WEEDS TREES and TURF

MAY, 1968

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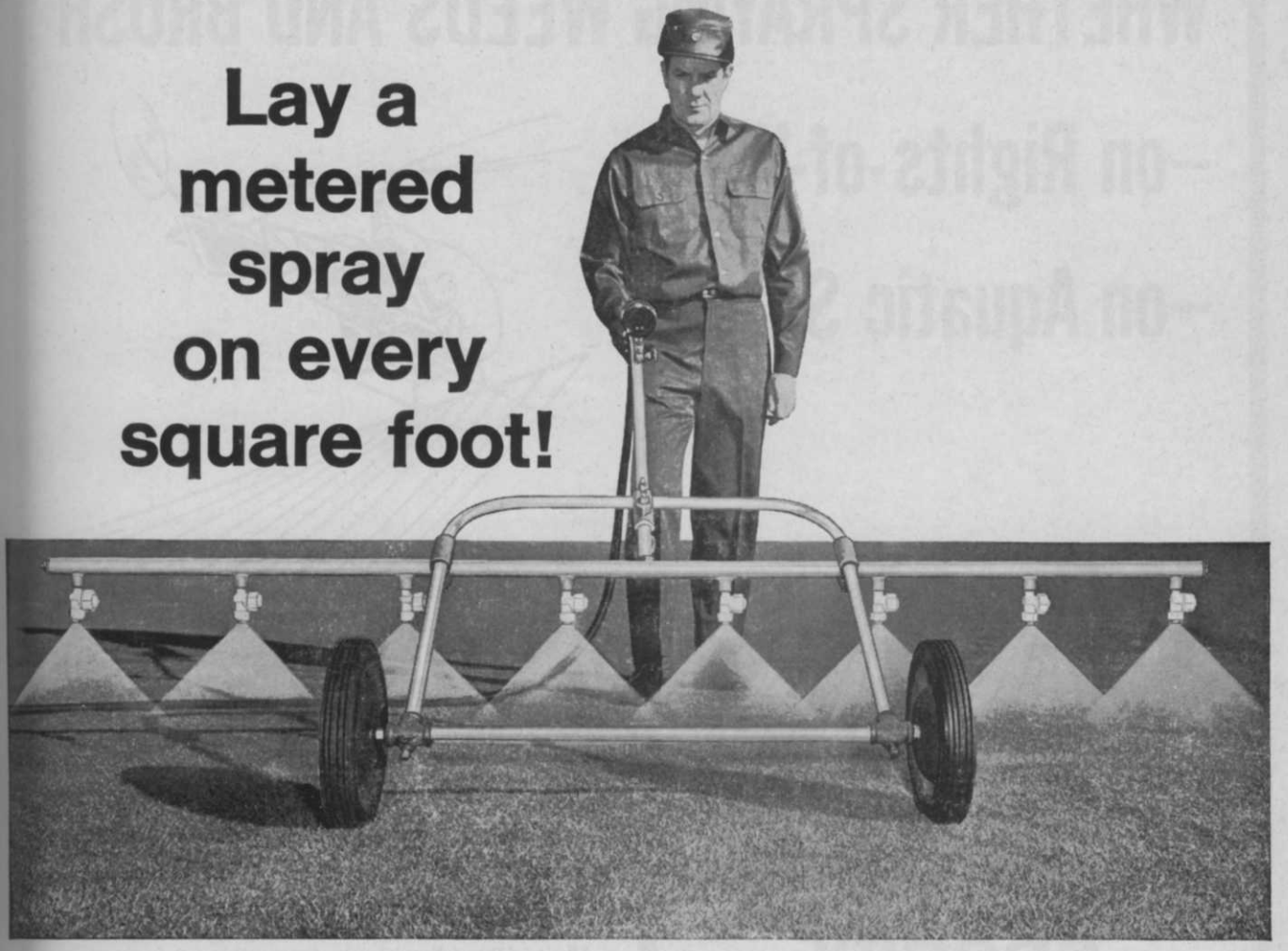

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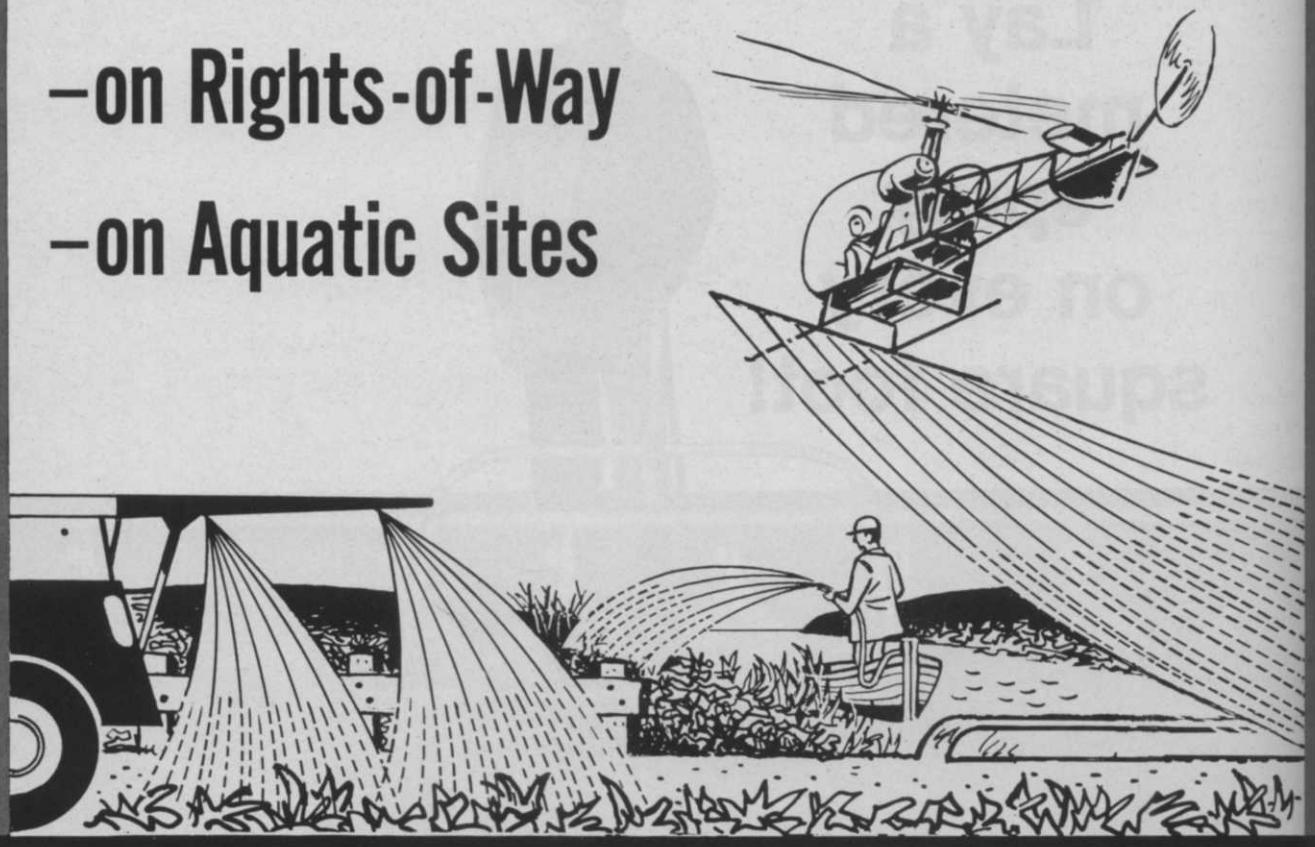

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The Cover

Forest City Tree Protection Company of Cleveland, O., drew a special tree planting assignment this spring. Four of 52 original sugar maples needed replacement on Erieview Plaza, an early phase of the bright new look for Cleveland which is a part of the Urban Renewal Program.

The Plaza adjoins Erieview Towers, Cleveland's new skyscraper, and overlooks Lake Erie. Original trees were planted by Ed Irish, Charles F. Irish Co., Inc., Detroit, Mich., 3 years ago.

William Lanphear, vice-president of the Forest City group, reports that Forest City has maintained the trees since 1965. Forest City trims, sprays, and fertilizes the trees. Loss of the 4 trees just replaced is thought to be due to premature leafing. The underground garage for Erieview Towers is beneath the Plaza. Planter boxes for the trees extend down into the garage which is heated to 45° F. during the winter season. Heat pipes too close to some of the boxes are thought to have started spring leafing. Trees on the Plaza are subjected to heavy lake winds. Leaves are often blown off or torn.

Forest City Manager Bill Fry, in charge of the replacement planting task, estimated each tree and ball weighed approximately 2½ tons. The replacement sugar maples were 20 years or more in age and 30 feet in height. Vehicles are not permitted on the Plaza proper since it is located over the garage and overlaid with a special patio base. Thus, the Vogt & Conant crane with 85 foot boom was required to pick up the balled trees and swing them distances of up to 90 feet to reach the most distant planting box. Dead trees and ref-

(Continued on page 37)

WEEDS TREES and TURF

FORMERLY WEEDS AND TURF

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Industry Needs Your Service

Well landscaped industrial plants are assets to the community and executives responsible for them need the help of the vegetation care industry in developing and maintaining them.

This is the crux of the new survey findings of the American Association of Nurserymen. Wayne Dickson, public relations director for the AAN, who coordinated the reports of 200 top industrial companies, is urging AAN members to take their place as professionals in the field and do a more aggressive job in aiding industries who need help in upgrading their industrial parks, or in developing new grounds. We think Dickson is correct in his view that the vegetation care industry can do a more thorough job in selling itself.

More than 90% of the executives responding to the AAN study said that they felt that attractive landscaping was "important" or "very important" to their companies. These industry leaders believe that building care and lawn care increase employee morale and help attract good employees. They also feel that it increases the receptivity of the community to industry, and that plant sites become a source of pride to communities and to employees.

But even though the industrial executive is aware that attractive grounds improve the corporate image, he still has to be sold. This is the job of the tree care company, landscaper, irrigation contractor, sod producer, nurserymen, and others in the field. A coordinated, planned and scheduled sales effort is probably the weakest area of the average program of companies in such businesses.

The job, then, is to sell the industrial executive on yourself as a professional, with technical ability, equipment, and personnel. Sell renovation or offer help in developing a new plan. Sell a maintenance program, and the fact that a service company can do a better job at less cost than the industrial client can do with his own departmental help. Talk the feasibility of a lease program, where vegetation is leased and maintained. Finally, make the big pitch, that industry today needs to lead in community improvement.

WEEDS TREES AND TURF is the national monthly magazine of urban/industrial vegetation maintenance, including turf management, weed and brush control, and tree care. Readers include "contract applicators," arborists, nurserymen, sod growers, and supervisory personnel with highway departments, railways, utilities, golf courses, and similar areas where vegetation must be enhanced or controlled.

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Analyze Inland Water Before Any Aquatic Control

Dr. Stephen J. Toth, Soil Chemist, Rutgers University, uses a Perkin-Elmer Model 303 Atomic Absorption Spectrophotometer which determines the content of metallic elements in water samples down to parts per million level.

