

**Efficacy of PC Turf herbicide product at different application rates and volumes –
Spring 2010 trial.**

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MATERIALS/METHODS

Plots were located in turf research area at the Guelph Turfgrass Institute, Guelph, ON. The site is an area of established turf (predominantly turf-type perennial ryegrass, infested with dandelion, clover and other lawn weeds) (Figure 1). Turf was maintained with typical medium maintenance turf regime: 1.0 kg actual N 100 m⁻² per year in 3 applications (spring, summer, dormant); P and K in a 4:1:4 ratio with N; irrigated to prevent stress prior to treatment application and to prevent dormancy thereafter; mowed at 3 inches.

The treatments were combinations of different rates and volumes of post-emergent herbicide, as well as controls for a total of 10 treatments (see Table 1). Each treatment was replicated four times in 1 x 2 m plots arranged in a randomized complete block design. Plots were separated by 0.5 m buffer strips. Treatments were applied May 28, 2010. Treatments were applied with a compressed air sprayer (Teejet 8001VS flat fan nozzles - 5 ml/sec/nozzle at 20 psi).

An anecdotal photographic record of the experiment was kept.

All measurements were analysed by appropriate statistical analyses (general linear models).

Data Collection. Plots were rated pre-treatment for weed presence by visual ratings of broadleaf weed density and point quadrat measurement of weed cover. Post-treatment measurements of weeds were taken at 2-3 weeks after treatment and later in the season. Plots were rated visually and using canopy reflectance (normalized-difference vegetation index) 2-3 days after treatment for phytotoxicity of treatments to broadleaf weeds and to grasses.

Environmental conditions were noted at treatment application and for 24 hours following.

RESULTS

Phytotoxicity immediately post-treatment. There was evidence on broadleaf weeds of necrosis and leaf curling four days after treatment (Table 2). There was no evidence of phytotoxicity on grasses at the same time. Patterns of phytotoxic effects on weeds were not statistically significant among herbicide treatments, but all

Table 1. Treatments

Treatment	rate(gal/acre)	oz/1000	spray volume (gal/acre)
1 WW1 31-480	2	5.8	62
2 WW1 62-240	2	5.8	31
3 WW1 47-480	3	8.7	62
4 WW1 62-480	4	11.6	62
5 WW1 94-240	3	8.7	31
6 WW1 125-120	2	5.8	15.5
7 WW1 125-480	8	23.2	62
8 WW1 187-120	3	8.7	15.5
9 Killex	0.59	1.72	62
10 Control	—	—	—





Figure 1. Plot area, 5 days after treatment (June 2, 2010).

had more phytotoxicity than the control plots.

Canopy reflectance. Canopy reflectance, which can be correlated with photosynthetic activity and plant health, was reduced by all treatments relative to the control (Table 3). Differences among treatments were statistically significant on all dates, but the patterns varied. Over the season, there was a general rate effect among the experimental treatments, but all had less reduction in canopy reflectance than the phenoxy herbicide standard (Table 4).

Broadleaf weed control. Broadleaf weed infestation in the plot area 2 days before treatment was about 27% of the area, as estimated by point-

quadrat counts (Table 5). This is roughly equivalent to a visual rating of 3 (Table 2). Most of the weed present was dandelion and chickweed, with smaller amounts of black medic, white clover, narrowleaf plantain, field bindweed and thistle. There was significant reduction in total broadleaf weed by 2 weeks after treatment in most treatments (from 27% to 16%) and a further reduction by 10 weeks after treatment (to 11%). There was a rate effect, though usually not statistically significant, with the higher concentration x volume treatments providing better weed control. The same pattern was evident in the visual weed ratings (Table 2), though visual ratings showed a slight regrowth

Treatment	Grass		Weed		Weed ratings			
	phytotoxicity	Leaf curling	phytotoxicity		4 DAT	18 DAT	33 DAT	52 DAT
Control	0.5 ¹	0.8	0.8		5.0 a	5.5 a	5.5 a	5.5 a
Killex	0.8	3.3	2.8		2.0 b	0.3 c	0.5 c	1.3 c
WW1 31-480	0.3	1.8	2.3		3.5 ab	3.3 ab	4.3 ab	4.5 a
WW1 47-480	0.3	1.5	1.8		3.0 ab	2.5 bc	3.0 abc	3.5 abc
WW1 62-480	0.5	2.8	2.0		2.3 b	0.8 c	1.5 bc	2.0 bc
WW1 125-480	0.3	3.0	2.5		1.5 b	0.8 c	0.8 c	1.5 bc
WW1 125-120	0.8	2.3	2.3		2.0 b	1.3 bc	2.8 abc	3.3 abc
WW1 187-120	0.8	3.0	2.3		2.8 b	1.8 bc	2.8 abc	3.5 abc
WW1 62-240	0.0	2.3	2.8		2.8 b	1.8 bc	2.5 bc	3.8 ab
WW1 94-240	0.3	2.0	2.3		3.3 ab	2.3 bc	3.3 abc	3.8 ab
msd p=0.05	NS	NS	NS		2.2	2.3	2.9	2.5

¹ Visual ratings 0-10, 10 = most phytotoxicity, most weed. Means of 4 replicates. Means within columns followed by the same letter are not significantly different (Tukey's HSD test, p=0.05).

Table 3. Canopy reflectance in treated plots.

