JANUARY 1976

USGA GREEN SECTION RECORD

A Publication on Turf Management
by the United States Golf Association

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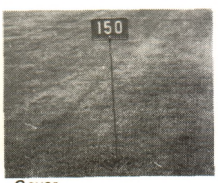

Cover

Simple yet effective artificial marker.

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The 150-Yard Marker

Figure 1. Low-growing evergreen shrub-type marker set near the fairway.

STANLEY J. ZONTEK, Eastern Agronomist, USGA Green Section

Golfers are always looking for an edge to improve their game. They like to have the latest equipment and the knowledge of the distance to the green from certain landmarks. Perhaps one of the most difficult decisions to make on a golf course (next to the size of the bet) is what club to use for the shot to the green. Not everyone is a good judge of distance, especially on a strange course that could be deceptively long or short, depending upon the terrain. So, one usually asks his caddie or partner for advice. These fellows know the course and should be able to help in club selection. Such information is fine if it is accurate. I'm certain almost everyone has played a course where he has been either well or poorly clubbed. Undoubtedly, this measurably helped or hurt your score.

What happens when caddies are not well trained or simply are no longer available for advice and yardages? This is becoming the case more and more with increasing use of powered golf cars. You can always legally ask your partner for such advice (but not your opponent or your opponent's caddie, if he has one) or you could search out any established yardage markers that might exist on the hole. More and more, the latter alternative grows in popularity.

THE FIXED YARDAGE MARKERS

The USGA at one time was opposed to established yardage markers intended to indicate distances from the fairway to the green. Today the USGA has no objection, except that if the markers are not natural (trees, shrubs, sand bunkers, mounds, etc.), the USGA may ask for their removal if any USGA tournament is to be held at the course.

For whatever reason, yardage markers set 150 yards from the center of the green have become the arbitrary standard. The following illustrations represent some of the 150-yard markers that we have seen. None of these are recommended by us, nor will they find use on every golf course. After all, there is no substitute for individuality. In fact, such illustrated yardage markers only serve to tickle one's imagination on how to best accomplish the same end. They could even be used to add a little uniqueness to the course besides helping to speed play (??!) and helping guests puzzle out an unfamiliar course.

NATURAL MARKERS

Figure 1 (Rhode Island CC, West Barrington, R.I.) illustrates a type of low-growing evergreen shrub that is planted in the rough on one or both sides of the fairway to show yardage to the green. The natural markers have the advantage of being permanent, looking part of the course landscaping, and being almost vandal-proof. If the plant species is carefully chosen and placed well in the rough for the larger growing ones, such markers can even add to the aesthetics of the golf hole and indeed the whole course. This is especially true when the more unusual colored and foliaged or flowering varieties are used. In the Northeast, any number of ornamental trees or shrubs could be used:

1) *Betula papyrifera*—Paper Birch or other Birch species.
2) *Acer* species like the Crimson King Maple variety.
3) *Cornus Florida*—Flowering dogwood, or

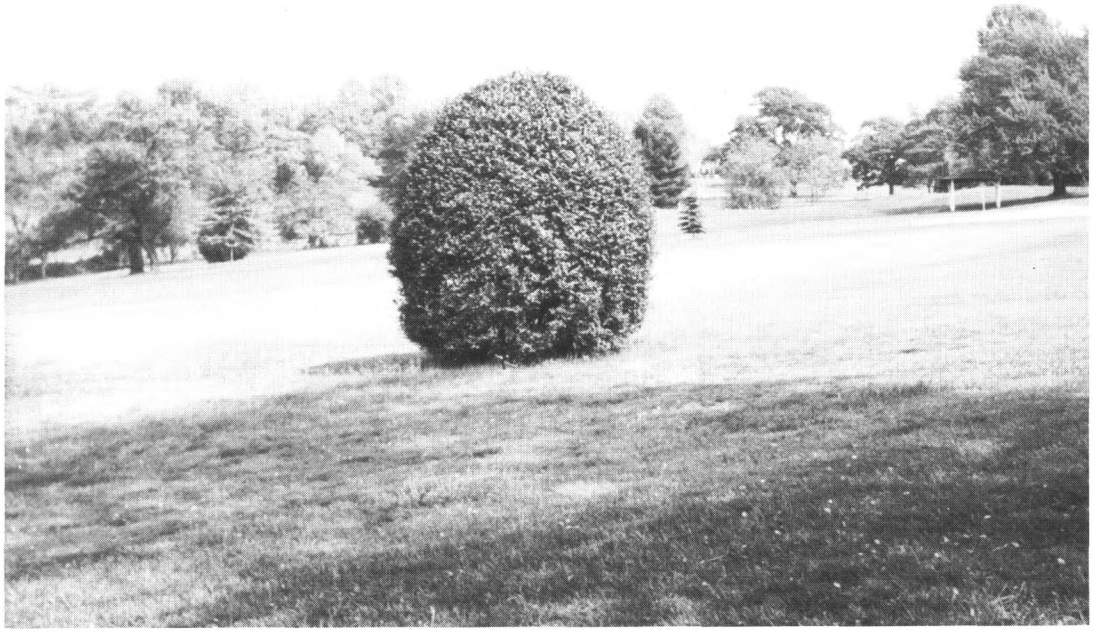


Figure 2. Larger evergreen shrub marker set well off the fairway.

other dogwood species.

4) *Ilex opaca*—American holly, or other holly hybrids or species.
5) *Taxus cuspidata*—Upright Japanese yew.
   Taxus cuspidata nana—Dwarf Japanese yew, or other yew species.
6) *Picea pungens glauca*—Blue Colorado spruce.
   Picea pungens glauca compacta—Dwarf blue Colorado spruce.
   Picea glauca—White spruce.
   Picea abies pendula—Weeping Norway spruce, or other spruce species.
7) *Tsuga canadensis*—Canada hemlock, or other hemlock species.
8) *Juniperus* species—Especially the low-growing varieties.
9) *Azalea* species—Many different ones available.
10) *Thuja* species—Various arborvitae available.
11) *Pinus mugo mughus*—Mugho pine, or other pine species.

