Winter-Spring Injury in the East

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To everyone but those on the Eastern Coast, July may seem an inappropriate time to discuss winter-spring injury. Never has weather in the East wrought so much damage to the fine turfgrasses as was done this year. Golf courses were especially hard hit. The effects will certainly be felt through the 1963 season, and this summer may prove to be one of our most trying seasons in golf course management. Again, much will depend on weather.

What caused this severity of damage? To explain it fully, it is necessary to describe the weather we have had. Veteran superintendents, to a man, agree that the '62-'63 winter season for turf was the most severe ever.

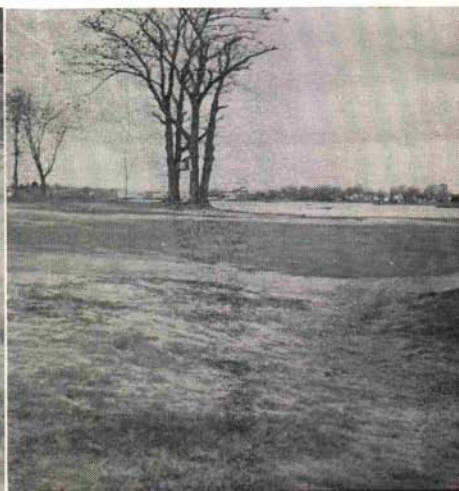
Cold was accompanied by freezing rains which seemed to fall every few days. One freeze compounded the next, and so a total of 9 to 12 inches of solid ice accumulated on **closely** mowed turf. In rough areas, where turf was higher, there seemed to be enough air cushion to keep the ice from adhering strongly to the turf and so it never seemed to bother these areas.

On greens and tees, however, ice was so thick, and remained so long, that superintendents and their crews could do little to encourage quick removal. (See Photos 1 and 2) They could only attempt to break through the ice in several places to allow air to get through to the base so that it would be easier to remove the ice at a later date. Picks, axes, crow-bars, 'dozers, and shovels were used to little avail. The ice would not be forced until it was ready to come off. It adhered to the turf so strongly that large pieces of grass were torn up when attempts were made to force the ice off the green.

Where did the ice form thickest and remain longest? Successive rains froze immediately upon reaching the ground, and the **normal surface drainage channels and swales** became most heavily covered with ice. It remained longest on these low areas, actually until the spring thaw. The high

Photo 1. The No. 5 green at Kernwood Country Club, Salem, Mass., under solid ice. Note thickness to right of shovel and pick. Les Allen photo

Photo 2. The same green at Kernwood after the ice melted. Note injury pattern in foreground — the area of natural surface drainage.



mounded and contoured areas on greens thawed more quickly, but it was not until the second and third weeks of March that most superintendents were able to remove the ice from the low drainage paths.

Finally, during the last week of March, we experienced two days of 80-degree weather and the ice disappeared entirely. It appeared at the time that all was well. The turf under the more heavily iced areas was a vivid green, while the high areas were not of as good color. The high areas were exposed to the elements earlier and so were hardened-off to take that "off-green" color which most cool-season grasses have as they emerge from the winter.

Weather Change is Deadly

Then the roof fell in! After two days of summer-like temperatures, weather once more turned very cold, the winds blew incessantly, and extreme drought set in. The grasses that were under ice longest and were a vivid green-soft and succulent—collapsed.

The effect was deadly. It was just like taking a plant out of a hot-house and placing it in freezing temperatures. Toxic gases such as methane and carbon dioxide may have been a contributing factor. In the pattern on surface drainage, entire areas of turf turned brown or black, took on a slimy appearance, and horrendous odors were reported. The hardened-off high areas were not affected.

Men who attempted to turn on irrigation systems found that numerous breaks occurred due to the deep freeze, far more than in even the most severe prior year. One club reported in excess of 60 breaks in its system. (See Photo 3). Others reported fewer, but enough to keep them from using the water system when it was critically needed, especially in the renovation attempts that followed.

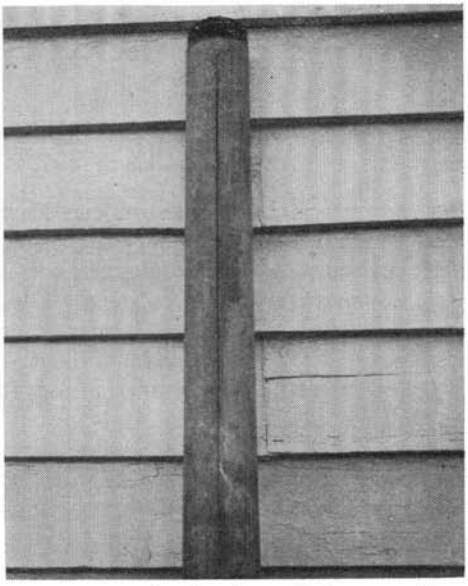


Photo 3. Water line break — split in center. Many such breaks were reported — split at the bottom —due to deep freeze.

