

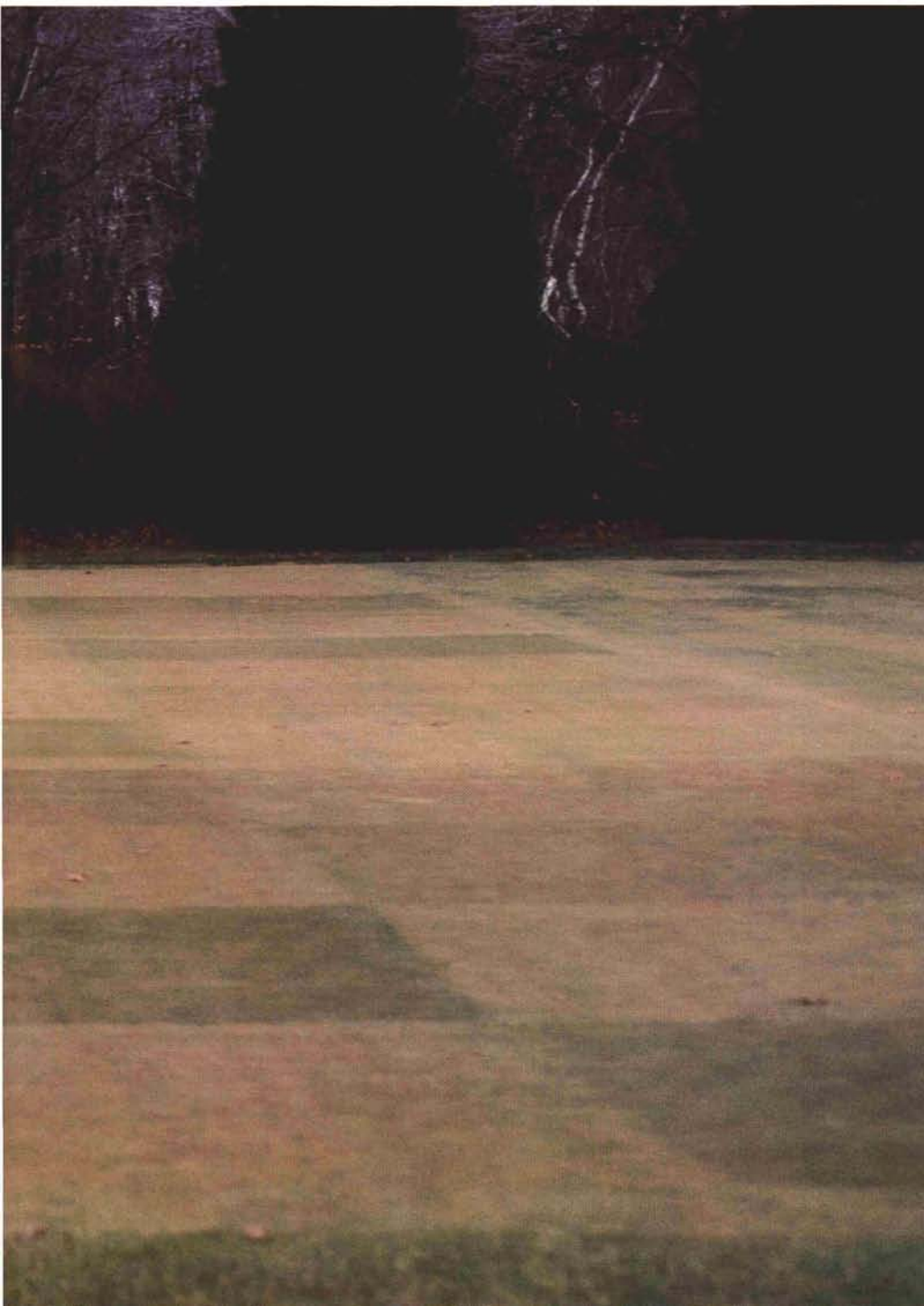
Putting Green and Sand/Soil

by R. J. COOPER and C. R. SKOGLEY¹



Responses to Sand Topdressing

Fall color retention was noted in November of each year. The dark green turf plots seen here are those which received monthly sand/soil topdressing. They retained good color later into the season than turf receiving other programs.



