

OCTOBER, 1969

WEEDS TREES and TURF



Aquatic
Weed
Control



or



GO MECHANICAL!



Patent Applied For

Here's a mechanical sod harvesting machine that is setting the standards for the sod industry! The reason? Years of commercial field performance has proven its ability to handle all types of turf, to do it quickly, efficiently and at a low cost!

An important feature is the choice the grower has as to harvesting sod in rolls or slabs. The rolling and slabbing unit is interchangeable, and can be changed quickly and easily.

The NUes Sod Harvester and 3 men can lift, roll or slab and palletize up to 1200 sq. yds. of sod per hour. The harvester travels alongside, never on top of the turf, during harvesting. The machine is adaptable to all regions taking into consideration terrain, soil and sod conditions. Operator has clear visibility of all operations at all times, field grading of sod is done on the move, field conditions are easily and quickly adjusted for, while in operation, with hydraulic controls.

The NUes Sod Harvester is the solution for growers looking for a proven way to quickly and economically harvest sod. If you can cut turf with any standard sod cutter . . . our machine can pick up and harvest it!

For more information please contact:

THE JOHN NUNES MECHANICAL HARVESTING CO.
2006 Loquot Ave., Patterson, California 95363, Phone (209) 892-8776



For More Details Circle (105) on Reply Card

**FOR MORE FACTS
USE THE
POSTAGE FREE CARD**

You are invited to use the Reader Service card provided to obtain further information on equipment, materials or supplies appearing in this issue. This card is preaddressed and postage paid.

Your inquiry will be forwarded to the manufacturers in whose products you are interested.

**FOR MORE FACTS
USE THE
POSTAGE FREE CARD**

You are invited to use the Reader Service card provided to obtain further information on equipment, materials or supplies appearing in this issue. This card is preaddressed and postage paid.

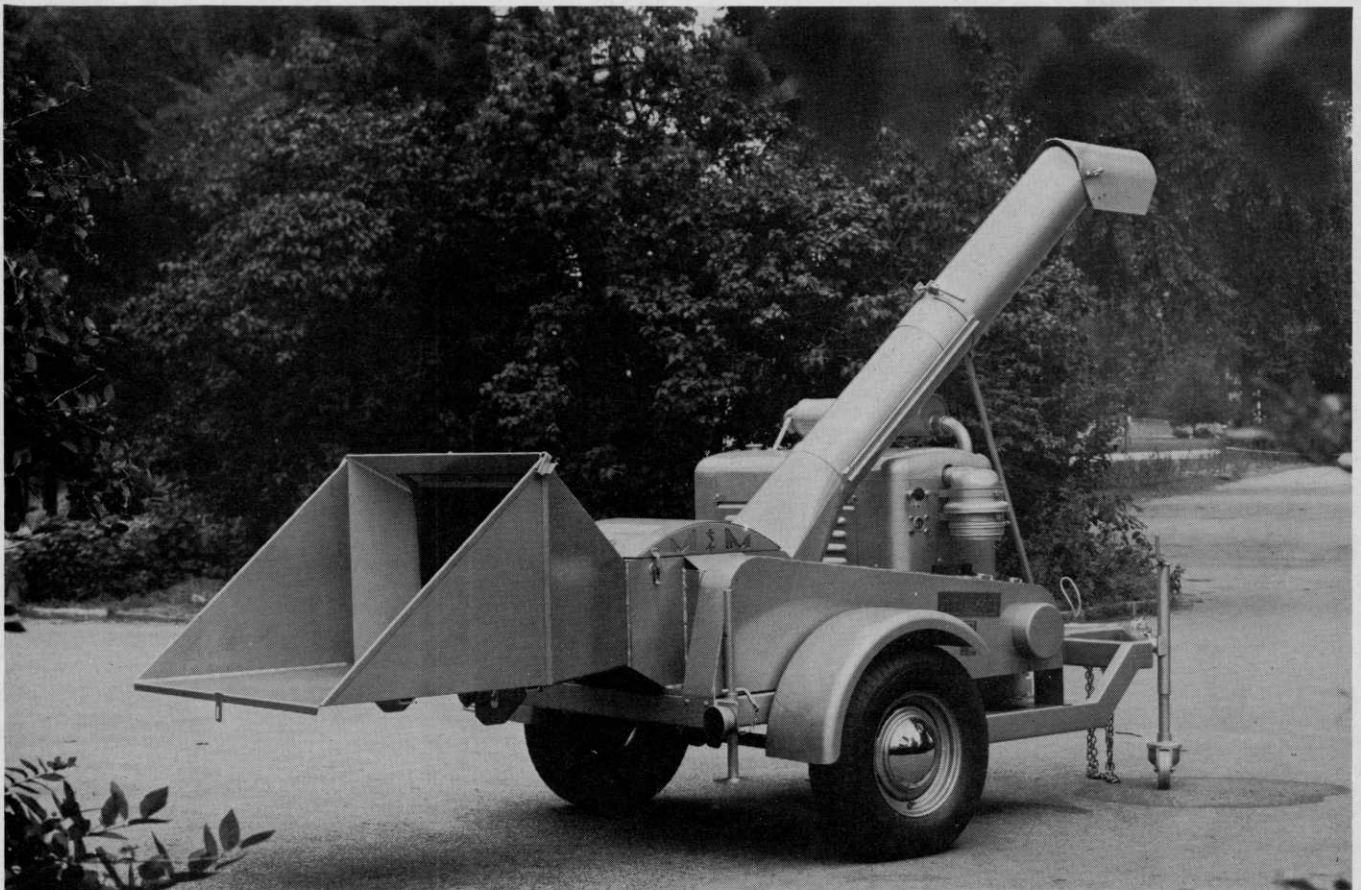
Your inquiry will be forwarded to the manufacturers in whose products you are interested.

the WISER winter izer

Most effective winter protection at lowest cost, WILT PRUF Anti-Transpirant prevents excess water-loss caused by drying winter winds. You can eliminate burlap windscreens. WILT PRUF saves shrubs, trees and roses all year round . . . from winter kill, summer scald, drought and city air pollution. Combats transplanting shock and extends the safe transplant season, too. *Write on your letterhead for 50-page technical manual of applications.*

**WILT PRUF®**

NURSERY SPECIALTY PRODUCTS, INC.
410 Greenwich Ave., Greenwich, Conn. 06830 / (203) 661-5840



The Mitts & Merrill Brush Chipper . . . most efficient way to reduce branches, limbs, brush

These exclusive features:

- Staggered knife pattern . . . means more cuts per revolution, smoother cutting action, smaller chips of uniform size (reusable as mulch)
- New folding feed chute extends to 60" overall length, eases maneuverability and protects cutting chamber.
- Reversible knives . . . give you twice the service between sharpenings; also self-adjusting with positive lock pin to prevent throw-out

- Heavy duty construction . . . coil spring, torsion type suspension; all tubular steel trailer frame
- Torque converter . . . available on all models

For complete information and list of specifications, contact dealer nearest you or write us direct.

mitts & merrill

SUBSIDIARY
walco
WALCO AMERICAN
CORPORATION

There's a Mitts & Merrill Brush Chipper dealer near you — ready to serve.

ARKANSAS, Little Rock
Moody Equipment & Supply Company

CALIFORNIA, Los Angeles
SABCO

CALIFORNIA, Sacramento
Action Equipment Company

COLORADO, Commerce City
Macdonald Equipment Company

CONNECTICUT, Stamford
Muench Company, Inc.

FLORIDA, Jacksonville
Florida Equipment Co. of Jacksonville

ILLINOIS, Rosemont
Illinois FWD Truck & Equipment Company

ILLINOIS, Springfield
Drake-Scruggs Equipment, Inc.

LOUISIANA, Baton Rouge
General Equipment, Inc.

MASSACHUSETTS, Needham Heights
E. J. Bleiler Equipment Co., Inc.

MICHIGAN, Detroit
Contractors Machinery Company

MICHIGAN, Franklin
Cannon Engineering and Equipment Co.

MINNESOTA, Minneapolis
Road Machinery and Supplies of Minneapolis, Inc.

NEBRASKA, Omaha
Omaha Body & Equipment Company

NEW HAMPSHIRE, S. Merrimack
Consolidated Utility Equipment Service, Inc.

NEW JERSEY, Lodi
Dianem Company

NEW YORK, Masapegua Park, Long Island
Equipment Sales & Service Co.

NEW YORK, Albany
R. B. Wing & Son Corporation

NEW YORK, Syracuse
State Equipment Company, Inc.

NORTH CAROLINA, Charlotte
Baker Equipment Engineering Company

OHIO, Massillon, Karl Kuemmerling, Inc.

OKLAHOMA, Enid
Bert Smith Road Machinery Co., Inc.

OREGON, Portland
Cal-Ore Machinery Co.

TENNESSEE, Memphis
Utilities Equipment Company, Inc.

UTAH, Salt Lake City
Truck Equipment Sales Company

VIRGINIA, Richmond
Baker Equipment Engineering Company

WASHINGTON, Seattle
Sahlberg Equipment, Inc.

WISCONSIN, Brookfield
Utility Equipment Company

CANADA, Cooksville, Ontario
A. E. Joslin Machinery & Equipment Limited

Winnipeg, Manitoba
Howard F. Powell (1963) Limited

Montreal, Quebec
Aird Equipment Limited

or contact Mitts & Merrill, Inc., 109 McCoskry St., Dept. WT-83, Saginaw, Michigan 48601

For More Details Circle (107) on Reply Card

Special for This Issue

Water	8
<i>Pollution of water resources by aquatic weeds is a growing national problem. The story sets the tone of this special issue on aquatic weed control.</i>	
It Takes a Total Water Management Service	10
<i>How the Pennwalt Aquatic Applying Service works.</i>	
Aquatic Weed Harvesting	14
<i>C. Brate Bryant, president of Aquamarine Corp., talks about the effects and costs of harvesting weeds mechanically.</i>	
How One City Manages Aquatic Weeds	18
<i>Jay Blanchard, director of parks and recreation for Winter Park, Fla., tells how he employs both chemicals and harvesters to manage water weeds.</i>	
Hydrilla Verticillata	20
<i>Technical report on chemical control research by Robert D. Blackburn and Lyle W. Weldon of USDA's Agricultural Research Service.</i>	

Regular Features

Editorial: <i>What's Tough About Becoming a Professional</i>	6
Letters to the Editor	7
Meeting Dates	25
Sod Industry Section: <i>Mercer Sod — Since 1928</i>	26
Insect Report	28
New Products: <i>Useful in Aquatic Weed Control</i>	30
Industry News: <i>45th ISTC Report</i>	32
Industry People on the Move	38
Trimmings: <i>A penguin and litter bugs</i>	38
Classified Advertising	39
Advertisers' Index	39

The Cover

David Wright (pilot) and David Powell of Pennwalt Aquatic Applying Service demonstrate their technique of spraying to control aquatic weeds. They're operating on Lake Maitland, within the city limits of Winter Park, Fla. Chemicals are either released from the rear of the airboat in twin jets just beneath the surface or directed by stream. Powell uses a dye to show dispersion and action in an especially heavy infestation of hydrilla verticillata. The airboat is made by Hurricane Fibreglass Products, Inc., Lake Hamilton, Fla. It's equipped with an F. E. Myers 10-gpm pump. Read more about the Pennwalt service on page 10.



WEEDS TREES AND TURF is published monthly by The Harvest Publishing Company. Executive, editorial: 9800 Detroit Ave., Cleveland, Ohio 44102.

Single Copy Price: 50 cents for current issue; all back issues 75 cents each. Foreign \$1.00.

Subscription Rates: WEEDS TREES AND TURF is mailed free, within the U.S. and possessions and Canada, to qualified persons engaged in the vegetation care industry and related fields in controlled circulation categories. Non-qualified subscriptions in the U.S. are \$7.00 per year; Canada and other countries, \$10.00 per year. Controlled circulation postage paid at Fostoria, Ohio 44830.

© The Harvest Publishing Company, 1969

Member Business Publications Audit



WEEDS TREES and TURF®

Volume 8, No. 10 October, 1969

Gene Ingalsbe
Editor

Alis Anthony
Editorial Assistant

Arthur V. Edwards
Editorial Director

A. J. Michel
Advertising Production

Hugh Chronister
President and Publisher

Dan M. Humphrey
Vice-President, Advertising

Roy Bever
Director of Circulation

ADVERTISING SALES OFFICES

Cleveland, Ohio 44102
9800 Detroit Ave./216+631-6468
William Schmunk, Mgr.

Chicago, Illinois 60601
333 N. Michigan Ave./312+236-9425
Richard Scrymiger, Mgr.

**Shawnee Mission (Kansas City),
Kansas 66202**
6811 W. 63rd St./913+722-5900
Austin Schnacke, Mgr.

New York, New York 10017
757 Third Ave./212+421-1350
Herbert Lager, Mgr.

Columbus, Ohio 43212
1350 W. Fifth Ave./614+486-9638
Gilman Calkins, Mgr.

Lansing, Michigan 48906
4415 N. Grand River/517+372-5254
Paul Bundschu, Mgr.

Los Angeles, California 90005
The Eschen Company
3142 Wilshire Blvd./213+382-8391
Henry Eschen

San Francisco, California 94104
The Eschen Company
57 Post St./415+781-7440
Al Pierce

What's Tough About Becoming a Professional

Granted, defining professionalism is about as difficult as nailing Jello to a tree. The word seems to wriggle out of every attempt to nail down its meaning.

Even so, there's a tougher chore: taking the action that's necessary to become recognized as a professional. *Taking the action!*

Public utility arborists have organized. The Landscape Council has been formed. Good steps. But it's funny-strange, thinks Daniel Capper, writing about TLC on page 7, that many have hesitated to put their signature on the application card, "even though no money is being asked at this time." But that's the hard part. Actually signing up requires the commitment to *take action*.

Discussion at the International Shade Tree Conference pretty well covered what a professional is. There were many suggestions also on how to become one. One way helpful in achieving the objective is to analyze what other recognized professionals have done. For example:

Look over the examination that an accountant has to pass before he can be listed as a Certified Public Accountant.

Study doctors' and lawyers' codes of ethics.

Take note of the way certain trade unions, such as bricklayers, plumbers, and electricians, control their memberships and as one result enable them to demand a premium for their services.

Consider the stiff licensing laws that apply to pilots, pharmacists, and most ministers.

For the most part, these standards to live and work by were written by the respective professionals themselves. What's more significant is that the members recognize the standards as being so important that they have given their organizations the power to force individual members, when loyalty falters, to live up to those standards.

"Seek and ye shall find . . ." is the ancient and workable advice from the Good Book. Seek connotes action. The fact that there is so much talk about upgrading a given profession is an indication there hasn't been enough *real seeking*.

"The forestry profession has stayed in the woods too long," quipped John Mixon, Atlanta city forester. Perhaps his charge applies to all arborists; otherwise, it might have been an arborist who first announced his services by "hanging out his shingle."

the **GREAT** one! Highland Colonial Bent

Just possibly, Highland Colonial Bentgrass is the greatest value in grass seed today!

A highly attractive blue-green, cool-season grass, it is one of the most economical of the fine-bladed varieties and has every attribute required for a truly luxurious turf.

Highland Bent may be seeded alone or in a mixture . . . is adaptable to many soils and climates . . . is durable under heavy foot and light vehicle traffic and thrives on close-cutting to 1/4 inch.

With some 8 million seeds per pound, the potential number of plants is great. Highland is also popular for overseeding in Southern regions.

If you would like complete data on cultural practices, seeding rates, fertilization, etc., please write to:



Oregon Highland Colonial Bentgrass Commission

Suite one / Rivergrove Building
2111 Front Street N.E. / Salem, Oregon 97303

For More Details Circle (111) on Reply Card

Changing Your Address?

If so, notify our circulation department right away to be certain the magazine reaches you at your new location. The Post Office won't forward your copies. So when you write us, make it at least three weeks in advance of your moving date, and include your old address, as well as the new one. We'll see you don't miss a single issue.

Send old and new address information to:

WEEDS TREES and TURF magazine
Circulation Department
9800 Detroit Avenue
Cleveland, Ohio 44102

Landscape Council, Editorial and Content Comments

I recently spent two weeks of the most rewarding and most frustrating times of my nursery career. I attended two conventions at which the underlying current concerned the Landscape Council.

Most nurserymen seem to agree with the program, but have hesitated to put their signatures on the application card.

Why? Either procrastination, unanswered questions, or just plain conservatism are the most apt reasons. It can't be fear of losing money, because no money is asked for at this time. And nurserymen have a reputation of always being willing to spend money for something that *might* help them.

The most common excuse I have heard is that "I have all the business I can handle." Truer words were never spoken, BUT will this situation remain static? I doubt it. The mass merchandisers, right now, sell somewhere around 50% (and this is conservative) of the total plants sold. How much did they sell in 1959? Maybe 10%. At this rate, in ten years they will sell upwards of 90% of the plants, *leaving us with 10%!*

Would you be willing to have more business if you could handle it?

No one that I have talked to has answered that question negatively. How can we handle more business? By getting more competent help.

This program is going to put the squeeze on both wholesalers and retailers alike. There won't be enough plant material available to meet the demand. According to the economic axiom of supply and demand, prices of nursery stock will rise from the producer. Carrying the normal markup, the retail prices will also rise, resulting in a higher dollar profit. With the higher dollar profit, you can pay higher wages to attract more and better people.

The increased wage scale and the status of a large industry will attract labor to our industry that heretofore would feel degraded to do "farm work." The increase in the dollar profit and the image of the industry will also stimulate other suppliers, such as the machinery manufacturers, to the

market we will create by our demands for better mechanization.

Let's face it, the nursery industry has never been loud enough or worth a manufacturer's time and dollars to develop something *just for us*. Almost always, we have had to adapt some piece of machinery to our needs that was really developed for an entirely different job.

All of these theories are, of course, predicated on the success of The Landscape Council. The question is (although no one has really voiced the opinion that it wouldn't): *Will it work?*

I can only answer this question with a question. Is this program so different from the ones used by the Florida Citrus Commission and, closer to home, the florists with F.T.D., that they could not be compared? Everyone has seen the tremendous growth and profits of the florist industry under F.T.D. Also, the phenomenal growth and success of the Holland Bulb producers came after a program such as this was instituted.

Although all the details have not been announced as yet, I understand that the S.A.F. (Society of American Florists) is instituting a national sales program late in 1970 using, as their media, the larger mass merchandising magazines, and the services of the N.B.C. Monitor program on radio.

