



## *Reducing Winter Damage on Putting Greens*

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**W**inter injury to turfgrasses often occurs in the northeastern United States, and particularly so on putting greens. Excessive frost heaving in soils of high silt content, and strong winds blowing over open turf combine in dehydrating the turf and surface layers of the soil.

These conditions produce injury referred to as desiccation.

Damage is generally more severe if the turf has been weakened during late summer and fall and if it is underlain by a moderate to heavy thatch layer. Excellent fall management to provide healthy turf for winter dormancy is important in preventing winter injury. This includes proper fertilization, insect and disease control, and frequent and judicious topdressing, combined with aerification and vertical mowing to prevent excessive thatch build-up.

Once heavy damage through desiccation has occurred, considerable time, effort, and, often, frustration are involved in returning damaged greens to acceptable playing conditions. At times even the professional life of the golf course superintendent may be in jeopardy. Superintendents and professional turf specialists are aware of this problem and have devised a number of counter measures.

Winter irrigation and antidesiccant sprays are used to retard transpirational water losses through the foliage. Excelsior, hay, straw or brush have been suggested as insulation against cold temperatures and to trap snow. However, most of these procedures have some serious drawbacks which are responsible for their limited acceptance.

In research work at the Rhode Island Agricultural Experiment Station a number of opaque polypropylene shade screens have been investigated for putting green winter protection. An earlier report<sup>2</sup> showed that dark-colored materials providing 45-55 per cent shade were effective. They provide protection for the grasses, not so much by trapping heat or preventing freezing, but by producing a modified micro-environment in the turf surface with a reduced amount of physical stress on the plants during the winter. These screens are apparently unaffected by weather and will last almost indefinitely if not willfully destroyed.

Further experiments were conducted on both Velvet and Penncross creeping bentgrass putting turf during the winters 1967-68 and 1968-69. In addition to a black polypropylene screen of 55 per cent shade, several nitrogenous fertilizers and snowmold fungicide treatments were employed to determine their effectiveness in conjunction with the protective cover. The

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tests were started in mid-December of 1967 and late November of 1968.

### Velvet Bentgrass Study: 1967-68

In a split plot field experiment, ureaform (Nitroform) and activated sewage sludge (Milorganite) were applied at two and four pounds of nitrogen per 1,000 square feet and compared against an unfertilized check treatment. Fungicide treatments consisted of Cadminate at two ounces per 1,000 square feet applied in 20 gallons of water and Calogran at 10 pounds per 1,000 square feet. Half of all plots were then covered with the polypropylene screens (55 per cent shade). Data were taken in the form of visual turf quality scores which reflected color, density, texture and vigor of the turf.

#### Results and Discussion

Very little response was observed during December and January, since the turf was dormant when the test was initiated. Some color development was noticed on covered plots by early February. It was most pronounced in combination with the activated sludge treatments. Effects continued to increase slowly during February and March. Progress was related to prevailing weather conditions as the season progressed. Early responses to cover and fertilization were evidenced by the appearance of new basal shoots near the surface. During freezing temperatures these tillers changed color from bright green to a purplish brown — a characteristic change of chlorophyll in plant tissues during cold weather. As long as frost periods were quite prevalent, this purplish color would predominate. As warmer temperatures prevailed (late March), the newly produced growth remained brilliant green. At first little vertical growth occurred. Early turf improvements were produced primarily by the cover but were strongly enhanced by both application rates of activated sludge.

Visual data were taken from late March through mid-May weekly, at first and later at biweekly intervals. Until April 19, the cover treatment was the predominant force in influencing turf quality. After the cover was removed on April 11, and the turf mowed on April 19, the cover effect diminished. Most of the early growth was removed by cutting, and open turf improved in color with normal spring recovery. The subsequent improvement in turf quality after mowing from May 15 to May 19 demonstrated that the cover was not detrimental to the grass since the effect of the cover treatment was still quite noticeable.

Fertilization with activated sludge at four pounds N/1,000 square feet under the cover

<sup>2</sup>Ledeboer, F. B. and C. R. Skogley. 1967. The Golf Superintendent 35 (8): 22-32.

produced the best turf on all reading dates during the test period, followed closely by the two pound rate. Ureaform treatments did not show significant benefits over the unfertilized check until May 17.

Fungicide evaluations were not made because *Tiphula* snowmold incidence was small. Both fungicides prevented snowmold completely in open as well as covered areas. The thought that the cover would provide better conditions for snowmold development could not be substantiated. Number and size of diseased areas in protected plots were not greater than in open turf of the untreated check areas. Nitrogen sources and rates apparently had no influence on snowmold incidence.

