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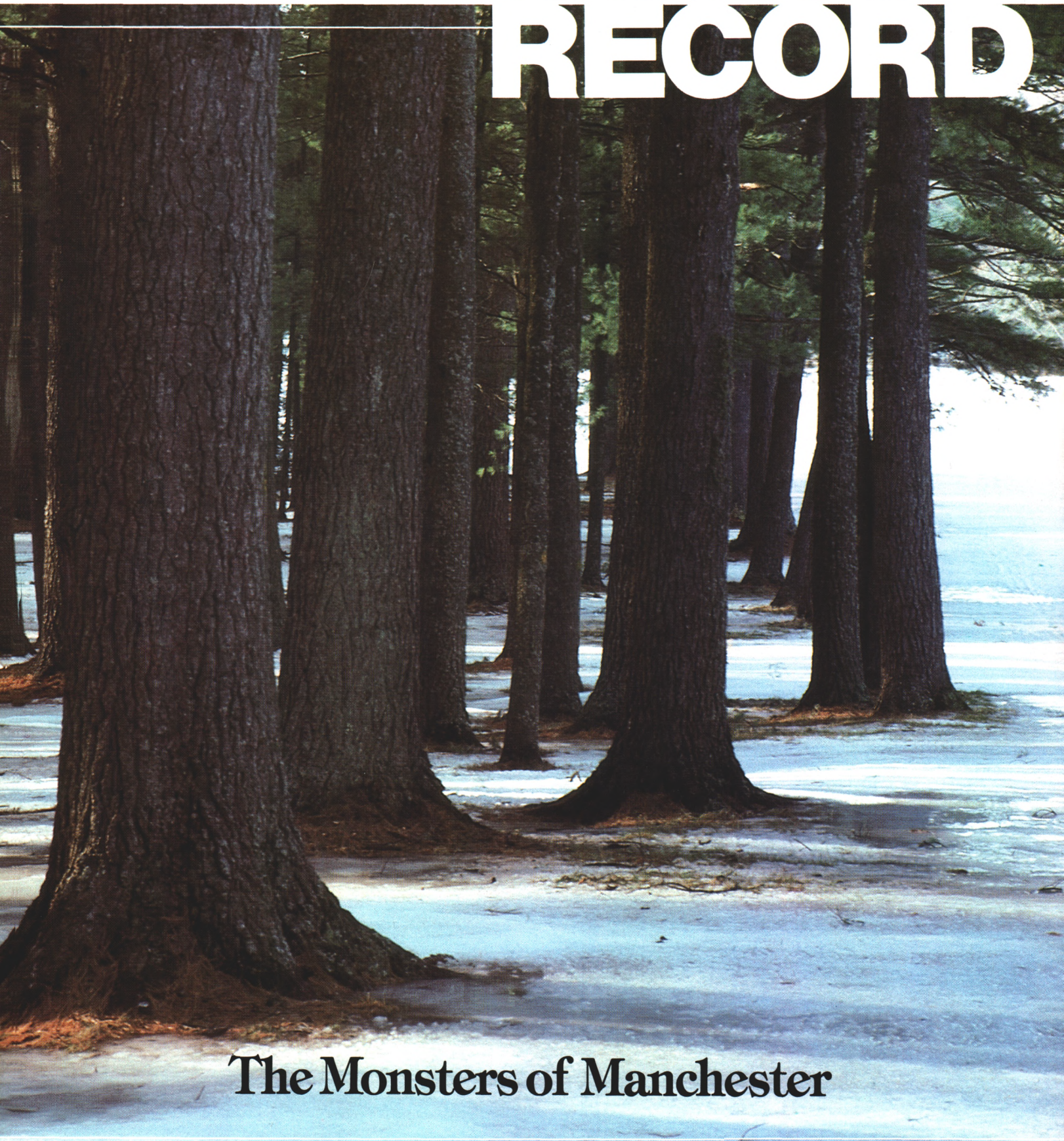

The Monsters of Manchester

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The monsters of Manchester.

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The Monsters of Manchester

by GARY A. WATSCHKE
Agronomist, Northeastern Region, USGA Green Section

TREES HAVE probably ruined more good golf holes and turf than any other single feature on the course! Do you agree with that? After all, trees play a prominent role on most American courses. They give definition and character to certain golf holes by guarding doglegs or greens, creating shots, directing lines of play, defining target areas, and protecting one hole from another.

If the trees have been properly selected, they will add great beauty to the golf course in spring, summer, and fall. They can differ in form, shape, and texture, and their seasonal changes provide aesthetic qualities that are often subliminal and sometimes startling. One usually hears all of these things from the advocates of trees. There is seldom a discouraging word.

But just as important as trees are to the golf course and to the game, they are often the source of serious problems. They can affect the way a hole is played as well as the quality of the grass. The long-term effects of an overzealous course beautification committee (which usually means a tree-planting program) are not usually seen until the trees become mature. Then, with the trees already established, it may require an act of Congress to remove trees that have been on the golf course "forever."

From a design point of view, most trees are innocent enough until they grow older and their overhanging branches limit the use of a tee or block the use of a normal approach shot into a green, because what was supposed to add character is now a formidable obstruction. As it grows older, it could mask the view of a strategic bunker. If it had been planted directly between the bunker and the green, it could create a situation known as double jeopardy.

None of the preceding cases is the planned result of the beautification committee or anyone else, but they can be easily found.

