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 genuses 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 ¾ 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

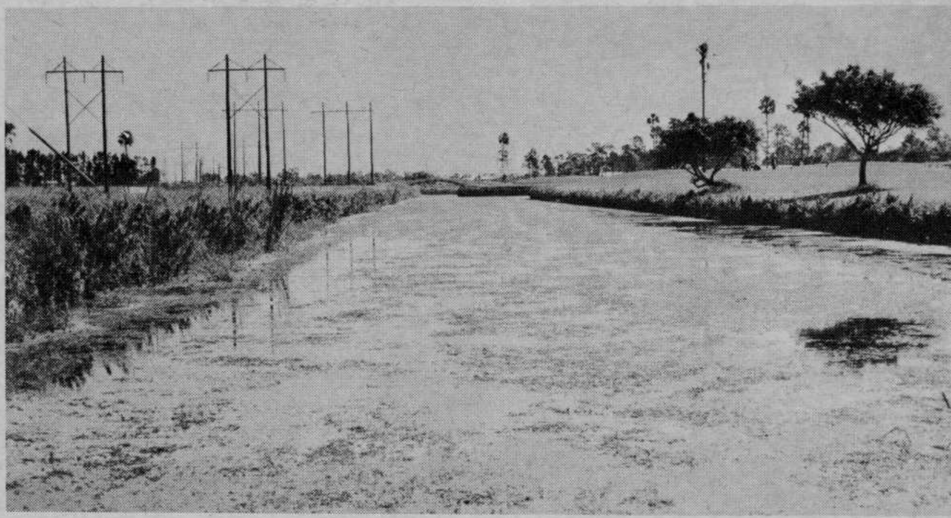


Fig. 1. A flood control canal at time of treatment (top) and the same canal two weeks after treatment with 3 ppmw of the amine salt of endothall for control of hydrilla (bottom).

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.

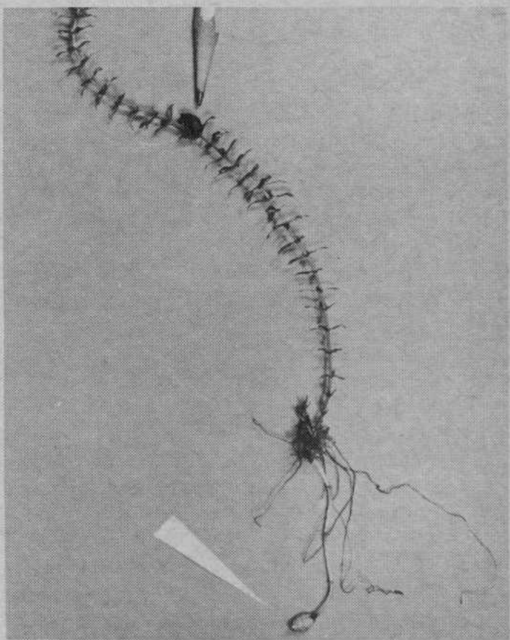
Visual evaluations were made at 2 and 4 weeks and at monthly intervals thereafter until the plot had regrown. A rating scale of 0 — 100 was used (0 = no effect, 100 = complete kill). Percentage of regrowth of the plants in the plot was also recorded at each evaluation.

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

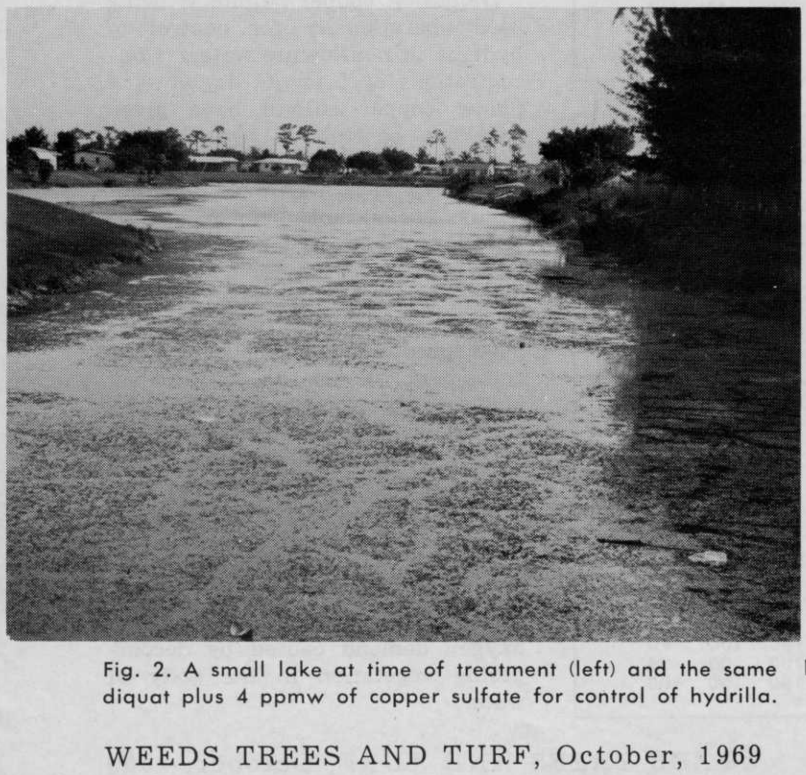
During the past six years, 37 different herbicides have been evaluated in small field-plot experiments on hydrilla. The results of 15 of these herbicides are shown in Table 3. The herbicides were not as active in the field as in the laboratory. It was necessary to increase the herbicidal concentration 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



