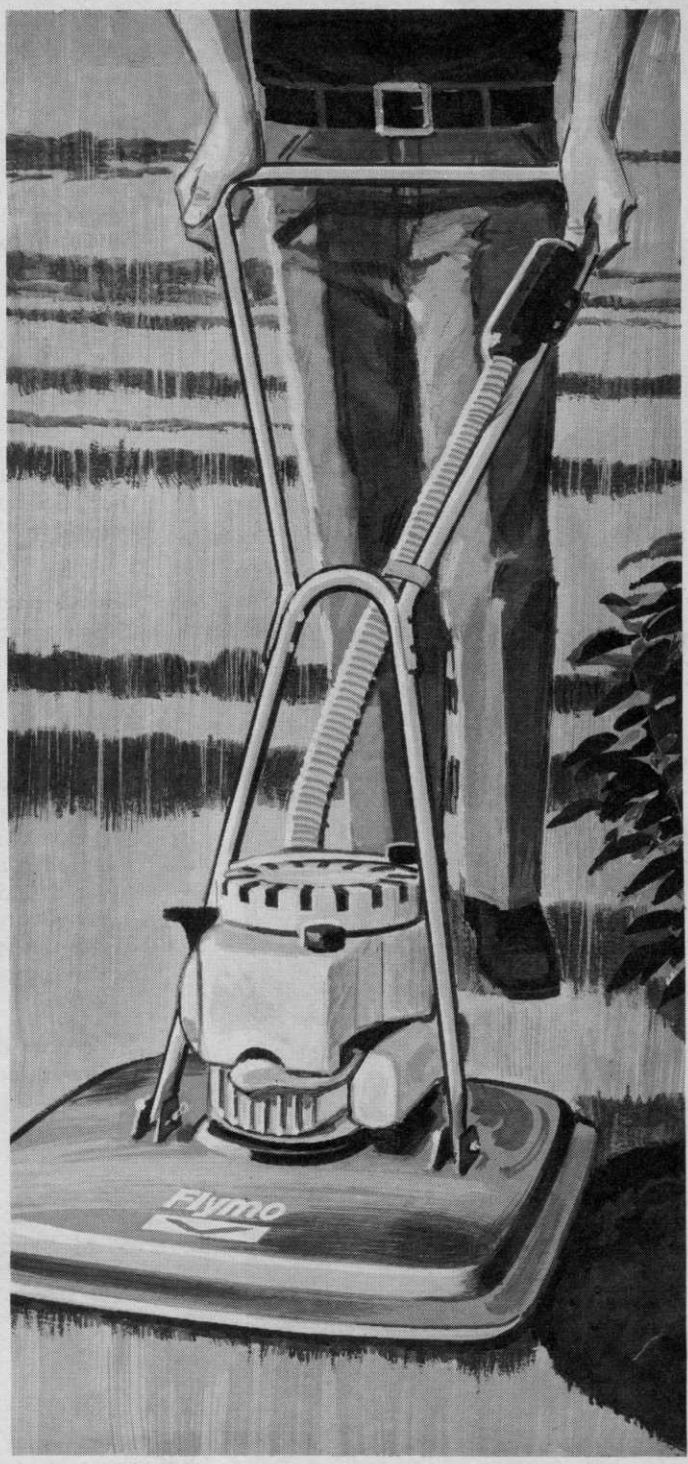
Betasan also controls goosegrass and barnyardgrass along with several annual broadleaf weeds. Remember too, that Betasan controls poa annua that germinates in late winter or spring.

Keep your grass areas clean of crabgrass, goosegrass and poa annua with Betasan at a new low cost. See your distributor now for turf-care products made with Betasan. Stauffer Chemical Company, Agricultural Division, Dept. HD, Westport, CT 06880.

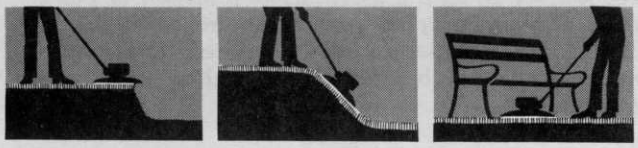
Betasan from Stauffer CHEMICALS

It's here! The Flymo® revolution

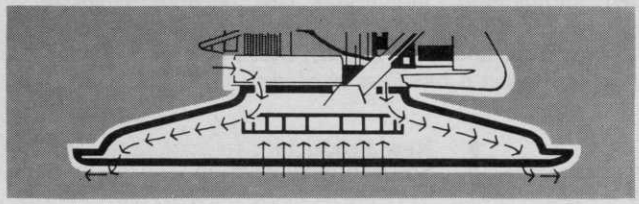
the world's only air-cushion mowers now in the U.S.



FLYMO FLOATS—TRIMS CLEAN AND CLOSE



Edgings, traps/Steep inclines, bunkers/Under benches, close to trees.



The Flymo impeller sucks in air and presses it to the edge of the hood covering the cutting blade. An air cushion is formed, lifting the machine and making it float. Under the cutting blade the upward return airstream raises the grass so that it is cut to the same height.

Proven in golf-course and institutional grounds maintenance throughout the world, the Flymo rides on a stable, controllable cushion of air, making the irregular maneuvers of trim and clean-up work faster and easier than ever before. And without scalping. No wheels to limit direction of movement or height above ground. Deep and wet grass no problem. Cutting height easily adjustable from less than ½" to 2½" or higher. Flymo 19" and 21" models with 4 and 5 hp motors. A nation-wide network of distributors and dealers stands behind your Flymo machine with prompt, dependable service.

Flymo Division, Keltec Inc.
P. O. Box 939, Elkhart, Indiana 46514
Telephone 219/293-8661

Send complete details on the Flymo aircushion mowers and name of my nearest Flymo dealer/distributor.

NAME_____

ORGANIZATION_____

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For More Details about Stauffer Chemical, Circle (105) on Reply Card

For More Details Circle (112) on Reply Card

WEEDS TREES and TURF®

Volume 11, No. 5 May, 1972

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The Cover

Utility rights-of-ways must be maintained to keep unwanted vegetation from encroaching on high-investment power lines. Spraying these areas with chemical protectants will keep vegetation under control. Keeping the public informed about the need for weed and brush control can be an important step in getting the job done. This month's cover ties closely with the article "The Public Relations of Public Spraying" that appears on page 12.

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Introducing Krovar I

a new one-two punch for tough weed problems

KROVAR I is really two great herbicides in one—bromacil and diuron. Each chemical has certain advantages over the other, and together they produce a single product with many superior advantages . . .

Controls more weeds and grasses.

KROVAR I controls a wider spectrum of weeds and grasses than HYVAR® X or KARMEX.® It even gets tough ones like water grass, groundsel and filaree. Applied at higher than normal rates, it actually suppresses the tougher perennials, such as bermuda grass, salt grass and yellow nut grass.

Gives you an edge on the weather.

In high-rainfall areas, KROVAR I doesn't dissipate as rapidly. In low-rainfall areas, it takes only a little moisture to start KROVAR I working against weeds. Result? Better control in a wide range of rainfall.

The interval between application and rainfall is less critical than with other residual herbicides. KROVAR I effectively reduces weather as a factor in weed control.

Economical.

KROVAR I gives such effective, long-lasting control that it substantially reduces the need for follow-up sprays later in the season. In many areas, one application takes care of weeds and grasses all season long. Additionally, KROVAR I used in retreatment extends the desired controls and reduces the need for "touch-up."

Large safety factor.

When used as directed, KROVAR I is safer to trees, shrubs and other desirable vegetation than "straight" HYVAR products. It's non-volatile, non-flammable, non-drifting.
Pick up a supply of KROVAR I soon and specify it in your orders for custom application.

With any chemical, follow labeling instructions and warnings carefully.

DU PONT REG. U. S. PAT. OFF. **KROVAR® I** WEED KILLER

For More Details Circle (138) on Reply Card

Editorial . . .

The Hat Trick

A recent survey of six major classifications of readers of WEEDS TREES and TURF confirms what advertisers and industry market people have thought for some time. Our readers perform many occupational jobs.

While this in itself offers convincing proof that the Green Industry is comprised of people who are "jack of all trades" we also find that these same people are professional masters of these trades, too. Survey data representing 21.4 percent of 3500 questionnaires mailed indicates that of 14 occupations listed WTT readers are involved in part or all in the performance of their jobs.

Consider the **golf superintendent.** The data shows that his primary job is turf care and management. Nothing surprising. Yet he is also concerned with aquatic weed control, brush control, tree care and planting, soil preparation and to a lesser degree pool care and tennis court maintenance. Likewise, **tree care companies** are mostly involved with tree care and planting, but also wear hats which include brush control, sod installation, turf care and management, irrigation and weed control.

It is interesting to note who is the biggest group of hat jugglers. **Parks and Grounds maintenance superintendents** rank first with over 70 percent wearing six occupational hats to accomplish their job. **WEEDS TREES and TURF grounds managers** consisting of supervisors and managers in areas of vegetation care at armed forces installations, airports, colleges, shopping centers, cemeteries, athletic fields, etc., appeared next with over 50 percent having 10 occupational chapeaus in their lockers.

Contract applicators and **rights-of-way maintenance personnel** are also multi-occupational, but to a lesser degree. Their strong areas are in chemical application and brush control.

What else can be learned from this survey? Nearly all occupational hats cover vocations that are service oriented. Indeed, professionalism within the Green Industry must be measured by services rendered. The opportunity to diversify and wear more occupational hats also carries the responsibility to perform each job in a professional way. Poor service or repeated call backs only creases the hat of the occupation represented. The well-informed individual who regularly increases his knowledge of chemicals, equipment and techniques will be better able to diversify his operation and maximize profits throughout the year.

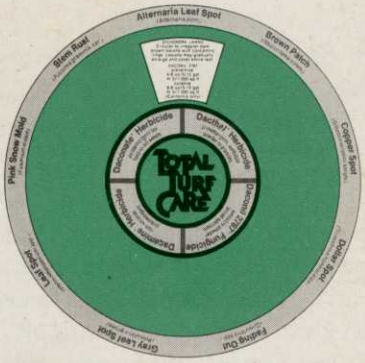
Dacamine®... rough on broadleaf weeds.

Dacamine postemergence herbicide controls problem broadleaf weeds . . . even stubborn perennials like dandelion, plantain, thistle.

Yet there's no danger from volatility to valuable plants nearby. This means you get the weed control you've been looking for, but Dacamine doesn't jump up and move across the fence on a hot day. Dacamine combines the weed killing power of an ester with the safety of an amine herbicide.

A special oil soluble, water emulsifiable formulation helps Dacamine penetrate waxy weed foliage. Dacamine moves all the way to the roots, killing the whole weed for good.

Send the coupon for helpful Total Turf Care dial on turf diseases and weeds. Helps you identify your turf problem and find the solution. *BE DIAMOND SURE!*



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Gentlemen:
Please send me a Total Turf Care dial.

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Position _____

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City _____ State _____ Zip _____

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Government News / Business

Senators Claiborne Pell (D., R. I.) and Daniel Inouye (D., Hawaii) have dusted off two legislative bills which propose metrication in the U.S. One Bill, from the Administration, would not make metrication mandatory; the government would provide no special incentives for easing conversion by companies and industry would set its own timetable under an independent metrication board. The Pell-Inouye Bill would set a ten-year deadline for conversion and assign the government to police the process for special tax benefits.

The Institute of Paper Chemistry of Appleton, Wisc. recently presented the U.S. Department of Agriculture with a 6-foot quaking aspen tree. The tree was one of the first to be produced in laboratory glassware, the result of 6 years of research in tissue culture. The tissue culture process is a nonsexual, vegetative method of reproduction. Starting from small pieces of cambial plugs, which develop calluses when combined with plant hormones, a completely new individual, genetically identical to the parent plant, is developed. The entire procedure -- which can produce a 3-foot tree in 6 or 8 months -- occurs in the laboratory completely isolated from wind, rain, sunshine and soil.

SAFE USE program is now into its second year. This is a cooperative program among states, industry, USDA and EPA to insure that users of parathion use the insecticide safely. USDA's Animal and Plant Health Service is coordinating the program. Compliance will enable health officials to determine areas of heavy use. Program relies on a brief form to be completed by seller and purchaser. The program is directed to ethyl parathion rather than methyl parathion.

Midwest Research Institute, in a recent study for EPA, found that 2,4-D, properly applied at concentrations to control sagebrush growth, did not persist in soil or cause toxicity to man, domestic animals, game or fish.

Arsenate herbicides will be studied on salt marsh ecosystems to determine if residues reach tidal marshes and what, if any, effects they have on marine life. The USDA has signed a 3-year, $30,000 grant to the Alabama Agricultural Experiment Station.

Expect state highway departments to become more involved in Federal highway plans. The Federal Highway Administration has announced a new approach for its research and development program. Called "Federally Coordinated Program of Research and Development in Highway Transportation," the aim is to utilize the talents and capabilities of FHWA field offices, state highway departments, universities and private research organization in the search for solutions and in the development of new techniques.

Improve your maintenance game

With the right clubs, a golfer can cut strokes from his game. And add power to his swing.

With the right maintenance products, a caretaker can improve his performance, too.

Dolge makes everything you need to achieve the best results, outdoors and in. With less labor. At less cost.

For example: *Tote* can kill any weed it hits; is non-poisonous. *E.W.T.-Plus* is a selective weed-killer. *Penetrate* improves soil porosity. *Lake Dye* colors ponds blue. *Anti-Dessicant* protects turf from drought and snow damage. *Boost* detergent-degreaser cleans machinery. Dolge also supplies famous fungicides.

Whatever your grounds-and-clubhouse maintenance problems, call on Dolge, the *Complete* Caretaker.

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DOLGE
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The C. B. Dolge Company
Westport, Conn. 06880 • (203) 227-9591

Outdoors & In—Dolge. The Complete Caretaker

6 Stroke-Savers from DOLGE

1 TOTE non-poisonous weed killer for use where no growth whatsoever is wanted. Kills annuals, biennials, perennials on parking lots, drives, walks, gutters, courts. Finishes roots, stops seeds, sterilizes soil. 40 gallons of Tote in 60 or more of water cover a whole acre.

2 E.W.T.-PLUS selective weed-killer finishes broad-leaved weeds—kills dandelions, plantain, mouse-eared chickweed, even poison ivy—does not harm good grasses. Amine formulation: non-volatile; does not "jump" to flower beds or shrubbery.

3 PENETRATE natural, organic soil improver. Works through compacted soil; lets air, water and nutrients go deeper. Promotes deeper, stronger root growth. Encourages vigorous, beautiful turf, shrubs, trees. Prevents soil erosion and puddling of surface water. Speeds germination of wanted vegetation.

4 LAKE DYE a safe, non-toxic blue water dye for lakes, ponds, water hazards. Colors to shade of blue you desire. Apply 2 pounds to the acre, 4 to 5 feet deep. Harmless to wild life—swans, ducks, geese, fish, frogs. Harmless to grass too. Compatible with fungicides, insecticides, turf chemicals.

5 DOLGE ANTI-DESSICANT protects turf grasses and broad leafed evergreens against drought and snow. Allows plants to breathe, yet prevents loss through water transpiration. Guards against summer scald and plant shock, too.

6 BOOST detergent-degreaser for machinery. Spray or mop it on mowers, tractors, carts; hose off: clean! In the clubhouse, Boost is a real handyman for extra-heavy cleaning jobs. Great on concrete floors.

Write for your free sample copy of CLEANUP, Dolge's indispensable Bi-Monthly source of product and service news about the industry.

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ON TARGET

Foamspray™

YOU CAN SEE THE DIFFERENCE

GROUND BOOM

AERIAL

INDUSTRIAL

Foamspray's foaming adjuvant, for herbicides and pesticides, aids in reducing spray drift and evaporation. Provides better coverage with accurate placement of materials.

IN ADDITION:

Foamspray will *LOAN* you aerial and ground boom foaming nozzles. Easy to install on all conventional sprayers capable of 40 PSI pressure. These nozzles were developed specifically for Foamspray foaming adjuvant.

See your nearest Foamspray Products distributor, or mail in the coupon below, for complete details.

Northwest Occidental Chemical Co., **West** Monterey Chemical Co., **Midwest** Thompson-Hayward Chemical Co., **Northeast** Stauffer Chemical Co., **Southwest—South & Southeast** Helena Chemical Co. (West Helena, Ark., Columbia, S.C., Lubbock, Tex.), Southern Mill Creek Products Company, Inc.

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For More Details on Preceding Page Circle (101) on Reply Card

For More Details Circle (136) on Reply Card

The Public Relations of Public Spraying

By Jim Hansen
The Dow Chemical Company

SPRAYING SEEMS to have become a hazardous occupation. Not in the usual physical sense, of course, but with the 1972 spray season just starting, applicators who contract for a routine spray job along a highway or power line can set off enough controversy to provide some real headaches. How to avoid these headaches and how to ease the pain after they start has become a subject well worth exploring.

People today are concerned with anything that they think may have some adverse effect on the environment. Often that concern is almost totally uniformed and sometimes equally irrational, but it is real. The concern may be fanned by one of our current crop of "instant ecologists" who for reasons of personal advantage need to maintain a "tiltable windmill." Rights-of-way spray jobs or any spray work on public land fills the bill. It is visable. It comes under the domain of the "establishment," and it can be influenced by public pressure without trampling on the rights of the "little man."

This climate adds an element of risk to any spray operation that must be taken into account if normal maintenance is to continue.

(continued on page 23)

THE FORD DIFFERENCE

MAINTENANCE ADVANTAGES THAT GIVE YOU LESS DOWNTIME, MORE TIME ON THE JOB.

Fact: Ford industrial tractors call for far less maintenance than some competitive rigs.

Look at the operator's manuals. Some manufacturers recommend oil changes as frequently as every 100 hours. Ford gives you a whopping edge: *300 hours* is our recommended interval between oil changes.* Our recommended interval between transmission oil changes is *1,200 hours.* That's 200 hours longer than some other rigs.

Look at this advantage: some tractors call for daily greasing. Ford recommends greasing at intervals of *50 hours.*

Ford maintenance advantages. They mean less time stopped for lubrication—more jobs done at the end of the day. See all the other Ford differences that *cut downtime* at your nearest Ford tractor dealer!

NUMBER ONE ON WHEELS

FORD TRACTOR

Ford

*Maintenance times are quoted under normal operating conditions. Adverse conditions may dictate more frequent maintenance.

Your Ford industrial tractor and equipment dealer is listed in the Yellow Pages under "Tractors" or "Construction-Equipment." See him for information on how to buy, lease, rent or finance.

For More Details Circle (152) on Reply Card

This is a field of certified Manhattan perennial ryegrass grown by Carey Strome, Junction City, Oregon. Notice the high uniformity of plant type and freedom of annual ryegrass. Good seed production starts with perennial ryegrass fields such as this. Photo is by Dr. C. Reed Funk.

FLUORESCENCE — NATURE'S HEREDITARY TRADEMARK

Ultraviolet Light Helps Decode Ryegrass Species

EDITOR'S NOTE: Five authors interested in the importance of perennial ryegrass to the turfgrass industry have written this article. They are: Richard H. Bailey, *vice-president, Turf-Seed, Inc., Hubbard, Oregon;* Dr. Henry W. Indyk, *specialist in turfgrass management, Cooperative Extension Service, Rutgers University, New Brunswick, N. J.;* Dr. C. Reed Funk, *research professor, turfgrass breeding, College of Agriculture and Environmental Science, Rutgers University, New Brunswick, N. J.;* E. E. Martin, *director of the seed laboratory, Oregon State University, Corvallis, Oregon;* C. R. Edwards, *chief of the seed branch, Consumer and Marketing Service, U.S. Department of Agriculture.*

The information presented here will familiarize the customer with ryegrass species so that he may have a better knowledge of the product he is buying.

The first section is by Richard H. Bailey.

Contamination of perennial ryegrass seed by common annual ryegrass has become an increasing problem with ryegrass breeders, producers and the customer. Although both are from the genus *Lolium, L. perene,* perennial or English ryegrass is the fineleaved shorter growing, darker green, more dense, turf-type ryegrass when compared to *L. multiflorum Lam.,* annual or Italian ryegrass which is generally, light green, fast growing, erect, hay or forage type.

The main concern of turf breeders and producers of the turf-type perennial ryegrass seed is that contamination from *L. multiflorum* does not become an uncontrollable problem. Few customers would want to seed a perennial ryegrass and later discover it contaminated with annual ryegrass.

While it has been known that perennial ryegrass has flat leaves in the bud and florets which are not awned, and annual ryegrass has rolled leaves in the bud and awned florets, the breakthrough in seedling differentiation comes in exposing seedling roots to black or ultraviolet light. *L. perenne* or perennial ryegrass does not reflect the fluorescence character. *L. multiflorum* exhibits fluorescence.

Some perennial types exhibit a degree or low percentage of fluorescence. This is the case where hybridization between *L. multiflorum* and *L. perenne* has taken place. Linn Perennial Ryegrass is such a variety. Somewhere in its genetic development there was a hybrid as one or more of the parent clones, which thus exhibited a fluorescence level which is still present in the variety.

The authors will examine fluorescence as related to: ryegrass recommendations, ryegrass breeding, ryegrass seed production and the Federal Seed Act.

Fluorescence As Related To Ryegrass Recommendations

By Dr. Henry W. Indyk

The turfgrass industry is experiencing a very exciting period in which many new turfgrass varieties are being developed by plant breeders and released to the seed trade for production and distribution. The recent development and availability of turf-type ryegrass varieties represents a major breakthrough in the improvement of ryegrasses. As a

(continued on page 26)

Your first step to healthier turf

1 Spring is the time to take it

Leaf Spot problems caused by overwintering spores of Helminthosporium spp. can spoil the health and beauty of your turf this spring. So can Rust and Rhizoctonia.

But if you apply TERSAN® LSR now, you can break the Helminthosporium spp. cycle before it becomes a costly problem. You stop Leaf Spot before the "melting" or "fading" out stage. And Rust and Rhizoctonia don't get a chance to damage your turf.

The application of TERSAN LSR to tees, greens and fairways in the spring is the first step in the Du Pont TERSAN 1-2-3 Disease Control Program. The program that prevents or controls all major turf diseases on all common grasses throughout the entire year.

The TERSAN 1-2-3 Disease Control Program is effective, economical and entirely non-mercurial. It has been proven by hundreds of professional turf men throughout the country.

For complete details on the program and a supply of TERSAN fungicides, see or call your golf course supplier today.

With any chemical, follow labeling instructions and warnings carefully.

DU PONT REG. U.S. PAT. OFF. **TURF PRODUCTS**

Slow Release Herbicides

A New View In Aquatic Weed Control

By N. F. Cardarelli
Chief Scientist
Creative Biological Laboratory
Norton, Ohio

AQUATIC weed control relies primarily upon the chemical treatment of the water course. Plant mortality depends upon both the amount of herbicide applied and the exposure time. Usually exposure times are small, several days perhaps, and thus the amount of the chemical used must be relatively large. Natural factors, such as reaction of the control agent with the mineral content of the water, solar radiation, dilution by incoming waters and absorption by soil particles and by organic matter detoxifies the control agent. Since a quick kill is essential massive amounts of the herbicide are utilized, and the target plant succumbs through an *acute* intoxication method.

