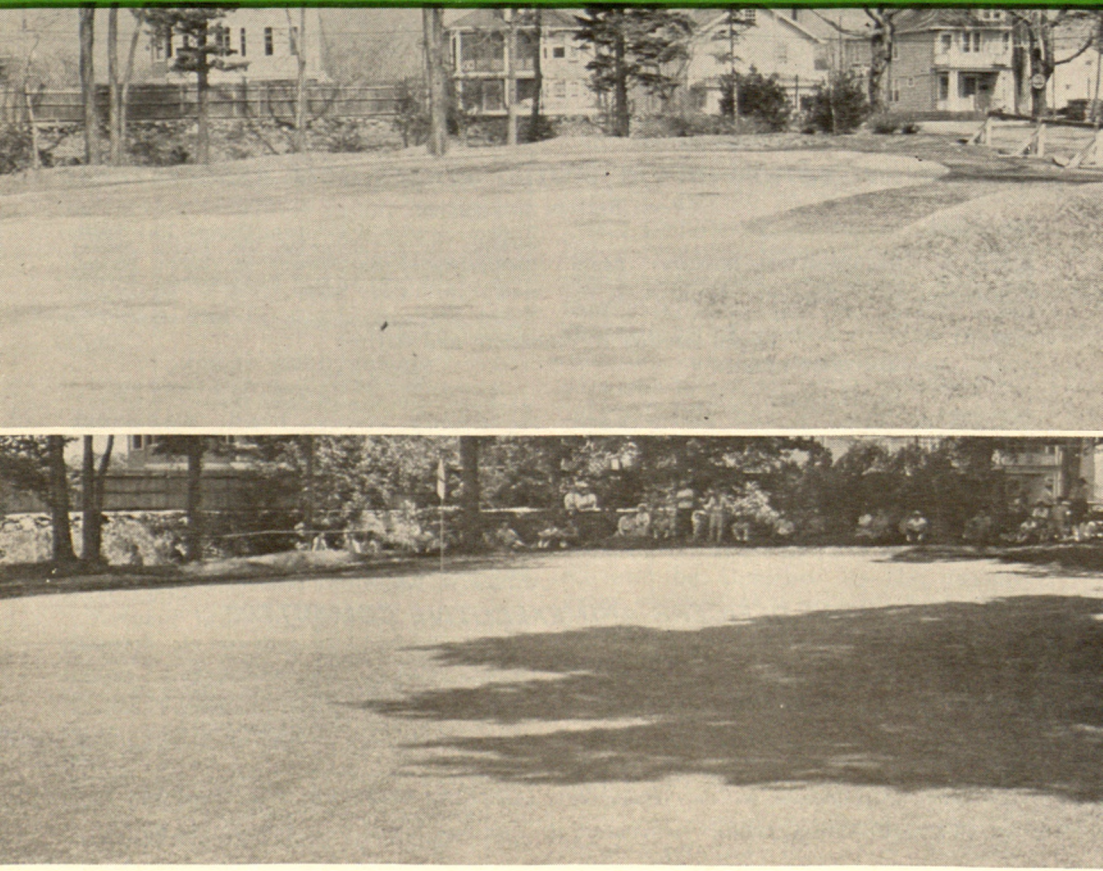
SEPTEMBER 1963

USGA GREEN SECTION RECORD

A Publication on Turf Management
by the United States Golf Association



RECOVERY FROM WINTER INJURY

This is the first green at The Country Club, Brookline, Mass. The top picture was made on April 24, the bottom one made on June 19, the day before the Open Championship began. *(See Page 8).*

USGA GREEN SECTION RECORD

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Winter Injury of Turfgrasses Associated with Ice Sheets*

By **JAMES B. BEARD**, Department of Farm Crops, Michigan State University

Introduction

Winter injury to turfgrasses has been an extensive problem in portions of the northern United States and Canada, particularly grasses maintained under fairway, tee, or putting green conditions. Much has been written regarding possible causes of this injury with practically no experimental evidence to support these theories. Before effective practices can be developed to reduce winter injury, the actual cause or causes must be determined.

Winterkill is a term encompassing a large number of types and causes of injury. It is used loosely to include any type of injury that occurs during the fall, winter, or spring period, including desiccation, heaving, flooding, disease (snow mold), and direct low temperature injury. This paper will be limited to winter injury associated with ice coverings. Winterkill associated with ice coverings is common in areas where sleet storms predominate and in poorly drained locations.

Survey of Literature

A review of the literature reveals only one paper which involves the study of winterkill on turfgrasses. In 1939, Carroll and Welton found that common Kentucky Bluegrass was more susceptible to winter injury when heavy, late fall nitrogen applications were made.

Several individuals have published theories as to the causes of winter injury. One of the current theories is suffocation beneath ice sheets. A more recent theory is the accumulation of toxic substances such as carbon dioxide under ice sheets. Another theory which has been suggested is the outward diffusion of water from the plant during ice incasement resulting in desiccation.

Types of Injury

In 1962, Beard divided winter injury into two major types. Type I was grass which was dead at the time of spring thaws. Type II was grass which appeared alive and healthy at the time of spring thaws but which subsequently died.