TOPDRESSING IS the application of a thin layer of selected or prepared soil to a turfgrass area. Turf managers have been aware of the importance of topdressing since the early days of green keeping at the Old Course, in St. Andrews, Scotland. The benefits of an effective topdressing program include smoother putting surfaces, less thatch and grain, and tighter and finer-textured turf. Research has shown that topdressing is more effective than either vertical mowing or core cultivation in reducing thatch on fine turf areas. Topdressing also improves turfgrass establishment, cold tolerance, water and fertilizer infiltration, and annual weed control.

While the value of topdressing putting green turf is well known, opinions often vary as to what constitutes a good topdressing program. The USGA Green Section recommends using a mixture containing sand in the range of 0.11 to 1.0 mm with at least 75 percent medium to coarse sand (0.25 to 1.0 mm). They emphasize that the mixture must be laboratory tested to determine the exact percentages of sand, soil and organic matter since sources vary so widely throughout the United States. The Green Section also recommends 10-20 percent of a well-decomposed organic matter, but only if the prepared mixture is composted months in advance of use.

Topdressing with mixtures conforming to these standards has been successful and is practiced by many turf managers. In recent years, however, interest has increased greatly in a pure

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sand topdressing program developed by Dr. John Madison and his associates at the University of California. They recommend light, frequent topdressing using sand in the 0.05 to 1.0 mm range, with at least 75 percent being fine and medium sand. The sand is applied without soil or organic matter being added. Anticipated benefits from this program include: elimination of alternate layers of soil and thatch which often arise from infrequent topdressing, no thatch formation since stolons are continually buried, and a reduction in weeds and disease due to continual burying of seed and inoculum.

Although pure sand topdressing has become very popular, some turf researchers hesitate to recommend this practice due to possible problems with excessive drainage and leaching, low microbial activity, insufficient water retention, and low organic matter content. Also, once a sand program is initiated, changing to a finer-textured topdressing can cause problems with water movement through the soil profile. It is generally accepted that sand can be applied over a fine-textured soil without restricting water movement. Once a surface sand layer is developed, however, changing to a finer-textured topdressing material can result in a perched water table and problems with surface wetness, compaction, and increased disease susceptibility.

IN ORDER TO compare sand topdressing to more traditional sand/soil topdressing programs, a study was conducted at the University of Rhode

Island from 1976 through 1979. Penn-cross and emerald creeping bentgrasses and Kingstown velvet bentgrass were maintained under putting green conditions and subjected to the following topdressing programs:

MS — Three cubic feet of sand per 1,000 square feet applied monthly from April through November.

M S/S — Three cubic feet of sand/soil topdressing per 1,000 square feet applied monthly from April through November.

2 S/S — May and September application of 7.5 cubic feet of sand/soil topdressing per 1,000 square feet without cultivation.

2 S/S C — May and September application of 7.5 cubic feet of sand/soil topdressing per 1,000 square feet following cultivation.

The sand topdressing contained 55 percent fine and medium sand, and 31 percent coarse sand. Although this is slightly more coarse than desired, the sand was typical of the type available to golf courses in the area. The sand/soil material was a coarse sand and silt loam mixture containing 82 percent sand. With the 2 S/S C program, cultivation in May and September consisted of coring and grooving, respectively.

The bentgrass plots were maintained as putting green turf and mowed regularly at ¼ inch. Irrigation was practiced when necessary to avoid drought stress, except during 1979 when soil moisture data were collected.

An average of four pounds of nitrogen per 1,000 square feet was applied each year. Both complete fertilizers (12-2-8 or 25-5-10) and activated sewage sludge (6-2-0) were used, with sludge being applied during periods of high temperature.

