# Maintenance Practices Today

The pioneering days of turf management are for the most part over. Efforts are now directed on improvement of existing equipment and new uses for existing chemicals. The primary goals of engineers and chemists now are saving labor and fuel. Even water is becoming a critical limiting factor in turf maintenance in some areas.

Safety and environmental regulations for chemicals and equipment have increased cost without increasing productivity or efficiency. At the same time, they have greatly discouraged new suppliers from entering the market. Ingenuity is too often suppressed by the liability of manufacturing today.

After ten years of trying to meet unclear and constantly changing demands by the Environmental Protection Agency, chemical manufacturers have at least a few precedents to go by in chemical registration. As a result, more uses for existing products are becoming available. However, some of the chemical workhorses of turf management are floundering in EPA's Rebuttable Presumption Against Registration Process (RPAR). In this evaluation, products with suspected dangerous side effects are prosecuted under the full weight of environmental groups. This process forces the manufacturer to reevaluate the profitability of keeping older chemicals on the market when expensive testing is mandated. If the chemical is placed in a restricted category and the market for the product is reduced considerably, the manufacturer will be forced to raise prices to cover the cost of manufacturing smaller quantities.

The equipment manufacturer will soon face new safety regulations. Mower manufacturers are being required to add a blade brake which will supposedly prevent injury to feet and hands when the mower is not in motion. This precaution will add more than $30 to the cost of a trim mower. It is likely that similar safeguards will spread to machinery such as power trimmers, vacuums, and snow blowers.

Despite this burden of protecting the buyer against himself, manufacturers are making progress. Products are evolving which do cut labor time, gasoline consumption, and down time. Much of the savings however is lost in the price of the product.

The key to turf management efficiency is combining all known money saving measures into one in-

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**Thoughtful superintendent** *at Merion Cricket Club in Haverford, Pennsylvania, in the 20's rigged reel gangs in front of Toro tractor so that grass would be cut before heavy tractor wheels compressed it.*

tegrated plan. The turfgrass breeder, engineer, chemist and practitioner must consolidate their knowledge into a program which can be considered low maintenance and yet impressive from a quality standpoint. Since these factions have operated independently for the most part, a new panel approach must be organized. One way to start would be to select one golf course, one park, one shopping center, one office plaza, one cemetery, and one highway right-of-way to implement all known labor and energy saving technology. Since associations are mainly concerned with specific fields, this coordinated program would most likely be taken on by a state university.

Of course, individual superintendents and turf managers could implement a combination of labor and energy saving methods at their facilities.

Some of these methods are included in the following description of progress in specific turf areas.

**Aerifiers**

The original aerifier was designed to be pulled by a tractor. It used a series of spoon-shaped rods attached to a central axle to pierce the soil. Soon afterward a gasoline powered aerifier was developed, both of these firsts came from West Point Products. Today, this technology is the property of Hahn. Other methods of coring were developed to reduce the unsightly appearance of cores remaining after aerifying. Hollow rods attached to a drum and dragging after aerifying are examples. Dedoes, Cushman/Ryan, Jacobsen, Toro and Turfco have all included aerifiers in their turf lines. Cushman makes one model that uses rows of upright rods to alternately punch the surface of greens.

Soil modification through topdressing is regaining strength as a turf practice. Aerification and sand topdressing offer potential for golf as well as other turf uses. The role of well-aerated soil in disease, compaction and irrigation efficiency is being rediscovered. Its role in *Poa annua* control is being restudied.

A drawback to the aerifier is its infrequent use. An aerifier attachment for a tractor may be more sensible on a cost basis. The multi-use turf tractor may be a key factor in equipment efficiency in the future.

**Drainage**

Proper site preparation makes

correctional drainage unnecessary. On the other hand, improvements in trenchers and the development of flexible plastic drain tubing have greatly reduced site disturbance and installation cost. Very few good farmers have yet to tile their fields. Turf managers should follow suit realizing the installation cost can be recouped in better drained and playable turf. Drainage also provides the manager with better control over the environment of the turf. Excessive surface moisture encourages disease and *Poa annua*. A savings in fungicides and herbicides is a possible result.

**Fertilizers**

The most recent development in fertilizers has been liquid formulations of ureaformaldehyde. Sulfur-coated urea preceded liquid UF.

The latest intent of chemical manufacturers has been to provide convenient nitrogen sources for applicators of liquid materials for turf, primarily the lawn care market. Their developments could be applied to fertigation, an area of large potential for well-irrigated turf areas. Liquid lawn care to golf courses has not proven practical so far.

Granular fertilizers remain the dominant nitrogen source. Some dry materials are available in a form suitable for liquid application.