This program *will* work but it needs the backing and support of the entire industry to get off the ground. If it doesn't get started, we will always wonder whether it would have worked.

The disposable dollar is shrinking due to surtaxes and inflation, and, if we don't get our bid in for the amount of that dollar that's left, we may have plenty of time to wonder about it. To paraphrase an old saying, "he who hesitates has lost it for others as well as himself."—**DANIEL S. CAPPER**, Capper's Nursery, McLean, Va.

Accurate Reporting

We wish to thank you for the excellent coverage of the Central Plains Turfgrass Field Day in your July issue. It contained some of the most accurate reporting where I knew the story from ac-

tual experience that I have had the privilege of reading.

In your insect report, you may wish to report rather serious damage to fringes and fairways and occasional greens and other turf areas in Kansas due to Beet army worms and some unidentified lepidopterous larvae in mid and late July.—**RAY A. KEEN**, Department of Horticulture, Kansas State University, Manhattan.

Government Interference

I write for the first time to comment upon the content of two recent editions. But first, a word about myself.

I am a small independent Milwaukee area tree surgeon. I spent 14 years as an employee of the city of Milwaukee in the forestry department and five years as an independent. I operate alone, hiring help only when necessary. This gives me independence and saves the federal red tape regarding employees and record-keeping.

In a recent editorial, you objected to the federal government providing nursery stock at lower than prevailing free enterprise prices. I feel you have every right to be concerned, and if you speak on behalf of most nurserymen, those concerns are well justified. However, you address yourself to only a small part of the total problem. The list of citizens who are being offended by the central government grows longer each day. You should be concerned about all restrictive federal legislation.

Few of us see that the problem is not that which confronts us as individuals. The problem lies in that we are all divided and concerned with our very limited area, when we should all be concerned with federal usurpation of power.

In a more recent issue of WTT, you had an excellent article on the Federal Reserve System, and while I hardly expected to find that subject examined in a journal such as yours, I do commend you for speaking so forthrightly. You have made a good start, I feel, in going in the proper direction of an issue of vital concern to every American. I commend you.—**ROBERT W. JOHNSON**, Milwaukee, Wis.

THERE'S SO MUCH of it; why be concerned? And there you have in that public state of mind the real cause and extent of the water pollution we have today.

The public is at last becoming exposed—and aroused—about industrial, human waste, and thermal pollution. This issue focuses on a lesser known aspect of water pollution that's directly related to the industries this magazine serves. The pollutant to which we refer is aquatic weeds.

Why be concerned? It can be said that this country's water pollution by aquatic weeds alone is a problem growing as fast as a foot a week.

That's the rate of growth for hydrilla verticillata, a submersed weed variety discovered and identified in Florida for the first time only nine years ago. The plant has now infested large areas of the Southeast.

Cut it up and the pieces each will take root upon striking soil. It grows up from deep water, 20 to 30 feet. It will bog down motor boats, clog waterways, cause a painful itch or even entrap and drown swimmers. It displaces huge quantities of water, becoming so heavily matted that the non-swimming "lily-walker" bird trots safely across the surface.

"In just five months' time a typical recreation lake can become an economic problem," estimates Andy Price, aquatic biologist for Pennwalt Corporation. "Dig a new lake and the same thing can happen within a year."

No one knows how the weed got to the U.S. It may have been an "exotic tropical plant" imported for fish

aquariums, guesses Price. Then when somebody's fish died, the aquarium was emptied into the canal in back of the home.

But this weed pest is just one of some 150 species of vascular aquatic plants and more than 250 species of algae to worry about. Aquatic weeds have been around from the beginning.

Most any body of water eventually will die of eutrophication, or enrichment. Dig a new pond. Gradually, plants sprout, grow and die around the water's edges. Dirt from the bank sifts and tumbles in toward the center. Decayed plants provide nutrients for new plants. Eventually, the pond's water is displaced until it's just a bog. Finally, the water disappears entirely, leaving just a dip in the land.

But we the people have caused Nature to go berserk. By our very numbers, knowledge and mobility we have increased the eutrophication and, consequently, aging process to an alarming rate. We enrich waters with our wastes and commercial fertilizers, then spread untold varieties of weeds as far and as fast as we can tow a motorboat.

Why be concerned? Even the National Academy of Science's recently published volume on weed control, 471 pages, devotes only one chapter and 20 pages to aquatic weeds. Yet the opening sentence calls "aquatic weeds a worldwide problem that is becoming more critical."

"One aquatic weed alone, the waterhyacinth," the NAS volume continues, "has become known as the



'million-dollar weed' because of control costs and damage it has caused in recent decades in subtropical and tropical regions from the Nile River to the United States.

"It has been estimated that without unceasing control efforts, the Panama Canal would be closed by aquatic weeds within three to five years."

Dr. Lyle W. Weldon of USDA's Aquatic Weed Laboratory in Fort Lauderdale, Fla., reported to the National Geographic Society recently that:

"Aquatic weeds in Florida alone cost the state more than \$50 million a year in just property depreciation. The cost to the nation must be more than a billion."

Submersed weeds of many kinds infest 65% of all irrigation ditches in 17 western states, reported NGS.

Why be concerned? Such weeds, points out the NAS volume, present delicate control problems, requiring special techniques that do not endanger crops dependent on irrigation water or prove toxic to man, fish and wildlife.

Chemical control appears to be most promising. Yet, observes Andy Price, "it takes from \$1 to \$3 million to develop a new chemical, and anywhere from three to five years from conception to get federal registration."

A wide array of newly developed herbicides is being used, NGS stated, particularly nonresidual types that, when properly applied, are harmless to animals.

Some of these weed killers, said NGS, are so safe that aquatic biologists at National Weed Service in Orlando used them to treat a public reservoir. The weeds dis-

appeared in days; the potability of the water remained.

"A Miami country club discovered the value of herbicides," continued NGS. "Site of a \$200,000 golf tournament, the course was marred by unsightly weeds clogging its six miles of canals. Five days before the tournament, a herbicide crew treated the stagnant water. By the time the first golfer teed off, the canals were as clear as the club's swimming pool."

This one issue couldn't hope to cover the total scope of aquatic weed control. We've chosen to approach the subject by discussing a pioneering water management service that's offered by a large chemical manufacturer; by reporting on the latest in mechanical harvesters; by telling how one city is using both mechanical and chemical means to fight aquatic weeds; and presenting a technical report on government research to control hydrilla verticillata.

On an information-gathering run to Florida, this magazine's editor was given a tie clasp with the words "Clean Water."

An alert businessman had seen an opportunity to capitalize on the emblem that the U.S. Department of Interior had used for a booklet on aquatic pests in irrigation systems.

The editor wore the tie pin to a local restaurant. A "now-generation" waitress, catching sight of it as she placed a glass of water on the counter, exclaimed:

"Clean water, that's catchy!"

It had better be.



WATER



Andy Price, aquatic biologist for Pennwalt Corporation, is clutching the aquatic weed, *Hydrilla Verticillata*. He's actually in an airboat in the deep water of Lake Maitland, Fla.

It Takes a Total Water Management Service to Whip This

Price demonstrates that *Hydrilla* not only has mass but weight as well. The weed grows as much as a foot a week. At the surface, it mats with algae strong enough to support large birds.



"Considering that the human body is 70% water, you would think people would recognize the preciousness of our water resources."

ANDY L. PRICE was just warming up to a discussion of his profession when he injected this observation of the most puzzling aspect of his work. Price is an aquatic biologist for the Pennwalt Corporation.

As he continued, he turned up at least three reasons:

—People haven't realized that as population and pollution increase, "good water" — from the standpoint of its multipurpose uses — is a limited resource;

—Too many people don't realize the seriousness of water pollution nor recognize its presence; and

—Those people who recognize pollution don't always know what to do about it or where to go to find the problem's cure.

While Andy Price preaches enthusiastically on all three themes, his profession is to answer the third one — how to deal with water polluted with aquatic weeds.

"All we have to sell is a service — and an end result," he says. That service is the Pennwalt Aquatic Applying Service. And he calls special attention to the definition of the end result: An understood and accepted "aquatic vegetation management program."

"We're talking vegetation *management*," he emphasizes. Total control, or eradication, may not be possible nor even desirable."

Aquatic Weed Explosion

What has been happening the past few decades, Price explained as background, is that we have had a population explosion and a technological explosion; and the two have produced an aquatic weed explosion with as yet unrecognized proportions.

Technology has produced more leisure hours, and more people are traveling and taking to the water in boats, skis, swim suits and scuba gear. Technology has produced commercial fertilizer for every type of purchaser for every living plant. The excess plant nutrients are going into the water. Result: Aquatic weeds are traveling with their human carriers (boat motors, trailers, etc.), are infesting new water areas, and are growing rapidly in the enriched waters.

"The time is near when a land-

owner can't go dig a new pond when the old one becomes choked with weeds," warns Price. Nor can a city build a new lake and relocate itself around it.

The introduction of some tropical exotic plants has been especially disastrous, Price said. He singled out hydrilla verticillata. In the proper growing climate, "it will grow a foot a week." And fragments of plants easily take root when they contact soil.

This can mean that the weed introduced into an irrigation canal (30 feet wide and 4 feet deep), perhaps from the prop of a motor boat that went fishing over the weekend, could become an economic problem within three months, Price estimated.

For those who are responsible for potable water supplies, he tosses out this statistic:

"We found that in one surface acre of water, the aquatic weed hydrilla verticillata displaces 698 cubic feet of water."

Service in Reply to Inquiries

Some agricultural and recreational leaders have recognized the growing weed infestation. Out of their repeated inquiries for solutions has evolved the Pennwalt Application Service.

Pennwalt Corporation, a manufacturer of aquatic herbicides since the early 1950s, began some applying service in 1963. The service was then formalized by regions, beginning with the Northeast Region in 1963.

"Very few people are knowledgeable about the proper handling of aquatic herbicides," says Price. And the truth is that very many people are highly sensitive about what goes into their swimming, fishing, and drinking water.

"You don't just dump a chemical into a lake to control a certain weed," says Price, "without checking to see if the water flows into an irrigation canal for a citrus grove then continues to a stream through a dairy farm, and finally empties into a river from which a city gets drinking water.

"We initiated the idea — we're pioneers — of a professional service that considers all phases of water management."

"Send us your lake and we'll tell you how to weed it," Pennwalt has advertised as the simple way people with water problems can avail themselves of the service.

Actually, Price advises that the systematic approach is to form a

lake association or lake committee. "Then we have a practical group to work with."

How the Service Works

"We'll make a survey to determine if the water can be effectively treated," explains Price. "We'll prescribe the treatment, estimate the cost, spell out the degree of control that can be expected and the number of days to achieve it."

Once details are completed, an agreement is written and signed. The Pennwalt crew obtains all necessary permits and the work begins, using ground spray, airboats, or helicopters, as the situation dictates.

Post application inspections are made to assure that intended results were obtained.

The basic compound of most Pennwalt aquatic herbicides is endothall, with the brand names of the most-used being Aquathol Plus, Potassium Endothall and Hydrothol 191.

"But our applying service is not limited to the chemicals we make," emphasizes Price. "We'll use any herbicide that's federally registered as one that will control the problem in that particular locale."

Employees Carefully Trained

Providing a high-calibre applying service eliminates hiring just anybody that knows how to run a boat or point a spray stream.

Price has found that it pays to hire employees who take pride in their work and who want to continuously improve their craftsmanship. When he needs additional help, college students have proved most valuable.

"It takes at least a year to train a good sprayman," estimates Price.

They must learn how to mix a wide variety of chemicals, learn the most effective spray patterns, proper feathering, and boat maneuvers; how to avoid trapping fish in coves; and on occasion how to calm an aroused landowner by carefully explaining what is being done, why, and what effects can be expected.

Seeing a Pennwalt sprayman decked out in rubber gloves, overalls and boots, and wearing a face shield may cause some people to wonder if all that protective gear is necessary, thinks Price.

"But we take pride in our employees, and that's a measure of our interest in their health and safety," he explains.

Examples of Costs

Trying to pin down a cost for the Pennwalt Applying Service and a time required for accomplishing a given task is next to impossible. About the best that can be done to give some idea of cost is through specific examples.

For a surface aquatic weed, a floater such as water hyacinth, "we're talking about \$30 per sur-



Hurricane Fibreglass "Aircat" has proved the ideal vehicle for aquatic weed treatment, floating over the surface without picking up weed particles. Normal operation is to introduce chemicals below the surface as shown here. The airboat is equipped with an F. E. Myers 10 gpm pump.

face acre to clean it up," estimates Price. "The submersed problem is the highest priced with some species requiring as much as \$35 per acre foot. (A 1-acre pond 10 feet deep would cost \$350.)

Concerning time and length of control, an airboat can cover one surface acre in about 30 minutes, and most weeds could be expected to disappear in about a week.

In many situations, broad cost-sharing appears to be the only feasible — and fair — way to handle an aquatic weed problem.

At Winter Park, Fla., for example, Parks and Recreation Director Jay L. Blanchard says:

"We feel that because of the value of the chain of lakes to the city as a whole, it (aquatic weed infestation) is a community problem, a county problem, a state problem, and it is a federal problem."

Residents of Winter Park have at least agreed that aquatic weeds is a community problem by approving a city-wide one-mill levy to become effective on Nov. 1. They approved the levy to finance the fight against aquatic weeds even though only about 10% of the residents are lake property owners.



Pennsalt has become Pennwalt since a recent merger. Assistance and consultation on aquatic weeds are available through four offices, in Tacoma, Wash., Philadelphia, Pa., Montgomery, Ala., and Orlando, Fla.

Winter Park has 14 lakes, either part or wholly within the city limits. The lakes represent 800 acres of surface water and more than 20 miles of shore line.

Working for Winter Park Since '66

The aquatic weed problem has

taken on such magnitude that the next year's budget calls for a Lakes Division within the Parks and Recreation Department. The budget will be between \$150,000 and \$180,000. Eight men out of a 60-man staff work in aquatics full-time. Winter Park has used mechanical harvesters since 1963 and three years ago brought in the Pennwalt Aquatic Applying Service as added reinforcement.

In the past 2½ years, Winter Park has spread 17½ tons of Hydrothol 191 at a cost of \$14,425. The coming year's budget calls for four aquatic herbicide applications at an estimated \$20,000.

"We find this herbicide to be very satisfactory, and individual lake front homeowners are pleased with the results," says Blanchard.

Despite the city's mounting attack, in budgetary terms from about \$18,000 in 1966 to possible \$180,000 next year, the total weed population is increasing.

"Still, we feel the best method is to continue both the mechanical harvesting and herbicide treatments," states Blanchard. "Right now, we feel we've pulled ahead of the game in physical appearance."

An Airboat You Can Build

Need a floating platform to work narrow canals, maneuver among aquatic weed beds, or investigate shallows where motors cannot navigate? Then, consider the outfit put together by Leonard Devine, superintendent of public works at Palm Beach Gardens, Fla.

Devine bought a 12 hp motor, added a screen-enclosed 42-inch propeller, and mounted the outfit on a

14-foot, flat-bottomed boat, 6' 10" in width. Result is a unit weighing about 350 pounds that can be hauled on any trailer. It's truly an air-driven platform that's useful for pesticide application of aquatic weeds.

His bill of materials and approximate cost consisted of: (1) Model 300421 Briggs and Stratton 12 hp motor @\$231; (2) a 42" propeller with 24° pitch and 1" shaft size, designed for counter-clockwise rotation @\$37; and (3) a Monticello aluminum flat-bottom boat @\$350; plus miscellaneous screen and mounting brackets.

His regular spray equipment is hauled in the boat. It consists of a John Bean spray pump, hose and tanks, etc.

Devine says it has proved practical for municipal weed control and mosquito spraying and fogging. Because the unit is capable of slow speeds and very maneuverable, it has proved an excellent piece of equipment for close-in work in small canals which are typical of many city problem areas.



Hubert "The Boatman" Williams, pilots Palm Beach Garden's aquatic spray boat on a local canal. Lloyd "Tex" Horrell is sprayman and does all of the city's aquatic weed control work.

When it comes to controlling aquatic weeds . . .

SEEING IS BELIEVING



BEFORE



AFTER

Look at these before and after shots of the same scene in Margate, Florida

In the before picture, notice how water hyacinth and elodea carpeted the canal from bank to bank. Hardly anything but mosquitoes lived there. Certainly few fish. Now study the after shot, showing the canal restored to its original condition. The water again flows freely. Boats again ply there. Fish thrive and fatten.

This miracle of restoration — and, yes, conservation — was achieved by NATIONAL WEED SERVICES, custom applicators of non-toxic herbicides. We could show you many other similar "before and after" pictures. For instance . . . the canals at Miami Country Club . . . the lake at Burning Tree Golf and Country Club in Washington, D. C. . . . Chickahominy Reservoir in

southern Virginia . . . Skidaway Lake and canals in Savannah, Georgia . . . the lakes at the U. S. Naval Training Station in Orlando, Florida. Today you can see weeds retreating before our airboats and mixing rigs at Loxahatchee Wildlife Refuge in the Everglades and at General Development Corporation's satellite city of Port Charlotte, Florida.

If you have a waterway that resembles the before picture above, change it to look like the other photograph. You can . . . safely, economically, and permanently . . . through National Weed's continuing maintenance program. Drop us a line or give us a call. We'll make a believer of you. We guarantee it.

HELICOPTER AND AIRBOAT SPRAYING • GROUND RIGS FOR DITCH BANK SPRAYING • MECHANICAL HARVESTING

It Pays To Check With

NATIONAL WEED SERVICES

INCORPORATED

INSURED, BONDED
AND LICENSED

MEMBER HYACINTH
CONTROL SOCIETY, INC.

P. O. Box 2501 — Orlando, Fla. 32802 — Phone (305) 275-9430

"We Go Where Weeds Grow"

For More Details Circle (103) on Reply Card



The basic member of Aquamarine's Aqua-Trio is the H-650 Harvester. It cuts a swath eight feet wide and five feet deep. Live bed hold packs weeds automatically, unloads automatically.

Effects and Costs

Aquatic Weed Harvesting

By C. BRATE BRYANT, President
Aquamarine Corporation
Waukesha, Wis.

SINCE the first weed harvesting attempts in the early 1900s, there have been many unanswered questions about the effects of weed harvesting. Even if harvesting is proved beneficial, perhaps an overriding question yet to be answered is that of the cost of harvesting.

It is the purpose of this article to show there are more benefits by harvesting than just the short term removal of the weeds and, secondly, to offer some definitive costs on the removal of submerged aquatics, using the latest harvesting systems.

