SEPTEMBER 1970

USGA GREEN SECTION RECORD

A Publication on Turf Management by the United States Golf Association

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VOL. 8, NO. 5 **SEPTEMBER, 1970**

COVER PHOTO:
The ninth hole at the San Luis Rey Country Club in Bonsall, Calif. Research in turfgrass helps keep our courses playable and attractive.

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RESEARCH and YOU

by **WILLIAM H. BENGEYFIELD,** Western Director and Publications Editor, USGA Green Section

To turn a phrase, the golf course superintendent has done more to grow grass under his feet than any other individual in the world! Along the way the Green Section, since 1923, has actively pursued and supported turfgrass research matters for the betterment of the nation's golf courses and superintendents. Recent issues of THE USGA GREEN SECTION RECORD have told the great harvest from this research. Now an increased pace is planned by the Green Section for the 1970s.

Productive turfgrass research requires not only intelligence, imagination and talent, but also an understanding of the problems the superintendent faces in the field. If the researcher doesn't know the need, he is not likely to find the answer. Therefore, during the decade ahead, it is the responsibility of us all to determine what new information we need. What new research do we want to have undertaken. Once determined, this must be effectively relayed to the researcher. Here, the Green Section agronomist can play a vital role for all concerned.

Research—real research—is the key to a better life and for us, better golfing turf. But because research has produced so many wonders in the past, one must be alert to the possibility of overuse or abuse of the word. The mere term "research" is not holy. It should not be considered as a sacred cow and go unchallenged.

All too frequently some "research projects" have in reality been simply a demonstration of already known facts or a duplication of effort already competently accomplished, documented and thoroughly investigated. Dr. Elwyn E. Deal, Assistant Director of Extension Service for The University of Maryland, recently wrote in *Park Maintenance* magazine, "Duplication of effort, especially in research, reduces efficiency of the people working in any field." Duplication is not only wasteful of talent, but funds as well.

Research is "laborious, careful inquiry or investigation," (Webster). May we not also expect it to lead to the development of new information? If turfgrass research funds are limited—and they are—should not the effort go toward needed new information rather than continually reconfirming the old?

Like everyone else, the turfgrass researcher has his job responsibilities and his superiors to please. It is an old but true cliche that he must "publish or perish." Under similar circumstances, we would all find ourselves publishers. It is up to us then—the users of turf culture information—to see that the researcher is aware of our needs and to financially support his investigation of *those* needs.

In the recent past, the topic of "research needs" came under discussion at several golf course superintendents meetings attended by the author. You may be interested in the replies received:

Irrigation:
- Better sprinkler heads.
- Better sprinkler patterns.
- An independent survey of sprinkler equipment.
- Establishment of irrigation standards for golf courses.
- An accurate, mobile soil moisture sensing device.

New Grasses:
- **Dwarf varieties.**
- **Wear resistance varieties.**
- **Winter and summer hardiness.**
- **Year round color for bermudagrass.**

Growth Retardants.
Better *Poa annua* Controls.
Better Algae Control for Ponds.
Labor Efficiency and Management Methods.
Better Equipment and Labor Saving Machines.
An Improved Dye for Winter Bermuda.
Soil Environmental and Micro-Biological Studies.

What would *you* add to the list? Certainly from the above one can see not all future research needs lie in the field of agronomy or even agriculture. During the 1970s we're going to require assistance from other branches of the university system as well.

Although research has brought us a long way since the 1920s, there's still a long road ahead. Needed now is a coordinated effort between all national turfgrass research interests. With it and the continuing work of outstanding scientists (like the authors of the following two articles), the technology of turfgrass management will enjoy unprecedented progress in the decade ahead. It is progress sorely needed and you and I and all of us have a direct stake in it!

FIG. 1. Bentgrass varieties used in this study. Individual plots are 5 x 10 feet.

Phytotoxicity of Preemergence Herbicides

by F. V. JUSKA, A. A. HANSON, and A. W. HOVIN
United States Department of Agriculture, Beltsville, Maryland

Crabgrass and annual bluegrass (*Poa annua* L.) are serious weeds which invade putting green turf. Of the two weeds, annual bluegrass is the most difficult to eradicate. Annual bluegrass is a prolific seed producer that can produce seed under putting green height of cut. Annual bluegrass is the main grass component in some putting greens because it persists under many putting green management programs.

H. B. Sprague and Glenn W. Burton[3] were among the first researchers to observe that lead arsenate was slightly toxic to annual bluegrass. Lead arsenate has been used to control annual bluegrass on putting greens for many years with a fair degree of success when applied at the right time and at the right amounts. Calcium arsenate is used to some extent for annual bluegrass control, but control has been somewhat erratic. Injury from calcium arsenate can result from high application rates, excessive buildup of soil toxicity levels, and from applications made during hot weather. V. B. Youngner[4] states that calcium arsenate is not safe to use on greens under their conditions in the West.

Although several preemergence herbicides give excellent control of crabgrass, there is justifiable concern over potential injury to bentgrass greens. There is also the possibility of injury from preemergence herbicides applied for annual bluegrass control. Holman M. Griffin[1] reported good control of crabgrass with DCPA (Dacthal) on bentgrass. His findings are supported by field experience that shows this herbicide to have a high degree of safety on all but Cohansey bentgrass greens. A. T. Perkins[2] reported bensulide as a promising herbicide to eradicate annual bluegrass without injury to 16 bentgrass selections.

The purpose of this study was to determine the phytotoxicity of six preemergence herbicides on several bentgrass varieties.