Injury was so widespread that the USGA Green Section's Eastern Office issued the following statement in early April to USGA Member Clubs in the area affected:

MEMORANDUM TO: Chairmen, Green Committees and Superintendents of USGA Member Clubs:

A large amount of winter injury is prevalent on golf courses throughout the Northeastern Region. This has been due to several factors but mostly due to ice accumulation on greens, frozen soil especially in low portions of greens, also some desiccation. The lateness of the spring growing season, the high winds, the lack of warmth and rainfall have further hampered recovery of injured turf. We are at least two weeks behind in growing weather, and unfortunately so, because the turf is extremely weak and play on weak turf will retard recovery.

We have inspected numerous courses throughout the region and the pattern is the same . . . the turf is brown or hay colored . . . and looks absolutely dead . . . yet close inspection of injured areas shows that root systems are alive and growing points of the grasses are green. It will

take time, patience, some better weather, and programming but we feel that chances for recovery will be good.

Steps that should prove helpful in the recovery program:

(1) Apply any organic nitrogen or topdressing to attract the heat of the sun's rays . . . one to one and one-half pounds of nitrogen equivalent per 1000 sq. ft. depending on products you choose, or one cubic yard of topdressing, or both for an average green.

(2) Aerate the greens when roots are strong enough to keep the sod from lifting.

(3) Spike the greens several times over and overseed the browned-off areas.

(4) Syringe the greens lightly if high winds and/or low humidity should be a factor. In any case, attempt to keep adequate moisture on the turf and in the soil without overdoing it. Remember that the surface temperature of injured turf will be higher than that of healthy growing turf and it will dry faster; therefore, several syringings may be required daily.

(5) Keep play on injured greens to a minimum, and provide temporary greens for those severely injured. This may be necessary for two to three weeks.

We trust that this will be helpful . . . if we can be of further help, please write.

Sodding, of course, is a method of reestablishing greens quickly. However, in many cases there was not enough nursery sod available. Moreover, it is quite difficult to do a patching job on a putting green in spring and have it turn out well. While this note pointed primarily to greens, tees and fairways also suffered greatly. Many tees were lost completely, and large patches of fairway turf also died in low areas and depressions where ice layers formed strongest.

The effect on hillsides and slopes was very similar to that damage which occurs where youngsters coast and sleigh ride over turf where the snow packs to form ice sheets. The turf beneath turns brown, and normally is the last area to green up in the spring. This year the ice on all these areas packed similarly and the "hot-house" effect mentioned earlier was disastrous. (See Photos 4 and 5). High areas, where ice melted earlier and the grasses had a chance to acclimate themselves to the cold, came through without any trouble.

New turf was not injured. New courses and newly sodded areas on old courses where soil was prepared or

Photo 4. No. 17 hole at Wellesley Country Club, Wellesley, Mass. — note severe injury on sloped fairway where ice remained longest. This was typical of injury pattern.

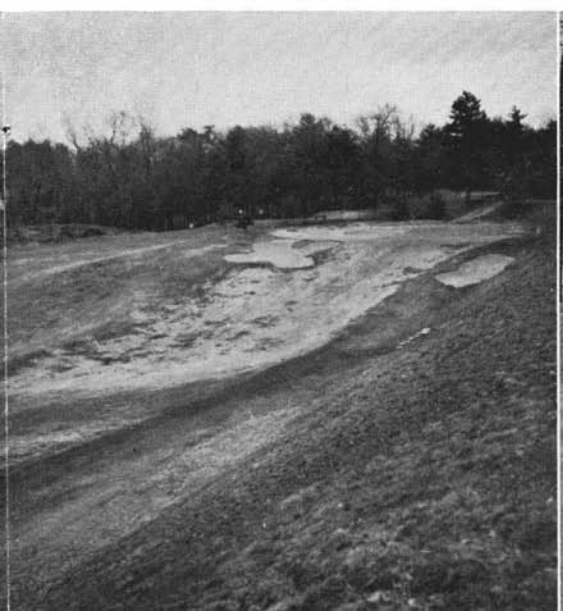


Photo 5. Not all greens were injured in areas of drainage. Supt. Nick Florio, center, makes point at Somerset Hills Country Club, Bernardsville, N. J., with Holman Griffin, USGA Green Section Agronomist, left, and Chairman of Green Committee John Winston on No. 11 green.

altered prior to grass establishment came through with flying colors. It certainly appears that well aerated soils were a prime factor in survival.

Of those inspected, courses 6 years old or younger didn't show any ill effects. (See Photo 6). Some chairmen and superintendents on older courses attributed their lack of trouble to timely ice removal in the spring and/or timely aeration or cultivation in the fall.