Since a prime cause of today's weed problems is an over-abundance of nutrients in our waters, it would seem logical that a cutoff of nutrient input would effectively retard weed growth through nutrient starvation.

This weed-algae-nutrient relationship is being recognized. Massive expenditures on better sewage treat-

ment, effluent diversion projects, separation of storm and sanitary sewer systems, and community sewage systems instead of septic tanks are a few of the positive efforts in this direction.

These efforts seem to be a losing battle, with population pressures building faster than our capabilities to cope. To compound our problems, the fertilizer industry has grown exponentially, nearly paralleling the seriousness of the weed problem.

A measure of the scope of the nutrient problem is the fact that 32 states reported production of 20 million tons of fertilizer from July, 1967, to June, 1968. Because of rising demand for wood and paper, the forestry industry is presently planning large scale forest fertilizing to promote "instant trees." A side effect will again be enriched water runoffs into lakes and streams! So, for the foreseeable future, nutrients will be entering our waters at an increasing rate, and weed crops will ever increase—nearly as a direct

function of the nutrients present.

Mechanically or Chemically

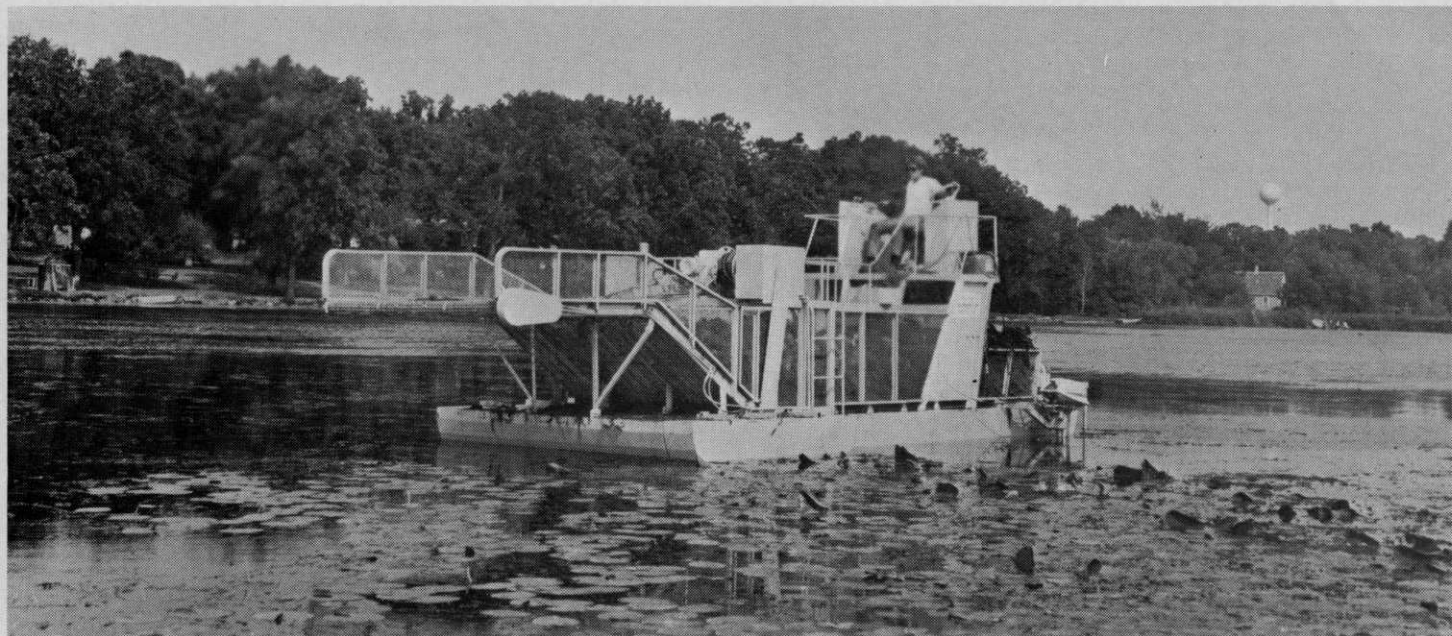
It then is evident that every person in a position of responsibility for weed control eventually has the choice of attacking cause or effect, i.e. nutrients or weeds.

The usual two choices commercially available to people with weed problems are mechanical weed harvesting or chemical herbicides: One attacks the nutrient problem (cause), and one attacks the weeds (effect). Very little has been documented about the former, leaving the field wide open for the latter—and the vacuum is being understandably filled by herbicide manufacturers, because herbicides **do** make weeds disappear.

Lack of documentation on the effects of extracting weeds from the water, plus the thin information available on costs of harvesting, are probably the two most damaging roadblocks to its universal acceptance. However, there seems to be a stirring of curiosity within the "anti-pollution community" to find out what harvesting does do to a lake now that some sophisticated harvesting equipment is being produced.

Weed-Harvesting Research

The Wisconsin Water Resources Center in Madison, Wisc., is presently backing a weed-harvesting research project in Lake Mendota. Professor Grant Cottam, of the Botany



Weeds are transferred from the Harvester automatically to the T-650 Transport, which in turn unloads automatically into the Shore Conveyor (next page).

Department of the University of Wisconsin, is in the third year of a project to analyze the effects of harvesting Eurasian Watermilfoil (*Myriophyllum exalbescens*).

Monthly samples are cut from each of three one-hundred-square-meter areas in University Bay. Comparisons are then tabulated against three unharvested control areas as regards density (stems/acre), stem length, and dry weight. Regrowth has been averaging less than 20 cm. per month and, most promising, "harvesting also produces an initial reduction of density since all the cut stems do not resprout in a month's time."

Since 99% of milfoil revegetation is through resprouting, removal of the weeds from the lake after cutting is a critical and necessary pre-

requisite. This is one reason why it is a Wisconsin state law that all weed-cutting programs must incorporate coincidental weed removal.

Although milfoil shows significant growth retardation after harvesting and a cut stem does not resprout in a month's time, what of other species? What if each cut end sprouts six new branches, as it has been said happens with elodea? One of two things (or a combination of both) can happen: If each sprig grows at the same rate as before harvesting, weed tonnage will be produced at six times the former rate in the same area, greatly reducing per-ton harvesting costs the second time around and accelerating nutrient removal. More likely the growth rate of each sprig will slow somewhat due to natural retardant

effects of shading, crowding, and nutrient removal. However, net weed tonnage grown will still be largely proportional to the nutrients present.

M. E. Grinwald, who has been harvesting weeds for 20 years in Pewaukee Lake in Wisconsin, reports, "A 2000-foot channel, mechanically harvested for four years of heavy weed growth to open a public access to the lake, did **not** require harvesting a fifth year, while the weed growth on either side of the channel was as dense as ever.

A similar situation seems to have occurred in Rib Lake, Wisc., where after two years of harvesting, practically none was required the third year. Water clarity and fishing con-



BEFORE TREATMENT

to control **ALGAE**
USE CUTRINE

(Patent and Trademark)
 USDA Registration No. 8959-1

CUTRINE is the only known algacide that will eliminate **ALL** forms of algae at safe limits to the fish, or the fish food chain, animals, humans, or turf when applied as directed. We offer over 50 years' experience in the surveying, research and chemical treatment of algae and weed-choked bodies of water. Write now for more information or tell us about your problem.

MARINE BIOCHEMISTS, INC.
 P.O. Box 91900
 MILWAUKEE, WISCONSIN 53202

For More Details Circle (106) on Reply Card



ONE WEEK LATER



Attachable wheels connect easily to the H-650 Harvester, making it quickly mobile. It's easily towed with a minimum loss of cutting time.

ditions have reportedly improved considerably."

Using Herbivore Not Feasible

The nutrients in our waters show up visibly in the form of weeds and algae. A great deal of research is being done to locate some herbivore with a yen for aquatic weeds or a water flea with a voracious appetite for algae. But does this not beg the question?

The successful location and transplanting of this manatee, flea, snail, or whatever, only removes the weeds from sight and transforms them into another form of nutrient on the bottom of the lake, or in solution, ready for another weed growth cycle. It might be argued that this is a better alternative than a solid, floating surface of hyacinth. But if we are successful in controlling the hyacinth without controlling the nutrients, nature will immediately fill the vacuum with elodea, milfoil, or worse.

In consideration of the nutrient problem, Professor A. D. Hasler, Director of the University of Wisconsin

Limnology Department, ventured the following in "Natural History" magazine in November, 1968:

"The best that can be said for spraying chemical poisons on lakes in the grip of algae and weeds is that it is usually a futile undertaking. Treating a lake with copper sulfate or other toxic chemicals is no more effective than taking aspirin for a brain tumor. It offers only temporary relief, masking the symptoms of cultural eutrophication. In the long run it makes a lake sicker. Poisoning algae and weeds simply accelerates the natural process of growth, death, and decay, thereby freeing nutrients for another cycle of plant production."

Perhaps the weed problem is so staggeringly massive that we must close our eyes to accelerated cultural eutrophication in exchange for making the weeds go away for awhile. Lacking a potential alternate solution might justify shunting the eutrophication problem into the laps of our children and grandchildren. But harvesting of weeds on a big scale can potentially let us eat

our cake and have it, too: Weed control plus nutrient removal.

Detroit Lakes Program

A three-year program to prove such a double benefit is presently under way at Detroit Lakes, Minn. Funded by \$140,000, a joint venture of local groups, city and county governments, the Department of Interior, and the Minnesota Conservation Department, has purchased a harvester and is harvesting weeds in Lakes Sallie and Melissa, downstream from the Detroit Lakes sewage plant. It is their hope to remove more nutrients in the form of weeds in the summer months than flow into the lake in a year.

Harvesting Costs

In November of 1968, the City of Maitland, Fla., contracted with Aquamarine Corporation to harvest 20 acres of Florida Elodea as a demonstration of the new AQUA-TRIO system:

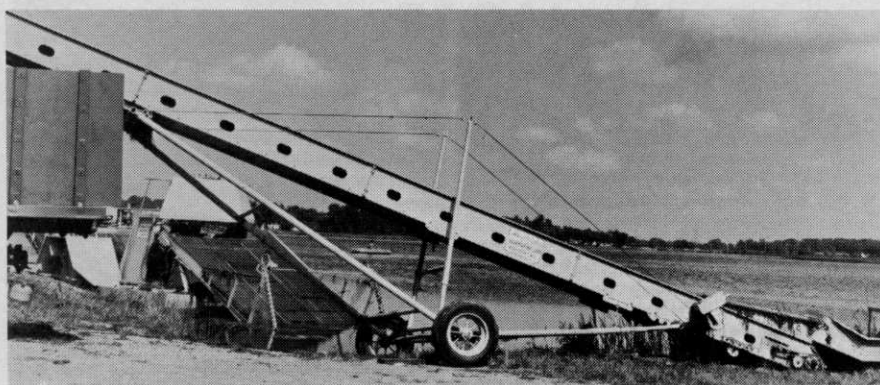
Conditions:

1. One 20-acre solid mat of Florida Elodea (*Hydrilla Verticillata*) 2 feet to 4 feet thick on surface of lake (acreage determined from scaled map of lake).

2. Density of freshly harvested weeds, compacted by their own weight in a 3-foot deep pile. 10 lbs./cu. feet.

3. Harvesting system used: AQUA-TRIO manufactured by Aquamarine Corporation, Waukesha, Wis., consisting of one H-650 Harvester, one T-650 Transport, and one S-650 Shore Conveyor, and one dump truck. Note that paddle wheels were furnished on the T-650 Transport instead of outboard motors shown.

4. Average run for transport



The S-650 Shore Conveyor loads weeds automatically into truck. Remote controls allow conveyor and transport to be operated from one position.



Steering mechanism is part of tow bar assembly and makes handling of Harvester easier.

barge—800 feet.

5. Average run for dump truck—1200 feet.

6. Manpower used: One harvester operator, one transport operator, one truck driver.

7. Harvester capacity of 650 cu. ft. loaded to 500 cu. ft., or 5000-lb./load.

Results are shown in Table I.

Conclusions

Before extrapolating these costs into any other waters or weed infestations, adjustments must be made to allow for changes in labor rates, weight of harvested weed, average weight of unharvested weeds per acre of lake, distance of weeds to shore conveyor site, dump truck haul distance, and design of harvesting equipment.

Significant cost reductions could be expected if Figure 1 is studied closely. Note that peak production was hit after the operators became experienced in the capabilities of the system. On Nov. 23, a rate of 9.3 tons per crew hour was achieved or \$1.69 per ton cost. The balance of the harvesting was largely clean-up work, reflecting lower production figures and higher costs.

TABLE I. Mechanical Harvesting Demonstration, Maitland, Fla.

Date 1968	Transport Loads Harvested	Crew Harvesting Hours **	Loads Per Hour	Tons Per Crew Hour
11/13	9.5	5	1.9	4.8
11/14	11	6	1.8	4.5
11/15	16	7	2.3	5.8
11/16	4	1	2.9	7.3
11/18	12	4.5	2.7	6.8
11/19	4	1.5	2.7	6.8
11/20	6	3	2.0	5.0
11/21	11.5	6	1.9	4.8
11/22	15	6	2.5	6.3
11/23	22	6	3.7	9.3
11/25	2	2	1.0	2.5
11/26	3	2	1.5	3.8
11/27	9	7	1.3	3.3
Total	123	57	2.2 Average	5.5 Average

* Loads and times independently tabulated by K. Downey, City of Maitland.

** Adjusted to account for down time, weather and demonstration delays.

Harvesting Rates:

1. Tonnage harvested: 123 loads at 2½ tons each = 307.5 tons.
2. Weed concentration per acre, average $307.5 \div 20 = 15.4$ T/acre.
3. Man-hours expended in actual harvesting: $57 \times 3 = 171$ man hours.
4. Tons harvested, transported, and trucked away per man hour $307.5 \div 171 = 1.8$ T/man hour.

Costs:

Equipment: AQUA-TRIO	\$44,000.00	
Dump Truck	3,500.00	
	<u>\$47,500.00</u>	
Weekly depreciation on a 10-year basis		\$100.00
Interest: \$47,500.00 @ 10% =		100.00
Labor: 40 hours at \$8.00/crew hour =		320.00
Maintenance and running costs (estimate)		100.00
		<u>Weekly Cost</u>
		\$620.00

Tons harvested, transported, and trucked away per 40-hour week:

40 hrs. \times 3 men \times 1.8 Ton/man hour = 216 Tons/week.

Cost per ton (Lake Maitland) = $\$620/\text{wk.} \div 216 \text{ Ton/wk.} = \$2.87/\text{Ton}$

Cost per acre (Lake Maitland) = $15.4 \text{ Ton/acre} \times 2.87/\text{Ton} = \$44.20/\text{acre}$

For Turf Care!

One of the handiest sprayers a professional can own. Ideal for jobs too small or too irregular for power equipment. Sprays either a 48" wide or 24" wide swath. Unique rubber wheel-pump "milks" out solution as you push the sprayer. Improved model reduces pulsations for smoother spray pattern. Lays down a heavy residual spray. For killing weeds. Fungus control. Insect control. Turf grubs. For fertilizers, too. Safe. Sure.

Write for new catalog



New low cost kit adapts late model wheel pump sprayers for towing behind small tractor.

UNIVERSAL METAL PRODUCTS

Division Leigh Products, Inc., Saranac, Mich. 48881

For More Details Circle (101) on Reply Card

Chemically and Mechanically

How One City Manages Aquatic Weeds

By JAY L. BLANCHARD

Director of Parks and Recreation
Winter Park, Fla.



Roy Campbell shows how a Prentice grapple hook loader, ordinarily used for handling logs, comes in handy during aquatic weed harvesting. He's refueling a harvester.

WINTER PARK, FLA., a suburban community of 27,000 residents, is engrossed in a major lake weed program that is costing thousands of dollars. It is unique for a city, let alone the Parks and Recreation Department, to be involved in lake weed management.

We have 14 lakes part or wholly within the city. These lakes represent 800 acres of surface water and more than 20 miles of shoreline. The lakes, which vary in depth from 30 to 85 feet, are surrounded by 417 homeowners, and are used by thousands of swimmers, boat owners and water skiers.

We are not troubled by pollution per se, but by eutrophication, caused by society and its affluence. In this enriched water (which is not harmful for recreational use, nor is it devoid of oxygen), plant material such as submerged aquatic weeds grow abundantly. This is the problem we are trying to combat by both mechanical and chemical means.

The problem has been with us for quite some time but not of the magnitude that it is today nor of the same type of weeds. Earlier in 1963, the major weeds in the lakes were:

- Vallisneria americana*—Eelgrass
- Najas gaadalupensis*—Southern Naiad
- Eichhornia crassipes*—Water Hyacinth

Today the lakes have changed in their process of eutrophication to contain almost entirely *Hydrilla verticillata*—Florida Elodea. To ob-

serve our three major lakes—Lake Virginia, Lake Osceola, and Lake Maitland—would indeed be a study in lake ecology. Lake Virginia has changed from *Vallisneria* to almost all *Hydrilla* in the past two years. Lake Osceola has both *Vallisneria* and *Hydrilla* in abundance. Lake Maitland now has many patches of *Hydrilla* and still contains a large amount of *Vallisneria*.

Active Program Began in 1963

The City of Winter Park recognizes this problem of lake eutrophication as one that must be managed to preserve our lakes for their economic and aesthetic value. We have been aware of this problem since before 1963, when we began an active program of lake weed management.

Under the guidance of Robert D. Blackburn of the Crops Research Division, Agricultural Research Service, U.S. Department of Agriculture, test plots and programs were set up and followed to the point that we do not have a problem with the earlier listed weeds, such as eel grass, water hyacinth, or southern naiad.

In the scientific research area of our program, the City of Winter Park is involved in an aquatic weed research group headed by C. W. Sheffield of the Orange County Water Conservation Department and Rollins College. We are also involved at this time in individual research with the 3M Corporation of St. Paul, Minn., and with Robert D. Blackburn.

Mechanical Harvesters Bought

In October of 1963, the City purchased from the Aquatic Controls Corporation of Waukesha, Wis., an amphibious, self-propelled harvester and an amphibious, self-propelled barge, to help with the aquatic weed problem. This unit was primarily for the harvesting of eel grass.

The harvester and barge work together, requiring an operator each. The harvester cuts the aquatic weeds from 12 inches to 4½ feet in depth. This first harvester is still in operation. In 1966 it removed 1,149 tons of *Vallisneria* and in 1967 it removed 1,585 tons.