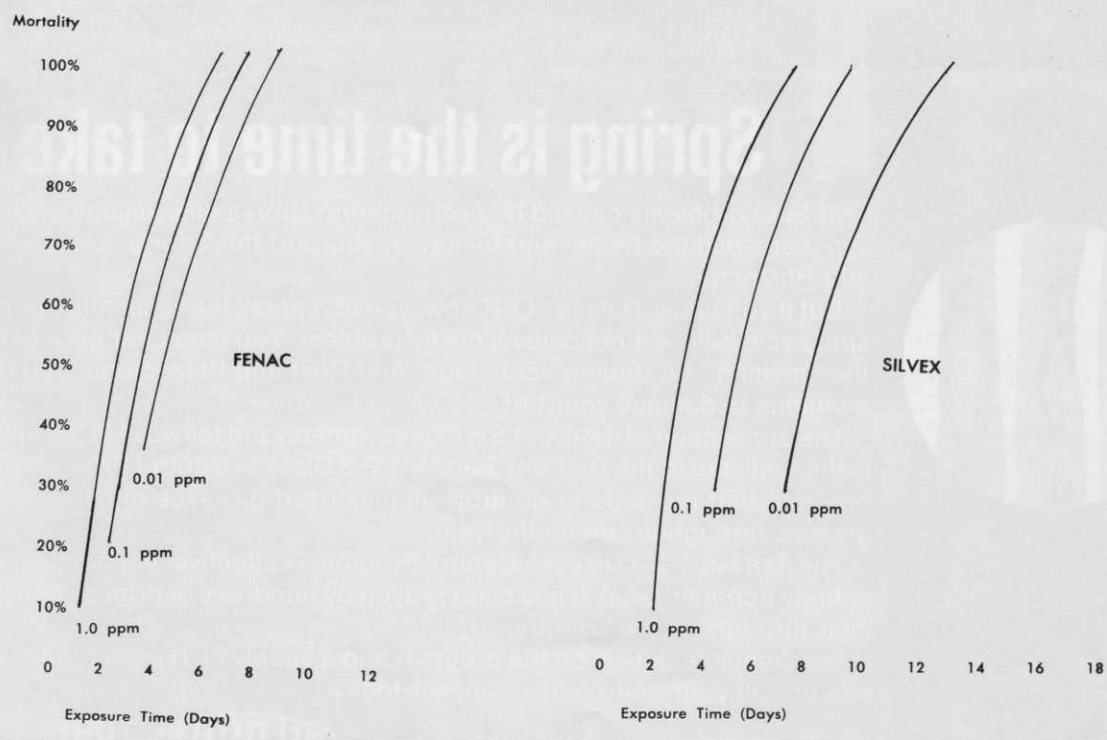
Even the safest of herbicides will affect many non-target members of the biological community; fish certainly and small organisms in the food chain; perhaps birds and mammals as well. If we can reduce the total amount of herbicide needed while achieving the same degree of control, unwanted environmental effects will be lessened. The ecologists are questioning the use of ULV insecticides used at a few ounces or less per acre and we in weed control are applying pounds per acre!

Now what can we do to satisfy our detractors (if that is possible) and perhaps help ourselves economically at the same time?

At the Creative Biology Laboratory we are exploiting three interwoven concepts that promise economy, long term control, and much less environmental contamination. This work, sponsored by the U.S. Army Corps of Engineers, is based upon the slow release of a minute amount of a non-persistent control agent in the growth area (phytozone) of the target; such release to occur over a long period of time. Rather than destroy the pest through *acute* intoxication which re-

(continued on page 36)

FIGURE 1: Chronic Effect of Herbicides on Eurasian Watermilfoil



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Eptam granular formulation	Rate* per 1,000 sq. ft. Annual weeds	Nutgrass, quackgrass
5-G	2.75 lbs.	5.5 lbs.
2.3-G	6.5 lbs.	13.0 lbs.

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Turfgrass Retardation With Chemicals

By D. M. Elkins
Associate Professor
Plant Industries
Southern Illinois University
Carbondale, Ill.

D. M. Elkins, associate professor, and Ted Kitowski, graduate assistant, compare Kentucky bluegrass sprayed with a growth retardant (right) and an untreated control.

THE USE of chemical growth retardants on turfgrasses offers a number of exciting possibilities in the not too distant future. These chemicals could be used widely for both agricultural and non-agricultural purposes. Good chemical growth retardation of grasses have these possibilities:

(a) roadbank stablization of long stretches of the interstate highway system — good chemicals have the potential to reduce overall costs of maintenance, making widespread use of retardants feasible
(b) retardation of grass growth in parks and recreation areas, "short roughs on golf courses, and vegetation on grounds of industrial plants, airfields, cemeteries and similar areas
(c) reduction of grass growth in lawns of homeowners — this would be useful throughout the peak periods of grass growth, but would be a particular asset when the home-

(continued on page 30)

Table 1. Height of Kentucky bluegrass,[1] color ratings, and dry matter yield as influenced by growth retardant treatments.

Treatment	Rate (lb/A)	Grass Height (cm) No. Days After Treatment 14	28	42	Color Rating[2] 19	49	Dry Matter Yield g/44 sq. ft. 33
Untreated control	———	9.4	10.3	11.8	9	9	363
MON-820[3]	1	6.5	7.0	9.0	8	8.5	168
MON-820	2	6.0	6.1	6.8	7	7	125
MON-820	3	6.1	6.0	7.1	7	8	137
MON-820	4	6.5	6.0	7.2	7.5	7	132
Slo-Gro[4]	1	8.2	8.9	10.2	8.5	8.5	304
Slo-Gro	2	8.2	8.4	9.9	8	8	256
Slo-Gro	3	7.3	7.4	9.5	8	8	237
Slo-Gro	4	7.9	7.4	9.4	8	8	218

[1] Low nitrogen level plots, Adequate P and K supplied but no N applied during growing season
[2] 0 = dead, 10 — best color
[3] Experimental compounds from Monsanto Company
[4] Maleic hydrazide formulation manufactured by Uniroyal Chemical

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ART EDWARDS
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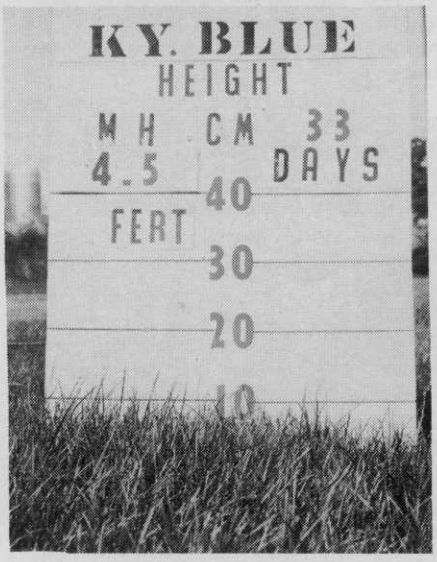
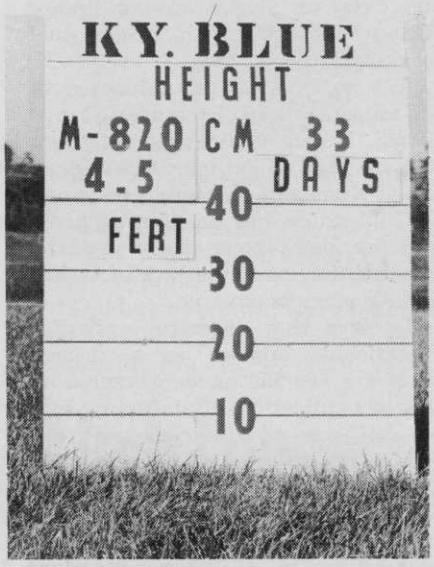
Untreated control plot of Kentucky bluegrass. The three photos here were taken 33 days after grass was mowed to an initial height of 5 cm and sprayed.



Plot sprayed with 4 lbs./A of Slo-Gro, a maleic hydrazide formulation.



Plot sprayed with 4 lbs./A of MON-820, an experimental chemical.

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A rear view of the injection rig crossing a fairway. Tractor speed is set at six miles per hour. Note the cuts made by the machine.

FLORIDA APPLICATOR SAVES OWNER $45/ACRE

Injection System Keeps Nematodes In Check

A CUSTOM applicator in Orlando, Florida is injecting a nematicide in large turf areas at a cheaper cost than the price of the same chemical formerly used as a soil-drench.

Jack Russell, owner Soil Fumigants Inc., and his son John II, have applied Nemagon on 15 golf courses totalling approximately 500 acres this past summer in Florida with excellent results.

"On large turf areas we have been charging $50 an acre for material and application," Russell says. "This is figured as $25 for material, $15-$20 for overhead and 10-12% net profit."

Russell, who has been selling nematicides for many years, says that costs are variable. It's possible that costs in the future for treating may be cut even more.

"New and more efficient machinery could be a factor in reducing this cost. We are now developing a new injection unit that if successful, should be much more efficient than the coulter and shank unit we are now using," Russell comments.

He said Nemagon applied with soil injection results in a deeper rooted and healthier turf which requires less irrigation and less fertilization It suffers less from winter kill than infected turf.

"Also, a healthy turf free of nematodes will flourish to the point of crowding out most weeds, greatly reducing the need for herbicide application," Russell says.

In 1969, Dr. Vernon Perry and associates in cooperation with Shell Chemical Co. and the Gainesville Country Club, applied liquid Nemagon in fairway turf plots using a simplified two shank tractor drawn applicator with gravity feed.

The tool consisted of coulters set 12 inches apart to cut the sod followed by thin shanks to further open the soil to an average depth of four inches.

A delivery tube was attached to the back of each shank to permit the metered Nemagon to dribble into the cut to the four inch depth. A packer wheel or a fairway mower followed to seal the cut. Sometimes both were used.

Afterwards, a light sprinkling of water from the irrigation system helped insure there would be practically no loss of chemicals.

"Results from these tests indicated not only that the injected fumigant was far more effective than the drench application, but also that a much lower dosage of active Nemagon could be used, thus lowering the cost of application," says this businessman.

Russell further explains that preliminary data from Dr. Perry's tests indicated that about 20-25 pounds of actual Nemagon would give adequate nematode control for 12 to 24 months for established turf on sandy soils.

Using results from Perry's plots as a guide for dosage and methods, Russell developed a larger commercial rig to inject the chemical.

The first injecting unit had eight coulters and shanks set 12 inches apart on a heavy tool bar. Behind each shank was a heavy packing wheel to seal the cut.

"We soon learned that with eight shanks we could not adequately penetrate the soil so we cut back to six shanks and added 1,000 pounds of weight to the rig, Russell says. "This gave us the turf penetration needed; but we had to go to a heavier tractor to handle the weight."

Large balloon tires replaced conventional bar treads. Russell found he could operate over soft fairways and even on slopes around greens and across tees with minor turf markings.

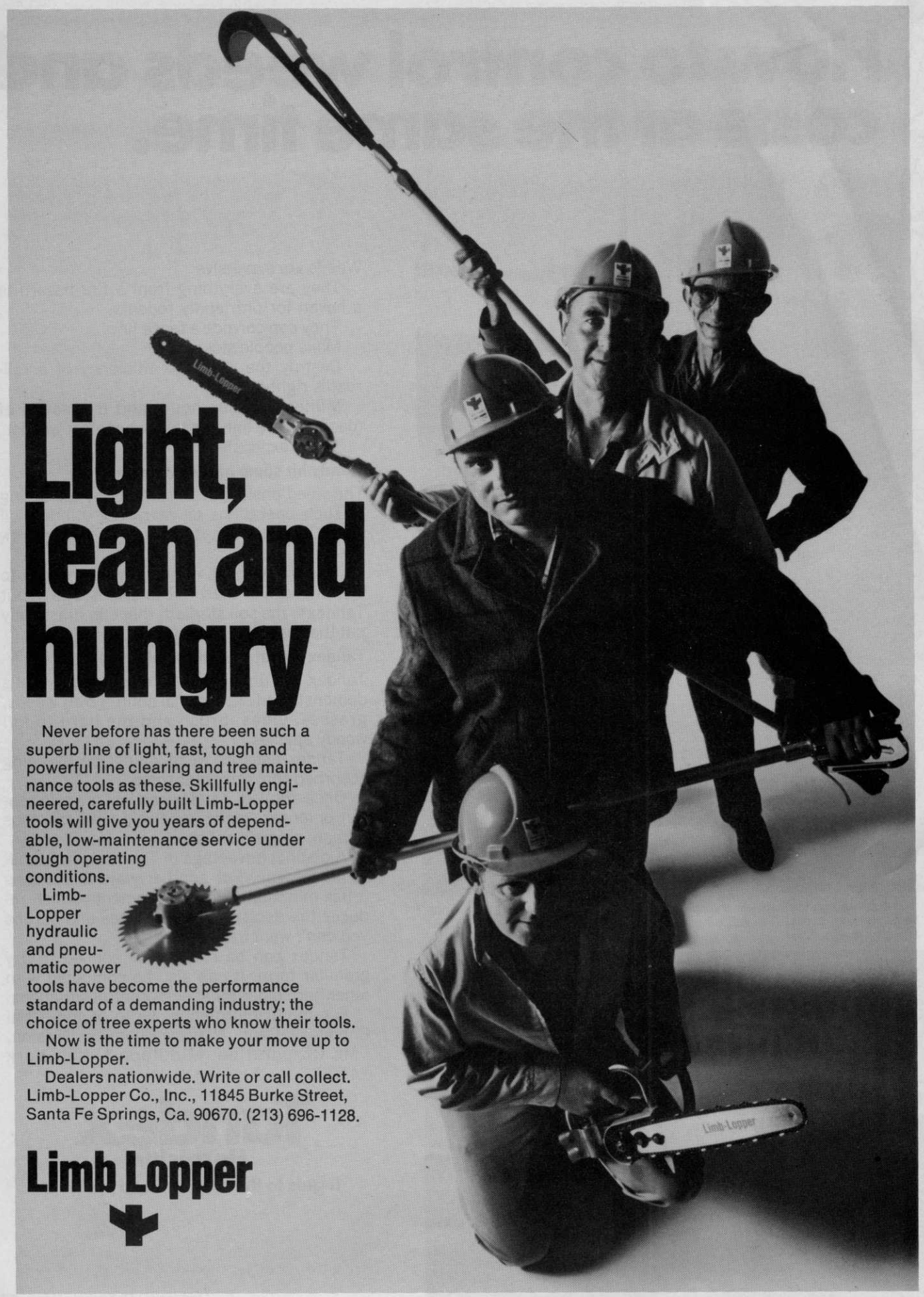
"We inject at a ground speed of six miles an hour. Pressure is set at 40 psi. Nozzle orifices of sufficient size are used to deliver 25 pounds of actual Nemagon per acre," he says.

"Calibration has been so accurate that we have been using material consumption as a method of determining acreage covered."

He says that chemical costs for nematicides applied as a drench often are $60-$80 an acre excluding cost of application. By injecting into the soil, cost of materials with excellent results has been reduced to $25 an acre.

The high investment for equipment — $10,000 to $12,000 is usually prohibitive to the superintendent

(continued on page 44)



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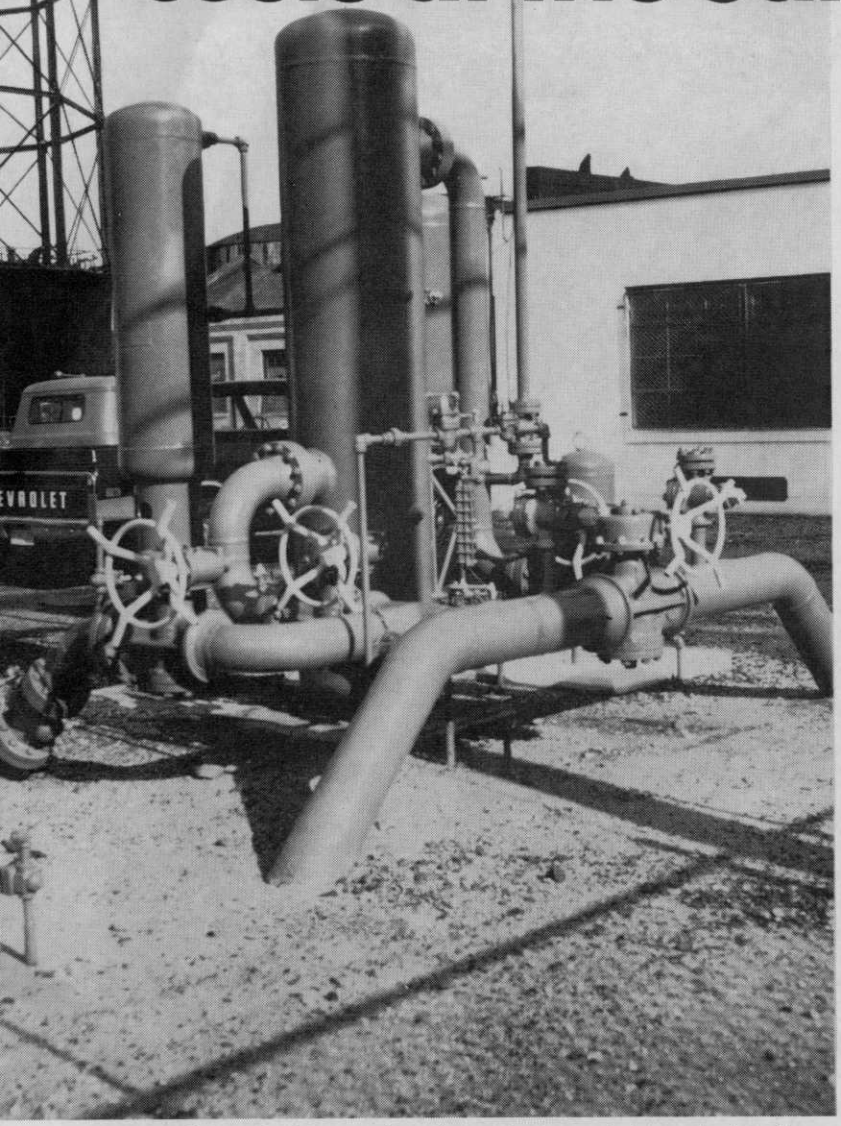

In industrial applications, as shown here, Tandex controls weeds along fence lines, parking areas, ditches, pipelines, sidings, storage areas, tank farms, and sign posts.

Weeds are expensive.

They are everything from a fire hazard to a haven for unfriendly rodents.

They can corrode a fence line.

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Tandex is a urea-carbamate compound that's demonstrated exceptional control over weeds, grasses, vines, brush and the hard-to-kill woody species.

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Once applied, Tandex can last a whole season, or longer. Yet it's relatively non-hazardous to man, animals or fish.

A distinct advantage of Tandex is its stability in the soil. Put another way, this means it has minimum lateral movement—which reduces the danger to nearby trees and shrubs you *don't* want to lose.

Tandex can be sprayed or applied in dry granular form. It can also be combined with other herbicides for special control situations.

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SPRAYING*(from page 12)*

It is important that consideration of potential public relations trouble areas be as much a part of your planning as the areas on your system that present special problems of terrain or weather.

Planning to meet public relations problems will not make them disappear, but it will help you to meet them without panic and in a manner that will cause least disruption to your operations. The planning itself may indicate weak spots in your program that need attention.

Pinpoint Problem Areas: This is the first step. From a public relations standpoint this is easier than you might think. These areas can be located on the basis of:

a) history
b) visibility
c) awareness
d) factors totally unrelated to spraying

History is a good indicator of sensitive areas. Any field man can list a number of chronic complainers in his area. These are a few people who can be counted upon to be upset about something every year . . . complaints can range from noisy trucks to pole locations or road signs they don't like. It's a sure bet that these people will object to your spray program now that it has become fashionable. An area with a history of problems deserves some special attention in your planning for this season's spray program.

Visibility has a real effect on the degree of sensitivity of an area. If you are conducting a normal spray program deep within your own property or in a location remote from roads or people, the likelihood of problems is not too great. However, if you are causing "brown out" or severe die-back close to a row of suburban homes or through a local arboretum, watch out. You probably will be in for trouble. Even the presence of spray equipment in some areas of high visibility is enough to cause problems without proper planning and preparation.

Awareness is a rather nebulous idea, but it plays a role in the public relations aspects of a spray program. If in a particular area there is a rather high concentration of people active in environmental causes, you can expect a ready interest in your operations. This can pose some problems, but it can also present you with opportunities to tell your story.

If you are already involved in controversy over something else, you probably can count on some opposition. A public utility in a rate battle, a highway department fighting over highway location, or a timber company contesting property lines is apt to hear protests over spraying. This problem cannot be solved by a public relations program surrounding your spray operation.

Plan Your Spray Program: This is the next step once potential trouble spots are located. It is a good idea to make the best of the situation in each area. This may require some soul searching such as:

a) changing the way you evaluate particular vegetation control programs.
b) requiring a careful look at the personnel that deal with the public and that operate the spray equipment out on the job.
c) upgrading your efforts toward a public information program.

In some situations you may want to change your approach to vegetation control. There may be some spots so sensitive that the best solution might be to hand clear it or, you may want to consider dormant season treatment to avoid excessive (and obvious) summer browning of foliage. Spot spraying on a more frequent schedule may be the best way to approach the problem in an area of high visibility. Maximum attention to drift control is a must. The use of pelleted materials may avoid even the suggestion (real or otherwise) of drift in highly visible locations. Planning a flexible spray program to meet the varied needs of your whole system is a major part of a public relations program.

People are always key factors in your relations with the "outside world." If your people are clean, neat and act as though they know what they are doing it makes a real difference. Clean coveralls for the spray crews, fresh paint and regular wash jobs for the spray rigs will generate profit in goodwill. A *professional* look creates confidence . . . the idea is as old as the first patent medicine commercial, but it works.

Crew leaders need training that goes beyond the mechanics of the job. They need to know what to say when someone asks what they are doing, what kind of material they are spraying and what it does. (See *Herbicides Keep Jacksonville Drainage Ditches Open,* page 16, WTT, March 1972) Whether they are your employees or work for a contract applicator makes no difference to an interested or concerned citizen. They represent *you.*

Vegetation maintenance in areas of high visibility can be handled by spot spraying on a more frequent basis. Granular formulations applied in the dormant season may be the answer.

Field men or supervisors that contact home and property owners in areas adjacent to the spray job need to develop a talent for *listening* as well as *talking.* In many cases someone who raises objections just wants some questions answered. A good listener can find out what they really are and answer them. Those contacting the public for permission to spray need good backgrounding in the facts of the spray program, including information about the products to be used, their effects and why the whole job is to be done. They should also be able to give some accurate background on how spray materials are developed and the long series of safety tests that a material must pass before being used in the field.