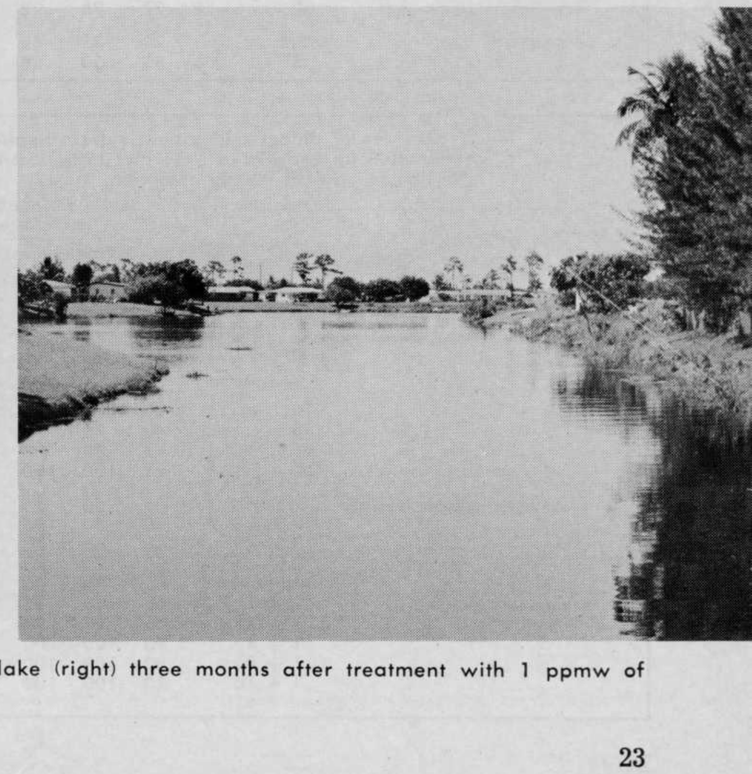


Fig. 2. A small lake at time of treatment (left) and the same lake (right) three months after treatment with 1 ppmw of diquat plus 4 ppmw of copper sulfate for control of hydrilla.

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 algaecide 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."

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.

. . . Since 1928

By PHIL LANCE
Philadelphia, Pa.

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.

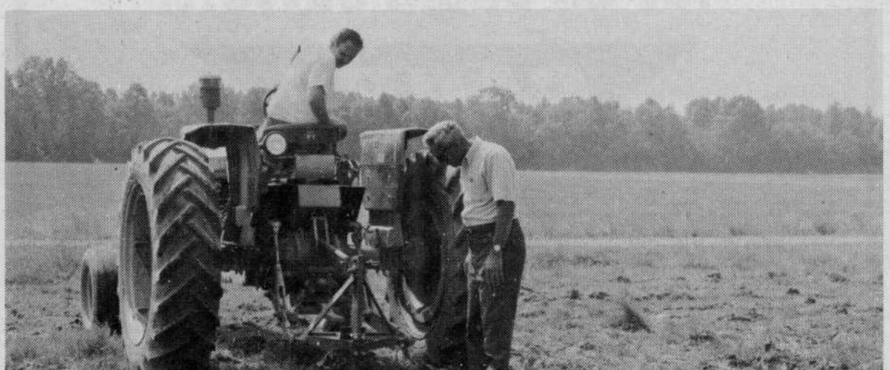
During the years, the elder Cacavio was assisted by his four sons as they came out of school. When the elder Cacavio retired, the four sons took over active management of the business. Under their guidance, Mercer Sod has become a leading grower of sod in the state of New Jersey—winning the 1968 Soil 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.



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

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

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 ¾ 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.

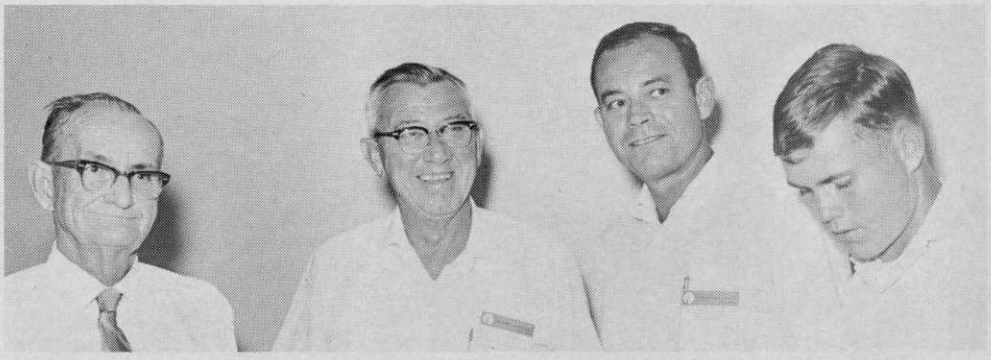
Every operation that takes place in any field is immediately recorded. Whether it is seeded, fertilized, watered or harvested, the date that the activity took place, what the activity was and further remarks are noted for the particular field.