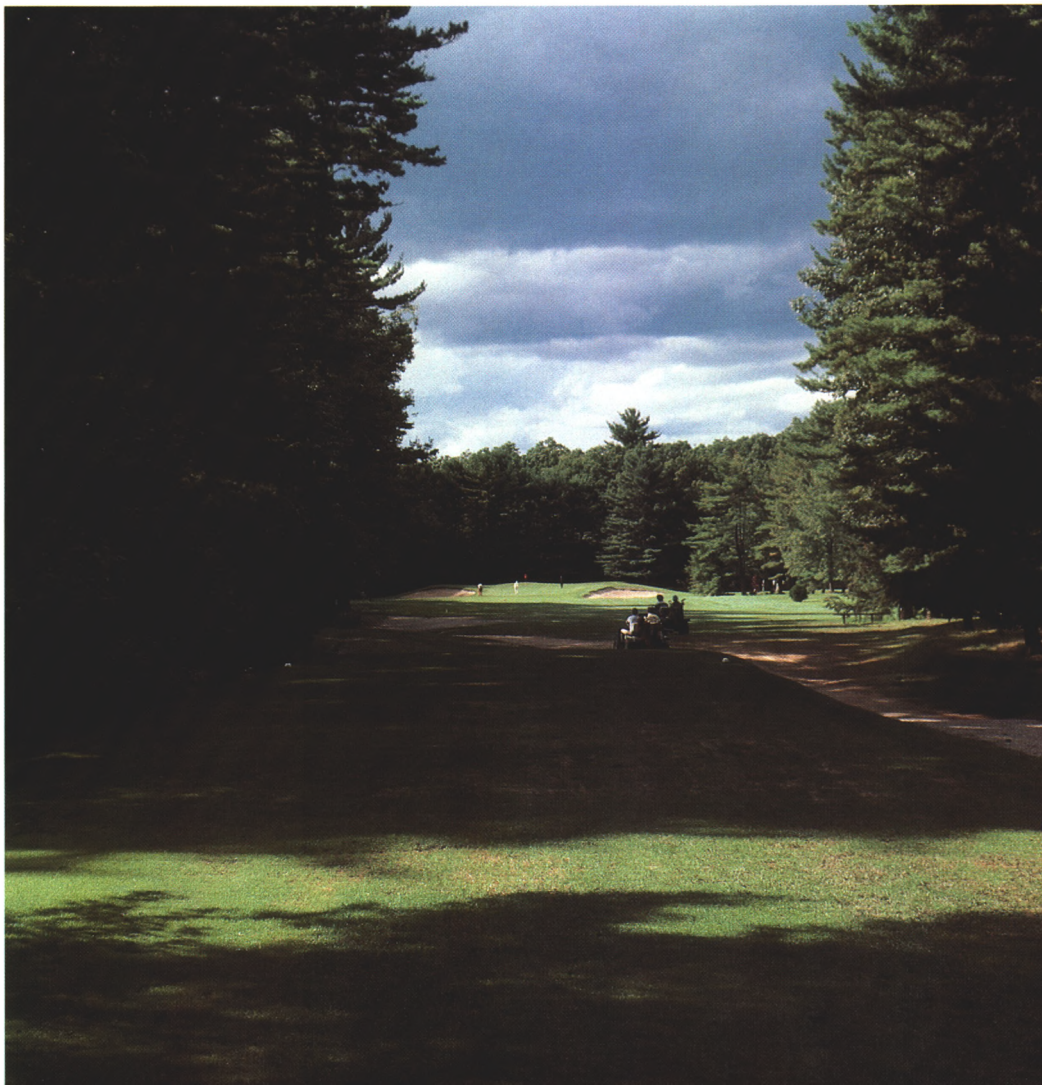
DESPITE HOW TREES can affect play, their greatest impact is, perhaps, on how they can affect turfgrass physiology. Trees can strike at turf from three angles. The negative effects can be from 1) overshading, 2) reduced air circulation, and 3) root competition. A turf manager can play the game with one or two strikes, but given all three, his turf is out.

The effect of heavy shading causes physiological changes within the turfgrass plant that result in an overall deterioration in plant vigor and hardiness. A delicate structure and succulent growth are common characteristics of shaded turf. They also show a reduced tolerance to drought, heat, cold, and wear.

Overplanting trees can also significantly reduce the air circulation above a stand of grass. While an increase in carbon dioxide levels may be an advantage here, it is quickly countered by the negative effects of increasing relative humidity, dew point, and temperatures. Disease is enhanced when weak, succulent turf is subjected to these environmental conditions that work in the pathogen's favor. This problem is often expressed around greens and tees where tree plantings can quickly become congested and grass is mowed to its lowest limit.

While root competition is often subtle, it is equally detrimental to the growth of healthy turf. Shallow-rooted trees are fierce competitors for the available

The sixth tee trees called for a shot through the chute and dense shade for the tee.



Manchester's sixth tee in mid-April after reforestation work. Improved air circulation and more sunlight is now assured.

water and nutrients intended for the good of the turf. Trees such as willows, poplars, silver maples, and white pines show shallow-rooted characteristics and often grow next to greens and tees. When they are important to the overall scheme of things, the trees should be left and their roots pruned periodically. If the tree isn't important, removal could be the best thing to happen.

GOLF COURSE superintendents and green committees strive to achieve certain constants in playing conditions at their clubs. These are produced by establishing specific cutting heights, green speeds, irrigation cycles, bunker conditions and by setting up maintenance programs that provide consistent results. Like everything in nature, however, a golf course is dynamic and constantly changing from year to year. Most changes are subtle, but over the long haul they can have a dramatic impact on the immediate surroundings. Quite often trees are the monsters that create the negative changes.

This was the case at the Manchester Country Club, in Manchester, New Hampshire, where the board of directors and an enlightened green committee came to grips with the emotional dilemma of how to handle the conflict between trees and turf. Even though nothing was seriously wrong with the maintenance program, Manchester Country Club was perennially hit hard by winter kill that seemed to escalate each year. Robert Dunn, chairman of the green committee, and Jim Diorio, the golf course superintendent, explain further.

The Green Committee Chairman — Robert Dunn

"In the fall of 1984, the green committee and golf course superintendent selected 50 trees to be cut down during the winter. The trees lining the fairways were extending their branches to such an extent that tee shots were becoming much more than a challenge on certain holes. Up to this point, only a handful of trees had been removed for golf reasons since the club had been formed, in 1923. Trees were more than sacred, and the pruning done in 1984 was criticized. Most members seemed to believe we were significantly changing a Donald Ross course to something less than it was intended. Our only answer was that when the course was built, the number and height of trees was not a problem. Indeed, after reviewing old pictures of the course, we could see how much time had changed our tree population. In recent times, our club's reputation was for its magnificent trees rather than for its playing condition. We now believe, and we are convinced, that Donald Ross did not wish us to do a great job growing trees, but that grass should be our first priority.

"As winterkill in some of our fairways and greens became worse each year, the green committee decided to take a stand in the spring of 1985. On-site visits from the golf course architect Philip Wogan, University of New Hampshire's Dr. John Roberts, and the USGA agronomist Gary Watschke provided important information that was presented to the board of directors. The consensus was that cutting down 1,200 or more trees was the answer to growing grass. The board of directors turned it down.

"At the next meeting of the board, the green committee had the magic words — the USGA agronomist Gary Watschke and the forester Tom Ryan, of Monadnock Forest Products, would select which trees should be removed or pruned. These two professionals would compliment each other in their work and MCC would be best served under this approach. The board agreed.

"As the membership does not own the club, Jack Cullity, our President, had to get permission from the owners before we could move on this project. The owners approved, and the calls were made to Tom and Gary to find a suitable time in the fall of 1985 to select trees for removal. In mid-September two days were spent doing just this with help from green committee member Tom O'Neil and superintendent Diorio. Our President and myself were also in attendance. Each tree selected was sprayed with a yellow paint mark the size of an apple for proper identification in the winter.

"The exact date for cutting was to be in late December or January, depending on turf conditions. The heavy equipment coming in and the number of trees coming down made it imperative that the ground be frozen. Snow cover would help. The work began the second week of January and continued until February 18, 1986. Our golf course superintendent was present throughout the

process, making certain everything was done just right. The lumber from the removed trees represented 270,000 board feet, producing an income of approximately $15,000 for the club. The owners had agreed this money could be spent on removal of stumps and the balance used for re-landscaping with more appropriate plants.

