Watching Your Tees & Q's

By STEVE BATTEN AND BUD WHITE
United States Golf Association-Green Section
Southeastern Region

Monitoring Soil Temperatures

New interest has begun for the use of soil temperatures as turfgrass tools. The most common use of soil temperatures is the estimation of shoot growth rates of bermudagrass and overseeded grasses. Several superintendents in Florida are discovering the relationship of turfgrass physiological events as well as a year-to-year pattern-to-soil temperatures in their areas.

There are two periods of the year when soil temperatures become important. These are fall soil temperature decline and late spring fluctuation of temperatures from intermittent cycles of cool to warm. In North Florida decline of soil temperatures in late fall and early winter is a predictable pattern from year to year. In South Florida, late spring and early summer soil temperatures can vary yearly which could explain phenomenons such as the retention of overseeded heat tolerant turfgrasses.

In 1983, late spring transition of overseeded perennial ryegrass and creeping bentgrass was common throughout Florida. The bermudagrass was not actively growing as early as previous years, and the overseeded grasses did not decline in vigor as soon as usual. There are several reasons for this. One is the unusual high amount of late spring rainfall. Another is the increased heat tolerance of the new commercial cultivars of overseeded perennial ryegrass. But cooler soil temperatures had the greatest direct impact on the spring transition.

The greatest variance in soil temperatures is in the spring each year. In contrast, they become stable and very predictable during late summer and midwinter. One of the first golf course superintendents in South Florida to recognize this was Bill Whitaker of Seminole Golf Club in North Palm Beach. Bill has recorded daily readings of 4 inch soil temperatures at dawn for over four years. He has observed that temperatures were exactly the same for January 1982 and 1983. However, in May, June, and July, the soil temperatures were from 1-4 degrees cooler for 1983 than for 1982. He also observed that the Penncross overseeded bentgrass has a much slower rate of late spring/early summer transition this year under the same cultural practices and overseeding rates.

Bill Whitaker also noted that it was August 1983 before average soil temperatures caught up with the average of previous years. Bill's observations could explain the late active spring shoot growth of the Tifdwarf bermudagress reported on several coastal golf courses in his area.

Ron Hill of Amelia Island Plantation near Jacksonville is another golf course superintendent who records daily soil temperatures. Ron's observations of soil temperatures from 1981 to 1983 in northwestern Florida are different than Bill Whitaker's. Ron observed the lowest average soil temperatures in May of 1982 instead of 1983. Very little difference was noted between the average May soil temperatures of 1981 and 1983. June soil temperatures were the same in 1982 as in 1983.

Both Bill Whitaker and Ron Hill have long term objectives in recording soil temperatures. They are reviewing soil temperature patterns and relating them to their cultural practices, such as fall overseeding and spring transition. Bill Whitaker has also monitored the amount of bentgrass mower clippings by baskets that are removed from the greens. He has found a direct correlation between soil temperatures and the rate of shoot growth. Likewise, he has observed a similar response to the bermudagrass by observing when it starts late spring active growth and when it is recessed in the fall.

Amelia Island Plantation and Seminole Golf Club are seaside golf courses. Soil temperature patterns could vary inland as close as 5 miles on other golf courses. However, the range of temperatures in which certain physiological plant responses occur will be the same at any location. Therefore, more superintendents should consider recording soil temperatures. There could be a wealth of information gathered at different locations that could correlate soil temperatures to common turfgrass practices.

Predictions could be made for the optimal time for overseeding, the results of spring transition, the best date for the first annual aerification, and even the need for nitrogen fertilization prior to a golf event.

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If soil temperature information is to be recorded, then there are several factors to consider. First, they should be recorded at the same time every day. Bill and Ron each record theirs at dawn each day. At dawn the soil temperature at 3-4 inches is at a daily low point. Soil temperatures have approximately a one hour lag time for response from surface soil temperatures. Recording of air temperatures and rainfall should also be considered.

If daily highs are desired, then mid-afternoon around 3-4 o'clock, would be preferable. Daily averages could be estimated by recording both at dawn and in the afternoon. Keep notes on mower clippings, disease and other information in a log form. After three years, a pattern will begin to be apparent for soil temperatures on your golf course.

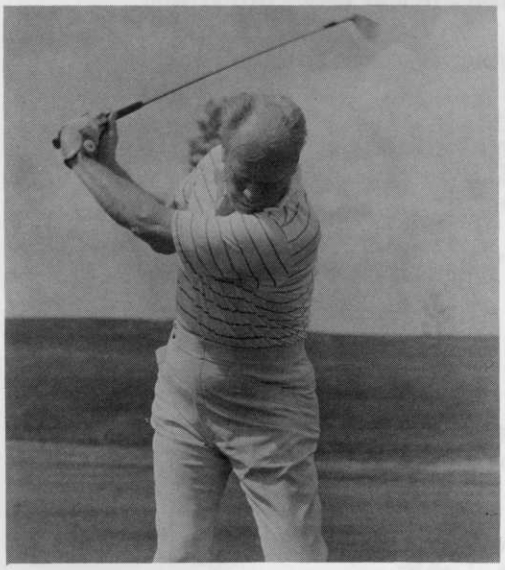
Soil temperatures are just one more way to observe the cycle of turfgrass events on the golf course.

AVERAGE 3 INCH SOIL TEMPERATURES AT AMELIA ISLAND PLANTATION IN DEGREES FAHRENHEIT

	1981	1982	1983
JANUARY			
first	45	57	53
middle	37	38	39
last	46	46	48
average	42.5	47.0	45.5
MAY			
first	65	61	64
middle	70	60	70
last	75	71	74
average	68.4	66.5	69.0
JUNE			
first	77	72	73
middle	79	75	74
last	76	76	75
average	77.5	73.5	74.0

AVERAGE 4 INCH SOIL TEMPERATURES AT SEMINOLE GOLF CLUB IN DEGREES FAHRENHEIT

	1982	1983
JANUARY		
first	66	66
middle	64	64
last	55	55
MAY		
first	68	68
middle	70	65
last	70	70
JUNE		
first	77	72
middle	76	74
last	78	73
JULY		
first	79	77
middle	81	75
last	81	73



PRESIDENT FORD OPENS EAGLE TRACE

President Ford in action. His swing has improved since retirement.