RED ALERT FOR SPRAYMEN

AQUATIC WEED CONTROL in inland water has become a complex operation. Spraymen cannot afford to treat haphazardly for aquatic weed control. Nor can they perform pest control measures with safety, unless they know the makeup of the water and the precise effect of pesticides on fish and wildlife.

Recreation and other uses of inland water have become economically important to residents of the area. The blame for any fish kill, if it follows treatment of any type, will surely fall on the professional sprayman who treated the water.

For protection, spraymen need to sample water before treatment. Samples from various areas of the stream or lake, with resulting analyses by a recognized laboratory, can help pin down the causes for any ensuing fish or wildlife kill. Analysis ahead of treatment will likely spot metallic elements which may be dangerous to certain species of fish. This can be particularly helpful in areas where fish are to be stocked for recreational purposes following clean up.

Soil Chemist Dr. Stephen J. Toth, Rutgers University, New Brunswick, N. J., has developed new data on the effects metallic elements have on fish in inland water. In one instance, Dr. Toth found that as little as 1/10 part per million of nickel killed trout. The entire 5500 trout released in a stream stocking program died within 3 days as a result of this small amount of nickel.

In his research, Dr. Toth uses an atomic absorption spectrophotometer. He measures the content of most metallic elements in water samples. The process is both fast and accurate. More than 50,000 water samples yearly can be processed through his single laboratory.

Light Spots Elements

Briefly, the spectrophotometer (a Perkin-Elmer Model 303 Atomic Absorption Spectrophotometer) works this way: atoms absorb light at certain frequencies which differ for each metallic element. The amount of light absorbed indicates the element present. It also shows the amount of the metal, or the sensitivity level in parts per million, or in some cases, in parts per billion.

Before development of this system, most analyses of water samples were confined to pH, hardness, turbidity, and the content of sulfates, chlorine, iron, and manganese. But with the new system, Dr. Toth has been

Table 1. Mean Composition of Surface Waters of New Jersey.

Constituent	Spring Flow				Summer Flow			
	North	Central	Southern Inner	Southern Outer	North	Central	Southern Inner	Southern Outer
				(ppm)				
Calcium	18.3	11.7	11.0	1.0	31.3	15.8	11.5	0.90
Magnesium	9.0	4.6	3.5	0.6	15.3	6.5	2.9	0.40
Potassium	1.0	1.3	2.6	0.7	1.3	2.6	3.6	0.60
Sodium	*	*	*	*	6.1	9.0	9.6	3.0
Iron	0.07	0.26	0.54	0.51	0.12	0.72	2.0	0.60
Aluminum	0.09	0.21	0.29	0.33	0.09	0.08	0.31	0.26
Silicon	3.5	8.2	11.2	3.6	3.7	9.3	12.1	4.5
Chlorine	20.0	13.0	16.0	8.5	12.8	15.5	15.4	6.7
Nickel	0.005	0.005	0.009	0.002	0.008	0.016	0.017	0.001
Copper	0.013	0.020	0.018	0.018	0.024	0.030	0.022	0.024
Manganese	0.020	0.052	0.055	0.013	0.022	0.056	0.034	0.011
Zinc	0.010	0.019	0.014	0.014	0.010	0.085	0.032	0.013
Chromium	0.002	0.003	0.003	0.001	0.011	0.013	0.013	0.025
Strontium	0.040	0.026	0.027	0.004	0.129	0.065	0.021	0.002

* not determined.

able to study much of the inland water makeup of the New Jersey area. He and his fellow researchers have found that metallic elements are important in determining fish productivity, and recreational or industrial usefulness of streams, lakes, and ponds.

New Jersey soils vary greatly in composition. Because of this, Dr. Toth reports the state was divided into North, Central, and Southern regions. The Southern region was subdivided into inner and outer coastal plains. Coastal plains are made up of sea deposits. In the tested areas, 4 major streams in each area were sampled at several sites. Samples were taken during both spring and summer flow periods. Results of these analyses can be seen in Table 1.

Dr. Toth cautions against taking a single sample of surface water. Waters vary, he says, according to the nature of the soils through which they flow. For example, Table 2 shows the findings at two sites of Big Flat Brook in the Northern region. Sampling site No. 1 lies in a calcareous soil area. Site No. 2 is in acidic soils. Result is that the calcium and magnesium content of the water sample at Site 1 is approximately 3 times higher than for the sample at Site 2.

Table 2. Composition of Big Flat Brook Water at Two Sites.

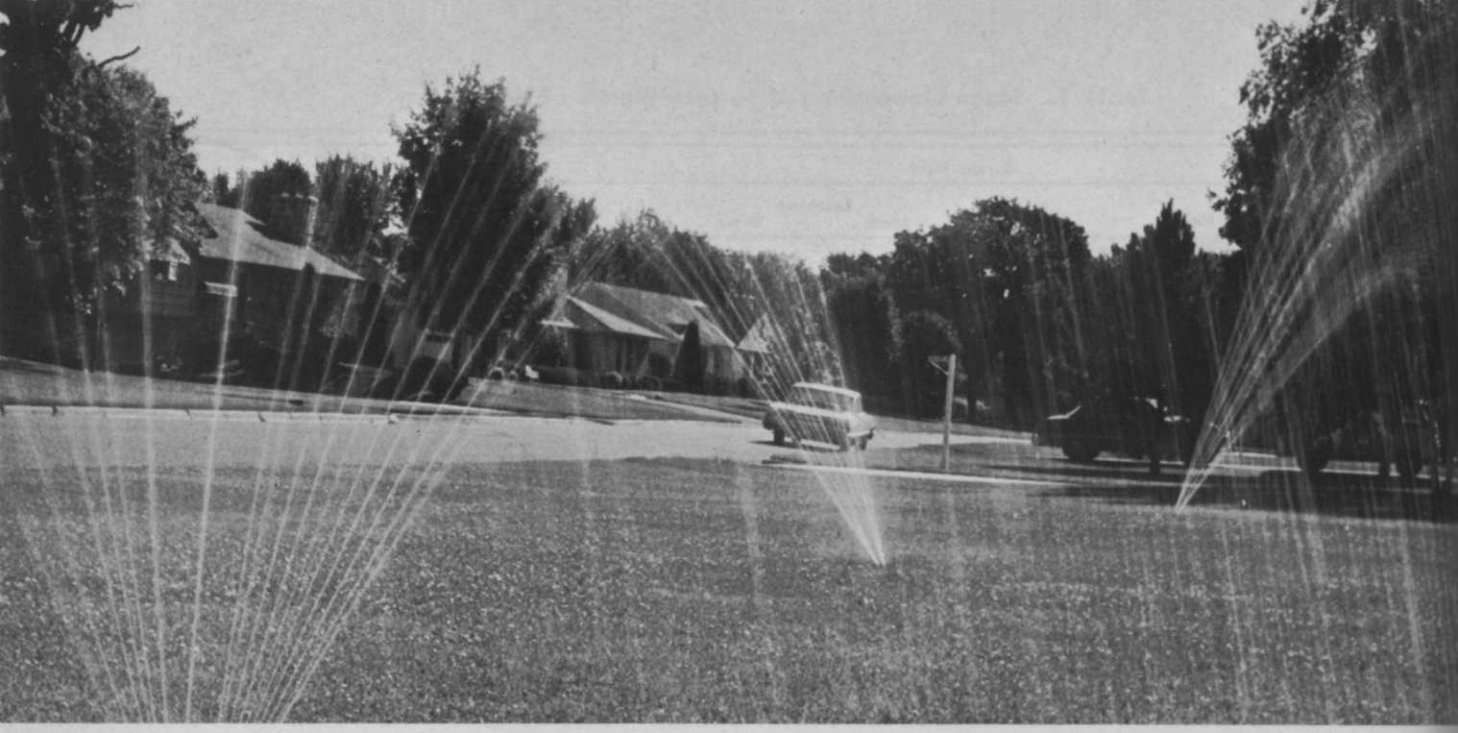
Element	(Calcareous) Site 1	(Acidic) Site 2
	(ppm)	
Calcium	35.0	11.2
Magnesium	7.5	2.4
Potassium	6.6	0.6
Sodium	3.7	2.5
Iron	0.08	0.03
Aluminum	0.07	0.10
Silicon	2.5	4.0
Chlorine	11.5	4.0
Nickel	0.006	0.001
Copper	0.016	0.022
Chromium	0.002	0.002
Manganese	0.016	0.008
Zinc	0.010	0.010
Strontium	0.500	0.030

More Elements At Low Water

Minor elements ranged from 0.001 to 0.129 ppm in the New Jersey area. Usually, the smaller water flow of summer periods had a tendency to increase the contents of these minor elements. For example, strontium is greater than zinc. Zinc is equal to copper. But copper proved to be greater than nickel which in turn was found in greater amounts than chromium.

In the Northern region of New Jersey, such major elements as calcium and magnesium were high during both spring and summer than other regions. This is because of the high limestone content of the particular soils these streams pass through. Other differences, some not related to soil base, were traced to specific agricultural practices in an area. Soils which are high in leaching losses will likely show

(Continued on page 20)



Small neighborhood park is being irrigated with an efficient wave-type sprinkling system. (Its control box is shown below.)

Design Is Key For Effective

Small Area Irrigation Systems

J. R. WATSON

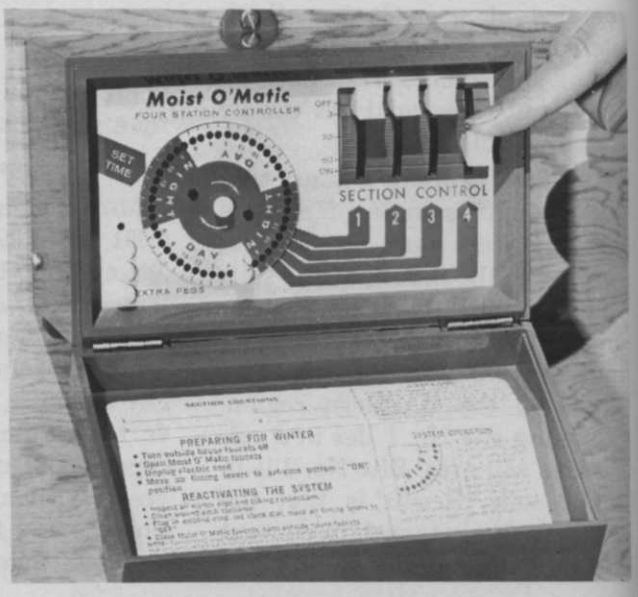
Director of Agronomy, Toro Manufacturing Corporation, Minneapolis, Minnesota

Careful balance and adjustment of many complex factors are needed to properly water turf. The basic requirements are the same, whether the area is small or large. Regardless of size, the soil conditions, demand of climates, and the physiological requirements of the plants must be considered.

There are, however, irrigation problems with small areas which are not always found on larger sites. Examples include: complexity of landscape patterns or designs; space limitations; concentrations of plants with widely different water requirements, and frequently, limited water supply; poor quality of water; inadequate pressure; and poor or restrictive distributive systems.