These are only a few examples of plant materials available through local nurserymen. Additional suggestions may be obtained from your local County Agent. This does not preclude the use of other plant materials that might suit the purpose. Individual choices however, are often limited by the region of adaptation for the various plants, membership likes and dislikes, finances, and even the imagination of the people planting the project.

Figure 2 (St. Davids Golf Club, Wayne, Pa.) shows another species of evergreen that serves the same purpose . . . i.e., indicating a set yardage to the putting green. Note that it was planted some distance off the fairway in the rough so that the shrub can grow unrestricted and have little affect on play except for poorly directed shots that should be penalized anyway.

Figure 3 illustrates a similar type of large shrub

Figure 3. Marker type and placement must be well considered so maintenance and play are little affected.

Figure 5. Imbedded type fairway marker.

Figure 6. Easily movable and replaceable artificial marker.

situation except this particular shrub *could* cause a problem for play from the bunker, especially as it continues to grow in the future. When such naturally growing and spreading materials are used be sure they are either continually trimmed to maintain a small size (as in the case of Figure 1) or placed deep enough into the rough so when they do enlarge they will little affect play (as in the case of Figure 2).

ARTIFICIAL YARDAGE MARKERS

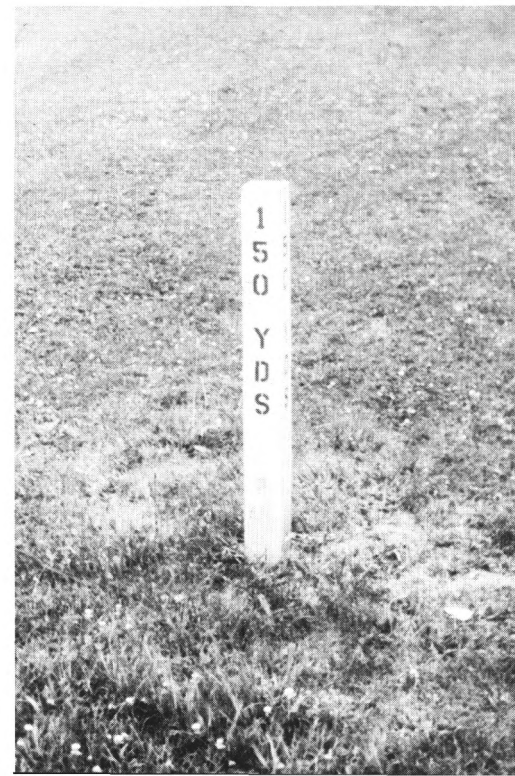
On many courses we have seen non-living yardage markers used to good advantage. They do not have the problem of growing or dying, are usually less expensive, and can be easily removed and replaced as the need dictates. However, this type of marker can be made so attractive as to be vandal and theft-prone unless it is very well secured.

Cover photograph (Blind Brook Club, Port Chester, N.Y.) illustrates a simple, good looking marker that shows exactly what it is . . . placed 150 yards from the center of the green. In the case of this particular marker, it is simply stuck in the ground and easily movable for mowing equipment and play.

Figure 5 (Old Oaks Country Club, Purchase, N.Y.) shows another type of marker that is simply imbedded in the center of the fairway 150 yards from the green. Because it lies flat, its effect on play and maintenance is minimal. Similarly, center row fairway irrigation heads could also serve this same purpose because they are usually uniformly placed out from the green, but not necessarily at exactly the 150-yard point . . . which is arbitrary anyway. The sprinkler heads could be trimmed and distinctively painted so they will stand out.

Figure 6 (from the Briar Hall Golf and Country Club, Briarcliff Manor, N.Y.) illustrates another artificial and inexpensive fairway yardage marker. It is simply a brightly colored pipe resting in another

Figure 7. Inexpensive yet effective wooden yardage marker.



SOMERSET HILLS COUNTRY CLUB GOLF COURSE DISTANCE CHART

Hole	Point of Measurement to Center of Green	Yards
1	Center of First Left Hand Trap	222
	Big Cherry Tree on Left	125
3	Front of Trap Left Fairway	145
4	End of Dolomites on Left	176
	Middle Fairway Bunker & Mound	84
5	End of Mound on Right	131
6	Back of Racetrack Dip	192
	Last Dogwood on Right	121
7	Furthest Dogwood on Left	215
	Middle of Trap Left Fairway	161
9	Lone Cedar Tree on Right	140
10	First Maple Tree on Left Opposite Bunker	204
	Tall Tulip Tree on Left	77
11	Direction Flag	170
	Brook	115
13	Large Oak in Clump of Trees on Right	150
14	First Pine Tree on Right	166
15	Front of Road	141
17	Last Spruce Tree in Left Rough	170
18	First Old Apple Tree on Right	164
	Front End of Bunker, Left Fairway	116

Figure 8. Separate card with yardages to the green from prominent hole landmarks.

larger diametered pipe sunk into the soil 150 yards from the green. This arrangement facilitates the marker's movement during maintenance or play and also assures that the distance will not be changed when the marker is replaced.

Figure 7 shows another inexpensive yet effective 150-yard marker (that is used at the Old Orchard Country Club, Eatontown, N.J.). This marker is a 4 x 4 piece of wood painted other than white so it is not confused with out-of-bounds markers and labeled with the appropriate yardage and placed in the rough along the fairway.

OTHER ALTERNATIVES TO YARDAGE MARKERS

The question can be asked . . . "Why indeed does the course need such markers that can be rather expensive to purchase, install, maintain, replace through vandalism, theft, or plant death?" We have seen several cases where the same end is accomplished by other means.

Figure 8 shows how a club (Somerset Hills Country Club, Bernardsville, N.J.) simply printed a separate card with yardages on it to be used in conjunction with the regular score card. This supplementary card uses already existing and prominent course landmarks, like mounds, trees, sand bunkers, brooks, etc. . . . to accomplish the same as a yardage marker installation program. The only cost is in the card itself. The card also has the advantages of listing two or perhaps more points of reference per hole for even a more complete aid in determining yardage to the green.

