"Manatee", underwater weed cutter, clips waterchestnut 8 in. below water surface. Conveyors dump harvest into a large basket that holds over 100 cu. ft. of the water weed.

at beaches, creating a barbed hazard for barefooted swimmers.

We are not certain how the plant spreads. Rosettes cut from their stems carry seeds for long distances, but an abscission layer, or break joint, that would allow rosettes to break free from the underwater stem without some severe disturbance hasn't been found. The spread of new plants, though, indicates that seeds are waterborne, probably on the rosettes. New infestations are usually found in the very shallow water at the top of marshy areas or in thick beds of aquatic weeds. The barbs on the spines can very easily attach to animal fur, and this may account for the spread of the plant to some areas.

Maryland authorities are concerned about lasting control of waterchestnut because the plant can thrive at depths of 15 ft., even after the rosettes have been cut off.

Extended Controls for Twelve-Year-Old Seeds

Because waterchestnut reproduces only from seed, it is possible to eradicate the species from an area by destroying the plants before they have set seed. However, the seeds can remain alive for at least 12 years, which means that complete control is necessary for that long. To date, most control measures have been mechanical, but testing with various chemicals is underway.

The first control attempts were made by the Corps of Engineers in the Potomac River back in the early 1920's. Rosettes were cut from their stems and allowed to float in the tidal currents to salt water, where they were apparently killed. Rosettes were cut with commercial and homemade weed cutters, and after 10 years of annual cutting, the infestation was reduced to a very low level. But the species was never completely eliminated from the Potomac system. The Corps still sends a crew of men into the field each year to hand-pull whatever plants they can find. In the summer of 1965, they pulled 41 plants, roughly the number removed annually by hand for the last six years.

In 1955, large patches of waterchestnut were discovered in the Bird River, a tributary of the Gunpowder River. The Maryland Departments of Game and Inland Fish and Tidewater Fisheries initiated a program to control the floating pest in the Bird River. Both Hockney underwater cutters and 2,4-D were used. After seven seasons of work, the project ended with the weed seemingly eliminated.

Then, in 1964, several large patches covering two or three acres were again discovered in the Bird River, and a rather severe crop of waterchestnut turned up in the Sassafras River. The greatest concentration was in Turner's Creek, a tributary of the Sassafras. A limited effort was made in the summer of 1964 to control the chestnut with cutters and chemicals, but previous commitments prevented an all-out effort at that time.

"Manatee" Joins the Team

In 1965, a full-scale project began to eradicate waterchestnut from the Sassafras water system. An aquatic weed harvester and transport barge were purchased from the Aquatic Controls Corp. of Hartland, Wis. The harvester, dubbed the "Manatee," is carried on an 8 ft. by 20 ft. barge. Its cutting head is 10 ft. wide and adjustable to depths down to 4½ ft.

A series of wire-mesh conveyor belts dumps the cut weeds into a large basket at the back of the craft. The basket, which holds more than 100 cu. ft., is emptied onto the deck of the transport barge. This 8 ft. by 24 ft. barge also has a conveyor belt that runs along the deck and feeds an elevator belt at the bow, enabling us to dump the cut weeds into a truck or on shore above high tide. The Manatee can enter and leave the water under its own power since its front wheels are power driven, both machines being

Waterchestnut first became a real problem in Maryland tidewaters in the early 1920's. Infestations spread under incomplete control measures until it took an all-out effort, here described by author Elser, to harness the weed and clear the waterways.

equipped with wheels for towing over land.

The Manatee cuts waterchestnut best when the cutter head is lowered about 8 in. into the water. Since a mass of rosettes is rather fluffy and unmanageable, some fall back into the water, so we have a skiff follow the harvester to pick up overboard plants.

Harvest Storage: a Problem

At first, we carried the cut weeds on the transport barge from the Manatee to the shore where they were dumped above the high tide line. However, we couldn't stack the plants out of reach of the next high tide, which carried some away again. It became necessary to hold the cut rosettes at a dump site. Because of the large area vulnerable to new infestation, and because floating rosettes carry seeds for long distances, we installed a semicircular chicken wire fence along the shore for a dump area. But, at very low tide we couldn't get close enough to the fence to deposit the plant material, and at very high tide some of the plants drifted over the top of the barrier. We then tried snow fencing that was formed into a circle and pushed into the mud floor of 2-ft.-deep water. At very high tides, however, the entire mass of plants floated over the top of the fence.

Eventually, we found a satisfactory solution to the disposal problem. We made a square frame of 2 by 4's, 12 ft. long, and nailed a 50-ft. roll of snow fence on the outside of this with the fence staves extending 1 ft. above the framework and 3 ft. below. Placed in the water and anchored by a stake, the bin formed a "bottomless pit" capable of containing an enormous amount of plant material.

When a mass of plants is confined in the pit, it dries on top and rots on the bottom in the water. In about a day, the plant mass is reduced to only a fraction of its original volume. This process allowed us to fill the pit every day. In spite of its almost infinite capacity, several of the "bottomless pits" were built since, on days when cutting was going well, a single bin could become overloaded. Plant material could not escape from above or below the bins because they followed the high or low water level. After two or three weeks of drying and rotting, the plants became so tightly matted that we could anchor the plant mass by staking through its center into the bottom of the stream. The bin was removed and the weedy flotilla left to rot while we used the bin at another operating site.

