

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 leaves 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

were taken with an infrared thermometer. During moisture stress periods in 1999 there were obvious differences in turf quality. Plots irrigated daily resulted in more uniform turf quality than plots irrigated once per week during maximum moisture stress.

In Table 6 surface temperature data is reported from June 22, 1999. On the morning of June 22 the weekly irrigation treatments were applied. In the early afternoon the daily treatment was applied and approximately an hour afterwards, the surface temperatures were collected. On June 22 an interaction existed between irrigation treatment and turfgrass species. Statistically the tall fescue maintained the lowest temperature regardless of irrigation treatment. Tall fescue is regarded as having better drought tolerance than most cool season species and the data surface temperatures collected on the non-irrigated plots lend credence to the claim. Overall, the differences in surface temperatures between the irrigated and none irrigated plots exceeded 20 degrees. There are many dates that surface temperatures were recorded in the summer of 1999 that have yet to be analyzed statistically.

Table 6. Surface Temperatures from irrigation Timing Turfgrass Species Study. Data collected June 22, 1999

	<u>Daily Irrigation</u>	<u>Weekly Irrigation</u>	<u>No Irrigation</u>
Kentucky Bluegrass	82.2 de	86.6 c	106.1 a
Perennial Ryegrass	81.6 e	83.9 d	106.5 a
Tall Fescue	81.9 de	83.3 de	102.4 b
LSD at (0.05)		2.1*	

* Significant at 0.01 probability level.

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

On September 30, 1999 broadleaf weed counts were taken. Data was entered and statistically analyzed. Data in Table 7 shows an interaction that was recorded between irrigation and fertility. Early in this long-term study there is one interesting trend worth drawing attention too. The corn gluten meal treatment consistently produced the lowest amount of broadleaf weeds regardless of the irrigation treatment. The corn gluten meal was included in the study upon the suggestion of an MTF member because it was rumored to have pre-emergent herbicidal activity on broadleaf weeds. So far so good! Dave Gilstrap and Kevin Franks will continue this study given the current retirement of Paul Rieke.

Table 7. Broadleaf weed counts from Irrigation Timing Turfgrass Species Study. Data collected September 30, 1999.

<u>N carrier</u>	<u>Annual N/M²</u>	<u>Daily Irrigation</u>	<u>Weekly Irrigation</u>	<u>No Irrigation</u>
Urea	2	1.1 de	0.4 de	0.1 e
Urea	2	3.2 abc	1.6 cde	0.4 de
Urea	3.5	1.3 cde	3.6 ab	0.2 e
Urea	3.5	4.4 a	1.4 cde	0.0 e
Urea	4	0.3 bcd	0.9 de	0.1 e
Urea	5	2.3 bcd	1.8 bcd	0.3 e
Urea	5	4.8 a	4.7 a	0.1 e
Corn Glutton	2	0.2 e	1.6 cde	0.0 e
None	0	3.7 ab	0.9 de	0.7 de
LSD at (0.05)			1.0*	

* Significant at 0.01 probability level.

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

Traveling Golf Spike Study II

Alternative golf spikes have become common in the United States. Thanks in part to research financed by the MTF and the Golf Association of Michigan; MSU has become recognized as the world leader regarding alternative spike issues. This is evidenced by our communications with the Australian Golf Course Superintendents Association, the New Zealand Sports Turf Institute, The Greenkeeper Verband Deutschland, publications in Golf Course Management Magazine, and an invite to Thom Nikolai

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).