The need to water small areas effectively may well be more critical than on larger sites. For, in total, the small areas such as home lawns, industrial lawns, school playgrounds, small community parks, athletic fields, and, in some cases, intensively used sections of larger areas, constitute a very large part of the green and landscaped areas of our cities and towns. In this respect, they are valuable and necessary as well as functional and aesthetic. They constitute places to play and to relax. They filter the atmosphere of our communities. They enhance the beauty and the value of property. When properly landscaped, maintained, and groomed, such areas attract visitors and invite industry. Thus they become economically important.

For these reasons, watering systems for small areas merit careful study, evaluation and se-



Compact Four Station Controller box regulates the system illustrated above.

lection. They must be chosen on the basis of *efficient performance* which will result in production of high quality turf, shrubs, trees, and flowers, with a minimum use of water.

Conservation of water is a vital issue in many areas and will inevitably become so in all areas. Among the first requirements for a small area irrigation system, then, must be application of water in a manner which results in maximum conservation. This can occur only when a watering system has flexibility to: (1) apply water in a manner suitable to a wide range of plant and soil conditions; (2) provide for maintenance of good soil-air-water relationships; and (3) permit application of water in "off-peak" use periods.

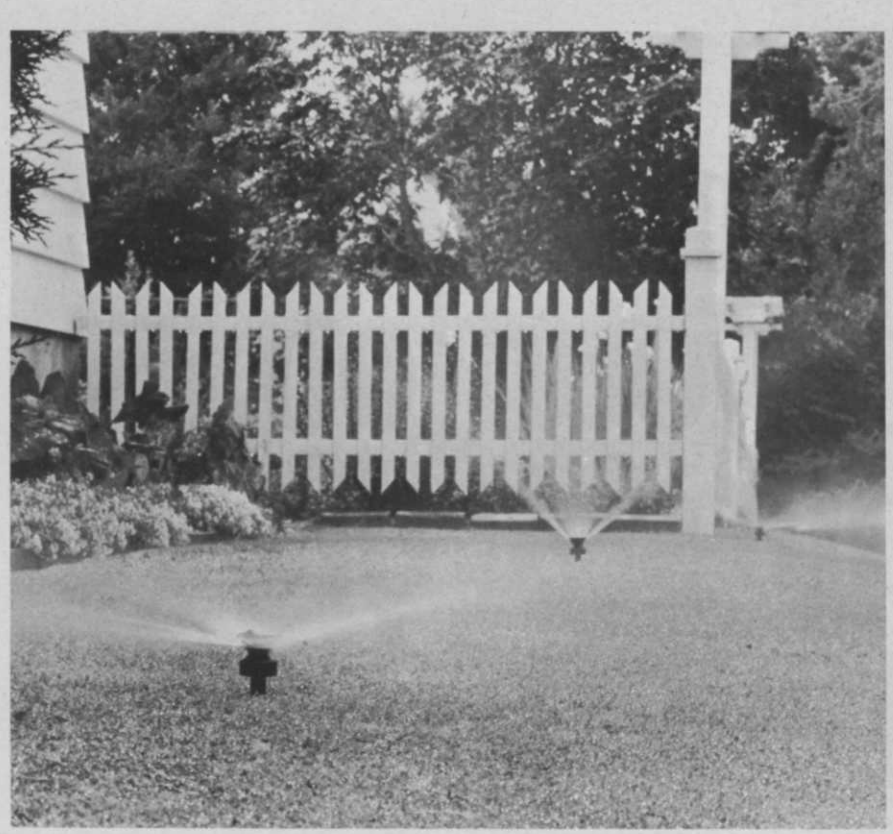
Amount of Water:

The amount of supplemental water required to keep lawns green and healthy throughout the growing season is dependent, principally, on temperature, sunlight, wind movement, and rainfall. For example, in the midwest, to sustain growth and to keep turfgrass green during the growing season, it has been calculated that supplemental water will have to be applied in varying amounts for 4 to 5 months, 65 to 75 percent of the growing season. This calculation is based on average weather data for the climatic regions for the midwest over a 30-year period.

Methods of Applying Water:

Techniques for applying water to small areas are flooding, sub-surface watering, and sprinkling. Flooding and subsurface irrigation are the least efficient from the standpoint of water distribution and use. These methods are seldom, if ever, used.

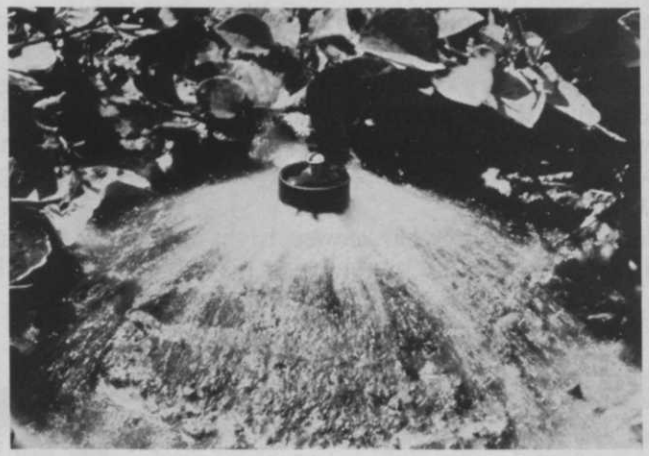
Hose-end devices, overhead (solid and portable), and underground sprinkler systems are the usual means of watering small areas. Of these, hose-end devices are, by far, the most generally used, especially on home lawns. Some hose-end sprinkling is done on larger areas, but most facilities such as athletic fields, industrial lawns, and small parks are watered by some type of underground system. Overhead systems are used for nurseries, sod farms and similar areas where a "crop" is involved and conventional cultivation is necessary. This type plays a minor role in the irrigation of small areas.



This pop-up sprinkler is excellent for watering small, complex areas.

Hose-end Sprinklers:

Hose-end sprinklers are available in many sizes, types, and prices. Such sprinklers often deliver water at rates faster than the soil can accept or absorb it, many times at a cloud-burst intensity of one inch or more per hour. Under such conditions, they need to be moved frequently. And, since this must be done by hand, there is a tendency to overwater and to waste water in runoff or in excessive percolation on well drained soils (movement of water through the soil profile). Also, little distinction is made between shady and sunny, or high and low areas. In addition to the inefficiency and inconvenience asso-



Bubbler sprinklers allow roots to be watered without wetting the plants' leaves.

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This pop-up sprinkler is directing water away from the leaves.

ciated with many hose-end sprinklers, labor costs (or time on the part of the worker or homeowner) are greater and the devices must be used, generally, during peak-use periods.

Underground Sprinkler Systems:

These are pre-planned for complete coverage of an area. When properly designed, installed, operated, and serviced, they are the most efficient way to irrigate. Underground systems may be of the quick-coupling or of the fixed-head type. They may be operated manually or by a pre-set clock similar to a clock-radio or an oven. (When quick-coupling systems are actuated and turned off—controlled—with a controller, they are called "semi-automatic").

If reliable, well trained manpower is available, the job of applying water to small areas can be accomplished with a quick-coupling or a clock-controlled automatic system, or even with a hose-end sprinkler. However, since such operators are rarely available, there is little doubt that the most effective, efficient, convenient, and economical way to water both small areas and large areas is by automatic underground sprinklers. Clock-controlled systems are flexible and constant. They are always on duty and available on demand. They prevent waste.

Automatic Systems:

There has been marked progress in the development of equipment to permit automatic watering of turfgrass and other landscaped areas within the past few years. Equipment presently available permits the controlled application of precise amounts of water. Further, such systems are capable of delivering the water in accordance with the needs of grass, trees, shrubs and flowers in conformance with the ability of a given soil to take it (infiltration capacity) and to store it (watering-holding capacity). Most important, systems today are economical and assure conservation of water with minimal operating cost.

Numerous advances in controllers, valves, and sprinklers have occurred within the past few years. Thus it is well to keep in mind that any system, old or new, irrespective of how well it has been installed, used, and maintained can be no better than its basic design.

Design:

Good system design and hence good performance have to start with the specifications laid down by the owner or his representative, preferably, someone with knowledge of turfgrass requirements. He must specify what he wants the system to do.

Basically, any system design is a compromise between cost and performance. Thus, the owner (or operator, or turfgrass manager) must make certain basic decisions, all of which revolve around obtaining the best performance for the costs involved.

Design of a system starts with the owner, operator, or turfgrass manager answering such questions as: area to be covered, hours available for watering, amount of water to be applied, type of system, precipitation rate, wind velocity, and service life of the equipment. Answers to these questions, once incorporated into the system design, are fixed.

The area to be covered or watered must be determined, preferably by use of an accurate plot plan. There will be no embarrassing questions later if this is scaled and laid out in advance.

On large areas like golf courses and parks, when the time available or allowable to apply a specified amount of water is limited or restricted, the cost will be substantially affected. This may also be a factor on small areas and is one reason that a competent irrigation specialist should be con-

A shrub sprinkler irrigates this vegetable garden.

sulted on system design for small as well as large areas.

A system is purchased to water grass and to keep it green during the growing season. This often coincides with the driest time of the year. Failure to specify a system large enough to provide adequate water will produce trouble for all concerned.

Wind Condition:

The importance of wind is often over-looked. Performance of various pop-up heads varies only slightly. So, a standard spacing chart may be of use as a guide.

Standard Spacing Chart for Pop-up Heads

Wind Velocity Miles Per Hour	Maximum Triangular Spacing (Percent of Diameter)
0- 3	70
3- 5	60
5- 7	50
7-10	40

The number of heads required for effective watering goes up in inverse proportion to the square of spacing. Therefore, 3 times as many heads would be required in an 8 to 10 mile-per-hour wind as are required in a 0 to 3 mph wind. Substantial savings may be affected by scheduling watering periods to coincide with time periods when wind is low.

These factors plus information on the maximum precipitation rate allowable and uniformity of precipitation and service life (durability) of the various component parts are critical to proper design. They must be specified by the owner or his representative.

Once these decisions are made and turned over to a sprinkler system designer, a system to meet your specifications may be designed. Do not fall into the trap of ignoring such specifications; or of relying on some well-meaning friend who tells you that you should use only X pipes, Y heads, and Z controls and valves. They may be perfectly good but not compatible with the needs of your turfgrass area. Failure to specify the basic requirements for a given system has resulted in unsatisfactory performance of many systems, both automatic and manual. One further advantage of specifying is that responsibility for performance is easily assigned to the designer. Specify the area, the hours, the amount of water, type of system, maximum wind and precipitation, and service life.

Summary:

To use water properly requires an understanding of the fundamental role water plays in plant growth; of the effects climate and weather have on growth rates; how they influence water-use rates and choice of grass or plant materials. Good watering practices demand a knowledge of the basic physical and chemical soil properties, how they affect water absorption, storage and drainage as well as the frequency, rate and manner in which water must be applied.

Small area irrigation requirements are similar in principle to those of large areas. They have the same basic function but may need to be more precise because of the complexity of landscape. The role of small area irrigation is important because of the impact that small areas, in total, have on the aesthetic and economic life of a community.

