USGA GREEN SECTION RECORD

A Publication on Turf Management
by the United States Golf Association

SEPTEMBER/OCTOBER 1978

Healthy Roots

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VOL. 16, No. 5 **SEPTEMBER/OCTOBER 1978**

COVER PHOTO: The Green Section specifications recommend high sand content in greens for excellence in drainage and healthy roots.

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National Field Days were conducted jointly by the USGA Green Section and the U.S. Department of Agriculture. A view of the September 1939 Field Day at Arlington Turf Garden.

Golf Course Maintenance and Management-

THE USGA'S ROLE

by ALEXANDER M. RADKO, National Director, USGA Green Section

IT IS GENERALLY agreed that the approximately 12,000 golf courses in the United States have the finest turfgrass playing surfaces found anywhere in the world. It wasn't always this way. Believe it or not, golf was once played in the streets in this country! The following document is on display at USGA headquarters, in Far Hills, N.J.:

THE HONORABLE COMMISSARY AND MAGISTRATES OF FT. ORANGE, AND THE VILLAGE OF BEVERWYCK, HAVING HEARD DIVERS COMPLAINTS FROM THE BURGHERS OF THIS PLACE AGAINST THE PRACTICE OF PLAYING GOLF ALONG THE STREETS, WHICH CAUSES GREAT DAMAGE TO THE WINDOWS OF THEIR HOUSES AND ALSO EXPOSES THE PEOPLE TO THE DANGER OF BEING INJURED AND IS CONTRARY TO THE FREEDOM OF THE PUBLIC STREETS.

THEREFORE, THEIR HONORS, WISHING TO PREVENT THE SAME, HEREBY FORBID ALL PERSONS TO PLAY GOLF IN THE STREETS, UNDER PENALTY OF FORFEITURE OF FL. 25 FOR EACH PERSON WHO SHALL BE FOUND DOING SO.

THUS DONE AT FT. ORANGE, AT THE MEETING OF THE HONORABLE COURT OF THE SAID PLACE, ON THE 10 DAY OF DEC. Anno. 1659.

December 10th, 1969

Translated from the Dutch Municipal Records of Albany by Arnold J. Van Laer, Archivist, N.Y. State.

It is also generally agreed that golf has been a dynamic force in the turfgrass industry. In 1917, Dr. C. V. Piper and Dr. R. A. Oakley published their book *Turf For Golf Courses.* Piper and Oakley were U.S. Department of Agriculture scientists who were stationed at the Arlington (Va.) Research Station, now the site of the Pentagon. The book drew attention to two prominent scientists with knowledge of turfgrasses, which, in the United States, at least, was a rarity at that time. Influential people in golf sought governmental aid in golf turf management (even to the extent that Presidential influence was sought) to establish a scientific agency to which they could look for guidance and information in turfgrass management. Stimulation was provided by the disastrous loss of greens at the U.S. Open Championship at Columbia Country Club, in Washington, D.C. It was the right time and the right place and the Green Section of the United States Golf Association was born.

E. J. Marshall, a Toledo attorney, a member of Inverness Club and apparently influential in other areas, brought the U.S. Department of Agriculture and the U.S. Golf Association together. Dr. Piper agreed to serve as Chairman of the Green Section while he was head of the agronomy section of the USDA Research Station. It was the beginning of an organized approach to solving turfgrass problems on golf courses in this country.

Subsequently, all Green Section research results were reported in the Green Section's first official publication known as *The Bulletin of the Green Section of the United States Golf Association.* This publication was the first Green Section periodical. It was made available to all USGA Member Clubs, to non-member clubs, and to anyone else interested in golf course management.

What has been accomplished from inception to the present day? The Green Section has assumed a role of leadership in the field of golf course maintenance and management. The United States Golf Association has invested some $4 million in Green Section operations since 1920. From 1920 through 1953, direct research, in cooperation with the U.S. Department of Agriculture, resulted in classic accomplishments made available in print to golf courses throughout the world, as follows:

- Published *The Bulletin of the Green Section of the United States Golf Association* from February 1921 through December 1933.
- Published *Turf Culture and Timely Turf Topics* through 1947 with brief interruption just after the depression years.
- Published the Turf Management section of the *USGA Journal* from 1948 through 1962.
- Published the *USGA Green Section Record* since 1963.

From 1920 through 1953, the Green Section conducted Field Days for anyone interested in turfgrass culture. Many golf course superintendents attended and benefited from research conducted at the USDA Research Stations at Arlington, Va., and at Beltsville, Md. Through these years, the Green Section was in large part responsible for setting maintenance guidelines for golf courses throughout the nation.

In 1932, Dr. John Monteith, then the Green Section Director, published *Turf Diseases and Their Control*, a classic study in turfgrass pathology. While controls have since changed, his description of the various symptoms associated with golf course diseases remains a classic reference.

In 1946, the Green Section initiated a bermudagrass research project with Dr. Glenn Burton at the Georgia Coastal Experiment Station. As a result, the Tifton series of bermudagrass hybrids were introduced to golf and were widely used throughout the world where bermudagrass can be grown. These Tifton varieties greatly improved playing conditions, and putting surfaces in particular, throughout the southern United States and was responsible in no small measure for the increased interest and participation in golf throughout the South. Now Dr. Burton has turned his attention to producing more winter hardy bermudagrasses. The Green Section is prominent in support of this important research project, which is designed to develop bermudagrasses that will survive winters throughout areas where bermudagrasses are grown and especially throughout the so-called "transition zone" where it is too hot to grow the cool-season grasses well and is too cold for the warm-season grasses to thrive.

In 1950, the United States Golf Association, in cooperation with the U.S. Department of Agriculture, after many years of research, released Merion bluegrass (B-27) as an improved Kentucky bluegrass. This was a major step in turfgrass improvement, and it made a tremendous impact upon the turfgrass industry. More recently, from 1967 through the present, the USGA has provided substantial support to a Kentucky bluegrass breeding program at Rutgers University under Dr. C. Reed Funk. As a result, several new and improved bluegrasses are now available to the turfgrass industry.

In 1951, Meyer (Z-52) Zoysia was released jointly by the USGA and the U.S. Department of Agriculture as an improved turfgrass. Meyer Zoysia is prominently used in difficult areas of the transition zone, since it is more winter hardy than bermudagrass.

In 1953, the Green Section changed its emphasis from direct research to extension, and the

Photo by W. J. Mead, U.S. Department of Agriculture

(Above) Merion bluegrass, one of the Green Section's proudest developments in cooperation with the USDA, exhibits the low-growing, dense shoot production that made it an outstanding bluegrass and set the standard by which all Kentucky bluegrasses were subsequently rated.

(Left) Green Section research described disease symptoms and established early controls that set standards in golf course maintenance that endured. The usual pattern of dollar spot.