Bentgrasses and Herbicides

The experiment was set up in 1965 on bentgrass plots sprigged or seeded in 1957. The experimental area included four replications of 5 feet by 10 feet plots planted to the following creeping bentgrass varieties: Arlington, Congressional, Cohansey, Collins, C-52 (Old Orchard®), Metropolitan, Penncross, Pennlu, Seaside, Washington, and a mixture of Arlington and Congressional (Fig. 1.). Herbicide treatments were applied across the replications in 16 main plots measuring 2½ feet wide and 55 feet long. Three of six herbicides were applied on two of the four bentgrass replications. The bentgrass variety subplots within herbicide treatments were 2½ feet by 5 feet. Herbicides and rates applied were: 1) bensulide, 15 pounds per acre; 2) DMPA, 15 pounds per acre; 3) siduron wettable powder, 12 pounds per acre; 4) DCPA wettable powder, 10 pounds per acre; 5) lead arsenate 96 per cent, five pounds per 1,000 square feet; 6) calcium arsenate 69 per cent, five pounds per 1,000 square feet; and 7) the control plot. Rates of all herbicides were based on active ingredients per acre except lead arsenate and calcium arsenate. All herbicides were applied with a knapsack sprayer, each in one gallon water, except for lead arsenate and calcium arsenate which were mixed with sand and applied with a fertilizer spreader.

Herbicides were applied to the same plots in May for five consecutive years, from 1965 to 1969. Visual phytotoxicity notes were taken in July or August of each year. Injury scores were not obtained in 1968 because of a severe attack of disease just before ratings were to be taken. Injury to the bentgrasses was not evident in 1969.

Results

The amount of injury to bentgrass varieties, averaged over three years, is listed in Table 1. Of the six herbicides used in this study, bensulide was the only one that did not appear to injure any of the bentgrasses tested. A trace of injury was observed from lead arsenate in 1966. There was no obvious injury to bentgrasses from lead arsenate in the other two years.

Appreciable varietal differences are apparent among bentgrasses in reaction to herbicides, with the exception of bensulide and lead arsenate. This is seen in the absence of siduron injury on Penncross and the appreciable level of damage from this herbicide on the Washington variety. Calcium arsenate injury on C-52 was relatively severe, with only slight injury on Penn-

TABLE 1. Turf injury scores on bentgrass selections (average for 1965–1967)[1]

	Herbicides and Rates					
Varieties	DMPA 15 lb/A	Calcium arsenate 5 lb/1000 sq. ft.	Siduron 12 lb/A	Lead arsenate 5 lb/1000 sq. ft.	DCPA 10 lb/A	Bensulide 15 lb/A
Pennlu	1.3	1.0	.7	.17	1.2	0
Arlington	.8	1.0	.7	.17	1.0	0
Penncross	1.2	.8	0	.3	1.2	0
Arlington Congressional	.3	.3	.8	0	1.2	0
C-52 (Old Orchard®)	.8	2.2	.17	0	1.0	0
Metropolitan	1.0	1.7	.8	0	1.0	0
Washington	1.3	.3	3.3	0	1.7	0
Congressional	.3	.7	.3	0	.8	0
Cohansey	.7	.7	.17	.3	1.8	0
Collins	.8	.17	1.3	0	1.2	0
Seaside	1.3	1.2	1.7	.3	1.5	0

[1] Scores: 0 = (no apparent injury) to 10 = (severe injury)

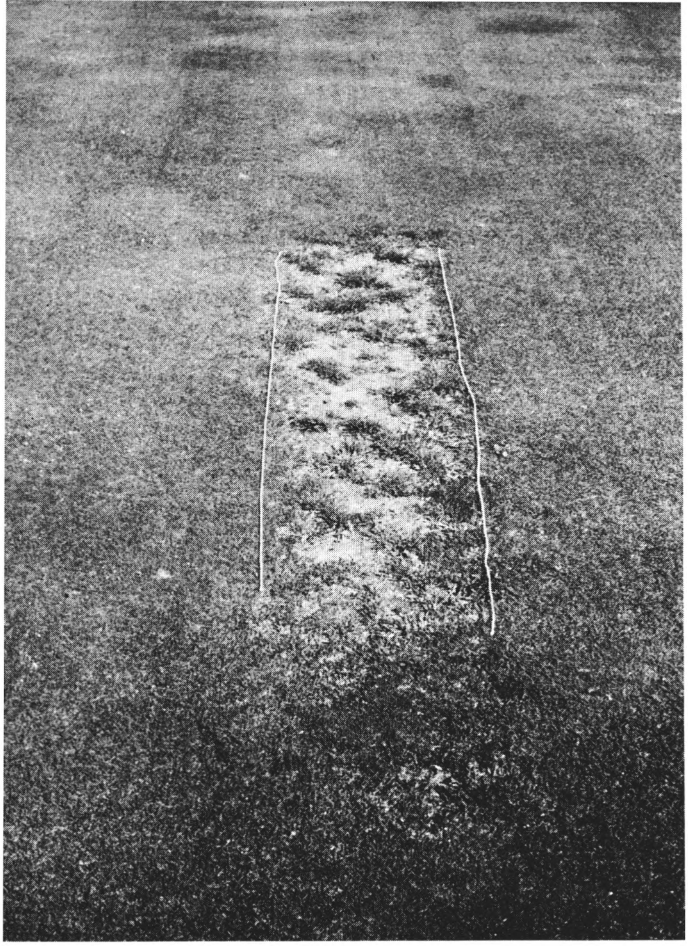

FIG. 2. Turf injury to Washington bentgrass from siduron applied at 12 pounds ai per acre.

cross and Washington bentgrass.

There was variation among years in the amount of herbicide injury on bentgrasses (Table 2). Injury from DCPA rated 2.3 in 1966, compared with .1 in 1965 and .8 in 1967.

DMPA rated 0 in 1965, 2.5 in 1966, and .4 in 1967 while calcium arsenate was rated 1.3 in both 1965 and 1966 but only .2 in 1967.

There was 107 per cent more injury from siduron in 1967 than in 1966. In 1965, siduron injury to Washington bentgrass was 7.5 (Fig. 2) with little or no damage to several other varieties. *Poa annua* largely filled in the injured areas of Washington bentgrass so that very little injury was observed during the next two years.

The higher rate of injury from calcium arsenate in 1965 was due to the susceptibility of C-52, which received an average score of 5.0 (Fig. 3) and to relative high scores assigned to Metropolitan (3.5) and Seaside (3.5). In 1965, all but two bentgrass varieties were slightly injured by the calcium arsenate application.

