Ontario Turfgrass Research Foundation

Final Report 2012

Weed suppression in turfgrass using different species and thicknesses of leaf mulch

Peter Purvis
Guelph Turfgrass Institute, University of Guelph

Pam Charbonneau
Ontario Ministry of Agriculture Food and Rural Affairs

Executive Summary

The objective of this study was to determine the effectiveness of mulched tree leaves to control broadleaf weeds in lawn-type turf. The influence of mulched leaves on overall turf and soil quality was also evaluated. In the fall of 2010 and 2011, leaves of Norway maple, silver maple, sugar maple, ginkgo and white ash, and needles of eastern white pine were collected, separately mulched and applied to weed infested turf at the Guelph Turfgrass Institute. As a comparison, commercially available bark mulch, compost, fertilizer and a broadleaf herbicide were also applied as separate treatments.

Application of leaf mulch did not significantly (statistically) reduce the number of weeds per plot. However, there were some trends in the data. The thickest depth (5-cm) of a composite blend of all leaves tended to have fewer weeds than the weedy control plot (no leaf mulch applied). The addition of leaf mulch did not alter the physical or chemical properties of the soil. It is significant to note that there were no detrimental effects on turfgrass colour or quality caused by any leaf mulch treatment, even at the maximum depth of application.

Table 1. Financial Report

			Total ($)
Labour	Research Technician	252.6 hours x $27.71/hour	7000
Lawn mower maintenance and supplies			500
Materials and Equipment	Trailer	$2136 / 2 (Cost shared with separate project)	1068
	Soil probe		218
Laboratory Analysis	Soil samples	99 samples x $26/sample: ($14 for P, K, Mg and pH; $12 for OM)	2574
	Leaf mulch samples	4 x $20 (N, P, K, Ca, Mg)	80
Plot Maintenance	Miscellaneous supplies i.e. rakes; leaf bags; small tools, stakes, paint etc		500

Introduction

Many home owners physically remove leaves from their lawns each fall and put them in bags or move them onto the street for pick up. However, some municipalities are tightening their rules on curb-side leaf collection (Figure 1). Mulching tree leaves is an alternative to raking and has been shown to reduce some weed populations in turf. Turfgrass managers need effective non-chemical methods for controlling weeds and promoting high quality soil and turf, particularly since cosmetic pesticide use is banned in Ontario. This study

examined the effectiveness of mulched tree leaves applied at two thicknesses to control broadleaf weeds in established lawn-type turf.

Objectives

1. To determine the effectiveness of leaf mulch from six different tree species, and a combination of leaves from all species, to control broadleaf weeds in established, lawn-type turf.

2. To determine the depth of leaf mulch that will provide the most effective weed control.

3. To determine the effectiveness of bark mulch and compost at two thicknesses and of two rates of applied nitrogen as weed control measures.

4. To evaluate the overall turf and soil quality with each treatment.

Methods

- Eighty-eight plots (22 treatments x 4 replications; each plot 2-m x 2-m in size) were created on weed infested lawn-type turf at the Guelph Turfgrass Institute in the fall of 2010.

- Leaves of Norway maple, silver maple, sugar maple, ginkgo and white ash, and needles of eastern white pine were collected from The Arboretum at the University of Guelph and separately mulched using a commercially available mulching lawn mower.

- Treatments included:

  - mulched leaves from each separate tree species applied at two depths (2.5-cm or 5-cm thick).
  - a composite blend of all mulched leaf species applied at two depths (2.5-cm and 5-cm).
  - commercially available bark mulch and compost each applied at two thicknesses (1.25-cm and 2.5-cm; purchased from ALLTREAT Farms, Elmira ON).
  - fertilizer (urea; 46-0-0) applied at two rates (0.25 and 0.50 kg N per 100 m^2) in May, September and October for a seasonal total of 0.75 and 1.50 kg N per 100 m^2.
  - a broadleaf herbicide (Par 3 applied at 55 ml per 100 m^2).
  - a weedy control plot with no treatment application.

- The plot area was established and treatments initially applied in November 2010.

- In 2011 and 2012, the plot area was maintained as lawn-type turf. The area was mowed at a height of 7-cm once per week. The plots were not irrigated.

- In 2012, weed counts were taken in May, August and October; Turfgrass canopy reflectance readings (an indicator of turf quality and colour) were taken in May, June and October.

- Soil samples were collected in October 2012 and send to Laboratory Services at the University of Guelph for nutrient and organic matter analysis.