Small area irrigation systems must perform efficiently and effectively. They must permit maximum conservation of water and they should be economical to operate. They should be designed by a specialist, installed properly, and serviced routinely.

Clock-controlled (automatic) underground sprinkler systems provide the best answer to the problems associated with irrigation of small areas. Their flexibility permits correct watering despite the varied conditions that exist on small areas. Also, they are economical to operate and they conserve water.

Clarke Outdoor Spraying Company, La Grange, Ill., is using a helicopter for golf course and tree spraying in the Chicago area. Clarke has found the demand for this type custom spraying good from February until freezing weather in the latter part of the year. Pilot for Clarke is Charles J. DuPont, a veteran pilot of some 20 years.

For Contract Applicators

Helicopter Is Versatile Tool

GOLF COURSES in metropolitan Chicago are becoming regular clients of Clarke Outdoor Spraying Company. With their helicopter, Clarke can spray the fairways on an 18-hole course in 1½ hours. Custom spray rates for the job are reasonable, especially when the savings in time on a revenue producing course are considered.

Charles J. DuPont, aviation manager and pilot for Clarke, says they have now established standard prices. Clarke was among the first, if not the first contract applicator, to spray golf courses on a commercial basis. Their price for spraying 18 fairways, is $100, and the same is true for greens. Cost of dry granular application is based on pounds applied per acre. These rates range from 65¢ to $2.35 per acre.

Helicopter application costs, according to DuPont, appear somewhat higher than the cost of using ground spray equipment. In the Chicago area, DuPont says, use of ground spray equipment will range between $60 and $70 for 18 fairways or a comparable number of greens. But this cost, he says, does not include the time of the superintendent, or other hidden costs such as down time for the course. Even though many courses are

Clarke uses Hughes 200 helicopter with fully articulated rotor. This model is small and compact and lends itself to close-in spray work. Pilot DuPont says that he normally flies about 5 feet above golf greens and fairways when spraying. Advantages of helicopter include labor saving, speed, and ability to spray when ground is soft.

Aerodynamic characteristics of the helicopter's rotor system creates what is referred to as "blade tip vortices." Because of the extreme turbulent air created, vortices are normally considered an undesirable area in which to introduce spray. Experience of pilot along with spray equipment thus become very important in even coverage. DuPont depends on vortex action to increase coverage in hard-to-cover tree tops and crotches.

closed on Mondays, superintendents find it difficult to spray both fairways and greens along with their regular maintenance in a single day.

Helicopter Saves Labor

Besides time, the key plus factors for the helicopter involve the climate and labor supply. Helicopters can spray when ground is too soft for ground equipment. Also, they do not tie up course help, except for fertilizer applications. In the latter case, 2 men are supplied by the course for help in loading. Another advantage of the helicopter is that which is so important in rights-of-way maintenance. It can easily cover inaccessible areas.

Clarke's spraying business includes larviciding, fogging, misting, inspection, and regular spraying. John Clarke, manager, purchased the helicopter primarily for use for mosquito spraying on areas impossible to reach with ground equipment. Spraying trees for control of Dutch elm disease followed. Since much of the tree work involved golf courses, spraying of fairways and greens was the next logical step. DuPont reports that Clarke last year gave several demonstrations for superintendents, a number of whom are now clients.

The helicopter can do a good job of spraying trees. Down wash from the rotor produces good coverage in the new growth areas of tree tops. Crotches are also well covered. Difficulty is in spraying trees along streets because of traffic and parked cars. DuPont says this is difficult but can be done with close cooperation of police and park departments. Where the trees are accessible, such as in parks or on golf courses, DuPont can cover 334 trees per actual hour of flying time.

DuPont points out, however, that ferrying time must be allotted in scheduling time between jobs and the normal wait for the service or nurse truck cuts down the number of spray hours per day. Clarke finds that 4½ hours spray time is normal on a good day. Scheduling is based on average weather conditions. John Clarke and DuPont checked meteorological data for the Chicago area for the three years prior to the '68 spraying season. Temperature, wind, and moisture were plotted. They then charted the expected average weather picture for this season as a base for setting up weekly work schedules. The helicopter cannot be used for spraying if wind is more than 15 knots (approximately 17¼ mph). For Dutch elm disease control on trees, the limit is 10 knots.

Season Begins in February

Spraying season for Clarke's helicopter business normally begins in late February. September through late October is almost dead time. Business then increases from late October until winter weather intervenes. Last season, DuPont reports that Clarke was able to spray until December 13.

Clarke's helicopter is a Hughes 200 with fully articulated rotor (3 blades). The 3-bladed rotor system is smoothest and most responsive in flight. This model is small and compact and a very practical type for spray work according to DuPont, a veteran pilot with 20 years of helicopter flying experience.

Operating cost including gas, oil, scheduled and unscheduled maintenance, and reserve for limited life item replacement amounts to about $22 per hour of flying time. A Hughes spray system is also used. This is a 36-foot boom equipped with 37 nozzles.

Such a unit has a broad application in the field of custom application. Fungiciding of fairways and greens had been well established. Cadminate, chlordane and ferrous sulphate were used in one application, DuPont reports. In another, actidione R. Z. was used in a standard mixture of 40 gallons of water per acre. Later, a reduced water mixture was also used with good results, important because it proved that the fungicide can be used safely with less than the normal quantity of water.

Fly control has proved to be very practical. Dibrom 14

used with a sugar water carrier has given successful abatement of adult flies for 1 week. Solution has been applied at rates of ½ gallon of water, ¼ pound of sugar, and 3 ounces of dibrom per acre. For shorter range kills, ultra-low volume applications of 1½ ounces per acre have been used successfully.

DuPont points out that not only may trees be sprayed for insect and disease control, but foliar applications of fertilizer are practical. Results to date have been excellent in controlling the elm bark beetle. Great advantage in this area is that a large volume of work can be done in a minimum of time.

Legal problems of using helicopters in metropolitan areas will vary. Federal regulations generally apply only if a helicopter is carrying passengers. Custom spray helicopters do not carry passengers, nor do they fly over congested areas since golf courses are generally in the open. Civil complaints because of noise, may arise. But DuPont believes these can be handled by education in the form of publicity. Club members who know the program can be a help.

Noise levels of helicopters can be expected to drop considerably during the next few years. Coming of the jet-turbine engine will help. Also, tail rotors such as the new model designed by Hughes which operates at a much reduced r.p.m. will help. Further advances in dispersing equipment can be expected and will greatly aid the custom applicator using helicopters. DuPont believes the time will come when a spray unit will be developed which can sense airspeed and regulate the rate of spray output to provide a constant flow per acre. Improvements are also needed in swath control, he says. This can prevent excessive dosage and give the custom applicator better control, and generally aid the industry.

Meeting Dates

Keystone State Association of Cemeteries, Spring Convention, Shawnee on the Delaware, June 9-12.

Turfgrass Sprinkler Irrigation Conference, University of California Extension Conference Center, Lake Arrowhead, Calif., June 21-23.

Tri-County Chapter, California Landscape Contractors' Association, 17th Annual Convention, Ojai Valley Inn and Country Club, Ojai, Calif., June 25-29.

Landscape Seminar, Associated Landscape Contractors of America, Inc., for Michigan and Ohio, Dearborn Inn, Dearborn, Mich., July 13.

National Fertilizer Solutions Association, 1968 NFSA Round-Up, Regency Hyatt House, Atlanta, Ga., July 25-26.

Lawn and Utility Turf Growers Field Day, Rutgers University, College of Agriculture and Environmental Science Campus, New Brunswick, N. J., July 30.

Golf and Fine Turf Growers Field Day, Rutgers University, College of Agriculture and Environmental Science Campus, New Brunswick, N. J., July 31.

Midwestern Nurserymen's Summer Meeting, Zelenka Evergreen Nursery, Grand Haven, Mich., August 13-14.

1968 Turfgrass Field Day, Pennsylvania State University, Joseph Valentine Turfgrass Research Center, Campus, noon August 21-noon August 22.

Lawn and Ornamentals Days, Ohio Agricultural Research and Development Center, Wooster, Ohio, September 10-11.

1968 Southern California Equipment and Materials Educational Exposition, City Park, Lynwood, Calif., October 16-17.

American Society of Agronomy, 1968 Annual National Meeting, Jung and Roosevelt Hotels, New Orleans, La., Nov. 10-15.

Weed Science Society of America, Annual Meeting, Las Vegas, Nev., February 10-13.

Red Alert for Spraymen

(from page 9)

less calcium, or other elements in water samples.

The question among spraymen who deal with aquatic weed control is how to apply findings such as these. The answers, once water samples are analyzed are simple. For example, Dr. Toth reports that rainbow trout and other fish suffer from nickel and other heavy metals. Rainbow trout do not survive in water with more than 0.1 ppm of nickel. But at the same time, brook and brown trout can survive in water at this level of nickel content.

Dr. Toth reports that, based on atomic absorption analysis of water, his research group can accurately predict what water can be stocked with certain fish in order to assure maximum productivity and eliminate fish kill. For the spraymen who treats water for weed control before a restocking program, such information based on water analysis may prevent many later problems.

Sterile Lakes Are Problem

Further, Dr. Toth says, the damning of a stream to form a lake without checking the tributary water may lead to creation of a sterile impoundment. This is illustrated in the case of Matawan Lake at Matawan, N. J. Two tributaries to this lake contribute sufficient sulphuric acid and soluble aluminum to kill almost all of the animal and plant life. The pH of this lake has been as low as 2.8 with soluble aluminum content exceeding 25 to 30 ppm and with an iron content of 12 to 25 ppm. It is obvious that water of this type is unsuitable for recreational or industrial use.

Establishment of farm ponds in the New Jersey inner coastal plains area often leads to conditions similar to that in Matawan Lake. Use of water from such ponds for irrigation of lettuce, tomatoes, and peppers can lead to severe crop damage. Waters of this type, however, can be treated with superphosphate and lime to raise the pH and precipitate the heavy metals.

Dr. Toth reports that his group can analyze with atomic absorption and accurately predict what water can be used effectively for irrigation of crops and golf greens. Burning of golf greens after irrigation has been common in the past. Recently, Dr. Toth reports, he analyzed irrigation water used on a golf course which was suffering burned greens. Water being used was high in copper and acid, thus causing the burning. Analysis of the water before irrigation could have prevented this situation and others like it.

Establishment of farm ponds in the New Jersey coastal plains area of the Southern region also creates problems when these ponds are used for recreation. The low content of bases and other nutrients in water of this region requires that the waters be periodically limed and fertilized for fish production. Large natural or impounded lakes and ponds in this region cannot be treated economically in this manner and must be considered as having very low fish productivity ratings.

Attempts to modify the composition of stream waters in this area using limestone or basic slag beds have not been successful.

WTT is indebted to Dr. Stephen J. Toth, Department of Soils and Crops, Rutgers University, New Brunswick, N. J., for his assistance in the foregoing presentation. Dr. Toth reports that his laboratory can process water samples on a custom basis, at cost, if commercial laboratories are unable to do so. Work is performed by graduate students who receive the fee. Spraymen, irrigation contractors, golf course superintendents, and turf specialists may contact him directly at Rutgers.