Public information programs are

(continued on next page)

SPRAYING *(from page 23)*

often an area that seem perilous to someone not experienced in this field. This is not the case. The basis for a good public information program is honesty and an open attitude. Sometimes you will feel that you have been mistreated in the press, but often close examination will show you didn't really try to tell your side of the story. Most news people are reasonably objective and make an honest effort to get the facts. Unfortunately, we sometimes make those facts hard to find.

Garden clubs, conservation organizations and ecologists in your area are not the enemy. They represent a very real opportunity to get your story out.

Garden club talks are time-consuming and don't sound very important, but they can be a real route to thought leaders in a community. These people really are interested in many of the small facts that you grew tired of years ago. To them the idea that grass survives better when the brush is cleared is new.

Local newspapers can help or hurt you. The "off" season is a great time to drop in and get acquainted with the editors in your area. Make sure they are invited to any special event you may be planning so that they know you and they know what you are trying to accomplish. This is especially important in an area where you anticipate a problem.

Here's a typical spraying scene. But to an uninformed public, it can set off a controversy that could put you out of a spray contract. Keep the public informed.

If you have real trouble (a spill, bad drift, an injury etc.) and the press descends with a multitude of questions, honesty is the *only* policy. Don't pretend that nothing happened (it's been tried) and don't assume that the reporters are out to get you. Give them the facts, but don't speculate. And if you do not know something, admit it. If questions are asked that deserve answers but the information is not readily available, offer to find the answers and call back. This will help head off the publication of an incomplete (and possibly damaging) story. But be sure you do call back.

Handling the public relations side of a spray program is as important as any other phase of the operation, and in these days of "eco-activism," may be the factor that determines whether the job gets done at all. Help is available and you should use it. Contact the National Agricultural Chemicals Association to help you tell the pesticide story. Companies like The Dow Chemical Company are available to provide help in training your personnel to do a better job. Product information should be readily available from all manufacturers. The tools are at hand; use them.

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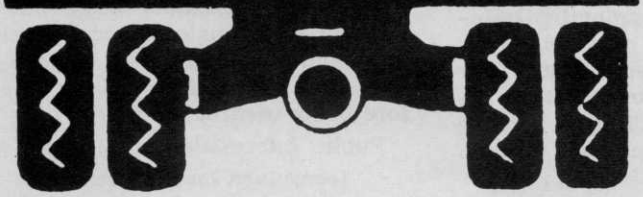

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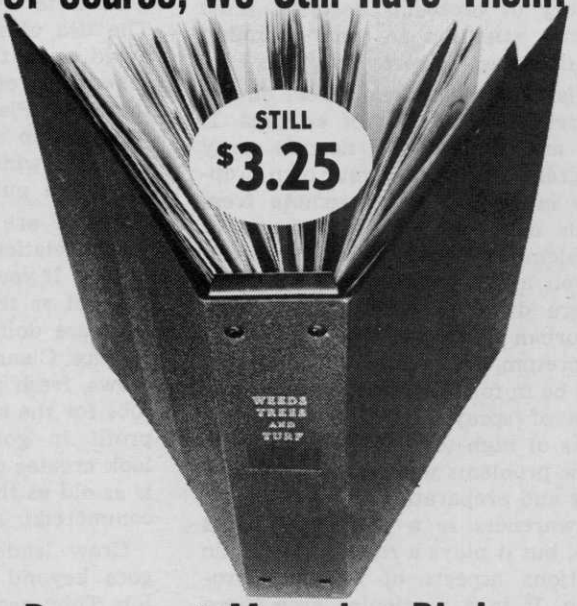

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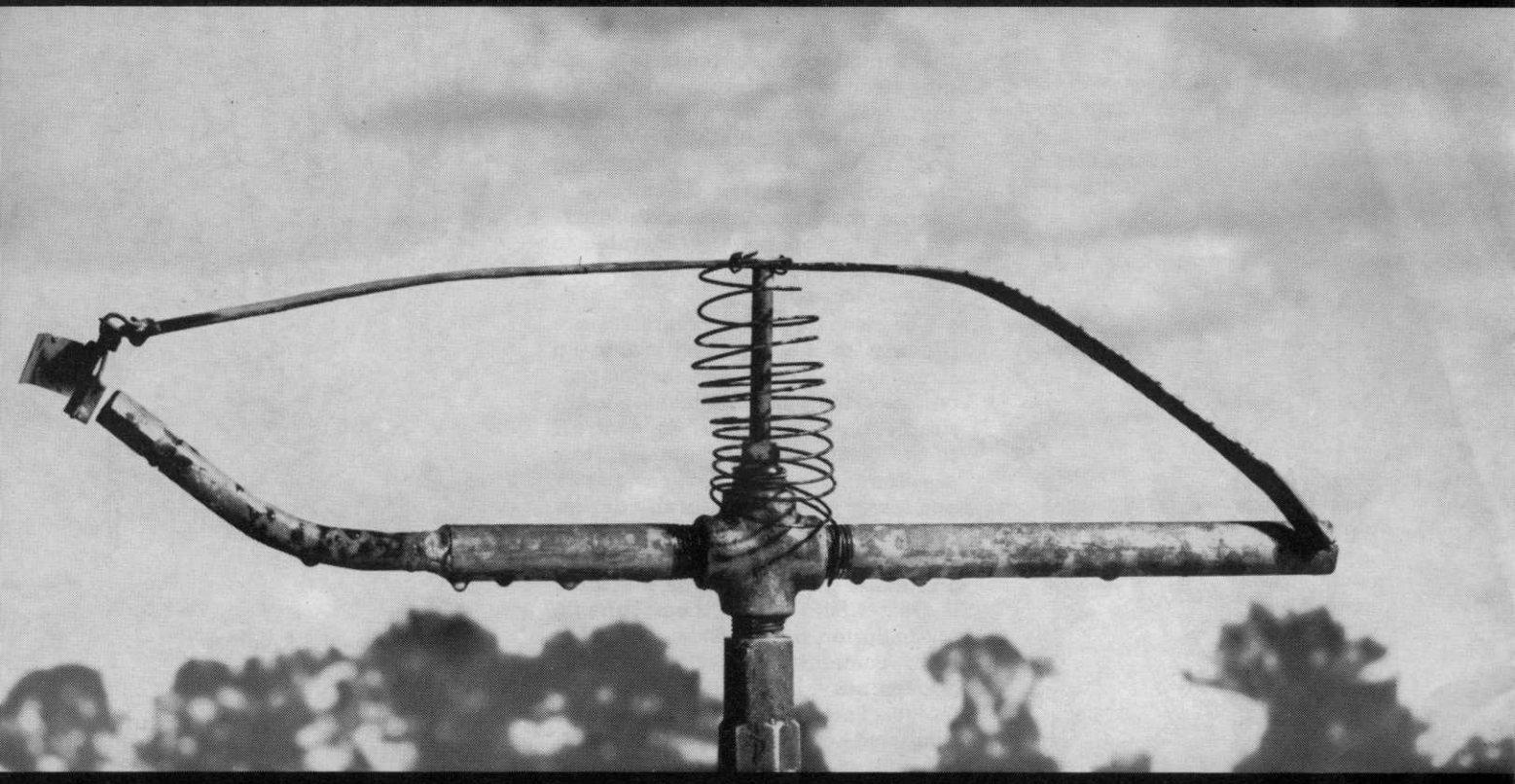

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FLUORESCENCE *(from page 14)*

result, new interest has been generated in the use of ryegrass for the satisfactory establishment of various types of turfgrass areas. Because of their proven superior performance and desirable characteristics, the new turf-type ryegrasses are receiving very favorable consideration in extension service recommendations for desirable turfgrass seed mixtures in many states. This represents a major departure from the type of recognition the old type (commonly referred to as pasture-type ryegrasses) received in recommendations for desirable seed mixtures for lawns or other turfgrass areas.

Before the development of the improved turf-type ryegrasses, recommendations for high quality turfgrass seed mixtures tended to discourage the use of mixtures containing ryegrass. These pasture-type ryegrasses include the annual, perennial or a combination of annual and perennial types. Considering the characteristics of the pasture-type ryegrasses, recommendations discouraging their use were justified. Although rapid germination and establishment were definite attributes, their coarse texture, stemminess, rapid and upright growth habit (particularly in the spring), light green color and difficult mowing, imparted undesirable characteristics to an otherwise high quality lawn or turfgrass area. One might argue that these undesirable characteristics are temporary when annual ryegrass rather than the common perennial ryegrass is included in the mixture. Admittedly, the annual ryegrass tends to disappear from the mixture within the first year. However, the exit from the mixture is usually very rapid and at a very critical period during the growing season. As a consequence, the remaining stand of turfgrass is left open and vulnerable to the rapid invasion by weeds, particularly crabgrass.

Annual Ryegrass

The new turf-type ryegrasses are proving to be of great value in strengthening extension service recommendations for establishing a desirable turfgrass cover. In contrast to the pasture-type ryegrasses, they are finer textured, leafier, slower and lower growing, naturally darker green in color, more compatible in a mixture with other turfgrasses, and easier to mow. These desirable characteristics make them suitable for inclusion in turfgrass seed mixtures containing superior varieties of Kentucky bluegrass and/or fine fescue. Their attractive appearance combined with rapid establishment, durability and persistence makes them very useful for easier and more successful establishment of various types of lawn areas as well as turfgrass areas for athletics, recreation or other hard use.

A major concern in obtaining the superior performance of these improved turf-type ryegrasses is availability of high quality seed that is genetically identical to the variety developed by the breeder. Unless proper precautions are taken in maintaining high standards in the production, processing, packaging and distribution of seed, the advantages of the new variety may be easily lost due to undesirable contaminants.

Norlea perennial ryegrass can be cited as an example of what can happen. Norlea was developed and introduced as one of the first turf-type ryegrass varieties. Its advantage in comparison to the pasture-type ryegrasses was convincingly proven in variety tests. However, its popularity as an improved variety of ryegrass rapidly declined after seed was made available to the public. Its performance under practical situations was not measuring up to the results of variety tests due to the contamination of the seed with inferior ryegrasses as well as other grasses unsuitable for turf purposes.

Perennial Ryegrass

What steps can be taken to protect the genetic purity of an improved turfgrass variety and provide the purchaser with the assurance of the seed being of high quality and true to variety? Several techniques are available which in some manner may involve the breeder, seed producer, seed certification official, seed control official, seed analysts, sales outlet, and in-

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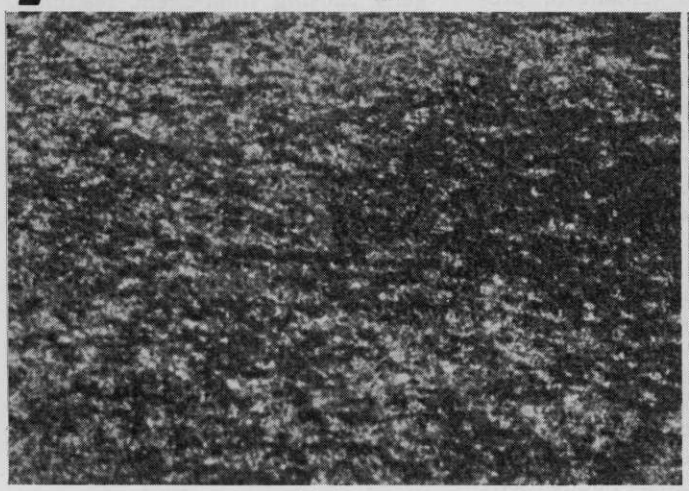
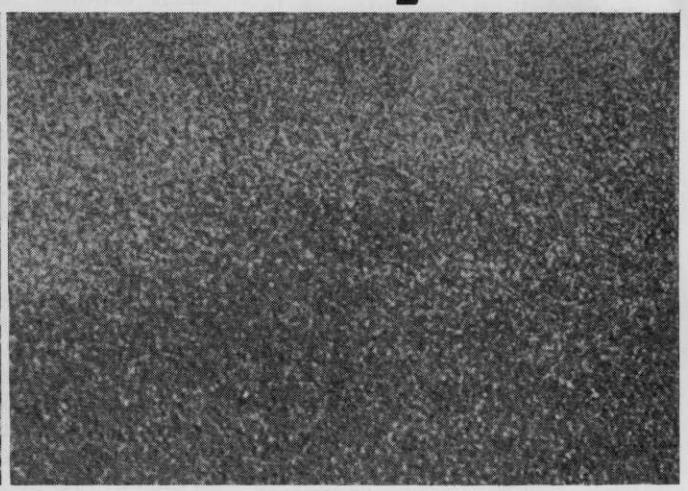
When dollar spot hits, here's how new systemic MERTECT® 140-F flowable saves your turf, time, and money.



Untreated dollar spot disease



Treated with MERTECT 140-F

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And with its special advantages, MERTECT 140-F makes the performance picture look even better.

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Since MERTECT 140-F is systemic, you also get away with fewer applications per season, thanks to its residual disease control. And it has a lower dosage rate than other fungicides, so you save there, too.

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FLUORESCENCE *(from page 26)*

dividuals responsible for formulating and making recommendations.

One of the techniques that can be very useful is the fluorescence test. It provides seed analysts a means of detecting inferior ryegrass contaminants in certain improved turf-type varieties. Among the ryegrasses presently available, the fluorescence test can be very useful in detecting contamination in the variety Manhattan which is gaining widespread recognition for its superior performance. Seedlings of annual ryegrass as well as certain perennial ryegrasses give a positive test when subjected to the fluorescence test. Fortunately, Manhattan ryegrass seedlings are different in this respect in that they do not produce a fluorescence when subjected to the test. Therefore, by this test, a means is provided by which contamination of the Manhattan seed with interior types could be easily detected.

The inclusion of the percentage of fluorescence on the seed label that is required by state and Federal seed laws would prove to be very useful. Seed analysts would be able to readily detect contaminating ryegrasses in varieties that do not produce the fluorescence test. It would provide very useful information to individuals in the extension service responsible for making recommendations of varieties of superior performance. And perhaps most importantly, it would provide the purchaser an assurance of the genetic quality of the seed.

Flourescence And Ryegrass Breeding

By Dr. C. Reed Funk

The plant breeder is charged with the responsibility of developing the best variety attainable, using present genetic resources and plant breeding techniques. Thus, he is concerned that the merits of the variety are not lost by improper standards of seed in increase and distribution. It is therefore necessary for the plant breeder to work very closely with quality-conscious seed producers, certification specialists and seed control officials to see that quality seed of a new variety is made available to the consuming public.

The maintenance of high standards of seed production are especially important in a cross-pollinated species such as perennial ryegrass. Ryegrass seed is often produced in fields badly contaminated with annual ryegrass or stemmy, hay-type perennial ryegrass or adjacent to areas shedding pollen of these inferior types. Even a slight mixture of these coarse, tall-growing ryegrasses can cause a serious reduction in the turf performance of an improved, fine-textured, lower-growing, turf-type variety.

The improved, turf-type ryegrasses are basically poor seed producers in comparison with the annual and hay-type, perennial ryegrasses. Thus, natural selection will cause a further rapid deterioration of the turf performance potential of the improved variety as such seed fields continue to remain in production.

To insure quality seed production of improved varieties the plant breeder in cooperation with the seed producers and the certification agency places strict standards on field selection, isolation requirements, stand life and generation interval.

In the case of a synthetic variety such as Manhattan perennial ryegrass, Breeders seed is produced from vegetatively propagated parental clones grown in a clean, isolated crossing field at Rutgers under the direct supervision of the breeder. This Breeders seed is used to establish an isolated "Foundation" increase field in Oregon which is grown under constant supervision of official state inspectors and hand rogued to remove any objectionable plant.

Certified seed must be grown only from Foundation seed in isolated fields. These fields must be essentially free from contamination by other ryegrasses and weeds and maintained according to certification standards.

The fluorescence test has been widely used in seed-testing laboratories for many years to distinguish between annual and perennial ryegrass. The seedling roots of annual ryegrass normally secrete a substance which shows a brilliant fluorescence under ultraviolet light. This characteristic results from a single dominant gene present in most annual ryegrass plants. Because this dominant gene can also be found in occasional plants of common perennial ryegrass and many of our older varieties, seed analysts and control officials have not been able to use this test as precisely as desired in their efforts to detect annual ryegrass contamination of perennial ryegrass seed (Nyquist 1963).

Breeders of some of the new fine-textured varieties of perennial ryegrass such as Pennfine and Manhattan realized the importance of being able to precisely detect any contamination of seed lots by unsightly annual ryegrass. With the helpful cooperation of seed analysts, these new varieties have been bred to be completely free of the dominant gene causing fluorescent seedlings. Any fluorescent seedling appearing in a seed lot of Pennfine or Manhattan immediately signals contamination. Therefore, plant breeders, quality conscious seed producers, certification agencies and seed control officials have one more tool to use in their joint efforts to provide the buying public with a superior product."

REFERENCES

1. Funk, C. R., R. E. Engel and P. M. Halisky. 1969. Registration of Manhattan perennial ryegrass. Crop Science 9:679-680.
2. Nyquist, W. E. 1963. Fluorescent perennial ryegrass. Crop Science 3:223-226.

Flourescence In Ryegrass Certification

By E. E. Hardin

After a variety has been developed through selection and/or breeding, production and market development are the next steps a variety must take on its way to the consumer. In order to grow a certified variety of perennial ryegrass in Oregon, the grower must plant Foundation seed stock on land which has not grown nor been seeded to any other perennial, ryegrass during the previous five years, unless the previous crop was of the same variety and passed the certification requirements. The field must also be free of *L. multiflorum*, and there must be adequate isolation to prevent crossing from outside pollen sources. A certified seed field must pass a Seedling inspection within sixty days after the initial planting, and a Seed Crop inspection prior to harvest of each crop.

The certification inspector looks for out of place and off-type seedlings of other ryegrass as well as isolation infractions during the pollination period. After harvest, a lot of seed must meet the mechanical purity requirements as established by the Seed Certification Service.

It is the intent of all concerned

(continued on page 52)

Shell P.C.O. Products.
The line the bugs fall for.

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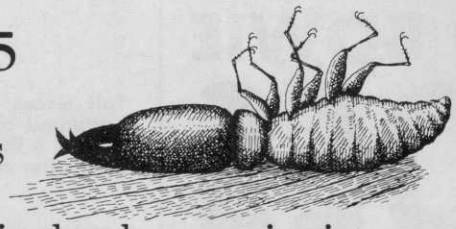

Insecticides were proven superior by university tests of Shell's termiticides. The tests proved conclusively that Shell's Aldrin is clearly superior in performance to all major competitive products for subterranean termite control. Second only to Shell's Dieldrin.

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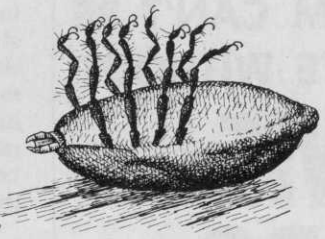
Gardona® 75 Insecticide is tough on ticks. It controls them for up to nine full weeks with a surprisingly low order of toxicity to fish and mammals.



Gardona can be applied with air or ground equipment.

Vaponite® 2 Insecticide rapidly reaches out and kills the toughest roaches. Vaponite's Vapona Insecticide vapors spread out into little nooks and crannies flushing roaches out and killing them rapidly.

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Tall fescue treated with three experimental growth retardants compared to an untreated control. All grass was clipped to a height of 3 inches before spraying with a 4 lbs./A rate of MON-814, MON-820, or MON-845. Picture was taken 43 days after clipping and spraying.

RETARDATION *(from page 18)*

owner is away for extended periods.

The discovery and use of growth regulating chemicals began in the years following 1935. One of the first growth-retarding chemicals tested on grasses was maleic hydrazide. MH-30, a maleic hydrazide formulation, first was tested for grass growth control about 1949, at which time it was found to be effective. At that time the public was not ready to accept chemical retardation of grass growth to a large extent. However, in recent years the increase in motor travel and interstate highway systems has greatly changed the roadside vegetation maintenance picture. Improved highways require better maintenance and make the development of better grass-retarding chemicals and their widescale adoption distinct possibilities. Several companies presently are developing and evaluating a host of grass growth retardants.

Chemical retardation of grass growth can offer these advantages:

(a) reduce cost of maintaining grasses used for roadbank stablization by increasing the savings on equipment and reducing the number of man-hours spent on mowing and trimming — much of the danger involved in mowing steep areas could be removed
(b) reduce formation of undesirable seedheads
(c) reduce drought injury and increase resistance of grass to adverse environmental conditions because of the dormant-like condition of treated grass
(d) possibly enhance grass color

(continued on page 32)

Table 2. Height of tall fescue, color ratings, and dry matter yield as influenced by growth retardant treatments.

Treatment	Rate (lb/A)	Grass Height (cm) No. Days After Treatment 14	28	42	Color Rating[1] No. Days After Treatment 19	42	Dry Matter Yield g/75 sq. ft. 28
Untreated control	———	13.8	15.2	16.5	10	10	433
MON-820[2]	1	8.2	8.9	13.8	8	9	91
MON-820	2	7.7	7.2	10.9	7	7	64
MON-820	3	6.9	7.1	9.6	6	6	46
MON-820	4	7.0	7.2	9.2	6	5	64
MON-845	2	8.5	7.8	11.7	7	8.5	52
MON-845	4	7.2	7.2	9.5	7	7	48
MON-845	8	6.8	6.5	9.2	5	4.5	45
Slo-Gro[3]	1	9.9	10.0	11.6	8.5	7.5	91
Slo-Gro	2	9.6	9.7	10.4	8	5	92
Slo-Gro	3	9.8	9.6	10.0	8	2	94
Slo-Gro	4	9.8	7.9	9.9	8	1	109

[1] 0 = dead, 10 — best color
[2] Experimental compounds from Monsanto Company
[3] Maleic hydrazide formulation manufactured by Uniroyal Chemical

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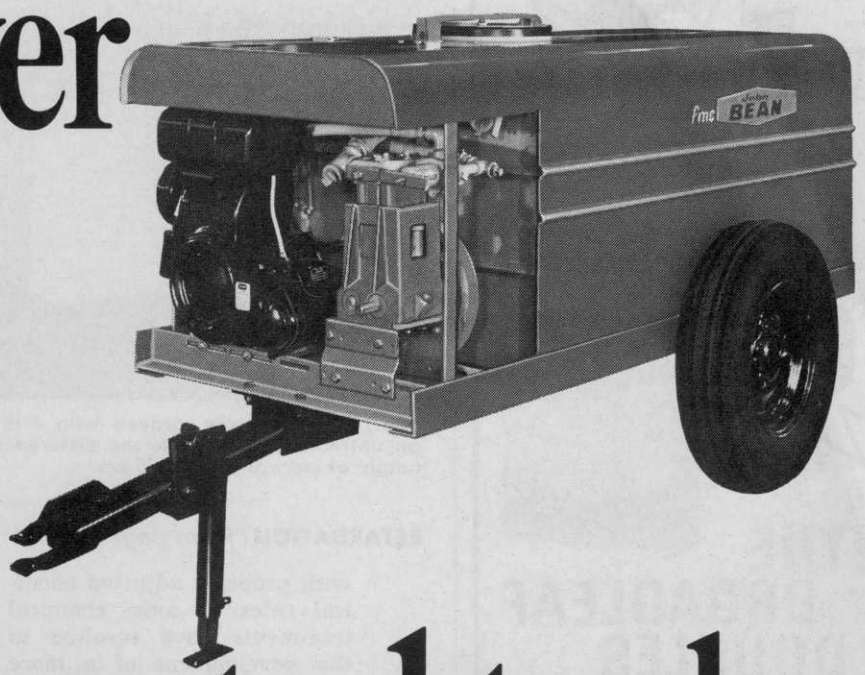

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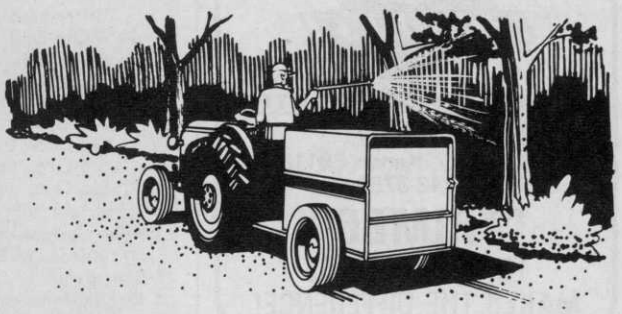

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Whatever the lie, fairway or green, choose **GORDON'S FAIRWAY BROADLEAF HERBICIDE** and **BENTGRASS BROADLEAF HERBICIDE**. They both contain "Trimec" Turf Herbicide and you will be the winner of the broadleaf doubles match.