Injury from DCPA was different from that of the other herbicides in that the turf was not scorched to form open areas. Stolons from DCPA treated plots failed to root well, the sod was less dense, and the turf had a ragged apappearance (Fig. 4).

In 1968, both lead arsenate and calcium arsenate were applied in water with a knapsack sprayer. Within a day or two the calcium arsenate plots showed considerable scorching which disappeared in approximately two to three weeks.

The lack of injury to bentgrass from application of bensulide confirms the findings reported by Perkins[2]. Control of *Poa annua* with bensulide may require annual applications for two or three years to prevent seed germination. Established *Poa annua* may remain in the greens for a number of years because of the favorable conditions for *Poa annua* growth found in most putting green management programs.

Date of preemergence herbicide application may be an important factor in amount of injury that may occur. Applications made in the Mid-Atlantic States in May, when temperatures are high, may be responsible for more severe injury to the bentgrasses, particularly from DCPA and calcium arsenate. Preemergence herbicide treatments for control of crabgrass and annual bluegrass can create problems in reseeding damaged greens. Residues from treatments can reduce the successful establishment of bentgrass seedlings. If herbicide injury is a problem, damaged areas should be sodded rather than seeded.

Summary

Phytotoxicity of 6 herbicides on 11 bentgrass varieties was observed in the field from 1965-1969. Herbicides were applied in strips 2½ feet wide and 55 feet long across plots of the 11 bentgrass varieties.

TABLE 2. Injury to bentgrasses from herbicides as it varied from year to year (average for all bentgrass varieties)[1]

	1965	*1966*	*1967*
Siduron	.7	.6	1.3
DMPA	.0	2.5	.4
Calcium arsenate 69% ai	1.3	1.3	.2
Lead arsenate 96% ai	.0	.3	.0
DCPA	.1	2.3	.8
Bensulide	.0	.0	.0

[1] Scores: .0 (no apparent injury) to 10 (severe injury)

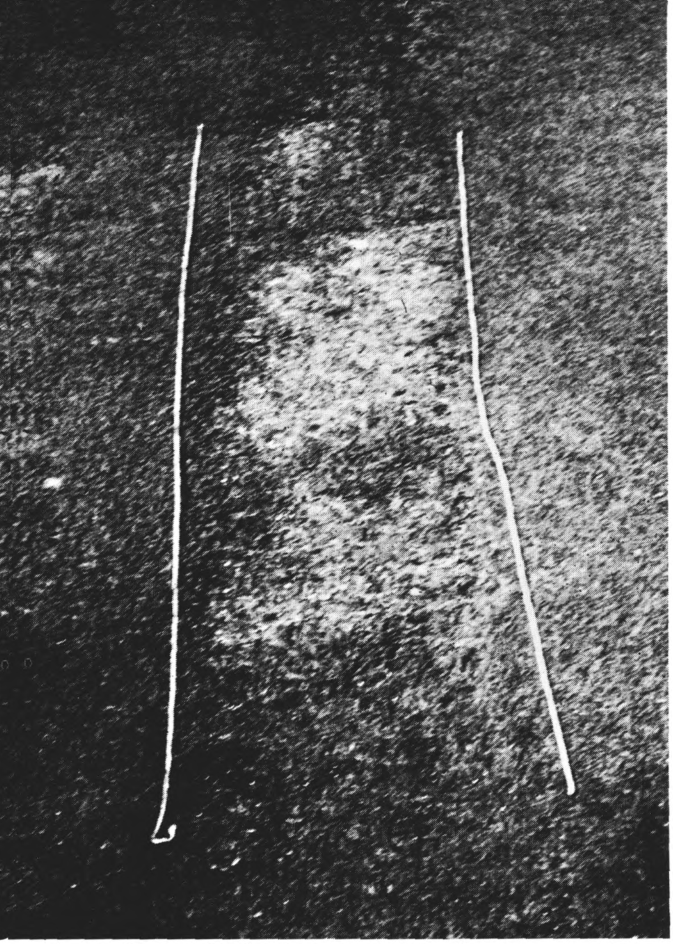

FIG. 3. Turf injury to Old Orchard bentgrass from calcium arsenate applied at 215 pounds per acre.

The Authors

This article is a contribution from the Crops Research Division, Agricultural Research Service of the United States Department of Agriculture, Beltsville, Md. Mr. Hanson is the Agricultural Administrator, and Mr. Juska and Mr. Bovin are Research Agronomists with the Department of Agriculture.

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Washington bentgrass was severely injured in 1965 by an application of siduron, but there was only a trace of injury on two other selections. DMPA did not cause any injury in 1965 but quite severe injury occurred in 1966. Old Orchard®, Seaside, and Metropolitan were most sensitive to calcium arsenate injury in 1965. There was some injury from calcium arsenate on all but two strains in 1966. Bentgrasses were discolored in 1968 when calcium arsenate was applied in liquid form. Injury from lead arsenate was negligible. Bentgrass stolons failed to root readily from applications of DCPA. Bensulide caused no noticeable injury.

FIG. 4 Congressional bentgrass stolons failing to root properly. DCPA applied at 10 pounds ai per acre.