"Now that this most difficult part of the project is behind us, we can breathe a sigh of relief and look forward to playing golf under more favorable conditions. We know that, to many, the changes may not meet with their approval. Time will tell if the solution was correct, but we are convinced that the best interests of all members would be served and this gave us the strength to act. In 1987, after a year of growth and development in this new environment, we believe we have the quality golf course the membership wants."

The Superintendent — Jim Diorio

"As Mr. Dunn has indicated, we have undertaken an enormous tree cutting program at our club, removing nearly 1,200 trees. The majority were white pine ranging in caliper size from 5 to eight inches. We also removed a lot of red maple, red oak, and white oak. A substantial amount of marketable lumber was sold to the harvesting company, and approximately 650 cubic yards of wood chips, representing non-usable tops and trees too small for milling, were also removed. We cleaned up the branches and any tops that broke off when the trees fell.

"Undertaking such an extensive program and making such a major change in the perceived character of our course was not a project for me to handle alone. The USGA Green Section and Monadnock Forestry Products provided professional guidance that was necessary to achieve the results the majority of the membership was looking for. Men from these organizations, along with club officials, worked closely with me so we all would understand the whys and wherefores of what was happening.

"Foremost in our minds was to remove those trees which were hampering our efforts to produce quality turfgrass. Some of the trees we removed were as close as 15 feet from our greens and within eight feet of some tees. A majority of those we removed were on the east and south sides of the areas we were trying to improve. Many of these problem areas were receiving as little as one to two hours of sunlight daily. We were not only trying to increase exposure to di-

(Below) The fourth fairway at noon in early January. Dense shade covers entire fairway. Severe ice damage was normal.

(Bottom) After tree thinning, only the left edge of the fourth fairway was seriously damaged by late April. Perhaps more tree removal is needed.

rect sunlight, but also trying to provide for more air circulation by eliminating the stagnant pockets created by the dense trees.

"Perhaps the most severe problems with shading occur during winter and early spring. During mid-winter and early spring thaws, many of the problem areas would receive just enough direct sunlight to initiate snow melt, only to have it freeze as a layer of ice. Year after year ice layers formed on some of the greens, tees, and fairways, sometimes 18 inches thick. While the trees were being removed last winter, we were able to see the kind of results our work was going to produce. The increased sunlight provided a more rapid snow and ice melt, which minimized the amount of time our turf was subjected to this stress. In fact, our trouble greens were completely void of snow and ice by March 17th even though ice had been as much as 10 inches thick earlier in the winter. This is the earliest I have ever seen our greens free of ice and snow in eight years.

"Root competition was also severe in many of the areas. Root pruning around critical areas such as greens and tees is now a part of our periodic maintenance program. It is a relatively simple process that must be repeated only every three or four years. We have learned that the beneficial effects, in terms of better quality turf, are worth the effort.

"Another objective of this project was to improve our remaining woodlands. From a forestry point of view we were to:

1. Remove dead or poorly formed, slow growing species in both the understory and canopy.
2. Select superior trees and thin around them to stimulate their growth and seed production.
3. Harvest selected mature trees that were beginning to deteriorate.
4. Thin pole size stands to stimulate their growth and vigor.

The plan and the above actions should provide the following long-term results:

1. A stand of more vigorous, better growing trees that do not interfere with play or have a negative effect on desirable turf areas.
2. Better conditions for the regeneration of desired species.
3. A safer place for golfers (i.e. fewer dead branches to fall from tree tops).
4. A more aesthetically pleasing forest.
5. Easier cleanup of tree debris in the spring and fall.

"As could be expected, we had to handle a rather massive amount of debris left by the wood cutters. On February 3rd we put on a crew of 10 men to clean it up. While the snow was still on the ground, these men hand picked the larger branches and piled and burned them. While the burning was going on, we were pushing the smaller pieces of wood into piles with our front loader tractor and a leased Bobcat loader. We were able to do this with very minimal damage to the turf, because snow and ice still covered the course. After piling the loose pieces, we brought in our dump truck, loaded the debris and took it to the dump site. We were able to clean up about 75 percent of the smaller pieces in this manner.

"We stopped burning on March 7th, when the snow melted. As the ice and snow left, we found we still had a rather substantial mess on our hands. A fair amount of wood was lying on and around eight fairways as well as on the three staging areas used by the loggers to load the timber and chip their waste. The remainder of our cleaning up was done by blowing the small debris into windrows and picking it up with the sweepers. All wet and soft areas required a great deal of hand raking and loading the wood into Cushmans for carting off.

"The majority of the membership seems to have understood what we were trying to accomplish and what the final goals are. Their initial reaction to the pruning has been one of surprise over the number of trees we removed, but also one of accepting the knowledge of the people involved in this project."

Having Tamed the Monsters

A Turfgrass Advisory Service visit to the Manchester Country Club on June 5, 1985, led the club to act on a tree removal program. The trees that had to be removed were clearly identified, and the reasons why they were causing problems were explained. On a return visit, in late April of 1986 (six weeks earlier than in 1985) the amount of healthy turf seemed to have increased by nearly 80% compared to what it was like in June of 1985. There was no question that taming the monstrous trees proved beneficial.

Obviously, many members were surprised to see the extent of this project. However, after inspecting the condition of the early season turf, nearly everyone agreed with the program. The membership is delighted to know golf can be played under acceptable conditions many weeks earlier in the season than before.

From a turf management point of view, the project had several objectives:

1. Improved exposure to direct sunlight allows for a quicker snow and ice melt. Therefore, winter damage may be greatly reduced, which means that much less ground must be reestablished from seed each spring.
2. Increased direct sunlight on greens and tees should help make the turf more deeply rooted, healthier, and competitive.
3. There will be less tendency for wilt, since the turf is now growing in full sunlight for most of the day. Turf grown in shade all morning then suddenly exposed to hot afternoon sun seems to wilt faster.
4. Because the turf is much less succulent, disease and insect pressures may be reduced. Also, since it is less succulent, it will wear better.
5. Spring and fall cleanup will be much easier because of less debris and better accessibility.
6. A healthy, more playable golf course, which translates to a happier membership.

It is clear that, to a large degree, the objectives have been met. The club will watch for further competition from other trees, and if more are found to be causing problems, they will be removed.

Careful planning is now needed with regard to re-landscaping some of the cleaned areas. Operating from a well-conceived landscape planting plan is imperative because when you are dealing with trees that may live for 50 to 150 years, continuity is essential. Attention should be given to selecting acceptable plants and placing them in proper perspective to tees and greens.

James Snow, Northeastern Director of the Green Section, wrote recently, "Trees near greens should have features that will not interfere with turfgrass growth. These include deep rooting, minimum shading, minimal litter, small leaves, strong branching, and good pest resistance. While few trees fulfill all of these requirements, the club should choose species with as many characteristics as possible. A tree may be deeply rooted, strong, long-lived, and litter free, yet cast deep shadows. This tree could still be acceptable if it is positioned so that the shadows don't fall on the putting surface until late afternoon. Also, modern equipment can deal with litter problems effectively, although it is still a nuisance. Severe tree root competition can be rectified as well with periodic root pruning. These practices do require extra expenses, and they can often be avoided through proper selection and placement of trees.

