

records, and requires users who buy one quart or more of a phenoxy herbicide to keep records and report to the state department of agriculture upon request.

## OREGON

Minimum requirements for licensing is 18 years of age. Exemptions to the Oregon Pesticide Application Law make a formidable list. They include: the State of Oregon and its agents, counties, cities, municipal corporations, irrigation and drainage districts, public utilities, manufacturers and governmental agencies using pesticides in research, caretakers using manually operated equipment, retailers (unless demonstrating application of pesticides), railroads (except when using volatile herbicides in power equipment), manual laborers, and pollenicide applicators. Preference is given to applicants in taking the written examination. Exempt are: applicants with four years of college, majoring in entomology or agronomy; a trainee completing 1,000 hours experience; former licensees who worked three months during a year in two out of the last three years. Regulations establish that four types of licenses may be issued, herbicide, insecticide-fungicide, structural pest and rodenticide, and fumigation. A "special applicator" and "special trainee" license may be issued to individuals in government employment.

## PENNSYLVANIA

Currently there is no pesticide use and application law. However, there are a number of laws which restrict pesticide usage or control the application of pesticides.

## RHODE ISLAND

This is one of two states where there are no exemptions to the licensing law. Everyone must be licensed.

## SOUTH CAROLINA

At presstime, there was no evidence of a pesticide use and application law. Relevant laws applying to county licensing of structural pest control operators has been authorized in legislation applying to Georgetown, Williamsburg, Clarendon and Greenwood counties. Applicable also is the South Carolina Economic Poison Law of 1954.

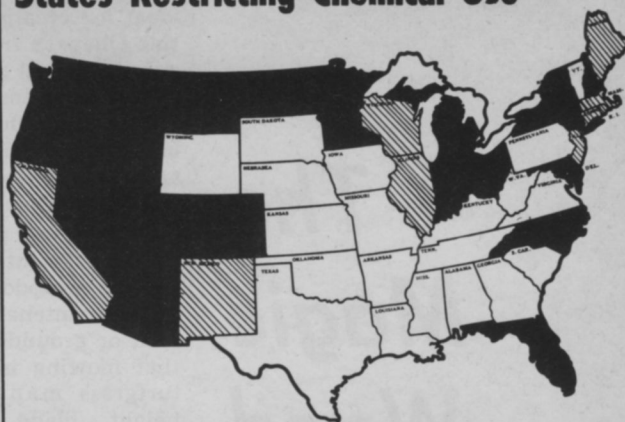
## SOUTH DAKOTA

The applicant must submit a written application (under oath) in order to activate the licensing machinery. The regulations provide for an examination of the applicant apply insecticides, herbicides or fungicides on agricultural land, and for a special examination for applicants applying parathion, TEPP, Metacide or other chemicals designated by the secretary of agriculture. The applicant must also file an affidavit that he has no outstanding claims or unpaid judgments. The regulations provide for a class "A" and class "B" permits for aircraft operators. Special permits are also required for application of pesticides within 10 rods (165 feet) of watered areas, and may be issued only after conference with the director of the department of game, fish and parks.

## TENNESSEE

Senate Bill 1434, approved April 25, 1972, repeals the

## States Restricting Chemical Use



■ States which restrict or have the authority to restrict the sale and use of certain designated chemicals.

▨ These states use terms or include authority for a state agency to prohibit, restrict or otherwise control the use of designated chemicals through the issuance of regulations.

Alaska  
California (restricted materials or injurious materials)  
Connecticut (prescribed or prohibit use)  
Hawaii (herbicides only)  
Illinois  
Maine (relating to waters)  
Massachusetts (hard, persistent pesticides)  
New Jersey  
New Mexico (environmentally harmful, persistent pesticides)  
Rhode Island (banned or restricted pesticides)  
Wisconsin

existing pest control act and adopts the Tennessee Pest Control Operators Act of 1972. This act is admittedly concerned primarily with structured pest control activities. However, the Board is authorized to "... determine the different categories of service or classes (of) ... licenses ... ." and a number of such categories have been established, including agricultural pest control by aircraft. Perhaps more important is the licensing procedures. Unless licensed, it is unlawful to solicit, give advice, or engage in work for compensation, for the control or eradication of insect pests, plant diseases, pest animals, and wood-destroying organisms. Applicants for licenses are certified as first-class or second-class, depending upon qualifications. These include two years experience or two years college study in an appropriate field. Included in the application must be references and copies of proposed contracts to be used in the business. A preliminary written exam is given each calendar quarter, followed by appearance and examination before the Board. Oral exams are prohibited. Licensees must report each month's business to the department of agriculture and send copies of all contracts for termite service.

## TEXAS

There is no pesticide use and application law per se. The Texas Herbicide Law, however, regulates the sale, use, and transportation of herbicides and requires commercial applicators to obtain a permit. Those who sell herbicides are required to be licensed by the department of agriculture. Equipment used in custom application must also be inspected and licensed. In a recent amendment to the law, authority was given to county commissioner courts to exempt, revoke exemptions and reinstate exemptions of counties from the provisions of

(continued on page 36)

# The Magic Wand Of Science

# A Ryegrass That Cuts Clean

**M**ICHELANGELO'S wide, shaggy paintbrush may have been ideal for creating beauty in the Sistine Chapel's frescoes. But a shaggy paintbrush cut on a golf course seeded with perennial ryegrass signals a fuzzy turf that can slow down a ball and one that takes on a damaged, frayed look when the shredded ends dry out and turn brown.