In the low areas all turf was injured badly. Bentgrass was hurt in varying degrees, but *Poa annua* was killed out completely. (See Photo 7). Attempts to renovate were seriously hampered by high winds, lack of rainfall and lack of warm weather. Those who were most drastic in aeration, thatching, spiking, and in using vertical mowers prior to seeding were more sucessful than those who tried to coax and baby the turf along. The weather was so dry, cold, and windy that even *Poa annua* didn't volunteer as it normally does in spring. Recovery was so slow that many clubs, for the first time in their history, closed regular greens.

Officials at The Country Club, Brookline, Mass., site of the 1963 Open Championship, chose to close their course until the first week of June because of the severe setback. They could have opened earlier but they elected to remain closed in order to provide the very best possible playing conditions for the Open Championship.

The pattern of injury also can be associated with heavy play. Heavily played municipal courses and private courses that have many guests were more seriously injured than others. Courses that do not allow winter play on regular greens fared better than those that do. It appeared to be the cumulative effects of traffic subtly taking its toll over the years on courses most seriously affected. Walk-off areas, where traffic is funnelled from green to tee, were seriously injured.

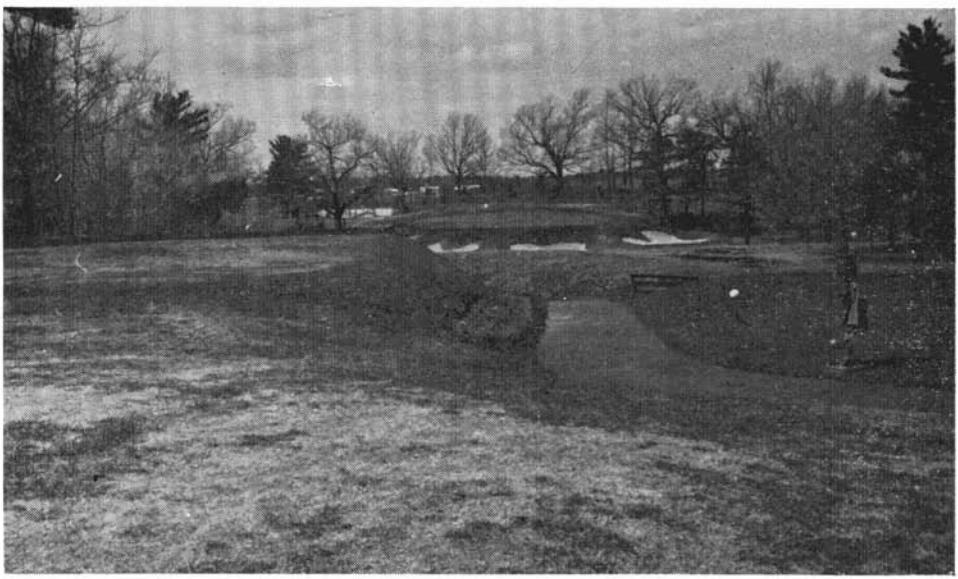


Photo 6. The 11th hole at Salem Country Club, Peabody, Mass. Note new tee to right came through unblemished . . old tee to left injured by winter.

Photo 7. Holman Griffin, USGA Green Section Agromist; Charles J. Wenzel and John O'Connor, Golf Course Superintendent of the Salem Country Club, Peabody, Mass., examine Poa annua apron that went out . . while bentgrass green came through without a blemish.

How much traffic does it take to kill turf in winter? Supt. Jack Ormond of Canoe Brook Country Club, Summit N.J., can tell you. Photo 8 shows the effects of one routine treatment to one of his greens. Though other greens had thawed, this tree-protected green was still frozen at the time. A small spreader was used to apply limestone in December 1962. The picture was taken May 1, 1963. Note the footprints and wheel marks five full months after the spreader was used! The turf was severely injured, and did not recover until some time in June. Other greens that were limed the same day came through unscathed.

The question is often asked, "How much harm can we do by playing greens in Winter?" This is very difficult to answer, but a year like this gives far more graphic answer than words. As shown in Photo 8 injury occurs when grass is frozen.

Photo 8. Spreader tracks and footprints show up on greens five months after being made on frozen grass.

A more subtle type of injury occurs when the ground is thawed to a depth of one inch or less and the pressure of foot traffic squeezes the soil and destroys its structure. The lubricating action of the moisture makes "mud pies" beneath the turf and the soil becomes severely compacted at the

surface. February and March are the months to watch most carefully for this injury. When the ground is frozen solidly or thawed beyond one inch, there seems to be no cause for alarm regarding severe soil compaction. However, one cannot be sure that conditions will not change during the course of one round - from frozen to thawed soil in the time it takes a fourball to play 18 holes.