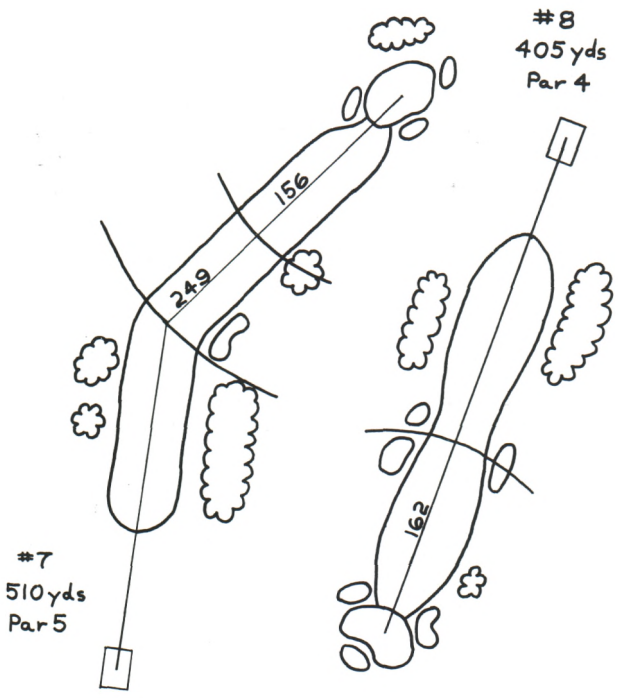
Figure 9 illustrates another alternative that could be used on a score card to aid the golfer in determining yardage and thus what club to select. As in the above method, it involves no on-course plannings or artificial markers but does require a redesign of the existing score card to include a map of the course layout. As the illustration shows, this map includes arcs from prominent hole landmarks listing the appropriate yardages to the green. Such a map can also aid the flow of play if the golf course is often used by many unfamiliar with it.

SUMMARY

This article is an attempt to update the situation on the usage of yardage markers on the course, if indeed the club feels they want to use them, and, admittedly many do not. It has also included some examples with associated pros and cons of the various types of markers seen in our visits to Green Section Turfgrass Service subscribing clubs. These examples and illustrations are by no means complete as this is usually a function of the tradition, industriousness, imagination, and ingenuity of the course and the individuals involved with the project.

By having a better idea as to the specific yardage, all the golfer now has to do is to hit the ball properly . . . and, "therein lies the rub."

Figure 9. Score card designed with the layout of the course and each hole's design with respective yardages from prominent hole landmarks to the green.



Shortages? Cost? Residual Response? Burn Potential? Mower Pick-Up? Application Date? Efficiency? Initial Response? Spreadability? Application Rate?

Selecting the Right Nitrogen

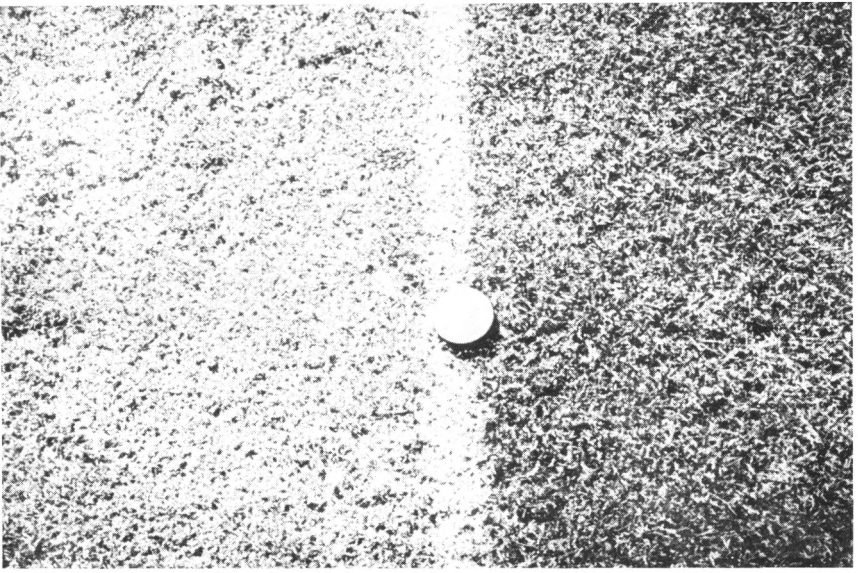
by A. J. POWELL and J F. SHOULDERS,
Turfgrass Extension Specialists V.P.I. and S.U., Blacksburg, Va.

Questions about nitrogen fertilizers are easy to ask, but the world needs answers. Shortages and increased costs have now made us fully aware of the importance and dependence of nitrogen in our turf management programs. It is necessary for the organic chemist to completely understand N fertilizer before he can effectively and safely grow quality turf. Certainly nitrogen is the TNT of turf management.

Many turf superintendents are presently purchasing specialty turf fertilizers with which they are not totally familiar. Results have often been less than desirable. Burn, streaking, lush turf, hungry turf and mower pick-up have been encountered. What does one do about these problems? Should he switch to another fertilizer, or maybe go back to the one he previously used?

Regardless of what fertilizers you may have in your storage area, they can be used. Your main problem is understanding how to use them; where to fit them in your management program. Nitrogen fertilizers have generally been classified into categories concerning their origins: e.g. chemical (synthetic) or organic (natural). Of much greater value is their classification according to their nitrogen release rate. As a general rule, the following classes can be defined:

Not only should one understand the nitrogen release properties, but when using a fertilizer-pesticide combination he must also completely understand the pesticide properties and safety requirements. Among other things, serious burn and overlap problems can develop.



To maintain superior color and quality throughout winter, nitrogen must be made available to the turf during the fall and winter seasons. The only difference in these plots was that the turf on the right received two additional applications of nitrogen in November and December; picture taken in January.

Fast release—These include the chemical nitrogen fertilizers such as ammonium nitrate, calcium nitrate, ammonium sulphate, etc. Turf is expected to respond within two days to a week after application. Although residual response depends greatly upon soil texture, rate of plant uptake, and water movement through the soil, the response would likely be greatest within the first two to four weeks.