"Trees near greens may be any height, but high branching species are generally preferred. The outer foliage line at maturity should not be closer than 30 feet from the edge of the green. Rarely should tall, dense trees be planted on the east and south sides of putting greens. If they are, they should be spaced far enough apart to allow direct sunlight to reach the green during most of the day.

"Trees planted in the vicinity of tees may possess somewhat different characteristics from those located near greens. They may have lower branches and produce larger volumes of leaves. However, sufficient air circulation and exposure to sunlight is in direct proportion to the branching height above the teeing surface. Deeply rooted species are preferred so that root competition and the associated root pruning can be avoided.

"Trees may be placed closer to the back of the tee than in front as long as adequate clearance for shots hit from all teeing positions is maintained. For the same reasons, low hanging branches should be avoided on the trees planted near the front of the tee for the same reasons. Sunlight must reach the turf throughout most of the day to ensure dense, vigorous turf with sufficient recuperative potential. When they are properly placed, trees and tall shrubs can provide shaded havens, perfect for bench locations, and a full view of the fairway.

"Some golf course superintendents have had special training and formal education in landscape design and are capable of developing a proper plan. However, if the club is not so blessed, best results can be ensured by consulting with a golf course architect or a landscape architect with experience in golf course planting. They are educated in the principles of design and can bring out the best in the course. Their cost of services is quite small when it is averaged over the lifetime of the plantings they recommend."

Trees, turf, and golf can be compatible when attention to proper design, selection, and location of plant materials is given. Manchester Country Club is developing plans for re-landscaping those areas where complete clearing was required. Assurance is given to provide the proper sunlight, air circulation, and reduction of root competition around all greens and tees. The decisions have not been easily reached, but the success has been of great magnitude.

"Timber!" About $15,000 worth.

The Future of Turfgrass Management and Underground Water Quality

by Dr. T. L. WATSCHKE
Department of Agronomy, Pennsylvania State University

NUTRIENTS and pesticides are an integral part of any turfgrass management program. High quality turf depends on them to ensure aesthetic value and function. In spite of this dependency, the use of fertilizers and pesticides throughout the country has been criticized. Turf on golf courses, lawns, athletic fields, cemetaries, and other sites that are given adequate fertility and pest control usually has good to excellent quality, but some cities have challenged whether the need for excellent quality turf is worth the perceived environmental risk associated with fertilizers and pesticides.

Significant concern has been expressed about the effects nutrients and pesticides have on the quality of water percolating through and running off from it. In the March 18, 1985, issue of *U.S. News and World Report*, Senator Dave Durenberger (R-Minn.) of the National Water Alliance, stated, "When you combine poor soil conservation with the new fertilizers everybody puts on their lawns, you have real problems. The fertilizers and pesticides run into the streets, then into the storm sewers, and from there into the drinking water intakes and our rivers."

Most of the available information concerning urban-surburban watersheds is limited to the quality of water emanating from impervious surfaces (roads, sidewalks, parking lots, etc.). Most studies indicate that water quality tends to decline as urbanization increases, due to the movement of undesirable materials in runoff from these impervious surfaces. Little is known about the quality of runoff from pervious surfaces (grassed areas) in urban-surburban watersheds. With the dramatic increase in nutrient and pesticide use (due to the increase in golf courses and in particular the growth of the professional lawn care industry), in such watersheds, the quality of runoff and percolated water may be affected.

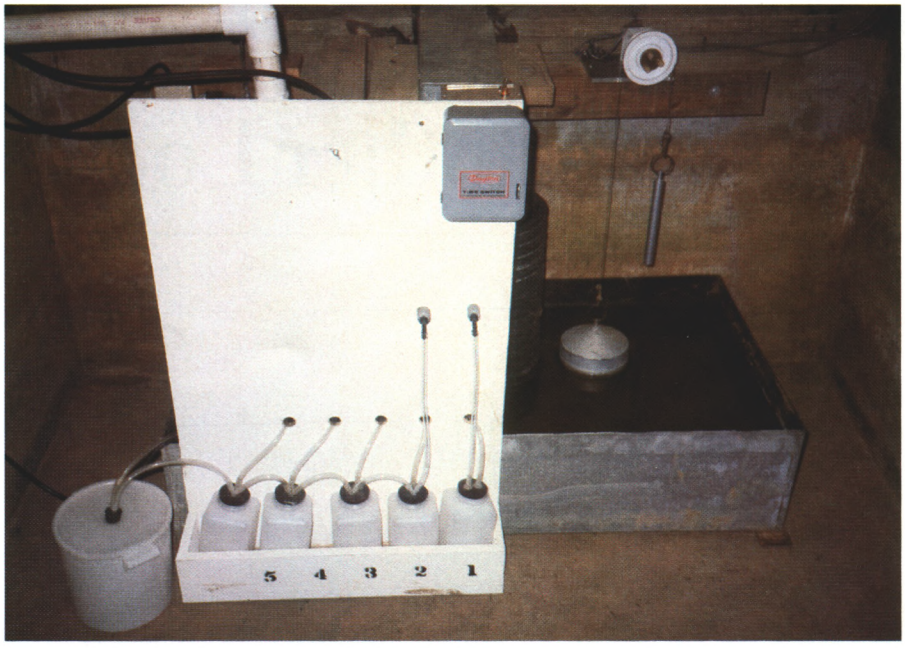
Most research over the past 25 years pertaining to the nutrient and pesticide content of surface water has been conducted in relationship to agricultural lands. In cases where water quality has declined because of nutrient and/or pesticide movement in water or eroded sediment, the use of grassed buffer strips between treated fields and bodies of water has significantly reduced the problem. These studies only provide indirect evidence of the impact that grassed areas have on water quality. Only by monitoring the quality of water emanating from and through well-managed turfgrass sites can the direct impact of nutrient and pesticide use be determined.

A WATER QUALITY research center has been developed at Penn State University to assess the effects of nutrients and pesticides on the quality of percolation and runoff water. The center has 12 sloping plots, each with an automatic irrigation system and an automated collection system at the bottom of the slope. Four lysimeters per plot have been installed approximately seven inches under the surface in each slope. Nutrients and pesticides have been applied according to label recommendations, and subsamples of runoff and lysimeter water have been taken. These samples are currently being analyzed by the Penn State University pesticide laboratory.

Different establishment methods were used when the turf on each slope was installed. Some of the plots were sodded with a Kentucky bluegrass blend, some seeded according to extension recommendations and some with a seed mixture similar to that used by building contractors (having a high percentage of temporary species).