From safe to hazardous conditions in a few hours . . . so how is it possible to answer firmly and definitely the question, "Is it safe to play regular greens today?" The decision to close the course must be flexible, and it must rest with the superintendent, the Green Chairman and his Committee; but their decision should be final.

There are several kinds of winter problems; injury usually is due to one or more of the following:

(1) Snow mold - a fungus disease. Not much snow mold was apparent this year. One can protect against this by treatment with fungicides. It normally is not a severe problem.

(2) Desiccation - a dehydration of the grasses caused by high, dry winds that remove water from the plant when ground is frozen and roots can't pick up enough water from the soil to replace the water lost through the leaves.

(3) Ice damage - a smothering or suffocation of the turf due to ice remaining on it too long.

(4) Excess water in upper soil fraction during thaw.

(5) The "hot-house" effect we seemed to experience this year.

(6) Toxic gases - methane and/or carbon dioxide.

(7) Over-succulence going into the winter months.

(8) Traffic when grasses are frozen - when soils are thawed in upper inch.

Frequently the question is asked, "Should I remove the ice from greens?" The answer is "Yes" if you are sure that subsequent weather is going to turn and stay warmer, and "No" if the weather is going to be cold, dry, and windy. If warm weather had continued as it started in late March this year, we would have had far fewer problems. Just a simple turn of the weather caused extreme problems of almost unbelievable proportions. The general geographic pattern for injury to cool-season grasses was from the northern Massachusetts border to central New York State to Wilmington, Del. Injury to warm-season grasses was reported as far south as Atlanta.

Bermudagrass injury during the winter and early spring was rather severe throughout the East this year. The cause often defies explanation. In Philadelphia much of the loss can be attributed to an unusually cool spring. Superintendents reported that bermuda came through the winter

COMING EVENTS

August 6 — U. S. Department of Agriculture, Field Day, Beltsville, Md.

August 7-8 — Rutgers Turfgrass Field Day, Rutgers University, New Brunswick, N. J.

August 27-29 — Turfgrass Management Conference, University of Florida, Gainesville, Fla.

September 4 — Annual Turf Field Day, Virginia Polytechnic Institute, Blacksburg, Va.

September 5-6 — Auburn Turfgrass Conference, Auburn University, Auburn, Ala.

September 11-12 — Penn State Field Day, University Park, Pa.

September 18-19 — Fourth Annual Lawn & Turf Conference, University of Missouri, Columbia, Mo.

alive, but because of the cool weather in March, April and May it was unable to produce any top growth.

The spring weather was warm enough on several occasions to break the root dormancy but there was no top growth to manufacture new food, and roots began to rot. By late May, much bermudagrass appeared to be injured beyond recall even in areas which had survived the past 12 to 14 winters. Similar injury was observed as far south as Atlanta.

Although much of the answer lay in the poor growing weather during the spring, this did not seem to be the sole cause of injury. Desiccation from high winds along with compaction from traffic and damage from ice and water are all sources of possible injury.

At least two things were evident. Where the bermudagrass was clipped higher, as in the rough, it was not as severely affected. Areas sheltered by trees or steep banks seemed to be healthier.

A third factor was noted—bermudagrass nurseries seemed to have less damage than the course. In speculating, one might assume that lack of traffic and extra care brought nursery areas through the winter better than other sections. Many nursery areas were burned off in late fall and it is possible the dark color of the charred remains absorbed additional heat from the sun.

In contrast to bermudagrass, zoysia, which has a higher minimal growing temperature and is more winter hardy, came through the winter in good condition.

There was much concern for all grasses during this particularly adverse year, and re-seeding or, in the case of bermudagrass, re-sprigging or sodding was in order for many clubs.

In past years we have learned a great deal about the management of turfgrass, but we must still have help from the natural climatic factors which ultimately control the growth of grasses.

Because of the extremely cold, dry spring season, knotweed, dandelion, and plantain grew uninhibited with no competition from *Poa annua* or permanent grasses. Knotweed is especially abundant again on most courses, and because of the extreme drought few superintendents hazarded the chance to apply chemical controls. Courses will be plagued with this weed in '63, and it certainly will be a problem for the next few years. If we have unfavorable climate this summer, many courses will be weak. If high temperatures and high humidity persist, we could lose a large percentage of the newly seeded greens because they were borderline going into June.

Summary

In summary, winter-spring injury was more severe -

On heavily played courses.

On walk-off paths from greens, tees, and in confined approach areas where traffic was funnelled.

On poorly drained areas where ice remained longest - in depressions especially.

On **good** natural surface drainage areas, too . . . where ice accumulated.

On close clipped turf more so than high cut turf.

On *Poa annua* more than on bentgrass.

Where water could not escape when soil and ice first thawed.

Where toxic gases were formed under ice and water.