With the advent of the new weed, *Hydrilla*, and its rampant growth, the city has embarked upon a three-point program: applied research, scientific or basic research, and operational methods.

Lakes Board Formed

To aid in the development of the applied research and operational methods, the city established a Lakes and Waterways Board in January of 1968, with Robert S. Witherell as chairman. This board is composed of active, enthusiastic lake-front homeowners who wish to save our lakes.

Through the action of the Lakes and Waterways Board, we purchased in January a large Scavenger from the Aquatics Control Corporation of Waukesha, Wis., and in August we purchased a second large Scavenger. These new units are one-man operated and combine the operation of the older harvester in that they act



The Prentice loader will transfer a harvester load of weeds to a truck in about three 1,000-lb. bites. In the foreground, Andy Price, Pennwalt Corporation aquatic biologist, visits with Jay Blanchard, Winter Park's director of parks and recreation.

as a cutter and barge in one piece.

They cut aquatic weeds to a depth of 5 feet and unload the harvested weeds on the shore by reversing its process. The three harvesters augmented with a hydraulic grapple loader to load dump trucks, 4 barges, 2 boats with sprayers, and the dump trucks give us more than \$135,000 in Lake Weed Management inventory.

With this expanded inventory we harvested last year 9,610 tons of Hydrilla from the lakes, compared with 2,734 tons in 1966 and 1967.

Through August of this year, we have harvested 6,665 tons with three months to go.

Herbicide Usage

Along the herbicidal lines of the program, we have in the past 2½ years spread a total of 17½ tons of Hydrothol 191 at a cost of \$14,425.

In the past we have been treating the shoreline on a hit or miss basis with the individual homeowner purchasing the herbicide and the city spreading it for them. This way many areas have been left untreated.

We incorporated a trial program in Lake Osceola in 1968 to herbicide the lake perimeter by the volunteer cooperation of the individual lake-front homeowners. This was accomplished at a cost of \$5,300 per application with 2 more applications following in December 1968 and September 1969 as the need arose.

In the 1968 budget year, we expended in labor, operational expense, herbicides, and research more than \$42,632, along with \$92,000 in capital purchases, giving a total of \$134,-

632 for the year. This compares with \$18,160 for 1966 and \$25,705 for 1967.

In this year's budget, we formed a Lakes Division under the Parks and Recreation Department and this budget is in excess of \$100,000, and by the time some new equipment is added it will approach \$180,000.

A city-wide one-mil levy, effective Nov. 1, will bring in money specifically earmarked for our aquatic weed management program.

Operational Approach

We propose not to cut all the weeds in each lake, but to construct islands, or leave islands of aquatic weeds. These will be marked off by floating buoys for all to easily distinguish. These islands will be in various places in the lakes, keeping in mind the boats, water skiing, fishing needs, scenic boat routes, and crew racing lanes.

The islands will be left so there will be a balance between the lake weeds and the excess nutrients. If we tried to remove all the weeds, we would have a good chance of the

lakes progressing into another class of eutrophication.

In herbicide management, we treated the entire built-up areas of three lakes out to 35 feet.

To help with this cost, the City either procured the herbicides and applied them at a pro rate per front foot of beach area or subcontracted with Pennwalt or 3M Company.

We also treated only 300 to 400 feet of beach at a time and skipped 300 to 400 feet in order to give fish the chance to leave the area temporarily. After a few days, we returned and treated the skipped 300 to 400 feet.

Along with this treatment, we marked the treated areas with signs to notify the residents so they would not inadvertently use the lake water for irrigation for about 7 days.

The present method of herbicide treatment with liquid Hydrothol 191 at 4 ppm costs the homeowners \$33 per 100-foot of beach front.

Herbiciding has proved very effective in the shallower water but is far from being permanent. It must be repeated as is the mechanical operation. We feel both methods have a valuable part in our lake weed management program.

Cost-Sharing Needed

The City of Winter Park does not feel it can adequately tax just the lake-front homeowners for the lake weed problem.

We feel that because of the value of the chain of lakes to the city as a whole it is a community problem, a county problem, a state problem, and it is a federal problem.

Therefore we would like to see the State of Florida and the federal government help municipalities like Winter Park with a 50-50 matching fund program as well as other bodies or agencies. In this manner those cities, counties, areas, districts, and agencies that are trying to combat the problem will get the assistance they need.

HYACINTH CONTROL SOCIETY

dedicated to the control of noxious aquatic weeds

Invites YOU to join TODAY

MEMBERSHIP: \$8

Annual Meeting

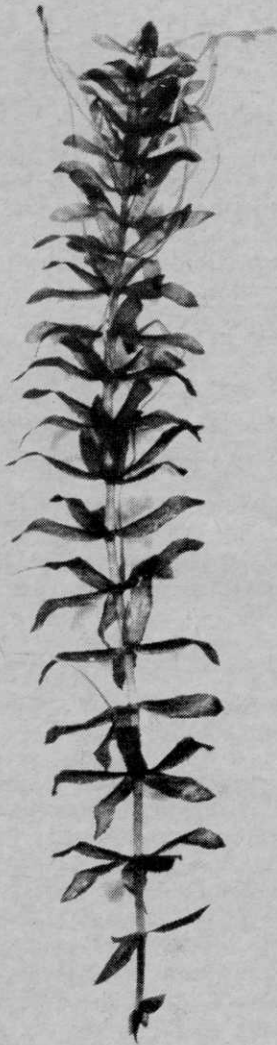
Journals are available covering 10 years of aquatic weed control experience both in the field and via research

Stan Abramson, Sec. Treasurer

7501 Paradise Place, Tampa, Florida 33619

For More Details Circle (109) on Reply Card

Hydrilla Verticillata



By ROBERT D. BLACKBURN and
LYLE W. WELDON*

* Botanist and Research Agronomist, Crops Research Division, Agricultural Research Service, U. S. Department of Agriculture, Fort Lauderdale, Fla.

HYDRILLA (*Hydrilla verticillata* Casp.) was first discovered in the United States near Miami, Fla., in 1960. It has dispersed over the entire state and into Georgia and Alabama since its introduction.

Largest infestations in Florida are located along the southeast coast in the slow-flowing canals and conservation areas, in the central area in the clear water lakes, and in the clear water springs and rivers along the central west coast.

Since its introduction, the plant has infested more than 60,000 acres of water in the southeastern United States.

Growth of submersed vegetation is a common occurrence in Florida. Any body of water will be choked with aquatic weeds in a relatively short period. Effective control is not only necessary but essential if the water is going to be used for fish production, recreation or irrigation.

Extensive research under controlled as well as field conditions has shown that there is no universal panacea for controlling submersed aquatic weeds. Control methods must be based on the aquatic species and on the environmental conditions.

It is also necessary to take into consideration the season and the stage of development of the weed. However, it is not logical to expect the same method of control will give even approximately comparable results on all aquatic weeds or under all various climatic and soil conditions.

It is important that the species causing damage be studied intensively from the antecological and the synecological aspects. Knowledge of the plant's habitat, relation to soil and climate, method of dissemination, special plant and animal enemies, power of variability and actual distribution is necessary before work on weed control is taken up.

Research on hydrilla was initiated on a very limited scale at Fort Lauderdale, Fla., in 1962. Early research was conducted under the misconception that hydrilla was

elodea (*Elodea canadensis* Michx.). Proper identification was not obtained until 1965. The realization that a new weed species had been introduced into the United States gave substantial support to the need for additional research on physiology, ecology and control.

In subtropical areas it is a very difficult task to check the growth of aquatic vegetation. There are many chemicals which have been used as aquatic herbicides in the United States. It is not advisable for the aquatic weed scientist to recommend these aquatic herbicides for the control of a plant that he knows little about or about which there is little information available in world literature. This investigation was designed to evaluate herbicides and herbicidal combinations on hydrilla in laboratory and field conditions.

Identification of Hydrilla

Hydrilla is a submersed vascular aquatic plant, rooted to the bottom with long branching stems. Lower leaves are opposite and small, whereas the medium and upper leaves are in whorls of fours and eights.

Leaves are verticillate and narrowly lanceolate. Flowers arise singularly from the spathe, and are found at or near the surface and from near the growing tip. The entire flower is inconspicuous and measures no more than four to five millimeters across the tip of a threadlike pedicel.

Seed formation is poor if it occurs at all. Reproduction is both vegetatively and by fruits. Broken shoots develop into new plants which attach themselves in the hydrosoil by fine filiform adventitious roots. Plants also produce subterranean shoots with swollen tips, densely clothed with fleshy, acute or acuminate scale-like leaves which are termed "stem tubers." An additional propagating structure, "the turion," is produced by hydrilla.

In taxonomy keys, elodea and hydrilla seem easily identifiable, but the actual plants are very difficult

to distinguish. Hydrilla is referred to as an Old World genus and elodea as a New World genus. Vegetative characteristics that may be used to distinguish between the two genres are the copiously toothed leaves of hydrilla, although elodea may often have similar teeth. The plants must be in flower to be positive of their identification.

This plant is found in Russia, Prussia, Australia, Central Africa, East Asia, India and many other areas of the world. Only recently has it become established in Florida, Southern Georgia and Alabama.

Material and Methods

Still-water laboratory experiments were conducted in a temperature and light intensity controlled room to determine the effect of various herbicides and herbicidal combinations of hydrilla. Herbicides were evaluated at concentrations of 1, 5 and 10 ppmw. The visual herbicidal effect was recorded at 2, 4 and 6 weeks after treatment. A rating scale of 0 - 100 was used (0 = no effect, 100 = complete kill). Copper sulfate and 2,4-D were used as standard treatments. Technical and formulated samples of herbicides were furnished by various chemical companies. Herbicidal combinations were prepared in the laboratory.

Herbicides that showed outstanding herbicidal activity in the laboratory were further evaluated in field plots. Canals, conservation areas, and lakes with uniform infestations of hydrilla were selected as the experimental sites. Plot sizes varied depending on the size of the weed infestation in the canal or lake and the amount of herbicide made available by the company. All plots were replicated three times in each experiment. The field experiments were located along the east coast of Florida from Orlando to Homestead.

Herbicides were injected 4 to 6 in. below the water surface with a single $\frac{3}{4}$ in. off-center nozzle at an operating pressure of 125 psi. An airboat was used to apply the herbicide evenly through the plot. The desired amount of herbicide to be

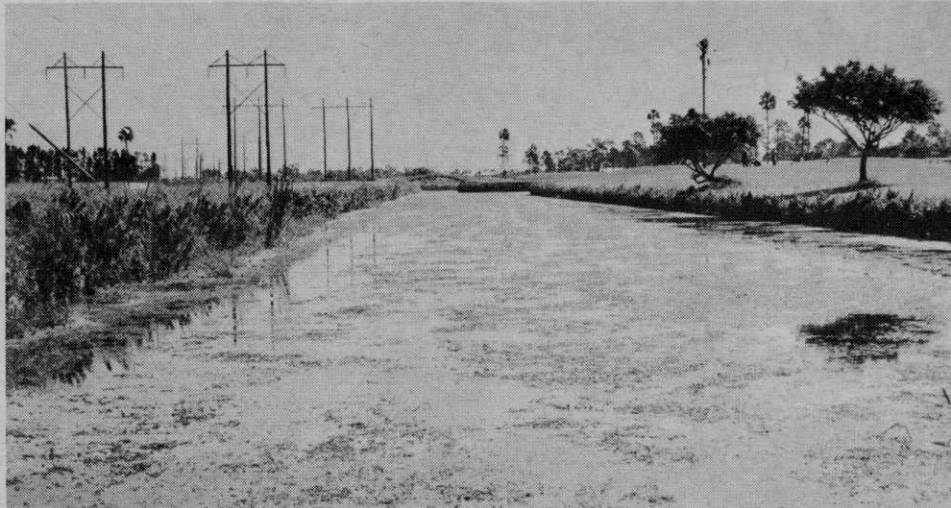


Fig. 1. A flood control canal at time of treatment (top) and the same canal two weeks after treatment with 3 ppmw of the amine salt of endothall for control of hydrilla (bottom).

Table 1. Effectiveness of selected herbicides on hydrilla in laboratory tests.

Chemical	Conc. ppmw	Percent Control		
		Weeks after treatment		
		2	4	6
2,4-D	1	0	0	0
	5	5	12	15
	10	8	23	30
2,4-D (BE ester)	1	0	0	0
	5	10	30	68
	10	25	55	83
2,4-D (Tertiary Amine)	1	20	33	55
	5	100	100	100
	10	100	100	100
Silvex (Potassium salt)	1	0	0	0
	5	7	15	28
	10	10	38	50
Silvex (10 ester)	1	10	22	35
	5	25	55	68
	10	45	75	95
Acrolein	1	60	75	10
	5	100	100	100
	10	100	100	100
Endothall	1	45	68	70
	5	75	100	100
	10	98	100	100
Endothall (dihydroxy aluminum salt)	1	30	85	93
	5	75	100	100
	10	87	100	100
Endothall (monococamine salt)	1	90	100	100
	5	100	100	100
	10	100	100	100
Endothall (dicocoamine salt)	1	97	100	100
	5	100	100	100
	10	100	100	100
Simazine	1	0	0	0
	5	7	17	45
	10	18	38	68
Ametryne	1	0	0	0
	5	47	48	80
	10	65	98	100
Diquat	1	85	100	100
	5	100	100	100
	10	100	100	100
Paraquat	1	70	98	100
	5	100	100	100
	10	100	100	100
Dichlobenil	1	0	0	0
	5	0	3	15
	10	20	35	47
Fenac	1	10	25	30
	5	22	75	95
	10	38	95	100
Diuron	1	2	38	53
	5	10	87	100
	10	17	95	100
Bromocil	1	7	10	15
	5	17	58	98
	10	30	85	100
G-14260	1	30	60	95
	5	40	75	100
	10	55	95	100
Diquat + endothall	0.5 + 0.5	37	100	100
	2.5 + 2.5	100	100	100
	5 + 5	100	100	100
CuSO ₄	1	17	18	25
	5	38	55	68
	10	45	80	100
Chloroxuron	1	0	0	0
	5	45	85	100
	10	70	100	100
Sodium arsenite	1	30	45	50
	5	93	100	100
	10	100	100	100
Amitrole-T	1	0	0	0
	5	0	0	0
	10	5	10	10
Cupric chloride	1	30	52	53
	5	40	80	93
	10	70	100	100
Aromatic solvents	10	5	40	60
	20	50	100	100
	40	95	100	100

applied in each plot was mixed with enough water to equal 150 gpa.

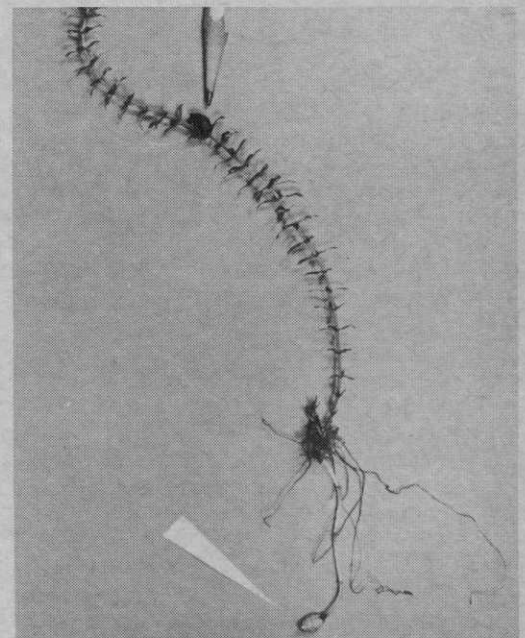
Visual evaluations were made at 2 and 4 weeks and at monthly intervals thereafter until the plot had regrown. A rating scale of 0 — 100 was used (0 = no effect, 100 = complete kill). Percentage of regrowth of the plants in the plot was also recorded at each evaluation.

Laboratory Evaluation

Results of the evaluation of 26 herbicides selected from more than 800 different herbicides evaluated on hydrilla in still-water tests are shown in Table 1. Many of the herbicides evaluated were those presently used in aquatic weed control. Less than 5% of the herbicide exhibited sufficient activity to be considered for further evaluation. The laboratory evaluations have served as a fast means of eliminating the herbicides inactive on this plant.

The similarity in appearance of hydrilla to elodea and egeria is not true when comparing methods of control. The plant is very resistant to most aquatic herbicides. To determine if the effectiveness of herbicides could be increased, evaluations were made using a combination of various herbicides. The results of three commonly used aquatic herbicides applied alone and in combinations, selected from more than 75 different combinations, are

As many as 100 turions, either axillary (pencil) or subterranean (arrow), may be produced per square foot in one growing season.



shown in Table 2. The addition of low concentrations of copper sulfate to diquat and endothall greatly increase the effectiveness of these two herbicides on hydrilla. Diquat plus copper sulfate was the most effective combination evaluated.

Field Evaluation

During the past six years, 37 different herbicides have been evaluated in small field-plot experiments on hydrilla. The results of 15 of these herbicides are shown in Table 3. The herbicides were not as active in the field as in the laboratory. It was necessary to increase the herbicidal concentration 4 to 8 times in field-plot experiments to obtain control equivalent to the laboratory. This was expected because of the dilution of herbicide out of the treated plots and other environmental factors which would not affect laboratory evaluations.

The most effective herbicides evaluated on hydrilla were acrolein, endothall cocoamine salts, aromatic solvents and copper sulfate. However, all of these herbicides are toxic to fish and other aquatic fauna at the concentrations needed to kill hydrilla. Diquat and paraquat were effective on hydrilla at concentrations of 2 ppmw, but the cost of applying this concentration would make their use prohibitive. The potassium salt of endothall was not as effective as the dihydroxy aluminum salt.

Combinations of herbicides have been very effective in other types of weed control. Laboratory results

Table 2. Effectiveness of diquat, copper sulfate, and endothall alone and in combination on hydrilla in laboratory tests.

