TURFGRASS CULTURAL PRACTICES REPORT

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The research reported herein was conducted at the Hancock Turfgrass Research Center. Financial support was provided by the Michigan Turfgrass Foundation and it is gratefully acknowledged.

Leaf Mulch Studies

Since 1990 three studies have been conducted at the Hancock Turfgrass Research Center (HTRC) that examine the feasibility of mulching leaf litter into existing turfgrass canopies. The first study examined different leaf rates (50 and 100 lbs. dry leaves / 1000 sq. ft.) and the timing of nitrogen fertility. The objectives were to determine if there were any negative effects of mulching tree leaves into the existing turfgrass canopy with a lawn mower and if the nitrogen fertility would enhance leaf litter decomposition. The study ended in 1996 concluding that there were no negative effects of mulching the leaves into the turf at the rates applied and that the nitrogen treatments did not aid in the degradation of the leaf litter. The second study was initiated in October, 1991 to examine the effects of mulching different leaf types (oak and maple) at a rate of 100 lbs. dry leaves per 1000 sq. ft. into a Midnight Kentucky bluegrass turf using a rotary push-mower. This study was concluded in the fall of 1998. Objectives included were to determine if the different leaf types would have an effect on soil pH and or turfgrass quality. Turfgrass quality increased on plots that had maple leaf treatments due to the fact that fewer broadleaf weed growth was observed in these plots. No differences were observed regarding soil pH for the duration of the field experiment. Soil cores taken in the fall of 1998 concluded that there was an increase in the amount of organic matter in plots that had oak and maple leaves mulched into them compared to the check plot (Table 1). Tissue analysis of clippings collected in October of 1998 also found that the grass plants that came from plots having leaves mulched into them also had a greater percentage of carbon and nitrogen. However, the carbon nitrogen ratio was not affected.

Table 1. % of Organic Matter in the Thatch Layer and the % of Carbon and Nitrogen in the Turfgrass Clippings of Poa pratensis cv. Midnight from October of 1998

	% Organic Matter	% C in turf tissue	% N in turf tissue	C/N Ratio
Control	7.5 b	1.7 b	0.13 b	13
Oak leaves	8.9 a	2.1 b	0.16 a	13
Maple Leaves	8.4 a	2.1 b	0.16 a	13
LSD at (0.05)	0.7 *	0.1 *	0.01 *	N.S.

* Significant at 0.01 probability level.
Means in columns followed by the same letter are not statistically different at the 5% level using the LSD mean separation test.

The previous studies led us to conclude that there were more benefits than negatives for turf managers and homeowners that mulch tree leaves into their existing sites. The question became "Could there be an expanded roll for turfgrass in the leaf litter collection process"? With decreasing landfill space many states have looked to farm fields as a means of alleviating their leaf litter disposal. Truckloads of leaves were taken to farms and the leaves were tilled into the soil. However, it was found that this activity had the potential to increase the C/N ratio to 50 to 1. When the C/N ration goes above 30 to 1 nitrogen inputs are required to put the system in balance to make nitrogen available to the plant for uptake. It was also determined that some loading of heavy metals was taking place due to the collection process of the leaf litter and automobile parts were being reported by farmers who partook in the exercise. With that in mind our third leaf mulching study was initiated in October of 1995. The objective was to determine if low maintenance turfgrass sites could take heavy loads of deciduous leaves and maintain their usefulness. The study consisted of mulching a mix of deciduous leafs into an existing sunny seed mix turf (Kentucky bluegrass, perennial rye, and fine fescue). Excessive dry leaf rates of 150, 300 and 450 lbs. per 1000 sq. ft. were mulched in with the aid of a mulching mower. Two mower deck heights (1.5 and 3 inches) were included in the study to determine if deck height had a significant impact on the degradation of the leaf

Table 8a. Controlled Release Fertility Study 1999 Initiated 8 June, 1999 Color ratings 9=excellent, 6 and above is acceptable, and 1 = dead or chlorotic turf