### Penncross Study — 1968-69

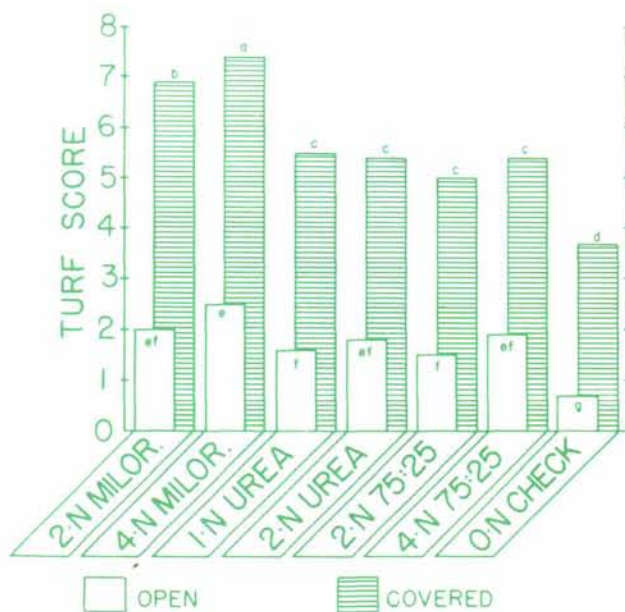
A test area of Penncross creeping bentgrass was selected for a similar study the following year. The site had been maintained as putting turf the previous summer and had received fertilization to produce acceptable growth, density, and color. The cutting height was one quarter inch.

Fertilizer treatments were made on November 22 as follows:

1. Activated sewage sludge at two and four pounds N/1,000 square feet.
2. Urea at one and two pounds N/1,000 square feet.
3. 75:25 Ureaform: Urea at two and four pounds N/1,000 square feet.
4. Check-no fertilization.

The test was laid out in a split plot design. Two snowmold fungicides were applied across

Figure 1. Response of Penncross putting turf on 4/4/69 to cover and fertilizer treatments applied during the winter.



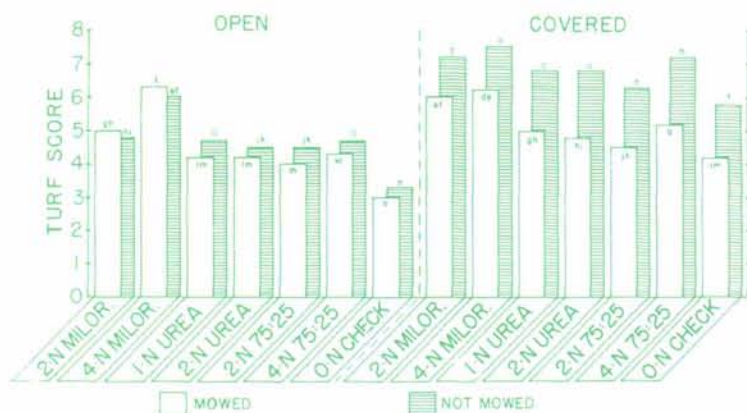


Figure II. Effect of mowing on Penncross turf quality at time of cover removal on 4/8/69 as influenced by cover and fertilizer treatments applied during the winter.

the fertilizer treatments on November 25, Calogran at eight pounds/1,000 square feet and Calochlor at four ounces/1,000 square feet. Half of all plots were covered with the polypropylene screen (55 per cent shade) on December 10. The cover remained in place until April 8, 1969, and half of all plots were mowed the first time on that day. All plots were mowed completely on April 15.

Because of a generally low incidence of snowmold in the test site, data on treatment effects again were omitted. As in the previous winter, the cover did not appear to increase snowmold incidence or damage.

### Results and Discussion

Results obtained were quite comparable to the 1968 data. Turf quality was significantly increased by cover and fertilizer treatments.

The cover treatment, again, strongly influenced spring recovery early in the year (through March). Turf score data in Figure I, on April 4, demonstrate this effect. Differences between fertilizer treatments on open turf were only small at this time but all were significantly better than the unfertilized check. Turf recovery under the cover was enhanced most by activated sludge treatments, producing excellent quality turf by early April. Both rates were clearly more effective than either urea of the 75:25 mixture.