Result and Discussion

Soil Analysis

There were no significant differences among treatments for soil organic matter content, nutrient content or soil pH levels (Table 2). Even treatments that received a 5-cm thickness of leaf mulch applied two years in a row had similar physical and chemical properties as plots with no mulch applied. It is likely that the duration of this trial was too short to detect changes in soil properties. The physical and chemical differences in the soil would likely only show up after many years of leaf mulch application.

Weed Counts

The numbers of weeds per plot were counted in May, August and October in 2012 (Table 3). The predominant weed species (from most to least) were dandelion, white clover, black medic, birdsfoot trefoil, narrow-leaf plantain and chickweed. In May, the average number of weeds per plot was 42%. This number dropped to 21% during the heat and drought of August. Weed counts increased again to an average of 34% per plot in October.

As expected on all sampling dates, the least number of weeds were found in the plots sprayed with a broadleaf herbicide (Table 3 and 4). In contrast, there were no significant (statistical) differences in the number of weeds per plot among the remaining treatments.

However, though not statistically different, a few trends did emerge from the data. There tended to be the fewer weeds in the plots where the maximum

thickness (5-cm depth) of a composite blend of all leaves was applied. For example, in May, August and October, respectively, plots receiving a 5-cm depth of all the leaves combined had 29, 14 and 29% weed cover, whereas the corresponding weedy control plots had 43, 24 and 44% weed cover.

There also tended to be fewer weeds in plots that received nitrogen fertilizer. For example, in May, August and October, respectively, plots receiving 0.50 kg N/100m^2 had 29, 18 and 24% weed cover, whereas the corresponding weedy control plots had 43, 24 and 44% weed cover.

In 2011, weed counts were also reduced in the plots where a composite blend of all leaves was applied and where fertilizer was applied, although the trends were not as strong as in 2012 (Table 4).

Turfgrass Quality

There tended to be no difference among treatments in turf colour and quality throughout the 2011 and 2012 research seasons (data not shown). However, it is significant to note that there were no detrimental effects on turfgrass colour and quality caused by any leaf mulch treatment, even at the maximum depth of application.

Future Research

Following on from the positive trends of this OTRF funded research, a second trial was initiated in November 2012. The objectives of this new trial were: to determine the effectiveness of a composite blend of mulched leaves applied at a 5-cm depth; to determine the effectiveness of fertilizer application; and to determine the effectiveness of the interaction of mulched leaves and fertilizer applied together, to control broadleaf weeds in lawn-type turf.

Table 2. Soil organic matter content (%), nutrient status (mg/L) and pH from samples collected in October 2012.

	OM	P	K	Mg	pH
Weedy control	4.2	7.8	73	318	7.7
Par 3 herbicide	3.6	4.2	53	310	7.8
Urea (0.25 kg N/100 m^2)	4.5	7.2	78	338	7.7
Urea (0.50 kg N/100 m^2)	3.3	4.1	58	313	7.8
Bark mulch (1.25-cm)	3.6	5.7	60	310	7.8
Bark mulch (2.5-cm)	3.6	3.4	54	305	7.8
Compost (1.25-cm)	3.9	4.8	63	313	7.8
Compost (2.5-cm)	4.0	5.2	87	343	7.8
All leaves combined (2.5-cm)	3.9	8.1	77	325	7.8
All leaves combined (5.0-cm)	4.2	10.8	82	335	7.7
Ash (2.5-cm)	3.3	4.4	51	293	7.8
Ash (5.0-cm)	4.2	4.8	57	305	7.7
Ginkgo (2.5-cm)	3.5	3.7	54	298	7.8
Ginkgo (5.0-cm)	3.7	6.1	57	318	7.8
Norway maple (2.5-cm)	3.7	5.5	62	325	7.7
Norway maple (5.0-cm)	3.8	3.6	61	305	7.8
Silver maple (2.5-cm)	3.8	4.2	63	313	7.8
Silver maple (5.0-cm)	4.0	5.8	66	323	7.8
Sugar maple (2.5-cm)	3.8	3.9	58	308	7.8
Sugar maple (5.0-cm)	3.8	4.5	59	325	7.7
White pine (2.5-cm)	3.8	4.9	57	310	7.7
White pine (5.0-cm)	3.6	5.1	59	325	7.7