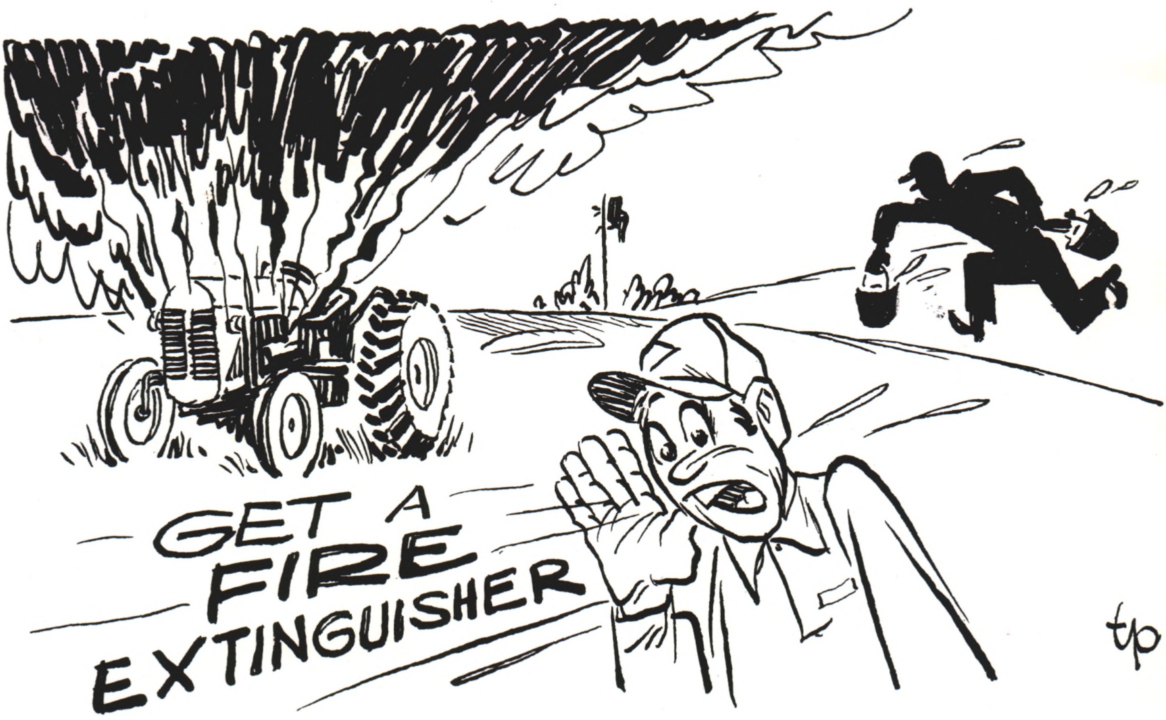
APPENDIX

LIST OF HERBICIDES REFERRED TO IN THIS PUBLICATION

Common name	Chemical name	Trade name	Manufacturer's name
DMPA	*O*-(2,4-dichlorophenyl) *O*-methyl isopropylphosphoramidothioate	* Zytron	* Dow Chemical
siduron	1-(2-methylcyclohexyl)-3-phenylurea	* Tupersan	* E. I. duPont
DCPA	dimethyl tetrachloroterephthalate	* Dacthal	* Diamond Shamrock
bensulide	*O,O*-diisopropyl phosphorodithioate *S*-ester with *N*-(2-mercaptoethyl) benzenesulfonamide	* Betasan	* Stauffer
calcium arsenate	calcium arsenate	several names	various companies
lead arsenate	lead arsenate	several names	various companies

* Mention of trade names, proprietary products, or company names does not constitute a guarantee or warranty of the product by the U.S. Department of Agriculture, and does not imply its approval to the exclusion of other products that may also be suitable.

SUPER SAM by Paprocki



Helminthosporium Leaf Spot and Crown Rot of Kentucky Bluegrass

by C. REED FUNK, PHILIP M. HALISKY, and PETER L. BABINSKI
Rutgers University, New Brunswick, N. J.

Kentucky bluegrass, including its improved varieties, is the premier lawn-type turfgrass in the northern half of the United States. Bluegrass is hardy, attractive and widely adapted. The development of improved, disease-resistant bluegrasses capable of producing a denser, more dependable turf under conditions of close mowing would make this species of even greater value to the golf course superintendent. The first requirement of such improved varieties should be a high degree of resistance to leaf spot and crown rot caused by *Helminthosporium vagans* Dreschs. This disease produces purplish or brown spots with straw-colored centers on leaf blades, sheaths, and crowns. When severe, the disease drastically thins and weakens bluegrass turf, a condition referred to as "melting-out." Most turf experts consider this to be the most destructive disease of closely-mowed bluegrass in the Northeastern region of the United States.

Seasonal Development

Under New Jersey conditions, *Helminthosporium* leaf spot initiates infections with the advent of cool, moist, cloudy weather in October and November. Large numbers of spores are produced during the late fall, winter and spring months. Highly susceptible varieties frequently become nearly 100 per cent brown from disease by early March. Subsequent spring regrowth is also subject to considerable infection during periods of cool, moist, cloudy weather. The fungus virtually ceases to pro-

Kentucky bluegrass showing leaf spots with dark borders and light centers.