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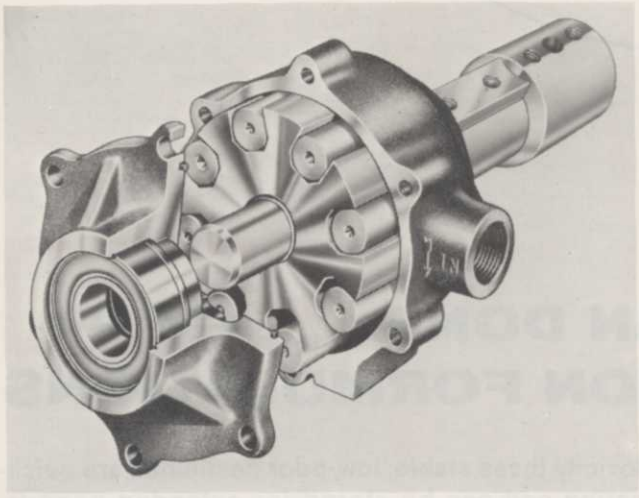
New Products . . .

Designed for the Vegetation Care Industry

Self-contained, self-powered material spreader suitable for use on all light-duty trucks is announced by the HI-WAY Division of Highway Equipment Company, 616 "D" Ave., N.W., Cedar Rapids, Iowa 52405. Utility unit converts any truck into a "spreader" on a moment's notice.

New engine powered model has been added to line of GlasStran (fiberglass) Tractor-Mounted Power Sprayers by The F. E. Myers & Bro. Co., Ashland, Ohio. The 100ETM, is a versatile, lightweight unit with 6 or 2½ hp engines. Capacities are 3 gallons per minute respectively. Pressures are adjustable from 20 to 500 psi. Designed for mounting on 3-pt. hitch tractor, the sprayer can also be used as a skid type unit on a truck, trailer, or golf utility wagon. Optional booms and high pressure spray guns are available.



New 8-roller sprayer pump for high performance farm spraying has been announced by Hypro, Inc., 381 Fifth Avenue N.W., St. Paul, Minn. 55112. Special scoopless-rotor design reduces liquid by-pass problems and results in more liquid delivery at higher speeds and pressures. The pump, Series 7560C, delivers up to 18 gallons per minute, develops pressures up to 300 lbs. with 4½ horsepower, designed for direct drive by tractor power take-off. Can also be used with belt and pulley or gear head drive.

Baker Equipment Manufacturing Company, 1710 High Point Avenue, Richmond, Virginia 23230, now offers the M-45 Articulating Aerial Tower with 50-foot working height. Standard unit is equipped with Baker's patented Spira-Matic rotation system and fiberglass lower boom insert. Four hydraulic self-locking "A" frame outriggers assure extra stability. Upper boom and basket are both fiberglass. Handy side entrance with steps offers easy access to the truck bed, between the pedestal and truck cab. The unit is hydraulically operated and features two sets of controls. One set at basket and the other at rear of truck, mounted on the pedestal.

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PARAQUAT is a non-selective contact herbicide that kills most annual weeds and knocks down many perennials. Usually, you get effective control within three to five days (under favorable conditions, you may see browning within 1 day).

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PARAQUAT is economical, too. Just a little withers up a lot of weeds. Use 1 to 2 quarts per acre in 50-100 gallons of water (combine with ORTHO X-77 Spreader or similar non-ionic spreader for maximum coverage and results).

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PARAQUAT

Officers and directors of the National Arborist Association at the NAA winter meeting at Tampa, Fla.: Left to right (seated), Edward C. Shearer, Farrens Tree Surgeons, Jacksonville, Fla., first vice-president; Kenneth P. Soergel, Kenneth P. Soergel & Associates, Gibsonia, Pa., president; Paul R. Walgren, Jr., Walgren Tree Experts, Hamden, Conn., second vice-president; (standing), Harry A. Morrison, Wilmette, Ill., retiring president; Glenn Burns, Karl Kuemmerling & Associates, Canton, O., director; William P. Lanphaer III, Forest City Tree Protection Co., Cleveland, O., treasurer; William A. Rae, Frost & Higgins Co., Burlington, Mass., secretary, and Riley R. Stevens, Stevens Tree Surgery, Portland, Ore., director.

James W. Polk

Arborists Change Membership Rules At Winter Meeting Held At Tampa

Arborists no longer need to be members of the International Shade Tree Conference in order to join the National Arborist Association. This change was made during the regular winter meeting of the national group. Meeting at Tampa, Fla., tree care operators also set up two new membership categories. The board of directors may now approve associate memberships for organizations who supply or service tree care companies. Another category was established for privileged members. The board, by a two-thirds vote may extend this type membership to any retired NAA member of the arboriculture profession.

Another noteworthy change in by-laws of the group, according to Clarke W. Davis, NAA executive secretary, was the decision to henceforth hold their annual meeting each February, rather than during the regular August meeting of the ISTC.

In the board session, previous mail approval for 21 new member firms was reaffirmed. Board members approved a final draft for their lightning protection standard, established a new committee to prepare a statistic questionaire, and approved a motion enabling the group's executive committee to set the location for future winter meetings.

EDP Possibilities

In the formal program sessions, the group invited a specialist to discuss the feasibility of computers for tree care companies. James W. Polk, First Data Corporation, Tampa, Fla., outlined the 3 current methods for electronic data processing available to a company. Computers can be purchased or leased, he said. But the most practical step for many smaller businesses is a third method which is use of a custom computer service.

Data service bureau centers offer a service in which they write programs to handle the various jobs desired by a company. They provide professional data processing counseling, help upgrade business procedures, set up cost accounting, and other services needed by a client. They can prepare economic surveys, develop market analyses, and make feasibility studies. Such custom services can also staff and operate a client's own owned or leased equipment.

Polk warned arborists that electronic data processing is not a program which can be attempted on a crash basis. Rather, he said, it needs careful consideration and time. Management needs to become acquainted with the capabilities of the system and its possible uses. As of now, Polk said, there is no

set formula for obtaining a profit by using a data processing system. Profits, he stressed, are derived from application of sound management principles, adequate planning, proper organization, and controlled execution.

Union Procedures Aired

How to react when the union knocks at your door was the subject of Daniel R. Coffman, Jr., Jacksonville, Fla., attorney. Coffman spent a good portion of his time telling arborists what wise management does before the so-called knock on the door. There is a crying need, he said, for management to become more knowledgeable and sophisticated on employee relations.

Coffman reported that he himself was well versed in the union guidebook written for union organizers. He further said he had discussed union problems in organizing with a union business agent.

Briefly, according to the union agent, chances of getting workers to organize are poor if employees are convinced that the company is not taking advantage of them. Other factors hurting unions in their efforts to organize workers are: employees who have pride in their work, good performance records kept by the company which show that employee efforts are recognized and appreciated, a lack of highhanded treatment or discipline, no claims of favoritism which has not been earned through work performance, and supervisors who have good relationships with subordinates.

Daniel R. Coffman

Coffman's union contact said his first advice to a non-union employer who wanted to stay non-union would be to get rid of supervisors who refuse to practice good day-to-day human relations in directing their employees. Also, he suggested getting rid of all borderline defensive-type employees who have forgotten (or never learned) how to give their employer a good day's work without griping. This direct union advice, Coffman said, confirms an old saying that the best union organizers are "first-line unqualified supervisors."

The first-line supervisor, Coffman said, is the keystone of good employee relations. He gives the company its image, whether good or bad. Coffman asked arborist employers to question their own operation. Do you, he asked them, have a method of supervisory selection which considers education, prior training, experience, and leadership ability? Succeeding questions from Coffman to arborists were: do you provide supervisors with adequate training in company policies, practices, and human relations; do you maintain an adequate margin between the supervisor's pay and that of his subordinates; and do you promptly follow up a supervisory selection to determine if it was a correct one?

Supervisors, Coffman said, must realize that they have a function other than getting the work out. They must know their men, and the men must feel free to communicate with them when they have problems or grievances.

Workers want security, Coff-

man went on, and those in nonunion companies often fear that favoritism may determine who gets laid off. For this and other reasons, there needs to be a system to handle day-to-day worker grievances. Also, workers fear the accelerating rise in living costs. Union promises of negotiated wage increases thus appeal to the struggling worker. Therefore, Coffman believes that the most important single factor in employer-employee relations is the absolute necessity for upward communication, the kind that tells management what employees really think and feel about their work. Whether large or small, he said, a company can have good employee relations only if it has good supervisors and good employee communications. The larger the company, the greater the need for communicating and the greater the problems in accomplishing this.

Once the union does knock on the door, or sends the so-called "demand" letter, Coffman stressed that the employer maintain his "cool." This is not the time, Coffman told the group, to become emotional or fearful. His advice, though technical in nature, indicated to the uninitiated the need for labor counsel. Ramifications of each step taken by an employer at this point hinge on numerous rules, regulations, and court opinions. Best course, based on Coffman's experience and knowledge, though he did not voice this opinion, would be to avoid pitfalls by immediately seeking knowledgeable counsel. Employers have many rights in influencing their employees prior to a union election, none of which threatens any employee or promises him special benefits. But what actually constitutes an unfair labor practice is often subject to judicial review. Practicing a regular program of preventative maintenance is the most profitable policy, according to Coffman.

Veteran Arborists Organize National Consulting Service

A new consulting service is now available on a national basis. Veteran arborists in the industry have organized the American Society of Consulting Arborists. Eighteen charter members, located in 16 states, held their first annual meeting recently in Florida and put the new group on record officially.

New president, Consultant Henry Vaughn-Eames, Stockton, N. J., said that the group had been discussing such an organization for the past two years. The need for highly qualified, unbiased opinions for new developments, help in organizing shade tree commissions, surveys, and for legal work has been evident for some time, Vaughn-Eames continued. He expects that more arborists, veterans in the business, will seek membership and official recognition by ASCA.

The new president in an interview with WTT, was careful to point out, however, that members are not being solicited. This group, apparently, is a highly selective and qualified group of individuals who are available for special consultant services. In instances where there might be a conflict of interest at the local level, a member consultant from another area could be solicited for an unbiased and professional opinion.

Membership in the ASCA is based only on ability as an arborist. Rules do not require a veteran arborist to be a member of either the National Arborists Association or the International Shade Tree Conference. Vice-president of the new group, H. M. Van Wormer, Van Wormer Tree Service, 209 Seay Bldg., 3122 W. Clary St., Richmond, Va., is handling membership requests.

The original charter membership is made up of arborists with 20 to 40 years in the tree care business. Additional members will likely possess similar qualifications. Elected secretary-treasurer at the session was Ray Gustin, Jr., Gustin Gardens Tree Service, Inc., Gaithersburg, Md. Headquarters address for the new group is 700 Southern Bldg., Washington, D. C. 20005.