USGA offered a Turfgrass Advisory Service whereby an agronomist trained in golf turfgrass culture would visit the course, discuss problems with the golf course superintendent and the green committee chairman and make his recommendations in a written report. This service has continued and, in fact, is being offered at a reduced price in 1979 in order that all clubs may avail themselves of this program. As an added program of reaching out to all clubs throughout the country, the USGA has embarked upon a series of regional meetings to be held at key points throughout the nation annually. There will be 13 regional meetings in 1979. Representatives of all clubs, whether they are USGA Member Clubs or not, are invited to these meetings. The meetings will feature discussions on specific subjects of interest to club officials and golf course superintendents in each region.

Although the Green Section's primary direction was changed, the USGA never lost sight of the importance of research. Since 1945 the USGA Green Section Research and Education Fund, Inc., has contributed in excess of $650,000 to worthy research projects at universities and land grant

colleges throughout the nation. In addition to the work cited at Tifton and Rutgers, the USGA supports in the area of 25 projects annually. A few of them:

(1) *Poa annua* study at Michigan State University. Project Leader Dr. James B. Beard. This six-year study culminated in the publication of a *Poa annua* bulletin (Research Report 352) which recently was forwarded to superintendents and green committee chairmen at all USGA Member Clubs. This bulletin is available from Michigan State University Bulletin Office, P.O. Box 231, East Lansing, MI 48824. One copy free and for all over one copy, the cost is 50 cents per copy.

(2) Bentgrass breeding program at Pennsylvania State University. Project Leader Dr. Joseph Duich. This project has been continuously in effect since the early 1950s. It is designed to introduce better bentgrass seeded varieties to golf courses throughout the world.

(3) Machinery improvement for golf courses. Project Leader Dr. B. P. Verma, University of Georgia. An improved soil mixing machine, an improved thatcher and a new attachment for mechanical sand rake machines that will screen gravel out of bunker sand. These improvements were described in articles in our *USGA Green Section Record*. When some manufacturer adds them to his line, they will benefit golf course maintenance.

(4) Electrostatic spray technique for applying chemicals to turfgrasses. Project Leader Dr. S. E. Law, University of Georgia. This research project is designed to reduce costs by greatly increasing efficiency of spraying chemicals on turfgrasses. Its implications are far-reaching environmentally also.

(5) Turfgrass wear studies at the University of Michigan and Texas A&M University. Project Leader Dr. J. B. Beard. This project is designed to rate wear qualities of all major turfgrasses when trafficked to maximum, thereby defining grasses for specific areas subject to wear on golf courses throughout the country.

(6) The research article by Dr. Roy Goss and included in this issue is another example of USGA support of projects designed to help golf course superintendents in their management programs.

(7) Beginning in the 1940s the Green Section Staff became intensely interested in methods of putting green construction. A research project was established at Texas A&M University which culminated in a USGA specification for putting green construction that has been widely accepted throughout the world.

(8) In 1950, the USGA sponsored the book *Turfgrass Management*, by H. B. Musser, of Pennsylvania State University. It was revised in 1962. Presently, Dr. James B. Beard is writing an entirely new book for the USGA which is due to be published in 1979. It will be an excellent addition to the library of anyone interested in the science of golf course maintenance and management.

(9) In 1976, the USGA developed an improved Stimpmeter, a device for measuring green speed and uniformity, and made it available at cost to all clubs throughout the world. Clubs interested in purchasing a Stimpmeter may write to the USGA, Far Hills, N.J. 07931.

(10) In recent years, the Green Section defined a particle size range for bunker sand and for use in topdressing mixtures for putting greens. This information was published in the November, 1977, *USGA Green Section Record*.

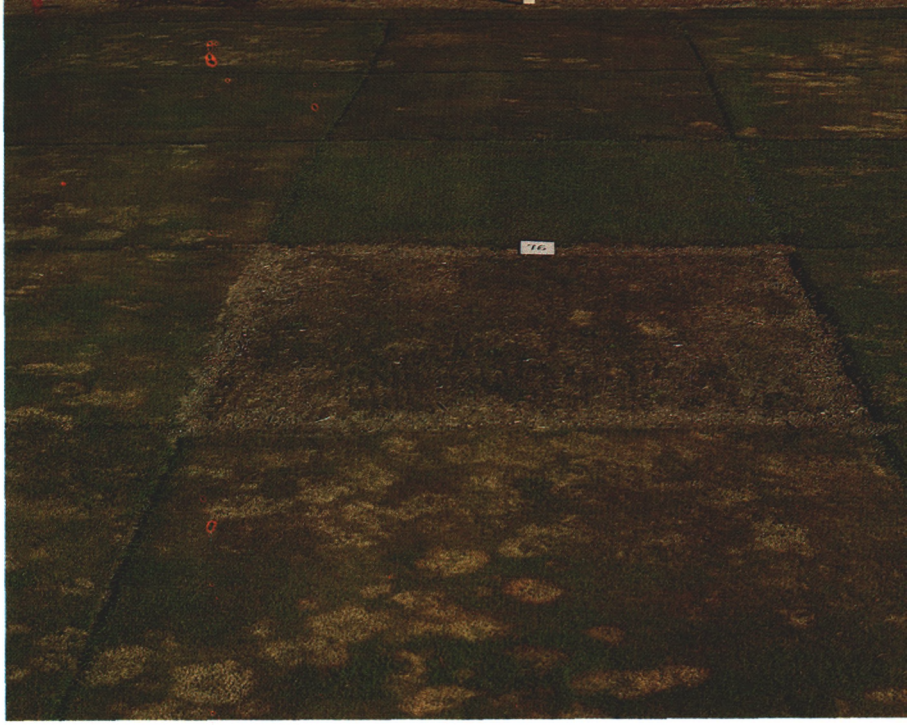
The research support by the USGA Green Section Research and Education Fund not only was instrumental in getting research done on needed projects, but it also trained leaders in the field of turfgrass management. A partial list of prominent leaders who received graduate level financial support from the USGA Research and Education program is as follows:

James B. Beard	Raymond Kunze
James E. Bogart	W. C. LeCroy
Cecil Brooks	David P. Martin
Lloyd Callahan	Wallace Menn
Scott Cameron	Miles S. Nelson
William H. Daniel	George A. Niles
R. R. Davis	Tom Perkins
Elwyn Deal	Sim A. Reeves
Albert Dudeck	Terrence Riordan
Joseph M. Duich	B. P. Robinson
James R. Fulwider	Charles Rumberg
Fred V. Grau	Richard E. Schmidt
Jack Harper III	Robert C. Shearman
Thomas K. Hodges	Robert Spartnicht
Leon Howard	James R. Watson
Edward Jordan	Gary Wilson

The Green Section's 10 staff members are also involved in presenting papers at national and regional meetings and conferences. They also write articles for turfgrass publications that reach most turfgrass managers. The staff attends field days and other turfgrass meetings to lend their expertise in the field of golf course maintenance and management to others. In sum total, the Green Section is a scientific agency whose mission is to assist USGA Member Clubs in the upkeep of their golf courses. That purpose has remained constant throughout its existence. The Green Section has developed grasses, materials and methods now in standard use. It has helped greatly in raising the level of maintenance of golf course conditions throughout America. The Green Section was the pioneer and is still a chief authority. The Green Section's effect on the turfgrass industry has been sometimes described as similar to dropping a stone in a millpond . . . resultant waves endure endlessly!