A concrete catch basin (7′ x 7′ x 4′ deep) is set at the bottom of each slope, and aluminum-sided buildings served with electricity are positioned on top of each basin. On the plot side of the building, a concrete weir intercepts runoff and directs it through a chute into the building. As the runoff enters, it is directed through a splitting device that provides a subsample for analysis and proportions the remainder into a galvanized collection tank on the floor of the catch basin. The collection tank has a partition that divides one-third of the tank from the rest. Runoff is proportioned by the splitter into the larger side of the tank. The partition in the tank has a standard hydrologic v-notch through which water can flow from the larger to the smaller side of the collection tank. A float, connected to a potentiometer, rises whenever water flows through the v-notch (the water level is maintained at the bottom of the notch at all times). The electrical signal created by the potentiometer is recorded on a data logger in another building at the site. This signal is scanned every 60 seconds by the data logger to monitor flow rate from each slope. The data logger is coupled to a recording device that in turn is connected to a microprocessor, which converts the electrical signal to gallons per minute of flow. By accumulating the data from all the scans, the total runoff is also calculated. Sensors from a complete weather station at the site are connected to the data logger as well as to a thermocouple buried at one inch below the surface. The irrigation system can deliver three inches per hour, which is equivalent to a storm of a 125 year frequency in central Pennsylvania.

AFTER the system was established, the hydrological characteristics of each plot were determined. The rate of runoff from seeded plots sometimes exceeded by 15 times the amount from sodded plots. As time passed this difference has increased, primarily because of thatch under sodded plots and an increased density of the surface stand. As the organic matter content under sod has increased, the soil structure has changed, and the infiltration rate has become three to four times greater. Compared with thin, poor quality turf, turf of high quality (dense and having some thatch) seems to substantially reduce the velocity of runoff. Perhaps as the poorer quality turf improves from fertilizers and pesticides,



(Top) Overview of runoff plot areas — June, 1986.

(Above, left) View inside building at the bottom of each slope. Collection bottles float-potentiometer device, and subsample apparatus.

(Above, right) Drawing samples of water from underground lysimeters.

the rate of runoff will continually decline.

Although this research is only beginning, the initial hydrological information relative to high quality turf appears to be very positive. This hydrological information will be useful to civil engineers as they design storm water collection systems. In the past, runoff data from pasture research has been used to estimate the rate of runoff coming from turfed areas. It appears that pasture runoff information overestimates runoff from high quality turf sites by a considerable margin.

High quality fresh water is one of this nation's greatest natural resources; it has become a top priority of government and industry. The turfgrass industry is quite possibly looking down the double barrel of increased water use restrictions and broadened regulation of nutrient and pesticide use. Only through research can a record be established from which a meaningful dialogue can be forged with those who have doubts.

*Bentgrass/*Poa *rough and fairway. Where's the border line?*

Bent/*Poa* Roughs . . . Another Look

by RICHARD P. BYERS
CGCS, Park Country Club of Buffalo, Williamsville, New York

MANY GOLF courses have changed the layout of their fairways through the use of contour mowing patterns in recent years, intending to add new interest to older designs, recapture some of the challenge lost to improvements in golfing equipment, and to allow more intensive fairway maintenance through the reduction in total fairway acreage. Generally speaking, when contours are exaggerated around ponds, bunkers and tree groups, the widths of most fairways have been reduced, and large areas of what had been fairway turned into rough. Most of the goals have been accomplished, but in many cases the program has caused new problems — rough areas consisting of *Poa annua* and bentgrass.

For several reasons, *Poa annua* and bentgrass are definitely undesirable as rough grasses. With rough areas maintained at a height of two inches, these species are unable to attain this height without developing excessive thatch and/or segregating into unsightly

The old rough has been stripped and made ready for Kentucky bluegrass sod.

clumps. In conjunction with the tendency to develop thatch at higher cutting heights, related problems of increased susceptibility to disease, insect and scalping problems also come into play. Since these grasses do not readily reach rough height and are of the same texture as the fairway turf, it is frequently very difficult for both golfers and maintenance personnel to recognize the difference between fairway and rough. After the architect has left, the golf course superintendent is often left with the problem of renovating roughs to save the entire contouring program. An outraged membership does not understand how the new rough areas have added to the beauty and playability of the golf course when they are so unsightly and difficult to play from.

In 1985, Park Country Club of Buffalo undertook a fairway contouring program as a first step toward the implementation of a long range master plan. Our long-range planning committee had worked for two years to develop the master plan for restoration of the golf course, which had originally been designed by C. H. Alison and H. S. Colt and had opened for play in 1928. In conjunction with this work, we also planned the installation of an automatic irrigation system.

ONCE the master plan was final, a golf course architect was brought in to establish the new fairway contours and centerlines so the new irrigation sys tem could be installed during the summer. Fairway contouring reduced the size of the fairways by approximately four acres, to 23 acres overall. The first hint that there might be problems with the new contours arose when we found it was necessary to repeatedly outline the contours with paint so that the men mowing the fairways could distinguish them from the rough. The bentgrass was not growing fast enough or tall enough to make a distinct difference between rough and fairway. Golfers were also becoming upset because they were unable to clearly identify fairway outlines as they teed off, often finding a shot they thought was perfectly aimed lying in one of the new contours, which had not been visible to them.

As the season moved into the stress period of the summer, clumps of grass began to develop in the rough. Many of the new rough areas had previously been overseeded with a bluegrass/perennial ryegrass mixture, which had produced only a sporadic cover of ryegrass. The ryegrass was flourishing in the heat of the summer, while the bentgrass and *Poa annua* surrounding it was collapsing. Golfers often found their balls nestled behind these clumps of ryegrass, creating a very difficult golf shot. By the end of the summer, the membership was distraught about the condition of the rough, and the future of the new fairway contour mowing was in serious jeopardy.

Knowing that the rough was of major concern, the grounds committee began studying solutions to the problem. It was apparent that a quick and permanent solution was necessary or the entire contouring program would be rejected. Since the existing grasses in the contours had become very thatchy and had segregated badly, all existing grass had to be removed in order to provide a uniform surface and a starting point. There were two possible routes to follow: (a) remove all the existing sod, or (b) use a non-selective herbicide to kill all existing growth. The chemical herbicide method would have to be followed by

Recently sodded bluegrass rough along a contoured fairway.

The Whole In One

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overseeding the entire area. In view of the limited success with overseeding in the past, the committee decided that the results were not only too slow, but they had not yielded an acceptable quality of turf cover to warrant continuing. The unsightly appearance during overseeding and the rather spotty cover of turf that follows for some time could actually aggravate an already sensitive situation. Having ruled out the possibility of overseeding, we were left with only one alternative — removal of the existing sod and replacement with new bluegrass sod.

TRYING TO obtain funding for this project and then implementing the program, which would involve the removal and installation of some four acres of sod, was a frightening prospect indeed. Realizing that it would not be possible to complete the entire course in one year, we chose to work first on those areas that would make the greatest visual impact and lend the greatest support to the program. Holes No. 1, 2, 10, and 18 were chosen as the first areas to be resodded, composing approximately 30 percent of the entire project. In discussing the procedure and timing for implementation, it was obvious that our own maintenance staff would not be able to complete the project when we wanted it done. They were busy finishing the cleanup following the installation of the new irrigation system. In addition to speed, it was clear that the project must be completed with a minimum of disruption to play. The installation of the irrigation system had already produced a disrupted golf schedule for the entire summer. With these restrictions in mind, a commercial landscape contractor was hired to do the sod removal, soil preparation and new sod installation. The club agreed to cut the sod along the designed fairway contours to insure proper location and to purchase the sod.