"Bottomless pit" proved the solution to disposing of the harvest. Disposal bin of snow fence tacked to a 12 ft. square frame rides with the tides and has an almost limitless capacity. Cut, trapped weeds rot in two to three weeks, then bin is removed.

Single Plants Picked With Ten-Foot Pole

Waterchestnut infestations vary in size from single, widely scattered plants to dense mats covering many acres. The Manatee can work efficiently only on the large patches, because the machine is too clumsy for sharp maneuvering where plants are scattered. The solitary plants are best controlled by hand pickup. This operation is just what it seems, that of picking the rosettes by hand, generally with the aid of a rake or other tool. We found the best tool was an apple picker at the end of a 10-ft. pole.

Three two-man crews worked on waterchestnut pickup during the summer of 1965, with one of these following the Manatee and the others handpicking. The crews used 16-ft., flat-bottomed boats made of plywood. Boats had no center seat so that large loads could conveniently be carried. They were powered with 9½-hp. outboard engines, which were mounted on adjustable transoms and rigged with weedless propellers. With these craft, we were able to cut through heavy weed beds and travel through as little as 3 in. of water.

Infestations too scattered for the Manatee and too dense for hand pickup presented a problem difficult to solve. We tried a smaller cutter, the "Manette" by the same maker, which cut the waterchestnut very efficiently, but wasn't equipped to remove weeds from the water. Finally we compromised: we used the Manatee on patches that were really too small for it and handpicked even moderately large patches. We are now planning to use a custom-made cutter designed for operation on the in-between infestations.

Rosettes Seed After Cutting

To see if rosettes would continue to develop after they were cut from the stem, a "bottomless pit" was used to confine tagged rosettes in the water. We found that plants which were cut before the blossoms had matured continued to develop and produced normal seeds. These results con-

firmed experiments that have been carried out in New York State and justified the use of "bottomless pits" to keep rosettes from floating away after they were cut.

Plant Shows Fourfold Annual Increase

In 1964, we were able to work only some two weeks on the waterchestnut problem. Of 100 acres in the Sassafras River system, we cut about 30 acres in Turner's Creek at that time. By June 1965, only scattered plants marked the areas cleaned out in 1964, whereas the uncut areas were covered with dense mats of waterchestnut. We estimated that the infested area increased about four times in the untouched portions of the creek. If this was an accurate estimate, it indicates that three-fourths of the chestnut must be destroyed each year just to hold an infestation at status quo.

Salt May Halt Regrowth

In mid-July 1964, new growth appeared at the surface less than a week after cutting. These rosettes were small and did not set seed. In 1965, however, there was almost no regrowth. We think that the salt content of the water may have prevented regrowth in 1965, although we were not able to detect salt in any part of the Sassafras system. Frequent measurements by various agencies show that salt content of the Chesapeake Bay has been increasing for three or four years; by September, salinity in one fresh-water area on the Susquehanna flats had reached three parts per thousand (ppt.). In August, we found rather heavy sets of barnacles in most of the tributaries of the lower Sassafras, and these barnacles cannot survive in water with less than 4 ppt. salt.

On waterchestnut we had not yet cut, the outer leaves of rosettes turned brown and fell off. Many of the stems rotted and remaining rosettes floated away with their seeds. In the summer of 1965, we cut some 180 acres of chestnut; the salt water intrusion, we believe, finished the job for us.

Need More Data on Pesticide Risks, Maryland U. Conferees Are Advised

"We have some information on the risks involved in the use of pesticides, but we need more," Dr. J. E. Dewey, of Cornell University, Ithaca, N.Y., told delegates to the Sept. 27-28 Northeastern Arborist-Nurserymen's Pesticide Application Conference at the University of Maryland, College Park.

Dr. Dewey noted that continued employment of pesticides is a must, but cautioned that the safest chemical that will do a given job adequately should be used. He called for increased emphasis on the use of sprays rather than dusts, and on use of more carbamate and organic phosphate pesticides which leave less residue than some others.

Attended by more than 75 arborists, nurserymen, pesticide coordinators, and others, this was the third in a series of custom applicator schools sponsored by the University of Maryland and the Northeastern Pesticide Coordinators.

Program speakers included Dr. John A. Weidhaas, Cornell University entomologist, who talked on "The Chemical Aspects of Shade Tree and Nursery Insect Control"; Horace Webster, National Park Service plant pathologist, who described municipal pest control in the Capital region; Dr. Charles W. McComb, University of Maryland entomologist, who headed a session on "Recognition of Some Important Insects of Shade Trees and Their Control"; Dr. Edward Duda, of Bartlett Arboretum, Stamford, Conn., who discussed "Hydraulic Application of Pesticides"; and Dr. James L. Brann, Jr., Cornell University entomologist, who covered "Some Factors Affecting Air-Blast Sprays."