This frayed and fibrous look can cost a superintendent plenty in re-seeding, re-sodding and general turfgrass maintenance. Any superintendent or grounds manager will agree that mowing is an integral part of turfgrass management. Cutting height, blade sharpness, mowing speed, clippings—all are top priority items. A correctly adjusted mower with a finely honed blade can create just the effect desired by the golfer. Run this mower on an area where a ryegrass is seeded and the result is often an unsightly brown caused by rough and shaggy blade ends.

The nature of most perennial ryegrasses is to produce rapid growth early in the season until the more predominant Kentucky bluegrasses develop. But the advantage of early season growth is offset by the disadvantage of perennial ryegrass being hard to mow. Recently, however, science and nature have teamed up to develop a new ryegrass that has superior mowability characteristics. The new ryegrass is Pennfine perennial ryegrass.

This fine-leaved perennial was bred specifically for superior mowability. As the November WTT cover shows, Pennfine cuts sharp and clean. How? Turfgrass breeders at Penn State University, under the direction of Dr. Joseph Duich, developed this non-fluorescent variety to have softer, cleaner-cutting fibers, a marked departure from the inherent characteristics of other ryegrasses.

Further, by refining the coarseness of the leaf, the scientists discovered that when cut, the blade produces a scissor-cut look that holds a ball erect.

This attractive feature combined with the superior mowability has caused many turf managers to take a second look at Pennfine. For example, Jim Ganley, superintendent at Pinehurst Golf Course, North Carolina, regularly overseeds greens with perennial ryegrass.

"We've been using Pennfine on Pinehurst's No. 2 course with excellent results," he says. "It takes a good, even cut. Any shredding that does take place is probably not as noticeable to the eye because of Pennfine's finer blade. Our plans

are to include it in the overseeding of the other four courses here at Pinehurst."

The finer-blade variety has performed favorably in many research trials at state universities. In tests conducted at University Park, Pennsylvania, Pennfine cultivars ranked first in mowability among nine ryegrasses tested. It was also first in texture, density, decumbency (low growth) and disease tolerance to snowmold and leafspot.

The trials for leaf-width measurements showed Pennfine to average 2.5 mm for the first mature leaf compared to 2.7 mm to 5.6 mm for others in the test.

A. E. Dudeck and E. O. Burt, assistant professor and professor of ornamental horticulture, respectively, at the University of Florida, point to another characteristic. Their tests evaluated the performance of 24 varieties and mixtures of ryegrasses, bluegrasses and fescues used for overseeding of winter-dormant bermudagrass putting greens on southern golf courses.

Besides noting the high mowability and turf quality during the critical spring transition period, they charted slow growth rate as a distinct advantage.

"Clipping weights were taken 10 weeks after seeding as a measure of differential growth rates between treatments," Dudeck said. "... Annual ryegrass produced the most clippings compared to other ryegrasses while Pennfine produced the least. Pennfine ryegrass would appear to have an advantage over the other ryegrasses because of its slow growth rate and good quality ratings."

All commercially produced perennial ryegrasses have certain desirable characteristics; however, up to now, mowability has not been one of them. Seedsmen and sod producers usually point out the other attributes of perennial ryegrass and leave the cut of the blade as an unmentionable. But the mowability of Pennfine has started a mild revolution.

Russ Billings, long-time seedsman and president of Stanford Seed Company, Buffalo, New York, has 35 years of grass seed selling under his belt. Nearly every turfgrass available has come under his critical eye.

"Frankly, I've never seen anything like Pennfine," he says. "It has thick, complete coverage, a pretty green color, and when I cut it, it just doesn't brown or fray as other ryegrasses have always done. It cuts cleanly."

**Results of turfgrass trials at Ohio State University on tests of ryegrass cultivars.**

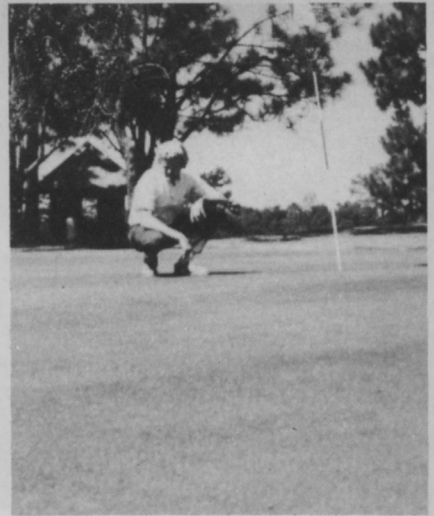
Cultivar	Density <sup>1</sup>	Uniformity <sup>2</sup>	Color <sup>1</sup>	Disease <sup>3</sup>	Desirability <sup>1</sup>
Pelo	6.0	6.6	5.6	3.5	5.6
Norlea	5.9	6.1	5.4	3.0	5.3
Common Perennial	4.0	4.1	4.3	2.0	3.3
Manhattan	7.2	7.3	6.9	5.0	7.0
NK-100	5.1	5.4	5.6	2.5	4.4
MSU Perennial	4.9	5.1	4.8	1.8	4.5
Brabantia	4.6	5.0	5.7	2.8	4.3
Combi	4.1	4.5	5.3	3.3	3.6
K9-124	7.5	7.1	8.1	5.0	7.3
K9-123	3.8	4.1	6.0	1.8	3.6
K9-125	5.5	5.8	7.1	4.3	5.3
Pennfine	7.6	8.1	7.0	8.3	7.4

<sup>1</sup>average of 4 ratings

<sup>2</sup>average of ratings on July and Aug. 3

<sup>3</sup>average of rating on July 1

Rating System: Density, Uniformity, Color, Desirability  
 9 most 1 least  
 Disease 1 most 9 least



Jim Ganley, superintendent at Pinehurst Golf Course, Pinehurst, North Carolina.

