

An Investigation Into Cultural Approaches for Weed Control in Pesticide-Free Home Lawns.

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Introduction:

- In Ontario traditional pesticides are not permitted on home lawns, since April 22, 2009 (MOE, 2009)
- Further investigations into using cultural practices without the use of herbicides is required (Busey, 2003)
- Larsen and Fischer (2005) found that on fertilized fairway turf vertical mowing can reduce weed pressure
- Core cultivation practices reduces the compaction of the soil and improves the soil profile by promoting greater water infiltration, higher soil oxygen levels and an increase in thatch decomposition rates; which is important for maintaining healthy turfgrass growth (OMAFRA, 2009)
- Experiments that examine the efficacy and timing of renovating a weedy home lawn in a pesticide-free environment is needed
- Development of a herbicide-free maintenance program and how the individual aspects of the program effect the sward composition is required

Objectives:

A: To evaluate four methods of turfgrass renovation in a context of a herbicide-free environment.

B: To evaluate post renovation cultural practices and their effects on sward composition.

Material and Methods:

- All research was performed at the Guelph Turfgrass Institute, Guelph, ON, Canada
- Plots were arranged in a Randomized Complete Block design (RCBD) 4x5x2 factorial design with four replications (Table One).
- To evaluate timing of renovation 2 separate replicates were renovated in the spring, and 2 separate replicates were renovated in the fall
- Plots were renovated May 26th 2010, September 28th 2010, June 3rd 2011, and September 26th 2011 (Figure 2 and Figure 3)
- Visual ratings of percent turfgrass coverage and weed populations were taken monthly.
- Population point quadrat counts were taken June and September 2010, 2011, and 2012.

Renovation Methods	Post Renovation Cultural Practices	Overseeding
Core cultivation	Fall Core Cultivation (CC)	Overseeding
Scalping	Spring Power Raking (PR)	No Overseeding
Roto-tilling	Fall CC and Spring PR	
Nothing	Herbicide (+control)	

Table One: Summary of the treatments applied to the home lawn renovation and post-renovation trial. Renovation methods were performed two times in the spring and two times in the fall, for a total of 4 complete replications of the entire study.



Figure 2: Fall renovation picture taken September 27, 2011 before plots were seeded, while the site was still being prepared.

Results:

Objective A Renovation results:

- All renovation treatments lower weed populations, by 5-15% (Figure 3)
- Roto-tilling appears to lower weeds more, it also reduces turfgrass coverage (Figure 3)
- Spring renovation encouraged annual weed growth, while fall renovation resulted in more perennial 'turf' weed growth (Figure 4)
- Spring renovation requires
- Annual weeds were effectively mown out of the spring renovation plots by August both years