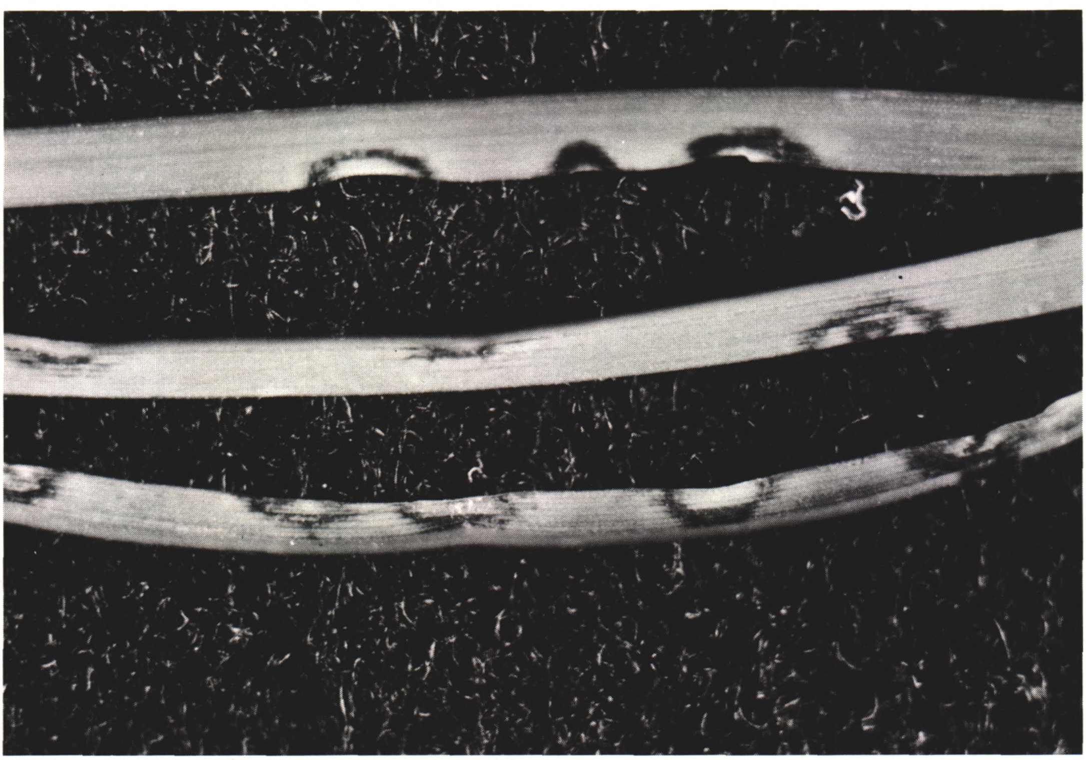


Table 1. Relation of turf loss due to melting-out by *Helminthosporium vagans* and weed invasion in Kentucky bluegrass varieties.

Bluegrass Variety	Turf loss caused by melting-out (%) May	Broadleaved weeds per 100 sq. ft. (no.) October
Anheuser Dwarf	1	5
Pennstar	5	4
Merion	7	6
Cougar	25	31
Newport	27	61
Delta	43	34
Park	65	104
LSD at 5%	6	31

duce spores during the warmer season of May to October.

However, infections already present continue to progress causing a peak of destruction in late May and early June. Defoliation and melting-out of bluegrass turf results in unsightly patches of bare ground subject to easy colonization by both crabgrass and broadleaved weeds (Table 1). Subsequent recovery of the bluegrass depends on the level of food reserves present in the plant, the environmental conditions favoring recovery, and the extent of weed invasion. This disease is normally of minor consequence during the bright, sunny weather of late summer and early fall. The occasional spots present on leaves produce very few spores during this warm season of bright sunshine.

Management Factors

The severity of this disease is greatly influenced by certain management factors. Disease injury is considerably greater under close mowing in contrast to higher mowing. Close mowing tends to deplete carbohydrate food reserves, thereby weakening the grass and making it more subject to damage and less capable of recovery. Turf receiving low levels of nitrogen fertilizer often shows greater numbers of leafspot lesions compared with highly fertilized turf when examined in March or April.

However, observations made during late May and early June, when the crown rot phase of the disease is most severe, have shown that turf receiving high rates of nitrogen fertilizer suffers the greatest permanent damage. As shown in Table 2, turf mowed at 2½ inches and maintained at moderately low fertility showed little damage from melting-out and was virtually free of crabgrass. On the other hand, turf mowed at ¾-inch and heavily fertilized showed 63 per cent turf loss in early summer resulting in 33 per cent crabgrass cover by the end of the summer.

Varietal Resistance

Turf mowed high and fertilized lightly may not suffer as greatly from leaf spot, but neither does it possess the rich green color, density and neat appearance desired by most people. Varieties with a high level of disease resistance are therefore essential for the production of high quality turf. The outstanding success of Merion Kentucky bluegrass can be attributed primarily to its inherent resistance to leaf spot. Unfortunately, Merion is not well adapted to all areas and is subject to certain other weaknesses, such as susceptibility to the stripe smut disease. New varieties presently coming on the market such as Fylking, Pennstar, and Warren's A-20 have good resistance to both leaf spot and

Table 2. The effect of cutting height and fertility level on loss of Common Kentucky bluegrass turf from melting-out by *Helminthosporium vagans* and subsequent weed invasion.*

Fertility level**	Cutting Height 2½ inches %	1½ inches %	¾ inch %
0 pounds	5 (1)	8 (2)	16 (1)
30 pounds	22 (3)	24 (12)	43 (18)
60 pounds	34 (7)	50 (22)	63 (33)

*Percent crabgrass invasion given in parenthesis.

**Fertility applications consisted of applying 10-6-4 fertilizer in 10 lb/1000 sq. ft/application as follows:

0 = none; 30 = early April, May and September; 60 = early April, late April, May, September, early October, and late October.

stripe smut. They should be of considerable value to those who enjoy quality turf (Table 3).

Table 3. Reaction of Kentucky bluegrass varieties to *Helminthosporium vagans* in New Jersey under turf maintenance. 0 = best resistance.

	Good Resistance		
NJE P-104	0.7	*Merion	1.0
NJE P-23	0.7	*Pennstar	1.2
NJE P-16	0.7	PSU K107	1.2
NJE P-1	0.8	*Fylking	1.2
NJE P-56	0.8	NJE P-84	1.2
Anheuser Dwarf	0.8	NJE P-59	1.4
NJE P-101	0.9	NJE P-115	1.4
NJE P-5	0.9	NJE P-69	1.4
NJE P-72	0.9	NJE P-35	1.4
*Warren's A-20	1.0	*Warren's A-34	1.5
NJE P-106	1.0	NJE P-57	1.6
NJE P-27	1.0	NJE P-29	1.7
	Moderate Susceptibility		
Belturf	3.0	*Delft	4.8
*Windsor	3.6	*Newport	4.8
Campus	4.0	*Newport C-1	4.8
*Prato	4.2	*Cougar	5.2
	High Susceptibility		
Primo	6.0	*Kenblue	7.0
*Delta	6.5	*Common	7.0
*S-21	6.8	*Park	7.0
*Geary	7.0	*Nu Dwarf	7.0
*Arboretum	7.0	*Troy	8.5

*Varieties commercially available in the United States.