Charter members of the new American Society of Consulting Arborists are: seated, left to right, Hackett C. Wilson, Wilson Tree Company, Inc., Shelby, North Carolina; Riley R. Stevens, Stevens Tree Surgery, Portland, Oregon; James T. Turner, Turner Tree Service, Atlanta, Georgia; Henry Vaughn-Eames, President, Consultant, Stockton, New Jersey; H. M. Van Wormer, Vice President, Van Wormer Tree Service, Richmond, Virginia; Ray Gustin, Jr., Secretary-Treasurer, Gustin Gardens Tree Service, Inc., Gaithersburg, Maryland; F. L. Dinsmore, Dinsmore Tree Service, St. Louis, Missouri. Standing, left to right, Freeman L. Parr, Parr & Hanson, Hicksville, New York, George W. Goodall, Goodall Tree Expert Company, Inc., Portland, Maine; Walter P. Morrow, Morrow Tree Company, Sewickley, Pennsylvania; Winston E. Parker, New Jersey Certified Tree Expert, Moorestown, New Jersey; H. N. Engledow, Mid-Western Tree Experts, Indianapolis, Indiana; and Harry A. Morrison, Arborist, Wilmette, Illinois. Unable to be present for the picture were Ira F. Wickes, Ross Farrens, and C. L. Wachtel.

Nurserymen Promote Trees At California Exposition

Feature of Arbor Day at the California Exposition was the planting of a 10-foot gingko tree. Cal Expo was presented the tree by the Superior Chapter of the California Landscape Contractors Association. Nancy Rivett, a University of California at Davis co-ed who is Sacramento's reigning Tree Queen, took part in the planting. Others present for the ceremony were, left to right: George Cioli, president, Sacramento Valley Chapter, California Landscape Contractors Association; Donald B. Marty, president, Superior Chapter, California Association of Nurserymen; and Louis Roth, Cal Expo Director of Design and Construction. The tree was planted at the base of the American River levee near the main north-south pedestrian walkway. The gingko was selected for its beauty and history.

Sex Attractant Found For Western Pine Beetle

Researchers have found an artificial sex attractant of the Western pine beetle. Now they hope to develop a way to use it.

The discovery was made by Dr. David L. Wood, University of California, and Dr. R. N. Silverstein, Stanford Research Institute.

The Western pine beetle is a big killer of mature ponderosa pine sawtimber in the West.

The tiny beetle (about 4 millimeters long) damages the tree by boring through the bark to the cambium layer which carries the tree's life-sustaining sap. It then builds tunnels, into which it lays eggs, and introduces fungi. The fungi develop, stop the flow of sap, and the egg dies.

Needed Chemical Deicers Damage Highway Vegetation

A relatively uncharted area of scientific research felt the probes of scientists and highway engineers from seven states at a University of Connecticut symposium on pollutants in the roadside environment.

The exchange of ideas centered around three major problems, as set forth by William C. Greene, formerly with the Connecticut highway department and now landscape architect with the Bureau of Public Roads in Washington, D. C.: highways must be kept free of ice and snow for safe driving; highway engineers must know the most effective chemical deicers to use and the minimum rates to apply; and scientists need to determine the long-term effects of applying chemical deicers on water supplies, soils, plants and agricultural production.

As the symposium ended, most agreed that more research was needed on the deicing problem and side effects of pollution.

Research in New Hampshire, Virginia and Florida suggests widely varying susceptibility of different plants. Sugar maple, white pines and hemlocks seem most severely affected. But oaks and Norway maples are more tolerant.

Of the grasses, slender wheat grass, Kentucky 31 fescue, reed canary grass and Troy Kentucky bluegrass are most tolerant. In addition, black locust, honey locust, Russian olive and ponderosa pine are among the less susceptible smaller trees. White birch, redbud, privet and honeysuckle are among the more tolerant shrubs.

Damage to roadside plants seems to be insignificant if plantings are kept 30 feet or more back from the road. Some engineers would appear to favor, in the interests of safety, removal of all trees closely bordering roads. But at odds with this view are the conservationists, who

state that the beauty of New England roadsides is one of the area's tourist attractions.

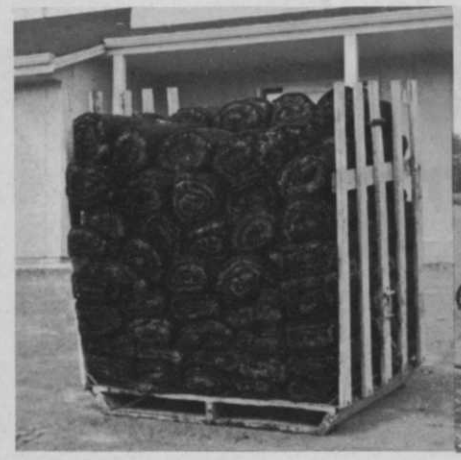
According to Edwin D. Carpenter, University of Connecticut, the salts currently used—sodium chloride, calcium chloride, or mixtures of the two—are the most effective and economical obtainable for deicing roads. The deicing chemicals are used, in Connecticut at least, at rates of 800 to 1000 pounds per mile of two-lane highway.

However, applications may be much higher in the more northern and mountainous areas. Applications of up to 30,000 pounds of salt per year per 2-lane mile have been reported.

Although a conclusive case has not been established against the salts as the killers of roadside plants, the circumstantial evidence mounts. Dr. Avery E. Rich, of the University of New Hampshire, reported that nearly 14,000 dead trees were removed from 3700 miles of his state's roads in one year. Subsequent and continuing investigations indicate that a high proportion of those trees were killed by salts. Trees showing symptoms of salt poisoning appear to be slowly dying, often with reddish-colored leaf fringes and too-early fall coloration of the leaves.

Another factor of roadside pollution comes from engines of autos, trucks and buses. These engines put out ozone, sulfur dioxides, florides and nitrates—but the really dangerous products come from further breakdown of the first-stage chemicals by reaction with light.

Dr. F. A. Wood, of Pennsylvania State University, pointed to the multiplying output of hydrocarbons when he predicted that there would be 250 million autos in the United States by the year 2000. Autos are considered the most important source of hydrocarbons in the atmosphere. Fuel consumption will nearly triple from 1966 to 2000 A.D., with proportionate increases in pollutants.



Turf rack pallet at unloading site.

Mowing cultured sod on Mork farm.

Greater highway safety in hauling.

Field To Lawn Sod Handling Equipment Is Basis For New MinnTurf Corporation

Sod producers in all sections of the country are faced with a labor shortage. One, Orrie Mork, Edina, Minn., found labor so short that he was forced to mechanize to stay in business. But, he says, this proved to be a profitable venture. His newly developed sod handling equipment proved successful and popular to the point that he has formed the MinnTurf Equipment Designs Corporation to handle the business.

Mork, who serves as president of the family owned enterprise, continues to operate Minnesota Turf Farms at Edina which produces cultured sod on Mork's farms. The business includes growing, harvesting, delivery, and installation. Mork says that they do the entire job, including fine grading. A large percentage of their sod is Park Kentucky bluegrass for parks, schools, and home lawns. A 2-way General Elictric radio system between office, sod farms, and the landscaping operation helps maintain schedules.

New equipment which the Corporation sells includes a turf rack for handling palleted sod and a series of scrapers for fine grading. These latter are built in various sizes, with ballast optional.

Of primary interest to growers is Mork's turf rack which actually constitutes a container system for handling harvested sod. The rack is designed in conjunction with a flat pallet. Idea behind the container system was development of a pallet with sides permanently attached. Also, Mork wanted a series of units which could be stacked and returned to the field in groups.

Result of the turf racks is a sod container system at reasonable cost. The units save waiting time for trucks, permit use of forklifts for easy loading and unloading, and help eliminate the need for hand labor. Most important is the saving in time from cutting in the field to final laying on the installation site.

Easy Pallet Loading

The turf rack pallets are built to accommodate both 18 and 24 inch cut sod. Unskilled labor can be used for loading pallets. Sod rolls do not have to be tied in as is the case of sod loaded on

Flat bed unit insures a glass-smooth finish according to Mork.

pallets without sides. This is especially true of peat based sod which is much lighter in weight than that grown on mineral soils. On Mork's turf rack, the weight of the sod holds the hinged sides of the turf rack together.

Also, according to Mork, there is no damage to sod from the tie-in. Pallets will carry more sod, thereby permitting maximum capacity from the forklift. Mork points to the greater safety of sod during highway transport because of the extra stability provided by the container system. This is also a helpful factor in moving pallets by forklift on side slopes. Pallets can be stacked up to 5 deep in open position, making it easy to return stacks of empties to the field.

Turf racks are built of ash hardwood with steel brackets. Quality construction, Mork says, is the key to units on which a patent is pending.

Fine grading equipment designed and being produced by Mork includes a series of flat bed scrapers for turf preparation finish work. These are made in 78 and 96 inch widths, both of which are 48 inches in depth. Weights are 300 and 350 pounds respectively. Optional ballast adds 200 to 250 pounds to the units.

Advantage of the flat bed scrapers is that they level in both forward and reverse direction. Hand raking, according to Mork, is eliminated. He has found that unskilled operators can successfully level rough graded or loose material such as blacktop, crushed rock or dirt. The units are made to fit any Category 1 three point hitch. They can be adjusted for pitch and side slant by means of the tractor's right lift arm and top link.

Mork grows and installs 50 acres of sod yearly from his own firm of Orrie Mork Landscaping. In addition to some custom landscape work he also buys cultured sod from other sod growers. Mork believes that the sod industry can be expected to grow as more home owners and industries demand the so-called instant lawn. He also feels that growers will have to continue to mechanize and automate their operations to cope with the labor problem. Not only does labor cost more today, he says, but responsible help is more difficult to find and to keep on the job.

Dr. James Beard, left, MSU turfgrass researcher, and Dr. Paul Rieke, right, MSU soil scientist, confer with Dr. Marvin Ferguson, Mid-Continent Director, USGA, and Dr. Joseph Duich, Penn State University agronomist.

Research Report

Michigan Turf Conference

MORE than 500 professional turfmen attended the recent Michigan Turfgrass Conference at Michigan State University and heard reports on late research developments and recommendations.

Here, in a nutshell, are highlights of reports given during the meeting:

—Variety "blends" produce better turf than any single variety grown alone.

—Organic sod has more root development, will not wilt as readily during a water shortage and generally establishes as rapidly as sod grown on mineral soils.

—Pesticides of the organic phosphate type can stimulate turfgrass growth by making nitrogen more readily available to the turfgrasses.

—The best all-around control of broadleafed weeds can be provided with a combination of 2,4-D and 2,4,5-TP.

—A mixture of soil, sand and organic matter in the proper ratio provides a good base for establishing putting greens, if this layer is above coarse sand and gravel to allow good drainage.

Variety "Blends" Best:

The report on variety "blends" producing better turf than any single variety grown alone was made by Dr. James Beard, MSU turfgrass researcher. Since there are no "ideal" varieties, he said, blending together several varieties provides a higher quality turf adapted to a wider range of soil management and environmental conditions.