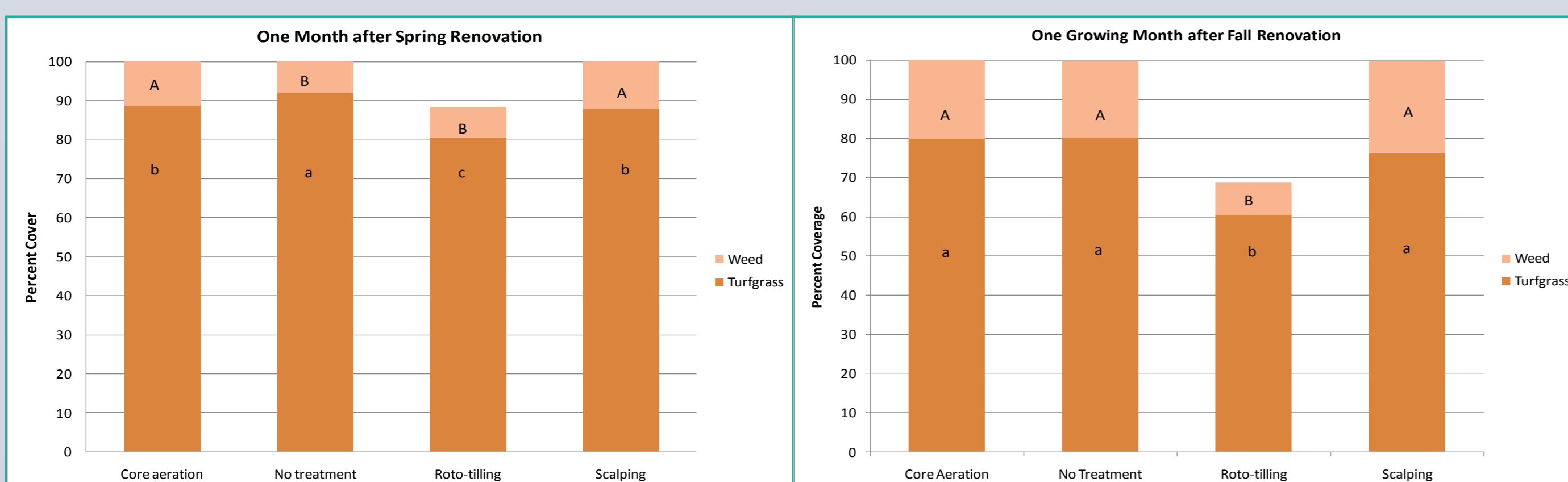


Figure 3: Percent turfgrass and weed coverage. LS means calculated using ANCOVA where the pre-treatment population percentages were used as the covariate to correct for variance in species population between plots before treatments. Bars with different letters are shown to be different at the $P < 0.01$.

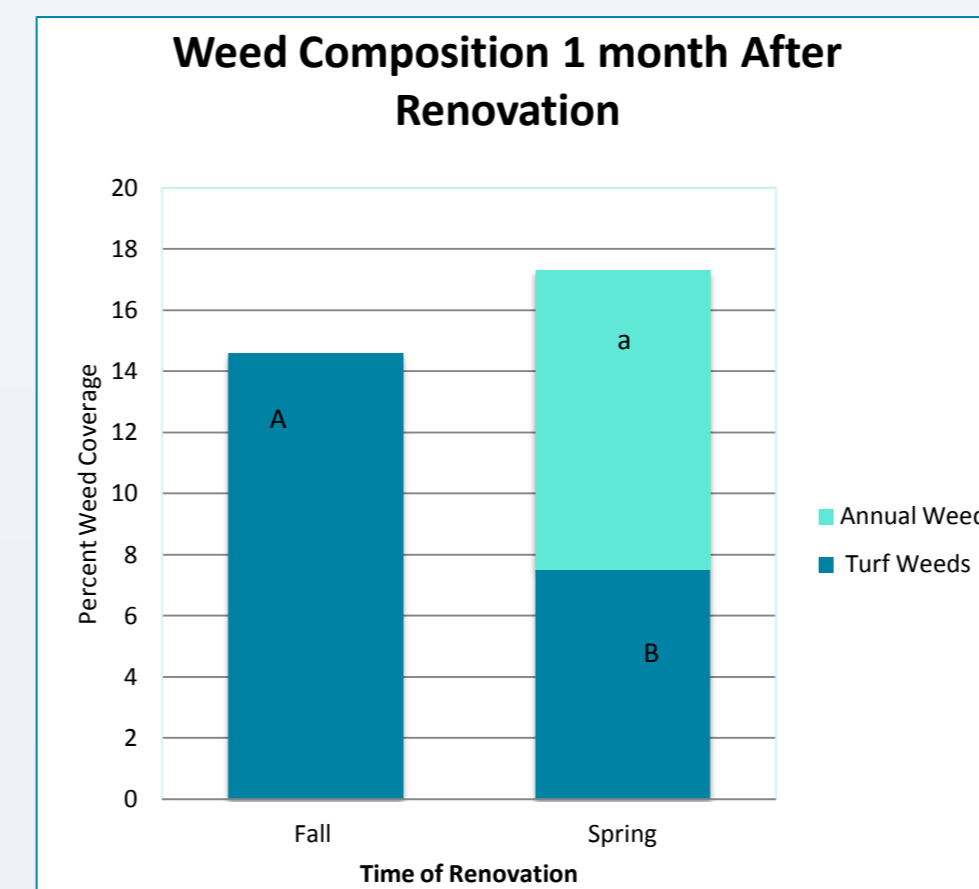


Figure 4: Percent weed coverage. Turf weeds are dandelions, plantain, clover, black medic, and chickweed. Annual weeds were primarily redroot pigweed and wooly lambs quarters. LS means calculated using pair t-test. Bars with different letters are shown to be different at the $P < 0.05$.



Figure 5: Spring roto-tilling (1) resulted in annual weed infestation (2, one month after renovation) that were eventually mown out of the sward by August (3).