Type I injury kill may occur in five ways:

1. Deficient supply of oxygen under the ice sheet. The respiring plant requires oxygen for maintenance of plant tissue even at extremely low temperatures. The ice sheet could impair oxygen diffusion to the extent that, in time, it might become limiting.

2. Accumulation of toxic levels of carbon dioxide under the ice sheet. Carbon dioxide is a by-product of plant respiration processes. Even at below-freezing temperatures a minimum respiration rate exists. Thus, it is possible, in time, for killing concentrations of carbon dioxide to accumulate or for some similar toxic breakdown product to accumulate. Injury of this type has been reported in alfalfa.

3. Severe hydration of the plant tissue causing leaching of cell contents from the protoplasm. On sunshiny days light rays will pass through the ice and be absorbed by the opaque grass surface. It is possible that these absorbed light rays could heat the grass sufficiently to melt the ice surrounding them. This would result in a condition in which the leaves are incased in water with a heavy ice sheet still existing around them. This condition would be favorable for se-

*This article taken from Michigan Turfgrass Research Report, Spring 1963, Volume 1-Number 1.

vere leaching to occur, and has been observed in small grains.

4. Outward diffusion of water from leaves incased in ice. When leaves are incased in ice the relative concentrations of solutes is higher outside the leaf than internally, due to water existing in the solid phase. This could result in outward diffusion in water from the leaf in an attempt to attain equilibrium. If sufficient water is removed from the leaf, desiccation could occur. However, when the vapor pressures of water and ice are compared it appears that at equilibrium, sufficient water would not be removed to cause plant desiccation.

5. Total destruction of the protoplasm within the hydrated growing tissue of the plant due to severe ice formation at low temperatures. This is a mechanical injury to the brittle protoplasm caused by the formation of large ice crystals. This type of injury will be less in plants that are permitted to properly harden through dehydration or reduction in water content. If plants are improperly managed through over-watering, fertilization or any process which stimulates growth in the late fall, then the chance of direct kill by low temperature is much greater.

Type II injury could occur in two primary ways.

6. Total destruction of cellular protoplasm within the hydrated growing tissue of plants which have prematurely initiated spring growth. The grass may survive the winter in excellent condition. Subsequently, the weather may turn extremely warm for three or four days, resulting in a premature loss of hardiness due to an increase in hydration within the plant. If this is followed immediately by a severe drop to below-freezing temperatures, direct low temperature injury may occur. The chance of this type injury occurring can be reduced by avoiding any practices which encourage premature early spring growth.

7. The mechanical injury of the lower crown tissue and root. The original cause of injury is destruction of the cellular protoplasm in the lower crown tissue due to ice crystal formation. This in turn results in death of the root system and lower crown while the above-ground leaves and shoots appear normal. Cross-sections of the grass crown show a browning of the lower crown and roots. With the advent of spring thaws the grass plant will appear on the surface to be normal. However, warmer temperatures will result in growth and transpiration of the above ground tissue. Plants with severely injured crowns may not be capable of producing a new root system fast enough to meet the water uptake requirements of transpiration. Under these conditions the plant will die of desiccation resulting from the severe crown injury.

Progress Report of Findings

In the fall of 1962 studies were initiated to determine the actual cause or causes of winterkill. Three species were utilized in the experiment: Common Kentucky bluegrass, Toronto creeping bentgrass, and *Poa annua*. All vegetative materials were allowed to harden naturally in the field. On November 26, 1962 (soil temperature 34°F.) four-inch plugs were taken for use in the experiment. The following treatments were applied: (1) flooding then freezing, (2) freezing, then applying thin ice layers, (3) freezing, then applying a snow layer followed by an ice layer, (4) placing in a sealed container and freezing, (5) balk pressure freezing, (6) no treatment, and (7) submerging in water at 35°F. All treatments were held at 25°F. except for number 7. At fifteen-day intervals, replicated samples from each variety and treatment were removed from the low temperature chamber, thawed, and placed in a 70° growth chamber.

The total length of the experiment was ninety days. Observations made included percent top survival, moisture content of leaves, microscopic

crown examination, and top yield. Results of this study showed that during the 90-day period, winter injury by oxygen suffocation, toxic accumulations, cellular leaching, or outward water diffusion in ice were of no significant importance. No injury occurred in bentgrass, while a small degree of injury was observed in Kentucky bluegrass. Annual bluegrass was intermediate between the two. These results cast doubt on the importance of suffocation, toxic accumulations, or leaching in the winter injury of these three grasses when associated with ice covers. None of these treatments produced symptoms of lower crown injury of the type which was observed in the spring of 1962 in the Detroit area.

Evaluating Injury in the Field

The conditions under which each of these six types of injury occur are quite different. The turf specialist must be capable of recognizing both the type of winter injury and the causal conditions. This involves observations of types of ice and snow cover; duration of coverage; time of occurrence, degree, and duration of low temperature; occurrence of water incasement in ice; and physiological condition of the grass plant at the time of low temperature occurrence.