The actual procedure was very simple. Once the soil was exposed, hand tillers and tractors with soil pulverizers prepared the soil to a depth of approximately two inches. The surface was then hand raked and a starter grade fertilizer was applied. Sod was delivered in 5,000-square-foot shipments because of a weight limitation on an access bridge, and all the sod was laid on the day of delivery to ensure quality. A thorough watering followed the installation, and ropes were put up to limit cart traffic.

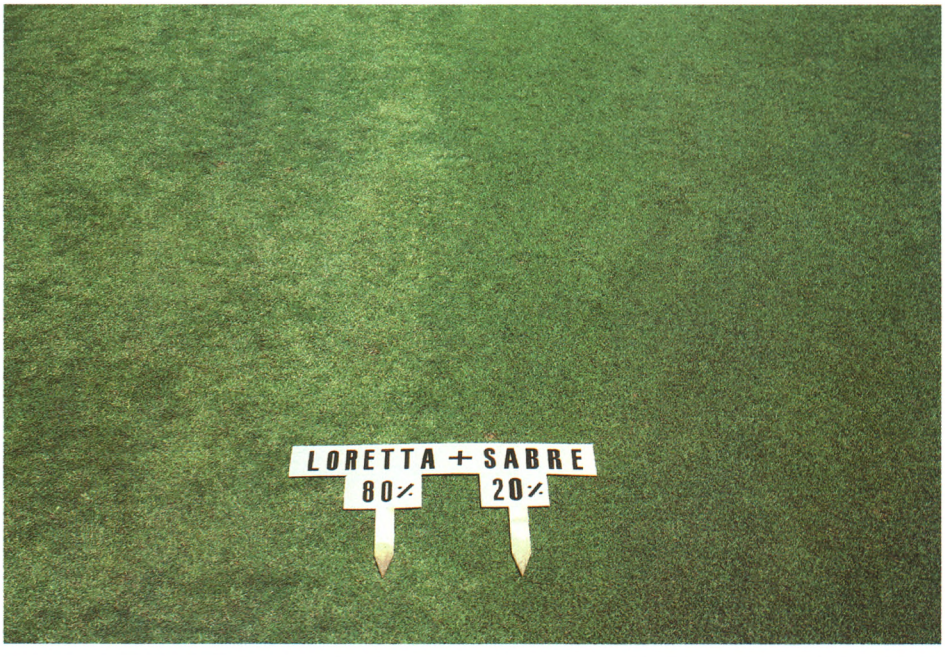
It took approximately six working days to convert 47,000 square feet of bentgrass/*Poa annua* rough into 100 percent bluegrass. Surprisingly, however, that was not the only change. The attitude of the membership toward the contouring program was changing almost as rapidly as the new sod was being installed. Suddenly, comments could be heard about how striking the contours now looked, and how nice and uniform the rough areas were. It appeared that our plan for a rapid and striking change in these rough areas had worked far better than anticipated. The contrast provided by the bluegrass made the contours extremely visible and allowed the artistic beauty the architect had planned to show through. Since the completion of this first phase, further funding has been approved and plans call for the entire project to be completed in about three years.

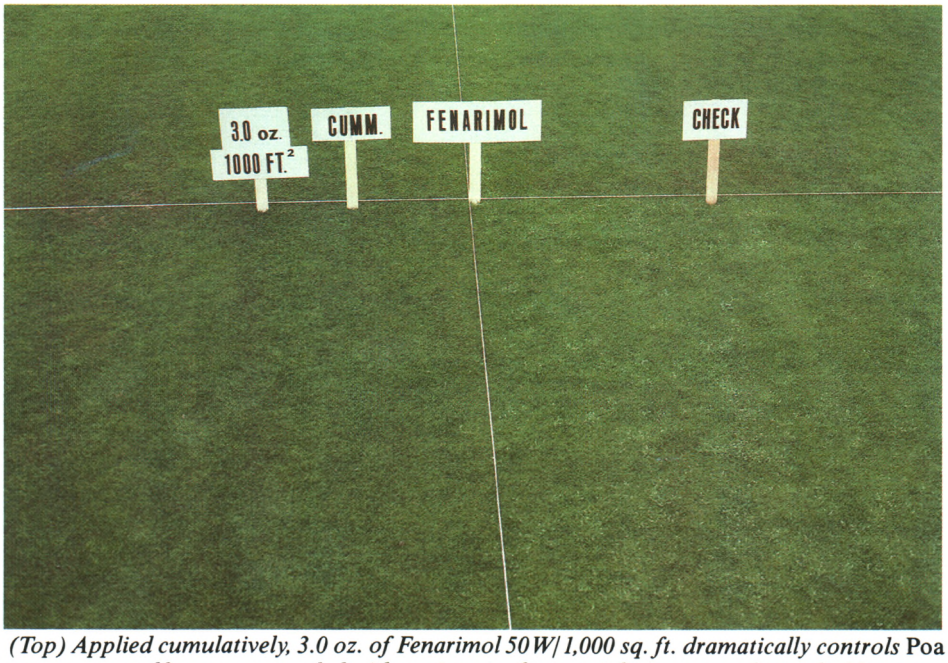
SEVERAL valuable thoughts developed from the experiences of the fairway contouring program at Park Country Club. First, if you embark on a program of fairway contouring, be prepared to do some extensive renovation work on the new rough areas. In addition, the goals of the program should be explained to the members, and they should be told what to expect. Sodding fairway contours is a viable alternative to renovating and overseeding. Certainly the initial cost for sodding is greater, but the cost and time involved in establishing a dense, mature stand of turf by means of overseeding can also be significant both in terms of the cost and in dealing with a group of unhappy golfers.

While most golf courses would not have the resources to resod every square foot of bent/*Poa* rough turf, you might consider this technique in crucial play areas, or where it is especially difficult to establish turf from seed because of heavy traffic. If the opportunity presents itself, try resodding a small area and see how impressive it can be. I think you and your members will be pleased with the results. Resodding is certainly an alternative to overseeding bentgrass/*Poa annua* roughs on golf courses today.