Intermediate—These have mainly included the natural organics. The nitrogen becomes available within a few days after application and continues to release N for one to two months.

Slow release—These have mainly included the 38 per cent urea-formaldehyde fertilizers; those with a low (1.3: 1) urea to formaldehyde ratio. Nitrogen becomes available within a few days after application and continues to release nitrogen for two or even three years.

This classification is simple enough, but where does urea and the new specialty turf fertilizers fit this scheme? First, look at urea. In most all turf situations urea (an organic) should be considered immediately available—very similar to the chemical fertilizers like ammonium nitrate. The wording or representation on some fertilizer tags still attempt to mislead the customer into thinking that since urea is an organic, it therefore has a slow release capability. Within a few days after urea application, a natural soil enzyme (urease) helps hydrolize the nitrogen in urea to ammonium. Further natural transformations result in nitrate nitrogen. This total process may only require two or three days.

For the past several years, we have been evaluating certain N fertilizers as to their comparative nitrogen release in order to better understand the specialty turf fertilizers. This has been conducted on bentgrass under putting green management. The programs have been designed to furnish most of the nitrogen to the turf during fall, winter, and late spring (mid-May to late June). The following are some comparative results of these tests:

Fast release—Ammonium nitrate was used as a standard chemical fertilizer and applied during the fall, winter, and late spring in seven applications (8½# Total N). Generally, this treatment has resulted in superior turf.

Intermediate release—Milorganite, a natural organic, was applied fall, winter, and late spring in six increments (11, #N). Generally, this has resulted in

A large slow-release fertilizer pill that stays near the surface can burn and spot a bentgrass green.

slightly less color than the ammonium nitrate during the colder seasons. An exception was the 1974-75 winter (unusually mild) in which the natural organic was the superior treatment.

Slow release—The 38 per cent urea-formaldehyde treatment was applied in two increments in September and May (8# Total N). Since previous work and experience with U.F. had shown essentially no residual response during the winter, two applications of soluble N were added during winter to give 11# total N. Due to the lack of winter response of U.F. two applications of soluble N were added during winter to give 11# total N. This treatment has also resulted in very acceptable turf quality. Although one would expect a darker green color from this source during the summer months, we actually found almost no differences between any of the programs during the past four summers.

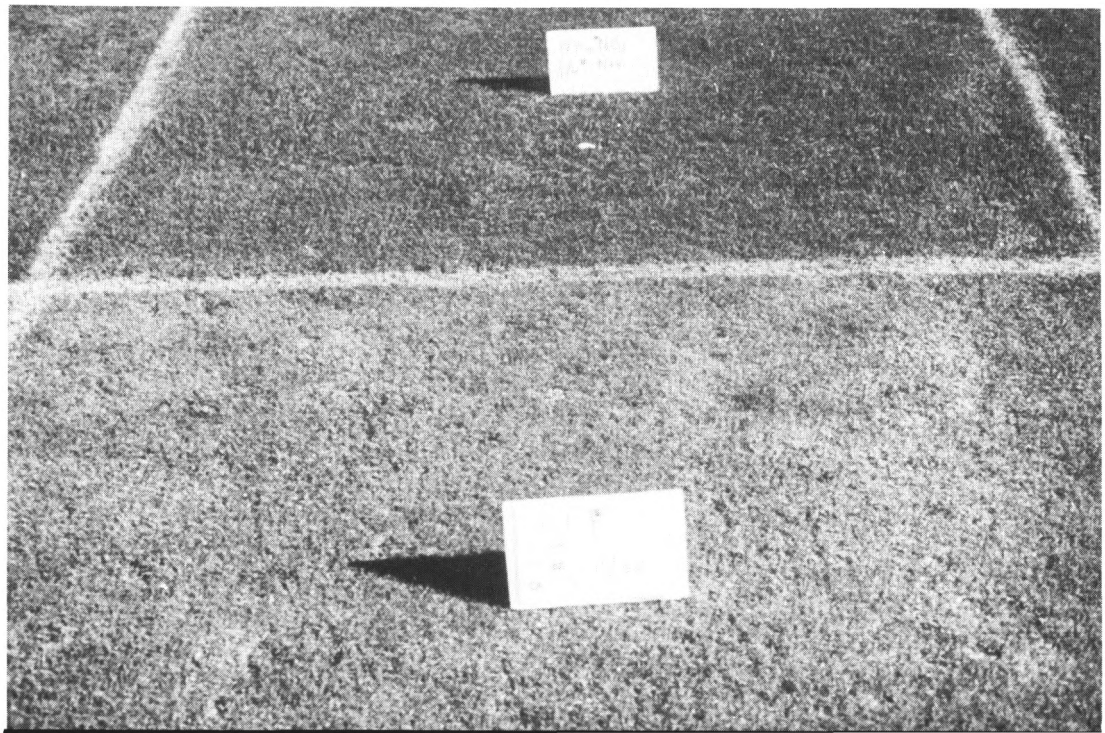
In order to assess the response of certain specialty fertilizers containing less total and differing urea-formaldehydes, we compared the Scotts Pro-Turf with both the fast and intermediate release programs. This fertilizer contains a higher urea to formaldehyde ratio (2:1); more of its nitrogen is readily available and the water insoluble portion is residual for a shorter period of time. Results from the ProTurf fertilizer have been at least as good as that of the solubles or natural organic. That is, at one to 1½# N/1000 ft.^{2} this fertilizer can be expected to respond similar to a soluble source of N. At 2# N/1000 ft.^{2} you can expect a residual response similar to the natural organics as used in the intermediate release program.

Commercially available IBDU (isobutylidene diurea) was compared to both the intermediate and slow release programs. Results were best when IBDU was used in multiple applications as was accomplished with the intermediate release program. As a result of several applications during the late fall and winter, an obvious winter color response was noted. Nitrogen from IBDU is released by a chemical hydrolysis reaction which certainly could take place (at a reduced rate) during cold weather. When applied at heavy rates according to the slow release program, it appeared to fully release its nitrogen in about three months. Therefore, when applied in September, the N was dissipated by winter and the spring green-up was very poor. According to this work, it appears that IBDU should be classified "intermediate release."