An example would be a blending of Merion, Newport and Delta to establish a good bluegrass turf. Merion is attractive and resistant to leafspot disease, but it requires high management and does not adapt to shade. Newport is better adapted to shade and is fairly resistant to powdery mildew. Delta requires

C. J. Chapman, left, Detroit, receives the second annual Meritorious Service Award from Dr. K. T. Payne, chairman of Michigan State University's crop science department. Payne presented the award on behalf of the Michigan Turfgrass Foundation. W. Bruce Matthews, center, accepted the first annual award on behalf of Dr. James Tyson, MSU soil scientist. Tyson was presented the award posthumously for his contributions to Michigan's turf industry.

Certificates of scholarship awards were presented to two outstanding students in Michigan State University's two-year turfgrass maintenance course offered by MSU's Institute of Agricultural Technology. Receiving the award were Frederick McMullen, left, East Lansing, and Scott Sincerbeau, center, Flint. The awards were presented by Norman Kramer, right, Benton Harbor, a board member of the Golf Course Superintendents Association.

low management and is resistant to stripe smut.

Blends, said Beard, give professional turfmen a better chance to establish more hardy grass under a variety of conditions.

Organic vs. Mineral Sod:

John King, another MSU turfgrass researcher, reported on research which showed organic sod to have some advantages over sod grown on mineral soils.

In seven different trials, noted King, organic sod exhibited more root development and better establishment than mineral sod.

In another study, King saturated sod grown on mineral and organic soils, then allowed both types to dry. He found that the organic sod lost more water, but the sod grown on mineral soil showed wilting two days earlier. Watering is more critical in the establishment of mineral sod.

Beard and King also noted that sod cut at normal thickness (¾ inch) had better rooting and establishment than sod cut at either ⅜ or 2 inches thick.

They also reported data showing that soil should be moist at the time of laying to insure good establishment.

Best Nitrogen Carriers:

Dr. Paul Rieke, MSU soil scientist, discussed the importance of fertilizer, particularly nitrogen, and he pointed out some of the shortcomings of some nitrogen carriers.

In a comparison of soluble nitrogen carriers vs. organic carriers, Rieke found that the soluble carriers are both faster acting and less expensive. The ureaform aldehyde types do not give quick "green up" to turf, particularly during the cool times of the year.

He also advised turfmen to be wary of applying fertilizer through their irrigation systems. While this may seem like a more convenient method, he said, it is only effective if distributed evenly over the turf. The irrigation system must be properly designed to achieve this uniformity.

Dr. Beard noted that sod which had been produced with high levels of nitrogen tended to heat up more quickly during shipping. In early trials, however, there has been no indication that the faster heating has caused greater damage.

Pesticides Increase Nitrogen:

In another report, J. Timmerman, MSU graduate assistant in soil science, reported on his study which showed that pesticides, particularly organic phosphates, can increase turfgrass growth by making nitrogen more readily available.

Apparently, he said, certain organic pesticides stimulate the microorganisms that make nitrogen available, but he admitted that more research needed to be done to determine why these

organic pesticides have this effect.

Weed Control:

Dr. William F. Meggitt, MSU crop scientist, noted that there weren't any recent spectacular "breakthroughs" in turfgrass weed control, but there were some useful guidelines to follow for an effective control program.

He said good management is the key to many weed problems, because a well-kept turf gives the grass a fighting chance against competing weeds. Herbicides can be a big help, he added, but there is no herbicide label that will claim the chemical will grow grass.

Meggitt said a combination of 2,4-D amine and 2,4,5-TP, applied at the rate of one pound of active chemical per acre, will control dandelions, plantains, clover, chickweed, black medic, creeping charlie, red sorrel and round-leaved mallow.

Soil Mixtures:

Three researchers commented about the importance of a good soil mixture to the establishment of turf. And all three suggested mixtures that would reduce compaction, maintain adequate water holding capacity in the root zone and provide good drainage whenever there was a problem of excess water.

Dr. Ray Kunze, MSU soil scientist, recommended a special mixture for putting greens. This included a layer, about 12 inches thick, of a mixture of soil, sand and organic matter. Below this layer would be coarse sand (about 4 inches), then pea gravel and, finally, subsoil. Tiling would be placed in the area just under the sand in the pea gravel.

Dr. Kunze explained that the coarse sand and pea gravel did not have the "capillary attraction capacity" to draw water from the upper zone. As a result, water does not move down until the upper area is saturated.

Dr. Joseph Duich, Penn State University agronomist, pointed to a project which he had started in 1960 which showed that many turfmen pay too much attention to the quantities in soil mixtures rather than the quality of the sand, soil and peat. For example, he said, the important thing in concrete sand is the particle size distribution. He urged turfmen to examine this particle size to determine how well it will hold water and allow drainage.

Duich noted that with 10 per cent peat in a mixture, turfmen would need 40 per cent coarse sand to get any infiltration at all. They would need at least 60 per cent sand for good infiltration (drainage) of water.

Duich also studied mixtures which had undergone two years of compaction. He found that the best infiltration rate was given with a mixture made of 40 per cent Turface, 10 per cent peat and 50 per cent soil.

Dr. Marvin Ferguson, Mid-Continent Director, U.S. Golf Association, Greens Section, Texas A & M University, noted that the relationship of pore space between soil particles had the biggest influence on soil mixtures.

He noted that by constructing different textural layers in the proper order, a surface could be constructed that would hold enough water and still allow enough drainage for good turfgrass establishment.

Plant Diseases:

Dr. M. Britton, University of Illinois plant pathologist, listed the major turfgrass diseases, noting that there has been very little success in finding a control for them. But he did have a recommendation for getting rid of much of the guttation water which encourages turfgrass diseases.

Guttation water, he explained, is a solution from within the leaf which contains nutrients that encourage turfgrass disease. Most of this solution can be removed with light applications of water (syringing) before mow-

ing. Syringing washes the guttation water off the leaves.

Britton also noted that temperature, light and mowing affect the severity of diseases. He pointed out that most disease causing organisms have survival mechanisms (such as spores) to grow under any conditions. Free moisture keeps fungi alive outside of the plant.

Decreased light decreases photosynthesis and increases carbohydrates, said Britton, making the plant more susceptible to diseases. This decreased light also affects temperature which, in turn, affects various organisms, depending on which temperatures they need to survive.

Britton also pointed out that close mowing increases plant numbers, decreases plant size and increases the effect of a single infection on turf. The smaller plants in a denser population are weaker and less able to fight off disease.

Manage Fertilizer For More Heat Tolerant Bent

Using less nitrogen and boosting the potassium rate when hot weather arrives may reduce heat damage to creeping bentgrass. This type management may increase the use of bent on southern golf courses.

Results from experiments on Pencross bentgrass indicate proper fertilizer will improve year-round performance of the grass, even in warm, humid climates. Results show that nitrogen should be reduced and potassium increased at the start of hot weather. This hardens the grass against high temperature.

Research was conducted at the University of Arkansas, Fayetteville, Ark., by Dr. C. L. Murdoch, agronomist. It was supported in part by a grant from Arkansas State Golf Association. A number of Arkansas golf course superintendents, have found bentgrass hard to maintain during the summer when temperature and humidity are high.

Experiments by Murdoch were based on the common knowledge that nitrogen will increase succulence of plant tissue, and at the same time decrease hardiness. It is also known that potassium decreases succulence and increases hardiness. Purpose of the research was to determine if Pencross bentgrass could be hardened against heat injury by varying applications of potassium and nitrogen fertilizers.

Pencross bentgrass seeds were grown for 30 days on a greenhouse bench at 80° F. They were in soil which contained adequate nutrients for favorable plant growth. Plants were clipped to ½ inch and kept at this height throughout the experiment. After 30 days, the various fertilizer treatments (listed in table) were applied to the plants and they were kept on the bench for an-

(Continued on page 38)

SCOTCH BROOM

(Cytisus scoparius)

Drawing from: Ivon Watkins-Dow Ltd., New Plymouth, New Zealand.

Prepared by: O. A. Leonard, Botanist, assisted by B. J. McCaskill, Senior Herbarium Botanist, Botany Department, University of California, Davis.

Scotch broom (**Cytisus scoparius**) and French broom (**C. monspessulanus**) are ornamental leguminous shrubs that have escaped from cultivation on the Pacific Coast and have become problems in both wooded and pasture areas. Another introduced leguminous shrub which is potentially even a worse problem on the Pacific Coast is gorse (**Ulex europaeus**). In New Zealand gorse was introduced as a shrub for fence row hedges, but escaped and has occupied hundreds of thousands of acres of first-class pasture lands. Great effort has been expended in controlling both Scotch broom and gorse in that country. Interestingly, these shrubs are not serious problems in Scotland, a country from which they were introduced. Some effort, however, toward controlling them is also practiced in that country. There are about 80 species of **Cytisus** native to Europe, the Canary Islands, northern Africa and western Asia.

Scotch broom is an erect shrub with green branches from about 3 to 10 feet high. The foliage is sparse and deciduous. On young plants the leaves are trifoliate and from ¼ to 1 inch long, with the petioles being about the same length as the blades. On older plants, the leaves may be from ⅛ to ½ inch long, with the petioles again being approximately the same length as the blades. The flowers are yellow, legume or pea-like in shape, about ¾ inch long, and occur solitarily or in pairs in the leaf-axils. They are extremely showy during their flowering period which extends from January to June.

While this plant is a useful and beautiful shrub when kept under control, it can be a serious problem if left to grow unchecked. It is noted for its ability to produce a large number of seeds with long-lasting viability. On the Pacific Coast these seeds germinate from fall through spring. Since Scotch broom is a leguminous plant with nitrogen-fixing bacteria, its small seedlings quickly develop nodules on their roots and thereafter can take care of their own nitrogen requirements. Therefore, these seedlings often grow very rapidly and extend their roots sufficiently deep to withstand competition from grass and other vegetation during the dry summers common to the Pacific Coast.

Although Scotch broom is not a vigorous sprouter, cutting a plant off near the ground line does not prevent it from sprouting. However, a severe fire will kill the entire plant. Incidentally, Scotch broom is highly flammable when conditions are right and can, therefore, be a fire hazard. It burns with such intense heat that many forest trees have been killed by Scotch broom fires.

Young Scotch broom plants can be controlled with 2,4-D. Periodic sprayings will be necessary, however, because seedlings will keep appearing. Even the older plants can be killed with 2,4-D when the treatments are made when they are most sensitive, i.e. when they are in bloom and there is sufficient soil moisture for good growth to occur. Good coverage of the plants is required for best kill and esters should be used. When the plants are old, especially when conditions are not ideal, 2,4,5-T should be used. Again esters should be employed. Mixtures of picloram and 2,4-D or 2,4,5-T are being used in New Zealand to control this shrub.

Like many woody plants, Scotch broom is susceptible to basal sprays. Esters of 2,4-D and 2,4,5-T, or 2,4,5-T alone, are mixed with diesel oil and sprayed on the stems above the ground line. Control is assured if a good application job is done.