Objective B Post-renovation cultural practices results:

- Cultural practice results varied from season to season
- Spring power raking effectively reduce/maintain low weed population when moisture availability is ample in 2011 (Figure 6)
- Spring power raking resulted in the lowest turfgrass coverage and the highest bare ground during 2012 when Ontario had severe drought conditions (Figure 7)
- Spring and fall overseeding increased turfgrass density, but had no effect on the weed population of the sward

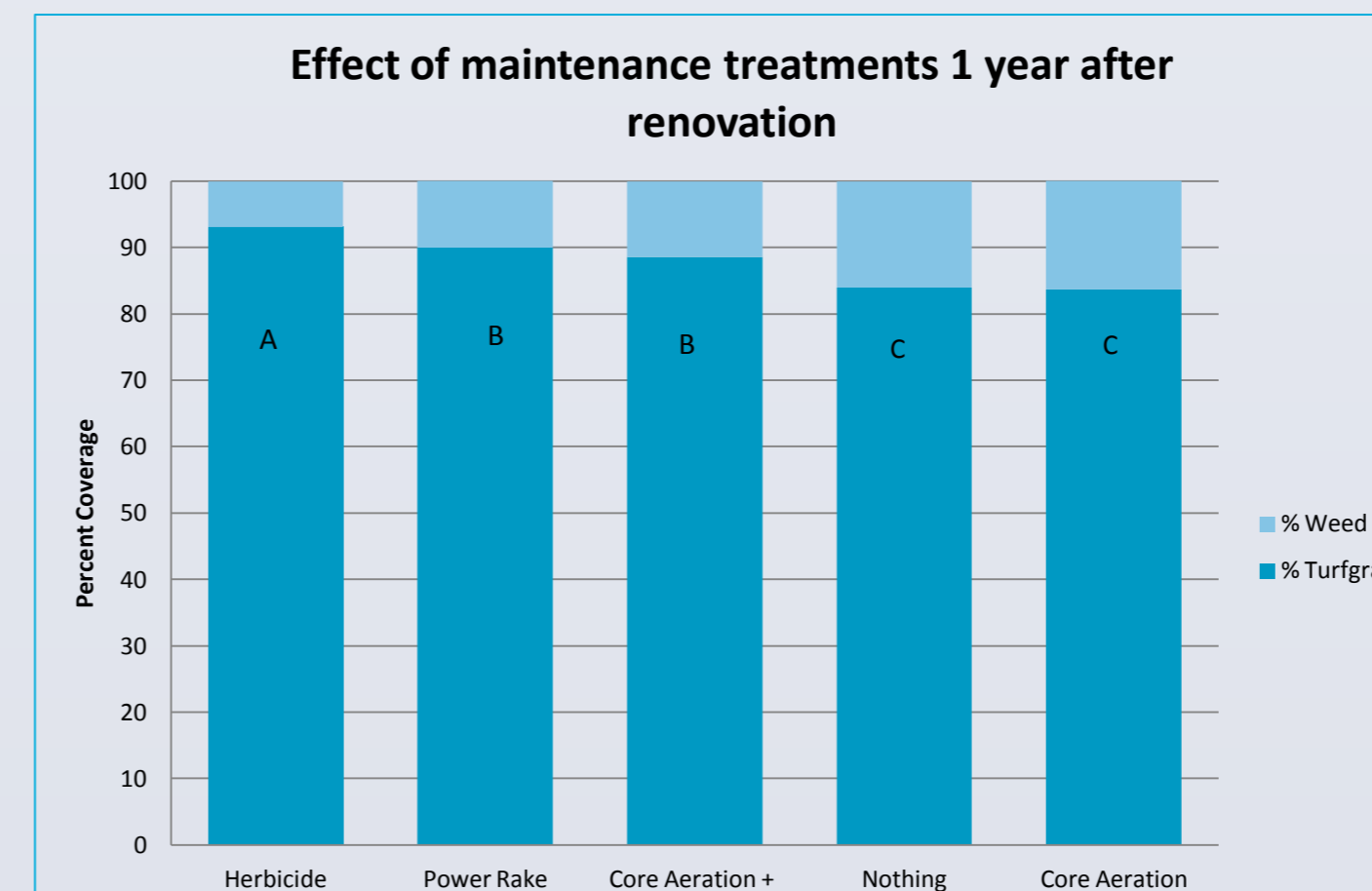


Figure 6: Percent turfgrass and weed coverage. Data represented here is only from the first spring renovation in May 2010. LS means calculated using ANCOVA. Treatments with different letters are shown to be different at the $P < 0.01$.