Sulphur coated urea (SCU) is a promising new source of nitrogen with several potentially different release rates. One of the SCU's tested in this experiment compared very well with U.F. except that it did give a superior winter response.

What does this all mean? You can continue to argue and ask questions about which fertilizer is best. If properly used, they can all do about the same job. The solubles and some of the specialty fertilizers will need to be frequently applied at low rates. The natural organics and some of the specialty materials can be applied somewhat less often and at higher rates. The straight (38%) U.F. fertilizers can be applied least often but with U.F., additional soluble N will be necessary if a late fall or winter response is desired. The highest priority in developing a nitrogen program is for one to fully understand the expected turf response to the Nitrogen source(s) he intends to use.

In order to obtain a color response during cold weather, certain fertilizers such as urea-formaldehyde must be supplements with quickly available N. Note turf color in December after either a urea-formaldehyde (foreground) or ammonium nitrate (background) treatment.



"The Last Man Hired"

Golf course maintenance has become mechanized.

by TOM MASCARO*

Would you believe that Debbie Winters helps grow grass for a living?—the kind of grass that beautifies America and keeps people healthy. Debbie works on a golf course.

Golf courses have traditionally employed men only in America. This is not true in other parts of the world, but for some reason golf courses in the United States have always had all male maintenance crews.

There have been a few exceptions, but these were rarities. For instance, Mildred Corrie became a tractor driver during World War II at the old Wilmington Country Club in Delaware. She moved with the club to its new location, and became the right hand man for Superintendent Gus DeFelice and then with Harry McSloy, the present golf course superintendent. Mildred is now retired. While on the job, she learned to do virtually everything. She not only drove tractors, she also repaired and kept them mechanically perfect. Gradually she took charge of the course's maintenance shop and issued work orders to the men. With her deep knowledge and love for growing good grass, Mildred unquestionably qualified to become superintendent of her own course. But she chose not to leave the club.

Zelda Baxter of Keokuk, Iowa, became the first woman in the United States to reach full status as a golf course superintendent in 1954. Her husband was president of the Carthage, Ill. golf course, across the river from Keokuk. Zelda became familiar with club operations and then her interest turned to grass maintenance. She took over the job of supervising the course at Keokuk Country Club in 1959.

Chet Mendenhall, Superintendent of Mission Hills C.C., Kansas City, Mo., had a lady assistant named Mrs. Barker and two girls on his work crew in 1959.

But these were all unusual cases that were the main topic of conversation at many golf course superintendents meetings. Now this is no longer true. Girls—girls are everywhere! They are driving tractors, wheeling triplex greens mowers, raking traps, washing down equipment, digging ditches, planting trees, spraying—you name it and they can do it. South Florida apparently leads the nation's golf courses with female maintenance crews. Larry Weber, Superintendent of Inverrary Country Club, Lauderhill, Fla., has had as high as 12, with about five or six still on the payroll. Tom Grondski, Superintendent of Ocean Reef courses, has four girls on his crew. Arlin Grant, Superintendent at Innisbrook Country Club, at Tarpon Springs, Fla., had at last count, 22 girls working on his course.

Some golf course superintendents, like Otto

*Director, Marketing Relations, Safe-T-Lawn, Inc.

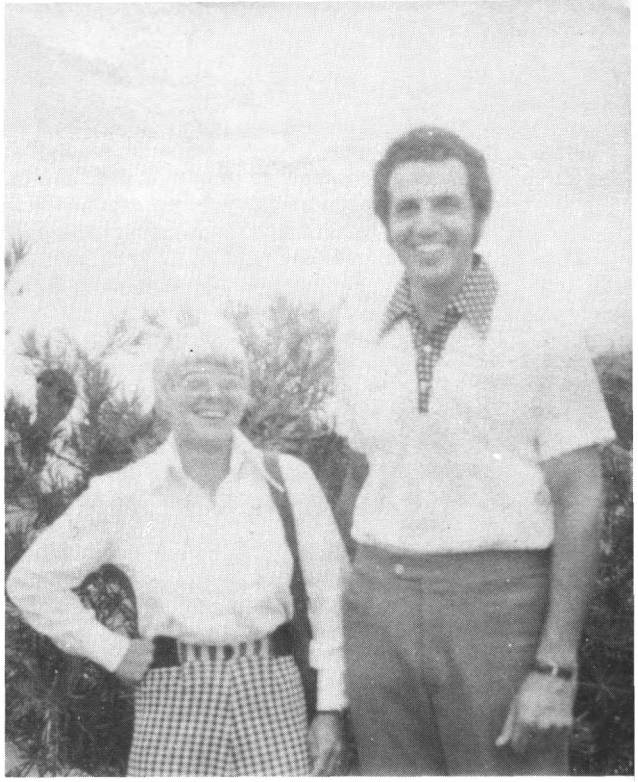
Schmeisser at Indian Creek, have daughters who work on the golf course in the summertime. Woodlands Country Club, Ft. Lauderdale, has had as high as 25 girls, but with college terms arriving, the crew will stabilize at 11 or 12.

Joe Yuzzi, golf course superintendent at Woodlands, looks at it this way: "The mere presence of female help on the golf course changes the total environment. Everything is cleaner and neater. The language is civil and a happier atmosphere prevails. Girls are generally perfectionists—certainly more so than men. They are neater and more careful in their work."

Although it may not appear so to the average golfer, maintenance of the grass on greens, tees, fairways and even roughs, is an exacting profession. Extra care is needed to determine the grass's nutritional requirements, mowing schedules, irrigation and general overall maintenance. Millions of dollars are invested in our South Florida golf courses. Professional people are required to protect this investment, which not only provides wholesome recreation for Florida residents, but is also virtually the backbone of the tourist industry.