Billings is building a home in an area where the surrounding soil is a heavy clay poor in nutrients—definitely not the easiest place in the world to get grass started. But in spite of that “Pennfine has taken hold right away.”

Mowing clean can mean a lot for sales of turfgrass sod. Homeowners who invest many dollars in a quality sod demand that the turfgrass not only cut clean but look well manicured. A sod containing perennial ryegrass that has a shaggy, rugged look is cause for rejection. Business back at the sod farm hurts when this happens. That's why a ryegrass that mows cleanly can boost profits in the sod sales department. As Parker Shirling, vice president, Princeton Turf Farms, Inc., Centreville, Maryland, put it, “We've had no trouble mowing Pennfine and we don't change mowers to get the cut either. It really mows clean.”

Unlike the superintendent or grounds manager whose standard maintenance practices include keeping mowers sharp, the homeowner is often guilty of operating his mow-

ing equipment under less than ideal conditions. While he wants his lawn to maintain a good appearance, the task becomes an often dreaded chore. But even with seldom sharpened mowers homeowners such as Ronald Barrett of Guilderland, New York report less shredding of leaves with Pennfine.

“It doesn't shred as easily as other grasses I have grown,” he claims, “and my lawnmower hasn't been exceptionally sharp either.”

Pennfine is recommended for athletic fields, golf courses, cemeteries, public grounds, parks, sod farms and home lawns. It is highly compatible in blending with other grasses or in overseeding of established turf areas.

In all these areas, turfgrass managers are interested in getting the maximum performance from their turfgrass seeding. Like Michelangelo, each continually works for perfection with the tools available. A clean cutting ryegrass adds a new dimension to turfgrass care. Small wonder that the excitement over Pennfine's mowability is contagious.



Fine-leaved Pennfine is ideal for home lawns. Fibers cut clean even with a seldom sharpened mower. Great for overseeding, too.

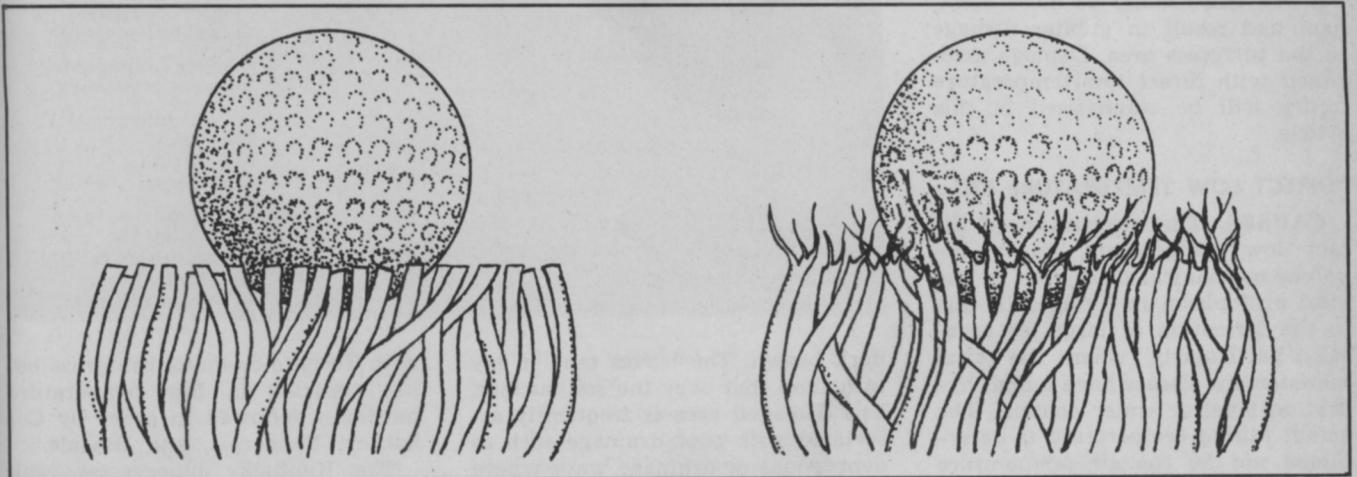




Figure 1. Direct low temperature kill of Kentucky bluegrass sod in depressional areas where the standing water had caused increased hydration of the turfgrass crowns just prior to a severe freeze.

# LOW TEMPERATURE TURFGRASS KILL

By DR. JAMES B. BEARD  
Professor, Department of  
Crop and Soil Sciences  
Michigan State University

**I**N ORDER to take steps to prevent winter injury, it is first necessary to delineate the specific type or types of winter injury occurring on the particular turfgrass area under concern. The specific preventive practices selected will vary depending on the type of winter injury that most commonly occurs.

Specifically, the three major types of turfgrass winter injury that occur are direct low temperature kill, desiccation, and low temperature fungi. In some cases all three types of winter injury may be present, but one will usually be more dominant and result in greater damage to the turfgrass area. Damage associated with direct low temperature injury will be emphasized in this article.