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The plot above was sprayed with 4 lbs./A of MON-820. The plot on the right is an untreated check. Note the difference in grass height after only 8 days. Initial height at start of test was 5 cm.

RETARDATION *(from page 30)*

with properly adjusted chemical rates — some chemical treatments have resulted in the development of a more attractive dark green color.

In greenhouse studies with grasses in pots and in field studies at Southern Illinois University, the effectiveness of several rates and combinations of 19 different growth retardants in reducing above-ground vegetative growth was evaluated. Included in the test were tall fescue, several varieties of Kentucky bluegrass, zoysia, bermuda, perennial ryegrass, and several grass mixtures. Pot studies were used for screening a large number of chemicals and rates and for selecting the more promising ones for field trials. Prior to spraying, grasses in pots were clipped to a uniform height. All pots were placed at random to receive one treatment within a measured area for spraying. Effectiveness of chemical retardation was measured by means of weekly height measurements and periodic color ratings. In field studies, we took similar measurements but also harvested a portion of each plot in order to calculate dry matter yield as a quantitative measure of chemical retardation.

Growth retardants that have looked most promising in greenhouse and field trials with tall fescue, Kentucky bluegrass, and other turf species have been MON-820

(continued on page 38)

Table 3. Height of Kentucky bluegrass[1], color ratings, and dry matter yield as influenced by growth retardant treatments.

Treatment	Rate (lb/A)	Grass Height (cm) No. Days After Treatment 14	28	42	Color Rating[2] No. Days After Treatment 19	49	Dry Matter Yield g/44 sq. ft. 33
Untreated control	———	10.3	14.8	16.4	10	10	668
MON-820[3]	1	6.5	8.1	13.2	7	9.5	282
MON-820	2	5.9	6.1	9.1	6	9	158
MON-820	3	6.0	6.1	9.0	6	9	165
MON-820	4	6.4	6.0	9.0	6.5	8.5	148
Slo-Gro[4]	1	9.4	12.7	15.5	9	10	560
Slo-Gro	2	8.5	11.5	13.9	8	9.5	467
Slo-Gro	3	8.3	10.3	13.0	8	9	376
Slo-Gro	4	8.7	9.5	13.4	7.5	9	343

[1] High nitrogen level plots. Adequate P and K were supplied as well as application of 2 lb. N/1000 sq. ft. at beginning of experiment.
[2] 0 = dead, 10 = best color
[3] Experimental compounds from Monsanto Company
[4] Maleic hydrazide formulation manufactured by Uniroyal Chemical

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Asplundh calls it a forestry truck. You'll call it indispensable.

ASPLUNDH'S FORESTRY TRUCK MODELS L-40, 42, 45 and 50. This unit is the key to quick, efficient trimming in crowded, urban areas as well as along rural roadsides. It lifts the climber, chips the brush and dumps the chips. Asplundh's famous 12-inch chipper is mounted curb-side. The truck has a dump body that packs in 300 cu. ft. of chips. This configuration is the most compact, effective machine of its type ever produced. For further details, write or call: ASPLUNDH CHIPPER COMPANY, a division of Asplundh Tree Expert Co., 50 E. Hamilton Street, Chalfont, Penna. 18914 • (215) 887-2500.

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Banvel attacks weeds two ways: one, it attacks through the leaves; two, Banvel is absorbed through the roots. Then Banvel is translocated throughout the plant—even to the deepest roots—to destroy the weed completely.

If you're still plagued by some of the "old favorites" such as dandelion, plantain, knawel, wild garlic and/or onion, burdock, etc., along with the real tough ones mentioned above,

Banvel+2,4-D combination is unbeatable for broad-spectrum control without setback to established turf and rhizome development.

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Although Chlordane has long-lasting action, *it does not magnify biologically.* Residues have seldom been detected in foods, water, fish, or wildlife. When detected, they have been insignificant.

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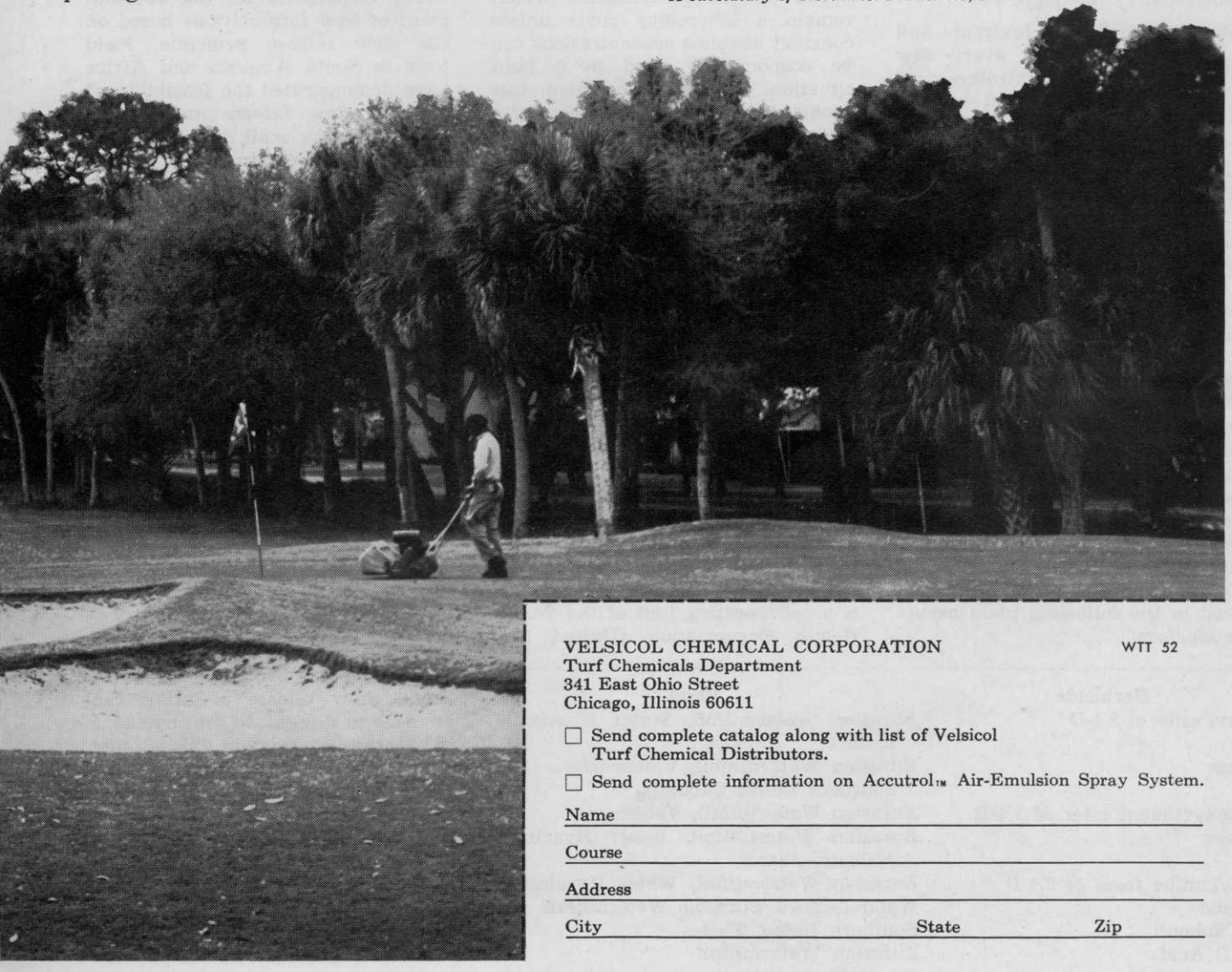

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FIGURE 2: Chronic Effect of Herbicides on Southern Naiad

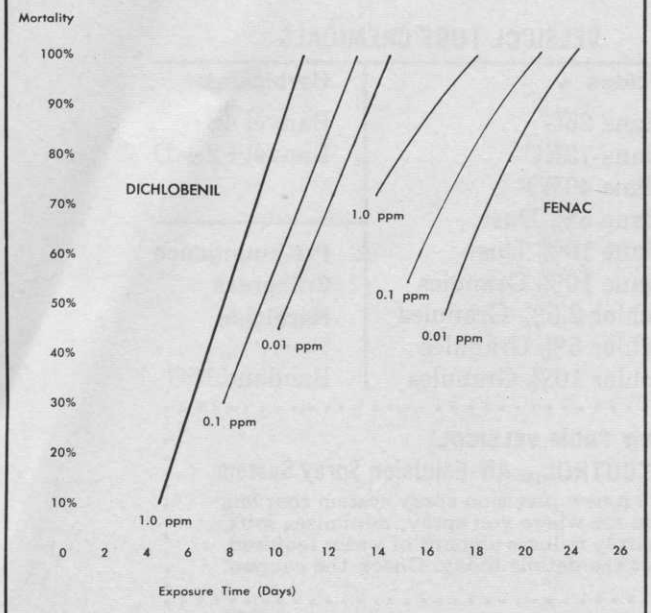
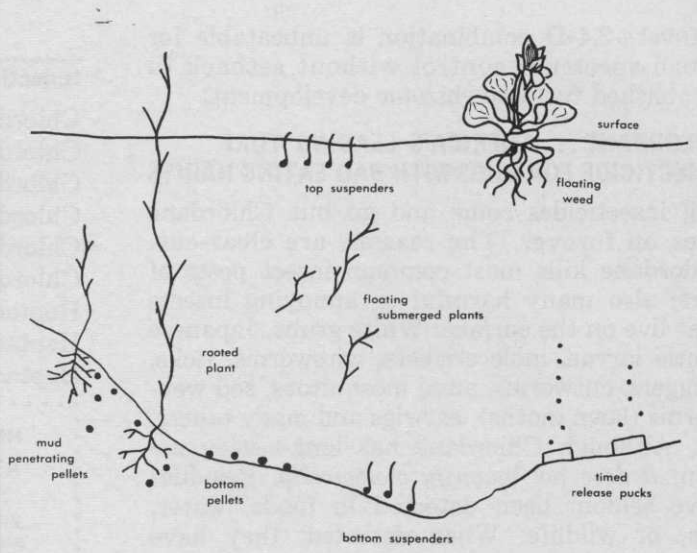


FIGURE 3: Phytozone Treatment Concepts



HERBICIDES *(from page 16)*

quires a great deal of toxicant—and the usual retreatment every few months for adequate control; our intention is to provide just enough chemical to give rise to a *chronic* intoxication effect which is just as deadly to the target through requiring a longer time to kill.

Chronic intoxication requires much less of the control agent than necessary to produce acute effects. As we decrease the amount of agent used, time necessary to kill does not increase accordingly! Figures 1 and 2 illustrate this effect. Present work with herbicides at concentrations as low as 1 part-per-billion in water show that we can destroy Eurasian Watermilfoil if the exposure period is long enough. In fact we intend to extend our studies with this aquatic weed to 100 parts-per-trillion concentrations, 10,000 times lower than in-use concentrations!

Chronic effects have been observed in the following plant-herbicide schemes:

Herbicide	Plant
Butyl ester of 2,4-D	Eurasian Watermilfoil, Water Hyacinth Elodea
Fenac	Eurasian Watermilfoil, Vallisneria, Southern Naiad, Cabomba
Butoxyethanol ester of 2,4-D	Eurasian Watermilfoil, Vallisneria
Silvex	Eurasian Watermilfoil, Water Hyacinth, Alligator Weed
Oleylamine form of 2,4-D	Eurasian Watermilfoil, Water Hyacinth
Diquat	Water Lettuce, Eurasian Watermilfoil
Dichlobenil	Southern Naiad, Elodes
2,4-D Acid	Eurasian Watermilfoil

The chronic phenomenon would remain a laboratory curio unless constant ultralow concentrations can be economically used in a field situation. In order to solve this problem we turn to the concept of a "slow release" matrix.

In 1964 it was discovered that anti-fouling agents could be incorporated in certain rubbery materials, and by the use of additives and proper vulcanization, the pesticide would slowly bleed out. Effective release of the agents involved has reached 89 months on test panels and over 5 years on ship hulls, buoys, and other marine objects. This material, under the name Nofoul is marketed by the B. F. Goodrich Company.

By 1966 insecticides, fungicides, and bacteriacides had also been formulated in slow release rubbery materials. However, our big thrust is in the direction of molluscicides, "snail killers" and our organization is a collaborating unit of the World Health Organization (United Nations) responsible for the development of new formulations based on the slow release principle. Field tests in South America and Africa have demonstrated the feasibility of using a slow release molluscicide and destroying snail disease vectors through *chronic* intoxication.

In 1969, the butoxyethanol ester of 2,4-Dichlorophenoxyacetic acid (2,4-D) was successfully compounded with natural rubber and a slow release mechanism established. Our investigations, confirmed by outside agencies, proved efficacy against the Water Hyacinth and Watermilfoil. Release lifetimes of 18 or more months have been analytically determined. Limited field tests are in progress.

In order to further reduce possible ecological disturbances, advantage was taken of the fact that rubber can be formulated in many shapes. 2,4-D and possibly other herbicides "layer-out" in still or sluggish waters. That is, there is little vertical mixing. Water weeds are confined by nature to certain areas of the water course or phytozones. Slow release materials can be made to stay put in the phytozone of interest, at least in fairly quiet waters, liberating the chemical agent where it will do the most good. Why poison the total water course if the target can only contact and absorb the herbicide in a particular part of that volume? Here are a few exciting solutions to this situation:

Floating pellets released at the

water surface that spread a thin layer of 2,4-D across the surface. Sinking pellets, by density adjustment can be made to penetrate or rest on bottom mud, that release herbicide where rooted plants are the most vulnerable. Suspending strands that hang vertically in the water. What we call "top suspenders" release 2,4-D in the first 6 inches of the water and are extremely effective in small pool tests against Water Hyacinth. In fact they tend to entangle in the roots of this floating plant. Bottom suspenders that release in the six or so inches of water just above the water bottom. All of these forms can be encapsulated in a heavy clay binder that, when dispersed in water, breaks foliage, sinks to the bottom, and degrades, slowly releasing pellets or suspenders. By proper choice of a binder release time is controllable. Figure 3 illustrates these concepts.

Now what does this all mean? If the laboratory results translate to the field we will not only be able to control aquatic weeds at 1/15 to 1/100 present dose levels, but extend between-treatment times to perhaps several years. In other words, we reduce contamination while saving money in labor costs.

A dose of 20 ppm held for 1 day, with retreatment twice a year gives an annual average dose of 164 parts-per-billion per day. We know that control under laboratory conditions is feasible at 10 parts-per-billion per day and probably at 1 ppb/day.

It is our belief that the future will see a great deal of research into slow release pesticides with many resulting commercial products of benefit.

Abbott Laboratories Releases Brochure

A new brochure, "Dipel and the Gypsy Moth," is now available from Abbott Laboratories. Dipel Biological Insecticide recently received Federal registration by the Environmental Protection Agency for the control of Gypsy Moth and certain other caterpillar defoliators of ornamental, shade and forest trees.

The brochure, in question and answer form, provides information on how to use the product under a variety of conditions. Dipel is registered for control of Gypsy Moth, elm spanworm, spring and fall cankerworm, bagworm, fall webworm and Red-Humped caterpillar (California only).

For more details, circle (719) on the reply card.

Insects In Weed Control To Be Studied

Insects to control weeds will be studied in a five-year program to be conducted by Virginia Tech.

Weeds have been estimated to cause more damage to crops than insects and diseases combined. Many insects, however, feed on weeds. Their use as a non-chemical means of weed control will be explored during the study.

According to Robert L. Pienkowski, professor of entomology and director of the project which is funded by the Cooperative State Research Service, USDA, researchers will identify and determine the distribution and abundance of insects attacking important weed species in Virginia.

Among the weed species to be studied are wild garlic, Johnsongrass, curled and musk thistles, crabgrass, morningglory, yellow nutsedge, horse nettle, fall panicum and ragweed.

The research complements work being done by Virginia Tech on control of musk and curled thistle through use of an imported weevil.

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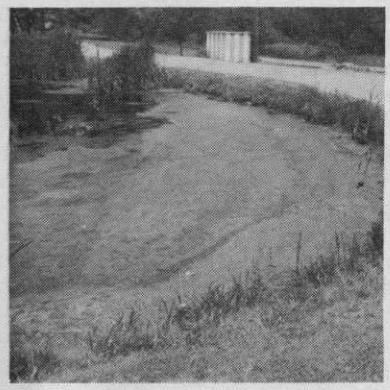

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RETARDATION *(from page 32)*

and MON-845, experimental compounds from Monsanto Company; and Slo-Gro, a maleic hydrazide formulation manufactured by Uniroyal Company. In addition, MBR 6033 from the 3M Company and Maintain CF-124 from U. S. Borax Corporation have looked very promising in greenhouse trials. Field evaluations of these chemicals will be conducted in 1972.

Mon-820 has looked especially promising in retarding grass growth for six weeks or longer without much color loss. At rates of 1, 2, 3, or 4 lb/A it has given consistently better tall fescue and Kentucky bluegrass retardation over a 42-day period than Slo-Gro, which is currently available for use on roadbank vegetation in some areas. Some color loss became evident with higher rates of all chemical treatments. At no time during the study did lower rates of the MON chemicals affect color greatly. No rate of Slo-Gro affected color significantly in the early growth, but tall fescue color loss was very severe, particularly with higher rates, about five weeks into the trial. Kentucky bluegrass was not affected as severely by Slo-Gro treatments. Color maintenance was not affected as severely by Slo-

Table 4. Height of several grass varieties and species as influenced by treatment with the growth retardant MON-820.

Variety and Species	MON-820 Rate (1b/A)	Grass Height (cm) at 8 Days After Treatment
Common Kentucky Bluegrass	2	7.2
	4	7.3
	Control	14.2
Merion Kentucky Bluegrass	2	7.8
	4	6.9
	Control	12.4
Pennstar Kentucky Bluegrass	2	7.9
	4	7.2
	Control	11.1
Prato Kentucky Bluegrass	2	8.0
	4	7.4
	Control	13.0
Newport 25% / Merion 50% / Park 25% } Kentucky Bluegrass	2	7.5
	4	7.0
	Control	11.7
N-7-16 Kentucky Bluegrass	2	7.5
	4	7.3
	Control	13.3
Fylking Kentucky Bluegrass	2	8.0
	4	7.7
	Control	11.7
Red Fescue 50% Common Kentucky Bluegrass 50%	2	8.7
	4	7.9
	Control	13.2
Perennial Ryegrass	2	8.6
	4	7.4
	Control	13.2
Perennial Ryegrass 50% Common Kentucky Bluegrass 50%	2	7.9
	4	7.2
	Control	12.4
Kentucky 31 Tall Fescue	2	7.5
	4	7.2
	Control	13.2
Common Bermuda	2	7.1
	4	6.7
	Control	10.7
U-3 Bermuda	2	5.6
	4	7.0
	Control	8.4
Tiffine Bermuda	2	5.5
	4	5.4
	Control	7.3
Kentucky 31 Tall Fescue 50% Common Kentucky Bluegrass 50%	2	7.6
	4	7.4
	Control	13.8
Meyer Zoysia	4	5.7
	Control	7.0
Midwest Zoysia	2	6.1
	4	6.2
	Control	9.1

Gro than with MON compounds on Kentucky bluegrass throughout the test and with tall fescue for a few weeks, but Slo-Gro was greatly inferior on tall fescue after five weeks.

All MON-820 treatments — 1, 2, 3, and 4 lb/A — gave greater retardation than the same rates of Slo-Gro on both N-fertilized and N-unfertilized Kentucky bluegrass plots over a 42-day period. Differences between treated and control plots were greatest when all plots had been fertilized with 2 lb N/1000 sq. ft. This N application brought about a greater color loss with the MON compounds than with Slo-Gro early in the experiment, but these effects did not last throughout the duration of the experimental period.

Dry matter yields of tall fescue and Kentucky bluegrass from MON-820 and MON-845 plots were generally lower than yields from Slo-Gro plots at comparable chemical rates, which indicates better growth retardation. In most instances, yields from MON plots averaged only one-fourth to one-seventh the yield of the untreated controls.

MON-820 treatments resulted in significant retardation of common, Merion, Pennstar, Prato, N-7-16, and Fylking Kentucky bluegrass; common, U-3, and Tiffine bermuda; Meyer and Midwest zoysia, and mixtures of Kentucky bluegrass with red fescue, perennial ryegrass, or tall fescue.

Based on our results with 19 growth retardants, we believe that chemical growth retardation of grasses has a great potential and a great future.

Literature on Chinch Bug Available From Stauffer

Literature about Chinch bug control with Aspon insecticide is now available from Stauffer Chemical Company.

A new brochure tells how to detect these pests in turf and specifies control procedures.

According to Stauffer, Aspon is recommended by leading turf experts and has been successfully used by home owners, golf course superintendents and commercial lawn care specialists with outstanding results. The product, Stauffer says, is one of least hazardous materials available for chinch bug control and in most instances only one application is needed per season.