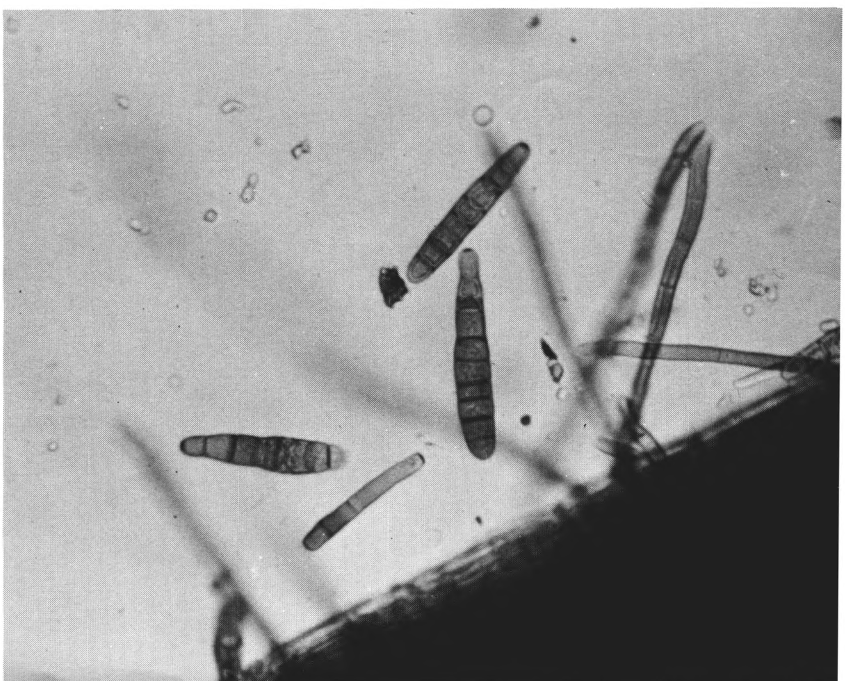
Chemical Control

The control of leaf spot and crown rot in Kentucky bluegrass usually involves a combination of disease resistance, proper management practices, and chemical control measures. Since none of the resistant varieties is immune to this disease, and since disease severity is often accelerated by uncontrollable environmental factors such as cloudy weather, the use of fungicide applications is often desirable. An excellent selection of non-mercurial, low-toxicity chemicals that are highly effective against this disease is available to the golf superintendent today. These include Daconil, Dyrene, Fore, Tersan and Captan. Additionally, granular formulations of PCNB also are very effective. Recent work in Pennsylvania has shown that 2-3 high dosage applications of chemical at 3-week intervals during spring are often adequate for controlling this disease in bluegrass turf.

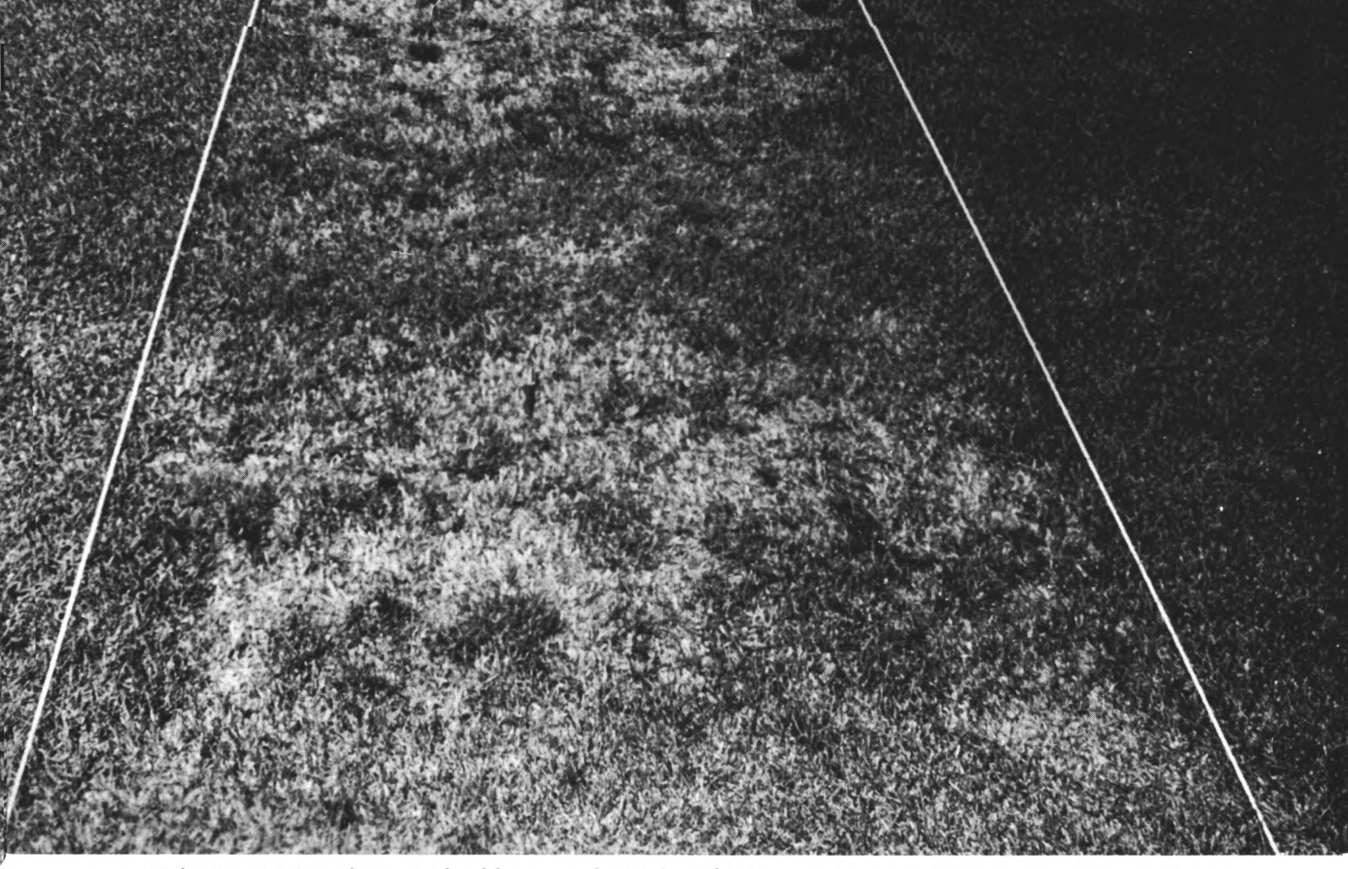
Breeding Resistant Varieties

When the turfgrass breeding program was started at Rutgers in 1962 the number of leaf-spot resistant bluegrasses was very limited. They included Merion, Fylking, Pennstar, Warren's A-20, and Anheuser Dwarf. An extensive collection of over 6,000 bluegrasses made by Rutgers during 1962 and 1963 provided a few additional resistant bluegrasses including NJE P-1, NJE P-23, NJE P-59, NJE P-62, NJE P-107, NJE P-115, and NJE P-123. It was soon apparent that bluegrass plants with adequate leaf spot resistance were very rare in old turf areas.

