TURFGRASS CULTURAL PRACTICES REPORT

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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

to speak at this year's GCSAA National Convention in New Orleans. With such international credibility MSU researchers were invited to Germany and Austria in the spring of 1999 to traffic putting greens with different alternative spikes at six different golf courses. Afterwards the members of the clubs were invited to rate the wear produced by the spikes on their putting surface. As in similar studies performed in Michigan and Ohio by MSU the 8mm and 6mm metal spikes received the worst rating regarding wear on the putting surfaces. None of the alternative spikes received a rating that would suggest banning the spikes from the golf course.

Controlled Release Fertility Study

On June 8, 1999 a controlled release fertility study was initiated on a Kentucky bluegrass turf at the Hancock Turfgrass Research Center at Michigan State University. The grass was maintained at a 2.5-inch cutting height and was mowed 2 times per week. The study was designed to evaluate four experimental slow release products as compared to six commercially available slow release fertilizers and urea. All treatments were applied at the rates of 1.5 lbs. N/1000 sq. ft. A check plot was included to determine the quickness and duration of turfgrass response to the nitrogen carriers. A total of 12 different treatments were in the study. The treatments are outlined in Tables 1 and 2. There were four replications of each treatment and each plot was 4 feet by 12 feet.

Color ratings for the season are presented in Tables 8a and 8b. As expected the urea received the highest color ratings for the first two weeks after application. On June 14 only the urea, Poly Plus, and Nutralene received numerical values indicating an acceptable turfgrass color. On June 21, two weeks after application, the EXP 43-0-0 A, EXP 41-0-0 B, Polyon, and IBDU were still not receiving acceptable ratings, although all products, with the exception of the Polyon, did receive statistically greater values than the check plot. On June 29, EXP 41-0-0 A, B, and C, along with the Trikote, received the highest color ratings. The Polyon and IBDU still received values less than acceptable yet statistically greater than the check plot. On July 6, four weeks after application, the Polyon and IBDU received acceptable color ratings for the first time. The EXP 41-0-0 series and the Trikote continued to receive a share of the statistically highest color ratings. By July 12, 5 weeks after treatment, all Pursell EXP's shared the highest color ratings. Also on that date the Nitroform started a three-week period of receiving ratings that were considered unacceptable. On July 20, six weeks after application, Polyon received the highest numerical rating statistically sharing the highest color rating with the EXP 41-0-0 B. For the remainder of the study the Polyon received a share of the highest color rating. Also noteworthy on July 20 the IBDU received a below acceptable color rating.

Overall, Polyon received the most statistically significant share of the highest color ratings (nine times). The EXP 41-0-0 A and C received a share of the highest color rating eight times while the EXP 41-0-0 B, EXP 43-0-0, Trikote, and IBDU received a share of the highest color rating seven times apiece. The other products and the number of dates they received a share of the highest color rating are in decreasing order Poly Plus (6 times) Nutralene (4 times) Nitroform (3 times) and urea (2 times).

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.