One of the most important aspects of any management practice is how it affects turfgrass quality. Visual ratings of turf quality were taken monthly and were based on color, texture, density, uniformity, and disease incidence (Table 1). Monthly sand/soil topdressing (M S/S) resulted in higher turf quality than any other program from 1977 through 1979. This was due to the periodic addition of nutrients contained in the soil component of the topdressing. Monthly sand topdressing (MS) resulted in poorer quality turf than both M S/S topdressing and semiannual topdressing with sand/soil (2 S/S) during 1978 and 1979. Semiannual sand/soil topdressing following cultivation (2 S/S C) consistently resulted in the poorest quality turf. This was probably due to infrequent application combined with injury from the cultivation process.

The spring and fall color response of the turf also varied considerably among programs. Monthly sand/soil topdressing resulted in better spring and fall color than all other topdressing programs during 1978 and 1979. This was due to the monthly addition of nutrients contained in the material, as well as to the increased absorption of solar radiation by the dark sand/soil mixture. Also, monthly sand/soil topdressing in September, October, and

TABLE 1
Average monthly turf quality scores for all bentgrass varieties during 1977, 1978, and 1979

| Topdressing Program | Turf Quality ¹ | | |
|---------------------|---------------------------|-------|-------|
| | 1977 | 1978 | 1979 |
| MS | 6.9 b* | 6.0 c | 6.8 c |
| M S/S | 7.2 a | 6.9 a | 7.4 a |
| 2 S/S | 6.8 b | 6.5 b | 7.1 b |
| 2 S/S C | 6.5 c | 5.6 d | 6.6 d |

¹Scale: 1 to 9; 9 = ideal turf.

*Scores within years followed by the same letter are not significantly different at the 5% level.



View of gypsum block placed approximately 1 inch deep in the soil to monitor available water during the 1979 growing season. The wire lead is attached to a soil moisture meter.

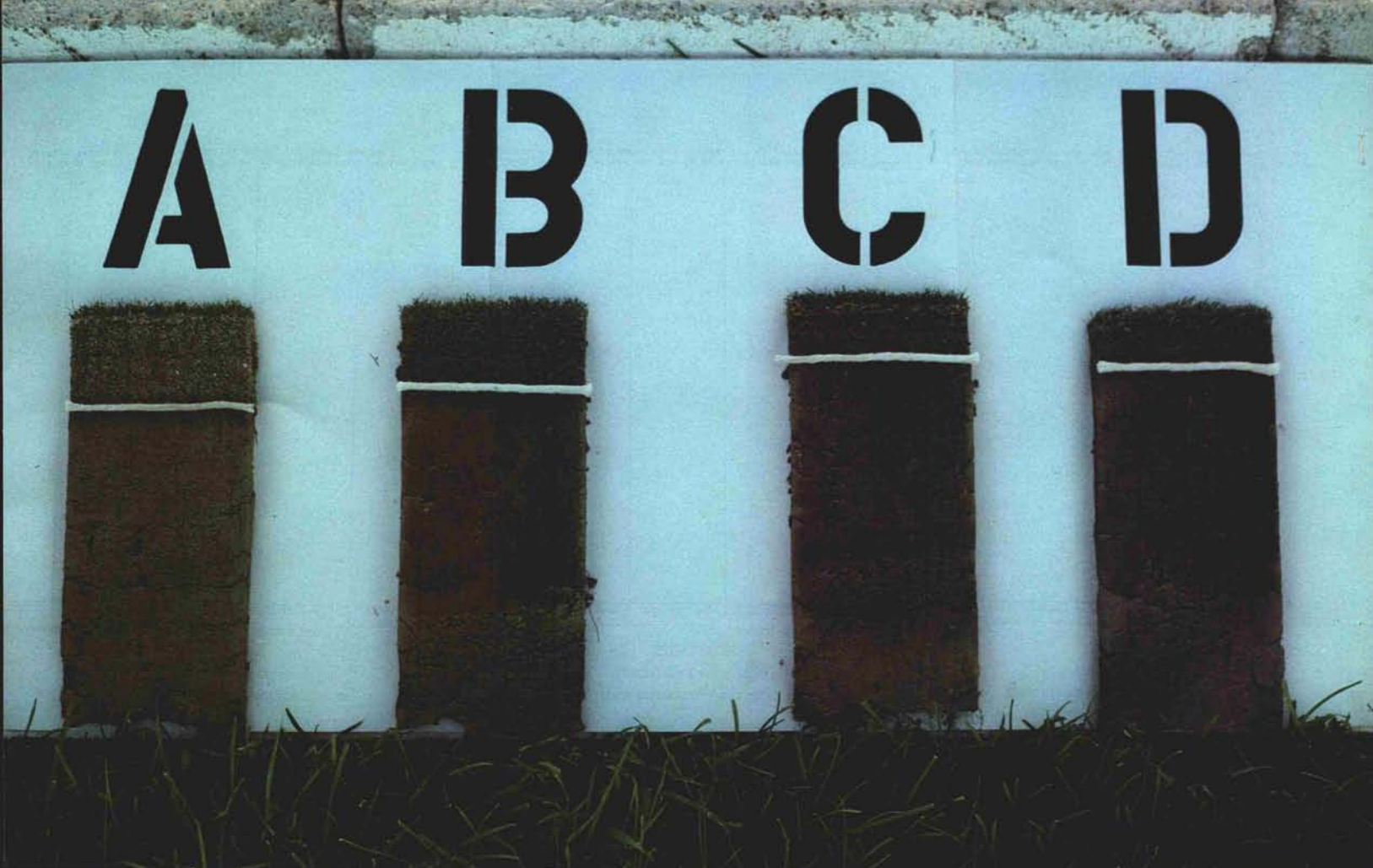
November may have helped the turf survive the winter in better condition than turf receiving other topdressing programs.