Samples of grass should be taken at key times in the winter and placed under higher growing temperatures to observe if injury has occurred. Cross-sections of the grass crown can be taken with a knife to check for lower crown injury which will typically appear as a browning of the lower crown and root. By this means, the turfman can ascertain if and when winterkill has occurred.

In time, the turfman will become experienced with the conditions under which injury occurs, as well as in what locations injury is most likely. With this knowledge proper precautionary measures can be taken. Hasty evaluations regarding winterkill causes based on superficial information can lead to erronous conclusions. On-the-spot, detailed observations are needed to arrive at the correct causal factors.

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"Instant Scoreboard"

By **W. H. BENGEYFIELD,** Western Director, Green Section of the United States Golf Association

"I've got ten men on this golf course: one called in sick this morning, another didn't show up at all and the night irrigator just quit. Now this happens!"

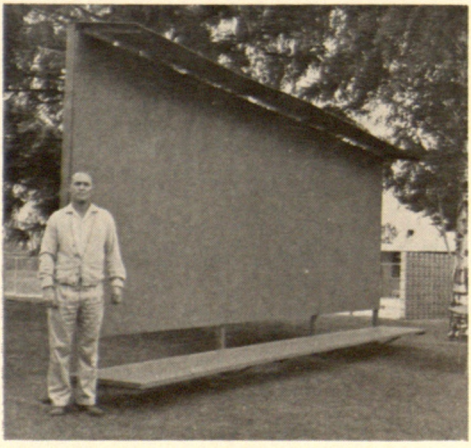
These were the first sputtering words of the superintendent. On the other end of the conversation was the club manager—merely relaying a message: "It seems the Tournament Chairman just called and requests installation of the big scoreboard for tomorrow's tournament."—And so, that entire afternoon, five men from the already depleted crew labored to put the scoreboard in place. Their normal duties went unattended.

Now this may never happen to you; but don't count on it. "Putting up the scoreboard" is one of those traditional tasks most superintendents must face three or four times a year. It usually comes on suddenly and unexpectedly. You can count on it taking time, manpower, and money.

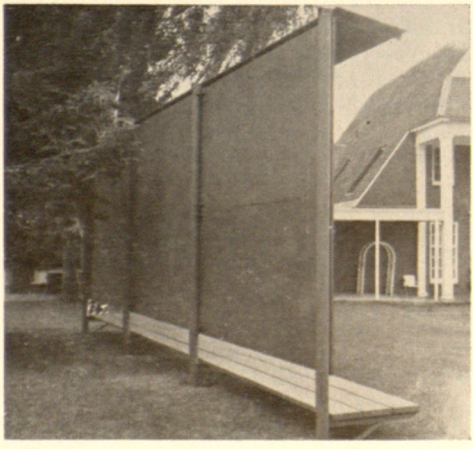
Clifford Everhart of Manito Golf and Country Club, Spokane, Wash., has an answer. With two men and two hours, Cliff can install an 8′ x 24′ board complete with walkway and roof cover! That's about as close as anyone will ever get to an "Instant Scoreboard."

Prefabrication is, of course, the answer, but Cliff's is deluxe prefabrication. First, four "sleeves" are cemented in the ground on exactly eight-foot centers. Each sleeve is three feet long and of 3½-inch pipe (threaded on one end). A 3½-inch pipe coupling is placed on the threaded end. When the scoreboard is not in place, a 3½-inch pipe plug is used as a cap for each sleeve. Sleeves must be plumb and on the same grade or elevation if you are to have a square scoreboard.

The four uprights or posts for the scoreboard are made of 3-inch pipe and each is 12 feet long. Welded to each upright is a brace for the walkway. This is composed of two pieces of angle iron 1/8th-inch x 2-inch x 2-inch. The first piece of angle iron is 30 inches long and welded perpendicular to the upright exactly 3 feet from its base. The second angle iron is welded exactly 2 feet from the base and angled to join the perpendicular one. Thus the walkway brace is formed. The upright will slide easily into the cemented ground sleeve until the angled walkway brace fits tightly against the top of the sleeve.

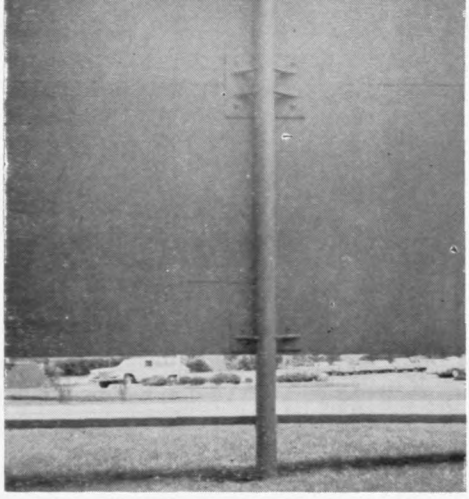


Cliff Everhart and his scoreboard.



A rear view of the board.

The board is mounted upright in this sleeve.