A special section lists suggested application rates. For more details, circle (725) on the reader reply card.

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Fits compactly into the back of a small pickup with ample room remaining for working supplies. **Provides convenient curb-side reach of tank lid, starter, hose reel and all controls.**

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5-GPM Positive Displacement Pump... adjustable up to 300 PSI. Simple drive belt adjustment and belt guards for safety!

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For More Details Circle (130) on Reply Card

U.K. Forestry Plantations Adopt Shell Prefix

Forestry plantations of the United Kingdom have adopted Shell Prefix herbicide. The official approval follows extensive field trials on Prefix granular formulation containing 7½% of the active ingredient.

The trials demonstrated Prefix as an efficient and economically attractive forestry herbicide, with cost savings arising from a smaller labor requirement and improved manpower utilization compared to other methods of weed control.

The first application of Prefix is recommended at a rate of 50 lbs. of granules per treated acre applied as a 3 ft. band over the trees.

Prefix is applied by means of the specifically developed machine, the Horstine Farmery Air Flow Granular Applicator, which ensures accurate and rapid placement either as a 3 ft. continuous band over the trees or, as a spot treatment over and around individual trees. The Applicator will treat an average of 5 acres per man day.

Tree Service Company Transplants Chinese Ginkgo

A 150-year-old Ginkgo tree in Niagara Falls, N.Y., was saved from the destruction of urban renewal, thanks to ecology buffs and the professional skills of Frost and Higgins Landscaping service.

The Niagara Ginkgo is estimated to be 150 years old and was planted by Thomas Tugby, who brought the tree back from China in a small tub. Since then, it has grown to five feet in diameter, 90 feet tall and with an 80-foot spread. Botanists say this oriental species is more than 200 million years old.

About 2,000 disturbed ecology buffs put pressure on the Niagara Falls Urban Renewal Agency to save the tree. With the cooperation of the mayor and the city government, they convinced the Housing and Urban Development (HUD) to appropriate money to save the tree.

Monroe Tree Company of Rochester, N. Y., was retained to study the possibilities and determine if the tree could be moved. Monroe contacted Frost and Higgins of Burlington, Mass. Authorization was granted to move the tree.

It was a triumph in large tree moving, says William A. Rae, president of Frost and Higgins. The tree was moved with a large root ball, 28 feet in diameter and 6 feet in depth. The root ball was placed on a platform and the tree moved slowly along a wide trench approximately 200 feet to its new home.

Rae says that the Ginkgo will receive much care for two to three years to insure proper growth after the shock of transplanting.

This is the 150 year old Ginkgo tree, five feet in diameter, that was transplanted by Frost and Higgins Landscaping service.

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THE 6900 SERIES are heavy duty reach up-and-over, reach down-and-under models with 90° total movement on the lower boom. Available with Type "A" center design, 210° outer boom action; or type "C" center action with 270° total outer boom movement; in 40, 45, and 50-Ft. sizes and many standard SKYWORKER options. For complete technical data, write DEPT. WT-1.

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July 10-12

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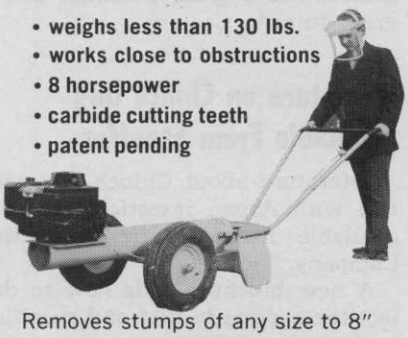

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For More Details Circle (149) on Reply Card

industry people on the move

Charles M. Culver, promoted to refrigeration/air conditioning sales manager for Aeroquip Corporation. Industrial Div., Jackson, Mich. Will have marketing responsibility for all Aeroquip products in this specialized field.

* * *

Dr. Ming H. Yu, joined O. M. Scott & Sons, Research Div., as a plant geneticist. He is a graduate of Chung-Hsing University, Taiwan, Texas A&M and Iowa State University.

* * *

Duane A. Jacklin, named general management assistant to the Jacklin Seed Company. He has just returned from a tour of duty with the U.S. Navy in which he served as senior systems analyst for the data processing center of the Commander-In-Chief of the Atlantic Fleet.

* * *

Dan Hedglin to service manager for Chushman Motors division of Outboard Marine Corporation. He replaces **Oscar J. Wisbey** who is retiring. Will direct service functions involving all Cushman lines of golf, industrial, turf and Trackster vehicles.

* * *

Dean M. Carpenter, named manager, outdoor and leisure products, for Allis-Chalmers Corp, Agricultural Equipment Div. He will head merchandising, sales promotion, advertising, engineering specification development and manufacturing liaison.

Paul L. Conner and **C. Ben Meadows,** appointed district sales managers for Pioneer Saws, Galesburg, Ill. Conner was midwestern sales manager for Consolidated Furniture Industries before joining Pioneer Saws. Meadows is a professional fisherman and ranks among the top 20 fishermen in the nation.

* * *

Eldon Reeves, to controller for the Turf Products Div. of the Toro Company. He was controller for NuLine Industries and division controller for the Cinch-NuLine Division of TRW, Inc. before joining Toro.

* * *

Joseph E. Testa, appointed executive vice-president, Melnor Industries, Moonachie, N.J. He has been with Melnor since 1963.

* * *

Ken Mills, becomes eastern regional sales manager for Rain Bird. He has been a member of the Rain Bird Golf Sales Team and has served as district manager for the N.E. United States. Will be located in Illinois.

* * *

Leo Miles, to product manager for herbicides and plant growth regulants for Niagara Chemical Division of FMC Corporation. He will be responsible for the market development of Tandex herbicide.

* * *

John A. Wichtrich, becomes western regional sales manager for agricultural products, Union Carbide Corporation. He was sales services manager.

* * *

James Burton Wolford, joined Thompson-Hayward Chemical Company as agricultural sales representative. He will be located in Fayetteville, N.C.

Cuts twice as fast as most lawn tractors, hugs the ground for hillside safety

NATIONAL 68-inch Triplex

Mows a 68-inch swath at speeds up to 4 miles per hour, a half acre in 15 minutes.

It's a turf-professional type mower, with three powered, free-floating reels that follow ground contour. It shears grass cleanly; doesn't leave unsightly "tip burn" as rotaries often do.

Reduces trimming time because the reels reach out over curbs, up to obstructions and in other hard-to-cut places.

Built to last—with Timken bearings, automotive-type transmission and a lip on the cutter bar to take years of wear.

Do your lawn job in about half the time and do it better with the all-mower mower, the National Triplex.

Other models from 25 to 84-inch cut.

Write for information.

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For More Details Circle (109) on Reply Card

Controlled-Release Chemicals May Aid In Reforestation

"Controlled-release" herbicides can accelerate the regrowth of forests. Herbicides can be effectively used in much smaller amounts than previously. The demand for wood products is projected to increase by 130 percent during the next 15 years.

These were the findings of three scientists of the University of Washington. Drs. R. M. Wilkins, G. G. Allan and Chetan S. Chopra, senior research associate in the University of Washington's College of Forest Resources, Seattle, reported their studies during the 163rd national meeting of the American Chemical Society in April.

According to Chopra, herbicides are "locked" into such substances as bark, crab shells, or lignin, which decompose slowly, releasing low levels of the herbicide to the soil over an extended and predictable period of time.

Substantially smaller amounts (a factor of 10 to 100) of herbicides are introduced into the environment by this method, compared to previous ways of applying herbicides, he said. The herbicide is allowed to penetrate and link chemically to the bark. Therefore, the chemical cannot volatilize or be leached from the material.

"After one growing season, weed levels in a newly planted Washington State forest were down threefold and the growth of the treated conifer seedlings was twice that of untreated seedlings," Chopra told attending pesticide chemists.

"Controlled release combinations of bark/herbicide at specific application levels did not damage Douglas fir seedlings and yet had the capability of eradicating established and undesirable Western red alder seedlings whilst simultaneously inhibiting weed seed germination and growth for one entire growing season."

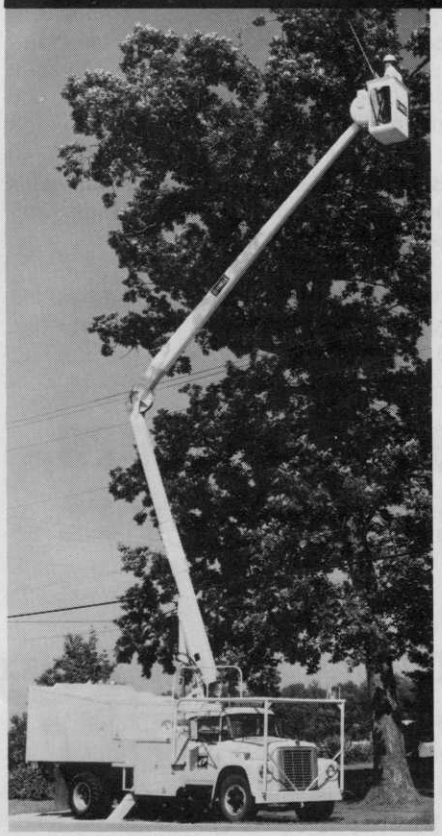
He pointed out that although there are more than 500 million acres of commercial forest lands in the U.S., one-fifth is currently covered with brush or small trees or inferior quality and could be made more productive by reforestation with conifers.

"One of the problems of such endeavors is provided by the rapid invasion of conifer plantations by fast-growing deciduous brush which in the Pacific Northwest is typified by Western red alder and vine maple. These deciduous plants, and their counterparts elsewhere regionally, tend to crowd and overshadow the conifers during their first five to ten years of growth and provide root competition for water and nutrients for many further years. The deleterious effect of this competition is further exemplified by the 50 percent loss in merchantable timber," he said.

The elimination of brush presents many problems, however. Wildlife that depends on brush for survival may be forced to forage more intensively on the tree crop. Commercially available herbicides are not clearly selective to brush. And herbicides may be ecologically undesirable. Water pollution problems may arise.

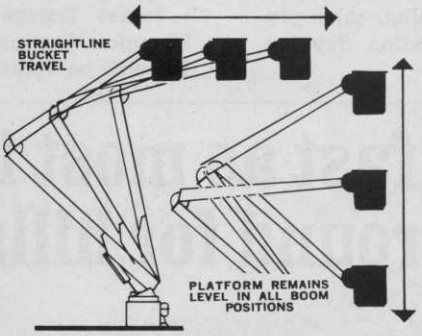
"To solve these and other forest pest management problems, new and more sophisticated methods of control will have to be developed and the approaches taken at the University of Washington are based upon the concept of controlled release pesticides." he said. "These materials are chemical or physical combinations of known and established pesticides with macromolecules such as bark, kraft lignin and crab shells, he said.

HI-RANGER® gives you more



. . . that's needed for safer, more productive tree trimming and line clearing.

More than 20 years refinement in design and construction account for the No. 1 position HI-RANGERs hold among owners and operators of mobile personnel towers for overhead work.



Accurate, positioning, stability, and precise movement are possible, as shown, only with HI-RANGER.

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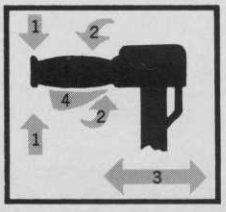

Owners and operators of HI-RANGERs "wrote the book" for features exclusive with HI-RANGER . . . ☐ single hand 3-D bucket control, ☐ automatic safety interlock system, ☐ stronger tapered upper boom, ☐ power-reserve accumulator system, ☐ constant-angle upper boom movement with straight-line bucket travel, ☐ self-leveling bucket, and ☐ maximum safety with faster, easier operation for more work at low cost.

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insect report

TURF INSECTS

RANGE CRANE FLY
(Tipula Simplex)

CALIFORNIA: Females infested pastureland at Modesto, Stanislaus County.

WESTERN TENT CATERPILLAR
(Malacosoma californicum)

OREGON: First instar larvae on bitterbrush at Mt. Vernon, Grant County.

TREE INSECTS

NANTUCKET PINE TIP MOTH
(Rhyacionia frustrana)

OKLAHOMA: Over-wintering generation emergence complete and adults on young pines in Latimer County.

EASTERN TENT CATERPILLAR
(Malacosoma americanum)

SOUTH CAROLINA: Webs 2 per tree on wild cherry in Sumter, Richland, Lexington, Calhoun, Dorchester, and Colleton Counties. First of season. NORTH CAROLINA: Webbing noted in Wake, Columbus, Bladen, and Brunswick Counties. MARYLAND: First larvae of season on wild cherry in Montgomery and Prince Georges Counties. TEXAS: Medium to heavy on wild plum throughout Brazos and Madison Counties. ARKANSAS: Hatched in northwest areas about March 5, and about February 27 in south areas. MISSISSIPPI: Larvae on cherry trees in southern half of State.

CONIFER SAWFLY
(Neodiprion taedae linearis)

ARKANSAS: Hatch began in south areas February 28. Weather conditions favored larval feeding and development. Third to fifth instar larvae present. Feeding damage not yet serious. Numbers sufficient to cause defoliation in local areas. Activity began about 2 weeks earlier than normal.

PINE TUSSOCK MOTH
(Dasychira plagiata)

MINNESOTA: Surveys indicate population collapse in east-central areas; this jack pine area scheduled for controls in 1972.

GALL MIDGE
(Taxodiomyia cupressiananassa)

INDIANA: Specimens collected from bald cypress in Vanderburgh County during October 1971. This is a new state record. Specimens collected in Posey County during November for a new county record.

WEEVIL
(Phyllobius oblongus)

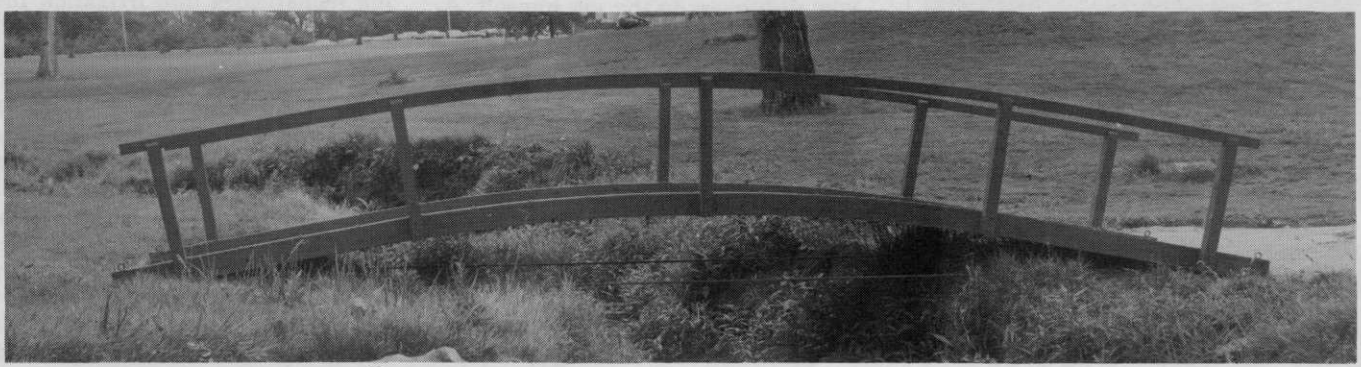
MAINE: Specimens reported at Hampden, Penobscot County on June 17, 1971. Adults feeding on newly planted Norway maple. This is a new State record.

MARAGRODID SCALE
(Kumania quercus)

CALIFORNIA: Specimens collected from oak at Napa, Napa County for a new county record. This scale collected for first record outside Asian Continent in 1965 at Monticello Dam in Yolo County.

SOUTHERN PINE BEETLE
(Dendroctonus frontalis)

ALABAMA: Heavy localized infestations destroyed about 10 acres of pine in Marengo County.



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They are available in 3 and 5-foot widths with lengths of 8, 12, 16 and 20 feet. You have a choice of a wooden railing (as shown above) or a chain and steel post railing. Write for complete details and specifications on the Porta-Span® bridge. Free, descriptive literature available upon request.

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Cuts Heavy Growth, Weeds 2-3 Feet High, With Enclosed Blade!

MOWS LAWNS VELVET SMOOTH

- 8 Horsepower, Recoil Start
- 26" or 30" Cut
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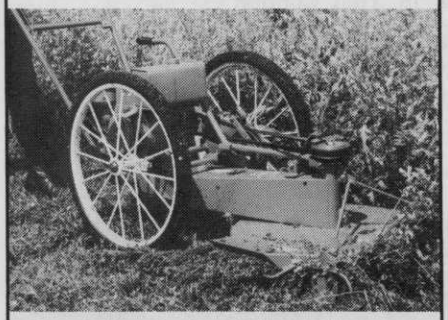
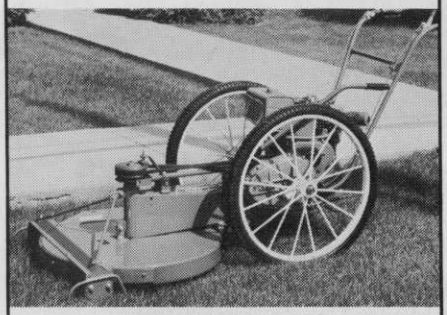
- Single Belt
- Steel Wheels, Rim Gripper Tires

ROOF VP-75 cuts tall weeds, heavy growth 2 to 3 feet high, with covered cutting blade. Without clogging blade housing. Exclusive, patented Variable Pitch makes it possible. Variable Pitch enables you to change the angle at which blade strikes growth. Go from cutting tall weeds to mowing show place lawns by simply changing blade angle.



By tipping front of blade downward (crank furnished), trailing end of blade tips upward over cut debris. Blade housing won't clog, growth is cut clean, not trampled.



Flatten angle of blade for mowing fine lawns. Cutting height adjustments from 1" to 4".

Rugged construction, simple maintenance, easy operation. Choice of swivel caster front wheels (top photo), or runners. Operators cart optional.

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Mounted on a 3-point hitch hydraulic system, the machine can be lifted out of the ground or set to any desired depth. Shown here are the coulter, the nematicide pipeline just behind it and the packing wheel. Just above the coulter is a 350 pound weight. A similar weight is on the opposite side.

INJECTION *(from page 20)*

who desires to do the job himself. A custom applicator can pro-rate equipment investment costs over many jobs and charge less. Another plus for custom application is the supervision by technical and experienced personnel.

How do golf superintendents feel about nematicide injection?

"We applied a nematicide at the Ormond Beach course with excellent results," says Russell. "Then the superintendent moved to another course. He called me to apply nematicide on 80 acres of that course. He said he had saved many times over the cost of the application."

Russell formulated the first batch of Nemagon to be sold in Florida about 20 years ago. Pursley Sod Co., St. Petersburg, purchased a shipment and used it on newly established zoysia lawns in the area as a surface drench.

"At first we thought the problem of turf nematodes had been solved but as time went on it was rather apparent that surface drenches of Nemagon were inefficient," he notes.

"Though good results have been obtained by drenching small areas, there were many failures showing up because of insufficient drench, buffering action of organic matter present and insufficient vertical penetration."

Other turfmen have tried injecting nematicides into irrigation lines for application to large areas with varying results. Russell points out that failures can usually be attributed to the high chemical loss by evaporation from the water droplets before they fall to the surface and penetrate the soil.

He said some tests have demonstrated as much as 50-75 percent nematicide loss from sprinkler irrigation systems.

As early as the late 40's, Drs. Perry and Christie, then with the USDA in Sanford, Fla. found that many turf problems in central Florida were caused by one or more species of plant parasitic nematodes.

Shortly after, but before Nemagon was registered, Dr. Perry experimented with injecting D-D soil fumigant into turf soil. There was some phytotoxicity at the point of injection but this disappeared and the turf responded favorably.

Russell said unfortunately this method of injecting nematicides into the soil was never tried commercially and was subsequently overlooked. The veteran nematicide expert says there is no reason why turf equipment can't be developed for home lawn injecting. "We are now working along these lines and hope to have equipment available soon."

For More Details Circle (129) on Reply Card

Aquatic Weed Program Set For July 9-12

Industry people concerned with aquatic weed control will meet July 9-12 at Miami, Fla., for the annual meeting of the Hyacinth Control Society. The Society is dedicated to control of all noxious weeds.

The program will include a field tour of the Aquatic Research Laboratory at Ft. Lauderdale. This lab is an arm of the USDA Agricultural Research Service, and has experienced considerable growth and change within the last two years.

Formal phases of the program will include technical papers on aquatic weed control and water management by leaders in the field. A special program is also planned for both wives and children.

Headquarters will be the Miami Springs Villas—Kings Inn, Miami, Reservations can be made directly with the hotel and convention rates are $14.50, single or double.

Traditionally, the Society welcomes non-members and extends a special invitation to anyone interested in this phase of the weed control industry. All types of aquatic weed control are featured on the program, including chemical, biological, and mechanical.

More details are available from Society president, Robert J. Gates, Box 508, Floral City, Fla. 32636.

Penn State Fertilizer Tests Indicate Good Results

IBDU, a synthetic organic turfgrass fertilizer being tested on experimental plots, has produced good results, both in grass vigor and green color, says Dr. Donald V. Waddington, associate professor of soil science at Penn State.

He believes that IBDU is a useful addition to the list of slowly available nitrogen products for long term maintenance of turfgrasses. IBDU is available commercially, both as a single material and as a component in other turfgrass fertilizers.

As a synthetic organic fertilizer, IBDU dissolves very slowly in water, making its nitrogen available over several months. Two applications per year, spring and fall, should give uniform growth response and color throughout the growing season, Dr. Waddington claims.

Introducing a New Era in turf maintenance...

Myers new TurfLine Sprayers

Myers TURF LINE

This is the TL10ETMG, headliner of the new Myers TurfLine Sprayers. It's designed specifically for eliminating weeds, fungus and insects. It also reduces labor, saves time and lets you get on with other work. If turf, shrubs and trees are your responsibility, it'll pay you to look at this one. It includes features like these:

- Hi-flotation tires for minimum ground compaction. Distributes weight evenly for a smooth ride over all kinds of terrain.
- Adjustable fast hitch makes it usable with tractors and carts.
- Molded fiberglass tank (100 gallon capacity) has prop-type agitator and built-in sight gauge.
- Plunger type spray pump (10 GPM at 300 PSI) handles liquids as well as wettable powders.
- Boom covers 15-foot spray swath, uses nylon, drip-proof diaphragm check nozzles, folds and stores on built-in arresting hooks.
- Has convenient hose connections for high pressure spray gun work.

Thoroughly field proven, this unit has already shown people in all parts of the country how to handle their grounds maintenance jobs efficiently and economically. Shouldn't you look into this one now? See your Myers TurfLine Dealer or write today for our new catalog.

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We put a lot into our Pioneer saw chain. Precision engineering. Effective design. The right steel. And we stand behind our finished product with our guarantee.

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Range: Up to 40 feet . . . Heights up to 30 feet using interchangeable PVC jets.

