Leaf Mulch Forum "Research and Real-World Techniques"

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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.

In 1991 an oak and maple leaf mulching study was initiated at Michigan State University to study the effects of mulching different types of leaves into an existing turfgrass stand. Both leaf types were mulched into a "Midnight" Kentucky bluegrass turf at the rate of 100 lbs of dry leaves per 1000 sq. ft. (approximately ankle height in depth). Check plots receiving no mulched tree leaves were included. A second variable, nitrogen, was also included in the study. On improved bluegrass varieties, such as "Midnight", proper fertility is a must to maintain the desired stand of grass. Nitrogen was applied at 4 lbs. N per 1000 sq. ft. annually with either a spring or fall emphasis. Spring emphasis applications were applied in April, May, July, and August while the fall emphasis were applied in June, July, September, and October. A check plot with no nitrogen was included to further examine the impact nitrogen had on the decomposition of the tree leaves. There were three replications of each treatment. Plots measured 4' x 12'.

In Tables 1 and 2 are the color and quality ratings taken regarding leaf type. The data reflects an average regardless of nitrogen treatment thus the numbers represent an average of nine plots for each treatment. No statistically significant data occurs regarding turfgrass color. In Table 2 the Maple leaf treated plots had statistically greater quality than the check plot on two dates and statistically greater quality than the oak leaf plots on one date. The oak leaf plots had statistically greater quality than the check plot on one date.

Table 1.

Oak & Maple Leaf Mulch Study 1997

Initiated 1991

Color Ratings 9 = excellent, 6 and better is acceptable, 1 = dead

	May 3	June 13	July 15	August 25
No leaves	6.5	6.5	6.9	7.4
Oak	6.8	6.2	6.9	7.4
Maple	6.8	6.2	7.5	7.4
Probability	n.s.	n.s.	n.s.	n.s.
LSD @ .05	———	———	———	———

n.s. = not significant

Table 2.

Oak & Maple Leaf Mulch Study 1997

Initiated 1991

Quality Ratings 9 = excellent, 6 and better is acceptable, 1 = dead

	May 23	June 13	July 15	August 25
No leaves	5.0 c	5.8	5.3 b	6.1
Oak	5.9 b	5.7	5.8 b	6.2
Maple	6.7 a	6.2	7.2 a	7.0
Probability	0.00*	n.s.	0.00	0.00
LSD @ .05	0.5	———	1.0	n.s.

Means in Columns followed by the same letter are not significantly different at the 5% level using the LSD mean separation test. (n.s. = not significant)

* Statistical interaction exist between leaf type and nitrogen program(see Table 4).

In 1995 no weeds grew in any plots treated with maple leaves. In order to determine if maple leaves

had an effect on broadleaf weed growth no herbicides have been applied on the plots since August of 1995. In Table 3 are the broad leaf weeds counts per mulching treatment. On May 22 the number of dandelion flowers were counted on each plot. Dandelions are bi-annuals that flower during the second season. Consequently, the greater number of flowers are a reflection of the age and health of the plants. The broadleaf weeds counts that were obtained on May 23, July 15, and August 25 were generally dandelion and plantain. Clover has slowly been growing into several plots and has taken over 50 % of one of the check plots. Clover counts were not taken, but the clover growth was taken into account for quality ratings.

Table 3.

Oak & Maple Leaf Mulch Study 1997

Initiated 1991

Broad Leaf Weed Counts

	Number of dandelion flowers.	**Number of broadleaf weeds per plot**		
	May 22	May 23	July 15	August 25
No leaves	33 a	8 a	11 a	15
Oak leaves	30 a	4 ab	8 ab	13
Maple leaves	4 b	1 a	1 b	2
lsd @ 0.05	19.02	2.7	6.6	11.5
Probability	0.01*	0.01*	0.02*	0.07

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

* Statistical interaction exist between leaf type and nitrogen program(see Table 4).

Table 4

Oak & Maple Leaf Mulch Study 1997

Initiated 1991

Statistically Significant Interactions Between Leaf Type & Nitrogen Treatment.