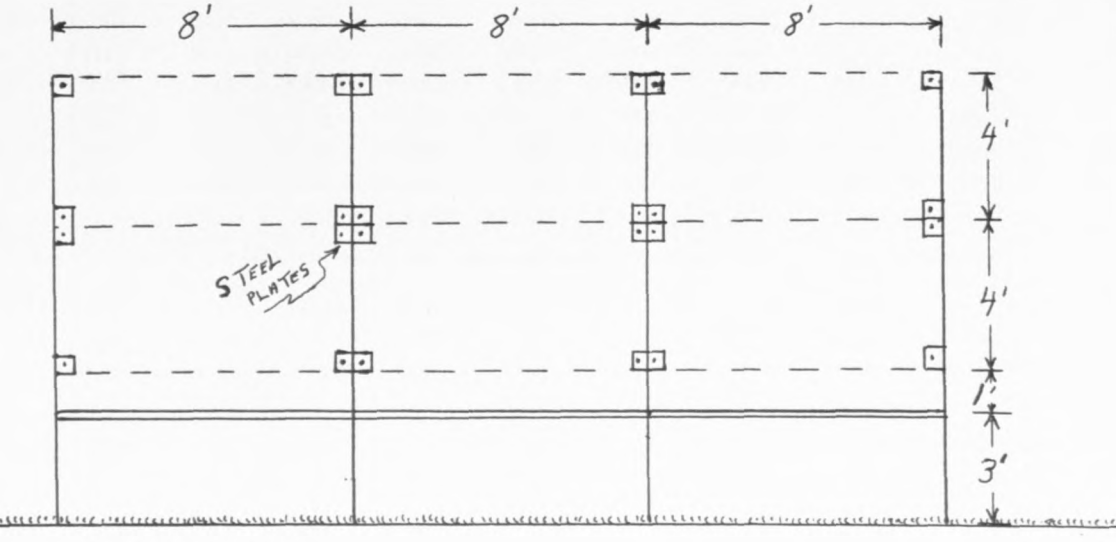


Backside of scoreboard showing post and steel plates holding weatherproof plywood.

The two center uprights or posts of the scoreboard need a slight modification for the walkway brace. Here, each brace should be made of two pieces of angle iron welded together—back to back—making a "T". The walkway boards (2-inch x 10-inch x 8-feet planking) butt together and are bolted to the "T".

Also welded to the "front" of each upright are 1/4-inch x 6-inch x 12-inch steel plates. These are used as a facing and point of attachment for securing the plywood itself to the frame work (see diagram). The plywood used is 3/4-inch all weather material. Six plywood panels (3/4-inch x 4-feet x 8-feet) are needed for the scoreboard. The roof or canopy plywood can be 1/4-inch and attached to suitable angle iron braces.

Mr. Everhart reports the entire cost of materials for his project was less than $300.00. Used pipe is just as satisfactory as new pipe and considerably less expensive. He recommends the project as a good one for rainy day work. Furthermore, we think it represents a professional approach in solving a chronic golf course management problem.



Golf Course Mainte

Compiled by **CHARLES H. FATU**
Hampshire Country C

In 1962 a survey was initiated because of the lack of available, accurate data on golf course maintenance costs, particularly in Westchester County, N. Y. In this survey, variables of any nature were eliminated if possible in an effort to achieve the greatest accuracy. Superintendents' salaries, new equipment, construction and improvements, trees, shrubs, and flowers, and clubhouse area maintenance costs are categories which vary from year to year and from club to club. Therefore, these items were not included in the Maintenance Cost section. These categories, with the exception of Superintendents' salaries, were included in the survey, however, because this information is desirable.

All the categories, with the exception of irrigation and electricity, have been totaled and an average cost for each item is listed to the right of Col-

1962 Golf Course Maintenance Cost S

CLUB:	A	B	C	D	E	F	G	H
Labor Cost	$31056	$47000	$37489	$26044	$29000	$36000	$36647	$33601
Supplies	2365	5000	1821	1438	800	2000	500	1202
Repairs & Parts	3403	—	4090	3341	1900	3500	375	3901
Gas, Oil, Grease	1350	1500	1416	819	1700	1400	824	1479
Irrigation	2628	1150	2461	—	4800	540	—	7143
Chemicals	1590	2500	2787	1500	1900	4000	1378	1976
Fertilizer, Lime	2200	5100	2101	3000	5600	5400	3930	2188
Soil, Topdressing	1226	600	518	1200	400	1000	400	707
Seed	1576	600	985	800	800	1500	216	372
Sand For Traps	1900	—	671	1545	800	450	245	486
Electricity	54	—	661	2108	—	1500	—	1265
Total	$49348	$63450	$55000	$41795	$47700	$57290	$44515	$54320
New Equipment	10035	7400	4841	2236	5600	4000	2259	5772
Construction	3000	—	11820	7251	—	2000	—	—
Trees, Shrubs	1000	2100	2998	1250	1000	2500	250	1000
Club Grounds	2300	1500	2923	4354	—	2000	—	6759
Total	$16335	$11000	$22582	$15091	$ 6600	$10500	$ 2509	$13531
Club Acreage	110	170	370	135	420	120	117	170

enance Cost Survey

ATUM, JR., Golf Course Superintendent,
y Club, Mamaroneck, N. Y.

umn Q in the chart. An average for irrigation and electricity costs could not be made fairly because some clubs have their own water supply or their electricity is recorded on one common club meter.