EXCLUSIVE FEATURE: In no time, without tools, unit converts to ULV (Ultra Low Volume) with micron droplets down to 30 micron using brass jets. One tankful moistens ten times the area as spraying, reducing labor and material.

Other options on special ordar: THERMAL FOGGING, DUSTING, GRANULES & FLAME THROWING.

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meeting dates

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

Sub-Tropical Turfgrass Trade Show, Deauville Hotel, Miami Beach, Fla., May 7-10.

Florida Nurserymen & Growers Association, Walt Disneyworld, Orlando, Fla., May 25-27.

International Vehicle and Highway Safety Conference, in conjunction with the **United States International Transportation Exposition (TRANSPO 72),** Sheraton Park Hotel, Washington, D.C., May 30-June 2.

Forestry and Wildland Resource Institute, 5th annual, for high school students interested in careers in forestry, wildlife, fisheries and outdoor recreation, Virginia Polytechnic Institute and State University, Blacksburg, Va., June 11-17.

Watersheds in Transition, a national symposium, Colorado State University, Ft. Collins, Colo., June 19-21.

National Golf Foundation Western Seminar, Sunriver Lodge, Sunriver, Oregon, June 26-30.

American Association of Nurserymen, Statler Hilton, Washington, D.C., July 16-19.

Society for Economic Botany, 13th annual, University of Mississippi campus, University, Miss., July 30-Aug. 2.

National Golf Foundation Eastern Seminar, Pine Needles Country Club, Southern Pines, N.C., Aug. 7-11.

Rutgers Turfgrass Research Day, College of Agriculture, College Farm Road and Dudley Road, New Brunswick, N.J. August 10.

International Shade Tree Conference, Inc., 48th annual, Newporter Inn, Newport Beach, Calif., Aug. 13-17.

American Association of Nurserymen Management Seminar, Syracuse University campus, Aug. 13-18.

Canadian Parks/Recreation Association, 1972 conference, Ottawa-Chateau Laurier Hotel, Aug. 14-17.

Eastern Kentucky Turfgrass Field Day and Conference, Powell Building, Eastern Kentucky University, Richmond, Ky., Oct. 10-11.

Turfgrass Equipment and Materials Educational Exposition, 12th annual, Southern California Turfgrass Council, Brookside Park, Pasadena, Calif., Oct. 11-12.

Missouri Lawn and Turf Conference, 13th annual, Ramada Inn, Columbia, Mo., Nov. 7-8.

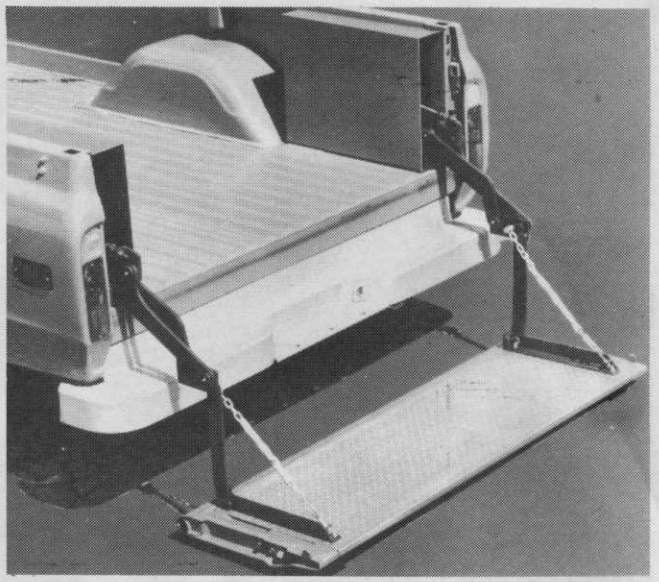
Ohio Turfgrass Conference and Show, Franklin County Memorial Building, Columbus, Ohio, Dec. 12-14.

Golf Course Superintendents Association of America, 44th annual International Turfgrass Conference and Show, Boston, Mass., Jan. 7-12.

Southern Weed Science Society, 26th annual meeting, Jung Hotel, New Orleans, La., Jan. 16-18.

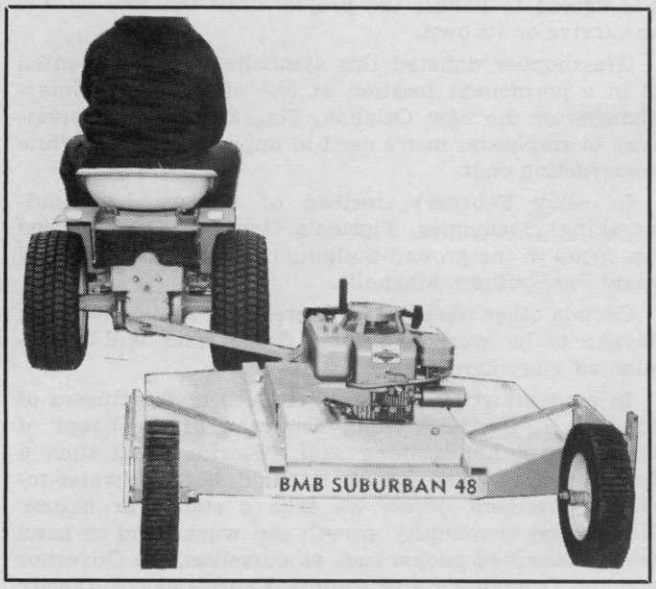
MOWER ATTACHMENT: Thomas Equipment Ltd., Centreville, New Brunswick, Canada

Convert the Thomas S/S Loader into a mower with this sickle bar attachment designed for all applications of grass cutting. Available with cutterbar lengths of five, six and seven feet, the operating range of the cutterbar is from minus 75 to plus 90 degrees. The sickle bar can be depressed below the loader level to cut ditches, banks and other hard-to-reach areas. The mower also trims hedges both horizontally and vertically. Mower is powered by a heavy duty reversible hydraulic motor with a built-in relief valve. Cutterbar is protected by heavy duty guards and the knife is made of three inch underserrated sections. For more details, circle (709) on the reply card.



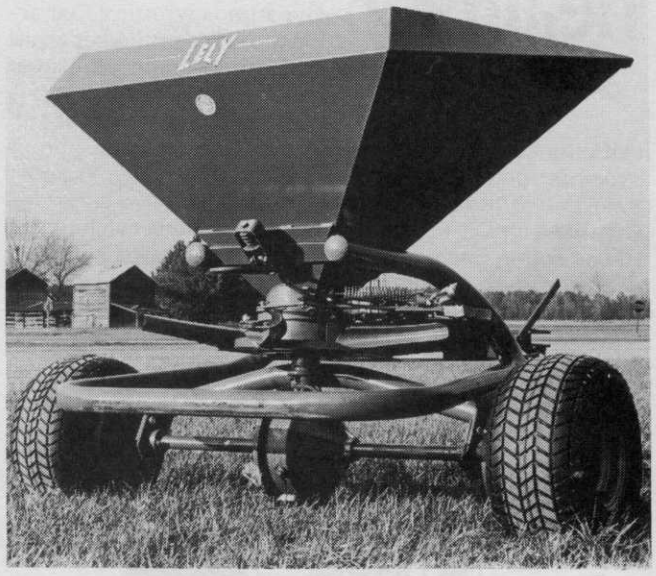
ELECTRIC-HYDRAULIC TAILGATE: S & H Industries, Inc., Cleveland, Ohio

Designed to mount on standard half-ton and three-quarter-ton pick-up trucks, the Keysco-Matic Electric-Hydraulic Tailgate does not change the original styling of the truck. It utilizes the original tailgate with full rear view for safety. Truck battery powered, it is built to handle loads up to 1,000 pounds. No body or frame modifications are necessary. Installation is simple. Non-slip, Diamond Steel lift plate, all hoses and fittings are included. For more details, circle (710) on the reply card.



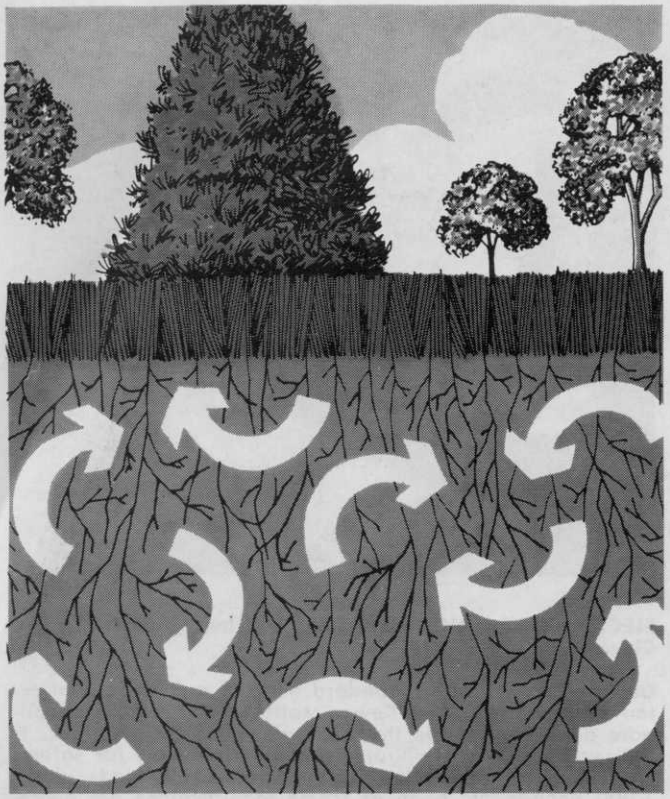
TRAILING MOWER: BMB Company, Inc., Holton, Kans.

Here's a new 48-inch trailing mower designed for use on estates, park areas, roadsides, schools, or anywhere light mowing is required. The BMB Suburban 48 attaches easily to any self-propelled vehicle. Alloy steel knives that cut material before it is bent to the ground are powered by an 8 H.P. motor with heavy duty centrifugal clutch. Shield and housing are 11 gauge steel, reinforced with two inch channel framing. Two inch runners, full length, prevent scalping. Hitch offsets 24 inches right or left and the long tongue permits easy, short turns. For more details, circle (711) on the reply card.



PRECISION BROADCASTER: Lely, Wilson, N.C.

Use Model WGR as a fertilizer broadcaster, seeder or for broadcasting granular chemicals. It is ground-driven and features flotation tires. A centrifugal forced feeding spreading mechanism assures a wide, uniform spread pattern up to 52 feet. The unit can be operated behind a tractor, truck or any vehicle with a hitch at speeds from three to ten mph. The spreading mechanism can be disengaged for towing at highway speeds. Capacity is 800 lbs. The hopper and feed rings are removable for fast, easy cleaning. For more details, circle (712) on the reply card.



"Opens up" heavy soil for healthier turf!

Grand Prize® Lawn & Garden Gypsum is winning fast acclaim among professional turf and nurserymen wherever heavy soil presents growing problems. This natural soil conditioner turns hard-packed clay into an open porous structure; permits soil to breathe, air and water to penetrate, and roots to grow deep. Grand Prize Lawn & Garden Gypsum supplies neutral and readily available calcium and sulfate-sulfur, each vital to plant growth; helps stimulate decomposition of organic material; absolutely will not burn. Write for specifics. 101 South Wacker Drive, Chicago, Illinois 60606, Dept. WTT-52

UNITED STATES GYPSUM
BUILDING AMERICA

A symbol of man's awareness of the need to improve the land while constructing on it. This Southern Magnolia tree was planted during ground building ceremonies of the Orlando, Fla., East-West Expressway.

Florida Firm Babysits Tree

BABYSITTING a 25 foot tall Southern Magnolia is not exactly the job for next door's teenage girl. That's why Grasshopper Landscaping, Inc., Winter Park, Fla., has agreed to handle the project until the tree is able to survive on its own.

Grasshopper donated this symbolic tree and planted it in a permanent location at one of the future interchanges of the new Orlando, Fla., East-West Expressway to emphasize man's need to improve the land while constructing on it.

In early February, instead of the usual groundbreaking ceremonies, Florida's Governor Askew used his spade in the ground-building ceremony as he helped plant the Southern Magnolia.

Certain other trees in the Expressway route have been tagged to be worked around. Some trees will be replanted elsewhere.

In expressing the ecological concern of the citizens of Florida, C. C. "Kit" Giles, chairman of the board of Grasshopper Landscaping said, "Florida is in such a tremendous growth period it could become water-to-water pavement unless we take a stand for nature. Nature and community growth can work hand in hand when concerned people such as ourselves, the Governor and the Orlando-Orange County Expressway Authority also work hand in hand."

This 13.4 mile long, fully landscaped East-West toll-road starts east of Orlando, cuts through the center of town and ends near Walt Disney World and the proposed Sea World, a much needed connection because of the immense growth of traffic and population in the Orlando area.

Initial phase of the roadway will be a 4.2 mile subsection at a cost of $5,861,449.75 and due for completion by December 1973. Grasshopper Landscaping, Inc., will provide all landscaping and grassing for this section.

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Pesticide Discovery and Testing Costly, Dow Scientists Report

An explosion in requirement, coupled with an explosion in technology, has added dramatically to the costs and time devoted to toxicological studies needed for pesticide development, say two scientists from Dow Chemical, U.S.A.

According to Dr. P. J. Gehring, director of toxicology, these costs are "at the expense of pesticide manufacturers and therefore ultimately to the consumer."

In a paper presented to the American Chemical Society he said that he hoped unnecessarily restrictive demands would not "develop into being at the expense of the food supply of the nation and the world as well."

Improved technology does not always result in the replacement of outdated techniques for toxicological evaluation, he said. New methods often are required in addition to rather than in place of older types of evaluation. This has added to the problem, rather than simplifying or speeding results. He said that some standard clinical procedures are still required, although they have long ago been shown to be poor indicators of a particular type of response needed for toxicological evaluation of pesticides.

Requirements for toxicological studies on pesticide compounds in relation to cost and time have climbed from a modest $10,000 and a 30 to 90 day time period in the early Fifties to an investment of up to $700,000 and a time period exceeding four years.

According to Gehring, three factors have served to influence the more rigorous and extensive toxicity testing: increased sensitivity of analytical methods which provide a better measurement of tissue residues, new techniques of increased sensitivity to monitor toxicological parameters, and the increased awareness of the impact of pesticides on non-target organisms.

He suggests that the methods of interpreting test data have not kept pace with the development of techniques. Some tests such as those involving massive dosages may yield positive test results but little information. Striking results attract attention, he said, but do not necessarily contribute to scientific knowledge.

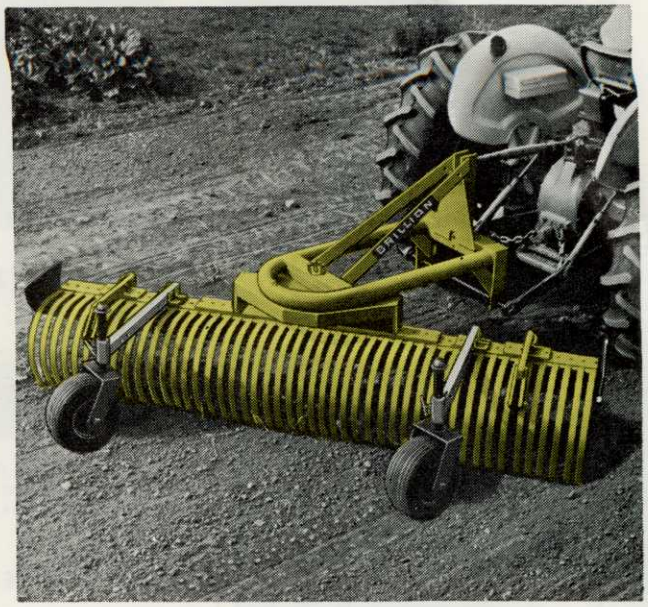
Dr. E. H. Blair, director of research and development for the Ag-Organics Department of Dow, then detailed the steps leading from the initial screening of compounds for biological activity to the eventual marketing of a material as a new pesticide.

One new pesticide emerges for every 10,000 compounds tested, said Blair. The time from discovery to market can be 10 years and the cost for a new pesticide is in excess of $10 million. Those are the odds in the pesticide development game.

Using 1956 as a base year, he said that research and development costs had risen by 245 percent in 1964 and had escalated 340 percent by 1969. He indicated that costs are continuing to climb because of pressure for more extensive toxicological and other testing combined with current high money costs and general levels of inflation.

He pointed out that a successfully developed new product, a "winner," must ultimately bear the costs of the research work done in support of a material eventually abandoned at some stage in research. He said the challenge facing the pesticide industry today is to identify and eliminate the "losers" early. Frequently, the "losers" of today can be associated in some manner with toxicology, metabolism, analytical or ecological factors which make them unsuitable for further development.

BRILLION Terra-Scaper



It works the soil, rakes, windrows, gathers... backfills, spreads, grades, levels... finishes seedbed

The multi-purpose Terra-Scaper saves time and labor—cuts equipment and operating costs on landscaping, turf maintenance and construction jobs. You can use it to break up small clods and soil—to level pulverized soil into a ready-to-use seedbed for seeding or sodding. The rake can be set at five angle positions to windrow stones, trash or debris—or straight ahead for gathering the windrows. You can add optional scraper blades for spreading, backfilling, grading and leveling of gravel, stone, soil or fill—or a scarifier for ripping sod, ridges and packed ground. Caster wheels and 6.50 x 13 flotation tires for easy maneuvering. Terra-Scaper is available in 6′ and 8′ widths for 3-point Category I pick-up. The best in the field—priced right. Mail coupon.

If Brillion builds it— it has to be better!

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Please send information on the following:

○ Terra-Scaper Landscape Rake ○ Landscape Grass Seeders
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○ Turf-Maker Grass Seeders ○ Name of nearest dealer

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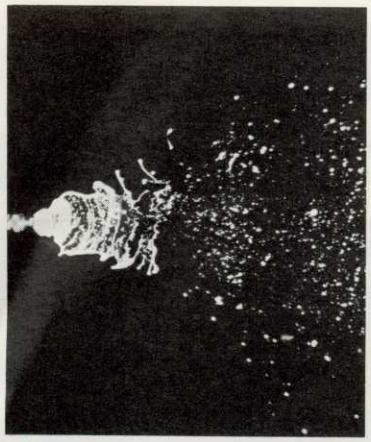
FOMEX Spray Pattern



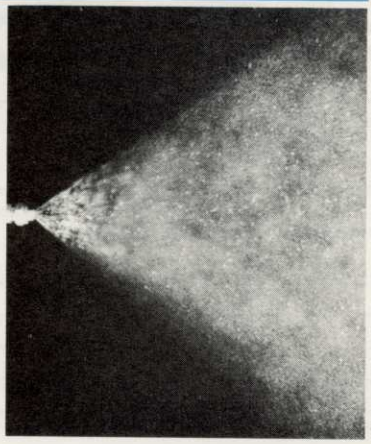
Fomex

A New Development in Reduced Drift Spraying of Herbicides

Colloidal Products Corporation and Delavan Mfg. Co., in cooperation have developed an adjuvant-nozzle system that allows application of herbicide sprays through existing aerial or ground spray equipment. With this unique combination, spray drift is reduced by as much as 50-70%.

Colloidal Products Corporation
P.O. Box 621, Petaluma, California 94952

Conventional Spray Pattern



These seedlings are about six weeks old. Note the differences in color and height. The Manhattan and Pennfine varieties are fine-leaved, shorter growing and darker green. Photo was taken by Dr. C. Reed Funk.

FLUORESCENCE *(from page 28)*

with the production of seed to see that high standards are maintained in the various steps of production. This assures the ultimate consumer the best possible product when he seeds his turf. Seed testing is that step in production which critically examines the seed for physical impurities. This information appears by law on all containers being offered for sale.

To the extent possible, seed analysts examine the seed for mixtures of other similar kinds of seed. For the best assurance one should use certified seed. Under such a program, a certification agency carefully documents the pedigree of the seed and supervises the growing conditions to prevent outside contamination. It provides an unbiased person to keep a check as the crop is growing.

Once the seed is harvested, cleaned, and in the bag, a sample is drawn and sent to a seed testing laboratory for a detailed analysis. Some seeds or seedlings have characteristics which differentiate them from other kinds. This becomes a useful laboratory method of detecting contamination. The fluorescence of annual ryegrass roots when observed under ultraviolet light is one of these characteristics.

Generally, perennial ryegrass roots do not fluoresce under the same light. Consequently, these two kinds can be separated on this basis at a very early stage of their development.

Four hundred seeds are planted on white filter paper and provided optimum conditions for germination. Complete germination is usually accomplished within fourteen days. The roots of these same germinated seedlings are observed under ultraviolet light and recorded as a percent of fluorescence or non-fluorescence. This information is then calculated into the purity reflecting any contamination which may be present.

New ryegrass varieties being developed do not necessarily exhibit this same fluorescence, but exhibit their own characteristic pattern. This pattern remains useful because once it is established it remains relatively constant, acting similar to a finger print. Any deviation from this pattern indicates the presence of contaminants. All of which provides us with more tools in our endeavor to provide information which allows the ultimate consumer the opportunity to buy the quality of seed he desires.

Flourescence And The Federal Seed Act

By C. R. Edwards

Conscientious seed producers take a great deal into account when producing certified seed especially of the new turf-type perennial strains. It is, however, also evident and relatively easy for less discriminating growers to produce noncertified

(continued on page 58)

For More Details Circle (118) on Reply Card

Ag-Organics Department, Midland, Michigan 48640

Dursban insecticide. Bugs have another name for it.

They call it "The Unsurvivable One!" Because nothing wipes out chinch bugs, sod webworms and many other serious turf pests like DURSBAN* insecticide. And DURSBAN insecticide won't leach. It has excellent residual activity. It's safe, too, for all common turf grasses. And economical—you get more bugs for your buck, because so little goes a long long way. Ask your Dow distributor or your contract applicator for "The Unsurvivable One!"

*Trademark of The Dow Chemical Company

DOW

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The great dwarf Bluegrass that stands below the rest.

NUGGET BLUEGRASS
Nugget Kentucky Bluegrass was discovered in Alaska near the old mining town of Hope on Cook Inlet.

In tests by leading turf research workers, characteristics of Nugget have proven to be outstanding, with exceptionally uniform performance over a broad area.

DWARF CHARACTERISTICS
Nugget is a decumbent, dwarf type cultivar of Kentucky Bluegrass. Its leaves grow close to the ground and at cuts as low as 3/4 inch Nugget still displays excellent turf quality in both appearance and strength. Nugget has exceptionally uniform regrowth, remaining neat and even if left uncut for longer than usual lengths of time.

SHADE ADAPTABILITY
Nugget's tolerance to powdery mildew contributes to its superior performance in shade as compared to other bluegrass varieties.

DISEASE RESISTANCE
In broad tests, Nugget has consistently ranked outstanding in resistance to Helminthosporium Leafspot. Nugget also shows good tolerance to Stripe Smut. It has also shown resistance to leaf rust, powdery mildew, and snow mold.