Superintendent Joe Yuzzi goes on to say; "Girls seem to obey orders better than men. They listen carefully to detailed directions and then carry them out to the letter. A ten to twenty thousand dollar green leaves little room for mistakes or shoddy work."

Joe is so pleased with the work that the girls have done he promoted Debbie Winters to an assistant superintendent's position. As a result, Debbie is now a working assistant directly under Joe. She issues orders, makes decisions on her own in some areas of the operation, and shoots down problems



Joe Yuzzi and Debbie Winters, assistant superintendent.

before they start. Three male mechanics back her up with a superb preventive equipment maintenance program.

How did Debbie get into this line of work? "Just looking for something to do," she says, "I thought I wanted to be a Physical Education teacher. After completing Broward Junior College I went to Florida Atlantic University. It looked like I was on my way to

Superintendent Joe Yuzzi, Woodlands C.C., Ft. Lauderdale, Fla, and his crew.

Brains, rather than brawn, are now in demand.

becoming a professional student. Then, I suddenly lost interest in phys. ed. I heard that Woodlands was hiring girls for golf course work, applied, and got a job on the crew." As Debbie puts it, "All of a sudden my whole outlook on life changed. I looked forward to each day. I suppose I was out to prove something in life and here was the opportunity of a lifetime. I wanted to do everything. I drove tractors, cut grass, sprayed for insects and diseases—you name it on the golf course and I can do it."

Debbie hails from Charlotte, N.C. She has found her place in the sun, here in Florida. Like many of the other girls I have talked to that have chosen this line of work, Debbie loves the challenge of a male-dominated profession. She enjoys the outdoor work, in any kind of weather. Her work day starts at 6 a.m. and ends at 3:30 p.m. In the cool of the morning, before the golfers start banging away, the big grooming jobs are completed without interference. She likes the fact that there is no pressure when you work with nature.

Debbie wants to pursue this line of work until she learns it well enough to become a full fledged Golf Course Superintendent.

There are, of course, many reasons why girls have chosen this field. Perhaps the biggest reason is that in the last 10 years, golf course maintenance has largely become mechanized. Slow, tedious, back-breaking hand work and walking behind machines have given way to sophisticated riding equipment. Dragging and lifting heavy hoses to irrigate the grass has been replaced with automatic watering systems. There are few laborers needed on the golf courses. Trained technicians who can operate modern equipment are needed now. Brains, rather than brawn are more in demand, hence this evolution to girl operators.

There are other reasons too. "Office jobs cost money," as one girl put it. "Almost everything I made went back into clothes for the job." The biggest attraction is the money. As Debbie puts it, "I'm already making twice as much as my former teacher." Golf courses pay well, generally speaking. Opportunities are also good for summertime work, which gives some girls needed extra income to complete their college education.

All the girls at Woodlands are single, with the exception of Gladys Saski. Her job is to groom the play equipment, (ball washers, tee towels, etc.) before play starts. Their ages average in the mid-twenties.

The Woodlands Green Committee is also unusual in that it has two women helping make club decisions. As a result, according to Superintendent Yuzzi, Debbie and her girls are well represented in policy matters.

When I asked Debbie if she had any hobbies, she smiled sheepishly and said, "I paint." "Are your preferences portrait, landscape or other areas?" I asked. She looked straight into my eyes and with a broad smile that is much a part of her personality, responded, "I didn't mean to imply that I was an artist, I paint houses!"

With this Superintendent Joe Yuzzi laughed and said, "They are all originals too—she never gets invited back." This is the kind of rapport that Yuzzi has developed with his girls and men.

My own observations are that it takes a special type of personality to relate to girls in this type of work. Some superintendents have tried female help and it has not worked out for the girls or the club.

It also takes a special kind of girl to become successful in this line of work. Speaking to the gals who might read this article, "Debbie Winters has it—do you?"

Note: This article originally appeared in the South Florida Green, Oct., 1974.

Deep dry wells may be needed for drain points for tile lines.

DRAINAGE —So Easy It's Difficult

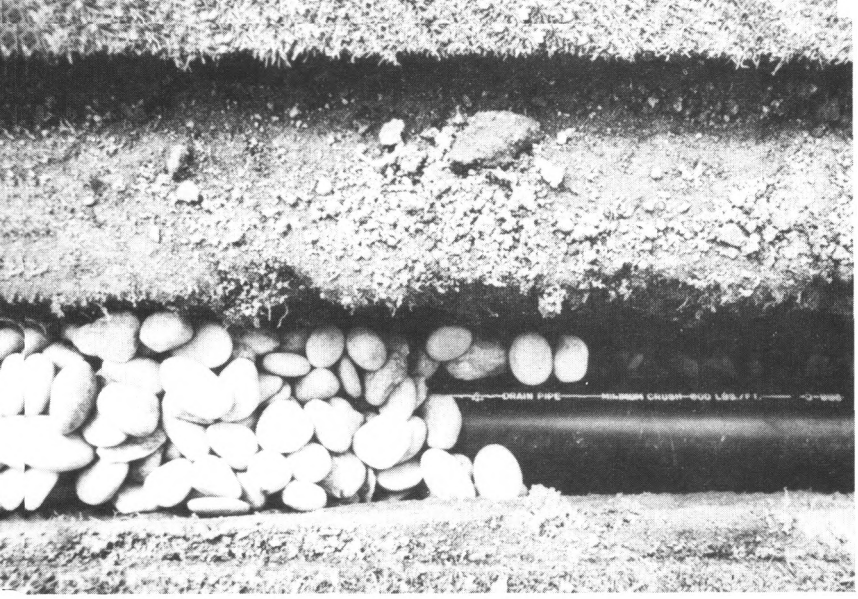
by WILLIAM H. BENGEYFIELD, Western Director, USGA Green Section

Secretly, every golf course has its own list of "Botched-up" jobs. Drainage projects must surely be at the top of at least 90 per cent of them! How can a relatively simple tile line installation turn into a disappointing, poorly done, botched-up mess? Maybe it's because it's so easy, only a few bother to do it right!