This survey is based on a private course of 18 holes with all except Ridgeway Country Club having watered fairways. Winged Foot Golf Club Sleepy Hollow Country Club, and Old Oaks Country Club have more than 18 holes but their costs have been interpolated to that of a regulation 18 hole course.

Fifteen of the 16 participating clubs have unionized workers. The union wages for a greensman were $1.71 per hour prior to June 1, 1962 and $1.86 per hour after June 1, 1962. Club acreage is listed at the bottom of the chart and shows great variation.

Survey for Westchester County, N. Y.

	J	K	L	M	N	O	P	Q	Average
01	$39404	$43005	$32964	$38490	$41000	$35709	$45000	$35000	$36714
02	1821	200	—	5030	3842	775	350	500	1843
01	2189	3000	5419	933	4000	2805	1600	2500	2864
79	1672	2500	1318	1339	2555	1725	2000	2200	1612
43	2540	7546	5221	3850	120	1200	4000	—	—
76	1340	1000	1869	1800	2673	2484	2000	3200	2125
88	3554	4000	2874	3700	3782	3048	5000	5800	3830
07	1072	800	716	500	900	1750	1000		853
72	950	500	1468	800	600	500	1500	1600	923
86	830	500	464	550	600	507	400	585	702
75	462	1275	466	—	1726	—	—	—	—
0	$55834	$64326	$52779	$56992	$61798	$50503	$62850	$51385	$51466
72	7277	4000	8519	5900	3700	3649	2000	9243	5402
—	3282	—	5626	—	—	10749	2000	23000	7636
00	600	—	139	3000	2700	3600	2500	2300	1796
59	5154	1720	—	3000	5200	3640	5000	4000	3657
31	$16313	$ 5720	$14284	$11900	$11600	$21638	$11500	$38543	$18491
70	135	165	120	150	270	120	176	150	—

A Double Victory Over Winter-Spring Injury

By **A. M. RADKO,** Eastern Director, Green Section of the United States Golf Association

There was a time when the arrival of winter signalled relief from further worry about the condition of the golf course until spring of the following year, but things change constantly and the golf course is no exception. In the dynamic field of turfgrass management, static perfection is not possible and turf managers now fear winter-spring problems as much or more than summer problems. In the northernmost areas, superintendents are becoming more apprehensive about winter injury because of its suddenness, its finality, and the lack of any sure-fire defense against weather-wrought injury.

The winter-spring season of 1963 was one that scared the wits out of many a seasoned superintendent. None have really gotten over it yet; in fact, most will be working for several years to recoup the permanent turfgrass losses of the past winter season. Most courses have been seriously afflicted with permanent turf loss, serious weed invasion, disease, insect, and wilt problems as a result of uncooperative weather. The article on winter-spring injury which appeared in the July issue of the *USGA GREEN SECTION RECORD* detailed observations and findings of the staff members of the Eastern Region Green Section Office.

This article deals mainly with the program initiated by two outstanding superintendents entertaining major tournaments who found themselves faced with heartbreaking turf restoration problems. Superintendent Doug Rankin of the Westchester Country Club, Rye, N. Y., had the Thunderbird Classic to contend with, and Superintendent John Kealty of The Country Club, Brookline, Mass., was preparing for the USGA Open Championship. Each course was in superb condition as the '62 season closed. When the ice disappeared in 1963 not a green was left totally unaffected and several appeared to be dead. The top picture on the front cover shows the extent of injury to the approach and green area on No. 1 hole at The Country Club. The bottom one was taken on the final day of practice for Open Championship competitors, and shows the almost unbelievable progress made in seven weeks against the worst spring weather odds ever encountered in the Northeastern Region. There was no artificial coloring or dye on this green at the time this photo was taken. Some greens were dyed later that evening to erase marks of vandalism and to reduce the sharp contrast in greens on newly seeded areas.

Weather conditions were extremely unfavorable. Snow fell in upper Massachusetts during the first week of May; USGA Green Section staff members wore winter overcoats during each early May visit ... the weather hovered around the freezing point ... high winds blew incessantly, and a record-breaking drought was begun. If we could have listed all the factors that we felt most seriously hamper recovery, the three mentioned would have headed the list. Everyone who saw either course first in spring and again in June agreed that a miraculous recovery was made. Mr. Rankin and Mr. Kealty accomplished nearly impossible tasks against staggering odds. Although we of the Green Section staff were in close contact with each superintendent at all times, we constantly heard rumors that each course had embarked upon a complete re-sodding program for all

greens. TO SET THE RECORD STRAIGHT, NOT ONE SQUARE FOOT OF SOD WAS LAID ON EITHER COURSE PRIOR TO THE CHAMPIONSHIP DATE.