APPEARANCE AND COLOR
Along with its uniform growth, Nugget's appearance is enhanced by its fine leaf texture and unusually deep, dark green color.

SEED QUALITY
Only Certified Blue Tag Nugget Kentucky Bluegrass, free of poa annua and bentgrass, is marketed. Only Certified Nugget is a direct progeny of the Alaska-grown seed.

Nugget . . . The Kentucky Bluegrass that survived Alaska. Try it where you live.

Write today for more information on Nugget, the dwarf grass that stands below the rest.

Name _____

Address _____ Zip _____

City _____ State _____

Nugget

Box 217, Albany, Ore. 97321

Golf Course Builders Elect Ball Pro As President

A builder of 50 golf courses since he retired from big league baseball 11 years ago has been chosen president of the Golf Course Builders of America.

Robert E. Chakales of Richmond, Va., will direct association activities through March, 1973. He succeeds Robert Vicent of Benton, Pa., who presided in 1971, and becomes the third president of the Golf Course Builders organization which is headquartered in Washington, D. C.

Chakales' 50 courses, all built east of the Mississippi, have been constructed since 1961. He is currently associated with R. E. Chakales & Associates.

He began his big league career with the Cleveland Indians under manager Al Lopez, was traded to the Washington Senators in the mid-fifties and pitched for manager Charlie Dressen. He retired from baseball in 1960 after a year with the Boston Red Sox.

As a retirement activity, he built his own Par-3 golf course in the Richmond area, but became so interested in golf course construction that he went into the contracting business full time.

In addition to his activities with GCBA, he is a member of the Mid-Atlantic and Virginia Turf Association.

Bob Chakales, Richmond, Va., (left) receives a congratulatory handshake from Bob Vincent, Benton, Pa., retiring president of the Golf Course Builders of America as he prepares to take over as the association's president for 1972.

Fertilizer Pollution Nil Says MSU Scientist

A Michigan State University soil scientist has concluded that the potential contribution of turfgrass fertilization to water pollution is insignificant "if common sense is used."

Dr. Paul Rieke made the observation in a talk at the annual Midwest Regional Turf Conference at Purdue University in early March. About 600 golf course superintendents, sod growers, architects and developers and industry and university personnel were in attendance.

The researcher reported that work done at Michigan State University showed that no more than 1.5 pounds of actual nitrogen should normally be applied per 1000 square feet at any one time. This is especially true when water-soluble (fast acting) nitrogen is being applied.

Excessive annual nitrogen rates showed that no more than 1.5 pounds irrigation should be applied judiciously, especially on sandy soils.

Low nitrogen requiring grasses, such as creeping red fescue, should be planted on sandy soils in areas where water sources (around lakes and along rivers) could be contaminated by leaching of nitrogen, he continued.

Rieke pointed out that most soils have a high capacity to hold phosphorus, so leaching of phosphorus under turfgrass conditions may not be a significant pollution problem.

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For More Details on Preceeding Page Circle (140) on Reply Card

HUSKY ENOUGH TO BE A ONE-TRACTOR MAINTENANCE CREW

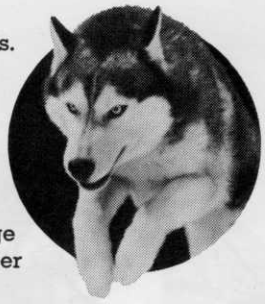
Big claims? Not at all.

This Bolens 18 hp tractor hitches up to 35 separate attachments. So it cuts big jobs down to size in a hurry; mowing, snow removal, tilling, cultivating, grading, terracing, weed cutting, loading, sweeping, seeding, fertilizing, hauling, aerating, scarifying, spraying, fogging, trenching, thatching, compost shredding, post-hole digging, and many others.

It shifts from one job to the next quickly, because Bolens exclusive collar-locking PTO system makes it a snap to change attachments. Foot pedal hydrostatic transmission lets the driver get through a job quicker. No time is lost in reaching to shift. A touch of the foot does it all.

Of course, any tractor that claims to be a one tractor maintenance crew would have to have a two-spool hydraulic system, large fuel tank, an inside turning radius of 54", and a twin-cylinder engine. The Bolens 18 hp Husky has all those, plus power steering and a three-point hitch as optional equipment.

Interested in hearing more on how this Bolens tractor can do your big jobs quicker, easier, cheaper? Mail the coupon below. But do it today! There's a big demand for a one tractor maintenance crew.



fmc CORPORATION

BOLENS

Bolens, Husky, and Bolens Husky are Registered Trademarks of Bolens Div., FMC Corp., Port Washington, Wisconsin.

Bolens Division, FMC Corp., Port Washington, Wisconsin 53074
Gentlemen: I'm interested.

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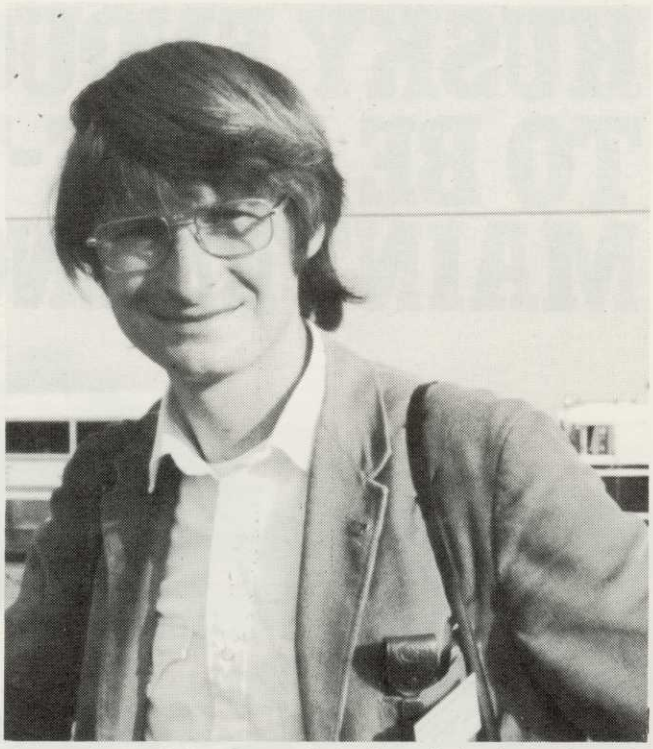
Chicken Feed From Clippings



Research specialist Steve Cockerham helped develop the Cal-Hy pilot program.

A CALIFORNIA turfgrass farm has found a way to turn clipping disposal from several hundred acres of grass into a money-making sideline.

Cal-Turf, Camarillo, the largest turfgrass grower in western U.S. currently grows more than 600 acres of bluegrass, dichondra and hybrid bermudagrass. Manicuring and constantly maintaining this much acreage is a large, round-the-clock job. The byproducts of this care are large, too, primarily consisting of mountains of grass clippings. More than 1,000,000 pounds per month.

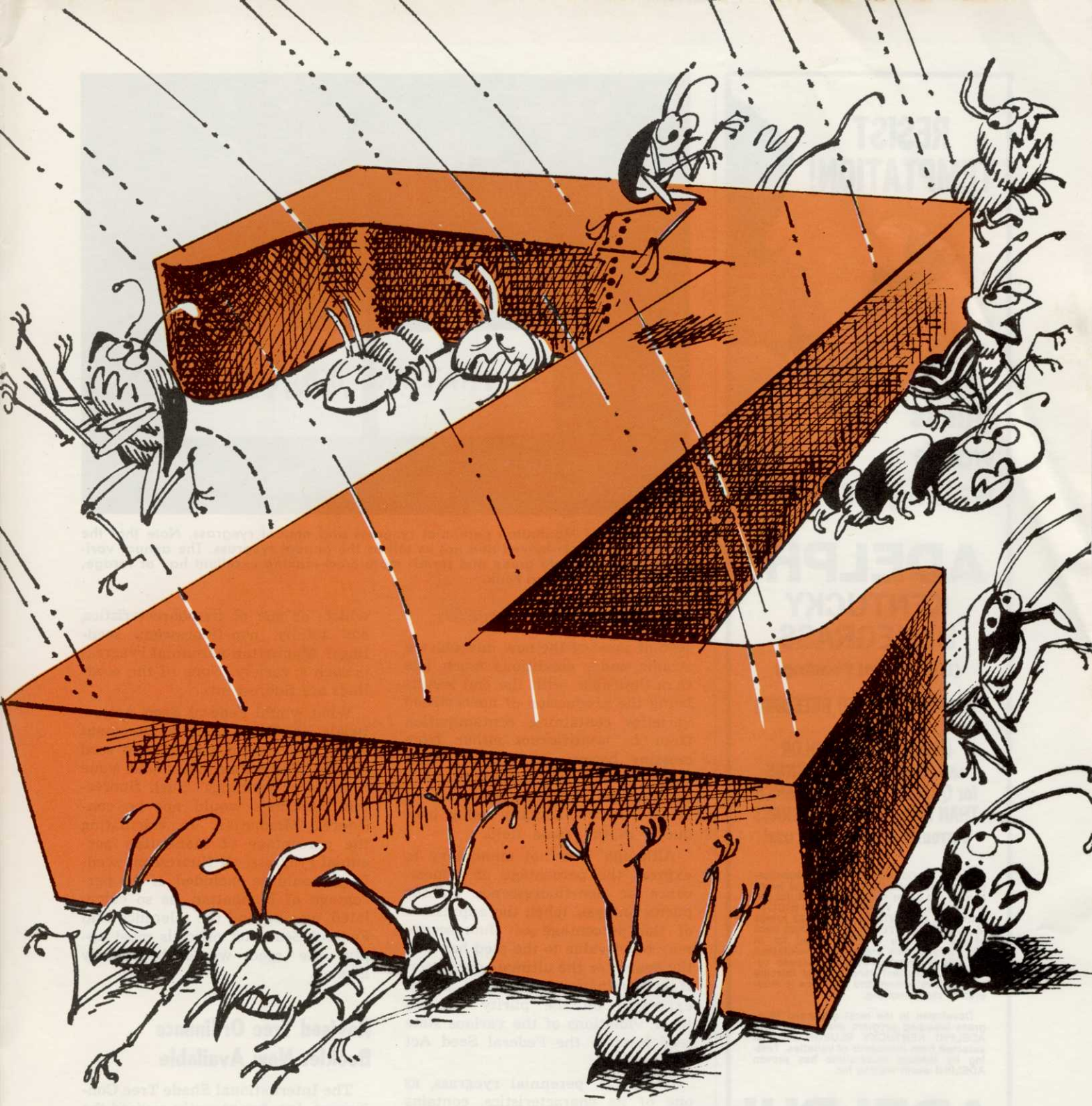
Getting rid of this huge volume of clippings has never been easy. And today, when pollution regulations make open burning impossible, the problem is compounded. Cal-Turf's solution is unique. They feed the clippings to chickens!

Basically, Cal-Turf has perfected a process for turning dried grass clippings into a high-quality poultry feed supplement. Called Hy-Gold, the material has proved to be a rapid success among chicken ranchers.

However, the success of Hy-Gold didn't come easily. The project started as no more than an idea in the mind of Toby Grether, president and founder of Cal-Turf. In mid-1969 he

(continued on page 59)

Custom built 12-foot flail mower is used in grass clipping program at Cal-Turf. Clippings are processed within 45 minutes of cutting.



Ag-Organics Department, Midland, Michigan 48640

How to make a lasting impression on bugs. Give them a dose of ZECTRAN* insecticide–the big, powerful, broad-spectrum insect killer. The one that works on almost all major foliage-feeding insect pests –even effective on the hard-to-kill kinds. And it's easily the most versatile. Use ZECTRAN on over 600 different flowers, ground covers, trees, shrubs, house plants and turf. It's biodegradable, non-staining, easy to apply. In liquid or powder. In our formulation, or to mix with yours. Get ready, bugs!

*Trademark of The Dow Chemical Company

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DOW CHEMICAL U.S.A.

RESIST TEMPTATION!

this is worth waiting for.

ADELPHI
KENTUCKY BLUEGRASS
(U.S. Patent Pending)

MAN-CONTROLLED BREEDING gives it DARKER GREEN COLOR and HIGHER TEST RATINGS for QUALITY & PERFORMANCE THAN ANY OTHER BLUEGRASS currently in widespread use!

Man's hybridization effort has successfully revolutionized agriculture and horticulture but never lawn seed. NOW, for the first time, 10 YEARS OF MAN-CONTROLLED PARENTAGE BREEDING brings to ADELPHI KENTUCKY BLUEGRASS most of the desirable features hoped for in turf . . . rich dark green color maintained the entire growing season, disease resistance, excellent density, good rhizome & tiller development and tolerance to moderately close mowing.

Developed in the most advanced bluegrass breeding program ever undertaken, ADELPHI KENTUCKY BLUEGRASS was selected from thousands of varieties. Testing by leading universities has proven ADELPHI worth waiting for.

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KENTUCKY BLUEGRASS
AVAILABLE THIS FALL!

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VAUGHAN'S SEED CO.
Bound Brook, N. J. 08805

Comparison of Manhattan perennial ryegrass and annual ryegrass. Note that the Manhattan is finer-leaved and not as tall as the annual ryegrass. The annual variety is generally light green and stands more erect making excellent hay or forage. Photo is by Dr. C. Reed Funk.

FLUORESCENCE *(from page 52)*

seed of some of the new unprotected strains under conditions much less than desirable, with the end results being the production of noncertified varieties containing contamination from *L. multiflorum* either from crossing because of pollen sources to close to the seed production field, or from physical contamination of *L. multiflorum* actually being produced in the same field.

Although it is not mandatory to express the percentage of fluorescence or non-fluorescence on the purity analysis label, the expression of the percentage of fluorescence may be of value to the seed handler, the dealer, or the ultimate consumer. If contamination exists and is not expressed on the purity analysis label, violations of the various state seed laws or the Federal Seed Act may exist.

Generally, perennial ryegrass, as one of its characteristics, contains a small percentage of fluorescent seedlings; most of the seedlings are non-fluorescent.

When dealing with such perennial ryegrass, do seed law enforcement officials consider the small percentage of fluorescent seedlings to be perennial ryegrass? Yes.

Under Federal Seed Act testing rules, allowance is made for that small percentage of fluorescent seedlings. They are considered to be perennial ryegrass.

But, what if a breeder develops a new variety of perennial ryegrass which, as one of its characteristics, has totally non-fluorescent seedlings? Manhattan perennial ryegrass is such a variety. None of the seedlings are fluorescent.

What would Federal Seed Act officials do if, in their enforcement work, they tested a sample of seed labeled Manhattan, but found some fluorescent seedlings? Such fluorescent seedlings would not be considered Manhattan. In calculating the percentage of Manhattan perennial ryegrass, all fluorescent seedlings would be excluded. If the percentage of Manhattan, as so calculated, was beyond the tolerance that Federal Seed Act officials must apply, the seed would be falsely labeled.

Revised Tree Ordinance Booklet Now Available

The International Shade Tree Conference, Inc. has recently revised the publication entitled "A Standard Municipal Tree Ordinance".

This fourteen-page booklet contains information of value to persons and municipalities who are interested in creating, revising, and improving municipal ordinances relative to the planting, maintenance, and preservation of shade and ornamental trees.

To obtain the publication, send request and prepayment of $1.00 per copy to the International Shade Tree Conference, Inc., P. O. Box 71, Urbana, Illinois 61801.

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For More Details on Preceding Page Circle (108) on Reply Card

CHICKEN FEED *(from page 56)*

sent a batch of grass clippings, dried in the summer sun, to Los Angeles to be analyzed for xanthophyll content. He found it in abundance.

Xanthophyll is the substance that produces the desired yellow pigmentation in a chicken's fat, its skin and in the yolk of its eggs. Chickens do not procure a large amount of xanthophyll naturally; it must be added to their diet in their feed. In the past, ranchers have used expensive corn gluten meal or marigold petals to fulfill the xanthophyll requirement for their birds. Less costly dehydrated alfalfa also has been used, but large quantities of this material are required in the ration to gain the proper level of pigmentation.

Based upon initial findings, Cal-Turf's dried grass clippings promised a high-level source of xanthophyll that was far less costly than corn meal or marifold petals, yet required only half the quantity needed with alfalfa to gain an equal degree of pigmentation. Best of all, the raw materials for this exciting new feed concept were plentiful and close at hand.

Getting from fresh clippings to today's finished product, however, involved many stages, plenty of manhours and the creative thinking of Cal-Turf people.

One of these men is Steve Cockerham, Cal-Turf's chief research scientist. Steve, a graduate of Purdue with a masters degree in turfgrass from New Mexico State, played an important role in determining how the clippings should be harvested to preserve and maximize the all-important xanthophyll.

With the cooperation of the United States Department of Agriculture and several independent research laboratories, Steve supervised a one-year pilot project. Many experiments were conducted, including tests of stability and duration of xanthophyll content, time and temperature of processing for optimum quality of product, potential yields with varying methods of processing, and other important questions. Small dehydrators were constructed to determine these factors. The USDA, with larger facilities, helped pinpoint them. Finally, with their thesis proved in the laboratory, Cal-Turf turned toward developing commercial production of the new feed.

One of the major factors in processing grass clippings is speed, since Cal-Turf researchers learned that as much as 40% of the xanthophyll

(continued on next page)

For More Details Circle (125) on Reply Card

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For More Details Circle (114) on Reply Card

CHICKEN FEED *(from page 59)*

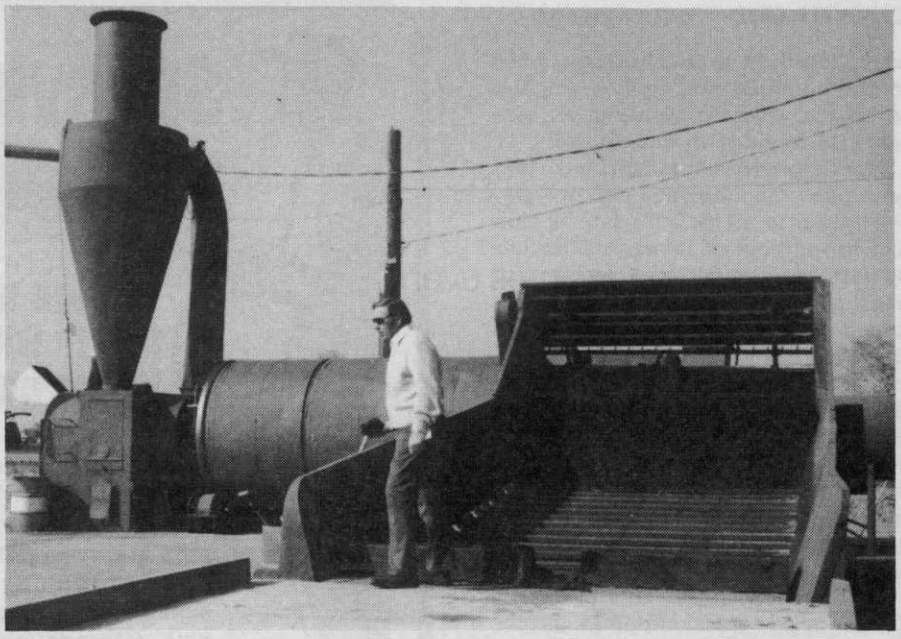
content can be lost through oxidation just one hour after mowing. To solve this problem, unique harvesting equipment was developed to permit clippings to go from the field to the processing plant in less than 45 minutes.

The plant itself was the major item in the project. The job of building it fell to another Cal-Turf specialist, project manager Bob Chase. In his lengthy analysis, Bob toured at least 22 dehydrators which were being used for such various products as alfalfa, wood pulp, sawdust and grape pomace. After investigation and evaluation, an alfalfa-drying type was finally chosen for the core of the new plant. Added to it were facilities for grinding, pelletizing, cooling and storing the product, as well as a complex series of electronic controls to maintain critical temperature levels. Actual construction of the plant started in December, 1970. The first batch of Hy-Gold was produced on March 24, 1971.

The processing of the feed occurs in five main stages. First the raw clippings are dehydrated. Then, primary milling takes place, increasing the product density from 12 to 18 pounds per cubic foot. Next is the pulverizing step (secondary milling) followed by pelletizing (which compacts the material to 48 pounds per cubic foot.) Finally, the pellets are crumbled for delivery to the consumer. In this last step different sizes of crumbled particles can be produced to fit the varying needs of the poultry industry.

The plant is currently processing more than one million pounds of raw clippings per month. It is

(continued on page 62)



Dehydrator built on Tobias Grether ranch is used to convert grass clippings into Cal-Hy poultry feed. Unit was demonstrated at recent American Sod Producers annual conference.

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New help may be coming!

Spring brings the green leaves on the trees to gladden the hearts of homeowners.

All too soon afterwards may come the hordes of hungry caterpillars and other insects, chomping leaves, denuding trees, sometimes even killing them.

Along with this damage comes the ugly mess of worm droppings, squirming caterpillars hanging from threads... crawling everywhere. It's uncomfortable to walk about the grounds, impossible to sit on the outdoor patio and unwise to even park a car under a tree.

Arborists have new help coming to give their customers greater freedom from insect attacks on trees and shrubs. It's Imidan® insecticide from Stauffer, which already is being used to provide outstanding control of many insects on fruit trees.

Label registration for Imidan is expected this spring before these insects hatch out to attack shade trees: gypsy moth, elm spanworm, spring cankerworm and birch leaf miner.

Years of tests by experiment stations and commercial arborists show that Imidan is highly effective in controlling these insects. And their results show that Imidan has special advantages in insect control, with a minimum of unwanted side effects on the environment. With its low toxicity to many beneficial insects, it allows their survival to improve their control of other injurious pests.

Imidan has been used for years to control major insect pests of apples, pears, peaches and several other fruit crops in commercial orchards. Imidan can be used alone for insect control and does not harm finish on automobiles or outdoor furniture.

For full information on Imidan and its expected new use for shade tree insect control, write to Stauffer Chemical Company, Agricultural Chemical Division, Dept. HD, Westport, CT 06880.

Imidan® from Stauffer CHEMICALS

Mini-size, Triple-Threat Trencher-Plow-Blade

"The Diggin' Dutchman" calls it his "triple-threat mini," but the Vermeer M-147H is really a giant in the service line field. It's built to absorb the daily punishment of hard commercial jobs; yet, it's designed with a no-shift, no-clutch hydrostatic drive so that anyone can be an expert operator in minutes. Ask "The Diggin' Dutchman" about the M-147H as a mini-trencher . . . mini-plow . . . mini-dozer . . . and maxi-moneymaker! Send for more information and complete literature. Better yet, tell him you want a demonstration.

Another Trencher From . . .

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For More Details Circle (103) on Reply Card

CHICKEN FEED *(from page 60)*

equipped with elevated dump tanks for loading out bulk trucks and 50-pound-bag packaging facility for small users. On-site bulk storage capacity is 150 tons, and these bulk tanks are equipped with a nitrogen gas generator to reduce oxidation and possible loss of xanthophyll.

