Turfgrass research review

by Dr. James B. Beard

Discussion of Soil Heating, Thatch Development

Effect of Soil Heating on Winter Growth and Appearance of Bermudagrass and St. Augustinegrass.
G. G. McBee, W. E. McCune, and K. R. Beerwinkle. Agronomy Journal. 60(2): 228-231. 1968. (from the Department of Soil and Crop Sciences, Texas A & M University, College Station, Texas 77843).

The effect of winter soil warming on the warm season turfgrasses, bermudagrass and St. Augustinegrass were investigated. Of particular concern was the maintenance of color and active growth during the winter period. Grasses utilized in the test included common St. Augustinegrass and three bermudagrasses, P-16, Tifgreen and Gene Tift. The Tifgreen was mowed at a height of 0.75 inches while the other turfgrasses used in the study were mowed at 1.5 inches. In addition, the response to mowing heights was evaluated at cutting heights of 0.25, 0.625, 0.75 and 1.5 inches.

Variables in the heating installation included (a) two types of soil warming cable (a commercial polyvinyl insulated cable and a non-insulated No. nine galvanized wire), (b) varying cable spacings which provided watt densities of 5, 10, 15 and 20 watts per square foot and (c) the location of cables at three depths of two, four and six inches. The control systems for heating included both air and soil temperature sensing thermostats with the incorporation of a time clock and a time delay relay.

Results of this study indicate that the four grasses utilized gave varying responses to soil warming. Within the bermudagrasses, Tifgreen and Gene Tift were more responsive to soil warming than P-16. At College Station, Texas, St. Augustinegrass was maintained in an essentially green, growing condition throughout the winter period by means of supplemental soil warming, providing the turf is kept closely mowed and thatch build-up prevented.

Both the polyvinyl covered cables and non-insulated galvanized wire have given satisfactory results to date. Cable placement depths as deep as nine inches appeared to be satisfactory. The air temperature sensing thermostats were found to be the preferred and simplest indicator for controlling soil temperature. The air thermostats give better anticipation of when heat should be applied because of the lag involved in soil temperature variations.

A watt density of 10 watts per square foot was adequate to maintain the soil temperature at a depth of one inch near or above 60° F. during short periods of extreme cold.

Mowing height was particularly important in maintaining adequate quality turfs during winter soil warming. Mowing heights of 0.625 inch or less are required in order to maintain acceptable appearance and turfgrass quality. Warm season turfgrasses maintained at higher mowing heights were subject to freezing damage and loss of color during extreme cold periods at the heating levels utilized in this study.

Comments: Soil warming is a relatively recent innovation in turfgrass management. It is now being used on a limited basis on athletic turfs in the United States. Those associated with golf courses may think that soil warming will not be utilized on golf turfs. However, it may not be too many years before this management aid will become one of the additional tools in maintenance of quality golf course turfs.

The Effect of Cultivation, Topdressing, Lime, Nitrogen and Wetting Agents on Thatch Development in 1/4-inch Bentgrass Turf Over a Ten-year period.
R. E. Engel and R. B. Alderfer. 1967 Report on Turfgrass Research at Rutgers University New Jersey Agriculture Experiment Station Bulletin 818. pp. 32-45. 1968. (from the Department of Soils and Crops, Rutgers, the State University, New Brunswick, New Jersey).

The influence of various management practices on the rate and nature of thatch development were investigated over a 10 year period from 1954 to 1964. The field tests were initiated on a six year old Seaside creeping bentgrass turf which had been overseeded with Penncross creeping bentgrass. The turf was grown on a loam soil having a pH ranging from 6.0 to 6.5. Phosphorous and potash were not limiting during the period of the study. The turf was mowed three times a week at 0.25 inch with clippings removed.

During periods of moisture stress, approximately 0.5 inch of water was applied three times per week. The 10 thatch control treatments were applied in four replications arranged in a randomized block design with a plot size of 6 by 20 feet. The thatch control treatments are summarized in the accompanying table.

Continued on page 65

Beard *Continued from page 23*

Treatment

No.	Nature of Treatment
1.	Minimum maintenance—6 lb N/1,000 sq. ft., no topdressing, no cultivation and liming to maintain 6.0 pH.
2.	Spoon cultivation and vertical cut to break cores—late April, June and September.
3.	Spike (disc spiker)—two week intervals, June 1 - August 15.
4.	Groove cut machine—April and September.
5.	Groove cut plus topdressing—April and September.
6.	Wetting agent—two week intervals from June 1 to August 15.
7.	Ground limestone—25 lb/1000 sq. ft./year.
8.	Extra nitrogen fertilizer—total of 9 lb. N/1000 sq. ft./year.
9.	Topdressing—April, May, June, July, September.
10.	Combination of treatments 7, 8, and 9.

The organic matter accumulation was measured in terms of actual depth and by the weight loss occurring during ashing of the organic material. Additional observations were made of turfgrass quality, turfgrass color, disease incidence, annual bluegrass incidence, and occurrence of dry spots.

Topdressing at a rate of 0.2 cubic yards per 1,000 sq. ft. per year and groove cultivation were the most effective management practices in reducing the accumulation of thatch on a bentgrass turf maintained at one-quarter inch. Annual liming and spoon cultivation gave some indications of deterring thatch accumulation. In contrast, high nitrogen fertilization and the use of a wetting agent tended to increase thatch accumulation. Observations made

Continued on page 81

Beard *Continued from page 65*

during this study indicates that the topdressing and cultivation treatments utilized did not give complete control of thatch accumulation. Thus, mechanical removal may be required from time to time.

Observations concerning the occurrence of dry spots as well as water penetration ratings indicate that topdressing, cultivation and liming result in less problems with water penetration. These were the same treatments which resulted in the least amount of thatch accumulation. In addition, cultivation and topdressing improved soil aeration. The degree of improvement in soil aeration was by far the greatest from the topdressing treatment.

Over the 10 year period the highest quality turf resulted from the topdressing treatment. Although cultivation reduced the rate of thatch accumulation, it did not produce a corresponding increase in turfgrass quality similar to topdressing. The cultivation treatments resulted in a certain degree of turfgrass injury which offset the benefits of thatch control. The highest quality turf was produced from the treatment involving the combination of liming, extra nitrogen and topdressing. Although liming and extra nitrogen did not result in a higher turfgrass quality when used alone, there was an increase in turfgrass quality when used in combination with topdressing.

Under the conditions of this test, the wetting agent did not produce any definite improvement in turfgrass quality. The wetting agent did give some improvement in water penetration through dry spots but was only temporary and did not provide a long term solution to the problem. The extra nitrogen treatment resulted in a decrease in dollar spot while the topdressing treatment increased the incidence of dollar spot. The annual bluegrass composition of the bentgrass turf appeared less on the topdressed turf. In general, good overall turfgrass quality was associated with a low organic matter content at the surface and a good moisture relations. □