effects which accompany this practice as well. It is not known if this practice would expose the turf to greater potential for turf loss due to winter injury should crown hydration occur in the early spring followed by a hard freeze. Any benefit from mowing short the first time would not likely occur if the grass is already green.

Topdressing studies on greens

The long range topdressing study on the Penneagle creeping bentgrass green was concluded at the end of the 1989 growing season. This study was initiated in 1982. Topdressing treatments as outlined in Table 8 were: no topdressing treatment (check); 3 cubic feet of sand applied per 1000 sq ft at 3 week intervals (3 WK sand); 6 cubic feet of sand applied at 6 week intervals (6 WK sand); 12 cubic feet of sand applied spring and fall (12 WK Sand); and 12 cubic feet of a sandy soil based mix applied spring and fall (12 WK mix). Each topdressing treatment received either 3 lbs N or 6 lbs N per 1000 sq ft annually. Plot size was 4 feet by 12 feet with 3 replications.

The turfgrass quality rating data taken from these plots in 1989 (Table 8) were quite consistent with those observed in previous years. The light and frequent topdressing programs ranked higher than the infrequent topdressing treatments on a few dates. As expected plots receiving higher nitrogen rates (6 lbs N/1000 sq ft annually) ranked higher than when treated with the lower rate (3 lbs N annually). On a few dates the opposite effect was observed. After topdressing application turf quality ratings improved for a few days then the ratings stabilized. One key observation was turf quality on the non-topdressed plots ranked consistently lower compared to topdressed plots. Those plots which were not topdressed developed a significant thatch layer making the turf susceptible to scalping and lower turf quality ratings. These plots receive maintenance traffic only so would be more susceptible to thatch accumulation than when turf routinely received intense traffic.

In August plots were sampled to determine effects of treatment on the physical properties of the "thatch" layer, that layer of thatch (nontopdressed plots) or thatch mixed with topdressing material. The "thatch" like layer was separated from the original underlying soil. Measurements taken in this layer were measured for percent organic matter as determined by ashing and thickness and bulk density of the "thatch" like layer (Table 9).

The percent organic matter in the thatch layer was much higher for the nontopdressed plots as would be expected since no topdressing material diluted the thatch. Thickness of the "thatch" like layer was greatest for plots receiving less frequent sand topdressing, lowest for the check plots and intermediate for the light, frequent sand topdressed plots and those topdressed with the soil based mix in spring and fall. The bulk density of the topdressed plots was quite uniform. Sand and organic matter mixed together had a higher density (close to 1.0 gm/cubic centimeter). Clearly topdressing resulted in more uniform turf and "thatch" conditions than when no topdressing was done.

The topdressing study on the Penncross creeping bentgrass green which began in 1986 was continued in 1989 (Table 10). Soil mixes applied were: sand alone; 80% sand, 20% peat; and 60% sand, 20% soil, 20% peat. Topdressing programs were either 3 cubic feet of soil material per 1000 sq ft applied

Table 8. *Effect of topdressing program and nitrogen treatment on turfgrass quality ratings on a Penneagle creeping bentgrass putting green. Treatments initiated 1982. Hancock Turfgrass Research Center. Averages for 3 replications.*

		1989 Turfgrass Quality rating (9 = Ideal)												
Topdressing	Nitrogen	4/24	5/9	6/1	6/14	6/20	7/6	7/17	7/27	8/3	8/14	8/29	9/19	10/3
Check	3 lb N/yr	4.3d*	4.3d	5.0h	5.5d	6.0e	6.7d	6.2c	5.3c	6.0d	5.5d	6.7abc	6.3d	6.0d
Check	6 lb N/yr	6.0ab	5.8abc	5.8g	6.5c	6.2de	7.3c	7.2b	5.5c	6.7ab	6.0cd	5.3d	6.7cd	6.3d
3 WK Sand	3 lb N/yr	5.3bc	5.5bc	6.3f	6.8bc	6.8bc	7.2c	7.0b	7.3ab	7.3ab	7.0ab	7.7a	7.8b	7.2bc
3 WK Sand	6 lb N/yr	6.3a	6.5a	7.2cd	7.3ab	6.5cde	7.8ab	8.0a	7.0ab	6.7ab	7.3ab	7.7a	8.2ab	7.8a
6 WK Sand	3 lb N/yr	5.7abc	5.5bc	6.7ef	7.0bc	6.8bc	7.5bc	7.2b	8.0a	7.0ab	7.2ab	7.3a	8.0b	7.0c
6 WK Sand	6 lb N/yr	6.5a	6.5a	8.0a	7.8a	6.7bcd	8.2a	8.3a	7.7ab	7.7a	8.0a	7.7a	9.0a	7.8a
12 WK Sand	3 lb N/yr	5.0cd	5.2c	7.0cde	6.8c	7.5a	7.3c	7.0b	7.0ab	6.7ab	7.0abc	7.2ab	7.7b	7.0c
12 WK Sand	6 lb N/yr	6.5a	6.0abc	7.7ab	7.5a	7.2ab	8.0a	7.3b	6.7b	6.4ab	6.7bc	5.8cd	7.3bc	7.0c
12 WK Mix	3 lb N/yr	4.8cd	5.2c	6.8de	6.7c	7.7a	7.3c	6.8b	7.0ab	7.0ab	7.2ab	7.3a	8.0b	7.3abc
12 WK Mix	6 lb N/yr	6.5a	6.3ab	7.3bc	7.7a	7.2ab	8.0a	7.3b	6.8b	7.7a	7.3ab	6.0bcd	7.7b	7.7ab

* - Means followed by the same letter are not significantly different at the 5% level using Duncan's Multiple Range Test.