## DIRECT LOW TEMPERATURE KILL

**CAUSES.** The mechanism of direct low temperature injury involves mechanical disruption of the vital protoplasm in living cells due to the formation of large ice crystals, particularly when the vital meristematic tissues have a high hydration level or water content. *The actual killing temperature is determined not by the air temperature*

*but rather the soil temperature surrounding the meristematic tissues of the grass crown and nodes of lateral shoots such as rhizomes and stolons.*

**SYMPTOMS.** At the time of spring thaw the leaves initially appear water-soaked with a whitish-brown color that turns rapidly to a

dark brown. The leaves tend to lay in a limp mat over the soil surface. The damaged area is frequently associated with poor drainage such as depressions or drainage ways where

water has been allowed to stand for a period of time. The appearance will vary in a large, irregular pattern or patches associated with sites where standing water occurred. In some cases a distinct, putrid odor occurs within 14 days after spring thaw.

**TURFGRASS TOLERANCE.** Turfgrasses vary in the ability to survive low temperature stress. This is dependent on the capability to harden-off in late fall. Hardening involves a series of physiological changes in which the water content of the plant tissue is reduced. It normally occurs at soil temperatures in the range of 35 to 45° F. over a period of three to four weeks during the fall. During this process the water content in the tissue will decrease from a normal level of 80% to between 60 and 70%.

The relative degree of low temperature hardiness varies seasonally through the winter. *Maximum hardiness is reached in December followed by a gradual decline until a minimal hardiness level exists just at the time of spring thaw.* At this point, the hydration level of the plant tissues is quite high and thus the plant is most prone to direct low temperature kill during this late winter-early spring period prior to the initiation of growth. Direct low temperature kill may occur if there is a rapid decrease in temperatures to below 20° F.

Turfgrass species vary in hardiness to direct low temperature kill as summarized in Table 1.

The creeping bentgrasses are exceeded only by rough bluegrass in terms of low temperature hardiness. There are also cultivar differences

Table 1  
The comparative low temperature hardiness of thirteen commonly used turfgrass species.

Low Temperature Hardiness Ranking	Turfgrass Species
Excellent	Rough bluegrass Creeping bentgrass
Good	Kentucky bluegrass Colonial bentgrass
Medium	Annual bluegrass Red fescue Tall fescue Zoysiagrass
Poor	Perennial ryegrass Bermudagrass Italian ryegrass Bahiagrass St. Augustinegrass

with Toronto creeping bentgrass being superior in low temperature hardiness followed in order by Co-hansey, Penn-cross, and Seaside.

The Kentucky bluegrasses rank

good in low temperature hardiness. Cultivar differences in low temperature hardiness occur within the Kentucky bluegrasses with Nugget being superior in low temperature hardiness followed by A-34, Baron, Fylking, Galaxy, Merion, Pennstar, Sodco, and Sydspport. Delta, Kenblue, Park, and Prato are generally inferior in terms of low temperature hardiness.

Among the perennial ryegrass cultivars, the relative ranking from most to least low temperature hardiness is Norlea, Manhattan, Pennfine, and Pelo.

It is evident that selection of the appropriate turfgrass species and cultivar for a given area will assist greatly in minimizing low temperature injury.

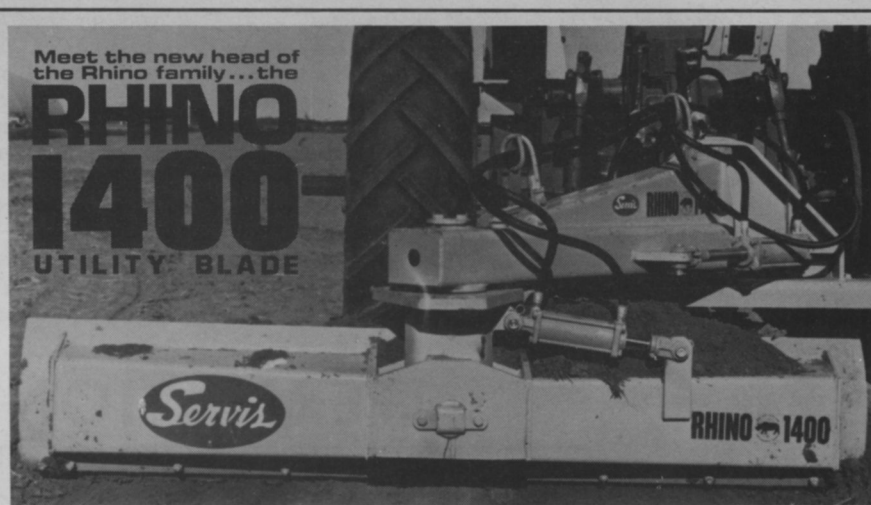
**PREVENTING LOW TEMPERATURE INJURY.** Aside from selection of low temperature hardy turfgrasses, the most effective method of minimizing low temperature injury is to ensure adequate surface and subsurface drainage. This is particularly evident in Kentucky bluegrass sod production fields where serious low temperature kill has frequently occurred during the past six years (Figure 1). This injury is generally associated with low, poorly drained areas where standing water occurs.

Preventing this problem involves ensuring proper surface drainage by establishing modest slopes toward catch basins, waterways, and open drainage ditches. Subsurface drainage in the form of drain tile will also facilitate removal of excess water from the soil, providing it is not frozen.