Herbicide	Conc. ppmw	Percent Control		
		Weeks after treatment		
		2	4	6
Diquat	0.1	0	10	27
	0.25	17	35	45
	0.5	35	75	80
	0.75	37	80	95
	1.0	45	90	100
Diquat + CuSO ₄	0.1 + 0.4	15	35	55
	0.25 + 1	37	55	87
	0.25 + 2	45	63	90
	0.25 + 4	48	75	90
	0.25 + 8	50	78	95
	0.5 + 1	37	80	98
	0.5 + 2	45	90	100
	0.5 + 4	50	97	100
	1 + 1	58	100	100
	1 + 2	60	100	100
	1 + 4	70	100	100
1 + 8	78	100	100	
CuSO ₄	1	0	3	10
	5	27	47	65
	10	68	80	95
	20	85	100	100
Endothall	1	10	35	57
	2	50	68	85
	4	70	93	100
	8	90	100	100
Endothall + CuSO ₄	2 + 1	50	75	80
	2 + 2	50	80	87
	2 + 4	55	80	93
	2 + 8	70	87	98
	2 + 16	75	95	100
	4 + 1	80	97	100
	4 + 2	85	100	100
	4 + 4	85	100	100
	4 + 8	90	100	100
	4 + 16	96	100	100
Diquat + endothall	0.25 + 0.25	15	25	37
	0.5 + 0.5	30	70	75
	0.75 + 0.75	45	80	99
	1 + 1	55	95	100
	2 + 2	85	100	100



Fig. 2. A small lake at time of treatment (left) and the same lake (right) three months after treatment with 1 ppmw of diquat plus 4 ppmw of copper sulfate for control of hydrilla.

Table 3. Effectiveness of 15 herbicides evaluated on hydrilla in field plot tests, expressed as percent reduction in original weed population.

Herbicide	Conc. ppmw	Percent reduction					
		Weeks after treatment					
		2	4	8	12	16	20
Diquat	1	45	65	70	55	15	0
	2	55	85	100	100	98	75
Paraquat	1	40	70	75	60	35	10
	2	50	80	100	100	100	80
Endothall (Potassium salt)	1	10	15	0	0	0	0
	2	10	17	5	0	0	0
	3	15	20	10	0	0	0
	4	20	25	10	0	0	0
	8	25	85	75	60	20	0
	16	55	100	100	96	75	55
Endothall (monococoamine salt)	1	65	85	60	40	5	0
	2	90	98	87	55	25	5
	3	98	100	95	80	50	15
	4	100	100	100	98	65	35
Endothall (dicocoamine salt)	1	75	93	70	50	10	0
	2	100	100	95	60	17	0
	3	100	100	100	85	65	20
	4	100	100	100	100	70	30
Endothall (dihydroxy aluminum salt)	2	38	72	75	50	35	20
	4	50	85	95	95	70	35
2,4-D (BE ester)	5	0	10	10	0	0	0
	10	15	30	15	5	0	0
	20	35	55	70	45	15	0
2,4-D (Tertiary amine)	2.5	35	45	20	5	0	0
	5	50	60	45	15	0	0
	10	65	85	70	50	15	0
Silvex (10 ester)	5	10	20	5	0	0	0
	10	25	40	10	0	0	0
Acrolein	4	80	90	78	50	25	0
	5	87	95	85	50	25	0
	7	98	100	95	65	35	0
	10	100	100	98	75	40	10
Aromatic solvents	10	25	15	0	0	0	0
	40	60	45	15	0	0	0
	80	100	100	75	70	25	5
	100	100	100	80	70	30	10
Fenac	2	0	15	20	10	0	0
	4	0	25	37	45	17	5
Dichlobenil	2	0	10	10	0	0	0
	4	0	10	20	10	0	0
Copper sulfate	10	10	25	10	0	0	0
	20	45	75	60	25	0	0
	40	80	85	70	40	15	0
	80	97	98	92	60	40	5
Ametryne	2.5	20	35	40	25	0	0
	5	35	50	65	45	40	25

Table 4. Effectiveness of diquat and copper sulfate applied alone and in combination on hydrilla in field plot tests, expressed as percent reduction in original weed population.

Herbicide	Conc. ppmw	Percent reduction					
		Weeks after treatment					
		2	4	8	12	16	20
Diquat	0.5	20	45	40	10	0	0
	1	50	75	60	35	10	0
	2	75	95	100	100	90	65
Copper sulfate	5	10	15	0	0	0	0
	10	13	25	40	25	0	0
	20	40	70	50	40	15	0
	40	75	85	80	50	25	10
	80	98	100	100	98	75	35
Diquat + copper sulfate	0.5 + 1	25	50	55	40	10	0
	0.5 + 2	30	60	55	40	15	0
	0.5 + 4	50	75	70	65	50	15
	0.5 + 8	50	75	75	65	55	20
	0.5 + 16	65	80	85	80	75	35
	1 + 1	65	90	90	80	55	40
	1 + 2	65	95	95	90	70	50
	1 + 4	75	100	100	100	100	90
	1 + 8	80	100	100	100	100	98
	1 + 16	90	100	100	100	100	100

had shown that a combination of diquat plus low concentrations of copper sulfate was very effective on hydrilla. The results of these combinations in comparison with each applied alone in field plots is shown in Table 4. The combinations of the copper sulfate plus diquat controlled hydrilla at economical and nontoxic-to-fish concentrations.

Diquat is widely used as an aquatic herbicide but has not been very effective on hydrilla. Copper sulfate is used as an algicide and sometimes on submersed weeds but it is usually not favored for use in fishery waters because of its toxicity at herbicidal concentrations, and its ineffectiveness at reasonable concentrations in alkaline waters. Copper sulfate will control hydrilla but it requires concentrations of 40 to 80 ppmw. The combinations of low concentrations of these two herbicides has resulted in a very effective control for hydrilla.

Acrolein and the monococoamine salt of endothall have been used successfully in operational aquatic control programs. Some fish toxicity has been noted in most of these treatments. Toxicity can be greatly reduced if the herbicide is applied at several different times. Caution should be taken not to apply enough herbicide at any one time to build up a fish toxic concentration in the entire lake or canal. Fish have been noted to swim out of the area during herbicidal application. Acrolein should be applied at 7 ppmw and the cocoamine salt of endothall at 3 ppmw. These herbicides may also be used in flowing waters.

Diquat + copper sulfate is being used operationally for control of hydrilla in nonflowing waters. Concentrations of 1 ppmw diquat + 4 ppmw copper sulfate have given excellent control of hydrilla and other submersed species. The two herbicides must be mixed together in the spray tank before application. Control has not been as effective when applying the two herbicides separately. This combination is very corrosive to metal. Fiberglass, plastic or stainless steel spray equipment should be used when applying the herbicidal combination. This combination should not be applied with conventional aerial spraying equipment. When applied at the recommended rate the combination is not toxic to fish. When treating large areas it may be advisable to treat at two different intervals to reduce the biological oxygen demand caused by decomposing vegetation in the body of water.

Meeting Dates

Dates for this column need to reach the editor's desk by the 10th of the month preceding the date of publication.

New York State Federation of Golf Course Superintendents, Annual Turf Conference, Concord Hotel, Kiamesha Lake, N.Y., Oct. 5-7.

Arizona Agricultural Chemicals Association, 22nd Annual Convention, Safari Hotel, Scottsdale, Ariz., Oct. 8-9.

Central Plains Turf Conference, Kansas State University, Ramada Inn, Manhattan, Kan., Oct. 15-17.

Texas A & M University, College of Agriculture, Fourth Annual Industrial Weed Control Conference, College Station, Texas, Oct. 20-22.

North Dakota Nurserymen's Association, Annual Convention and Trade Show, Fargo, N.D., Nov. 7-8.

National Fertilizer Solutions Association, National Convention and Equipment Exhibition, Cincinnati Convention Center, Cincinnati, Ohio, Nov. 9-13.

Ohio Turfgrass Conference and Show, Sheraton-Cleveland Hotel, Cleveland, Ohio, Dec. 1-3.

Oklahoma Turfgrass Research Foundation, Inc., Conference and Show, Oklahoma State University Student Union, Stillwater, Okla., Dec. 3-5.

National Aerial Applicators Association, Third Annual Conference, Roosevelt Hotel, New Orleans, La., Dec. 7-10.

Louisiana Turfgrass Conference at the Ira Nelson Horticulture Center, University of Southwestern Louisiana, Lafayette, Dec. 9-10.

24th Annual North Central Weed Control Conference, Sioux Falls, S.D., Dec. 9-11.

22nd Annual Helicopter Association of America convention at the Stardust Hotel, Las Vegas, Nev., Jan. 11-14.

22nd California Weed Conference at the Grand Hotel, Anaheim, Calif., Jan. 19, 20, 21.

Associated Landscape Contractors of America, Statler-Hilton, Orlando, Fla., Jan. 19-23.

Annual Virginia Turfgrass Conference, Sheraton Motor Inn, Fredericksburg, Va., Jan. 27-28.

40th Annual Michigan Turfgrass Conference at the Kellogg Center of Michigan State University, East Lansing, Jan. 27-28.

Kansas City's Elm Forest Suffering Triple Blows

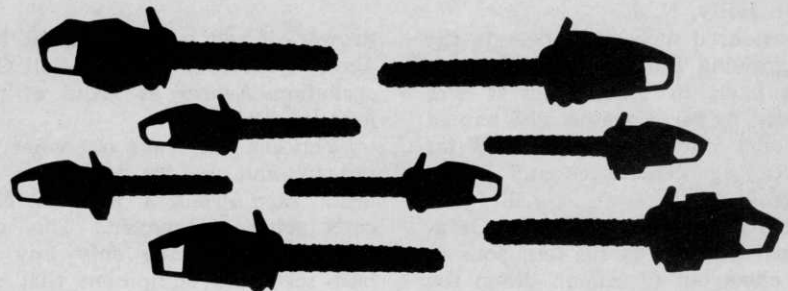
Kansas City's elm forest could be saved if a cure for Dutch Elm disease can be found within the next 10 years, reports The Kansas City Star.

At the present loss rate, the newspaper states, it will take another 24 years before all of the elms are wiped out.

However, this year's high winds, heavy rains and crimped budget have combined to speed up the loss rate.

About 400 trees have been blown down and another 3,000 have suffered damage, says The Star. The 1969 loss is expected to be about what it was last year — some 4,000 trees. But the loss is worse because the park department's reforestation program was slashed as the budget was trimmed earlier this year.

While the park department will still be able to draw on its nursery stock to replace ancient elms with saplings along boulevards and in parks, The Star says, all the park department can do in residential areas is to remove the dead trunks, "leaving a gaping hole where a proud elm once stood."



the replacement chain for all chain saws...

SABRE

the economical, long life saw chain. SABRE is the tough and hungry chain that's built for rugged use on any type or size of tree. It's so sturdy, it carries a no-time-limit guarantee and so economical that it's your

best saw chain value. See your dealer for Sabre saw chain in various pitches from 1/4" to 3/4", the most complete range of saw chain sizes.

USE THESE SABRE ACCESSORIES



SABRE SAW CHAIN INC.

840 Seneca St., P.O. Box 341, Lewiston, N.Y., 14092

the saw chain people

For More Details Circle (102) on Reply Card



Frank Cacavio is general manager of this pioneering business that began with its founder delivering sod to New York City more than 40 years ago.

ANYTHING that saves time, labor or effort finds a very welcome reception at Mercer Sod, Inc. A family owned sod-growing business, Mercer has its business offices in Trenton, N. J., and its 500-acre farm in Mt. Holly, N. J.

Considered to be a pioneer in the sod growing industry, the business dates back to 1928 when it was founded by Mr. Cacavio who hauled field sod into New York City for landscaping, cemeteries and building grounds.

During the years, the elder Cacavio was assisted by his four sons as they came out of school. When the elder Cacavio retired, the four sons took over active management of the business. Under their guidance, Mercer Sod has become a leading

... Since 1928

By PHIL LANCE
Philadelphia, Pa.

grower of sod in the state of New Jersey—winning the 1968 Soil Conservation Award as proof of progressive attitude.

"You can only take out what you put in, and we try to put in the best," says Frank J. Cacavio, Mercer's general manager. "This goes for everything. We only buy the best seed and equipment that will help us raise the best sod.

"This helped us to build our reputation for cultivated sod; not the regular field-grown sod but sod that

the best technology can raise. As a result, we have earned an enviable reputation for quality sod and service.

"From a 138-acre start, we now cultivate more than 500 acres. We intend to farm more. By moving in the slow but sure direction, our growth has been a steady and successful one."

With the exception of 10 acres of Penncross and 10 acres of Fylking bluegrass, the entire acreage is about evenly divided between New Jersey certified Merion, Merion mix and Kentucky Fescue. The certified Merion is under the constant supervision of the New Jersey Department of Agriculture.

Quick Action on Weeds

The seed is laboratory tested, the fields checked before, during and after cutting. Effective control of poa annua, bent and other objectionable weeds are under continuous supervision.

"We have our share of problems with broad leaf, dandelions and dog fennel as do other sod growers," says Cacavio. "However, we are able to control the growth of these weeds."

"As soon as any sign of these



A sub-soiler is used to counteract compaction of heavy equipment.



Broadcasting of corn is about to begin. When the corn is three feet high, it will be plowed under and the ground seeded to grass.

weeds develop, we spray with a mixture of one quart of 2,4-D and a half pint of Banvel D with 200 gallons of water. We spray an acre with this solution.

"The tank on our John Bean sprayer has been calibrated to cover 11 acres. We have been highly successful in controlling this problem with this application."

Seeding starts as early as weather permits, with cultivation and harvesting continuing until the last day that weather permits. Harvested sod is from 18 months to 2 years old and is cut in $\frac{3}{4}$ inch thickness. About 20 persons are employed.

Landscaping Part of Business

Mercer Sod, Inc., is one part of the business. Mercer Contracting is another. The latter concerns itself with landscaping. Dominic P. and Victor J. Cacavio are in charge of sales. Jim is in charge of administration and Frank is the General Manager. Each brother specializes in his own area. However, activities are interrelated so that there is continuing supervision and management through all levels of the business.

"We are firm believers in equipment that will help us do a job better and faster," says the general manager. "We have equipped our trucks, for example, with Side-O-Matic mechanical unloaders. This has saved us considerable time and labor.

"We have recently installed four

soil irrigation pumps and have installed more than 6,000 square feet of underground mains. This has eliminated considerable hand labor. We have a number of Nunes sod harvesters, which has eliminated hand picking.

"Our fields have been designed to collect rainfall water into our ponds. We have four that are about 400 feet by 80 feet by 20 feet deep."

To complete the irrigation of the farms, there are two 1,700-foot wells.

Sod growing equipment includes John Bean sprayers, Massey Ferguson and International Harvester tractors, Massey Ferguson disk harrows, John Bean roll harrows, Massey Ferguson plows, Everson's land levelers, Ryan sod cutters and Nunes harvesters, and Ryan sod lifters.

Mercer Sod has its own maintenance shop and all equipment is traded in on a four- to five-year

basis. It also has three Massey Ferguson and Ford fork lifts.

Fields are disk-harrowed after the removal of sod. Then a roller harrow moves over the field and 500 pounds of 10-10-10 fertilizer is spread over each acre. Three bushels of corn are broadcast over each acre. When the corn is three feet high, it's plowed under to introduce organic material into the sod. A John Deere sub-soiler runs two feet under the surface to break loose compaction created by the heavy equipment.

Soil analysis is used to determine the proper recommendations for fertilization.

Record-Keeping Vital

Cacavio is a stickler for accurate records. A map designates the entire Mercer Sod farm. The entire farm is sectionalized numerically.

Every operation that takes place in any field is immediately recorded. Whether it is seeded, fertilized, watered or harvested, the date that the activity took place, what the activity was and further remarks are noted for the particular field.

"We have our finger on the pulse of our entire 500-acre farm," says Cacavio. "We know when and what has taken place on every acre. By maintaining accurate records, we can keep pace with our cultivation program. We don't believe in any guess work. We know what we are doing and we do it. This is the reason for our quality sod and productivity."

A former president of the New Jersey Sod Grower's Association and a member of the American Sod Producers Association, Cacavio is quite optimistic about the future.

He feels that there is a greater need for cooperation between sod growers if improved legislation and ethics in competition are to be maintained. He feels there is a tremendous future for sod growers; and through a more cooperative spirit and technological advantages, greater financial gains can be enjoyed.

AMERICAN SOD PRODUCERS ASSOCIATION

invites your participation

If you are a Sod Grower you should be
a member of ASPA.

Keep in touch with progress.
Allied Industries are welcome.

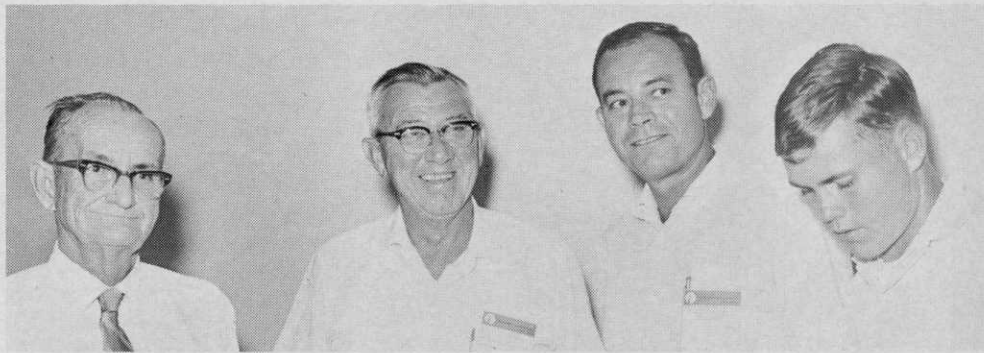
For More Details Circle (110) on Reply Card

Turf Beauty Key: Irrigation

How to get maximum use and yet maintain the beauty of turf was utmost in the minds of some 75 commercial representatives and turf growers attending the 10th annual turfgrass short course in September at Auburn University, Auburn, Ga.

One aid in accomplishing this is through automatic irrigation, said Dick Hoffman, district sales manager, Febco, Inc., West Palm Beach, Fla. Hoffman pointed out that the savings in labor costs alone would go a long way in paying for the system, not discounting the fact that timeliness, convenience, uniform coverage and other factors are to be considered in installing an automatic system.

Diseases often steal the beauty of the turf especially on golf greens.



Participants in the turfgrass short course at Auburn University included: From the left, Albert R. Mellon, Decatur parks and recreation department; Harold Thornhill, specialist in ornamental horticulture, Auburn Cooperative Extension Service; R. I. Collingsworth, NASA management agronomist, Huntsville; Wayne Milligan, Decatur parks and recreation department . . .

In his presentation, "Dew Is Not Dew," Tom Mascaro, divisional vice-president, Kearney-National, Inc., New York, said that many times exudation of plants was mistaken for dew. This, he said, always presents a problem in that spores germinate

and grow very rapidly in this material when compared to normal water.