Highlight of the two-day meeting was a guided tour of the 415-acre National Arboretum, in Washington, D.C. Participants viewed plant research projects and discussed measures used at the Arboretum to control pests of trees and shrubs. Anyone interested in additional information on the conference series should contact chairman David Shriver, chemical-pesticide leader, Department of Entomology, University of Maryland, College Park, Md. 20742.

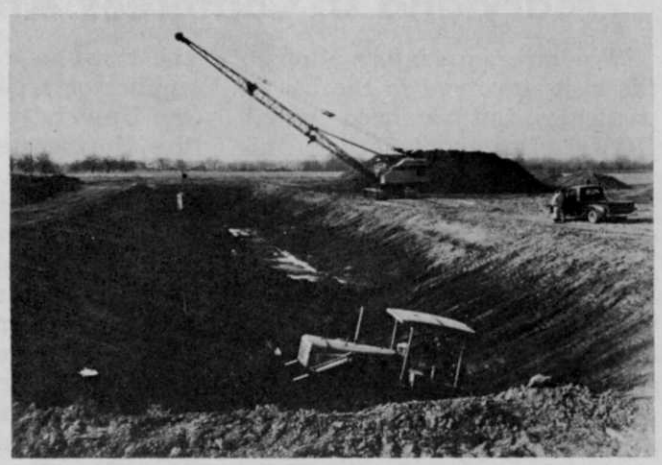
Centrifugal Spreader Gives Speedy Broadcast

The Diadem centrifugal fertilizer spreader is capable of broadcasting all types of fertilizers, lime, seed, granular herbicides and insecticides with precision in one-fifth of the time ordinarily required, according to The Vandermolen Co., North Caldwell, N.J., which has introduced the equipment in the U.S.

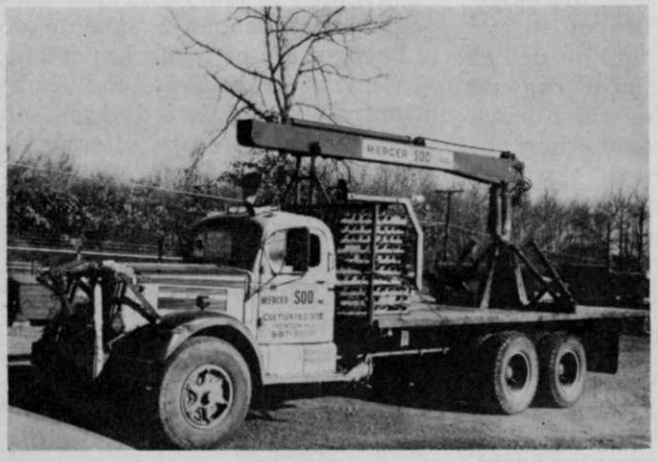
Diadem can cover up to 12 acres per hour with even swaths of 35 ft. and more, Vandermolen says. Spinner disk, scoop blades, and feed outlets are designed and matched to provide uniform placement of all types of material. Tractor speeds up to 10 m.p.h. can be used, and a simple adjustment will vary coverage from 9 lbs. to 2,600 lbs. per acre.

The Diadem spreader's conical steel hopper has a 700-lb. capacity. Spinner assembly and setting controls can be removed without the aid of tools for quick cleaning of parts. For complete information and illustrated literature on the equipment, which is manufactured in West Germany, write to The Vandermolen Co., 378 Mountain Avenue, North Caldwell, N.J. 07006.

Diadem centrifugal spreader holds 700 lbs. of fertilizer, seed, or herbicide, spreads at speeds up to 10 m.p.h.



Drainage ditch being cut (right) will flow into one of three reservoirs. All work except heavy excavating is done by Mercer.



Outfitting all trucks with boom loaders (left) has expedited shipments, reduced cost of unloading palletized sod.

Reservoirs Overcome Drought For New Jersey Sod Grower

By ALBERT S. KESHEN

Only by installing a network of reservoirs and drainage ditches has an expanding New Jersey sod farm been able to overcome the serious drought condition that faces the Northeast. Mercer Sod, Inc., began to grow sod about 15 years ago on 140 acres of poorly drained land off Route 206 in Springfield Township, N. J. Today, in spite of a heavy clay soil that once supported only poor crops of soybeans, corn, and hay (and even these used to be under water for three or four months at a time), Mercer has increased its productive land to nearly 600 acres.

One of 25 or 30 sod farms in a blossoming, $5 million New Jersey industry, Mercer's sod operation started as an offshoot of the Mercer Contracting Co., landscape contractors. Much of the sod produced goes into Mercer's landscaping jobs, and the company considers itself one of the largest turf contractors in the state. The four brothers who own and operate the two businesses, Frank, Dominick, James, and Victor Cacavio, readily admit that their rapid expansion has been made possible by improvements in the water situation, together with increased reliance on mechanization and the advantages of conducting a diversified operation. They credit a good part of their growth to the U. S. Department of Agriculture's Soil Conservation Service, which helped plan their drainage and irrigation system.

Three Irrigation Ponds Collect Water

When the Cacavios began to grow sod back in the early '50s, they called upon Soil Conservation technicians to design several drains to get rid of excess water standing in surface depressions. Results were so impressive that the owners decided to cut shallow, V-shaped, grass-lined drainage ditches in each field, and also to perform additional shaping and grading of the land so that water readily flowed into the ditches.