The successful formula used in each case was as follows:

All greens were topdressed with sterilized soil at the rate of approximately 1½ cubic yards per 5,000 square feet. Organic nitrogen fertilizers were applied, too. Each of these treatments was designed to attract warmth to greens from the sun in the hope of promoting a more desirable climatic soil environment for grass growth. Our observation this year was that the topdressing soil seemed to be more beneficial than the organic nitrogen for early growth; the spring was too cold for nitrogen breakdown. Later the organic nitrogen helped.

Then every type of cultivation tool available for greens (without plowing them under) was used to establish a seed bed in the seemingly dead turf. The plan was to introduce new seed while attempting to encourage as much recovery of the old injured turf as was possible. Aeration tools, spikers, and vertical mowers were brought into action at both courses, and additionally Mr. Kealty used a thatching machine. After greens were worked over with each of the tools mentioned, and doing as thorough a job as was permissible without tearing the turf out entirely, greens were seeded to a mixture of Seaside bent and redtop (equal parts). Aeration tools were used one to three times over the greens area depending on the type of machine used. Spikers made four to six passes over each green prior to seeding. Each time a pass was made over the green with any cultivating tool, the direction of travel was different from the last. After each such operation, the green almost looked as though it had been plowed.

Greens then received 3 pounds of superphosphate (0-20-0) per 1,000 square feet, a nutrient element which encourages rooting of seedling plants. They were then fertilized with a "complete" fertilizer and topdressed with soil several times thereafter in the attempt to promote and sustain life during the desperate but delicate battle for survival - when every little seedling plant that survived added immensely to the hope and prospect for good turf cover.

Greens were then syringed four to five times daily, including week ends. Unfortunately grass knows no holidays, and so can wilt and die just as fast on Saturday or Sunday as on any weekday. Capriciously, Mother Nature seemed determined to retard progress and did not take any holidays herself.

Every ten to fourteen days, greens were spiked or thatched and reseeded. In using the thatching machine, Mr. Kealty's technique was to set it shallow (½ inch or so) so that the discs merely slit through the thatched turf. Using this technique, the weak sod was not uprooted, and enough soil was exposed so that seed was able to make good contact with the soil. The use of any cultivation equipment when turf is weak and roots are shallow is a very touchy operation. If set too deep at such times, the turf is uprooted and the surface is marred almost beyond repair. It then becomes an additional problem to piece uprooted clods of the turf together like a jig-saw puzzle.

After the seedling grasses emerged, there was the barest minimum time left to encourage some growth. Still the weather through early June was most uncooperative and soils remained cold, and the only chance remaining was to apply minute quantities of soluble fertilizer in solution so that grasses would absorb nutrients through the leaves and make some top growth. Soils were too cold to have the roots take up nutrients as quickly and efficiently as they would in a normal May-June period. Yet there was some apprehension as seedling plants were extremely young and tender, and it was feared that even the slightest excess of nutrients applied might burn the turf or possibly incite "damping off".

The rates of liquid feeding on normal healthy turf must never exceed the rate

of ¼ lb. nitrogen per 1,000 sq. ft. The rate of application decided upon for the seedling grasses was 1/16 lb. nitrogen per 1,000 sq. ft., which is somewhat comparable to "eye-dropper" feeding. Two applications were applied at weekly intervals just prior to each tournament. The turf seemed to respond just in time for each contest.

During visits to the many courses affected by winter-spring injury, the question was often asked, "How about sodding greens?" Most turf specialists do not object seriously to the sodding of greens; in fact, some of them encourage it because replacing the brown turf with some green turf makes sense to them. However, the Green Section's Northeastern staff members have always opposed sodding except as a last resort, because it usually takes the remainder of the season to bring sodded greens around to be fairly good putting surfaces. It is extremely difficult to sod smoothly and to keep sod level and true in cupping areas when heavy play is immediately imposed. We have known it to be successfully done, but this has been the exception, not the rule.

Not one square foot of sod was used at Westchester Country Club or at The Country Club, and each was as severely injured as any we had inspected. In fact, as fate would have it, they were more seriously injured than most clubs visited, when it meant so much to them to come out of the winter relatively trouble-free. Going into the winter, each course was in superb condition, and a normal winter-spring season would have kept the turf in superb condition. Until we can do something about weather, winter-spring injury is one of the more serious hazards we face in the management of golf turf in the Northern areas.

Eighteen Alternate Greens

By **A. M. RADKO**, Eastern Director, Green Section of the United States Golf Association

The increased use of the golf course makes maintenance more difficult, costly, and time-consuming. Since labor is the major budget item, idle time is costly time lost. Maintaining a course "in between foursomes" not only adds to the total cost but also reflects in over-all maintenance. Required work on greens is the most time-consuming and costly item. Greens require more care than other parts of the course. More interruption to work takes place on greens also because this is the focal point of all play on each hole as half the game of par golf is played on greens. When golfers tee off from early morn and play until sunset, required major tasks are often deferred or left undone. Maintenance then becomes geared to play, and not to the best interests of turf itself.

The Belle Haven Country Club in Arlington, Va., was faced with this very problem—more and more play, and less and less time to maintain, let alone do anything to improve the turf. At that time, Jack Wilson, Chairman of the Green Committee; George Campbell, Superintendent, and John Howard, Club President, got together to see if they could do anything about it. Their decision was to build small greens in close proximity to every one of the regular greens on the course.