He recommended early morning watering as one means of controlling diseases. Also, syringing to dilute the exudate material is helpful. In

Insect Report

WTT's compilation of insect problems occurring in turfgrasses, trees, and ornamentals throughout the country.



TURF INSECTS

BUFFALO GRASS WEBWORM (*Surattha indentella*)

KANSAS: Larvae found in buffalograss fairway on golf course in Harper County. This is a new country record.

FALL ARMYWORM (*Spodoptera frugiperda*)

ALABAMA: Small to half-grown larvae 5 per square foot of zoysia and bermudagrass on lawn at Auburn, Lee County. SOUTH CAROLINA: On coastal bermudagrass in Beaufort and Hampton counties.

INSECTS OF ORNAMENTALS

BAGWORM (*Thyridopteryx ephemeraeformis*)

TEXAS: Heavy; damage excessive to juniper and other shrubs in Wilbarger County. IOWA: Fully developed at Mt. Pleasant, Henry County. VIRGINIA: Heavy on junipers in Middlesex County.

RED-HUMPED CATERPILLAR (*Schizura concinna*)

VIRGINIA: Completely defoliated dogwood in Rappahannock County.

TREE INSECTS

ASIATIC OAK WEEVIL (*Cyrtopistomus castaneus*)

MISSOURI: Adults collected in Shannon, Dent, Crawford, Ripley, and Oregon counties. All are new county records. OHIO: Light, 1-2 per square yard of foliage,

on black oaks in Monroe and Morgan counties for new records.

ELM LEAF BEETLE (*Pyrrhalta luteola*)

MISSISSIPPI: Damage heavy to Chinese elms in Pontotoc County for new county record. NEW MEXICO: More severe at Albuquerque, Bernalillo County, than past two years. No undamaged leaves on many trees; others completely defoliated. Heavy damage on elms at Caprock, Lovington and Hobbs in Lea County. UTAH: Damage especially severe at Green River and Huntington, Emery County. Defoliation 98% on elms at Blanding, San Juan County. TEXAS: Damage heavy to Chinese elms in Martin, Glasscock, and Pecos counties. Damage heavy in Wilbarger, Foard, Wichita, Throckmorton, Baylor, Lubbock, Garza Scurry, and Nolan counties. Found in Archer County for a new record. WEST VIRGINIA: Defoliated 60-80% of Franklin County elms.

MIMOSA WEBWORM (*Homadaula anisocentra*)

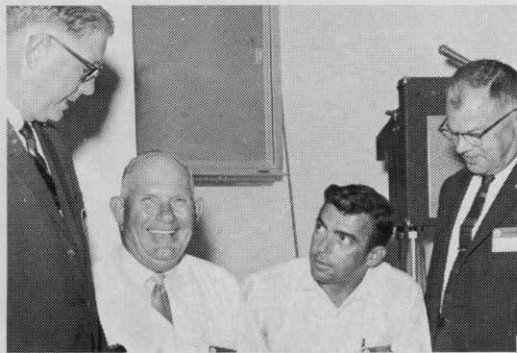
OKLAHOMA: Percent damage on mimosa 30-70 in Hughes, McCurtain, Pittsburg, and McIntosh counties. All except Hughes new records. TENNESSEE: Damage and webbing heavy in Davidson, Montgomery and Robertson counties.

SADDLED PROMINENT (*Heterocampa guttivitta*)

PENNSYLVANIA: Severe outbreak continued in northeastern area. Defoliated at least 50,000 acres of beech and sugar maple in southern and northern Wayne, western Pike, northwestern Monroe, eastern Lackawanna, and eastern Susquehanna counties. Beech and sugar maple in Sullivan County on state game lands continuing to die and decline due to one complete stripping in 1967; 50 million board feet of timber lost.

A STINK BUG (*Elasmucha Lateralis*)

CALIFORNIA: Heavy on birch tree at Burney, Shasta County. A new state record.



. . . James B. Moncrief, U. S. Golf Association greens section, Athens, Ga.; Mike Johnson, Birmingham; Bill Norrie, Jr., secretary-treasurer of the Alabama-Northwest Florida Turfgrass Association, Pensacola, Fla.; and Dr. T. B. Haglen, chairman of plant science division, Auburn's Cooperative Extension Service.

some cases drying of the greens will help in disease control. He also advised that 5-10 pounds of hydrated lime per 1,000 square feet placed on grass when dry will help.

Some of the necessities for a healthy turf, he added, are good soil, aeration, the right grass, water, nutrition, and proper management. Zoysia, ryegrass, and fescues, he pointed out, seem to be the driest grasses at early morning.

Of course the most beautiful golf courses start with proper green construction. James B. Moncrief, director of Southern Region USGA-Green Section, Athens, Ga., said that the green should be one that resists compaction, supports proper growth, one constructed to attract fewer disease problems, proper drainage and good infiltration. An improperly drained area is usually where diseases show first. For proper sub-drainage he suggested that 100 linear feet of drainage pipe be used per 1,000 square feet of area. Drain bunkers, he said, are also helpful. A good soil mixture at least 12 inches in depth is necessary. A green-keeper should have plenty of good soil mixture and a place to store it properly.

Ed Kearley, graduate assistant, agronomy and soils, talked on research on the use of surfactants. He pointed out that the use of a surfactant most always increased the effectiveness of an herbicide. A surfactant, he said, is a tool trying to get more from an herbicide, allowing more efficient and effective use.

The two-day short course was sponsored by Auburn University and the Alabama-Northwest Florida Turfgrass Association.

Interactions Significant For Trees and Turfgrasses

Established turfgrass has a striking effect on root development of newly planted trees, and established tree roots can greatly reduce root production and vigor of newly planted turfgrass.

Carl E. Whitcomb, ornamental horticulturist with the University of Florida, told members of the American Society for Horticultural Science Meeting at Washington State University at Pullman that when common Kentucky bluegrass was established before tree roots grew into that soil volume, silver maple root production was reduced by 50%. Honeylocust roots were not affected. The trees had no measurable effect on the bluegrass.

However, when bluegrass was seeded on soil containing well established silver maple or honeylocust roots, four major reductions in the vigor of bluegrass were noted with no measurable effect on tree roots:

(1) Germination of bluegrass seed was reduced by 29%, with no effect on subsequent tiller development.

(2) Clipping yields were reduced by as much as 30% immediately following fertilization.

(3) Grass sod yields were reduced by 40%.

(4) Grass root yields were reduced by 59%. Grass roots were very shallow, with few penetrating the established mass of tree roots more than a few inches.

North Dakota State To Study Pesticide/Plant Metabolism

Research to learn how pesticides are metabolized by plants will be conducted at North Dakota State University, Fargo, under a two-year grant awarded by the U.S. Department of Agriculture.

USDA's Agricultural Research Service will provide \$17,118 for the study, which will be led by Dr. George Graf, biochemist at the University.

Researchers will be particularly concerned with determining how crop plants and weeds biochemically break down urea, amide, and carbamate pesticides.

Among common weeds to be included are lambsquarter, goosefoot, ragweed, and mustard.

Findings are expected to add to a better understanding of pesticide susceptibility and resistance in plants and to improved pesticide management.



Big Wheel Turbo Blast Blower

Indoors, outdoors—parks, shopping centers, anywhere litter accumulates—find out how WINRO makes collection faster, easier, thorough.

- 20" Big Wheels roll easily over any surface.
- Big dual front casters make maneuvering easy.
- Forward or side air discharge with hand lever diverter.
- Handles fold for compact storage or hauling.
- 4-inch flexible hose carried on frame, ready at any time for use in hard-to-get-at places.*
- Washer kit for misting or washing action.*

* Optional accessories

Powerful 7 or 4 H.P. motor, rugged ¼" steel impeller. 3 ways to regulate force of air discharge. Complete new design makes WINRO adaptable for many litter and leaf collection jobs. Write for illustrated brochures, specs or demonstration.



A full line of BILLY GOAT Vacuum Units is also available from the makers of WINRO.

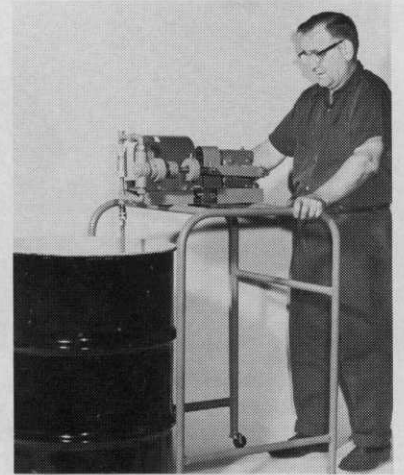
BILLY GOAT INDUSTRIES, INC.

Dept. WT-10, P.O. Box 229 • Grandview, Missouri 64030

For More Details Circle (112) on Reply Card



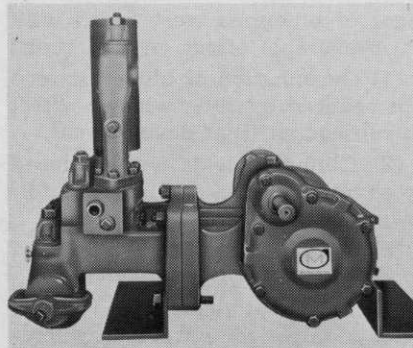
Hills-McCanna Division, Pennwalt Corporation, Carpentersville, Ill., announces a new portable chemical additive proportioning system called "Piggypak." It enables the proportioning of chemical additives direct from shipping containers. The pump is mounted on a tubular welded frame with casters. Pump, single-feed or double-feed, handles one or two different chemicals with viscosities to 1500 cp at rates from 0.07 to 28.5 gph feed and at pressures up to 1000 psi. For more details, circle (701) on reply card.



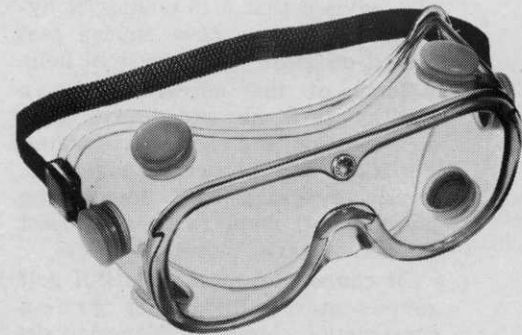
New Products Useful in the



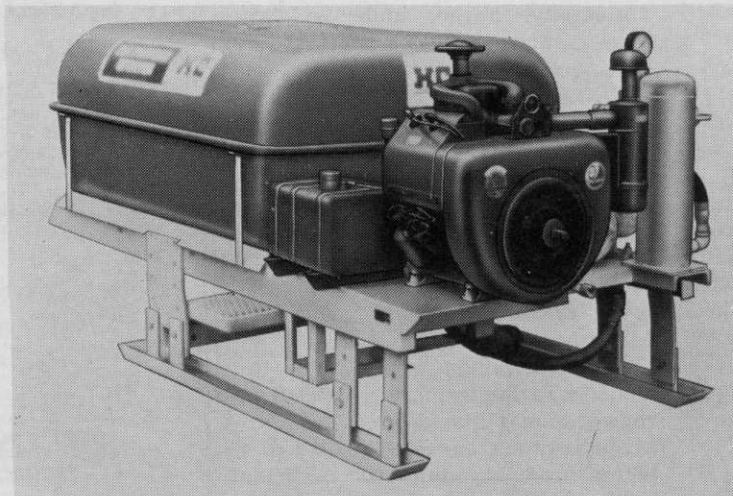
Smith Welding Equipment Division of Tescom Corp. of Minneapolis has developed a new Powder Braze Torch for high-speed, high quality hard surfacing, brazing, build-up, and welding. It features a powder flow selector dial, which provides the right amount of alloy powder for job being done. Reduces need for on-off operation of powder flow control lever. For more details, circle (703) on reply card.



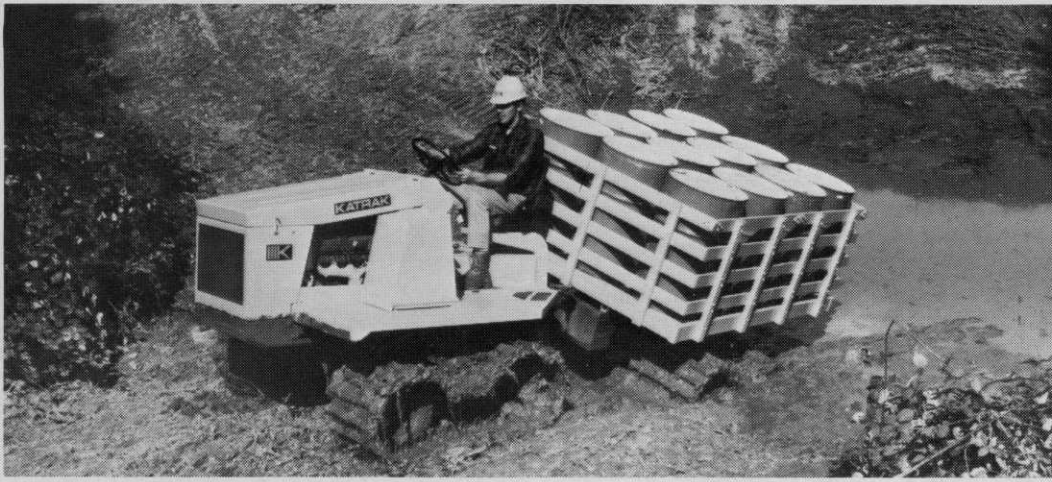
ITT Marlow, Midland Park, N.J., offers a new high-pressure piston pump line. Its "Piston-Flo" line can deliver from 5 to 50 gallons of water per minute at pressures from 400 psi to 1000 psi. Available in heavy-duty duplex and triplex designs. New line called extra-heavy constructed, attractively priced, compact, easily installed and maintained. For more details, circle (704) on reply card.



Glendale Optical Co., Woodbury, N.Y., has developed a replacement lens for safety goggles that's designed to inhibit fogging caused by extreme temperature variations. Fog-Ban is made of impact-resistant plastic in one-piece construction, using two lenses hermetically sealed in a moisture-controlled chamber. Meets requirements of U.S.A.S. Z87.1-1968 for flexible safety goggles. For more details, circle (705) on reply card.

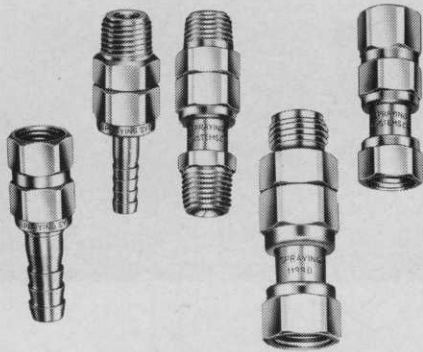


Hart-Carter Pacific Corp., San Jose, Calif., announces a line of high-pressure, general-purpose, chemical sprayers with high strength, corrosion-proof tanks of fiberglass. Sprayer types include trailer, skid, three-point mount, saddle tank, estate and greenhouse, ranging from 25 to 500-gal. capacity. Features include large, deep hatch openings for easy filling without spilling and exclusive stainless steel suction strainer on most models which permits cleaning the strainer without losing prime. For more details, circle (709) on reply card.

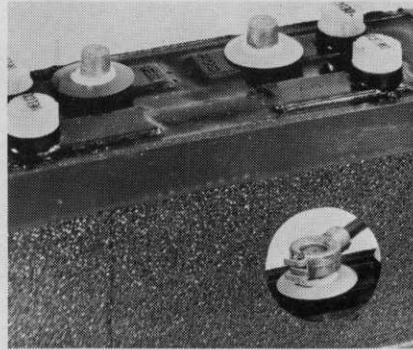


Katrak Vehicle Co., Canby, Ore., claims its revolutionary 4-track drive Katrak K-60 hauls heavy loads through knee-deep swampy or sandy areas with ease. Carries payloads of up to 2½ tons and travels at speeds to 25 mph. Powered by 302-cubic-inch, 200 hp Ford industrial engine. Turning radius is 11 feet. Eight speeds forward, two reverse. For more details, circle (702) on reply card.

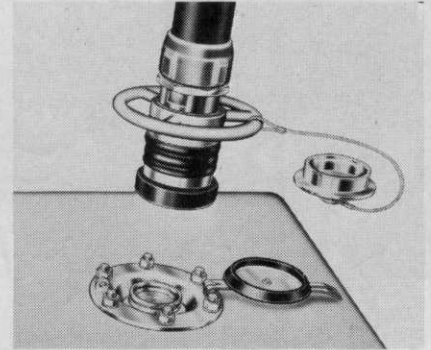
Aquatic Weed Control Industry



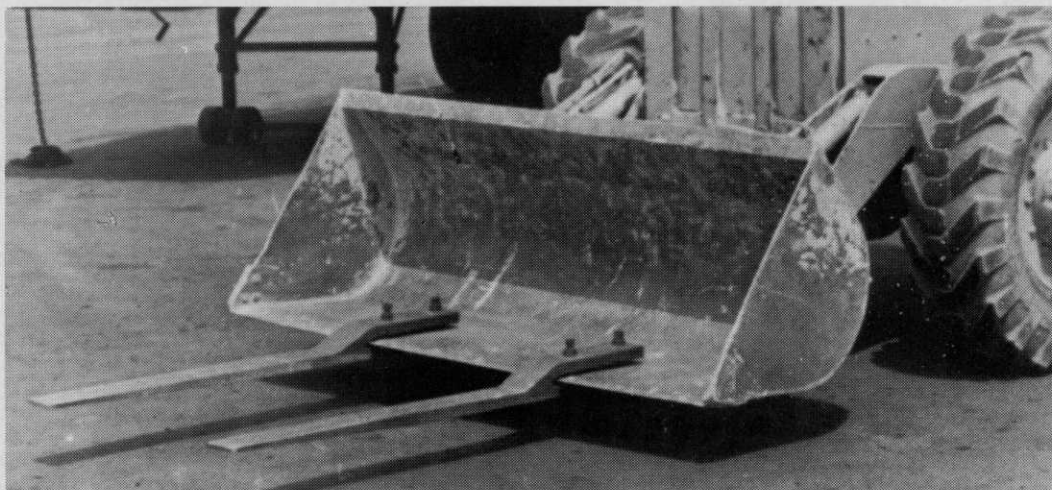
Spraying Systems Co., Bellwood, Ill., has a new complete line of No. 11990 series swivel connectors to provide free swiveling connection of hose and spray guns at pressures up to 800 psi. Connectors are ¼", ⅜", and ½" NPT and ¼" NPS male and female inlet and outlet connections, with .281" and .406" diameter hose barb sizes. Brass with nylon bearing washer. For more details, circle (706) on reply card.