"We had to rely completely on surface drainage because our soil is so heavy," Victor Cacavio says. "The S.C.S. people came up with a plan to run the ditches into one end of each of three irrigation ponds and out the other end. This way we keep as much rainwater on the farm as we can without ruining the sod. They also suggested several diversion channels to run crosswise on our 40-acre sloping field to stop the lower half from eroding after we cut sod. We now find that these diversion channels also keep water off our low, flat areas."

For the irrigation system, three ponds have been constructed and a fourth is planned. All construction on the drainage-and-reservoir system, except for the actual excavation of the ponds, was done by Mercer, which uses heavy earth-moving equipment in its landscape operations. Ponds are 70 ft. by 400 ft. by about 20 ft. deep, and are centrally located in the fields to reduce the amount of irrigation pipe required.

Shallow ditches are spaced about every 200 ft. apart in the fields. These drain into the main ditches, which in turn drain into and through the reservoirs. When the reservoirs have reached capacity, about 2 million gals., excess water overflows into ditches on the other side, preventing a backup of water in the sod fields. From reservoirs, three irrigation pumps, capable of handling 750

gals. per minute each, pump water through the main lines to portable 4-in. laterals. By the use of a "wheel move," hooked up to a series of pipes, one man can move up to 1,700 ft. of pipe without help, another of Mercer's labor-reducing innovations.

As new land is put to work cultivating sod, Mercer is continually expanding its drainage and irrigation system. More than 24,500 lineal ft. of V-shaped ditches have been constructed in the past year alone. With the continuous flow of water from ditches to reservoirs to irrigation lines, surface water is no longer a serious problem on the farm and adequate water is available for necessary irrigation. "Our sod farm is an outstanding example of what can be done with land which is affected by a serious drought situation," the four brother-owners echo with pride.

Drainage System Serves Field Grading and Roads

All the earth dug from ditches and ponds on the farm is used to shape and grade the sod fields. The grading serves a twofold purpose by permitting even distribution of irrigation water along with the drainage benefits. A factor that had to be considered when putting in the drainage system was the farm's network of well-graded roads, designed to permit heavy trucks to get as close as possible to each sod cutting site and to permit loaded trucks to pull out without becoming bogged down.

Drought in the Northeast, together with a heavy clay soil and serious drainage problems threatened Mercer Sod Farm's production. Today, Mercer has quadrupled its acreage and production is booming.

"Our operation is geared to top efficiency and we eliminate as much hand labor as possible," Victor Cacavio explains. "We can't make a profit hand-carrying strips of sod long distances, or pulling trucks out of the mud. The Soil Conservation Service people took this into consideration when they planned the original drainage layout and also when we bought additional ground."

Some time ago, the firm decided to initiate an efficiency program calling for greater mechanization. One of the first steps was to install Side-O-Matic unloaders on their fleet of trucks, which includes both medium-size vehicles for nearby deliveries and tractor-trailers for long distance sod hauling. Trailers can handle 8,000 to 10,000 sq. ft. per load. Mercer's total delivery capacity is up to 70,000 sq. ft. of sod per day. To match this delivery capability, sod harvesting had to be speeded.

Ryan sod cutters are used to cut sod into 1-ft. by 4-ft. strips, which are then hand-loaded onto nearby pallets. Forklift tractors transport the pallets to delivery trucks, which can be pulled in close because of the road network. Mercer figures that four to six men are eliminated by this type of operation, and loading is much faster. By the use of unloaders, the time and labor savings also extend to delivery of the sod. Since no hand labor is involved in the unloading process, handling of sod is minimized. Drivers can now load and unload in about 20 to 30 minutes, as compared to two to three hours for handwork with four to six men per truck.

Sod Farm Geared to Diversified Operation

Mercer Contracting Co. is, quite naturally, the sod farm's best customer. The landscaping contractor purchases from outside sources all the shrubs, flowers, and other plantings needed for its projects. But, because of its sod farm, the company is often called upon for consultation when projects calling for extensive turfgrass areas are planned. Turfs of Kentucky bluegrass-fescue mix, Merion bluegrass-Kentucky bluegrass-fescue mix, and straight Merion have been sodded throughout New Jersey by the contractor. Mercer Sod Farm also retails sod and sells to other nurserymen-contractors.

In its landscaping work, Mercer is geared to perform the complete operation, starting with clearing and grading, on to placing of topsoil, sodding or seeding, planting, and mulching. Specialized equipment, such as earth borers and hydraulic seeders, gives the organization large-job capability. "Such capability for covering the entire field of landscaping enables us to take on more work, and makes us more adaptable for all phases from layout to follow-through than the split operators," James Cacavio says.

He also points out that another important advantage of such a comprehensive setup is that the

Brother-owners of Mercer Sod Farm and Landscaping divide management duties. Shown here (left to right) are Victor, Frank, and Dominick Cacavio. Missing from photo is James.

company can function throughout the entire year with minimum layoffs of personnel. During winter months, Mercer keeps all of its key men busy with snow removal and equipment maintenance, and does its project planning then so no work time is lost. As a result, it can function as a year-round working force instead of a seasonal force, as do most of the nearby contractors. A crew of 80 to 125 men is employed on projects and another 15 on the sod farm, with some exchange of personnel to meet peak requirements. Of the farm crew, eight men are employed year-round, with the others assisting during the April-to-October cutting season.