Digging a ditch and installing a tile line is not the most exciting job on the golf course. Nevertheless, the proper completion of it is essential to every superintendent's success. Ask any man on the maintenance crew if he knows how to install a tile drain properly and he'll probably answer "yes." Inspect the job two days later and nine out of 10 times it won't pass muster. The wet, muddy area is still there. The sod is covered with soil or mud or has died from dryness. Often times, golf cars (carts) have pounded it to death or the sod is poorly replaced or the soil below has settled unevenly. Sometimes coarse gravel is used to completely backfill the ditch and it is soon scattered in all directions. Since mowers were never intended as gravel spreaders, the entire golf course shows the results of dull equipment and a poor cut. It's a tragic scene; seen too often.

Solving drainage problems, at least in most cases, is not difficult or complex. Water still runs downhill and the best way to rid an area of it is by good surface drainage. Filling small, low areas with soil or cutting swales for surface drainage of larger ones should never be overlooked. Recontouring the surface offers a long-range, permanent solution to drainage problems.

Another way to cure critically wet areas in the summer months at least, (i.e., during the irrigation season) is closer control over the irrigation program. Time after time golfers comment that their course is drier and more playable during the spring, fall and winter months (i.e., the rainy season) than during the



On a gravel base, the title line is then covered with more gravel.

dry, summer season. In many cases, we cause our own drainage problems with poor irrigation control. Rather than installing tile lines, the answer lies in rearranging or reworking the irrigation schedule in areas of perpetual wetness. It will save money in many ways.

But what of those areas where drainlines offer the only practical solution? There is not much, but there is a bit more to it than simply opening up a ditch, throwing tile or rock into it and backfilling.

French drains, i.e., rock-filled trenches without an actual tile line installed, work fairly well but only in limited circumstances. If an area is chronically wet or if the drainway must handle any volume of water at any time of the year, French drains usually are unsatisfactory. They easily clog, their efficiency drops to nil and their usefulness soon ends. French drains have limited value.

Several years ago, we heard a great deal about slit trenches. These were sort of miniature French drains. They were made with a power chain saw cutting several inches deep into a poorly drained area, usually on a putting surface. The slit was narrow and had to be backfilled with coarse sand or calcine clay. In practice, the chain saw blade usually clogged or plugged rapidly and extensive cutting was impossible. Further, slit trenching was never intended to solve major drainage needs. The technique has very limited application.

This brings us to the final and most effective way of moving water underground; i.e., through a tile line properly installed. Actually, we should think in terms of "tile line systems," not unlike major river systems of the world. The Mississippi River for example drains the entire central portion of our country. It starts with the smallest rill on the farthest farm in its huge basin.

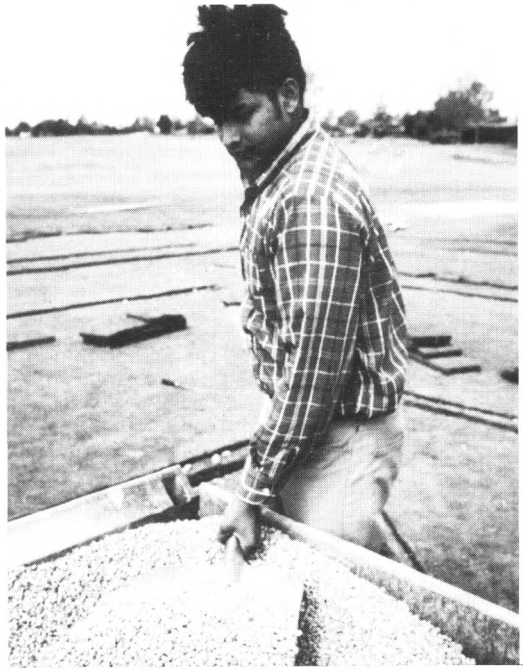
On a golf course, the nitty gritty of good drainage systems lies with moving excess water out of particular areas affecting play. These are usually found in front of greens, isolated fairway areas, occasionally on tees, frequently in sand bunkers, etc. Water collects, traffic passes and in any number of ways, poor playing conditions result. What can be done to correct this problem? How are tile lines most effectively installed here? The following check list is offered:

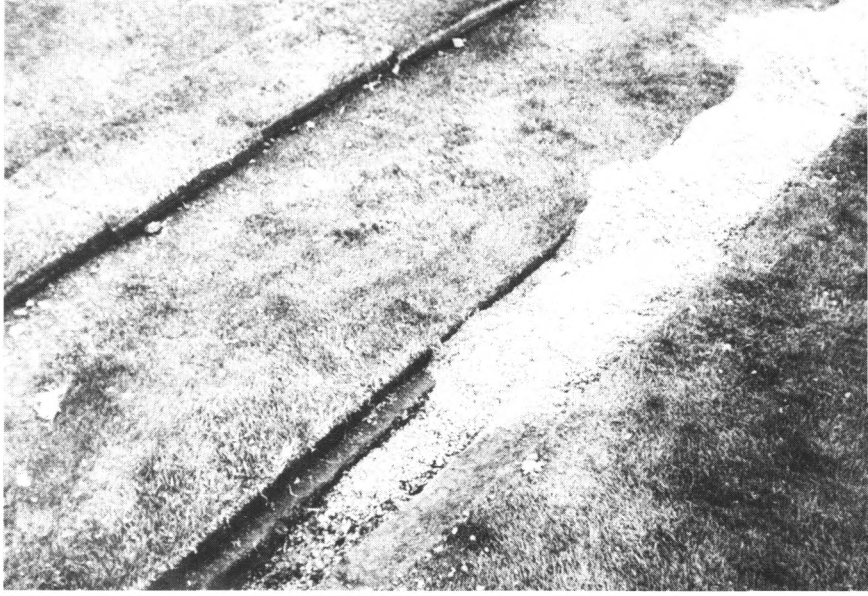
1) Stake out the best location for the line, keeping in mind the need for downhill flow. Too many drainlines are installed on level or even uphill flow patterns.

   When installing intercept tile lines, i.e., intercepting an underground flow or seepage of water from higher ground, be sure to install the line across or perpendicular to the direction of the seepage. The line must also be low enough to intercept the flow.