Slow-release fertilizer technology currently exists which enables managers to reduce the number of seasonal fertilizer applications.

Combining fertilizer with insecticides and herbicides to reduce the number of applications is desirable. Large users may economize by buying quantities of individual chemicals and mixing them. This is simpler in liquid form. Buying custom blended dry products is less economical. Distribution of dry materials from broadcast spreaders may not be even if particle sizes and weights vary considerably.

Guidelines to mixing various dry materials to consolidate applications would be well received.

**Growth Regulators**

If you remember that growth regulators were actually the materials used to develop herbicides from, you wonder why they haven't progressed more than they have. Scientists have worked decades to reduce the yellowing effect of most growth regulators on turf. Managers of fine turf still hesitate to use them. Establishing low maintenance areas will encourage the use of growth retardants for roughs, roadsides, and parks.

**Herbicides**

The biggest headache in selective weed control remains grassy weeds such as yellow nutsedge and *Poa annua*. Basagran is registered for nutsedge but must be used with care to prevent burning desired turf.

Some specialists say we create our own weed problems with excessive fertilization and irrigation. Adjusting these maintenance practices should then help.

Properly timed use of preemergence herbicides certainly reduces postemergence treatments. Weed control is one of the areas that can benefit the most from integrating management practices. Keeping a good eye on the turf to identify problems early is advised, as is eliminating adjacent weed seed sources. Renovating a nearby field to tall fescue may be cheaper than endlessly fighting airborn weed seed. Hand removal of a few isolated weeds may eliminate the need for large area treatment later.

# EQUIPMENT

## National Mower Company

The historical flavor of the mower market can be sensed from the background of the National Mower Company of St. Paul, Minnesota, and its founder Robert Stanley Kincaid.

Kincaid received his degree in mechanical engineering from Purdue University in 1908. He grew up in Kentucky and appreciated the beauty and needs of turfgrasses. Kincaid's father became ill at the time of Stan's graduation and was hospitalized in Rochester, Minnesota. Since he hadn't yet taken a job, Kincaid decided to look for work in the Rochester area. He took a trolley to Minneapolis. When the conductor asked for additional fare he got off to look around. He noticed a manufacturing plant across the street and decided to check the company for job opportunities

Although he was an engineer, he accepted an apprenticeship at the plant for $1.25 per day. That company was Gas Traction Company, the first manufacturer of gasoline powered tractors in the world. Engineering developments there were applied to nearly all gasoline tractors to be built in the next 20 years.

Kincaid later worked in cooperation with John Deere, the early founders of Toro, and Briggs & Stratton. The northern central states were a hotbed of gasoline powered tractors in the teens. In 1916, a demonstration of tractors from Ford, International Harvestor and others was held in Nebraska. The conversion from steam to gasoline was now certain.

At this same time Kincaid began experimenting with gasoline-powered reel mowers. He developed a 40-inch mower for estates and helped solve early engine lubrication problems. All efforts were directed at war for the end of the decade.

In 1921, two years after he returned from the war, Kincaid began making small numbers of gasoline-powered mowers. He always resisted fancy and unnecessary cowling and concentrated instead on the engineering strength of his mowers. Gradually he built up production and his son John joined him.

Today, National makes some of the most rugged riding reel mowers in the business. These mowers had their origins with Toro's Bull Tractor and continue to play a growing role in mowing of fine turf. Kincaid strongly believes in doing a few things well rather than many things poorly.

### Irrigation

Many turf specialists are suggesting irrigation has been misused, especially in the north and northeast. Battles with *Poa annua* , bentgrass in a stand of bluegrass, and turf disease are thought to be related to misuse of water. Much research on healthy irrigation levels for turf is needed. The practicality of using irrigation systems for chemical applications needs to be considered more seriously. This might well be a reason to install or upgrade an existing irrigation system since coverage would be critical for such use. Wetting agents may be one of those chemicals applied to improve the utilization of water by the turf.

Use of effluent or even city water may prove more economical than drilling a well or building a lake. In some areas, an extra meter can be installed on the system and sewerage treatment fees deducted from the water bill. If use is limited to necessary times water use can be curbed.

### Mowers

Hydraulics have gained a strong position in the mower market. Original resistance caused by extra maintenance for hoses and pumps is being overcome. Use of larger mowers is more practical due to hydraulics. Transporting large mowers no longer requires stopping the mower to pick up side units.

Hydraulics have helped the use of flail mowers for turf. Manufacturers offer fine edged blades for flail mowers. Benefits are said to be reduced blade sharpening and adjustment.