The Green Section of the United States Golf Association exists for the sole purpose of assisting clubs with their turfgrass problems. USGA membership and its services are open to all clubs — be they private, public, municipal, government, par 3, executive or other. The effects of our research, education and extension services affect the entire turfgrass world. All courses, all superintendents, all club members and club officials benefit in some ways whether they are USGA Member Clubs or not.

A GREEN SECTION SUPPORTED RESEARCH PROJECT



Pink Snowmold, Fusarium nivale, virulent infection, Western Washington.

Disease Resistance and Quality of Bentgrasses in Washington State

by C. J. GOULD, R. L. GOSS, A. G. LAW AND BUD ASHWORTH*

THE COASTAL PORTION of the Pacific Northwest is a veritable paradise for any number of turfgrass diseases. This region resembles England more than that of any part of the United States, probably because the climate is similar in many respects.

In 1956, the Northwest Turfgrass Association asked us to determine the cause and control of diseases which were causing increasing concern. The first job was to determine the major problems. On bentgrasses in western Washington these proved to be Fusarium Patch *(F. nivale* (Fr) S. & H.*)*, Corticium Red Thread *(C. fuciforme* (Berk.) Wakef.*)*, and Ophiobolus Patch *(O. graminis* var *avenae* (Sacc.) E.M.T.*)*. In eastern Washington the two major diseases are Fusarium Patch and Typhula snowmold *(T. incarnata* Lasch. ex Fr.*)*.

After determining the major causes, we decided that the most rapid control might be achieved with fungicides, but that studies on nutrition and disease resistance should follow as soon as possible. A shortage of both time and money delayed starting the resistance studies until 1971. During that year we solicited seeds and stolons from several available sources and planted 40 types.

During 1971 and 1972 we discovered that many more varieties were available from both foreign and domestic sources, but we lacked funds to expand our testing program. Fortunately, the USGA Green Section Research and Education Fund provided support so that the work could expand.

In 1973, a decision was made to expand the test to use the available seed and stolons for determining their resistance to Snowmold *(Typhula incarnata* and *F. nivale)* in eastern Washington. Plots were established at the Hangman Valley Golf Club near Spokane with 138 of the varieties that had appeared to be most promising at Puyallup.

Although the primary goal was to search for disease-resistant grasses, we were also looking for other desirable qualities. If a resistant variety lacks suitable color, texture, and other desirable characteristics, it is of little value, except as a source of breeding material. It was essential, therefore, that this be a cooperative effort involving

*Plant Pathologist and Agronomist, respectively, Western Washington Research and Extension Center, Puyallup, Wash., Agronomist, Washington State University, Pullman, Wash., and Certified Golf Course Superintendent, Liberty Lake Golf Course, Spokane, Wash.

agronomists and plant pathologists in selecting the best all-around varieties.

MATERIALS AND METHODS

The soil used at the Puyallup Research Center was a 14-inch deep mixture of sand and sawdust over gravel. A complete analysis fertilizer was applied whenever necessary and was supplemented with urea, except during the summer months when ammonium sulfate was used to suppress Ophiobolus Patch. Plot size was five feet square, and the number of replications varied from one to six, depending upon the potential of the variety and the availability of seed or stolons. The number of replications of the least promising types was reduced periodically in order to make room for more promising ones. A minimum of one plot, however, was maintained of all selections except two which died and four cultivars which were discarded to make room for new varieties. The area comprised 392 plots and was surrounded by an eight-foot canvas fence to slow air movement and to promote atmospheric conditions that encouraged diseases.

Forty selections were planted at Puyallup in 1971 and increased to 103 in 1972. The entire area was revamped and enlarged in 1973 to make room for additional varieties. There were 135 by 1974 and 160 by 1976. The data shown in Table 1 are based upon counts made between 1973 and 1977 of varieties numbered 1 through 103 starting in 1973, 104 through 135 in early 1974, and 136 through 160 in late 1974.

In an effort to introduce as many different strains of *F. nivale* as possible, clippings of diseased turf from different golf courses and home lawns were periodically scattered over the surface of the plots at Puyallup. Both Corticium Red Thread and Ophiobolus Patch also invaded these plots and were sometimes sufficiently abundant to permit evaluation of varieties for resistance. However, distribution of these latter two diseases was not uniform, so the varieties which are rated highest in Table 1 may only have escaped the pathogens and may not be inherently resistant to them.

All but two of the 138 varieties at Spokane were planted in 1973, with two five-foot square replications per variety. They were inoculated that fall with several cultures of *Typhula incarnata* which were isolated from diseased golf greens the preceding spring. We expected that *F. nivale* would quickly invade the plots from naturally infected grass nearby, but this did not occur. Even by 1977, about 99 percent of the diseased area was affected only by *Typhula*.

(Above) Fusarium (Snowmold) disease evaluations at the Western Washington Research and Extension Center, Puyallup, Washington.

(Right) Early spring recovery from Typhula incarnata.

Estimates were made periodically of the percent of disease infection and ratings were made of color and texture of the grass. These data were averaged and are shown in Table 1. In an effort to make it easier to compare performances, these averages and ratings were divided into five categories ranging from the best to the poorest. The best (least disease, darkest color or densest turf) were then designated +++++ and the other groups were rated from ++++ to a single +, the symbol which indicates the least desirable reaction.

Twenty-nine of the most promising varieties at Puyallup were planted in 1974 in larger 10-foot square plots and subjected to high and low nitrogen levels with and without fungicides. A full report on these will be made at a later date.

RESULTS

Some selections changed slightly as they matured — usually for the worse, but sometimes for the better, perhaps by selection of resistant clones. None were immune to either *Fusarium* or *Typhula*, but several varieties were not only much

TABLE 2

Average Percentage of Diseases in Different Agrostis Species

Species	No. of Cultivars	Corticium	Fusarium	Typhula*
Canina	2	16.0	0.8	35.4
Palustris	12	3.8	0.6	46.0
Tenuis	5	10.4	2.4	30.1

*Data from Spokane. Other data from Puyallup plots.

We Need Your Assistance - Will You Help?

The American Society of Golf Course Architects Foundation, the National Golf Foundation and the United States Golf Association are jointly involved in this survey to determine the status of the use of recycled water (effluent and other wastewater) on golf course and recreational turfgrasses. Complete confidence will be kept on all individual clubs or organizations reporting. Would you kindly help in this survey by taking a minute to fill out this questionnaire.