Analysis of the feed now being produced at the plant shows higher levels of xanthophyll (and also desirable carotene and protein) than even the exhaustive research had predicted. So successful has the operation proved to be that a second dehydration facility of the same type has been set up at Cal-Turf's El Toro sod farm, located at the Irvine Ranch. The dried clippings from this unit are transported to Camarillo for final processing and marketing.

Perhaps the most encouraging aspect of the Hy-Gold development is the increased contribution the entire process is making toward ecological progress. Not only does the new facility reduce air pollution by making use of waste materials that at one time might have been burned, but the use of long-lasting pesticides has been completely eliminated to maintain purity of the finished feed. The few products that are used in the field are short term and biodegradable. No clippings ever are processed until all traces have vanished. Some biological pest controls also have been successfully employed, and continuing research is being conducted in this important area.

Cost of Weed Control Compared With Slide Rule

A slide rule that compares the cost of using Assault soil sterilant with that of 21 other herbicides is now available from West Chemical Products, Inc.

The movable slide lists herbicide ingredients, unit price, rate of application, and use-cost. An application guide gives dilution instructions for proper use of Assault Concentrate on various types of soils. The tabulation shows that Assault can save the user from $10.00 to several hundred dollars over current weed control costs.

Assault, a liquid soil sterilant, soaks into the ground and attacks roots and seedling growth. Weeds begin to wither and die within 24 hours. A single treatment can prevent weed growth for up to 12 months. Assault is designed for areas where no plant growth is desired.

For more details circle (723) on the reply card.

New Formulation of Dylox Registered For Gypsy Moth

A new formulation of Dylox insecticide has been developed by Chemagro Division of Baychem Corporation for use in gypsy moth control programs conducted under the supervision of governmental agencies. A temporary permit application for the new formulation, Dylox 80% SPA insecticide, has been filed with the Environmental Protection Agency.

Dylox insecticide has been used on a variety of ornamentals and vegetable and field crops for more than a decade. The compound offers the advantage of pest control without destroying beneficial insect populations when applied as directed. Its low order of toxicity to beneficial insects has permitted extensive use in integrated control programs on agricultural crops.

A registered ultra-low volume (ULV) formulation of Dylox has provided exceptional control of gypsy moth larvae on forest and shade trees. However, since the ULV formulation can cause some spotting of automobile paint finishes, it is not to be used in areas where the spray might come in contact with automobiles.

Dylox fits well into a forest environment. It is a bio-degradable insecticide with relatively low toxicity to fish and wildlife as well as beneficial insects. Data indicates that exposure to dosages higher than normal forest insect control rates has not resulted in significant reductions of fish populations.

A mixture of Dylox 80% SPA and horticultural oil has been found suitable for application in helicopter and fixed-wing aircraft spray systems.

In cooperation with the U.S. Department of Agriculture Forestry Service, additional testing is to be conducted under the 1972 temporary permit in the New England and Mid-Atlantic states where gypsy moth infestations are most severe.

Davey Field Men Attend School of Hard Knots

Knowledge of ropes and knots are important to tree men who must move about in tall trees. Ropes must be in good condition at all times and knots must be tied properly to minimize the chance of an accident.

Davey Institute of Tree Service, the only school of its kind, recently graduated 29 students following an intensive five week program in the care and perpetuation of shade trees. During the course, tree care men from 11 states received instruction and training in tree feeding, moving large trees, pruning, cabling and bracking, tree identification, landscape planting, tree surgery, control of insects and tree diseases, first-aid and safety.

W. A. Jeffers, Institute director, says that students Davey field men further their education in laboratory, classrom and field courses at this school founded in 1909. They learn the latest techniques available including a working knowledge of ropes and knots.

Sixty years ago, tree men worked with nothing more than a length of rope and a hand saw, says Jeffers. Today they must know how to handle power tools, 70 foot cranes, skyworkers and all kinds of other mechanical equipment.

One of the newer sections in the course is insect control in conifers. Davey students learn the latest methods for controlling cankerworm or gypsy moth, the leaf-eating worms that have caused extensive damage throughout the Northeastern U.S.

Practice makes perfect and these men associated with the Davey Institute are getting first hand experience in knots. They are: (l-r) J. L. Hutson, Greensboro, N.C.; H. W. Fielder, Yonkers, N.Y.; W. A. Jeffers, Institute Director; and L. E. Thompson, Denver, Colorado.

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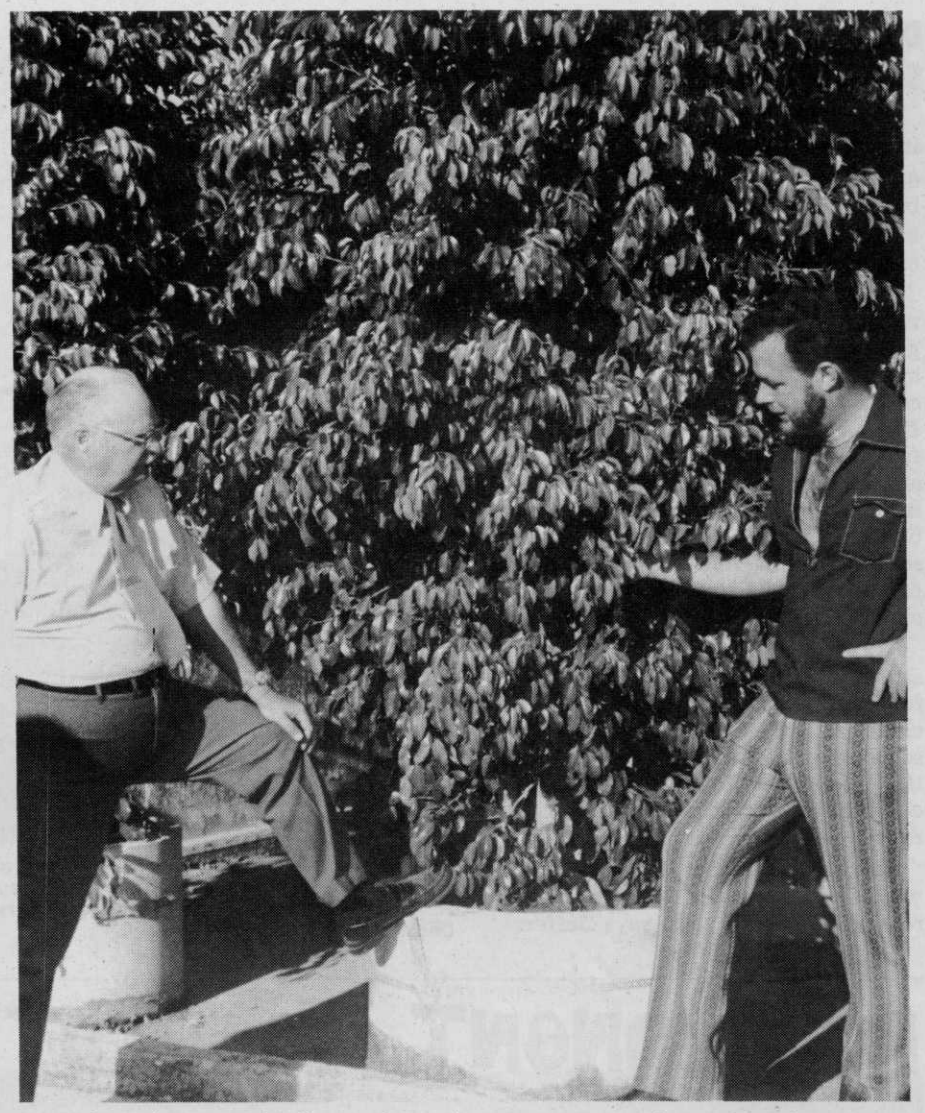

Down from the town of Palm Beach "with money in my pocket," was Robert Jones, Supt. of Parks. He and his host, Tommie Hofmann examine a "Big Stuff" Ficus nitida, grown in a special two-section container. It has never touched the ground.

Merchandising Pays For Hofmann Nurseries

Tommie Hofmann's recent unique merchandising idea of inviting the nursery industry to participate in his all day "Big Stuff" Plant Carnival, paid off "famously in fellowship and sales." About 400 friends (and buyers) representing every facet of the industry responded, with visitors waiting when the gate was opened at the Bill Hofmann Wholesale Nurseries in Hollywood, Fla.

If possible, those attending the Plant Carnival were as excited as Tommie and his "Uncle Bob" were happy with the gala; even the sun smiled its approval on the rain-predicted day.

There was a run on the electric carts for zipping through the symmetrically laid out nursery, where plants are always kept groomed in high fashion by Uncle Bob. And, fragrance wafting from two large barbeque ovens attracted traffic-stopping interest; for bubbling in one were 225 pounds of juicy pork tenderloin, and in the other, 4-20 pounds of piece de resistance . . . standing prime rib roasts.

The event was climaxed with the Florida Nursery Growers Assn. Broward Chapter's regular monthly meeting, with many of the FNGA state officers on hand. Included were, President Joe Welker, Duval Landscape Co., Jacksonville, Joe Shaw, Shaw Landscape and Nursery Co., South Miami, who steps into the presidency in May, and Second Vice President Dick Gladwin, Gladwin Nurseries, Jupiter. Also, Janette Robb, executive secretary. Others were Dave Stabler, Sr., Winter Haven Nurseries, Winter Haven, charter president, and Beverly Turbeville, the only woman to hold the presidency since the association's inception in 1952.

classifieds

When answering ads where box number only is given, please address as follows: Box number, c/o Weeds Trees and Turf, 9800 Detroit Ave., Cleveland, Ohio 44102.

Rates: "Position Wanted" 10¢ per word, minimum $3.00. All other classifications 20¢ per word, minimum $4.00. All classified ads must be received by Publisher the 10th of the month preceding publication date and be accompanied by cash or money order covering full payment. Boldface rule box: $25.00 per column inch.

USED EQUIPMENT

VERMEER TRUCK mounted tree spade, TS-44 mounted on 1963 Dodge, 4 wheel drive, asking $6,200. 1963 Dodge 4 wheel drive dump truck, 1 ton, $950. Asplundh V-8 16" chipper, excellent condition, asking $2,800. 1969 and 1970 Skyworker, 50' reach, excellent condition. We buy used tree equipment—chippers, stump grinders and aerial towers. Edwards Tree Service, 3190 Cooper Foster Park Rd., Vermilion, Ohio 44089. Phone 967-6750 or 933-6750.

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DOUBLE EDGE sod cutter blades. Will fit any Ryan sod cutter. Works like double edge razor blade. Cuts much more sod per blade. Made to bolt on both ways. $24.00 plus postage. New automatic sod loaders for direct loading to pallets, trucks or trailers. No workers needed on ground. Both products developed and designed by Hadfield. Write or call Glen Hadfield, 4643 Sherwood, Oxford, Michigan 48051. Phone 313 628-2000.

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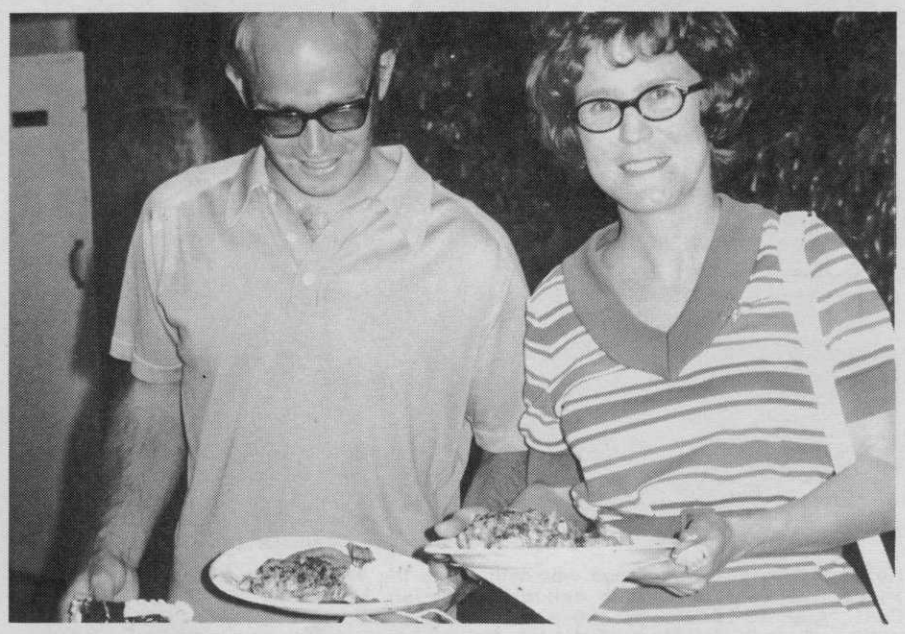
MISCELLANEOUS

LANDSCAPE DESIGN KIT, 37 rubber symbol stamps and ink pad. Postpaid $25.00. C.O.D. $26.00 plus postage. Order direct or brochure sent. California add tax. T-Gordon's, Box 741T, Reseda, Calif. 91335.



Helping themselves to the succulent prime ribs and pork tenderloin are Dr. P. L. Neel, III, and Mrs. Neel. Dr. Neel is associate professor and tree expert at the Agriculture Research and Education Center (AREC), Fort Lauderdale.

—Advertisers Index—

trimmings

ACUPUNCTURE FOR DYING ELMS has saved one 60 foot tall specimen. Wilfred Weber, a Kitchener, Ontario, blacksmith hammered galvanized nails into a diseased elm tree six years ago. He read about this remedy for Dutch Elm disease after reading a newspaper article in which a horticulturist said soil deficiency of some metallic elements often was responsible for the disease.

ONE HUNDRED TWO YEARS AGO James Ingalls on the floor of the United States Senate said, "Next in importance to the divine profusion of water, light and air, those three physical facts which render existence possible, may be reckoned the universal beneficence of grass."

NOISE POLLUTION IS NOT A 20TH Century phenomenon. As far back as the Roman Empire, there were noise ordinances passed. Noise pollution is an ever growing problem, however. Sound is measured in decibel (dB) and scaled to a range of 0 to 120 dB. Unlike other forms of pollution, the decibel is not additive. If two sources of 40 dB are combined, the total sound is not 80 but 43 dB.

The effects of noise on man can be broken down into three areas — physiological, physical and psychological. A constant exposure to noise levels greater than 85 to 90 dB can result in permanent damage to parts of the ear that even surgery cannot repair. Other physiological effects include fatigue, constriction of blood vessels and pupil dilation.

One physical effect of noise is speech interference. Loud noises also cause an automatic increase in the level of one's voice.

Phychological effects of noise can be described as distrubing, annoying, and at times create reactions of fear.

Transportation sounds are a major part of the noise pollution problem. The most irritating noises come from unmuffled motorcycles, autos and large trucks. Aircraft hold a close second. It's a good idea to wear acustical ear muffs or plugs when working around noise producing equipment.

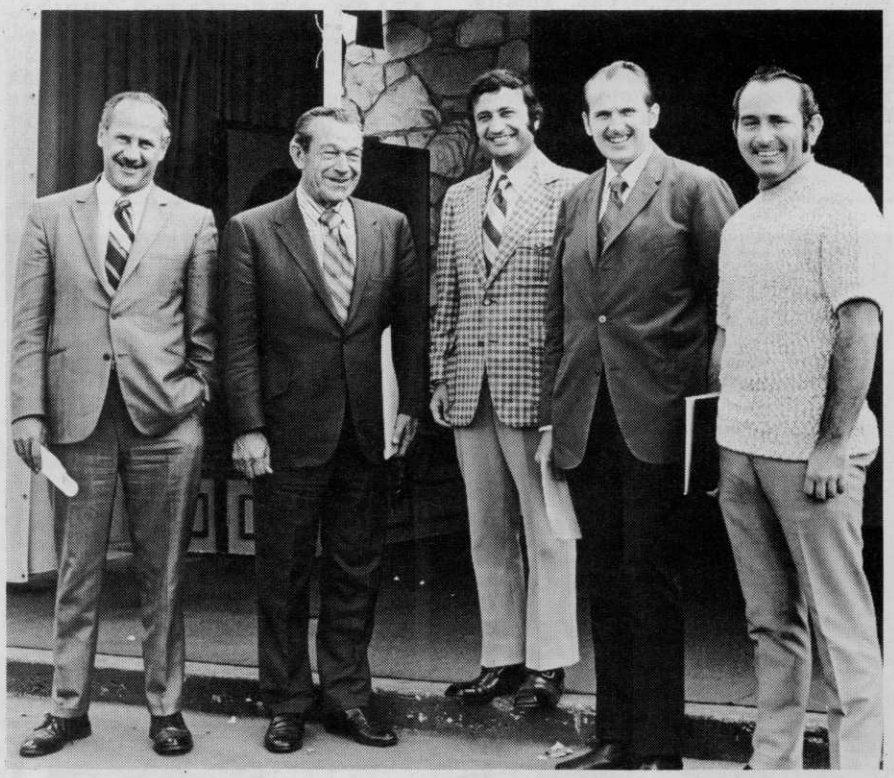
NATURAL OR SYNTHETIC RUBBER may be used in the application of insecticides and herbicides in the future. N. F. Cardarelli, University of Akron, says that a non-persistent chemical protectant dissolved in natural or synthetic rubber could be released slowly to maintain a very low level of the chemical in the environment. The overall amount of a chemical needed will probably never exceed three percent of that conventionally used.

PLASTIC GRASS AND PLANTS ARE OUT for the city of Los Angeles. The city's Public Works Committee voted to bar the use of plastic grass and plants for the 1972-73 season. Only living greenery will be allowed. The ban came following a public protest over the use of plastic trees in a highway dividing strip in southern Los Angeles. The trees were removed.

GENETICALLY RESISTANT SEEDLINGS may keep deer and rabbit damage to a minimum in Douglas-fir forests. Recent work in the Pacific Northwest by the Forest Service proves both the presence and the heritability or resistance traits in Douglas-fir. Unlike artifical repellents, resistant trees could provide year-round protection for as long as needed. However, it may take a decade to intensify resistance or to breed seedling stock in the amounts required. Physical research is underway to determine chemical factors underlying resistance.

THE TRIAD CONCEPT although basic to the plant pathologist, is often negelected in disease control programs. Plant disease does not always occur when a pathogen is present. A susceptible plant and a favorable environment are needed to complete the triangle. The absence of any one or more of the tree components of this triad results in no disease, a fact that can work to the benefit of the grower. If he finds the pathogen hard-to-control, he has the alternate choice of changing the environment or the plant.

HACKETT WILSON, a retired arborist in North Carolina, still has tree roots set deep in Tar-Heel soil. He is the former owner of Wilson Tree Co. and past president of the National Arborist Association and the International Shade Tree Conference. According to the **Charlotte Observer** he has recently helped beautify the streets of Shelby, N. C. His nearly half-century of tree experience bring a wealth of knowledge to the job.



Here's the hard-working cogs who will make the wheels turn at the International Shade Tree Conference 48th annual convention, Newporter Inn, Newport Beach, Calif., Aug. 13-17. Nearly 800 people are expected to attend. Standing (l-r) are: William T. Bell, president of the Western Chapter and General Chairman of this year's convention; C. Elmer Lee, transportation chairman; Gene Himelick, executive director, I.S.T.C.; Cal Bundy, executive secretary, I.S.T.C.; and, John F. Cyprien, assistant general chairman of I.S.T.C.

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When people ask John Watson of Watson Distributing Co., Houston, Texas, what's the best mower for rough turf, he's got the answer right away. It's next to him in the photo.

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Our customers say the Commercial 60 rotary mower is great anywhere the turf is really rough. In parks. Schools. Housing developments. Industrial sites. Any size area. It also puts a professional finish on fine turf.

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For More Details Circle (128) on Reply Card

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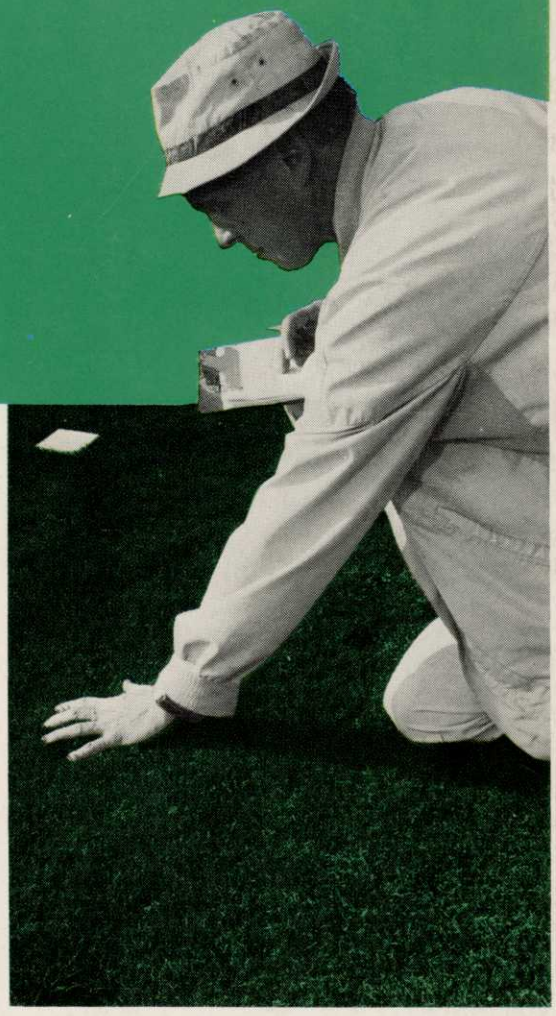

Today, when knowledgeable agronomists talk about The Greening of America, they're talking about Baron Kentucky Bluegrass—discovered in Holland by the renowned plant breeder and seedsman, Barenbrug of Arnhem, The Netherlands, and now grown in America exclusively by Lofts Pedigreed Seed, Inc.

Baron Bluegrass germinates rapidly, grows slowly, and is adapted to mowing as low as ¾" . . . making it ideal for golf courses, fine lawns, and industrial properties. Its broad blades interlock to make a crisp surface ideal for holding a golf ball on the fairway.

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A patent has been issued by the U.S. Federal Government for Baron Kentucky Bluegrass.

Other varieties of grasses currently available from Lofts include Jamestown Red Fescue, Exeter Colonial Bentgrass and Kingstown Velvet Bent.

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Dr. Kenyon T. Payne, Professor of Crop and Soil Sciences at Michigan State University, states: "Baron has been an outstanding variety. It maintains excellent dark green color throughout the season. During an exceptionally severe **Helminthosporium** leafspot infestation in 1970, it ranked second in seasonal appearance of all named bluegrass varieties which are commercially available, and first in this group in resistance to **Typhula** snowmold. It appears to be highly promising for the sod and turf industry." Dr. Payne heads the M.S.U. Turfgrass Breeding Research projects and is currently working on fine-leaf fescue breeding and seed production programs for Wintergreen Chewings Fescue and a new winter-hardy Meadow Fescue.

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