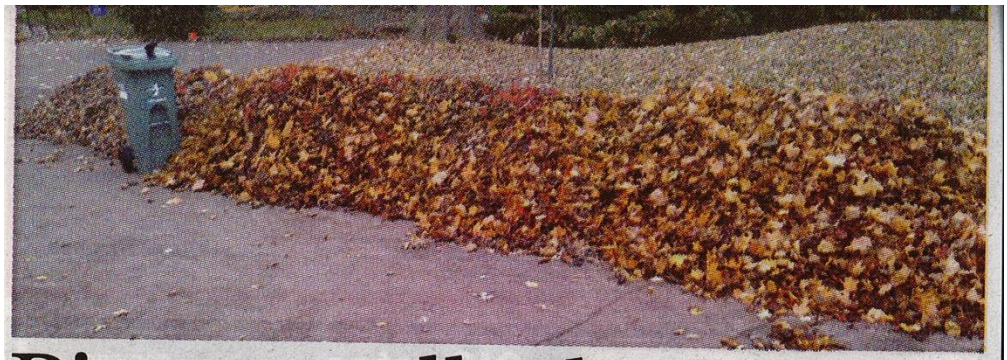
Table 3. Total number of weeds per plot (%) on three dates in 2012.

	May 23	**August 08**	**October 17**
Weedy control	43	24	44
Par 3 herbicide	9	7	1
Urea (0.25 kg N/100 m^2)	36	17	25
Urea (0.50 kg N/100 m^2)	29	18	24
Bark mulch (1.25-cm)	49	23	35
Bark mulch (2.5-cm)	54	22	36
Compost (1.25-cm)	46	21	26
Compost (2.5-cm)	44	23	44
All leaves combined (2.5-cm)	48	17	38
All leaves combined (5.0-cm)	29	14	29
Ash (2.5-cm)	42	17	36
Ash (5.0-cm)	57	22	44
Ginkgo (2.5-cm)	35	17	33
Ginkgo (5.0-cm)	55	24	40
Norway maple (2.5-cm)	48	30	31
Norway maple (5.0-cm)	40	16	32
Silver maple (2.5-cm)	37	22	35
Silver maple (5.0-cm)	51	32	44
Sugar maple (2.5-cm)	45	18	44
Sugar maple (5.0-cm)	30	24	32
White pine (2.5-cm)	47	29	41
White pine (5.0-cm)	50	25	34

Table 4. Number of weeds per plot (%) on three dates in 2011.

	June 03	July 18	October 17
Weedy control	17	37	37
Par 3 herbicide	5	10	13
Urea (0.25 kg N/100 m^2)	10	28	23
Urea (0.50 kg N/100 m^2)	14	23	26
Bark mulch (1.25-cm)	15	15	34
Bark mulch (2.5-cm)	15	19	30
Compost (1.25-cm)	20	41	38
Compost (2.5-cm)	15	32	31
All leaves combined (2.5-cm)	17	31	29
All leaves combined (5.0-cm)	12	20	21
Ash (2.5-cm)	20	33	30
Ash (5.0-cm)	20	38	39
Ginkgo (2.5-cm)	13	24	27
Ginkgo (5.0-cm)	25	43	39
Norway maple (2.5-cm)	25	37	35
Norway maple (5.0-cm)	15	23	25
Silver maple (2.5-cm)	15	33	32
Silver maple (5.0-cm)	25	43	38
Sugar maple (2.5-cm)	15	31	31
Sugar maple (5.0-cm)	15	27	17
White pine (2.5-cm)	25	32	32
White pine (5.0-cm)	20	36	31

Figure 1. Letter to the editor of the Guelph Tribune from October 2012.



Picture tells the story

I am sending the above picture to illustrate why city council and its administration needs to reconsider the decision to terminate the already meagre, twice-annual yard waste pickup.

The photo shows about half the leaves that will be raked from just our lawn this season, against the new green bin that is to conveniently swallow this pile – and much more – in two years time.

It should be obvious this approach isn't feasible for residents of older neighbourhoods with larger trees.

Composting makes sense, but using one small container for household and yard waste is silly.

Other cities allow residents to brown bag their yard waste and it's collected at regular intervals. This seems far more efficient and provides much better value to taxpayers. It likely favours the environment, and more exercise would be good public policy too.

This seems to be another penny-wise, pound-foolish way to save money.

I hope the city can now see the larger picture.

Chris Bonnett
Guelph

LETTERS TO THE EDITOR: CCLARK@GUELPHTRIBUNE.CA