

## **Effect of Mulched Maple Leaves on Broadleaf Weeds**

Dr. John N. Rogers III, and Alec Kowalewski

Department of Crop and Soil Science

Michigan State University

October 2005

### **Introduction**

Work at Michigan State University (Nikolai and Rieke, 1999) showed that maple leaf litter could be used as mulch with no apparent deleterious effects to established turfgrass canopies as quantified by quality ratings, C/N ratio or soil samples. Unrelated to the objectives of the initial research, turfgrass plots that were treated with maple mulch had statistically fewer weeds than the oak leaf treated or control plots. This presents the opportunity for a new study, which can compare the effects of the different mulched maple species (red maple, sugar maple, and silver maple) applied as an organic broadleaf control.

**Hypothesis:** Maple (*Acer*) leaf mulch can be an effective organic herbicide to the control the germination and/or the growth of broadleaf weeds (*dandelion*, *Taraxacum officinale*) in turfgrass.

### **Objectives:**

1. Quantify the effectiveness of maple leaf mulch as an organic herbicide for turfgrass under field conditions.
2. Identify which maple species give the most effective weed control in turfgrass.
3. Establish application rate (particle size and depth of mulch application/unit area) for most effective weed control in turfgrass.

### **Field Experimentation**

Field experimentation was initiated in August of 2003 at the MSU Hancock Turfgrass Research Center to examine the allelopathic activity of maple mulch under

natural Michigan environmental conditions. Established turfgrass plots were preconditioned to increase broadleaf weed infestation. Dandelion seed was applied to the plots to increase the preexisting seed bank level of broadleaf weeds. Leaves from the four following maple species [silver maple, *Acer saccharinum*; red maple, *Acer rubrum*; sugar maple, and sugar maple (high sugar content), *Acer saccharum*] were applied at two rates (0.5kg/m<sup>2</sup> and 1.5kg/m<sup>2</sup>) and at two particles sizes [medium (2.5 to 6.4 cm) and fine (less than 1.3 cm)] to the preconditioned plots described above. Control treatments consist of non-maple leaf mulch applications (red oak; *Quercus rubra*) and no mulch. Monthly dandelion weed count data was collected throughout the summer.

This field study was repeated on a second research plot in August 2005 to confirm first year results, and the original research plot received a second mulch treatment to determine the effects of multiple maple leaf mulch applications on preexisting dandelion populations.

## **Results**

Differences after the first year of application (2004) and the second consecutive mulch application (2005) were found between the different leaf species, application rates, and species x application rate interactions (Table 1). These results suggest that sugar maple (high sugar content) is capable of providing the greatest dandelion control in comparison to the other leaf species. In all instances below all leaf species resulted in fewer dandelions in comparison to the control. Differences in application rates suggest a correlation increasing rates and increased weed control. In all instances the high rate had fewer dandelions than the low rate, which in turn had fewer dandelions than the control.

Interaction results show that all leaf species applied at the high rate resulted in fewer dandelions than applied at the low rate.

**Table 1:** Effects of tree leaf mulch on dandelion weed counts<sup>1</sup> after one annual mulch application (2004) and two consecutive annual mulch applications (2005) HTRC, East Lansing, MI.

Leaf Species	One mulch application (2004)		Two consecutive mulch applications (2005)	
	Jul/07/04	Aug/03/04	Jun/15/05	Jul/05/05
control	21.4 a	36.8 a	40.3 a	56.8 a
red maple	7.7 b	18.7 bc	24.5 b	41.0 b
red oak	7.0 bc	17.6 bc	19.5 c	31.6 bc
silver maple	9.3 b	20.9 b	26.5 b	31.9 bc
sugar maple	4.2 c	19.1 bc	23.2 bc	30.0 c
sugar maple*	8.3 b	15.2 c	18.4 c	24.3 c
<b>Application Rate</b>				
control	21.4 a	36.8 a	40.3 a	56.8 a
low	11.1 b	21.3 b	24.7 b	35.1 b
high	6.2 c	15.9 c	19.0 c	28.5 b
<b>Species x Rate</b>				
control	21.4 a	ns	ns	ns
red maple x high	5.2 ef	ns	ns	ns
red maple x low	16.6 ab	ns	ns	ns
red oak x high	6.5 def	ns	ns	ns
red oak x low	8.8 cde	ns	ns	ns
silver maple x high	8.9 cd	ns	ns	ns
silver maple x low	14.2 abc	ns	ns	ns
sugar maple x high	3.5 f	ns	ns	ns
sugar maple x low	12.3 bcd	ns	ns	ns
sugar maple* x high	6.7 def	ns	ns	ns
sugar maple* x low	8.8 cd	ns	ns	ns

<sup>1</sup>values represent average number of dandelions per plot

lower case letters represent significant differences

ns = No Significant Differences

Species x particle size and species x particle size x application rate interactions were inconclusive

control = no mulch

\* sugar maple (high sugar content)

Repeating the initial field experiment in 2005 on a second research plot confirmed application rate results only (Table 2). Leaf species and interaction results were however inconclusive, and unable to support 2004 results.

**Table 2:** Effects of one fall application of tree leaf mulch on dandelion weed counts<sup>1</sup> after one annual mulch application (2005) HTRC, East Lansing, MI.

<b>Leaf Species</b>	<b>Jun/15/05</b>	<b>Jul/05/05</b>
control	0.92 ab	ns
red maple	0.49 b	ns
red oak	0.38 b	ns
silver maple	1.82 a	ns
sugar maple	0.33 b	ns
sugar maple*	0.77 ab	ns
<b>Application Rate</b>		
control	0.92 ab	11.08 a
low	1.49 a	7.91 a
high	0.26 b	3.34 b

<sup>1</sup> values represent average number of dandelions per plot

lower case letters represent significant differences

ns = No Significant Differences

Interactions were not significantly different and are not shown

control = no mulch

\* sugar maple (high sugar content)

### **Research Continuation**

These results provide the justification for the continuation of this experiment.

Repeating the experiment will be necessary to confirm the results and determine possible long-term effects. This experimentation will also be accompanied by further research to determine the factors responsible for the current results. The procedures defined in this

study will not only serve a potential form of organic weed control, but also as an effective recycling method.

**2006 Budget**

<b>Project</b>	<b>Research \$</b>	<b>Support \$</b>	<b>Total Funding</b>
<u>Leaf Mulch Study</u>			
Graduate Assistanship	8,000		
Student Labor	2,000		
Travel			
Data collection and Testing	1,500		
	<i>subtotal</i>		11,500