Table 9. Effect of topdressing program and nitrogen treatment on percent organic matter in the "thatch" layer, thickness and bulk density on a Penneagle creeping bentgrass green. Hancock Turfgrass Research Center. Study initiated 1982. Averages of 3 replications.

Treatments		Percent Organic Matter	Thatch Thickness(cm)	Bulk Density(g/cm^3)
Topdressing	Nitrogen lbs/N/yr			
Check	3	26.8 b	2.0 e	0.5 b
Check	6	29.3a	2.2 e	0.4 b
3 WK Sand	3	4.8 c	4.5 bcd	1.0a
3 WK Sand	6	5.2 c	4.2 cd	1.0a
6 WK Sand	3	4.4 c	4.9abc	1.1a
6 WK Sand	6	4.9 c	5.5a	1.1a
12 WK Sand	3	4.6 c	5.1ab	1.0a
12 WK Sand	6	4.9 c	5.1ab	1.0a
12 WK 2:1 Mix	3	6.2 c	4.4 cd	1.0a
12 WK 2:1 Mix	6	5.9 c	4.2 d	1.0a

* - Means followed by the same letter are not significantly different at the 5% level using Duncan's Multiple Range Test.

Table 10. Effects of topdressing mix and program on quality ratings of a Penncross creeping bentgrass green. Treatments initiated 1986. Hancock Turfgrass Research Center.

Treatments			1989 Turfgrass Quality Ratings (9 = Ideal)								
Topdressing	Rate (ft^3)	Frequency	4/17	5/9	6/1	6/9	8/14	8/29	9/7	9/19	10/3
Sand	3	3 Weeks	4.5c*	7.0a	6.7bc	7.2abc	6.5bc	7.2b	8.0bc	7.7a	6.5bc
Sand	12	Spring/Fall	5.0bc	7.0a	6.3c	6.7c	5.3d	7.0a	6.7d	6.7b	6.8abc
80 Sand: 20 Peat	3	3 Weeks	4.8bc	7.0a	7.0abc	7.3abc	7.0b	7.8ab	8.7ab	7.8a	6.7abc
80 Sand: 20 Peat	12	Spring/Fall	5.8a	7.0a	8.0a	7.8a	6.2c	7.0b	7.2cd	7.0ab	7.2ab
60 Sand: 20 Peat: 20 Soil	3	3 Weeks	4.7bc	7.0a	7.0abc	7.5abc	8.0a	8.7a	9.0a	7.7a	6.8abc
60 Sand: 20 Peat: 20 Soil	12	Spring/Fall	5.8a	6.7ab	7.7ab	7.7ab	6.8bc	7.8ab	7.5cd	7.2ab	7.3a
Check	--	----------	5.0bc	6.3bc	6.5bc	6.8bc	6.8bc	7.7ab	7.7c	6.7b	6.3c
Sand (Cored)	12	Spring/Fall	5.2b	6.0c	7.3abc	7.3abc	7.7a	7.7ab	7.3cd	7.0ab	7.0abc

* - Means followed by the same letter are not significantly different at the 5% level using Duncan's Multiple Range Test.

every 3 weeks or 12 cubic feet applied spring and fall. Also included were an untreated check and a plot which received 12 cubic feet of sand spring and fall after cultivating with 1/2 inch hollow tines.

Turfgrass quality ratings (Table 10) reflect the improvement observed after topdressing as observed previously. For that reason the light frequent topdressing program ranks better through much of the season than when topdressed only in spring and fall. But following spring and fall topdressings at high rates these plots freqently outranked the light, frequent topdressing program for a period of time.

Plots receiving the soil based mix outranked those receiving sand alone on several dates. This has been observed previously. We are still of the opinion that a soil based topdressing material is preferred if the soil mix in the green is no finer textured than the topdressing mix. Try to match the original soil if it is acceptable. If not, use a sandier mix but be sure the topdressing mix is sandy enough to permit good infiltration and will resist compaction. If a quality, consistent source of a soil based mix is not available, then sand can be used. It is essential to use light rates (2-4 cubic feet per 1000 sq ft except when applied after core cultivation) at intervals which are adjusted to the growth rate of the grass (an approximation of the rate of thatch accumulation). This means more frequent topdressing in spring and fall when growth is greater and traffic is lower, perhaps at 2 week intervals. By contrast, in the summer with greater stress and traffic it may be possible to stretch the interval to as much as 4 weeks. This must be determined on a site by site basis requiring careful observation by the superintendent.

Wetting agent study

The wetting agent treatments shown in Table 11 were applied to a Penncross creeping bentgrass green at the Hancock Turfgrass Center on June 26, 1989. Repeat treatments were made on July 25 and August 16. This study was designed to evaluate the effect of these wetting agents on prevention of localized dry spots. As was the case in 1988 we observed no significant development of localized dry spots on these plots. The soil is a modified loamy sand. Heavy irrigation of adjacent plots utilized for another study likely prevented localized dry spot development on these plots.

Significant differences in dew formation occurred on several dates, however (Table 11). Effects on dew suppression tended to be short term (2 to perhaps 4 days) for the sprayable wetting agents. Granular materials have a less dramatic effect short term but tend to provide dew suppression over a longer period.

Control of moss with Safer

A study to evaluate the effect of Safer in controlling moss in a shaded Kentucky bluegrass lawn in Okemos was established June 9, 1989. Safer was applied at 4 oz per 1000 sq ft. The degree of moss control was very good as observed by the relative ratings taken 1 week after treatment and at 1 and 2 month intervals. There was some short term phytotoxicity observed but this was limited in effect and duration. This product seemed to work very effectively but should be applied carefully according to label instruction to