1. **Do you presently use recycled water on your turfgrass area?**
   ☐ Yes ☐ No

2. **Are you considering recycled water as a possibility?**
   ☐ Near Future ☐ Distant Future ☐ No

3. **What is your source of recycled water?**
   ☐ Industrial ☐ Military Installation ☐ Housing Development

   Other _____

4. **Number of acres irrigated with recycled water.**

   _____ Greens _____ Tees _____ Fairways _____ Roughs

   Other _____

5. **Type of facility.**
   ☐ Private Club ☐ Public/Municipal Course ☐ Public Course/Privately owned
   ☐ Par 3 Course ☐ Executive Course ☐ Military Course

   Other _____

6. **Do you know of any other turfgrass facility using recycled water?** ☐ No

   ☐ Yes. Type of turfgrass facility _____

   Location (if more than one, attach list) _____

7. **If you use well, city or pond water for irrigation, how many gallons do you use annually?** _____

Form filled out by: _____

_____
Organization or Club (optional)

Please Return Questionnaire to:

USGA Green Section
P.O. Box 1237
Highland Park, NJ 08904

Attn: A. M. Radko

Wastewater Conference Scheduled

On November 13 and 14, 1978, a conference sponsored by the American Society of Golf Course Architects Foundation, the National Golf Foundation and the Green Section of the United States Golf Association will be held at the Arlington Park Hilton, Euclid Avenue and Rohlwing Road, Arlington Heights, Ill. 60006. The theme of the two-day conference is "Wastewater Irrigation of Recreational Turf Areas." The conference's objectives are (1) to produce "State of the Art" information and to document what is now known as it applies to recreational turf; (2) to generate additional information on wastewater uses; (3) to produce guideline information for publication.

Everyone interested in land disposal of wastewater (effluent and other) is cordially invited. A monumental bit of work has been done in this area. Interest in wastewater has quietly mushroomed because of concern for possible future limits on fresh, potable water for recreational purposes. Representatives of all recreation turf installations — golf, park and recreation, industrial, military, government, irrigation, landscape and water works are invited.

Mark these dates on your calendar now — plan to attend! Would you indicate your interest by detaching and mailing the following.

Please mail to:

USGA Green Section
P.O. Box 1237
Highland Park, NJ 08904

Attn: A. M. Radko

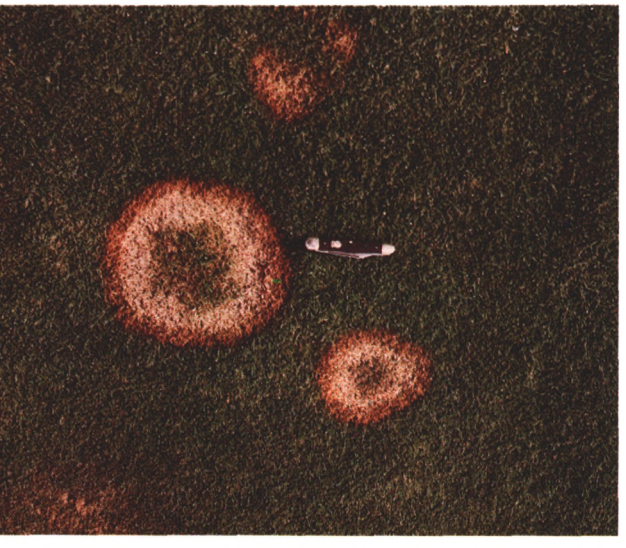
☐ Yes, I plan to attend the November 13-14, 1978, Conference.

_____
(Name)

_____
(Address)

_____

_____
(Number of guests)



more resistant than old varieties such as Highland and Astoria, but also had good cultural characteristics. Some of the others, which showed good disease resistance but had poor color or texture, could serve as sources of breeding varieties specifically adapted to the Pacific Northwest.

In general, varieties or selections from northern climates had the greatest resistance to *Fusarium*, but paradoxically, two of the best were MCC-3 from Oklahoma and ARC-1 from Florida, both *palustris* types. In general, the stolonized bents were more resistant to *Fusarium* than the seeded types, but the reverse was true with resistance to *Typhula*.

There were many interesting results with the various varieties. Some of the velvet *(canina)* bents, such as Kingstown and Novobent, appeared to be very good but may be difficult to maintain without extra care. The *tenuis* variety, Bardot, was rather susceptible to *Fusarium* but recovered more rapidly than other varieties of this species. Many of the selections from Canada and the northern U.S. went off-color in the dormant season during the winter at Puyallup. This feature would not detract from their use in eastern Washington or areas with continental climates, but would be undesirable in coastal areas where grass is normally green all winter. A few varieties developed unusual diseases or disease-like symptoms. For example, a salt tolerant selection (UCR-30) from southern California was the only variety in which sporocarps of *Typhula incarnata* have ever been observed in the Puyallup plots. Some other varieties were even more susceptible in the plots at Spokane.

The differences between varieties are also interesting. The average percentage of disease in varieties in the bent management plots is shown in Table 2. It should be remembered that most of these varieties had been chosen because they had some resistance to *Fusarium.*

Neither the Puyallup (nor Spokane) plots were aerified or dethatched, nor were they subjected to traffic. Therefore, as might be expected, the varieties performed somewhat differently when put into larger plots under a regular management program at Puyallup. Some of the varieties that appeared to be resistant to *Fusarium* in the smaller plots, showed less resistance and also exhibited different cultural responses. Since this management test has not yet been completed, we will not report details here. However, at this time, the most promising commercially available varieties for use in western Washington appear to be:

Seeded: A-75, Bardot, Emerald, Penncross, Tracenta, Kingstown, and Novobent.

Stolonized: Nimisila, Northland, and Waukanda.

Two other stolonized varieties appear very promising but are not yet commercially available. They are the Yale Selection (#65) and Drew Smith's 721 (#93).

Large-scale management tests are planned next for eastern Washington. Pending completion of these tests, the varieties showing most promise at this time are:

Seeded: Boral, Bardot, Enate, Penncross, Tracenta, Ligrette, Saboval, MOM AT4, Hummel, Pipo, Strandhem, and Norfel.

Stolonized: Toronto, Northland, Waukanda, Yale, Smith 736, HVT-2, and Hayden Lake.

Thus we now have available superior bentgrass varieties that are reasonably resistant to the major pathogens in the State of Washington. The adoption of these varieties in conjunction with the proper management, including application of sulfur, will permit a reduction, but not elimination, of the need for fungicides. This will not only lower maintenance costs, but it will also lessen the danger of environmental pollution while providing prospect for better turf than ever before possible in this state.