In making the collection of the 6,000 plants thousands of other bluegrass had been rejected because of obvious deficiencies at the time of



Spores of Helminthosporium vagans *which spread the disease.*



Melting-out of Park Kentucky bluegrass by Helminthosporium vagans. *Resistant varieties Merion and Fylking show very little damage.*

field selection. Many of the resistant plants were also strikingly similar to each other such as NJE P-59, NJE P-107, NJE P-115, and NJE P-123 or similar to bluegrasses already on hand, such as Anheuser Dwarf, Merion or Fylking. Like present varieties, all showed some weaknesses in seed production or other aspects.

Because of the difficulty of obtaining elite and novel plants possessing all desired characteristics from field collections, a hybridization approach was initiated at Rutgers. Hybridization allows the breeder to recombine the best characteristics of two or more parents into one elite variety if progenies of adequate size are evaluated. With apomictic reproduction, the improved plant will breed true to type and can become the foundation of a new turfgrass variety. As a result of seven years of hybridization work, over 100 bluegrass selections showing good leafspot resistance have been obtained with dozens of others being produced each year. These selections are all moderately low-growing, turf-type bluegrasses. The more promising hybrids are currently being evaluated for resistance to other diseases, apomictic reproduction, area of adaptation and seed production potential. The outlook for improved disease resistant bluegrass is bright.

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PLAN AHEAD

Long range plans made from aerial photographs pay big dividends.

by **HOLMAN M. GRIFFIN,** Agronomist, USGA Green Section

Barring luck, no one makes much forward progress today unless he has a plan. Planning is an integral part of modern existence. It implies mental formulation of ideas and sometimes graphic representation of these ideas. It is often the difference between success and failure and without it, a project may never come into existence.

Accurate anticipation of need is what planning is all about. Attention to detail enhances the value of plans and thorough organization streamlines the operation.

There are all kinds of plans used on golf courses and each type has a specific function. First, there is a job plan of very limited scope which deals with a single job. Next a work plan which covers all the necessary jobs on the golf course. Work plans are timely and may cover from one day to several months in scope. Beyond one year we begin to formulate long-range plans which will effect our progress in the years to come.

Long-range plans may be formulated for 5, 10, 20 or more years and when properly made and followed, will insure both stability and progress.

Long-range plans should definitely be positive in nature and not just a ruse used to avoid getting things done. Often I have heard the phrase, "That's in the long-range plans," when what is really meant is, "We realize the need and certainly hope the next generation will do something about it."

Essentially, long-range plans are concerned with new projects for improvement not covered by the routine budget; improvements which must be done in stages over a period of years and the changes required to maintain the "status quo" of the club.

Progress means change, but a good long-range plan will lessen the chances of making unwise moves which may not be in the best interest of the club. This sort of planning gives a club both a goal to reach and the direction of progress toward that goal. Without a goal there can be no progress, and without direction, progress is always slower with the end result more dubious.

Design changes take place at many clubs every few years, and there are some instances of clubs going through many expensive changes only to return to the original design as their final effort. Clubs which do this are very much like the man who resets his watch every time he sees a timepiece which does not agree with his. There has never been an 18-hole course built that would please everybody, even though a vast majority of courses are well designed.

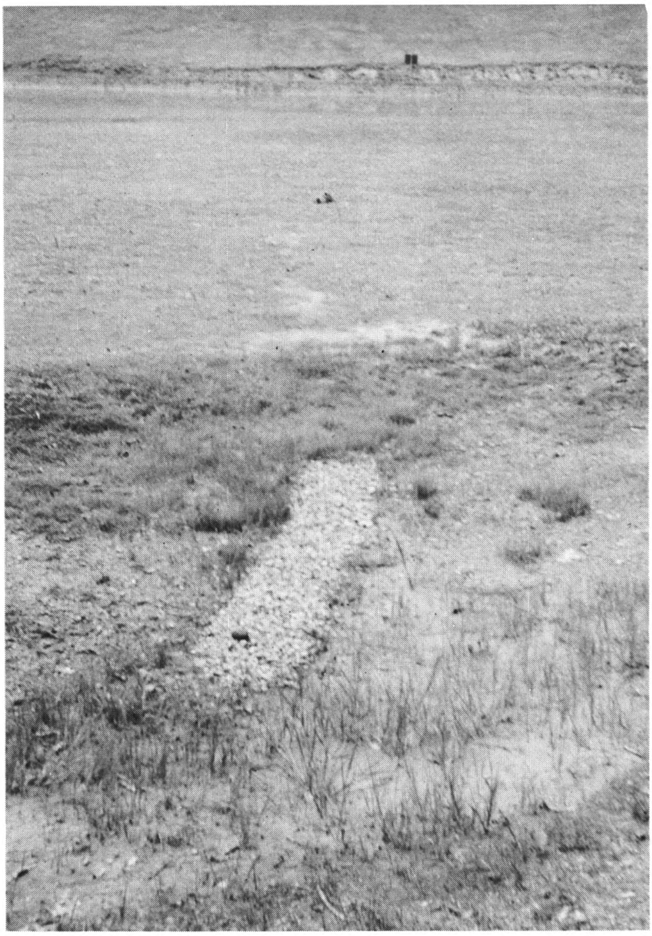
If plans for a new course are not well received by the majority of the people who pay the bills, then construction should never be started until an acceptable design is found. Once the course is completed it may be improved upon by correction of construction flaws or addition of new features which enhance the value of the property, but basic design changes are seldom advisable unless requested by a majority of the members.