2) At the outflow end of the tile line, be sure the water it carries has some place to go. A tile line should never deadend. It must daylight, connect to another flowing line, dump into a large dry well or in some way insure the movement of water out of the line.

Pea gravel covers the coarser material to within two or three inches of the surface.

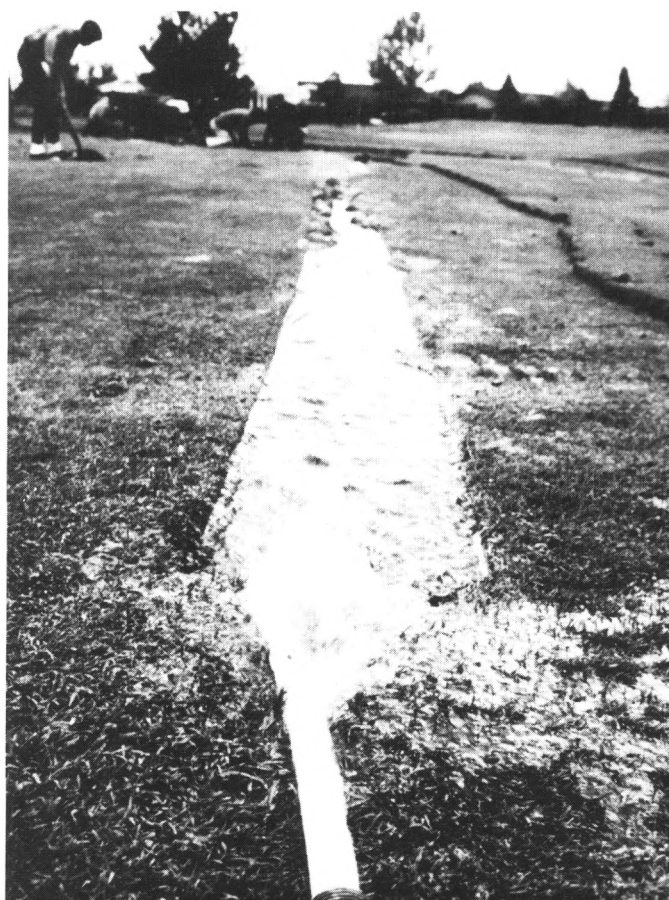




Coarse sand tops off the trench.

3) Dig the drainline ditch eight to 12 inches wide and approximately 18 to 24 inches deep. Keep downhill flow requirements in mind. Move the sod and soil directly to a wheelbarrow or truck. This keeps the job neat.
4) Place at least a 2-inch layer of gravel or coarse rock (¾inch to 1½-inches) in the bottom of the ditch. Adjust its depth to insure downhill flow.
5) Using 3- or 4-inch tile, place it carefully on the gravel base. Plastic corrugated perforated tile is most popular today although any perforated-type drainline material will do. Clay or concrete tile for agricultural purposes is good if joints are spaced about ¼-inch apart. Cover the upper half of each joint with tarpaper.
   Before going to step 6, make sure all tile has a downhill pitch and flow is assured.
6) Backfill carefully around the tile and ditch with gravel or coarse rock to within 4 to 6 inches of the surface.
7) Add 2 inches of pea gravel (¼-inch material) on top of the rock.
8) Finish off to ground level with a medium to coarse sand. Avoid fine sands.
9) Rope off the area if heavy golf car traffic is expected until the fill material becomes stabilized. Tell the fairway mowerman to take it easy in the newly installed drain areas.
10) Do not sod over the drainline. It will be far more effective if it remains "open" to the surface. However, if an extreme or critical condition dictates the need for an immediate grass cover, use only sod with a sand base. Do not seal off the drainline with sod having a heavy clay or silt base. This destroys effective drainage from the surface.
11) Gradually, the drainline scar will cover over with grass growing from the sides. This is fine. After several years, it may be necessary to re-establish or rejuvenate the drainline. This is easily done with a sod cutter stripping the grown-over sod, removing it and refilling the depression with more medium to coarse sand. Presto! the drainline is now ready to fully function once again.

Someone once said, "Common sense and good drainage are the two most important elements in golf course maintenance. If you don't have enough of Number 1 (common sense), then you had better have that much more of Number 2 (good drainage)." We agree! Good drainage simply cannot be beat when it comes to good turf for good golf.



Water is used for settling the backfill material.

USGA GREEN SECTION
JANUARY, 1976

TURF TWISTERS

GREAT CONFERENCE

Question: Where and when will the next Golf Course Superintendents Association of America Turfgrass Conference and Show be held? (Nevada)

Answer: The 47th Annual International Turfgrass Conference and Show will be held at the City Auditorium, Minneapolis, Minn., from February 10 through 13, 1976. Nearly $8 million worth of golf course maintenance equipment and services will be viewed by an expected 5,000 conference registrants from throughout the world. The Educational Conference will offer more than 45 hours of educational programs, featuring 65 speakers. Further information is available from GCSAA Headquarters, 1617 St. Andrews Drive, Lawrence, Kans. 66044.

SUMMER OR WINTER

Question: What's the difference between summer brown patch *(Rhizoctonia solani)* and winter brown patch (also *Rhizoctonia spp.*)? (New Hampshire)

Answer: As reported by Dr. Smiley, of Cornell University, apparently only about 40-50° F.

WITH EFFICIENCY AND RELIABILITY

Question: The last few seasons I've had a lot of labor headaches from absenteeism, insubordination, slow and usually sloppy work. Next season I'm seriously considering acquiring some female labor. Do you have any comments on this subject? (New Jersey)

Answer: Where we have seen the work of female employees on golf courses, their work has usually been efficient, neat, conscientious and reliable. The superintendents who are using, or have used, women on the course have generally been most pleased with the quality and quantity of their work. Legally, perhaps you should check with your insurance company for any special regulations under the OSHA standards that may exist for female labor. Also, women have the right, and should receive equal pay for equal work. (For further information, read "The Last Man Hired" in this issue.)