Subsurface drainage can also be enhanced by cultivation involving either coring or slicing that will reduce the degree of soil compaction. **The importance of proper drainage and the avoidance of standing water in depressional areas cannot be stressed too much.**

There are other cultural practices that also contribute to a decreased incidence of low temperature kill. Basically these practices either enhance the fall hardening process by avoiding excessive stimulation of shoot growth that increases the hydration level or they serve to enhance the degree of insulation against low temperature stress occurrence in the vicinity of the vital meristematic areas.

Specific practices that can be utilized include moderate nitrogen nutritional levels. This means avoiding nitrogen fertilization during the fall low temperature hardening period. (Continued on page 28)

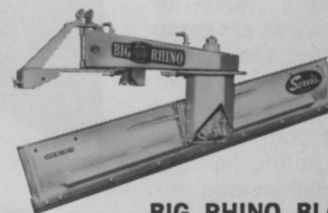


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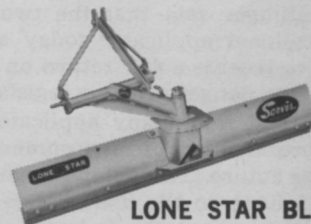
**BIG RHINO BLADE**

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LIKE an arctic iceberg, the bulk of professional applicators, both members and potential members, were remotely obscure at the 11th annual International Pesticide Applicators Association convention in September. The reclusion of those absent only increased the enthusiasm of those present, however.

Unlike the iceberg, the meeting was anything but cold. While a warm autumn sun beckoned with week-long shining rays, members resolutely turned their attention to the hotter issues confronting the custom applicator. Topics including legislation, public relations, weed control, biological insect control, operational safety, and infra-red photography highlighted this year's meeting which was held in Portland, Oregon.

Keynote speaker, Fred C. Trullinger, president of the Charles H. Lilly Co., Portland, set a tone of caution optimism for the applicators early in the formal program. "Today there are an increasing number of people who want your services. The public has demanded an environment which is safe. The pesticide issue has created an awareness that all chemicals should be handled carefully," he said. "You people represent a portion of the industry that has made tremendous strides in the past 20 years. . . . Agricultural chemicals have done as much as anything in improving the environment for what it is."

Trullinger said that the two principle issues of the professional applicator today are to operate the business to receive a fair return on investment and to eliminate the danger of being legislated out of business.

He said that many applicators are concerned about the introduction of environmental protection chemicals in the future. The potential uncertainty of the use life of products on the market has caused widespread concern throughout the industry. "In today's climate," he said, "it is a battle to hold onto the present registrations." Pointing to industry, he said the National Agricultural Chemicals Association reports that 23 percent of the research and development budgets of the agricultural industry is spent in maintaining registrations.

Additionally, he said it currently costs industry \$10 million to bring a candidate chemical from the test tube to the market place. "Let's face it," Trullinger remarked, "manufacturers are not going to invest \$10 million for a chemical that has a life of three or four years."

Trullinger concluded his remarks in noting that there is a need for: 1. more true professionals in this industry; 2. better profits; 3. better use of materials and methods of application; and 4. a united effort by all professional applicators.

The pesticide issue today was brought into clearer focus by an interesting presentation from Dr. J. Gordon Edwards, professor of entomology, San Jose State College, California. This was the second year Dr. Edwards

was on the program. Considered a world authority of the issue of DDT, he brought the group up to date on the background of the DDT ban and explained in detail many of the inaccuracies and inconsistencies surrounding the testimony in the recent hearings.

One interesting point made during the lengthy discussion was that all living creatures have absorbed less than one-thirtieth of one year's production of DDT. That is after 25 years of production and six billion pounds of product, said Dr. Edwards.

In the area of association public relations, James A. Sample, editor, WEEDS TREES AND TURF magazine,

focused attention on the exterior goals IPAA needs to develop. Calling it management of the public will, Sample said that as difficult as this job is, it is critical to the professional applicator. "IPAA needs more national exposure. It needs to use tools to enlist more support, or where necessary, weapons to oppose national legislation. It needs to develop national legislation. It needs to further its image," Sample said.

The magazine editor outlined three goals for IPAA which were later adopted by the board of directors. The first was a major feature article for consumers on the importance of the professional applicator to today's ecology-minded public. The second objective was to generate general publicity releases for consumer news media. The last goal involved the development of operational policy statements which could be used by applicators in the performance of their jobs and by the Association in testifying before legislative hearings and other official functions.

While attendance at this year's meeting totaled 145 with 59 actual members present, it was interesting to note representation by individuals from five states where active chapters have not been established. According to these people, there is concern in their states about pesticide legislation. They came to the meeting to associate and converse with industry leaders about specific problem areas. Of particular note was the extensive use of tape recording equipment. Conferees were anxious to record the program for their own use or for playback to groups of applicators who could not make the meeting.

During the second day of the convention Stauffer Chemical Company presented their famed "Miracle of the Land" audio-visual presentation. It clearly shows the role of agricultural chemicals in protecting the environment.

W. A. Harvey, extension environmentalist, University of California, Davis, next discussed the problems of weed control and the environment. He said the only reason for any weed control is to change the environment. Thus, when chemicals are used, the environment is altered. Herbicides, to be effective, must become an intimate part of the environment of the target plants.