TABLE 1

Bentgrass Variety Tests. Ratings of Color, Texture, Quality and Disease Resistance

Variety	Species[a]	Western Washington Tests (Puyallup)[b]						Eastern Washington (Spokane)[c]				Disease[d]				
		No. Reps. 1976	Color		Texture/Density		Overall Quality 1977 only	No. Reps. 1977	Overall Ratings			Western Washington			E. Wash. Typhula	
			Summer	Winter	Summer	Winter			Color	Tex/Den	Quality	F. nivale	Corti.	Ophiob.	Amt.	Recov.
1 Astoria	T	2	+++	+++++	++++	++++	+	2	+++	++++	+++	++	++++	++++	+++	++
2 Astra	C	1	+	++	++	+	+	—				+	+	+++++		
3 Avanta	C	2	+++	+++++	+++++	+++++	++++	—	++	+++	++	+++	++	++++		
4 Barbella	C	2	++	+++++	++++	++++	+	2	+++	+++	++	++	+++	++	++	+
5 Barbinet	T	2	+++++	++++	+++++	+++++	++++	2	+++	++++	+++	++	++++	+	+++	++
6 Barida	C	2	+	+++	+	+	++	2	++	++	+	+	+	+++	++	-
7 Bardot	T	4	+++++	+++++	+++++	+++++	++++	2	++++	++++	++++	++	+++++	++	++++	+++
8 Boral	T	2	+++	+++	++++	++++	+	2	++++	+++	+++	++++	++++	++++	+++++	++++
9 Contrast	T	2	+++	+++++	++++	+++	++	2	+++	++++	+++	++	++++	++	++++	++
10 Enbenta	T	2	+++	+++++	+++++	+++++	+++	2	+++	+++	+++	+	+++	+++++	++++	+++
11 EKO	T	2	++++	+++++	+++	++++	++++	2	+++	+	+	+++	+++	+++	++++	++
12 Enosca	C	2	++	+++++	+++++	+++++	++++	2	++	+++	++	+++	+	++	++	+
13 Enate	T	2	++++	++++	+++	+++	+++++	2	+++++	++++	++++	++	++++	++	++++	+++
14 Exeter	T	2	++	+++++	++++	+++++	++	2	++	++++	++	+++	++++	+	++++	+++
15 Highland	T	4	+	++++	+++	++	+++	2	+++	++++	+++	+	+	+++	++	+
16 Holfior	T	2	+++	++++	+++++	++++	+++++	2	+++	++++	+++	++	++++	++	+++	+++
17 Kingstown	C	4	+++++	+++++	+++++	+++++	+++++	2	++	+++++	+++	++++	+	++	++++	+
18 NZ Brntop	T	2	+++	+++++	++	+++	+	2	+++	++	++	+	+++	+++++	++++	++
19 Novobent	C	4	++	+++++	+++++	+++++	+	2	++	++++	+++	+++	-	+	++	+
20 NK N-3-44	T	2	++	+++++	++	+++	+	2	++++	++++	+++	++	+++	+++++	++++	+++
21 Orbico	T	2	++	++++	++++	++++	++	2	+++	+++	+++	+	+++	++	+++	+
22 Penncross	P	4	++++	+++++	+++++	++++	++++	2	++++	+++++	+++++	++++	++++	++	++	+
23 Prominent	P	4	++	+++	+++++	++++	++	2	+++	+++++	++++	++++	+++++	+	++	+
24 Rusta	C	2	+++++	+++	+++++	+++++	++	2	+++	++++	+++	+++	+++	+++	++	+
25 Seaside	P	2	+	++++	++	++	+	2	++++	++++	++++	++	+	++++	+	+
26 Emerald	P	4	++	+++	+++++	++++	++	2	+++	+++++	++++	+++++	++	+	++	+
27 S-4979	P	2	++++	++	+++	++++	++	2	++++	++++	+++	++++	++	+++	+	+
28 Tracenta	T	4	+++++	+++++	+++++	++++	++++	2	+++++	++++	++++	+	+++	++	++++	++++
29 Mikro Dae.		2	++	++++	+++	+++++	++	2	+++	+++++	+++	++++	++++	++++	++	+
30 Agrettina	C	2	++	+++++	+++++	+++++	++++	2	+++	++++	+++	+++	+	+++	+++	+
31 Ligrette	T	2	++++	+++++	++++	++++	++	2	++++	+++++	++++	+++	+++	++++	++++	++++
32 Saboval	T	2	++++	+++++	+++++	+++++	+++	2	++++	++++	++++	++	++++	+++	++++	+++
33 Arlington	P	4	+++	+++	++	+++	++	2	++++	++++	+++	++++	++	++++	+	+
34 Cohannsey	P	2	++	++++	+++	+++	+++	2	++	+++	++	+++	++	++	+	+
35 Congress'l	P	2	+++++	+++	+++	++++	++	2	++++	++++	+++	++++	++++	+++	++	+
36 Evansville	P	2	+++++	+++++	++++	++++	++	2	+++++	+++	+++	++	++++	+++++	+	+
37 Old Orch.	P	2	++	+++	+++	++	+++	2	++	+++	++	++++	+++	+	++	+
38 Pennpar	P	2	+++	++	+++	++++	++	2	+++	++++	+++	+++++	+++++	+	++	-
39 Toronto	P	2	+++++	+++	+++	+++++	++	2	+++++	++++	++++	+++	++++	++	+++	++
40 Washington	P	2	++++	++	+++	++++	++	2	+++	+++	+++	++++	++	+++	++	+
41 ACA-61	C	2	++	+++	+++	++	+++		+	+++	+	+	+	+		