Brothers Split Management Duties

Mercer Contracting Co., parent organization of the Mercer Sod Farm, was established in 1948 by the four Cacavio brothers, who began as small nurserymen and landscape contractors and have gradually extended the scope of their operations. The managerial duties are divided among the quartet, with Dominick as project manager, Frank in charge of the sod farm and maintenance, James as general manager, and Victor as field supervisor and expediter.

All of the company's operations are carried out from the central yard and office building, which covers about 30 acres in Trenton, N. J. In back of their one-story office building is the garage, which houses over 100 pieces of equipment, including tillers, harrows, mulching machines, equipment trailers, graders, scrapers, hydraulic seeders, mowing equipment, dump trucks, some 15 tractors, pickup trucks for the use of supervisory personnel, loaders, and four dozers.

Mercer belongs to the New Jersey Nurserymen's Association, Landscape Information Service, Landscape Contractor's Association, and the Cultivated Sod Association of New Jersey, of which Frank Cacavio is vice president.

Experts Advise How To Ready Trees and Shrubs for Winter

Trees and shrubs will better withstand the ravages of winter if watering is discontinued until the leaves have fallen, C. M. Drage, Colorado State University extension horticulturist, advises. Late-season watering produces soft or succulent wood that is susceptible to winter injury. Conifers and the main stems of broadleaf plants are particularly vulnerable.

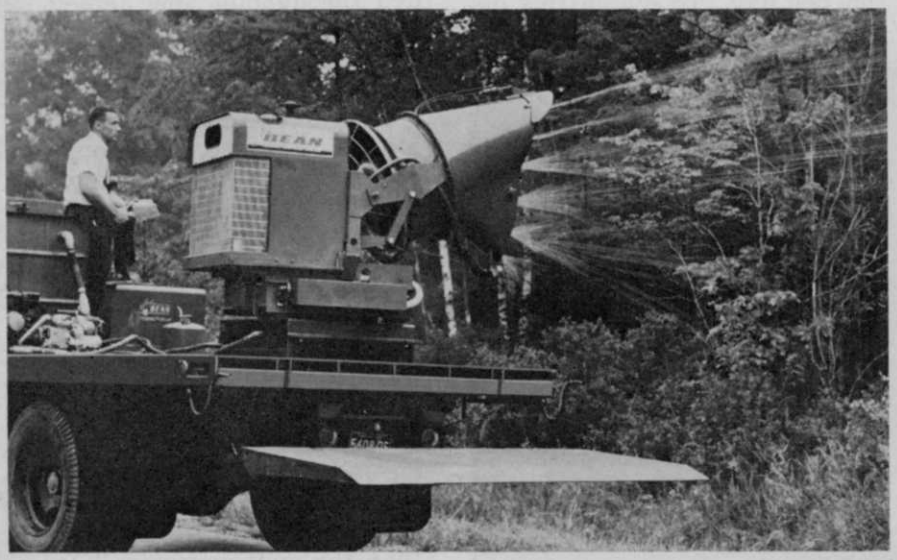
Conifer damage is usually apparent on the southwest side of the foliage. Arborvitaes are also liable to be damaged by winterburn. This problem is caused by rapid temperature changes, Drage points out. Researchers say that leaf temperatures on a sunny winter day may exceed 70 degrees even though air temperature is below freezing. When the sun sets, leaf temperature drops quickly with resulting injury. Main stems and leaves of deciduous trees often show symptoms of frostcracks and sun-scald during the winter, he adds.

Wrap Thin-Bark Trees

James Nighswonger, extension landscape architect at Kansas State University, recommends wrapping the trunks of such thin-bark trees as sugar maple, tulip, American linden, flowering dogwood, and magnolia with a commercial tree wrapping to prevent winter sun-scald. Wrapping should be removed when the weather warms in the spring. Nighswonger also suggests applying a wilt-preventative spray to broadleaf evergreens to reduce leaf drop and winter damage.

Mulches around the base of trees and ornamental plants will help get them through the cold weather in good shape, the experts say. Nighswonger suggests using wheat straw, leaves, pine needles, shredded bark, and even peat moss if the site is protected from the wind. Advising against the use of grass clippings for mulch, he adds that mulches should be about 4 to 6 in. deep and should stay where they are placed without being compacted. Mulches should not be used until after several hard freezes have occurred. Mulching reduces the loss of moisture and moderates the alternate freezing and thawing of soil that is a prime cause of winter damage, the extension landscaper concludes.

The experts advise thoroughly soaking the soil around plants with water before freezing sets in. Drage adds this hint: overfertilized trees are especially susceptible to winter injury; fertilize only in the early spring.