## INTERNATIONAL



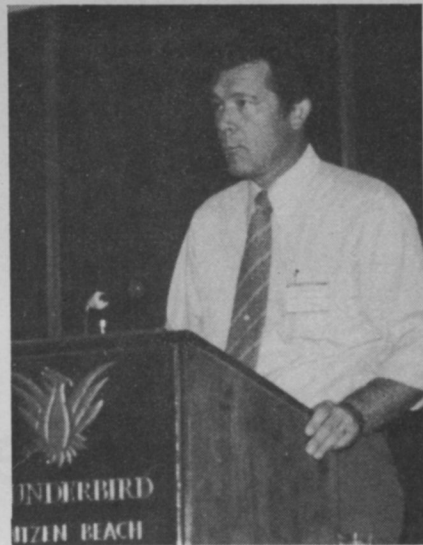
## APPLICATORS, INC.



Dr. J. Gordon Edwards, professor of entomology, San Jose State College, San Jose, Calif. discusses the pesticide issue.



Robert B. Black, industrial hygiene engineer, Health Division, State of Oregon, briefs delegates on operational safety.



Dr. Sidney Siemer, Abbott Laboratories, Fresno, Calif., introduced the concept of biological insect control to IPAA members.

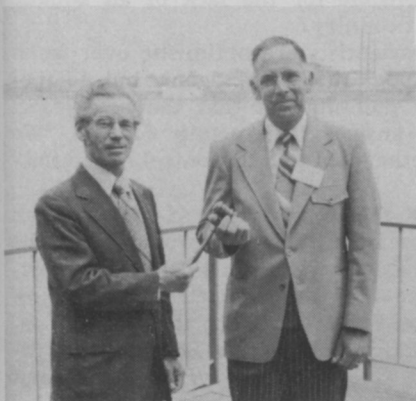
However, if the herbicides moves away from the target or persists too long, problems arise.

The extension specialist pointed out that the effects of herbicides on living organisms have been negligible. True, the environment has been changed, but only because man has willed it. A prosperous, well-populated country is more likely to change the environment to meet changing needs. Herbicides have been a tool rather than a cause of environmental change, he said.

Another program speaker who discussed biological insect control was Dr. Sidney Siemer, Abbott Laboratories. He said that biological insect control includes viruses, rickettsiae, bacteria, fungi, protozoans and nematodes. Narrowing the subject to bacteria, he mentioned that that bacterial pathogens can be introduced and so colonized for long-term regulation and suppression of test species. "Bacterial pathogens can also be used in a manner similar to chemical insecticides for short-term or temporary suppression of insect pests. . . . For example, *Bacillus thuringiensis* has been successfully used for omnivorous leafroller and grape leaf folder control without creating any mite build-up problems or having deleterious effects on leafhopper parasites," he said. Once an application of *B.t.* is made to foliage, a general stoppage of feeding occurs in the first 24 hours, (Continued on page 27)



The 1973 IPAA board of directors are: (l-r, bottom to top) Ray Collier, Oregon (alternate); Bob Huntwork, IPAA vice pres., California; Don Mock, IPAA president, Washington; Chuck Seibold, IPAA past pres., Oregon; Bill Owen, Oregon; Don Caldwell, Utah (director at large); Lew Sefton, exec. sec., Oregon; Ken Thorpe, recording sec., Oregon; Gary Mulkey, Oregon, Lew Crothers, Washington (alternate); Bob Skanes, Washington; Steve Fisher, Oregon; Milt Ellis, Oregon (alternate); Stan Raplee, Washington (alternate). Not present include: George Harrison, Jack Daniels, Mac Osborne, Alvin Wallman, Charles Bradshaw, Stan Taylor and W. R. Nahmens.



Don Mock (r) was elected IPAA president for 1973. Here, Chuck Seibold, past president, passes the traditional gavel to the new officer.



A banquet dinner was a highlight of the meeting. Shown here are: (l-r) Mrs. Steve Fisher, Mrs. Duane Saxton, Duane Saxton, and Mrs. Jerry Flowers.



# Weevil Battalion Charges Water Hyacinth

**F**OUR years of intensive research in South America by state and federal agencies has isolated an insect for release in Florida to help control the pesky water hyacinth.

First release of the water hyacinth weevil (*Neochetina Cichhorniae*) scheduled for Fort Lauderdale in late August under the direction of the Agricultural Research Service of the USDA, the Florida Department of Natural Resources, the Florida Division of Plant Industries and the U. S. Army Corps of Engineers. Additional releases of the eggs of the insect will be made in Gainesville and at points throughout the state within the next few months.

Exhaustive study by USDA scientists in South America found that the insect is a natural enemy of the water hyacinth and is "host specific" — meaning that in the absence of the hyacinth the insect cannot reproduce and dies.

Starvation and plant preference tests proved conclusively that the aquatic insect is safe to be introduced in the Southeastern United States waters to help control hyacinths. To insure that only a pure strain of the weevil would be introduced, arthropods were selected, kept in isolation in Argentina, cultured in the laboratory in quantities for shipment to a California laboratory operated by USDA, bred under strict laboratory conditions and only the eggs were released initially in Florida. Scientists released 500 to 1,000 eggs in Fort Lauderdale.

Water hyacinth control is a multi-million dollar a year expense to Federal and state agencies. The plant is a scourge which blocks waterways, impedes navigation, pollutes water and causes greater evaporation of water through the leaves of the hyacinth. Hyacinths continue to cover more water surface each year and repeated applications of herbicides by Federal, state and local agencies are necessary to keep the waterways open.

The weevil, one of several species being considered for introduction, is about two-tenths of an inch long and mottled grey in color.