After the cover was removed on April 8, half

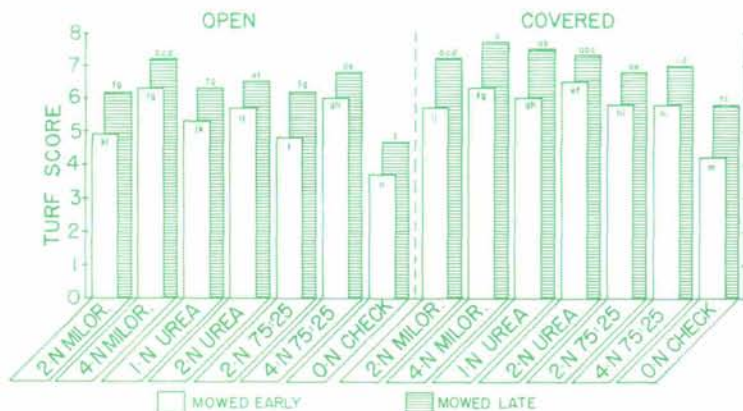
of all plots were mowed at 3/8 inch. Mowing on the other half was delayed until April 15. This cutting schedule was used to detect if a delay in mowing after removal of the cover would prevent the severe color loss of turf encountered in earlier studies. Turf scores were taken one day after mowing in both cases. The data are shown in Figure II and IV for previously covered turf as well as open plots.

Early mowing resulted in loss of color, depressing turf scores more severely in covered plots than in open turf. Early mowing of open turf fertilized with activated sludge actually improved appearance slightly for a while because mowing removed primarily necrotic leaf tips and exposed new green foliage below (Figure II).

The setback produced in covered plots was quite severe for all fertilizer treatments regardless of rate or types, but it was no worse than that suffered by the check. The smallest reduction in turf scores occurred with the activated sludge treatments. This would indicate — and it was clear from the appearance of the turf — that new growth produced was bright green to the base of the plants and that this growth was not overly succulent at the time the cover was removed.

Data in Figure III represent turf quality of the test plots one week later after the entire plot area had been cut at 1/4 inch. Overall quality had increased slightly in numerical

Figure III. Effect of delayed mowing on Penncross turf quality on 4/16/69. One week after cover removal as influenced by cover and fertilizer treatments applied during the winter.



values as temperatures became more favorable. It is clearly evident, however, that the delay of mowing by one week did not adversely affect the turf in previously covered plots. The detrimental effect of earlier mowing on open plots on April 15 was similar to the reduction suffered by covered plots.

While significant differences still persisted between fertilizer treatments, relative differences became smaller as the season progressed. The effect of the cover also diminished with time.

### Summary

Late fall nitrogen fertilization and protective covers strongly affected the time and intensiveness of spring recovery of bentgrass putting green turf in tests conducted in Rhode Island during the winters 1967-68 and 1968-69. Cover strongly enhanced turf quality early in the year, but the effect diminished slowly as the season progressed.

Fertilizer treatments variably intensified the cover effect depending on source and application rate. Of the fertilizer sources tested, activated sludge at four pounds N/1,000 square feet consistently gave the best results, especially early in the season. It was followed closely by the two pounds N rate, but urea at one and two pounds N/1,000 square feet gave similar results. A mixture of 75 per cent ureaform and 25 per

cent urea at two and four pounds N/1,000 square feet gave somewhat poorer results. Ureaform (UF) alone, at the same rates, was ineffective in producing the desired early results. UF did not produce a significant response until the normal growing season was well under way.

Timing of cover removal was critical. Subsequent management requirements of the putting surface depended on proper timing. The cover should be removed early enough to avoid overstimulation of succulent foliage, yet late enough to escape cold weather injury. Removing the cover a few days too early is better than removing it too late!

Mowing should be delayed for several days following removal of the cover so that the turf can acclimate to the open environment (higher light intensity and greater moisture as well as temperature differentials). No apparent damage is sustained with delayed mowing, and the turf continues to develop normally.

Two winters of testing did not produce a clear picture relative to snowmold incidence in conjunction with late fall fertilization, protective cover and snowmold fungicides. What can be stated is that the cover has no apparent influence on snowmold occurrence. Preventive snowmold fungicides should be applied as usual prior to covering of the turf in fall or early winter.

# *The Two Year Turfgrass Management Program At Michigan State*

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QUESTION: Who needs college training in turfgrass management?

ANSWER: Young men preparing for responsible managerial or sales positions within the turfgrass industry.

The purpose of Michigan State University's Two-Year Turfgrass Management Program is to provide the fundamental technical knowledge and skills required to enter the turfgrass industry. Graduates are well qualified to serve as assistant golf course superintendents, superintendents of smaller golf courses or in other turf positions. Four-year degree programs

offer a broader and deeper training in the sciences and humanities, but fewer specific skills. The choice of program depends on the individual. The specific occupational goal, academic interest and ability, and financial resources should be considered. Students who graduate with a B average or better may transfer to a four-year degree program if they wish.

MSU's Institute of Agricultural Technology and the Department of Crop and Soil Sciences administer the Two-Year Turfgrass Management Program with the cooperation of other subject matter departments. The program begins in mid-September with two terms of academic training. Six months of placement training begins in mid-March. The last two terms of classroom training are completed from mid-Sep-

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