Montooth Battery Products, Springfield, Ill., claims its battery saver increases battery life 50% by preventing corrosion. Vinyl accessory fits all standard automotive and truck battery posts, guaranteed to prevent corrosion formation or buildup if installed as directed. Field-tested four years. For more details, circle (707) on reply card.



Aeroquip Corporation of Jackson, Mich., has a new fast-fueling coupling. It allows equipment to be fueled in less time than conventional fueling methods. Coupling is safer. Fuel remains sealed at all times, reducing potential fire hazard. Tank half of coupling usually can be installed in a position accessible from ground level. For more details, circle (708) on reply card.



J. E. Coleman Co., New York, N.Y., is marketing a lighter-weight detachable fork for shovel loaders. "Scoop Fork" Model J-4 is 4" wide rather than 5" and 20% lighter in weight. Higher-alloy steel retains 4,000-lb. capacity rating. Fork has 46" carrying length. For more details, circle (710) on reply card.



THIS BUSINESS of beautifying with trees is a complicated, expensive and often frustrating endeavor. Nevertheless, beautification is accelerating all across the country. The public wants it; demands it.

That sensing comes from the 45th International Shade Tree Conference, Aug. 10-14, in Portland, Ore.

Making the country's urban environment beautiful, however, presents arborists with a formidable "give and take" challenge. Somehow, they must discover how to get the demanding public to *give* what it *takes* to get the job done—considering the sapping of resources by Dutch Elm Disease.

A thick portfolio of presentations helped bolster arborists' confidence that they are abreast of latest developments. Reports ranged from the Apollo 9 theoretical to the ground-level practical. Still, the haunting question hovers: How can arborists become more professional; more important, how can this professionalism be instilled in the public's mind?

An encompassing definition of a profession or professionalism just isn't to be found, conceded Leslie

45th ISTC Report

Beautifying With Trees Is a Complex Business

S. Mayne, owner of Mayne Tree Expert Co., San Mateo, Calif., speaking to commercial arborists. After researching the term and reviewing his experience as a landscape forester, he concluded that among the definitions is one that arborists can, or should, fulfill:

"A profession is a field of activity in which the best interests of the client come first and where advice given him is never, primarily, self-serving."

Others added that a profession "was an art rather than an exact science."

Mayne suggested that an individual could become known as a professional, but the general public needed "some method for the qualifying of professionals." This goal is beyond

the capability of the individual, he felt, agreeing with William Owens of Portland, who suggested in the discussion period that "the only way to go about the problem is organizationally."

Utility Arborists Organize

Utility arborists were meeting separately but apparently eavesdropping on the discussion about upgrading professions and how it could best be done organizationally. They formed the Public Utility Arborist Association.

The new group will function within the framework of ISTC. Annual meetings will be conducted separately but at the time of the shade tree conference.

"We currently have about 100 util-



The Portland Hilton, site of the ISTC conference, was a splendid example of how large commercial buildings can be beautified with trees.

ity representatives who are members," said President H. J. Cran, Connecticut Light and Power. "We

Officers of the new Public Utility Arborist Association are, from the left: President—H. J. Cran, Jr., Connecticut Light & Power, Hartford; vice-president—C. E. Lee, Southern California Edison Co., Los Angeles; vice-president—G. K. Brown, Georgia Power Co., Atlanta; and secretary-treasurer—J. E. Knight, Detroit Edison Co.



hope to cultivate more interest and communications within the utility arborist profession."

Secretary-Treasurer Jerome E. Knight, Detroit Edison Co., said the association would publish a newsletter to keep members alert of pressures from the public and to keep them informed about subjects of special concern to utility arboriculture. He cited as a specific example, growth inhibitor research; and generally, transmission structure and right-of-way beauty.

Hopefully, closer ties will develop between utility arborists, and, when the need arises, spokesmen for all utility arborists will be available. The new group, Knight feels, also will bring about better working relationships with commercial and municipal arborists.

The necessity of closer ties among all arborists was brought into focus in discussions of tree ordinances that are needed in metropolitan areas.

Utilities in the State of Oregon, reported W. L. Carey, Portland General Electric Co., "spend \$2 million annually trimming and removing trees that homeowners have planted beneath power lines."

Portland GE, he continued, has developed a long-range street tree planning service that's available to cities and subdivision contractors.

"Since 1960, we've planted trees along 150 miles of streets at a saving of \$40,000 annually," Carey said. "And considering the public relations value, the mileage we've gotten out of it is fabulous."

He said the program is presented to "anybody that would listen."

And more and more people are listening right now for ways to improve the environment, suggested a keynote speaker, Norvell Gillespie, executive vice-president of the California Anti-Litter League.

Trees have belonged to the domain of the nomad, he said. Only recently have they been talked about in the very top level of our government.

"Now we have blueprints in our hands and survival in our hearts."

Trees are a measure of urban culture, he continued, but "you can't salvage urban environment by just squeezing in a few trees."

Calling the audience "environmental crusaders," Gillespie challenged ISTC to take the lead in advising communities on how to beautify their environments. The strength of ISTC leadership in these times is unlimited, he said.

New View from Space

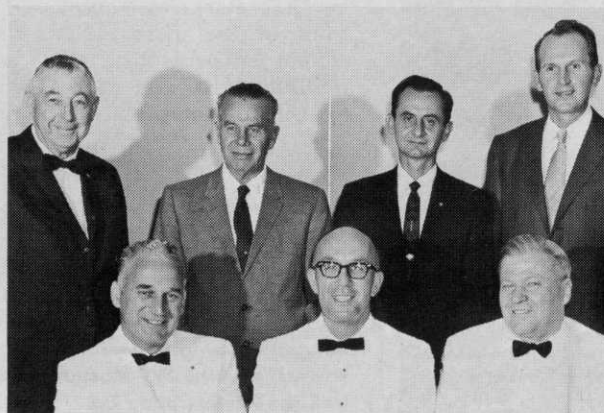
The space age has brought a new perspective for viewing our environment and taking inventory of our total vegetation resources, according to Lawrence Pettinger, research technician at the Berkeley campus of the University of California.

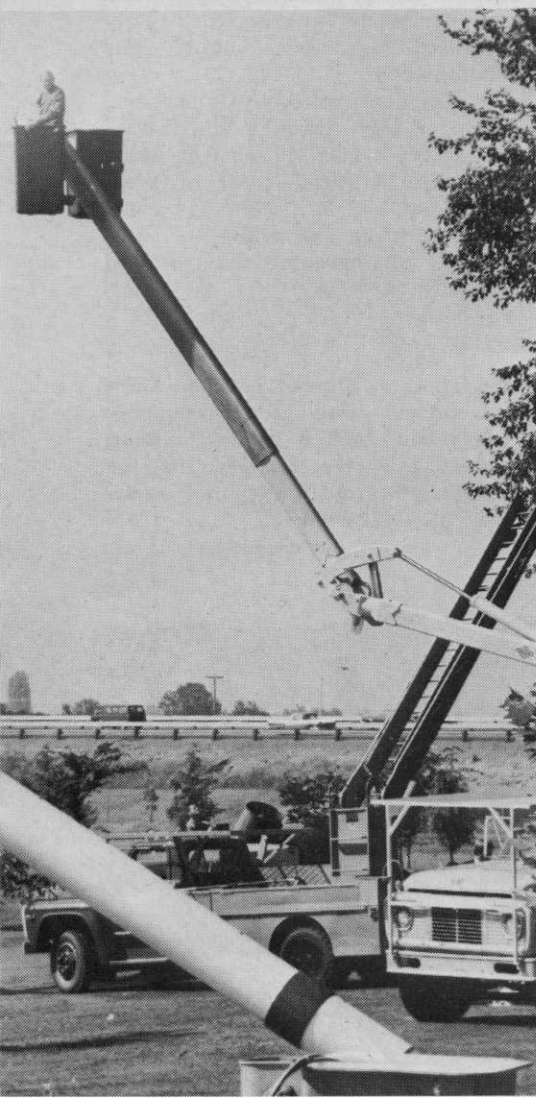
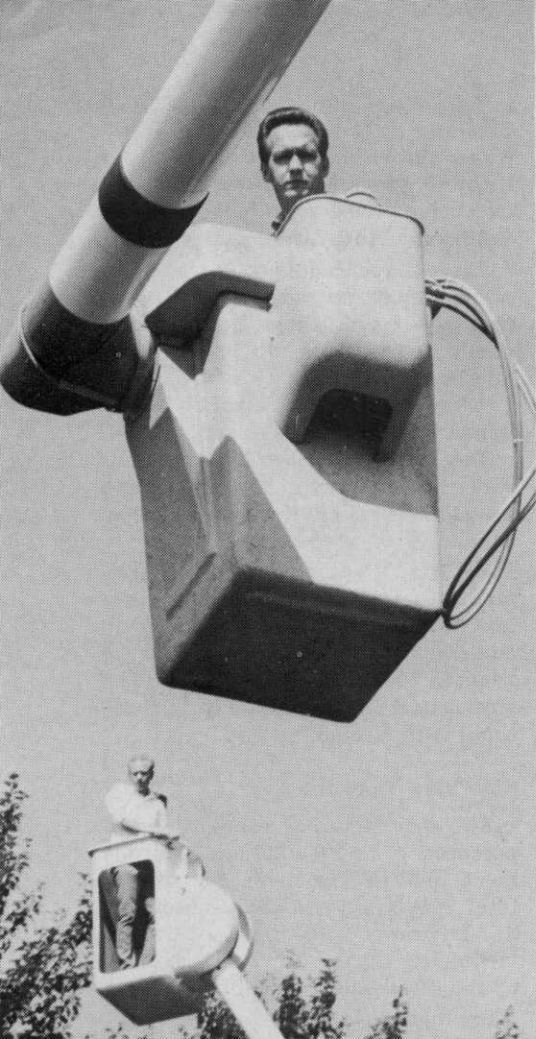
Photographs from space craft, such as Apollo 9, from special films now permit us to compare widely separated areas and to study their relationships.

A new depth of study is possible, Pettinger said, through the use of special types of film, such as black and white infrared, color infrared, ultraviolet, and false-color enhancements of black and white.

Aerial photographic surveying to

New officers for ISTC are: Seated, from the left—J. A. Kimmel, president-elect; Richard E. Abbott, president; and Keith L. Davey, past-president. Standing, from the left—H. M. Van Wormer, vice-president; Noel B. Wysong, editor; E. B. Himelick, executive director; E. C. Bundy, executive secretary. The sign that L. C. Chadwick, executive director emeritus, holds was prepared by the Western Chapter but reflected sentiments of all ISTC members.





gain inventory data on vegetation will increase tremendously, predicted Pettinger.

"I don't claim we can eliminate ground work, but it will be reduced a great deal."

Types of data that will be sought will be: (1) species composition; (2) vigor and healthiness of the vegetation; (3) agents responsible for loss of vigor; and (4) probable growth rate and eventual yield.

Tree Pollution Evident

More down-to-earth research on specific problems was discussed concerning pollution damage, growth control, and damage that can come from improper staking of young trees.

Pollution is like corruption, said Dr. Spencer H. Davis, Jr., plant pathologist at Rutgers University, New Brunswick, N.J. "A little of it can go a long way and do a lot of damage."

Pollution damage results in many different symptoms, which usually fit into patterns that can tell us the general type or source of pollutant, he said.

Pollutants in the soil, such as salt, or oil, usually result in scorch symptoms on the tips of leaves and needles. Soil sterilants bring death first to the veins and the basal part of needles. Weed killers can cause severe cupping and curling and even death to younger leaves and needles.

A complication of dealing with pollution damage, Davis said, is that "all plants that grow from seeds are genetically different. Two trees growing side by side may respond differently to air, water and soil pollution." So we're faced with the difficult task, he said, of singling out for propagation those specimens that demonstrate resistance to pollution.

Soil-borne diseases of shade trees will require more attention as urbanization moves into areas previously agricultural, stated Robert D. Raabe, another plant pathologist at UC's Berkeley campus. Because some of the more serious diseases cannot be controlled, such as verticillium wilt, and others are hard to control, one of the main ap-

Aerial buckets roamed the upper altitudes of the field demonstration site. From top to bottom, these are: Asplundh Chipper Co.; the Hi-Ranger from Mobil Aerial Towers; and the Sky-Master from McCabe-Powers Body Co.



For a moment, a Vermeer tree spade captured attention . . .

proaches to the problem is again the search for resistant plants.

Formula of the Three Rs

The most effective insect control, said Clark O. Eads, entomologist at UC's Riverside campus, comes by recalling our forefathers' capsule phrase of education, "the three Rs." For insect control, the three Rs are the *right* material in the *right* place at the *right* time.

The formula works also for achieving desired results in growth control. Though the search for controlling tree growth has been varied and is centuries old, common to all the methods is the objective of reducing stem elongation.

Control of stem elongation depends upon control of cell elongation and division in the subapical meristematic regions, explained Dr. Roy M. Sachs, horticulturist from UC's Davis campus.

There are cases of separate effects upon cell division and elongation, but such separation is of little significance in practical control methods. Of great importance, he said, is the separation of activities and control of the apical meristem on the one hand and the subapical meristem on the other.

Use the right growth retardant and you can reduce stem length without materially inhibiting leaf initiation, expansion, and flowering, he said.

Much at Stake in Staking

Seemingly simple tree-staking can do major harm to young trees, reported Lanny Neel. His research at



... from its compact-size T-200 dozer. Vermeer is at Pella, Ia.

UC's Davis campus is supported by ISTC.

Staking is to anchor, support and protect, he said. But improper staking can cause mechanical injury, trunk malfunction, and cause greater wood stress.

Neel showed illustrations of how young trees leaned away from wood stakes when untied. Others grew crooked; still others fell to the ground.

The importance of his work became apparent on a tour of the J. Frank Schmidt & Son Company. The nursery has a reported one million trees growing, all of which are eventually staked. Some varieties, such as Norway maple, will average six feet in growth from the base bud during the favorable March to October growing season. The nursery uses metal rod stakes and has been able to hold culls at harvest to around 10%, a spokesman said.

Although staking must be done by hand, most other field work at Schmidt & Son is expedited with heavy, specialized equipment.

Trees are irrigated with a sprinkler system, fertilized and sprayed for insect control from both the ground and air, and dug with mechanical harvesters.

Tree Business Complex Today

Schmidt & Son is one of the largest nurseries in the country, so automation could be expected. Still, the firm supported Frederick R. Micha's contention that managing an arboriculture business isn't what it used to be.

Micha, general manager of the Monroe Tree Surgeons, Inc., New York, said that "Gone are the days when a foreman could leave the Davey Tree Company, buy a few pieces of equipment and plunge into the tree service business and make a go of it."

You must hire professionals now for tax structure, business law, labor laws, accounting and financing, and advertising, he advised. Community involvement, social acumen, and quality comprehension are essential. Quality of dress and of written and spoken word can easily limit success, he added.

But, he cautioned, unless all these things "are coupled with common sense, you certainly will fail."

"Common sense begins from time you enter your office door 'til you close your books at night."

Municipal Arboriculture Report

From an appraisal of what's happening across the country in municipal arboriculture, it appeared that supervisory personnel have had to lean heavily on common sense to make the most of their resources. Tax revenues aren't keeping pace with service demands. Dutch Elm Disease, still rampaging unchecked, has forced some municipalities to devote nearly all park department effort on tree removal, or else seek increasing help from commercial tree companies.

New York City is a good case in point, reported Carl J. Schiff, director of horticulture. Some 5,000 trees are removed each year, most victims of DED. City employees, he said, can't take on the removal on top of regular maintenance. Most of the removal is by contract with commercial tree companies, now at a cost of a half-million dollars a year.

A very real indication that people are paying more attention to their environment, especially trees, he added, is that 40,000 requests came in from residents last year asking for tree care assistance. "We are now preparing a \$1 million contract calling for the pruning of 50,000 trees."

Schiff expects the city's present park budget to increase from its present \$5 million to \$8-9 million for the 1970-71 fiscal year.

Schiff talked about a number of new techniques tried within the past year. A helicopter suspending a Sling-King seeded several hundred acres of land too rugged to be planted by conventional means. The Sling-King carried 600 pounds of

Get the trimming job done **FASTER and EASIER** with **Ackley Hydraulic Pruners and Saws**

Safe, fast, light weight, more efficient . . . that's the Ackley Power Saw and Industrial Pruner story. Fully compatible with existing hydraulic systems both open and closed.

CIRCLE SAW

powered by exclusive, patented Ackley motor that outperforms all others. Amazing speed. Variety of heads and handles available.



CHAIN SAWS

also have the high speed, high performance Ackley motor. Both pistol grip and long handle (in epoxy or aluminum) available. Bar sizes from 12 to 24 inches.



INDUSTRIAL PRUNERS

with big capacity and full hydraulic power for both open and close of big 2" plus knife action. Powered by exclusive Ackley piston system - patents pending.



Write for Free literature on all the Ackley tools, air and hydraulic, that can help you do the trimming job with less cost at every turn.



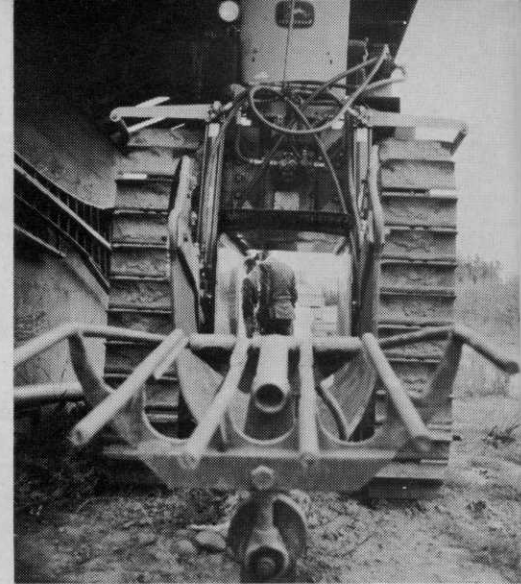
ACKLEY MANUFACTURING COMPANY

13770 S. E. Ambler Road
Clackamas, Oregon 97015
Phone 503/659-5660

For More Details Circle (113) on Reply Card



Guests saw large-scale tree farming at the J. Frank Schmidt & Son Co. The nursery has a reported one million trees growing. Aerial spraying of chemicals and fertilizer is



employed. Trees are dug mechanically with equipment such as the John Deere harvester at right that seems to have swallowed two men.

perennial rye and sowed a 60-ft. swath on each helicopter pass.