The insects belong to a group of aquatic weevils which have a waxy coating, adapting them for survival in water habitats. Water hyacinth weevils can submerge

for several minutes below the water surface and can swim clumsily, doing a type of breast stroke, scientists report.

In Argentina, when attack by this insect is severe, according to Dr. David Perkins of the USDA research staff, all leaves of the hyacinth bear a polka-dot pattern produced by the adult feeding. The adult insects feed mostly at night.

Dr. Perkins also noted that the immature stage of the insect is a small, white, grub-like worm which tunnels into the leaf stem. Damage caused by the worm tunneling into the stem often kills the hyacinth. As the grub stage grows larger, it forms an intermediate pupa stage. To do this, it leaves the leaf stem and enters the mass of roots, where it develops an underwater cocoon. The insect emerges from the cocoon and begins feeding on the leaves of the hyacinth immediately. Life span from egg to egg is about three months.

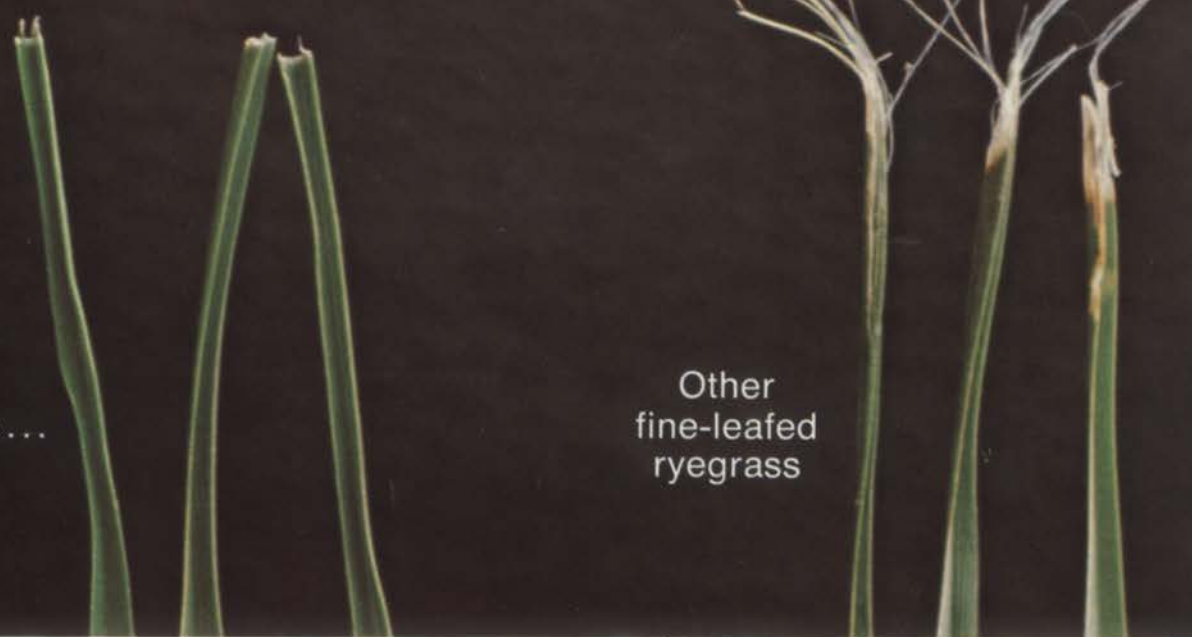
Damage by adults and weevil grubs is often helped by ever-present bacteria and scavenger insects which enter through the feeding spots. The secondary attack, according to Dr. Perkins, amplifies the effect of the weevils. The USDA scientists pointed out that in Argentina there is no control program against the hyacinth, and insect attack in conjunction with other conditions are apparently responsible for the lack of an aquatic weed problem in that country.

Federal and state scientists are optimistic over isolation of the new biological control agent, but temper their enthusiasm by pointing out that the new insect is not the ultimate answer to hyacinth control. "We believe it will be another tool to help control hyacinths," the scientists say.

Funds to support the four years of research on biological control for hyacinths was provided by the U. S. Army Corps of Engineers, and the Florida Department of Natural Resources has supported Dr. Perkins' continued research on the insect since the scientist returned to USDA headquarters in Fort Lauderdale. Further support is being given by the Florida Department of Natural Resources in the continuing program of rearing, release and dissemination of the weevils.

Release of the insects will be closely monitored by all participating agencies.





Pennfine ...

Other  
fine-leaved  
ryegrass

These two fine-leaved perennial ryegrasses were cut with the same mower. The one on the right shows the fibrous "paint brush" top which is characteristic of ryegrasses. Pennfine, on the left, took a smooth, even cut because it was bred for softer, easier to cut fibers.

# Pennfine: the clean-cut perennial ryegrass.

All the new fine-leaved perennial ryegrasses are beautiful. Until the mower comes along. That's the moment of truth for ryegrass. And Pennfine is the fine-leaved perennial ryegrass bred specifically for mowability. You can see the clean-cut look of Pennfine in the photo above. You'll see it in your turf, too.