42	MOM AT1	T	2	+	+++	+++	++	++	2	+++	++++	+++	+	++++	+++++	++++	++++
43	MOM AT4	T	2	+++	++	+++++	++++	++++	2	++++	+++++	++++	+	++++	++++	+++++	++++
44	Scott A74	P	2	++	+++	++++	++++	+++++	2	++++	+++++	++++	+++	++	+	+	+
45	Scott A75	P/T	2	+++	+++	++++	++++	++++	2	+++++	+++++	+++++	+++	+	+++++	++	+
46	Hummel	T	2	+++	+++	++++	++	++	2	++++	+++++	+++++	+	++	+	+++++	++++
47	Igeka	T	2	++	+++	++++	++++	++	2	+++	++++	+++	+	++	+	++++	++
48	Mamelou	T	2	++	++	+++	+++	+++	2	+++	++++	+++	+	++	+	++++	++++
49	Ohl OE332	T	2	+++	++	+++	+++	++	2	++++	++++	+++	++	+++	++	++++	++++
50	Pipo	T	2	++	++	++++	+++	+++	2	++++	++++	++++	+	++	+	+++++	++++
51	Strandhem	P	2	++	+	+++	++	+++	2	+++	++++	+++	++	+	++++	+++++	++++
52	Tendenz	T	2	+++	++	++++	+++	+++++	2	++++	++	++	++	+++++	+	+++++	+++
62	Nimisila	P	5	++++	+++	+++++	++++	+++	2	+++	++++	+++	++++	+++	++	+	+
63	Northland	P	5	+++	+	+++++	++++	++	2	+++	++++	+++	++++	+++++	+	+++	+
64	Waukanda	P	5	++++	++	+++++	++	+++	2	++++	++++	+++	++++	+++	++	+++	+
65	Yale Sel	P	5	+++++	++	+++++	++	++++	2	+++++	++++	++++	+++	++	+++++	+	+
66	Keen's 19		4	+++	++++	+++++	+++++	+	2	++++	+++++	++++	++	+	+	+	+
67	Keen's 22		4	++++	+++++	+++++	+++++	++	2	++++	+++++	++++	++	+	++	+	+
68	Keen's 27		4	+++	+++++	++	+	++	2	++++	+++	+++	+	+	++++	++	+
69	Keen's 28		4	++	+++	++++	+++	+	2	++++	++++	++++	++	+	+	+	+
70	Keen's 36		5	+++	++++	++++	++++	+++	2	++++	++++	++++	++	+	+	+	+
71	Keen's 41		4	+	++++	++++	+++	+++	2	++++	++++	+++	+++	+	++	+	+
72	Keen's 42		4	+	++++	+++	++	++	2	++++	++++	++++	+++	++	++	+	+
73	Keen's 43		4	+	+++	+++	+++	++	2	++++	++++	+++	++	+	++++	++	+
74	Keen's 52		4	++	+++	+++	++++	+	2	++++	++++	++++	+	++	++++	+	+
75	Arrowwood		5	++	+++	++++	++++	+	1	+++	++++	+++	++	+	+++	+	+
76	MCC-3	P	5	++	+++++	+++	+++++	+++++	2	++++	++++	++++	+++++	+++	+++++	++	+
77	HCC-7-2	P	5	++	++++	+++	++++	+	2	+++++	++++	++++	+++	++	+++	+	+
78	UCD-1	P	3	+	++	++	++	+	2	++	++	+	++++	+++	+++	++	+
79	UCR-53	P	3	++	+++++	++++	+++++	+++	2	++++	++++	++++	+++	++	++	++	+
80	UCR-30	P	4	+++	+++	+++	++	+++	2	+++	+++	++	+++	+	+++++	+	+
81	UCR-13	P	3	++	+++	+++++	++++	++	2	+++	++++	++	+	++	++	+	+
82	PA Sta. #3	P	2	++++	++	+++	+++	+	2	+++++	++++	++++	+++	++	+++++	+	+
83	PA Sta. #4	P	4	+	+++	+++	++++	+++	2	+++	++++	+++	+++++	+++++	++++	+++	++
84	PA Sta. #5	P	4	+++	++	++++	++	++	2	+++	++++	+++	+++++	+++	+	++	+
85	TS-666	P	2	++++	+	+++	+++	++	2	+++	++++	+++	++++	++++	+	++	+
86	S-704		1	++	+++	+	++	+++++	2	++	+	+	+++++	+++	+++++	+	+
87	S-705		1	+++	++	+++	++++	++++	2	++++	++++	++++	+++++	+++++	+++++	+	+
89	S-707		1	+	++	+	+	++	1	+	+	+	+++++	++	+++++	+	+
91	S-709		1	+	++	+	+	++	2	++	+	+	+++++	+	++	+	+
93	S-721		4	++++	++	++++	+++	+++++	2	+++++	+++++	++++	+++++	++++	+++	++	+
94	S-730		1	+	++	++	+++	+	2	++	++++	+++	+++++	+++++	+++++	+	+
95	S-731		1	+	++	+	+++	+	2	+	++	+	+++++	+++++	+++++	+	+
96	S-732		4	+	+	++	++	++	2	+++	+++	+++	+++++	++++	+++	++	+
97	S-733		1	++	+	+++	++++	+++	2	+++	+++	++	+++++	+++++	+++++	++	++
98	S-734		1	++	+++	++	++	+	2	++++	+++	+++	++++	+++++	+++++	++	+
99	S-735		1	+	++	++	+++	+	2	++	++	+	+++++	+++++	+++++	+	+
100	S-736		4	++	++	+++	+++	+++	2	++++	++++	++++	+++++	+++++	++++	+++	++
101	S-737		1	+	++	++	++	+	2	++	+++	++	+++++	+++++	+++++	+	+
102	S-738		1	+	+	++	+++	++	2	+++	++++	+++	+++++	+++++	+++++	+	+
103	S-739		1	+++	+	++	+	+					+++	+	+++++		
104	HV-T-3	T	1	++++	+++++	+++	+++	++	2	+++	+++	++	+	+++++	+++	+++	++

TABLE 1 *(continued)*

Bentgrass Variety Tests. Ratings of Color, Texture, Quality and Disease Resistance

Variety	Species[a]	Western Washington Tests (Puyallup)[b]						Eastern Washington (Spokane)[c]				Disease[d]				
		No. Reps. 1976	Color		Texture/Density		Overall Quality 1977 only	No. Reps. 1977	Overall Ratings			Western Washington			E. Wash. Typhula	
			Summer	Winter	Summer	Winter			Color	Tex/Den	Quality	F. nivale	Corti.	Ophiob.	Amt.	Recov.
105 HV-TC-4	T	4	+++++	+++++	+++	++++	+++++	1	+++	++	++	++	+++++	++	++++	++++
106 HV-G-5	G	4	++	+	++	+	++	2	+	+	+	++	+++++	++	+++++	++++
107 Atella	T	4	++++	++++	+++	+++	+++	2	++++	+++	+++	+	+++++	++++	+++++	++++
108 Ubiko	P	4	+	+++++	++	++	+	1	++++	+++	+++	+	+	++++	++	+
109 Finesse	T	4	+++++	++	++++	+++	++					+	++++	++		
110 HV-T-2	T	4	+++	+++	++	++	+++	2	+++	++++	+++	+	+++	++	++++	+++
111 ARC-1	P	4	+++++	++++	++++	+++++	++++	2	+++++	+++++	+++++	+++++	+++++	+++	+	+
112 235541	P	3	+	+	+	++	+++	2	++	+++	+	+++	+	++++	+++	++
113 251945	P	4	+	+	++	+	+++	2	+++	+++	++	+++	++	+++	+++	+
114 Norfel	T	4	++	+++	++	+	+	2	+++	+++	++	++	+++	++++	+++++	+++++
115 MSU-18-AP		4	++	+	+++	+++	++	2	++	++++	+++	+++++	++++	+	+	+
116 MSU-28-AP		4	++++	+	++	+	++	2	+++++	++++	++++	+++++	+++++	+++	+	+
117 MSU-38-AP		4	+++	+	++++	++	++	2	+++	+++	+++	++++	+++	++	+	+
118 Baldwin	P	4	++++	+	+++++	++++	+	2	+++	++++	+++	++++	+++++	++	+	+
119 Metrop.	P	4	++++	+	++++	++++	+++	2	++++	++++	++++	+++++	+++++	++	+++	+
120 F-63-10	P	4	+++++	+	++++	+++	++++	2	+++++	++++	+++++	++	+	++	++	+
121 F-67-3	P	4	+++++	+	++++	++++	+++++	2	++++	++++	++++	++++	+++	+++	+	+
122 F-67-9	P	4	+++++	+	+++++	+++	+++++	2	++++	++++	+++	+++++	++++	+++	+	+
123 F-M-63-3	P	4	+++	++	+++	+++	+++	2	+++	++++	+++	++	+++	++	++	+
124 A-24	P	4	+	+	++	++	++	2	+++	+++	++	++++	++	++++	+++	++
125 A-25	T	4	+	+	+	+	+		++	++	++	+	+++++	++		
126 A-44	P	4	++++	+	+++	+++	++++	2	+++	++++	+++	++	+	+	+	+
127 Springfd		4	+++	++++	+++	+++	+++	2	++++	+++	+++	+	+	++	++	+
128 TG040	P	4	++	+++	+++	++++	+	2	++++	++++	+++	++++	++++	+	++	+
129 TG043	P	4	+++	++	++++	++++	++++	2	++++	++++	++++	++	++++	+++	+	+
130 TG052	P	4	+	++	+	+	+	2	+++	++	++	++	+++	+++	+	+
131 TG058	P	3	+	+	+	+	+	2	+++	++	++	+++	++	++++	++++	++
132 C-27	P	4	+++	+	+	+	++++	2	++++	+++	+++	+++	++	++++	+	+
133 Twin Orch	P	4	+++++	+	+++	+++	++++	2	++++	++++	++++	+++++	+++++	++++	+	+
134 Jelling	T	4	++++	+++++	+++	+++	+++++	2	++++	++++	+++	++	++++	++++	++++	++++
135 Z2000	alba	4	++++	++++	+++++	+++++	+++		++	++++	++	+++	+	+		
136 Hay. Lake	P	1	+	+	+	+	+	2	+++	++++	+++	+	++++	+	++++	++++
137 Morrissey	P	1	++	++++	+	+++++	++	2	++++	++++	++++	+	+++	+	++	+
138 Zygma	G	1	+	++++	+	+	+	2	+	+	+	+	+++	+++++	+++++	++++
139 D.S. NFG	G	1	+	++++	+	+	+	2	+	+	+	+	+	+++++	+++++	++++
140 AC-1	C	1	++++	++++	++	++	+	2	+++	+	+	++	+	+++++	++++	+++
141 AC-5	C	1	+	+++++	+	+	+		++++	+	++	++	++++	++++		
142 AP-New.6	P	1	++	+	+	++	+++	1	+++++	++++	++++	+	+	+++++	+	++
143 AP-New.3	P	1	+++	+	+	++	++	1	++++	+++	+++	+	++	+++++	++	++
144 Hya. Vel.	C	1	++++	++++	++	++	+++	1	++++	+++	+++	+	++	+++++	+++	+++
145 AP-6 Cr.	P	1	+	++++	++	++	+++	1	++++	++++	+++	+	++	+++++	+	+