Broadcast pattern spray head introduced by John Bean, is shown here operating from hand-held remote controls. The attachment, called "Rotocast," is powered by a 4-cylinder, air-cooled engine, and can discharge 10 to 40 gals. of spray per minute at 40 p.s.i. Remote controls rotate the sprayer 210 degrees horizontally. Air stream is adjustable through an arc 45 degrees downwards and upwards. More complete specifications can be obtained by writing for Catalog L-1496, to John Bean Division, Box 9490, Lansing, Mich.

Turfgrass Tolerances Do Differ

(from page 7)

ing bentgrasses, particularly at the higher rates.

The use of trifluralin is declining since injury to all types of turfgrasses has been reported often enough to question its safety. It also has a very narrow safety margin for application. However, a recent analog of trifluralin, benefin, offers promise for improved safety on turfgrasses while at the same time giving good control of annual weedy grasses.

Herbicide Selectivity Calls for Careful Usage

Some herbicides exhibit considerable selectivity. Tupersan is one of these. It exhibits a high degree of safety on some grasses but causes serious injury to others. This chemical has appeared safe on newly seeded bluegrass, perennial ryegrass, and creeping bentgrasses, such as Penncross, Seaside, C-1, C-7, C-19, and Highland and Astoria colonial bentgrasses. Mature turfs of red fescue, Kentucky bluegrass and a few creeping bentgrasses show good tolerance, yet warm season grasses such as the bermudagrasses have been severely injured. This chemical has not yet been recommended for use on golf putting greens.

Another herbicide which has caused injury on bermudagrasses and zoysiagrasses is Betasan. This chemical, like tupersan, tends to be safer on cool season turfgrasses. Betasan gives excellent control of annual bluegrass in bent greens with little or no serious injury to the bentgrass. Treatments for annual bluegrass in bentgrass greens should be made in late summer to early fall and again in early spring.

Two excellent herbicides for general turfs are Zytron and Azak. At recommended rates these chemicals are safe on most turfgrasses but can cause some injury to bentgrasses. They are not normally recommended for use on bentgrass greens.

Bandane and chlordane are two herbicides which are usually safe on turfgrasses. Due to their tendency to persist and build up to toxic levels under droughty conditions, the turf should be adequately irrigated throughout the season following their use.

Two preemergence arsenical herbicides which have been available for several years are calcium arsenate and lead arsenate. Although bermudagrasses show good tolerance to these herbicides, cool season grasses can be easily injured. These inorganic arsenicals are not recommended for use on St. Augustine or around ornamental plants with shallow roots. They are good herbicides and give a high level of persistence for a second year's control of annual weedy grasses. They give good control of annual bluegrass. Lead arsenate is still favored by many golf course superintendents for the control of annual bluegrass and crabgrass in golf greens.

The important fact to remember in using any herbicide is to apply it at the correct rate at the proper time. Use an herbicide only on a turfgrass known to be tolerant to it and read the label and follow the directions precisely.

Friend Announces TracTank Sprayer

The TracTank Sprayer, a new compact sprayer for herbicide application, was recently introduced by Friend Mfg. Corp. It can be used with 2- or 3-point hitch tractors and is effective for weed and brush control, while a specially designed tree boom provides swath or individual tree base herbicide application, the company reports. Available with 2- or 4-cylinder plunger-type pump, the sprayer features a mechanical agitator for its 100-gal. epoxy-lined tank, and is said to have the easiest pickup and dropoff operation in its field.

Specifications and more information on the TracTank Sprayer will be sent WTT readers who ask for them from Friend Manufacturing Corp., Prospect St. & East Ave., Gasport, N. Y. 14067.

Featured speakers, Mitchell Wrich (left), and Professor F. L. Steve O'Rourke (right), pause at the arboretum during the shade tree course to talk with C. Gus Hard, extension horticulturist at the University of Minnesota, host for the meet.

Minnesota Shade Tree Course Stresses Planning Before Planting

"Nurserymen, arborists, city planners, and park managers should coordinate their efforts more than they do now if we are to realize the goal of unified horticultural programs," Professor F. L. Steve O'Rourke told an audience of 220 at the University of Minnesota's Fifth Annual Shade Tree Maintenance Short Course, held at the University Arboretum, Sept. 20.

Speaking on various aspects of tree programs, particularly in cities and parks, O'Rourke maintained that dialogue between planners and nurserymen is too often lacking. "Planners often do not give nurserymen sufficient lead time to provide desired trees." He advocated long range planning and contract arrangements that would allow nurserymen time to acquire stocks of clones for street and park planting. O'Rourke, horticulturist from Iowa State University, Ames, and Mitchell Wrich, of Chemagro Corp., Kansas City, Mo., were featured speakers on the shade tree program.

Arborist's Image

"In many places, the image of the arborist and nurseryman has been hurt by unscrupulous or unqualified persons," O'Rourke said. Calling upon arborists to establish standards for superior workmanship and a code of ethics for the profession, he advised them to base prices on cost studies and make sure they have sufficient profit margins on both material and labor.

Arborists should work not only to improve their public image, but to create more public interest in tree planting programs, the Iowa horticulturist noted. Personal contact, establishment of arboretums in parks, even labeling trees in public areas, are ways to stimulate interest.