## **Pennfine vs. other fine-leaved ryegrasses**

Developed and released by Pennsylvania State University, Pennfine is the best of the fine-leaved perennial ryegrasses. That's

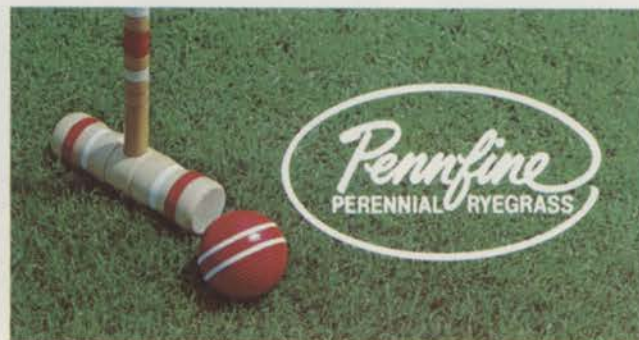
the finding of the trials at University Park, Pennsylvania. Among nine cultivars, Pennfine ranked first in texture, first in density, first in decumbency (low growth), first in tolerance to snowmold and leaf spot. And, of course, first in mowability.

## **Pennfine mows 'em down**

The remarkable mowability of Pennfine — the result of breeding specifically for soft fibers — is demonstrated in the above photograph. It was also proven by the University Park trials. Over a five-year period, Pennfine

averaged 8.3 (of a possible 10) in mowability. The next best score was 7.3, and the other cultivars rated considerably lower.

With the finest blade of all the fine-leaved ryegrasses tested, Pennfine is beautiful to begin with. And, because of superior mowability, it stays beautiful. It's also highly compatible with Kentucky Bluegrass, both in terms of appearance and management requirements. If you'd like more information on this clean-cut perennial ryegrass, just send in the coupon.



TO: **Pennfine Perennial Ryegrass**  
P.O. Box 923, Minneapolis, Minnesota 55440

Please send me technical information on Pennfine Perennial Ryegrass.  Names of Distributors.

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Robert Scott, president, John's Inc.

**A**N APOPKA, Florida firm is in the process of doubling 30,000 square feet of space for acclimatizing trees and tropical foliage plants for use in interior landscape designs and covered malls.

John's Inc. will be able to acclimatize trees up to 35 feet tall when new sheds are built. Presently Ficus and mahogany trees up to 22 feet tall are the largest in the acclimatizing house.

The firm has been experimenting for several years with the process of decreasing light and withholding water and fertilizer to harden plants to survive in the low light and low maintenance conditions found in interiors and malls.

In 1970, the firm built a 30,000 square foot shed with a network of polypropylene of different degrees of shade plus two different shades of paint on the roof.

The rigid plastic house is 18 foot high at one end and 14 feet high on the lower end. Two other sections of

the huge John's nursery also hold an overflow of materials to be acclimatized.

Wholesale value of the plant's being acclimatized is \$115,000.

Many plants, especially the larger ones, are moved into the acclimatizing house from almost full sun locations. Over a three-four month period the light intensity is reduced from 1,500-2,000 foot candle power to 400-500 foot candle power.

While the light is being reduced, water and fertilizer is also being decreased to harden the plants to conditions of low maintenance required in most enclosed malls.

Vern Buck, executive vice president of the 38 year old company, said plants brought in from full sun location drop some leaves when brought into the shade house. He said the black olive tree may drop its leaves once or twice but when leaves grow back, the trees are usually ready to sell.

"Various plants take varying

amounts of time to harden up but in general, three to six months time will harden up most plants and get them used to low light and maintenance conditions," Buck pointed out.

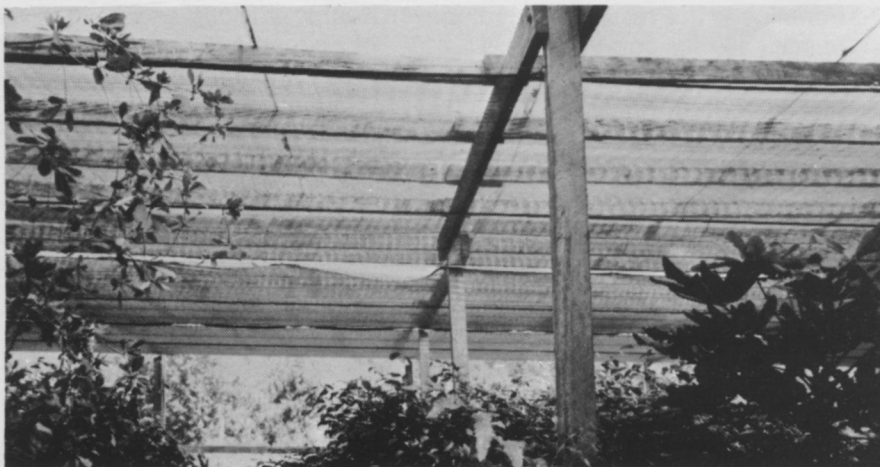
He suggested the black olive tree is one that should be used more often in interior landscape plans for malls. He said the tree will tolerate light conditions as low as 250-300 foot candle power but 400 is better for best leaf retention.

The shading material is strung on wires underneath the roof of the plastic house. It can be rolled back if desired or another layer can be placed over the first for more shade over a certain section to bring light down to minimum foot candles.

Watering plants in the three-fourths acre house is by hand. In general, water is withheld and plants are kept on the dry side.

Slow release fertilizers and systemic insecticides are used to keep plants in better shape for a longer time and to decrease the amount of

# Outdoor Trees For Indoor Use



Polypropylene is hooked to strands of wire underneath the roof of John's acclimatizing house. Also, two different shades of paint are used on the rigid plastic roof.



The acclimatizing house is 30,000 square feet. Robert Scott carefully checks the condition of all plants valued at \$115,000.