"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.

Turf Beauty Key: Irrigation



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 . . .

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. 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
(Cyrtepistomus 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)

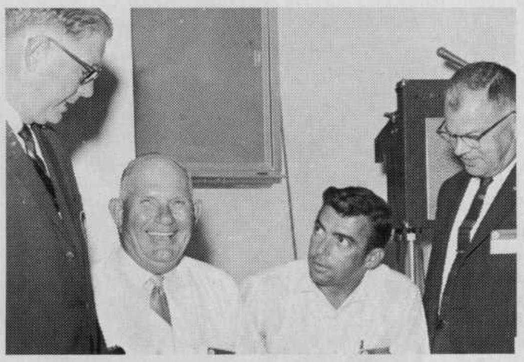
OKLAHOMA: Percent damage on mimosa 30-70 in Hughes, McCurtain, Pittsburg, and McIntosh counties. All except Hughes new records. TENNESSEE: Damage and webbing heavy in Davidson, Montgomery and Robertson counties.

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

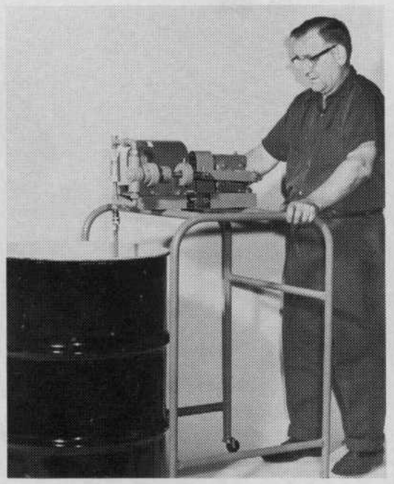
Research to learn how pesticides are metabolized by plants will be conducted at North Dakota State University, Fargo, under a two-year grant awarded by the U.S. Department of Agriculture.

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.

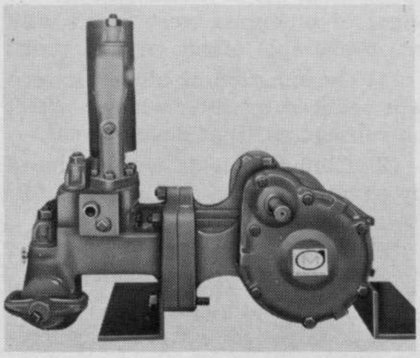
Findings are expected to add to a better understanding of pesticide susceptibility and resistance in plants and to improved pesticide management.



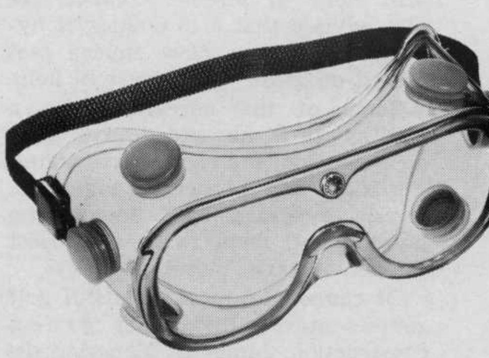
Hills-McCanna Division, Pennwalt Corporation, Carpentersville, Ill., announces a new portable chemical additive proportioning system called "Piggypak." It enables the proportioning of chemical additives direct from shipping containers. The pump is mounted on a tubular welded frame with casters. Pump, 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

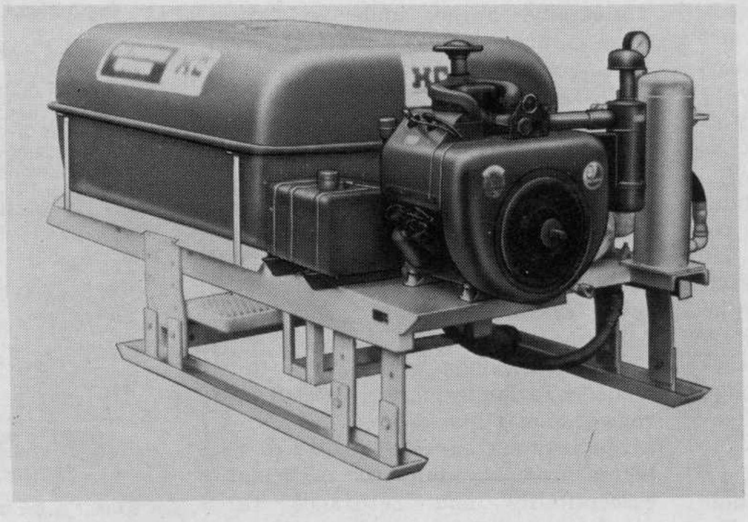
Smith Welding Equipment Division of Tescom Corp. of Minneapolis has developed a new Powder Braze Torch for high-speed, high quality hard surfacing, brazing, build-up, and welding. It features a powder flow selector dial, which provides the right amount of alloy powder for job being done. Reduces need 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-heavily 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.