Biological control tests on Scotch broom were begun in the U. S. in 1960 when moths of the Scotch broom stem miner (**Leucoptera**) were released in northern California. The use of seed weevils (**Apion**) to destroy broom seed has also been started in California. Reducing the vigor of the plants and destroying their seed with these insects should aid in slowing the spread of this menace.

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

FOR SALE

FOR SALE—Highway wheel and brush sprayer, 1000 gallon tank, 25 g. p. m. Hardie pumps mounted on 1967 hand drive, 2 ton International truck, 2500 miles. Custom built spray boom for right or left hand application with multiple O. C. jets, all controls mounted within cab. Equipment capable of 8-10 miles per hour, both sides highway, coverage complete. Covers 40′ swath. Also 500 gallon 245TLV4 chemical plus other mixed chemicals. Terms: Cash or certified check. To be sold as 1 unit. Write Box 32, Weeds, Trees and Turf, 9800 Detroit Avenue, Cleveland, Ohio 44102.

SPRAYERS, USED, all sizes and makes, at large savings. Send your requirements. Equipment Sales Co., 4742 Sunrise Highway, Massapequa Park, N. Y. 11762.

REBUILT RYAN Sod Cutters with or without cutoff. Sharon Welding Company, 11674 U.S. 42, Cincinnati, Ohio 45241.

FOR SALE

80 ACRE SOD farm on peat: 70 acres of Merion ready to cut. Metal barn, deep well for irrigating. Near Lansing, Michigan. Phone Ann Arbor 313 662-9398.

HELP WANTED

FIELD SUPERVISOR Industrial Weed Control firm in eastern Pennsylvania is looking for a field supervisor. Degree in one of the agricultural sciences is desirable but not necessary. Write Box 30, Weeds, Trees and Turf, 9800 Detroit Ave., Cleveland, Ohio 44102.

MANAGER FOR exterminating and weed control business. Salary plus commission and stock option. Expanding, established business. Write or call in confidence: Robert Eron, 3801-16th Street, North, St. Petersburg, Florida 33713. Phone 813 526-9111.

Cover Story

(from page 5)

use were carted away by hand prior to the replacement planting.

Forest City is one of the oldest and best known tree care companies in business, originally being started in 1910 by the father of William and John C. Lanphear, both vice-presidents. The Lanphears carry from 10 to 30 employees during the year and operate a complete tree care business. Both began part-time work in the business as youths, in the 1930's. They have continued with the company following college and are active in both the International Shade Tree Conference and the National Arborists Association.

Advertisers

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Manage Fertilizer

(from page 35)

other 7 days. Plants were then transferred to a growth chamber.

The chamber maintained a 95° F day temperature and 85° F at night (14 hour light period) and 90 percent humidity. After 14 days in growth chamber, the plants were rated for vigor and then clipped at the soil surface.

A close relationship was found between vigor ratings and dry weight of clippings for all fertilizer treatments. Dry weight and vigor were increased as levels of potassium fertilizer increased, while applications of nitrogen reduced dry weight and vigor. Best growth was at the highest level of potassium with no nitrogen.

Field experiments are now being made to find the best schedule of nitrogen and potassium fertilization.

Response of Bentgrass Grown under High Temperature and Humidity to Nitrogen and Potassium[1]

Lb. N/ 1000 sq. ft.	Lb.K/1000 sq. ft. 0	1	2	N average
0 lb.				
Gm. dry wt.	.30	.46	.48	.41
Rating[2]	1.88	3.22	3.38	2.99
2 lb.				
Gm. dry wt.	.22	.27	.34	.28
Rating	.81	2.12	2.88	1.76
4 lb.				
Gm. dry wt.	.36	.30	.38	.35
Rating	1.94	2.50	2.44	2.26
K averages				
Gm. dry wt.	.27	.34	.40	—
Rating	1.54	2.61	2.70	—

[1]Applied as solutions of NH_4NO_3 and KCl.

[2]Rated on a scale of 0 to 5 with 0 representing no vigor and 5 high vigor.

Chad Research Fund Up By $4,000

The L. C. Chadwick Memorial Research Fund was increased by $4,000 at the recent 39th annual short course for vegetation care management personnel.

An exhibitors' auction raised the money for the fund which sponsors research in landscape horticulture at Ohio State University.

Herbicide Persistence Varies By Soil Type

Many conditions affect the length of time herbicides will remain in soil. These include application rate, rainfall, and soil type and temperature. In addition, herbicides differ in solubility and resistance to degeneration.

Generally more persistence occurs in dry, cold, clay soils, low in organic matter, and with a low rainfall. Persistence is less in moist, warm, sandy soils, high in organic matter content, and under high rainfall.

Following is a table of some commonly used herbicides. It should be used only as a guide. It was prepared from observation, references, technical sheets and other literature by Dr. Edward Stroube, agronomist at Ohio State University, Columbus, Ohio. Rates of application can be found on the respective labels.

Persistence of Herbicides in a Moist Clay Loam Soil with Little or No Leaching under 60° to 80° F. Soil Temperatures

Chemical	Rate per Acre (Active Ingredient)	Type of Treatment	Persistence in Time
Amitrole	2-10 pounds	Postemergence	3-5 weeks
CIPC	4-8 pounds	Preemergence	3-5 weeks
Dacthal	6-12 pounds	Post or pre-emergence	3-6 weeks
Dalapon	5-20 pounds	Postemergence	1-6 weeks
Diphenamid (Dymid or Enide)	4-8 pounds	Preemergence	6-12 weeks
EPTC (Eptam)	2-6 pounds	Preemergence	3-8 weeks
Simazine	1-4 pounds	Preemergence	6-18 weeks
Trifluralin (Treglan)	¾-1½ pounds	Preplant (inc.)	1-5 months
2,4-D	½-3 pounds	Pre and post-emergence	1-4 weeks
2,4,5-T	½-3 pounds	Postemergence	2-5 weeks

Trimmings

How About Herbicides. Councilmen for the city of Dallas have bemoaned the fact that the city's ordinance for weed control is only about 10% effective. Of 1006 reported violations involving high weeds only 103 were satisfactorily disposed of. Problem seems to be that no city department has the equipment to keep up with the cutting job. We can't advise Dallas councilmen but we think the spraymen of the area need to enlighten the city on the use of custom contract applicators and tree care companies. There should be a chance for some good contracts in helping solve this problem via herbicides, not only in Dallas but in other cities as well.

* * *

Oak Trees Make Superior Campgrounds. Robert A. Bartlett, president of the tree care company bearing his name, said recently that areas with oak trees make the best camp and picnic grounds. Heavy foot traffic, he said, slows up circulation of soil oxygen which is vital to the root system. Oaks, Bartlett says, have roots which search far and wide for nutrients and are thus not hurt as badly by ground traffic. Beech, maple, dogwood, yellow poplar and other shallow-rooted trees suffer.

* * *

'Tis The Season. *Time again to warn people, and especially your clients who should know better, that opportunists in the tree spraying business abound. We haven't heard of any specific cases but were reminded on reading that as of now no Dutch elm disease exists in Denver. City Forester George Stadler was issuing the same type warning last fall. He told homeowners to ignore itinerants who solicited them for spraying elms. Since a cleanup program in 1949, no positive cases of DED have been found.*

* * *

Fertigation? It's a new word for us too. Seems that it describes the injection of liquid fertilizer into irrigation systems. The system isn't too new and has the advantages of cutting labor and getting nutrients to the plants in an available form more quickly. The system definitely has some advantages and we may see lots more of it. But we can't say the same for the newly coined "fertigation."

* * *

Congratulations to ASCA. The newly organized American Society of Consulting Arborists will be a boon to the vegetation care industry. Qualified, unbiased opinions are needed regularly by organizations and individuals who are willing to pay for consultation and technical advice. We hope the group expands to guarantee service throughout the country.

Insect Report

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

Turf Insects

LEAFHOPPERS

(Cuerna spp.)

Wyoming: Large numbers on rangeland near Burns, Laramie County.

Insects of Ornamentals

APHIDS

(Neophyllaphis podocarpi)

California: Nymphs and adults heavy on podocarpus nursery stock at San Jose, Santa Clara County. *Takecallis arundinariae* nymphs and adults medium on bamboo plants at Sacramento, Sacramento County. **Arizona:** *Aphis nerii* moderate on oleander terminals in plantings in Salt River Valley, Maricopa County; parasitism heavy.

LESSER PEACH TREE BORER

(Synanthedon pictipes)

Alabama: Constant girdling killed about half of 40 laurelcherry shrubs (5-8 feet tall) used as highway ornamentals: several others dying. First adult emergence occurred from these plantings. Pupae ranged 20-50 per plant under bark.

SPIDER MITES

(Oligonychus spp.)

Arizonia: *O. ununguis* heavy on juniper and *O. platani* heavy on many pyracantha shrubs in Tucson, Pima County.

Tree Insects

A BARK BEETLE

(Orthotomicus caelatus)

Delaware: Adult collected in blacklight trap in Dover, Kent County. Occurs in eastern Canada and in the United States as far south as Florida. Breeds in all species of pine and in spruce, larch, and fir. This bark beetle is an important secondary invader, often attacking weakened trees. With other bark beetles, often attacks and kills apparently healthy trees.

EASTERN TENT CATERPILLAR

(Malacosoma americanum)

Alabama: First and second instars 25-100 per small tent in many wild cherry trees from gulf coast counties north through central area. **Oklahoma:** Second instars on native plum trees in Major and Payne Counties.

SPRING CANKERWORM

(Paleacrita vernata)

Nebraska: Males abundant at lights in Lincoln, Lancaster County. **Wisconsin:** Males flying at windows on warm evenings.

NOCTUID MOTHS

(Lithophane laticinerea)
(Eupsilia morrisoni)

Wisconsin: Appearing in blacklight trap at Madison.

WHITE-MARKED TUSSOCK MOTH

(Hemerocampa leucostigma)

Nebraska: Egg masses common on deciduous trees in and around Lincoln, Lancaster County. Some defoliation possible.

A CONIFER SAWFLY

(Neodiprion taedae linearis)

Arkansas: No egg hatch observed in southern area week of March 11. Hatch well underway in mid-March 1967. Probably due to cool weather in 1968.

Compiled from information furnished by the U. S. Department of Agriculture, university staffs, and WTT readers. Turf and tree specialists are urged to send reports of insect problems noted in their areas to: Insect Reports, WEEDS TREES AND TURF, 9800 Detroit Ave., Cleveland, Ohio 44102.

Suppose you worked night and day all summer long. Keeping an acre of someone's turf clear of crabgrass. And for all your work, all your months of care, you got just $15. Know what they'd call you?

They'd call you Balan.™

Balan's the one effective pre-emergence herbicide that goes easy on a grounds maintenance budget . . . and goes all out against crabgrass. Weatherproof Balan clings to soil, resists leaching. It's highly active, yet contains no poisonous arsenic, mercury, or lead. Gives a wide safety margin when applied as directed . . . and is priced for all-over use. Balan costs as little as $15 an acre on northern (cool season) turfs. On southern (warm season) turfs, a heavier and a second yearly application may be needed. It's still a bargain. Order Balan Granular now. Then watch it go all out . . . all over . . . all season.

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