BOTH MONTHLY topdressing programs (MS and M S/S) resulted in more dollar spot on creeping bentgrass than the semiannual programs (2 S/S and 2 S/S C). This difference in dollar spot severity was especially great during 1977 and 1978. An increase in dollar spot incidence with monthly topdressing has also been noted in past research. Dollar spot was not a problem on Kingstown velvet bentgrass throughout the experimental period, but a slight infection of copper spot did occur occasionally.

One of the primary criticisms of sand topdressing is that it results in droughty putting greens which lack good moisture retention. Soil moisture content under the various topdressing programs was measured during 1979 using gypsum

blocks in order to evaluate moisture retention. Plots receiving monthly sand topdressing retained less water than plots subjected to sand/soil topdressing programs throughout the growing season. Although sand topdressed plots were most droughty, their available water content never fell below 55 percent at any time during the summer. Also, while sand topdressed plots dried out more rapidly than plots receiving other programs, they did not wilt any faster than other plots. This was due to a much denser root system under sand topdressed turf than under sand/soil topdressed turf. Thus, the superior root density of sand topdressed turf allowed it to absorb soil water more efficiently than sand/soil topdressed turf.

A major difference between sand topdressing and sand/soil topdressing is the organic matter content of the topdressing mixture. Advocates of sand topdressing feel that it makes little sense to add organic matter to topdressing



These soil profiles show the amount of topdressing accumulation after three years. The white lines indicate the original green surface. A — Monthly sand — 2 inches; B — Monthly sand/soil — 1½ inches; C — May and September topdressing without cultivation — 1 inch; D — May and September topdressing following cultivation — 1 inch.

when we are trying to reduce the thatch (an organic matter layer) on a putting green. This is a logical assumption; however, some minimum organic matter content is needed for optimum turf growth. It has been reported that as little as 5 percent soil or 10 percent organic matter added to pure sand can provide adequate nutrient storage for putting green turf. In this study, monthly sand topdressing resulted in less organic matter in the upper inch of soil than any other program. Sand topdressed plots contained about 2 percent organic matter while the sand/soil topdressing programs averaged 10 percent organic matter in the upper inch of soil. Sand topdressed putting greens having such a low organic matter content may become difficult to manage because of their inability to store and supply nutrients to the turf, especially as the depth of the sand layer increases.