	14 June	21 June	29 June	6 July	12 July	20 July	26 July
EXP 43-0-0 A	4.5 fgh	5.5 ef	7.2 b	7.9 bc	7.9 ab	7.4 bc	7.1 ab
EXP 41-0-0 A	5.0 ef	6.5 bc	8.4 a	8.2 ab	7.9 ab	7.0 cd	6.9 b
EXP 41-0-0 B	4.7 fg	5.9 de	8.4 a	8.4 a	8.1 a	7.6 ab	7.1 ab
EXP 41-0-0 C	4.5 fgh	6.2 cd	8.4 a	8.2 ab	8.0 a	7.2 bcd	6.9 b
POLYON	4.4 gh	4.6 g	5.7 fg	7.2 e	7.5 bc	7.9 a	7.5 a
POLY PLUS	6.2 bc	6.6 bc	6.6 cd	7.4 de	6.7 d	6.9 d	6.6 bc
NUTRALENE	6.6 b	6.9 b	6.4 de	7.1 e	6.5 d	6.0e	6.1 cd
TRIKOTE	5.4 de	6.9 b	8.4 a	8.0 abc	7.4 c	6.9 d	7.0 ab
NITROFORM	5.9 cd	6.2 cd	6.0 ef	7.1 e	5.7 e	5.6 e	5.7 d
IBDU	5.0 ef	5.4 f	5.5 g	7.0 ef	6.0 e	5.9 e	6.0 d
UREA	8.0 a	8.0 a	6.9 bc	7.7 cd	6.7 d	6.0 e	6.0 d
CHECK	4.0 h	4.4 g	4.5 h	6.6 f	3.5 f	4.7 f	4.5 e
probability @ 0.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00
LSD	0.51	0.43	0.44	0.42	0.46	0.45	0.51

Means in columns followed by the same letter are not statistically different to the 5% level using the LSD mean separation test.

Table 8b. Controlled Release Fertility Study 1999
Initiated 8 June, 1999
Color ratings 9=excellent, 6 and above is acceptable, and 1 = dead or chlorotic turf

	2 Aug	10 Aug	16 Aug	30 Aug	7 Sept	13 Sept	20 Sept
EXP 43-0-0 A	6.6 b	6.9 ab	7.2 a	6.7 a	6.5 ab	6.6 ab	6.1 bc
EXP 41-0-0 A	7.0 b	6.4 bc	6.7 abc	6.4 ab	6.5 ab	6.4 ab	6.5 a
EXP 41-0-0 B	6.7 b	6.4 bc	7.0 ab	5.7 bc	6.5 ab	6.1 bc	6.1 bc
EXP 41-0-0 C	6.6 b	6.5 bc	6.7 abc	6.5 ab	6.6 ab	6.7 ab	6.2 ab
POLYON	7.5 a	7.3 a	7.4 a	6.7 a	6.6 ab	7.0 a	6.5 a
POLY PLUS	6.7 b	6.9 ab	7.2 a	6.7 a	6.6 ab	6.6 ab	6.5 a
NUTRALENE	6.1 c	6.5 bc	6.6 abc	6.1 abc	6.2 bc	6.6 ab	6.2 ab
TRIKOTE	6.6 b	6.6 bc	7.0 ab	6.5 ab	6.4 bc	6.5 ab	6.4 ab
NITROFORM	5.6 d	6.1 cd	6.4 bc	6.0 abc	6.2 bc	6.7 ab	6.5 a
IBDU	6.6 b	6.6 bc	7.1 ab	6.5 ab	6.9 a	7.1 a	6.5 a
UREA	6.0 cd	5.6 d	6.0 c	5.4 c	6.0 c	6.0 bc	6.1 bc
CHECK	4.7 e	4.9 e	5.1 d	4.4 d	4.7 d	5.4 c	5.9 c
probability @ 0.05	0.00	0.00	0.00	0.00	0.00	0.01	0.00
LSD	0.49	0.61	0.86	0.77	0.49	0.84	0.29

Means in columns followed by the same letter are not statistically different to the 5% level using the LSD mean separation test.