When a citizens' group complained about DDT, Schiff agreed to run a test on trees planted at a new building site. On one side, trees were sprayed with Sevin and Malathion, on the other side, insect predators were brought in. Schiff said the biological approach worked to a degree but indicated the chemical spraying appeared more effective.

Not everyone is caught up with tree beauty, apparently. Schiff said that along many streets it has become necessary to install 18-inch metal collars around the trunks of young trees to protect them from the many dogs that people take walking.

Dutch Elm Disease, more demands for service, and inflationary costs without compensating tax revenues sent the Minneapolis forestry program on a six-year slide, reported David DeVoto, park forester. Now

he expects state legislation enacted this year to produce a turnaround.

The state lawmakers passed a bill that revamped the taxing authority of the Park Board. The bill replaced five separate out-of-date taxing laws with a single millage tax. The new tax law will increase the annual forestry budget from \$451,500 in 1969 to \$1,049,000 in 1970.

We hope to put new meaning into the reputation that Minneapolis is the "City of Trees," DeVoto said, with the establishment of a tree nursery. Annual production is to be 5,000 3½"-diameter trees.

Greenwich, Conn., may have the most expert tree man for a city manager of any municipality in the country. There's a reason. Joseph A. Dietrich had been in charge of the park department and has devoted a quarter-century to battling Dutch Elm Disease.

He reviewed the research work that five universities are conducting

through grants from the Elm Research Institute (he's a director). This work includes the development of disease-resistant varieties, expected to be available in six years; work on altering the odor code to repel the bark beetle (the use of juglone from shagbark hickory has reduced feeding 52% in some tests); and the breeding of wasps to prey upon the bark beetles.

City growth and DED are the major problems for the Lansing, Mich., park department, reported David L. Phillips, superintendent of forestry. Long known as the "City in a Forest," Lansing has increased since 1949 from 9,000 to 21,000 acres, he said. Tree removal, 4,810 in 1968, has necessarily diverted much effort from rotation pruning, research, and private-owner services.

An as yet unsolved problem is that of tree disposal. The state has barred the burning of all brush and wood. Phillips said utilization of

It's Arlow Heskitt, representative for Karl Kummerling, Inc., that appears to be getting a sales pitch. A couple dozen companies bought booth space to display products at the

conference. The Homelite Division of Textron, Inc., was one of about a dozen exhibitors who had both booths and field demonstrations.





You're looking at the business end of an Asplundh chipper making short work of a brush pile. At right, Melroe Mfg. representative demonstrated the maneuverability of its



Bobcat by rearing it backward and pivoting it to the opposite direction. It was equipped with a front scoop.

logs as firewood and as chips had not proved to be satisfactory.

William T. Bell, street tree superintendent for Long Beach, Calif., took the group far from DED but not away from problems.

His department has 67 employees, most of them tree trimmers. Some 26,000 trees are trimmed and shaped by the ornamental tree trimming crews. A six-man crew maintains the city's 20,000 palm trees.

One foreman is a full-time inspector, making more than 9,000 inspections a year. Insect and disease control require that a Rotomist sprayer be in operation nine months of the year. A two-man planting team works year around.

An ambitious beautification plan conceived in 1940 by the late Jacques Greber for the Canadian capital city of Ottawa "moves forward step by step," reported J. A. White, district superintendent of the National Capital Commission.

Included in the scope of the plan were the relocation of three rail-ways cutting through the center of the city, together with their mar-shalling yards and stations; devel-opment of an 85,000-acre natural parkland within a few minutes' drive of the Parliament buildings; and development supervision of a 38,000-acre strip of land around the city to prevent indiscriminate use by speculators.

Recognition and Awards

During the shade tree conference, the National Arborist Association took note of Portland's oldest elm, in the courtyard of the downtown YWCA. NAA President Paul Wal-gren and past presidents Freeman Parr and H. A. Morrison presented a plaque to Mrs. Fred Roggi, YWCA director. The bronze marker will be placed near the American elm, planted in either the 1880s or 1890s.

Among the awards presented:

Honorary Life Membership—Dr. L. C. Chadwick, Columbus, O.; Keith Davey, San Francisco, Calif.; Riley Stevens, Portland, Ore.; George W. Duncan, Youngstown, O.; George Hafstadt, Middleton, Wis.

Honorary Membership—Dr. Garrett Eckbo, Berkeley, Calif.; Leslie Hancock, Mississauga, Ont., Canada; and Hans Heybroek, Wageningen, The Netherlands.

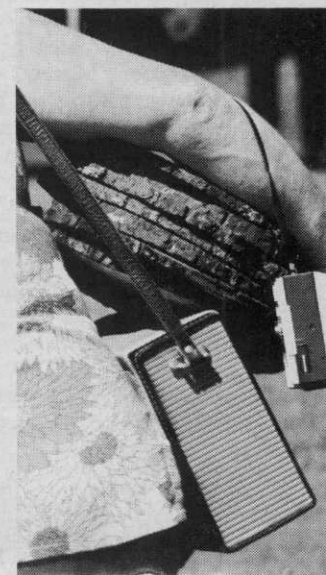
Award of Merit—Mrs. Valley M. Knudsen, Glendale, Calif.; Hackett C. Wilson, Shelby, N. C.; and O. C. Anderson, Houston, Tex.

Special Award—Iowa State Uni-versity film production staff for a film on Dutch Elm Disease.

Authors' Citation—Fred C. Galle, Pine Mountain, Ga.; George W. Kelly, Littleton, Col.; Dr. Mildred E. Mathias, Los Angeles, Calif.; Dr. Elizabeth McClintock, San Francis-co; Dr. Rene Pomerleau, Sielery, Quebec; and Prof. Victor H. Ries, Columbus, Ohio.

It's as easy as sawing off a log, Mark Eastwood finds; just as Harold DePue of Ackley Mfg. Co., predicted. In fact, after Fred Knowlton, left, and Joe Sullivan demonstrated

how little vibration there is with a McCullough chain saw, Kay Jones, Gales Tree Service, Belleville, Ill., decided to cut off a few souvenirs to take home.



Trimmings

"BEHIND EVERY SUCCESSFUL MAN is an astonished mother-in-law and an aggressive wife," someone said at the International Shade Tree Conference.

By the measurement of an aggressive wife, Gerald R. Thompson of Maui, Hawaii, must be highly successful. Mrs. Thompson was recognized at the ISTC by the Western Chapter for having inspired the planting of some 4,000 trees as a part of the island's Arbor Day activities last year.

* * *

THAT TREE GROWING in the roof of the courthouse in Greensburg, Ind. (reported in the September issue) has some new companions, perhaps better described as competitors. The Cleveland Plain Dealer carried a picture of the tower recently showing the tree and a healthy crop of weeds.

Our guess is that the courthouse doesn't have many job applicants for groundskeeper.

* * *

A PENGUIN can do a better job of reducing litter than a sign threatening a \$50 fine, claims Daline As-

sociates, Minneapolis. The firm ran tests on sign effectiveness around a picnic and recreation area. The firm's sign carrying a neatly dressed and friendly looking penguin, named Tidy Tim, saying "Littering is a No! No!" was 50% more effective than the fine warning in getting picnickers to deposit litter in trash bags.

"We feel people are more inclined to cooperate with appealing cartoon characters than they are with symbols of authority," said Arlo Johnson, Daline vice-president. As other examples, he cited Smokey the Bear, Snoopy the Pooch, Donald the Duck and, of course, Rudolph the Red-nosed Reindeer.

* * *

STURDY AS AN OAK is an expression with a great deal of supporting evidence. The Hartford Courant reports as an example the 2½-acre Spessart Forest near Aschaffenburg, Germany. The forest contains about 400 oaks more than 800 years old, the paper reports. Trees only 300 to 350 years old are frequently cut and sold for lumber. In the past 400 years, the item stated, no one has been allowed to settle in the forest or cultivate the land.

Industry People On the Move



Ryan Equipment Co., St. Paul, Minn., has named Charles K. Curry as national and worldwide sales manager and Oscar Bolling as superintendent of its St. Paul factory. Curry had been eastern sales representative. Bolling came from a similar position with Toro Mfg. Corp.

* * *

Velsicol Chemical Corp., Chicago, Ill., has announced three marketing appointments. L. E. Carls becomes manager of marketing, assuming additional responsibility for planning and executing programs for the agricultural, pest control, and home, lawn and garden markets. He will continue to direct all company advertising and sales promotion.

Vincent Mazza becomes manager of agricultural marketing, taking on more planning responsibilities. Howard C. Heffron, as manager of marketing, specialty products, acquires added responsibility for the pest control and home, lawn and garden market promotion.

* * *

Amchem Products, Inc., Ambler, Pa., announces the following additions and transfers for its sales force:

George M. Thompson to midwestern district; Harold E. Comstock to south-central district; David Shaffer to north-central district; Robert Wilson to midwestern district; John L. Wick to north-central district; Gary W. Green to north-central district; and Sidney Krebs to midwestern district.

USDA Tightens Regulations For Arsenic Pesticides

The U.S. Department of Agriculture has taken action to reduce the hazards from arsenical pesticides intended for use in and around the home.

Officials of USDA's Agricultural Research Service have adopted a new interpretation of federal pesticide regulations limiting the arsenic allowed in products for use in and around the home to 2% or less of sodium arsenite and 1.5% or less of arsenic trioxide.

The arsenic materials are marketed in 30% to 60% concentrates to kill termites and weeds. Dilutions of two to 3.5% are used in insect baits and rat poisons.

The new interpretation also requires new caution statements for arsenical products intended for agricultural, industrial and commercial use. If the product contains more than 2% sodium arsenite or more than 1.5% arsenic trioxide, the labels must now carry the warnings "do not use or store in or around the house" and "do not allow domestic animals to graze treated area."

Nutro Turf & Garden Products, Columbus, O., has appointed three territory managers. They are: Fred J. Gillmore, responsible for western New York state; John M. Talbott, from Indiana to Detroit, Mich., area; and Edgar B. Byrd, for Minnesota and Wisconsin.

* * *

Palmer W. Bigelow, Jr., Bigelow Nurseries, Inc., Northboro, Mass., has been elected to the board of the American Association of Nurserymen for Region I. He succeeds William Flemer III, who was elected president of the association at its 94th convention in July.

* * *

F. A. Bartlett Tree Expert Co., Stamford, Conn., announces that Dr. Edward L. Chandler has joined Bartlett Tree Research Laboratories in Pineville, near Charlotte. Formerly with Diamond Shamrock, Dr. Chandler will do a variety of research work but will give particular attention to the effects of air and soil pollution upon plants.

* * *

Diamond Shamrock Chemical Co., Cleveland, O., has promoted Ronald L. Dezember as Dachthal herbicide product manager.

* * *

Dr. Charles L. Wilson has been named Leader, Shade Tree and Farm Windbreak Investigations, Vegetables and Ornamentals Research Branch, Crops Research Division of USDA's Agricultural Research Service. A plant pathologist, Dr. Wilson is nationally recognized for his achievements in the field of tree diseases. Formerly a professor at the University of Arkansas, Dr. Wilson will now direct research of shade tree diseases, genetic selection, and related cultural practices at USDA's Shade Tree and Ornamental Plants Laboratory in Delaware, O.

TELL ME MORE

This page is provided for your convenience. To obtain additional information on new products, trade literature and advertised products in this issue, simply circle the corresponding number on the perforated card below, fill in your name, business address and mail the card. No postage is required.

FOR MORE INFORMATION FILL OUT AND MAIL TODAY!

ADVERTISED PRODUCTS

101 102 103 104 105 106 107 108 109
110 111 112 113 114 115 116 117 118
119 120 121 122 123 124 125 126 127
128 129 130 131 132 133 134 135 136
137 138 139 140 141 142 143 144 145

NEW PRODUCTS

700 701 702 703 704 705 706 707 708
709 710 711 712 713 714 715 716 717
718 719 720 721 722 723 724 725 726
727 728 729 730 731 732 733 734 735

Please send more information on items circled
(Please type or print) 10/69

Name

Position

Company

Street

City

State Zip Code

Please describe your type of business

Note: Inquiries serviced until Dec. 20, 1969 **A**

Use this convenient card if you wish to receive further information on products and services advertised or described in this issue.

BUSINESS REPLY MAIL

NO POSTAGE STAMP NECESSARY IF MAILED IN THE UNITED STATES

postage will be paid by

WEEDS TREES AND TURF

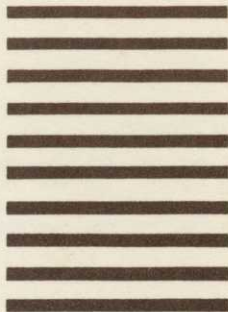
BOX 1100

DULUTH, MINNESOTA 55802

FIRST CLASS

Permit No. 665

DULUTH MINNESOTA



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. Bold-face rule box: \$25.00 per column inch.

FOR SALE

AUSTRALIAN BUSINESS — Agricultural Chemicals — Custom Applicators. This firm specializes in Agricultural and Industrial Weed Control. It is firmly established in three eastern States and there is potential for expansion to the remaining States and New Zealand. Opportunities in allied fields are excellent. An ideal proposition for a chemical or pest control company seeking a comprehensive introduction to the Australian Market. Any reasonable proposition will be confidentially considered by the Founder-Manager who is anxious to ensure the future of this unique organization before retiring. Address all inquiries to: "Chemicals," P.O. Box 767 G, G.P.O. Melbourne, 3001, Vic. Australia.

USED EQUIPMENT

SPRAYERS, chippers, log splitters and other equipment at large savings. Let us know your needs. Equipment Sales Company, 4744 Sunrise Highway, Massapequa Park, N. Y. 11762.

WANTED: Good used Mist Blower capable of hitting trees 100 ft. high. For further information please write to Bartlett Tree Experts, Box 889, Westbury, New York 11590.

HELP WANTED

FORESTER AND LANDSCAPER. A large midwest tree firm is interested in a forester as well as an individual capable of taking over a landscape service and tree work for private individuals. Prefer someone with a few years of experience as there will be some consulting involved and direction of men. The Company is well established and has been in business for many years. Minimum salary offered for the right individual will be \$10,000. per year plus transportation and travel allowance and an opportunity to share in the Company's profits. We offer the usual fringe benefits such as vacations, holidays and group life and hospital insurance, in addition to the above salary. If interested, write: Box 44, Weeds Trees and Turf, 9800 Detroit Ave., Cleveland, Ohio 44102.

TERRIFIC Opportunity. Manager for expanding industrial weed control firm serving the Texas Gulf Coast. Must be aggressive, profit minded and experienced in sales and application. Agriculture Science degree desirable but not necessary. Write or call Bill Spitz, President, Big State Exterminating Co., Inc., 2822 Leeland, Houston, Texas 77003. Phone 713 225-1195.

GARDEN Center Manager, Albany, New York. Garden Center expand-

Advertisers

INDEX TO ADVERTISERS

Ackley Mfg. Co.	35
American Sod Producers Assn.	27
Billy Goat Industries	29
Highland Bentgrass	6
Hyacinth Control Society	19
Jacklin Seed Co.	3rd Cover
Marine Biochemist, Inc.	15
Mitts & Merrill, Inc.	4
National Weed Services	13
John Nunes Mechanical Harvesting Co.	2nd Cover
Nursery Specialty Products	3
Sabre Saw Chain	25
Stihl American, Inc.	4th Cover
Universal Metals Products	17

ing operations. Must be enthusiastic and ambitious. Full charge of display, sales and supervision. Participation in planning coordination. Must have knowledge of plant materials. Retailing experience helpful, but not necessary. Submit detailed resume, including references and salary requirements to: The Garden Shoppe, Inc., Glenmont, N.Y. 12077.

INSTITUTION grounds experience desirable but will train. Operations in roads and grounds maintenance. Salary \$97.60 to \$156.00; 40 hours plus benefits. Opportunity for advancement relative to effort, ability and experience. Write Box 144, Wrentham, Mass. 02093.

Rohm and Haas Announces Two New Emulsifiers

Two new agricultural emulsifiers, Triton X-189 and Triton X-190, have been announced by Rohm and Haas Co., Philadelphia, Pa. Of special importance to formulators, says the company, is that both products are exempt from tolerance requirements established by the Food and Drug Administration.

Triton X-180 and Triton X-190 offer optimum performance in the emulsification of the organo-phosphate group of pesticides, either alone or in combination with chlorinated hydrocarbons, the company claims.

In addition, the two new emulsifiers are compatible with commonly used pesticide solvents. Both products also perform satisfactorily in soft or hard waters with only slight changes in their proportions.

Triton X-180 and Triton X-190 are anhydrous blends of alkyl polyether alcohols and organic sulfonates, the company discloses. Triton X-180 is predominately nonionic. Its companion product is predominantly anionic.

For more details circle 712 on reply card.



**FYLKING KENTUCKY
BLUEGRASS**

mightiest blade growing

The champion, a hardy Viking blade originating in Svalof, Sweden, Fylking Kentucky bluegrass excels on every count. Disease resistant, dense, ground hugging carpet strangles weeds. Colors early to deep-green emerald, blades stay unblemished, brilliant through fall. Sod can be lifted in less than 110 days. Fylking can be cut at 1/2 inch, is drought and winter tough. Proven in 10 years of international tests, specify the champion 0217® Brand Fylking Kentucky bluegrass. At your seed distributor.

For information or names of authorized distributors, write Jacklin Seed Co., Dishman, Wash. 99213.

For More Details Circle (108) on Reply Card

STIHL American, Inc.

194 Greenwood Ave.,
Midland Park, N. J. 07432.
Code 201-445-0890

7364 Lee Industrial Boulevard,
Mableton (Atlanta) Georgia 30059.
Code 404-941-1730

23962 Clawiter Road,
Hayward California 94541.
Code 415-785-9100



We've added Solid State Ignition to the World's most advanced chain saw!

Our engineers and designers are a very dedicated and conscientious group and not at all inclined to rest on past laurels.

Consequently, although the new Stihl 041AV was recognized all over the World, as being far ahead of its field in design, engineering and performance . . . our people still were not satisfied. How could we improve upon the World's first and only chain saw with built-in

shock absorbers to eliminate vibration?

We added Solid State Ignition!

Now, you have such Stihl "firsts" as automatic chain oiling and an anti-vibration system for smoother cutting with less fatigue . . . plus the addition of a molded solid state ignition system. Now our technical people are happy with the STIHL 041AV Electronic.

We think you will be too!



For More Details Circle (114) on Reply Card