Planners and others involved in tree programs should remember, he continued, that houses have changed radically in the past 50 years; trees once suitable are hopelessly out of scale with modern surroundings. Size and shape of a mature tree, need for pruning, disease resistance, and proved adaptability are factors to be considered before making the final selection of species to plant.

Although advocating the planting of clones of the same variety and size along a particular street, O'Rourke counseled against using the same species throughout a neighborhood. "Use of different species on alternate streets helps to insure that disease will not wipe out the tree population of an entire area."

Systemics Long on Protection

Systemic insecticides, applied on the plant or through the soil, are particularly good protection against sucking insects such as aphids, Mitchell Wrich related in his discussion of new developments in systemic and low-volume, high-concentrate pesticide applications. The greatest value of systemics, Wrich said, is that one application in spring will often provide season-long protection thus freeing arborists for other tasks during the busy summer season.

Low-volume aerial applications of highly concentrated pesticides can be very effective in amounts as small as 2 ozs. per acre, Wrich told the gathering. This type of application has significant potential for control of pests such as tent caterpillars in large acreage plots and forest areas.

Sponsors of this short course are the Department of Horticultural Science and the Agricultural Extension Service of the University of Minnesota, St. Paul.

Pennlawn Superior in North, Beard Tells Mich. Turf Day

Pennlawn fescue has shown superior drought and low temperature tolerance, as well as overall quality under northern conditions, Dr. James Beard, Michigan State University turfgrass researcher, told more than 200 turf specialists at the Northern Michigan Turfgrass Field Day in Traverse City, Sept. 13.

Continuing his evaluation, Beard, who was in charge of the program, noted that Chewings, though outstanding for the first two years of trials, has since deteriorated. Common creeping and Rainier have proved very susceptible to low temperature, the turf expert commented.

Opening with a tour of turf plots, established in Traverse City because its cool climate and sandy soil is representative of turf growing conditions in many northern resort areas, the day-long program also included equipment demonstrations and discussions of turf research.

The detrimental effect of ryegrass on bluegrass-red fescue turfs is much greater in northern Michigan than in sandy loam soils at East Lansing, site of Michigan State University, Beard

pointed out. "Drier soil conditions favor ryegrass establishment, which in turn suppresses development of bluegrass and red fescue seedlings."

"Under these conditions, the resultant composition of the turf is 80% to 95% ryegrass where only 20% to 33% rye was seeded three years ago. During winter, ryegrass will be seriously thinned by winterkill, resulting in a low-quality turf," Beard concluded.

"National Policy" Theme Of February WSA Meet

"The National Policy on Weed Control" will be the theme when weed specialists from all over the country gather at Washington, D.C.'s Statler-Hilton Hotel for the 1967 annual meeting of the Weed Society of America, Feb. 14-17.

Registration will open at noon, Monday, Feb. 13, and general session and sectional meetings are slated to begin Feb. 14. Program for the '67 meet will also include a tour of the U. S. Department of Agriculture research facilities at Beltsville, Md., on Tuesday afternoon. While weed experts are discussing latest contributions to the field of weed science, a ladies program will tour places of interest in Washington.

Dr. William R. Furtick, Farm Crops Department, Oregon State University, Corvallis, is president of the society. President-elect and program chairman for the Washington conference is Richard Behrens, Department of Agronomy and Plant Genetics, University of Minnesota, St. Paul. Other officers are Dayton L. Klingman, Agricultural Research Service, Beltsville, Md., secretary; F. W. Slife, Department of Agronomy, University of Illinois, Urbana, treasurer and business manager; and E. G. Rodgers, Department of Agronomy, University of Florida, Gainesville, editor of "Weeds," the society's publication.

Further program details will be announced in coming issues of *Weeds Trees and Turf.*

Know Your Species

KOCHIA

(Kochia scoparia)

Kochia, a native of Eurasia, was originally introduced as an ornamental and is still cultivated as such under the name of summer cypress. The young plant is a dark green, turning reddish as it matures, so that it is also known as fireweed, burning bush, and Mexican fireball.

Kochia is found throughout North America having spread very rapidly in recent years. This drought-resistant, bushy plant is most common in the Plains States. Kochia grows under most soil and moisture conditions, thrives in dry, alkaline soil, and is often found in pastures, croplands, rangelands, and fields.

In the fall, the kochia plant separates from its taproot and tumbles over the ground, distributing seeds widely. Seed are a common crop-seed contaminant.

An annual plant, reproducing by seed, kochia grows from a few inches to over 6 feet tall. Smooth, green stems branch considerably (1). Numerous alternate leaves are 1 to 2 inches long and are attached directly to stems. Leaves are narrow, hairy, and pointed.

Flowers (2) are small and green, without petals. Flowers and seeds grow in axils of the upper leaves and in terminal spikes. Seeds (3) are oval, flattened, and grooved on each side. Dull-surfaced seeds are brown with yellow markings. One plant will produce over 14,000 seeds, each about 1/16 inch long.