WETTING AGENT STUDY

In a container study, the effects of Primer wetting agent and Midorich soil conditioner (at two application rates) on water distribution patterns in a sandy rootzone mix and a soil with a higher content of silt and clay (sand/soil) were investigated. Table 10 shows volumetric soil moisture content in soil columns at different depths averaged over all sampling dates after repeated applications of Midorich soil conditioner and Primer wetting agent.

Table 10. Soil moisture content for different soils at different depths averaged over all sampling days.

Treatment/Depth	Soil moisture (Vol.%) 5 cm Sand	5 cm Sand/Soil	15 cm Sand	15 cm Sand/Soil	25 cm Sand	25 cm Sand/Soil
Primer	9.3 a	16.1 a	15.3 a	20.1 a	24.3 a	25.1 a
Midorich (high)	10.1 b	15.9 b	13.4 b	20.7 a	21.3 b	24.9 a
Midorich (low)	9.4 a	16.2 b	13.3 bc	20.8 a	22.5 b	21.2 b
Water	9.7 ab	18.1 b	12.6 c	20.7 a	18.7 c	25.7 a

† values in columns followed by the same letter are not significantly different from each other (a=0.05, Fisher's LSD test for multiple comparison of means).

For depths greater than 5 cm, high sand content rootzones treated with Primer wetting agent show significantly greater water holding capacity than rootzones treated with water or Midorich soil conditioner. At 5 cm depth Midorich treated sand columns showed significantly greater soil moisture content compared to columns treated with water or Primer.

The Sloping Green

This project continues to receive considerable attention. Turf was established in 1998 on three mixes: sand; sand: peat: and sand: soil. The sand plots established most slowly due to low water holding capacity and were the slowest to green up in the spring. As expected, after application of adequate water sand plots dried out faster than sand: peat or sand: soil plots. On some dates the sand: peat plots performed better than sand: soil plots. This was reflected in the soil moisture levels observed in the plots and in the surface temperature measurements. When the topmix in thinner at the high part of the plot there was more moisture in the soil than when the regular 12 inch depth was used. Moisture data support our hypothesis that modification of the depth enhances moisture conditions in the green. Sand plots exhibited more dollarspot than on other mixes. More insights and data are presented on this study elsewhere in the proceedings in a paper authored by Dr. Bernd Leinauer.

Golf spike traction survey

A special thanks to Dr. John Rogers III, John Hardy, and John Sorochan whose help was instrumental in conducting this survey. Alternative spikes have become anything but alternative as the majority of golf courses in America have banned 8mm metal spikes. The banning began, in part, by golfers demanding faster green speeds. As a result golf course superintendents went to tighter mowing heights on the putting surface. The shorter turf required meticulous management practices that resulted in the uplifting of the turfgrass plant from the soil as golfers traversed the green in metal spikes. This uplifting of the plant, commonly called "Christmas trees" by pro golfers, led to a small group a private clubs banning the 8mm metal spike in the early to mid 90's. However, it was probably damage to infrastructure that created the landslide of golf clubs that has banned the metal spike. In January of 1995, 55 golf course in the world had banned metal spikes, by January of 1998 over 3000 courses joined in the ban. Through this time-span (with the aid of numerous research) it has become commonly accepted that the 8mm spike produced the most damage to the putting surface and to infrastructure. It has also been commonly accepted that the alternative spikes are more comfortable on the legs and lower- back after a round of golf. However, it is also regarded as fact that the 8mm metal spike produced the best traction during the swing and on wet slopes. For this reason Michigan State University (MSU) conducted a survey on July 13, 1999 to find-out if there are any alternative spikes on the market that produce traction that is superior or equivalent to the banned 8mm metal spike.

The study was conducted at the Forest Akers East Driving Range in East Lansing on July 13, 1999. Seventy volunteers from across Michigan, Indiana and Ohio took part in the survey. All participants were capable of wearing size 11 golf shoes. While signing in to participate in the survey participants were asked to NOT look at the soles of their shoes while lacing them on. Afterwards, the participants began an obstacle course by lacing on a pair of golf shoes and proceeded to the tee and hit golf balls. After hitting the golf balls they were asked to rate the golf shoe for traction on a scale of 1 to 5. 1 =