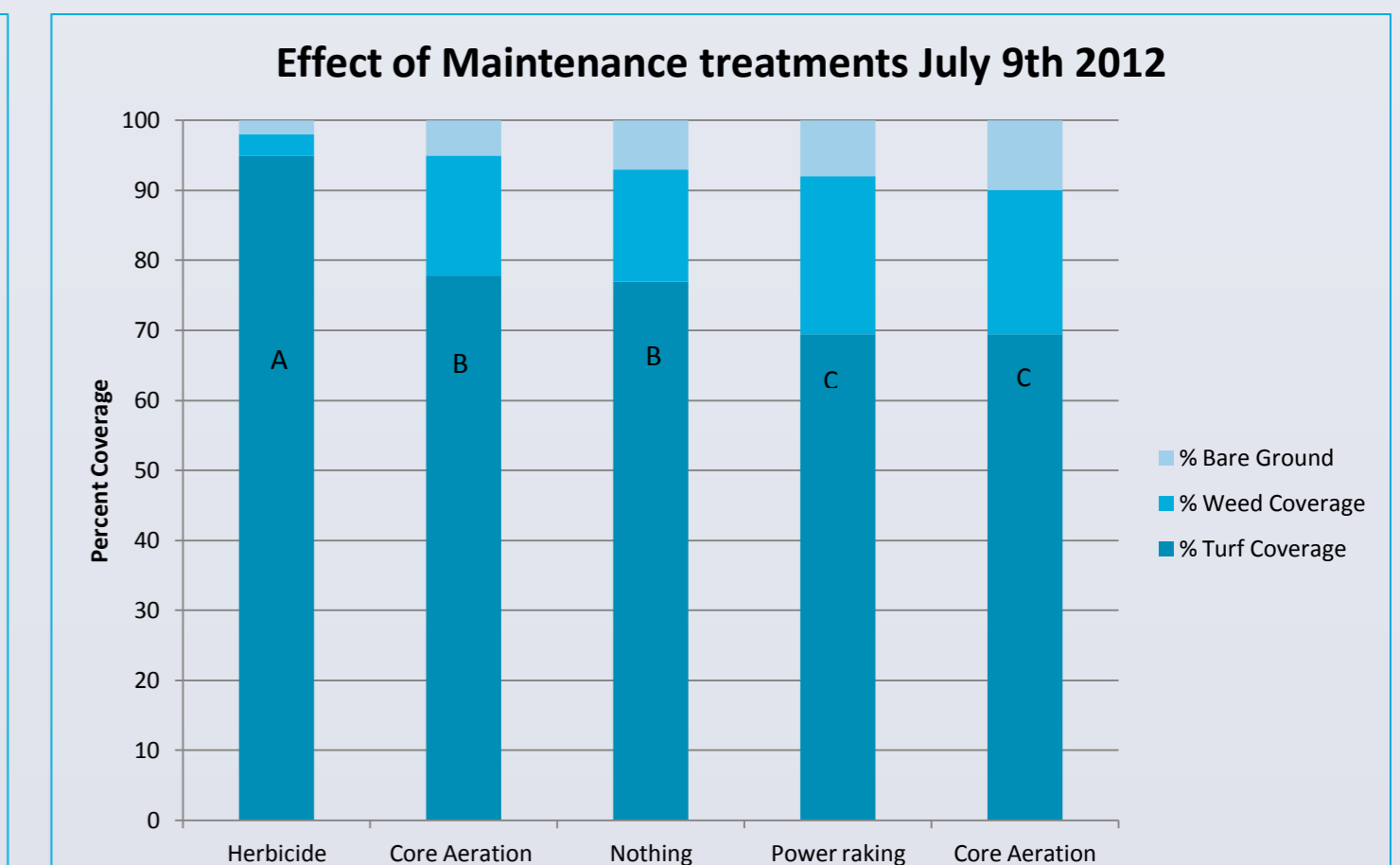


Figure 7: Percent turfgrass and weed coverage of 3 separate renovation studies (2 spring renovations and 1 fall renovation). LS means calculated using ANCOVA. Treatments with different letters are shown to be different at the $P < 0.05$.

Conclusions:

- Renovation practices without the use of herbicides can lower weed populations in a weedy sward
- Spring renovation resulted in significantly more annual weeds and fewer 'turf' weeds, suggesting that in a herbicide-free environment spring renovation may result in lower turf weed populations
- Spring power raking can be as effective as conventional herbicides as long as the weather conditions promote healthy cool-season turfgrass recovery
- Spring and fall overseeding increases turfgrass density

Future Consideration:

- Increased frequency of power raking throughout the growing season may effectively control weeds over time (Larsen and Fischer, 2005)
- Evaluate overseeding methods for optimizing the beneficial effects of overseeding in a home lawn environment

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Acknowledgements:

A special thank you to the groups listed below for their continued funding and support:

I would like to thank my advisory committee: Dr. Jordan, Dr. Lyons, Dr. Tardif, and Dr. Lortie. Also the support staff Dr. Carey and Mr. Porter, and research assistants: Michelle Lamarre, Nikita Soukov and Alana Hyatt.