Mowing greatly reduces the amount of kochia seed formed; however, even continuous close mowing may not prevent seed formation. Mowing should be done early before seeds mature. Young plants (under 10 inches) can be well controlled by applying ½ to ¾ pound of 2,4-D per acre. Older plants require more herbicide. Fully mature, woody plants are more difficult to control. Good results in controlling young kochia may also be obtained by using 2,4,5-T or silvex at a 1-pound-per-acre rate, or 2,4-DB at a rate of 2 pounds per acre.

Prepared in cooperation with Crops Research Division, Agricultural Research Service, United States Department of Agriculture, Beltsville, Maryland

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Southern Weedmen Confer In New Orleans, Jan. 24-26

Nearly every aspect of weed control relating to agriculture, industry, and public utilities will be covered when southern weed specialists convene at the Jung Hotel in New Orleans, La., for the 20th annual meeting of the Southern Weed Conference, Jan. 24-26.

The three-day session is scheduled to bring together researchers and educators representing colleges, chemical companies, public health and regulatory agencies, public service organizations, equipment manufacturers, and others from 12 southern states, including Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, and Texas.

President of the Southern Weed Conference is Donald Davis, Botany Department, Auburn University, Auburn, Ala.; Robert A. Mann, Tennessee Valley Authority, Chattanooga, Tenn., is vice president; secretary-treasurer is Dr. H. Hanly Funderburk, Botany Department, Auburn University; Dr. John Baker, Louisiana State University, Baton Rouge, is program chairman; and Robert Z. Torrance, of E. I duPont de Nemours, Baton Rouge, is in charge of local arrangements for the conference.

Noncrop Weed Sessions Set For Jan. 24-26 Calif. Meet

Headlining the Jan. 25 session on noncropland weed control, D. W. Yazell, Engineer of Vegetation Control, Santa Fe Railroad, will describe the Santa Fe's "Railroad Electric Weed Spray Car" to participants in the 1967 California Weed Control Conference, Jan. 24-26, at the Hilton Inn in San Diego.

The railroad has converted two baggage cars into modern spray units, equipped with diesel-driven centrifugal pumps for weed control on trackage that runs from California to Illinois, Texas, and Louisiana. In the same session, Mike Palermo, engineering commission, 11th Naval District Headquarters, will discuss the Navy's increased reliance on herbicides to control unwanted vegetation on shore establishments, and the cost reductions that have resulted.

Other papers to be presented during this session include "Weed Control Under Asphalt Paving," by Carl F. Lind, Asphalt Institute district engineer; "Weed and Brush Control Under Transmission Lines," by C. Elmer Lee, Southern California Edison Co.'s manager of line clearing; and "A Distributor's View of the Industrial Herbicide Market," by Bob Brunner, industrial herbicide specialist for Van Waters & Rogers, Inc. F. R. Ogilvy, western regional manager for agricultural and industrial products, U. S. Borax and Chemical Corp., Los Angeles, will chair the noncrop session.

Participants in the Annual Turfgrass Short Course of the Alabama-Northwest Florida Turfgrass Assn., at Auburn University, included (l. to r.) Dr. Henry Orr, Department of Horticulture, Auburn University; Bryson L. James, technical representative, Hercules Inc., Raleigh, N.C.; Marshall Dugger, Dugger Grass Co., Tuscumbia, Ala.; and Dr. R. D. Rouse, associate director and assistant Dean Auburn University School of Agriculture. Altogether, more than 100 participants and researchers discussed problems in turfgrass management during the Sept. 8-9 meet. Speakers included James, who discussed "Preemergence Treatment for Control of Poa Annua on Overseeded Grasses"; Dr. Orr, who talked about "Trees, Shrubs and Their Care"; James B. Moncrief southeastern agronomist, USGA, Greens Section, Athens, Ga., who delved into the loss of bermudagrass on golf courses in northern Alabama; W. A. Rocquemore, Patten Seed and Turfgrass Co., Lakeland, Ga., whose topic was "Renovation and Reconstruction of Tees"; and Tom Mascaro, West Point Products Corp., West Point, Pa., who reported on problems, including soil compaction and turfgrass wear, caused by golf carts. Dr. D. G. Sturkie, Department of Agronomy and Soils, Auburn, was chairman of arrangements for the meet and directed a tour of turf experiments on fertilization of zoysia, Tiflawn bermuda, and centepedegrass. Dr. Sturkie also described new strains of bermudagrass and zoysia under test at the Auburn plots.

MSU Sees Possible Turf Uses for Subsoil Asphalt

Water holding capacity of the soil is doubled, Michigan State University scientists say, by their newly developed process for installing a thin layer of asphalt two feet under a sandy soil. Asphalt layering may prove valuable for raising turf in such locations as a sandy golf course, they point out. The asphalt layer, about ⅛ in. thick, provides an artificial barrier and allows water to be stored in the zone where it can be readily used by plants.

Developed by two M.S.U. researchers, agricultural engineer Clarence M. Hansen and soil scientist A. Earl Erickson in conjunction with the American Oil Co.'s Research and Development Department, this asphalt layering process is said to have a potential for reclaiming millions of acres of droughty, sand soils. Cost, using the researchers' experimental equipment, is about $225 per acre, but developers feel equipment and application methods can be improved and cost reduced. They expect the asphalt layer would last about 15 years.

"Roots can penetrate the asphalt