Use of Fenarimol for Selectively Controlling *Poa annua* in an Overseeded Bermudagrass Golf Green

by Wallace G. Menn, Department Soil & Crop Sciences,
Texas A&M, College Station, Texas



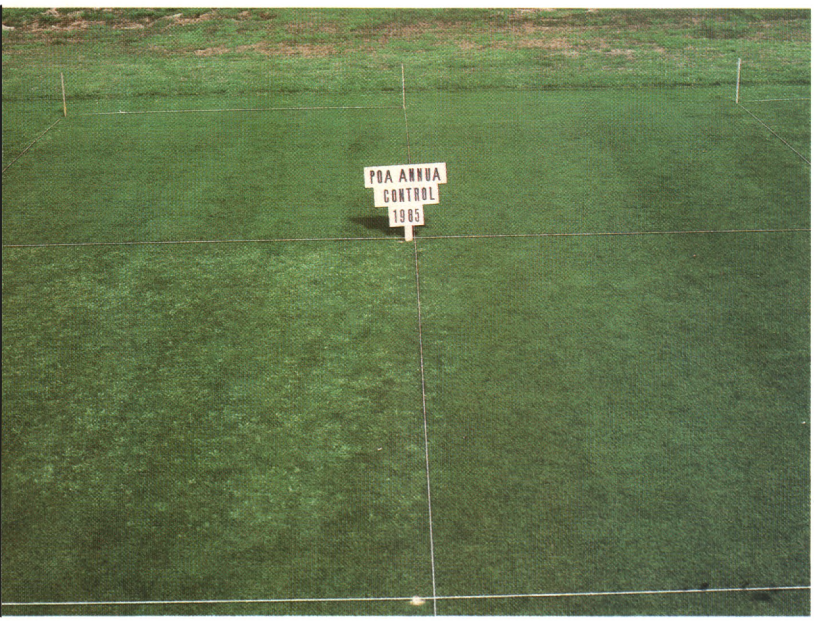


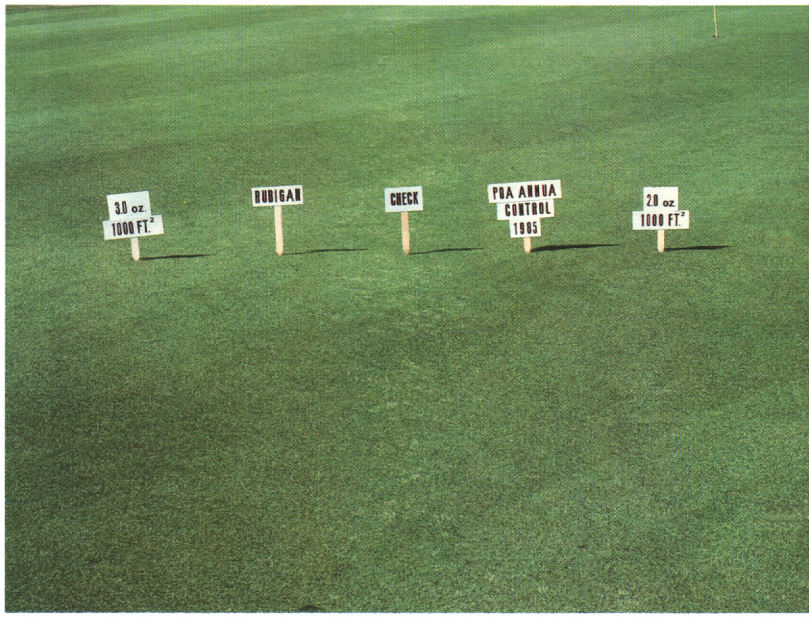
(Top) Applied cumulatively, 3.0 oz. of Fenarimol 50W/1,000 sq. ft. dramatically controls Poa annua *on a golf green overseeded with a mixture of perennial ryegrass and trivialis bluegrass. (Above) An untreated strip in the center of this green shows the control of* Poa annua *by both the high and low rates of Fenarimol 50W applied cumulatively.*

SELECTIVE CONTROL of annual bluegrass on overseeded bermudagrass golf greens is one of the most difficult weed problems facing superintendents of golf courses in the South. Use of various preemergent herbicides during late summer approximately six to eight weeks prior to overseeding has been successful, but it is not yet recommended by most herbicide manufacturers. Because of differences in climate, growing media, cultural practices, and overseeding susceptibilities, the use of preemergent herbicides prior to overseeding still presents a high risk to successfully establishing the cool-season species. At best, early application of preemergent materials is only effective in controlling early germination of *Poa annua* and it does not provide for control of this weed following the actual date of overseeding.

Fenarimol was initially evaluated for and is presently being used as a broad spectrum systemic, pyrimidine fungicide for ornamentals and turfs. During its fungicidal testing at Pennsylvania State University, it was noticed that in addition to disease control, repeated use of this material also seemed to bring about a reduction in the occurrence of *Poa annua*. Following up on this observation, researchers at Texas A&M University began evaluating Fenarimol in 1982 for its herbicidal properties, and, more specifically, its ability to control annual bluegrass.

During 1983, 1984, and 1985, both pre- and postemergent control studies were conducted at Texas A&M University, in College Station, Texas. Fenarimol was also evaluated cooperatively at Ridgewood Country Club, in Waco, Texas, and at Briarcrest Country Club, in Bryan, Texas. Test applications at both locations looked very promising for selective preemergent control of *Poa annua*.





(Above, left) Four experimental plots at Texas A&M University. Three were treated with 2-3 oz. of Fenarimol 50W/1,000 sq. ft., while the lower left plot was untreated.

(Above) Experimental plots showing Poa annua *control effected by the 3.0 oz. cumulative rate of Fenarimol 50W/1,000 sq. ft.*

SUBSEQUENT postemergent control evaluations have shown Fenarimol to have little or no effect when it is applied to actively growing annual bluegrass. At higher rates (>3.0 ounces of Fenarmol 50W/1,000 square feet), there may be some discoloration of the bermudagrass. This phytotoxic effect is usually short lived; it goes away after several mowings.

Studies have shown that for best results, Fenarimol should be applied at lower rates (1.0 ounce of product/1,000 square feet) in two or three applications spaced approximately two weeks apart. The last application should be timed at three to four weeks before the overseeding date. The product should be watered-in lightly following each application. Cummulative rates of 2.0 to 3.0 ounces of product/1,000 square feet should yield season-long control of *Poa annua* without interfering with the establishment of the overseeded species. It may be noted that Fenarimol is only effective in controlling the true annual strain of *Poa annua*, not the semi-perennial strain known as *Poa annua, reptans.*

Even though Fenarimol appears to cause no significant reduction in stand of the overseeded species, it was observed that when applied to a 100 percent stand of Sabre trivialis bluegrass, the overseeded grass did not tiller as quickly and thereby, did not thicken up as readily as the untreated areas. Where Fenarimol is used on golf greens that will be subsequently overseeded with predominately bluegrass, it is suggested that only the lower rate (2.0 ounces of a product/1,000 square feet) be applied.

The use of Fenarimol on overseeded golf greens has become quite popular, and indications are that its use could end the problem of *Poa annua* infested putting surfaces in the South.

Effects of Fenarimol on preemergent control of *Poa annua* out of Sabre rough bluegrass and Derby perennial ryegrass overseeding.