	Quality Rating	**Dandelion Flowers**	**Broadleaf Weed Counts**	
	May 23	May 22	May 23	July 15
No Leaves No Nitrogen	3.3 d	85.0 a	17. 7 a	27.0 a
No Leaves Spring N Program	6.0 bc	7.3 b	2.3 c	3.0 b
No Leaves Fall N Program	5.7 c	7.3 b	3.3 c	4.7 b
Oak Leaves No Nitrogen	3.8 d	83.7 a	11.0 b	20.7 a
Oak Leaves Spring N Program	6.7 ab	5.7 b	1.3 c	1.0 b
Oak Leaves Fall N Program	7.3 a	0.3 b	0.7 c	1.7 b
Maple Leaves No Nitrogen	6.2 bc	9.0 b	2.3 c	2.7 b
Maple Leaves Spring N Program	6.7 ab	0.7 b	1.0 c	1.3 b
Maple Leaves Fall N Program	7.2 a	0.3 b	0.3 c	0.3 b
Probability	0.00	0.02	0.03	0.05

LSD @ .05	0.8	33.7		5.4	11.5

In Table 4 are interactions that existed between leaf mulch type and nitrogen program. Notice that the no leaves no nitrogen and the oak leaves no nitrogen both have statistically significantly higher averages in weed and dandelion flower counts in comparison to the maple leaf with no nitrogen plots. If the lack of weeds on the maple leaf plots is due to differences in degradation of the tree leaf types or that maples leaves have allelopathic properties has not been determined to date.

In Tables 5 and 6 are soil test results from May- and October 1997, respectively. There was an initial concern of oak leaves changing the pH of the soil when the study was initiated in 1991. However, no changes in pH have occurred after six seasons of mulching tree leaves. There have also been no changes regarding phosphorous or potassium. Statistically significant data exists regarding calcium and magnesium in May of 1997 and calcium of October of 1997. However, these changes are slight enough that they would not be biologically significant.

Table 5.

Oak & Maple Leaf Mulch Study 1997
Initiated 1991
Soil Test Results from May 1997

	pH	Phosphorus lbs/A	Potassiumlbs/A	Calciumlbs/A	Magnesiumlbs/A
Control	7.5	26	72	1608 b	346 b
Oak	7.5	27	83	1799 a	373 a
Maple	7.5	25	81	1852 a	364 a
Prob.	n.s.	n.s.	n.s.	0.03	0.00
LSD @ .05	——	——	——	181.6	14.4

Means in Columns followed by the same letter are not significantly different at the 5% level using the LSD mean separation test. (n.s. = not significant)

Table 6.

Oak & Maple Leaf Mulch Study 1997
Initiated 1991
Soil Test Results from October 1997

	pH	Phosphorus lbs/A	Potassiumlbs/A	Calciumlbs/A	Magnesiumlbs/A
Control	7.4	23	77	1866 b	372
Oak	7.3	26	97	2210 a	427
Maple	7.4	24	89	2231 a	402
Prob.	n.s.	n.s.	n.s.	0.04	n.s.
LSD @ .05	——	——	——	309.5	——

Means in Columns followed by the same letter are not significantly different at the 5% level using the LSD mean separation test. (n.s. = not significant)

Conclusions

The disposal of yard waste to landfills was eliminated as the Solid Waste Management act became effective March 27, 1995. The federal act also made the Clean Air Act of 1970 more stringent by prohibiting the open burning of leaves in municipalities with populations of 7,500 or more. Compost piles are prohibited in many areas as urban sprawl continues and new residents find the odor offensive. Tree-leaf disposal has become an economic problem, as well as a laborious one. While the Solid Waste Management Act relieved the burden on landfills it created a leaf disposal problem in the fall. New strategies for handling leaf litter have become necessary. Mulching tree leaves into an existing turfgrass stand appears to be a viable alternative that should be considered as a portion of the leaf-litter disposal problem.