The small greens measure 300 to 400 sq. ft. in size so they are not a real costly item to manage. (See Photo 1) They are mowed and treated like the regular greens, except for irrigation. They are watered infrequently but deeply, as most would like to water regular greens.

Each alternate green is only slightly elevated. Mr. Campbell used only one load of topsoil to build them. He graded each so as to provide surface drainage and they contain no contours. Each green is level or as nearly so as possible except for a slight pitch to the front. The alternate greens are used for

Photo 1. George Campbell stands on alternate No. 11 green. It is seven clubs wide and approximately the same length.

Photo 2. The regular No. 11 green is in the foreground while Mr. Campbell stands on the alternate; note the relative sizes.

winter play, or when regular greens are closed because of inclement weather (thundershowers or thawing of the soil or overly wet soil or frozen turf, etc.), or when regular greens are being aerated, topdressed, seeded or undergoing some other major treatment. Mr. Campbell normally aerates three regular greens in one day and so he will take these three out of play and place the pin on the alternate greens. Everyone plays them so the course will be the same test for all, 15 regular and 3 alternate greens. The regular and the alternate greens for the eleventh hole are shown in Photo 2, indicating their relative sizes. These alternate greens provide excellent putting surfaces and members don't complain, possibly because they can try their putting skill as they do on regular greens.

Public Course Interest

Heavily played county municipal courses also have been experimenting with the alternate green system. Superintendent Ken Morrison and Superintendent Ed Brittain of the Union County courses, and Jerry DeRosa and Superintendent Harold Loescher of the Passaic County Course in New Jersey are experimenting with a few alternate greens. Because of extremely heavy play during the entire year, it appears that the alternate green system has considerable merit for them. They, however, build their alternates closer to 1,500 sq. ft. due to the extremely heavy play on their courses. If accepted by their players, they hope to provide a few more each year until there is one regular and one alternate green for each hole.

COMING EVENTS

September 25-27
Northwest Turfgrass Conference
Thunderbird Motel
Portland, Oregon

September 30-October 1
Annual Rocky Mountain Regional Turfgrass Conference
Colorado State University Campus
Fort Collins, Colorado

October 16-18
Central Plains Turfgrass Conference
Kansas State University
Manhattan, Kansas

November 18-22
American Society of Agronomy
Annual Meeting
Denver, Colorado

December 2-4
Oklahoma Turfgrass Conference
Oklahoma State University
Stillwater, Oklahoma

December 9-11
Turfgrass Conference
Texas A&M University
College Station, Texas

Experience with Maleic Hydrazide

By **JIMMY DUDLEY**, Athens, Ga.; Member USGA Green Section Committee

Maleic hydrazide (MH-30) has shown much promise as a growth retardant. It effectively reduces the competition offered by bermudagrass when the turf is sprayed one week before overseeding with cool season grasses. Reduction of the *Poa annua* population has been noticed in association with certain seeding dates.

Procedures followed at the Athens Country Club:

1. Aerate and vertical mow 3 to 4 weeks before you plan to overseed.

2. Allow the grass to recover to normal putting condition and spray with 1/2 to 3/4 ounce actual material per 1000 square feet in a minimum of 2 gallons of water per 1000 square feet. It would be best to spray in the morning while it is still cool. The following morning, the amount of clippings will be reduced greatly and about the third morning, you should receive very little, if any, clippings.

3. Drench the greens with fungicide.

4. Overseed the greens and work the seed thoroughly into the bermudagrass turf.

5. Topdress lightly.

6. Continue with normal practice for getting your overseeding established, such as keeping the seed moistened so sprouting takes place faster. This may call for 4 to 5 syringings and weekly use of fungicides to prevent loss of seedlings from damping off diseases. Also, the use of phosphate and potash before overseeding will aid the small seedlings.

Toxicity has been experienced if the overseeding follows the spraying date too closely. The Athens Country Club has always practiced overseeding a week after spraying and has not experienced a loss of seedlings. It would be advisable that anyone planning to use this method try a small area or one or two greens a year before spraying all greens.

The greens will become fast after spraying, but as soon as the overseeded grasses begin to grow the putting surface becomes slower. The bermuda is not very active for 3 to 4 weeks, which gives sufficient time for the cool season grasses to become established. Even distribution of the chemical is very necessary, and if you do not have this a portion of the bermuda will grow and could crowd out the overseeding. Overdoses may cause loss of grass.

This past year, the winter greens were the best the Athens Country Club has had. The question has been raised whether MH-30 was a factor in our winterkill. The following facts are established for consideration:

1. Winterkill was general throughout the south as observed by Green Section personnel, regardless of the use of MH-30.

2. Our winterkill was serious on only 4 greens. All of these have less than 4,000 square feet. Traffic was the heaviest for winter play on record.

3. No loss was observed on collars and fringes which were sprayed at the same rate as the putting surface. It is felt this was influenced by height of cut and traffic.