146 AP-3	P	1	++++	++	++	++	+	1	++++	+++	+++	+	+++	+++++	++	+
147 AP-P17-1	P	1	+	++++	+	+	+	1	++++	++	++	+	+	+++++	+	+
148 Skog AP-5	P	1	++++	++	++	+++++	++	1	+++	++++	+++	+	+++	+++++	++	+
149 AP-1	P	1	++	++	++	+++++	+	1	++	++++	+++	+	++++	+++++	++	+
150 AP-D1-1	P	1	++++	++++	++	++	+	1	+++	++++	+++	+	++	+++++	+	+
151 lag 5-60		1	+	++	+	+++++	+					+	++++	+++++		
152 lag 8-60		1	+++	++	+	+++++	++					+	+++++	+++++		
153 WYR 30409		1	+	++++	+	+	+					+	++	+++++		
154 WYR 22009		1	+	++++	+	+	+					+	+++++	+++		
155 N-010	T	1	+	++	+	+	+	2	+	+	+	++	++	++++	+++++	+++
156 PSU-PBCB	P	2	+	++++	++	++	+++	1	+++++	++	+++	+++	++	+	++	++
157 Gognan	T	3	+++	++++	++++	++	+++					++	+++	+++		
158 Parys Mt	T	3	+++++	+++++	++++	++	++++					+	+++	+++++		
159 HV-T-2/3	T	1	+++++	+++++	++++	+	++					++	++++	+++++		
160 PSU FB82	T	3	++++		++		+++					++	+++++	+++++		

[a] A = *alba*; C = *canina*; G = *gigantia alba*; P = *palustris* (& *stolonifera*); T = *tenuis* (& *vulgaris*)

[b] Average ratings for color, density, quality at Puyallup. (10 = best, 1 = poorest)

		+++++	++++	+++	++	+
Color	Summer	8.0-9.0	7.5-8.0	7.3-7.4	6.8-7.2	5.0-6.7
Color	Winter	6.1-7.0	5.7-6.0	5.1-5.6	4.6-5.0	3.1-4.5
Density	Summer	8.5-9.2	8.0-8.4	7.5-7.9	6.5-7.4	2.7-6.4
Density	Winter	8.0-8.9	7.5-7.9	7.2-7.4	6.7-7.1	2.0-6.6
Quality	June 1977	7.0-7.5	6.1-6.9	5.6-6.0	5.0-6.6	2.0-4.9

[c] Average ratings for color, texture/density, and quality in eastern Washington (10 = best, 1 = poorest)

	+++++	++++	+++	++	+
Color	7.0-over	6.5-6.9	5.9-6.4	5.5-5.8	5.4-lower
Density/Texture	8.2-over	7.5-8.1	6.7-7.4	6.0-6.6	5.9-lower
Quality	7.7-over	7.3-7.6	6.8-7.2	6.2-6.7	6.1-lower

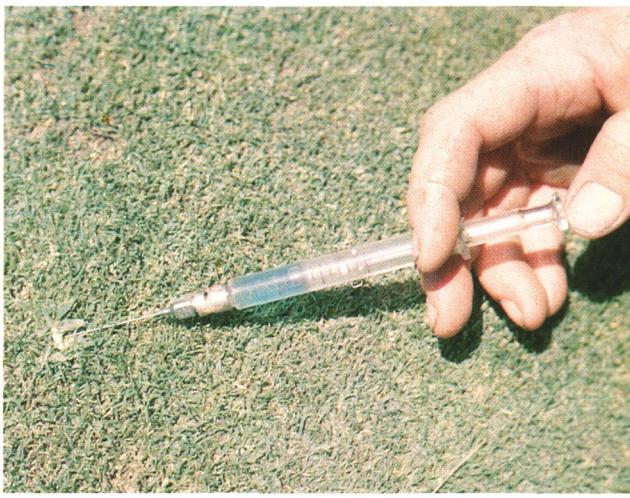
[d] Average ratings for disease (based upon percentage of area infected)

	+++++	++++	+++	++	+
Corticium	0-0.7	0.8-1.5	1.6-2.8	2.9-6.3	6.4 & up
Fusarium nivale	0-4	5-7	8-10	11-15	16 & up
Ophiobolus patch	0	0.1-0.9	1-1.9	2-4.9	5 & up
Typhula incarnata	1-19	20-29	30-39	40-49	50 & up
Typhula recovery	80-100	60-79	50-59	40-49	1-39

Average percent of disease turf on May 5 (1975) and 4 (1976) divided by amount on March 26 (1975) and 30 (1976). 80 = 80% recovery.