Hydraulic reel mowers offer an alternative to PTO driven versions or wheel driven versions. Gangs provide the extra flexibility of freeing the tractor for other jobs. Rotaries remain the modern workhorses due to high maneuverability and low maintenance. Hydraulics have eased some of the problems with belts on rotaries.

The sickle bar mower has slowly faded into almost strictly agricultural use.

### Seeders/Spreaders

The technology of seeders and spreaders has not abandoned the drop spreader, although broadcast and hydraulic seeders are dominating commercial use.

Convenience of size and speed often outweigh the accuracy of the drop spreader. Broadcast spreaders throw a wide swath of material in a short time. Distribution is less uniform, however. Large broadcast spreaders have greatly increased the practicality of topdressing with sand.

The hydraulic seeder quickly solves large seeding jobs. The seed can be applied with the fertilizer and mulch at one time. Blowing straw becomes unnecessary. Seeding rates are higher but instant protection against weather is provided and the job is completed quickly. Mulch quality must be carefully watched. Always use the well-known brands to avoid problems.

### Verticutter

More aggressive Kentucky bluegrasses have increased the need for vertical mowing. Increasing popularity of overseeding and topdressing also encourages the use of vertical mowers. Like the aerifier, the verticutter is used only occassionally. Combined with turf vacuums, verticutting can be a fairly quick form of turf improvement. Verticutting large areas remains a

# EQUIPMENT

## The Toro Company

Toro began as the Toro Motor Co. in 1914 when the Minnesota-based operation was commissioned to build engines for a manufacturer of farm machinery. It turned from its agricultural orientation in 1922 when the golf course superintendent of a local course suggested the company design a tractor-towed gang mower for fairway maintenance. By 1925 Toro turf maintenance machines were in service on nearly every major golf course in the country and on parks and large estates as well.

Toro produced its first power mower for residential use in 1939 but it was not until 1945 when it began to move into the home lawn market. Through a combination of acquisitions and research and development Toro began to expand operations around the country. Plants now exist in Bloomington, Windom, Shakopee, Fairmont, and Willmar, MN; Tomah and Hudson, WI; Riverside and San Marcus, CA; Columbus, OH; and Mason City, IA.

The company entered the rotary mower market with the purchase of Worldwind Inc. in 1948. Soon after Toro developed its wind tunnel housing, a major step in its technological growth. Toro was the first manufacturer to develop a mower with electric starting, the first to offer a rotary lawn mower with a bagging attachment, and led the way in establishing safety features for mowers.

Toro entered the snow thrower market in 1951, a major step in transforming the company from a seasonal business to a year-round supplier. It pioneered the development of compact, lightweight snow throwers and is now the leading manufacturer of snow throwers.

From snow equipment, Toro expanded into the irrigation field with the purchase of Moist O'Matic in 1961. Toro made extensive use of plastic in place of metal for irrigation equipment. Other innovations in irrigation include valve-in-head sprinklers, rotary gear driven sprinklers capable of sending a stream of water a diameter of 150 feet, pop-up pop-down sprinkler heads which virtually eliminate vandalism, and vibration-free easy-to-service sprinkler heads for all types of farm irrigation.

In 1979, Toro entered the lawn care service with the acquisition of Barefoot Grass, Columbus, OH. Its consumer yard care line which included both rider and walk-behind mowers has been broadened in recent years to encompass tillers, lawn debris pickups, flexible line trimmers, garden hoses, chain saws, and other outdoor appliances.

Toro's line of turf maintenance equipment ranges from a 21-inch walk-behind rotary mower to the giant HTM 175 that operates up to seven reels hydraulically and mows up to 80 acres a day. A total of 56 distributors in the United States and 56 in the rest of the world distribute Toro products.

time consuming job. Hydraulic drive could make larger units more practical than in the past.

### The Future

Managers of valuable turf areas in the future will face a complex set of considerations for problems that used to seem simple. Efficiency, application rates, chemical/biochemical interaction, water consumption, water content, precise rootzone condition and drainage control will be cross-checked for exact corrective measures. Turfgrass cultivar, disease organism identification, and soil chemistry would be the least number of factors to be considered and they would have to be considered in greater detail than today.

A computer may be required to manage the number and complexity of details for turf management. Research data bases will be developed by universities and large associations. Test results will be inputted by minicomputer at the site and transmitted via telephone for evaluation and recommendations. Demographic data will customize the answer for the computer user.