In all cases, an architect should be consulted and the changes should be a part of the long-range plan. Major design changes are never urgent and the time between conception and implementation should be at least a year which by definition makes them a part of long-range planning.

Long-range planning lends continuity to the management program of any course. Green Chairman, Green Committees, Board Members and Superintendents come and go, and more often than not, continuity is sadly lacking. The formulation of long-range plans does not imply that the first green committee the club has should make a rigid 30-year program and everyone from there on must stick to it. Long-range planning must be flexible to meet changing situations, but not flexible to the point that a new committee can take over and in one or two years change the course in chameleon fashion. The fact that some of the world's outstanding courses are old courses which have undergone only minor changes during the years would, in itself, lend credence to the practice of making long-range plans.

You may be thinking that not every golf course is a truly great one and that your own club needs some modernization and needs it now. Maybe you are faced with the seeming crisis of a new "super course" in your area competing for members. Long-range planning will be even more of an asset to you in these situations.

If your basic design is poor to start with, a



Planning of any kind would have prevented the designer to the center of the new green (right),

from installing a drain from the center of the bunker (left) where the first rain caused a blowout.

quick refurbishing can be extremely costly and probably won't help much on the long pull. What the course may need is complete redesign and rebuilding. If the committee in charge of planning has been on the ball, they will have recognized the inherent problems on the course and will have anticipated the possible danger of competition. A long-range plan should have been formulated to eliminate any severe consequences to your club.

If your basic design is good, a long-range plan will show your membership where you are going and they will appreciate the fact that long-range plans will make the changes less of an inconvenience and certainly less costly than a crash program.

Long-range planning should take into account that new and better grasses are being developed and that traffic is not only increasing, but also changing in type. Your long-range plans need not specify the type of grass to which you wish to change, but you can be almost certain that from now on there will be an improved turf variety for some area of your course when you are ready. The new variety probably won't be the ultimate, but it should be better than the one you have now. Honestly, now, think of all areas of your course—greens, tees, fairways, roughs, clubhouse lawn, etc.—and I feel sure you can picture at least one or more of these areas which could be made more desirable by switching to an improved variety of turf.

Increased traffic of all kinds has influenced golf course design tremendously in the last 10 years or so. Superintendents find it almost impossible to maintain turf on small, poorly constructed greens with limited cupping space. If this is your problem you have two alternatives: you can either restrict play, or you can build new greens.

The second solution seems much more advisable and should be a part of long-range planning. You might also get some relief from foot traffic on greens by instituting an educational program which advises the membership of the problem and encourages them to wear golf shoes of the type with the spike shoulder recessed in the shoe sole. This won't lessen the traffic, but it may reduce the wear on turf by 50 per cent, which in turn makes playing conditions better, gives the golfer a good excuse to buy a new pair of shoes, and makes the golf professional's cash register ring. This will be a long-range plan if you arrange it at all.

Golf carts and service vehicles constitute another type of traffic which is becoming increasingly difficult to deal with. Many clubs, realizing the need for cart paths and service roads, have begun to install these on a long-range basis because of the expense of putting all the necessary roads in at one time. Long-range planning will also allow you to decide better where they are needed, how successful the design will be, what width to make them to best serve your purposes, and a number of other things which may be overlooked on a short-term installation.

The scope of long-range plans should include, but not be limited to, land acquisition for additional holes or a new site which would offer the golfers better facilities than they have now. Tree planting for replacement of older trees or additional trees. Beautification to make the course and grounds more appealing. Improved drainage to make the course more playable and easier to maintain. New or additional supplies of irrigation water from wells and for storage tanks and ponds. Better irrigation systems to improve the turf and save manhours.

The list of ideas for long-range plans on the golf course is infinite, as is the value of such plans. Generally speaking, the happiest people are those who make things happen, and no one can make things happen without a plan.

USGA GREEN SECTION RECC
SEPTEMBER, 1970

TURF TWISTERS

CHORES

Question: Over the years, our greens have decreased in size due to the "cutting-in" by our operators. How can we best bring them back to their original size? (Mass.)

Answer: When a grass is cut regularly at apron height, it is difficult to reduce it to putting green height over one season. Normally it is not advisable to reduce the cut from apron to putting green height in one operation. To subject the turf to such treatment would probably kill or severely injure the turf.
There are several methods of successfully doing this, and a few are listed here.

1) Begin by reducing the height of cut in early fall, about 1/32nd at a time. Mow the turf *daily* at the same height, until observation tells that you may reduce it another 1/32nd of an inch. If fall weather is favorable, the area should be down to about regular putting green height before winter sets in.
When greens are aerated in spring and fall, these areas should receive at least twice as much aeration as the rest of the green for several years.

2) Strip the sod, improve the soil beneath, and turf the areas with putting green sod from the nursery. With present day power sod cutters, this task has become much simplified. The best time to do this is in early to mid spring.

3) If the turf is *Poa annua* and you wish to establish permanent grasses in its place, reduce the height of cut in one fell swoop in early fall, and then completely renovate the newly mown area. Prepare a seedbed by *thorough* but shallow aeration, or by drastic vertical mowing. Then add topsoil as needed, and reseed or stolonize to bentgrass strain desired.

TO CONSIDER

Question: Recently I have heard about new programs of winter feeding for cool season turf. Is this now an accepted practice? (Maryland)

Answer: Research has been conducted in this area of concern for the past several years by at least four universities in the North, South, Mid-Continent and Mid Atlantic regions. Virginia Polytechnic Institute, for one, now recommends several different programs of winter fertilization for their area based on the type of fertilizer used: i.e., chemical organic or synthetic. This concept of fertilization is proving successful in certain regions and has much to recommend it from research data compiled thus far.

THIS FALL

Question: When is the best time to apply potassium for general turf hardiness? (Minn.)

Answer: It has been our experience that periodic applications of potash throughout the season are more beneficial than a spring or fall application alone. A program of two light applications of 1 to 1-1/2 pounds per 1,000 square feet in the spring followed by an early fall application for a total of 3 to 5 pounds for the season has shown excellent results in improving summer as well as winter hardiness.