Rate of 50% WP per 1000 ft² (per 100 m²)	Method of Application	Control Ratings*	
		Tifgreen	Tifdwarf
Out of Sabre			
2.0 oz (61.0 g)	Cumulative	9.0 a**	9.0 a
3.0 oz (91.5 g)	Cumulative	9.0 a	9.0 a
2.0 oz (61.0 g)	Single treatment	8.5 a	9.0 a
3.0 oz (91.5 g)	Single treatment	9.0 a	9.0 a
Untreated check		1.0 c	1.0 b
Out of Derby			
2.0 oz (61.0 g)	Cumulative	8.7 a**	9.0 a
3.0 oz (91.5 g)	Cumulative	8.8 a	9.0 a
2.0 oz (61.0 g)	Single treatment	8.7 a	8.8 a
3.0 oz (91.5 g)	Single treatment	8.8 a	9.0 a
Untreated check		1.0 b	1.0 b

*Ratings based on a rating scale of 1 to 9: 1 = no control and 9 = complete control.
**Values followed by the same letter are not significantly different at the 5% level of Duncan's Multiple Range Test.

News Notes for Autumn

Update on Turfgrass Research Committee

Moving into its fifth year, the Green Section's Turfgrass Research Advisory Committee, working cooperatively and in conjunction with the Golf Course Superintendents Association of America, is staking out new ground, creating a new era for the advancement of all turfgrass interests. By the end of 1986, $1.25 million will have been placed by this committee in support of research efforts at 19 leading universities. The effort will lead directly to the development of minimal maintenance turfgrasses for golf. Never before have such sums or such a major commitment been made to turfgrass research.

Spending money is easy. Getting something for it is another matter. To insure that each research project is moving ahead and on target, committee members actually visit each supported university project annually. They see the actual work underway, discuss the needs and plans of the researcher and his staff and, in a way, become accountable for the future support level of the project.

As this 10-year effort moves to its half-way point, 32 direct visits by committee members have been made to research stations in the past year. The Turfgrass Research Library at Michigan State is now open and ready to respond to telephone information inquiries. The number is (517) 353-7209. The zoysiagrass, bentgrass, bermudagrass, *Poa annua*, and native grass breeding projects are moving into critical stages, and some even have newly developed varieties under greenhouse study. The plant stress mechanism research is entering its fifth year, and some early cultural practice studies (management factors relating to *Poa annua* — bentgrass competitiveness, for example, at Michigan State) are yielding important data. The Annual Progress Report covering all USGA/GCSAA Research Projects will be published in December, and a new series of 35mm slides depicting last year's research progress will be available.

Members of the Research Committee include Marion B. Farmer, USGA Executive Committee; Wm. H. Bengeyfield, USGA Green Section; Gerald F. Fauble, GCSAA Executive Committee; Dr. Victor A. Gibeault, University of California, Riverside; Frank Hannigan, Senior Executive Director, USGA; James B. Moncrief, retired USGA Green Section agronomist; James G. Prusa, GCSAA Assistant Executive Director; Dr. Paul E. Rieke, Michigan State University; Charles W. Smith, USGA Business Administrator; and Dr. James R. Watson, The Toro Company.

Karl Olson Announces Resignation from Green Section Staff

Karl Ed Olson announced his resignation from the Green Section Staff effective September 1, 1986. Karl was the USGA Agronomist for championships the past two years and traveled extensively in helping prepare the courses used in the U.S. Open, the Amateur, and other major USGA championships. He also served as the turf advisory agronomist for the New England area in his earlier years with the Green Section. He became a member of the staff in 1983. Olson has accepted the golf course superintendent's position at National Golf Links of America, Southampton, New York.

A Salute from GCSA of New England

In the June, 1986, issue of The Newsletter, a publication of the Golf Course Superintendents Association of New England, Ron Kirkman, the editor, wrote:

"We would like to take this opportunity to send a message from the Golf Course Superintendents Association of New England to the Green Section of the United States Golf Association. We salute you, for over the years, through your educational sessions, research, and experimental work you have brought us, the golf course superintendent, a wealth of knowledge that is of lasting benefit to our clubs."

We thank you — all of us in the Green Section!

Turf Advisory Service Fees for 1987

The USGA Executive Committee has approved an increase of $50 in the Turf Advisory Service fee structure for subscribing clubs in 1987. This is the first increase in two years and is necessary to keep up with travel expenses. Even so, the Green Section Service is still the biggest bargain in golf course maintenance today, especially when it is compared with commercial agronomic consulting firms. As with all USGA activities, the Green Section Turf Advisory Service is offered for service — not for profit.

The new fee structure for 1987 is:

½-day visit
$550 if paid by April 15
$600 if paid after April 15

full day visit
$850 if paid by April 15
$900 if paid after April 15

Your continued support of the Green Section is appreciated and needed.

The Research Committee at Texas A&M, Dallas, in mid-July, visiting the zoysiagrass and bentgrass breeding projects under D. M. Engelke.

TURF TWISTERS

HOW NOT TO SPEND MONEY

Question: The past few years we have been fertilizing our *Poa annua* greens with a variety of high nitrogen fertilizers and using a balanced fertilizer in between. Do you think a balanced fertilizer on a regular basis for *Poa annua* greens is better? (New York)

Answer: Not really, but the final answer would depend on a couple of present unknowns. For example, have you had soil tests taken at a two-inch depth recently? If the lab is familiar with samples taken from turfgrass areas and shows adequate phosphorus and potassium levels, there's no need to spend money for more and more phosphorus and potassium.

Grasses are high users of nitrogen, and nitrates are also highly soluble in the soil solution. They are readily lost through leaching (as is potassium). Therefore, *Poa annua* will do well with light and frequent applications of nitrogen and usually one or two balanced fertilizer (N-P-K) applications yearly. You might want to go to three or four balanced applications yearly if you get a pronounced response, but we would not expect this to happen unless your soils are very sandy or there is need to germinate new *Poa annua* seedlings at every opportunity.

ON PEARL

Question: Pearlwort. What is it and how can I get rid of it? (Iowa)

Answer: Although to some, pearlwort may resemble *Poa annua*, it is actually a broadleaf weed that can contaminate putting greens. It is often treated after it has emerged with a combination broadleaf herbicide. Field observations have shown that those who use the fungicide Rubigan are also getting post emergent control of the pearlwort with the fungicide spray. While not labeled for herbicidal control of pearlwort, Rubigan is labeled as a herbicide for *Poa annua*; its behavior as a herbicide is no secret. Indications are that the manufacturer may, at a later date, amend its label to reflect a warning concerning pearlwort.

AND BECOME A MILLIONAIRE

Question: Last year the salt index of our irrigation water had begun to rise. What can we do to counteract the detrimental effect of the salts? (Florida)

Answer: Salt problems in the soil can best be handled through applications of gypsum and elemental sulfur. Gypsum, applied at 400-500 lbs/acre three or four times a year helps break up the salt radical in the soil to a leachable form. Elemental sulfur at 1½ lbs per 1,000 square feet (60 lbs per acre) will lower soil pH. The soil amendments are best applied in early spring and fall, but they are spaced about a week apart to prevent burning. Heavy irrigation or leaching occasionally will also help keep salt concentrations below the root zone. As to the irrigation water itself, there is no inexpensive way to lower the salt index. Invent one, and you will be a millionaire!