(Above) Goosegrass — its distinct seedhead formation.

(Right) So frustrating is goosegrass control to some that one superintendent tried hypodermic injections of herbicide . . . it failed!



Goosegrass

by JAMES B. MONCRIEF,
Southeastern Director,
USGA Green Section

GOOSEGRASS *(Eleusine indica* (L) Gaertn*)* is a common weed in the tropics and sub-tropics of both eastern and western hemispheres. It is most frequently found on disturbed soil in the southern part of the United States; however, it has been recorded in all except the extreme northwestern states. Goosegrass is especially quick to invade fine turf areas. It appears to do well under the same cultural practices that our fine turfgrasses respond to.

Goosegrass is a prolific seeder, and in most cases it has three to seven finger-like racemes on one stem. Often 15 to 20 will be produced by one mature plant. Goosegrass is a tufted annual with few internodes, commonly reclining, is leafy and sparingly branched. It has three or more spikelets, flowered, disarticulating above the glumes in between the florets. Mature plants have more than 500 seeds on each raceme. Each mature plant could easily produce 20,000 to 70,000 seeds.

The grain is plump, with minute transversely rugose seed loosely enclosed in a thin pericarp. The basic chromozome number is nine. Goosegrass does quite well in a poor or thin stand of grass, and it grows very well under heavy traffic. It has a strong, extensive root system; all you have to do is try and pull the plant out of the ground to find out exactly how strong a root system it has.

The seed is lightweight and can quite easily be distributed. Winds of a velocity of 25 to 30 miles per hour will cause the seed to become airborne and distributed by the air currents. Golfers could scatter seed about the course with golf cars or on their shoes when the grass is wet because of dew, rain or irrigation water. The seed could be tracked into areas wherever the golfers or machines go.

Goosegrass seedlings proliferate when soils are disturbed in hot weather.

Goosegrass is extremely difficult to mow after it matures. It is easy to tell when the mowers encounter a patch of goosegrass; the blades will create a totally different sound. The mower blades must be sharp to get a satisfactory cut, otherwise they will tear the leaf and fray the ends.

Disease or insects are rarely a problem for goosegrass; however, during 1977, areas were observed where army worms foraged on this weed, leaving only the tough fibrous portion. Army worms were so abundant in 1977 in some areas that eggs were found everywhere, even around this most unpalatable weed.

Eleusine indica is also known by other names, such as toughgrass, irongrass, dogweed, and gardengrass. The name goosegrass is universally used, but it is also mistakenly called crowfoot, especially in northern areas where crowfoot does not grow. Crowfoot is easily distinguishable from goosegrass because its cluster of racemes originates from a central apex of the stem. Its racemes are about half as long as racemes of goosegrass. Crowfoot *(Daclyoctenium aegypstium)*, sometimes called Egyptian fingergrass, is quite a pest in the coastal areas from North Carolina to Florida and across the gulf. It increases each year, but it can be controlled with the same chemicals that control goosegrass. One of the best controls for goosegrass is a strong turfgrass stand as a seedling. Seedling goosegrass is not competitive in bermudagrass, but as it matures it becomes increasingly competitive.

Goosegrass often becomes established along golf cart roads where careless drivers overrun edges of the roads and compact the adjacent turfgrass area. Thereafter, seeds are scattered by golf cars and walking golfers. The person mowing aprons or fringes of the greens with a rotary mower must be ever vigilant not to scatter seed onto the green. Once infested, it is most difficult to eradicate.

Close mowing does not eliminate seed production. Goosegrass will produce seedheads horizontal to the soil line when greens are mowed at ⅛ inch. Grass that can be maintained in healthy condition at this height of cut is very competitive with goosegrass.

Pre-emergent chemicals used to control goosegrass are Benefin, Bensulide, DCPA and others. It is important to apply pre-emerge herbicides carefully at the precise time recommended for best control. Be sure to follow label recommendations carefully.

Post-emergent chemicals such as DSMA, MSMA and similar products used to control goosegrass may not be available for use on golf courses within a short time without a special permit. New materials are being researched which show excellent promise for controlling goosegrass when they are properly applied. Some of these new chemicals are Asulox, Ronstar and Sencor. Goosegrass can be controlled effectively in the South with both pre- and post-emergent chemicals. Asulox has recently been labeled for goosegrass control in Florida. Ronstar has recently been labeled for use on turfgrasses.

Tifgreen, Tifdwarf and common bermudagrass are quite sensitive to Asulox and Sencor if these chemicals are misapplied. They are used on food products such as sugarcane, soya beans and potatoes.

Chemical control is less expensive than hand-picking, but at times hand-weeding is essential. Goosegrass has strong fibrous roots, but the plant can be easily removed by cutting under the crown with a sharp instrument. The plant will not make new growth from its roots. Regrowth occurs only if any aboveground portion of the plant is left standing in the hand-weeding operation. Removal by hand is still practiced in many areas because it does retard the bermudagrasses, the way chemicals do.

Literature reviewed did not mention that goosegrass seed had been found in air currents a mile high, but in 1946, an entomologist found seed in his collecting nets at 4,000 feet. If this operation was repeated, I'm sure some goosegrass and other seed might be found. It was also established that goosegrass was brought into the United States by the early settlers, who used it for mulch. It was also found in hay for animals, just as many other agricultural pests have been brought into this country.

Goosegrass is a prolific seeder, which means that chances for annual reinfestation are good once infection takes place. It is therefore wise to be ever vigilant to prevent its encroachment.

USGA GREEN SECTION
SEPTEMBER/OCTOBER 1978

TURF TWISTERS

POSITION THE RAKE

Question: Where is the proper placement of sand rakes on the golf course — inside the sand bunker or outside of it? (Connecticut)

Answer: The most current guidelines from the USGA indicate that the rakes should be placed *outside* the sand hazard in areas that should least affect the play of the hole. So, if you have them in the sand bunker, move them out to the side, and if they are out now, just position them away from the most used angle of play on the hole.

TO PROMOTE UNIFORMITY

Question: Is the Stimpmeter proving the Green Section's claim that it will help the golf course superintendent provide uniformity in speed of greens at his course? (Virginia)

Answer: From our experience at USGA Championship courses this year we can firmly say, "Yes!" We were surprised to learn that after double-mowing for several days there was still a decided difference in speed readings, some greens were slower than others. Slower greens were triple-cut and they quickly fell into line with the speed range of others. This is but one way to manipulate a management program to affect greens speed uniformity at your course.

AND ALL WILL FLOW SMOOTHLY

Question: We are beginning to see some fungicides now being offered in "flowable" formulations. What exactly are they? (New York)

Answer: "Flowable" pesticides have an active ingredient that is practically insoluble or only slightly soluble in water or other organic solvents. To make it easier to use for the consumer, the active ingredient is very finely ground into a formulation that, in this state, can be readily mixed with water to form a stable, sprayable suspension. These flowable pesticides are especially suited to the new mist-type sprayers that more and more golf course superintendents are using.