The plans are to use MH-30 before overseeding on September 25, 1963.

CHEESMAN JOINS STAFF

Jerry H. Cheesman will join the USGA Green Section staff at College Station, Texas, on October 1. Mr. Cheesman holds a B.S. Degree from Colorado State University and is completing his M.S. studies at Iowa State University. He has been the recipient of scholarships provided by the Golf Course Superintendents Association of America.

Turf Lost in Upper South

By **JAMES B. MONCRIEF**, Southeastern Agronomist, Green Section of the United States Golf Association

The year of 1962-63 will long be remembered in the Upper South. There has been more bermuda lost in this area during the last year than at any one time during the past 50 years, according to the old-timers.

The Upper South is an area where many courses have bent and bermuda. Trouble may often be expected with either one on the greens. You can have trouble in the summer with bent and a miserable transition period with bermuda in the spring. The area surrounds and lies north of Birmingham, Ala., Atlanta, Ga., Greenville, S.C., and Charlotte, N.C.

Most bermuda greens were handled in the same order, that is by aerating, vertical mowing, and overseeding. In many cases, the bermuda made a partial recovery from the severe removal of thatch before the early deep freeze of -3°F in Atlanta.

The ryegrass in most cases was lost at this time, but those courses that had good stands of *Poa trivialis*, Pennlawn fescue and bent rye came through the overseeding very well. In exceptional cases, ryegrass survived.

In March, there was a suspicion of the loss of bermuda by many superintendents. In April, there was no doubt. The black, limp rhizomes and stems and soft nodes were the key symptoms of dead bermuda.

Greens that slope to the south and southeast in most cases made faster recovery than greens sloped north. In some cases, regardless of the slope, the bermuda was lost. One of the most noticeable effects on greens is the traffic pattern. The areas where the pin settings have been used most often are invariably the areas where bermuda was lost. Also, where trees partially shade the greens, bermuda was lost or was very slow in making re-growth. If there was appreciable traffic on the shady areas, the bermuda was dead. This was one winter where large greens with plenty of cupping space paid off. The scattering of the traffic and good drainage were key factors.

Aerators and disk spikers have been valuable equipment. The aerators aided the deeper rhizomes and underground stems to come through faster while the disk spiker helped the shallow rhizomes and stems.

TURF MANAGEMENT COURSE

A cooperative agreement has recently been worked out between the Southern California Golf Course Superintendents Association, the Public Links Golf Association of Southern California, The Southern California Golf Association, and Mt. San Antonio College to train course superintendents.

This will be a two-year program. Students who qualify will be placed on various golf courses during the summer as trainees. Summer employment will be primarily for experience but will be paid work.

At the successful conclusion of the program students who qualify will be placed on courses as assistant superintendent trainees until such time as they find regular employment or are terminated for some reason.

The program will go into effect in the fall of 1964 but students may start taking courses in preparation for the program.

Interested students should contact: G.A. Sherman, Dean of Agriculture, Mt. San Antonio College, 1100 North Grand Avenue, Walnut, California.

USGA GREEN SECTION RECORD
40 East 38th Street, New York 16, N. Y

TURF TWISTERS

Question: What is your recommendation for a mowing height on bermudagrass fairways?

Answer: We believe that bermudagrass should be cut short. One-half to three-fourths inch is desirable.

There are circumstances which might cause this recommendation to be changed. Rough ground underlying fairway turf may cause scalping. Thus the mower may have to be raised to get away from this condition.

It is also true that close mowing and frequent mowing go together. If you find it impossible to mow as much as three times a week, then it may be necessary to mow a little higher. You may also have to alter irrigation and fertilization practices so that not too great a proportion of the turf's leaf surface is removed at one time.

Question: Our Conference Planning Committee would like to have an agronomist from the USGA Green Section discuss putting green maintenance. Do you also have a Fairway Section from which we could get a man to talk about fairway maintenance?

Answer: Our Green Section agronomists will be capable of discussing both subjects. The Green Section of the United States Golf Association is concerned with the entire golf course. The name comes from the fact that the entire playing area of the golf course is "the green." According to Definition 34 in THE RULES OF GOLF, "through the green" is the whole area of the course except: a. Teeing ground and putting green of the hole being played; b. All hazards on the course.

Question: We have not been able to control sod webworms with chlordane. It was applied at the rate of 5 pounds per acre and watered in. Are the webworms becoming resistant?

Answer: It is possible that the sod webworms are becoming resistant to chlordane. However, it is much more likely that they escaped its effect because of their habits and your method of application.

Webworms live in tunnels constructed of a silk-like material and it is almost impossible to get insecticide materials in contact with the worm while he is in his burrow. He comes up at night, however, and feeds on the surface of the turf. We have found that worms can be controlled quite effectively by a light application of insecticide in late afternoon, provided the material is left on the foliage overnight. Because of his feeding habits, he comes in contact with the insecticide and if he feeds, he may ingest some of it.

When insecticides are used in this way, very light rates are effective. One pound per acre of chlordane, or like amounts of toxaphene, dieldrin, malathion, aldrin, heptachlor, or other similar material is sufficient.