One of the most important reasons for topdressing is to help control thatch

accumulation. In order to measure thatch buildup, cores were taken from all plots during September of 1979. The cores were compressed with a 1-kilogram weight before thatch depth measurement in order to eliminate any air pockets present in the thatch layer. Monthly sand topdressing resulted in only 2 millimeters of thatch during the three-year test period, while sand/soil topdressing programs averaged 12 millimeters of thatch. The firm, virtually thatch-free putting surface that results from light, frequent sand topdressing is one of the main reasons the program is so popular.

It should be noted that frequent sand topdressing does not decompose existing thatch as much as it prevents thatch development from occurring. The principle behind frequent sand topdressing is to topdress often enough to allow continual dilution of the organic matter being produced so that no thatch layer is allowed to form. Ideally, topdressing frequency should be adjusted to the turf

growth rate, topdressing more frequently during periods of maximum growth and less often during periods of slow growth. In general, three- to four-week application intervals have worked best in most areas.

Clippings were collected and weighed weekly from June through October during 1979 in order to evaluate the relative growth and vigor of the turf. Monthly sand/soil topdressing produced the highest average clipping yields during the growing season. Monthly sand/soil applications supplied nutrients, which resulted in more vigorous turf growth than the other programs. Monthly sand topdressing produced less growth than monthly sand/soil topdressing during all months. The slower growth rate of sand topdressed turf resulted in less recovery from injury and less stolon growth than turf receiving sand/soil programs. Also, pecking injury from birds searching for cutworms was much more severe on sand topdressed plots. Semiannual

sand/soil topdressing following cultivation (2 S/S C) resulted in less growth than the other sand/soil programs during September and October due to the injury associated with cultivation.

LIGHT MONTHLY sand/soil topdressing resulted in higher quality turf and better spring and fall color than light monthly sand topdressing or semiannual sand/soil topdressing. Light sand topdressing provided a smooth, firm, thatch-free putting surface; however, the low organic matter content and infertility of pure sand can result in less vigorous turf and slower recovery from injury than sand/soil topdressing. While sand topdressing resulted in the most droughty root zone and less available water for the turf, wilting did not seem to be a problem. Both monthly topdressing programs resulted in much more dollar spot incidence than semiannual topdressing. However, this problem can be solved by using a preventive fungicide program. The overall results of this study show

that light, frequent sand/soil topdressing is superior to heavy, infrequent application for maintaining high quality putting turf. In addition to the agronomic benefits, frequent light topdressing causes less inconvenience to golfers than infrequent heavy applications.

While monthly sand/soil topdressing provided superior turf in this study, the decision whether to use pure sand or topdressing containing some soil and organic matter is not clear cut. Sand topdressed greens do not store or supply nutrients as well as sand/soil topdressed greens. The infertile nature of sand can be overcome by fertilizing more heavily or using more slowly available nitrogen sources. The excellent putting surface provided by sand topdressing must be weighed against the increased fertility and management level necessary to maintain sand topdressed greens. This decision will become even more crucial in the future as fertilizer becomes more expensive and water availability for golf courses

becomes less certain. Topdressing is an important, expensive management practice. It is a good idea to review the advantages and disadvantages of any topdressing program before you begin using it.

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MAINTENANCE Aids

A TIP FROM

ALBERT (LES) ALLEN, Retired Golf Course Superintendent, Kernwood Country Club, Salem, Massachusetts

DURING HIS long tenure as superintendent at Kernwood Country Club, Les Allen, who is now retired, was known as an excellent mechanical innovator. One of his ideas, pictured here, shows a Del Monte rake attached to a mechanical sand rake. The one-piece rake easily is interchangeable with the sand raking apparatus normally attached. The Del Monte rake is used to comb greens occasionally prior to mowing, thereby reducing grain. A hydraulic lever controls precise downward pressure needed.