**Bill Lyons**, *former superintendent of Firestone Country Club in Akron, Ohio, and now owner of Lyon's Den Course, continues to apply 50 years of turf knowledge to the game of golf.*

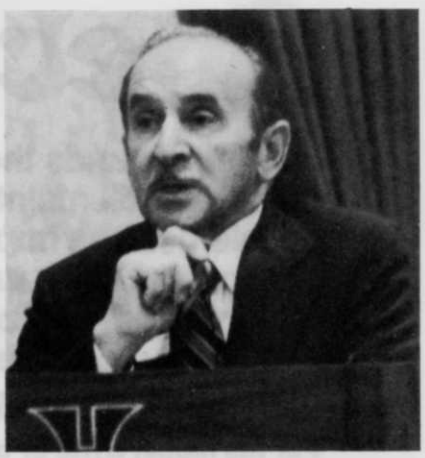
Such programs exist in simplified form today. Soil test facilities in Wooster, Ohio, provide a computer printout of recommended application rates for nitrogen and all other elements, including pH correction. The professional provides a soil sample and fills out a card listing type of turfgrass or tree, whether the sample is preplant or postplant, and county. The results from the lab are sent to the county extension turf specialist for filing and for delivery to the sender. If additional information is needed, the person can call the extension agent and he will have a record of the soil sample. Based on this information he can make fairly accurate recommendations in addition to those on the printout. This service costs less than $10 per sample.

In this fashion many more factors can be considered and processed through the extension agent or association technical specialist. One problem with this system is the two to three-week turnaround time. Direct access to a data base could provide instantaneous results. Access to the computer could be limited to subscribers of a system by a minicomputer which is programmed to communicate with the central processing unit.

Although it may sound like a great deal of money, $6,000 for a minicomputer is not excessive if it can help prevent the loss of a green before a major tournament, or the failure of a large seeding installation by a landscape contractor. The cost to the university or organization for the central processing unit is higher, it could be paid by subscriptions from users.

Another use for the computer is the implementation of integrated pest management programs. IPM can be very complicated if you fully consider chemical controls, biological controls, and site conditions. Natural predators for disease hosts and damaging insects are not well understood at this time. Since the Environmental Protection Agency is behind the implementation of IPM, perhaps it can supply data base needs to extention agents. Regulating IPM would be nearly impossible without computer assistance.

To really get control of chemical use by agriculture and turf, not that it is out of control, EPA will have to provide practical solutions and assistance in addition to enforcement. And, rather than building local bureaucracies with EPA control support of the existing extension service should be mandated. Extension specialists know the industries whereas EPA agents know only enforcement of rules. They too often misinterpret local uses due to vague national standards. For the Special Local Needs program, EPA has rightly sought the assistance and advise of Land Grant universities, the very source of information for extension agents. There may be a case for integrated government management.



**Al Radko** *has directed the USGA Green Section for the last two decades. He has edited the Green Section Record during that period.*

Solid state technology, already employed in irrigation, can be extended to other turf uses. Moisture sensors let the controller know irrigation is unnecessary after rain. Soil temperature sensors may indicate that syringing during hot weather is unnecessary. Phone communication with controllers can eliminate or change cycles. The uses of computers are limitless.

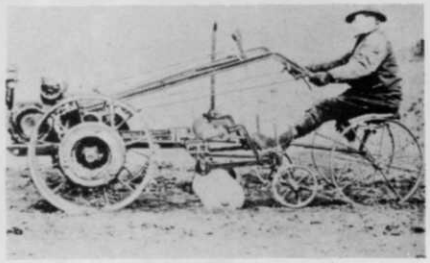
Use of infrared photography to indicate water or disease problems in turf may play a part in the future. Perhaps subtle differences in temperature of turf areas may pinpoint problems before they become detectable to the eye.

Effluent water (partially treated)is a good example of integrated management. It solves the turf managers problem with water costs and helps the sewerage department safely distribute water not needed for domestic or other industrial use. Wastewater control is another function, the biggest, of EPA. Its support for use of effluent for turf would help speed up conversion.

Growth regulators and water conditioners have a major role to play in the future. So does native material, such as wildflowers and prairie grasses. Here again, proper use depends upon full consideration of cost and site conditions. The benefits of lower maintenance products suffer from lack of comparison with alternatives. By planting native materials, mowing may be eliminated, but that doesn't eliminate the need for other maintenance to the right-of-way such as trash removal, fence repair, and shoulder maintenance. Maintenance based upon these other needs may be adequate for mowing less expensive grasses.

By improving turf maintenance technology we have uncovered new problems and raised new questions. Assembling data on all aspects is possible with the computer. In the future the computer will eliminate much of the doubt about modern methods, contribute to the sophistication of the industry, and prevent unnecessary losses caused by lack of information. **WTT**





**Sulky reel mower** *at Mount Vernon, Virginia, in the early 50's (top).* **First riding garden tractor** *was designed by Bolens in 1931 (bottom).*