Treatment	-11 DAT	-1	0	1	4	5	6
Control	0.583 ¹	0.644	0.603	0.580	0.616	0.669	0.607
Killex	0.575	0.647	0.621	0.586	0.587	0.644	0.570
WW1 31-480	0.587	0.658	0.642	0.596	0.611	0.663	0.604
WW1 47-480	0.591	0.676	0.635	0.586	0.598	0.650	0.592
WW1 62-480	0.596	0.654	0.645	0.591	0.602	0.659	0.589
WW1 125-480	0.575	0.652	0.656	0.583	0.574	0.638	0.559
WW1 125-120	0.566	0.663	0.647	0.617	0.630	0.684	0.602
WW1 187-120	0.576	0.654	0.654	0.606	0.620	0.665	0.590
WW1 62-240	0.590	0.695	0.647	0.606	0.622	0.664	0.600
WW1 94-240	0.577	0.655	0.636	0.597	0.606	0.649	0.594
msd p=0.05	0.019	0.032	0.018	0.017	0.014	0.013	0.020
	7	8	11	17	19	31	35
Control	0.656	0.612	0.607	0.588	0.606	0.603	0.642
Killex	0.616	0.561	0.544	0.521	0.557	0.539	0.575
WW1 31-480	0.654	0.591	0.598	0.559	0.565	0.549	0.594
WW1 47-480	0.647	0.593	0.590	0.560	0.583	0.572	0.593
WW1 62-480	0.638	0.569	0.593	0.524	0.526	0.533	0.576
WW1 125-480	0.624	0.556	0.556	0.516	0.533	0.543	0.579
WW1 125-120	0.670	0.607	0.626	0.563	0.592	0.571	0.637
WW1 187-120	0.642	0.589	0.589	0.508	0.566	0.573	0.614
WW1 62-240	0.650	0.613	0.597	0.541	0.580	0.572	0.594
WW1 94-240	0.646	0.583	0.588	0.557	0.558	0.564	0.609
msd p=0.05	0.010	0.020	0.018	0.016	0.014	0.011	0.012
	45	48	52	56	67	73	83
Control	0.618	0.580	0.563	0.568	0.529	0.543	0.498
Killex	0.554	0.535	0.491	0.499	0.412	0.441	0.414
WW1 31-480	0.576	0.537	0.482	0.528	0.467	0.481	0.438
WW1 47-480	0.585	0.557	0.534	0.554	0.460	0.476	0.413
WW1 62-480	0.562	0.514	0.454	0.491	0.406	0.394	0.388
WW1 125-480	0.595	0.548	0.499	0.500	0.427	0.432	0.434
WW1 125-120	0.593	0.556	0.512	0.539	0.457	0.451	0.432
WW1 187-120	0.597	0.554	0.529	0.542	0.484	0.508	0.492
WW1 62-240	0.581	0.553	0.527	0.529	0.483	0.489	0.479
WW1 94-240	0.587	0.539	0.485	0.500	0.451	0.445	0.420
msd p=0.05	0.014	0.018	0.016	0.020	0.019	0.026	0.024

¹Normalized-difference vegetation index. Means of ~50 readings x 4 replicates. Means comparisons by Tukey's HSD test (p=0.05).

Table 4. Seasonal mean canopy reflectance compared to control plots.

Treatment	delta NDVI ¹
Control	0.000 a ²
WW1 125-120	-0.015 b
WW1 187-120	-0.017 b
WW1 62-240	-0.017 b
WW1 47-480	-0.025 c
WW1 31-480	-0.028 c
WW1 94-240	-0.034 d
WW1 125-480	-0.047 e
WW1 62-480	-0.051 f
Killex	-0.052 f
msd p=0.05	0.0044

¹Canopy reflectance means corrected by subtraction of control means

²Mean of 21 observation dates x 4 replicates. Means within columns followed by the same letter are not significantly different (Tukeys HSD test, p=0.05).

Table 5. Total plot area (percent) covered by weed species.

Treatment	Total weed			Dandelion			Black medick			Chickweed		
	-2	13	70	-2	13	70	-2	13	70	-2	13	70
	DAT	DAT	DAT	DAT	DAT	DAT	DAT	DAT	DAT	DAT	DAT	DAT
Control	23.7 ¹	24.7	26.3	15.0	10.3	16.3	0.3	3.3	8.3	7.3	10.0	0.7
Killex	28.3	11.3	1.3	15.7	5.3	1.3	1.3	0.0	0.0	10.0	4.3	0.0
WW1 31-480	23.3	21.3	15.0	14.3	10.7	11.3	0.0	0.0	0.3	7.7	8.3	2.0
WW1 47-480	27.3	16.0	15.7	17.0	7.7	13.3	0.7	0.0	1.3	8.3	8.0	1.0
WW1 62-480	26.0	14.3	7.0	16.0	7.3	5.3	1.3	0.0	1.0	8.0	5.3	0.0
WW1 125-480	29.7	15.3	10.3	16.3	8.0	9.0	2.7	0.0	0.3	8.3	6.3	0.3
WW1 125-120	26.7	12.3	11.0	17.3	6.3	8.7	1.7	1.0	1.0	7.3	4.0	0.0
WW1 187-120	28.0	16.7	12.7	14.0	8.0	7.0	2.7	0.0	1.0	7.0	8.0	1.3
WW1 62-240	23.7	14.7	12.7	13.7	7.3	8.3	1.7	0.3	0.3	4.0	2.3	1.0
WW1 94-240	30.7	22.7	13.0	18.7	12.7	8.0	1.7	0.7	0.7	6.7	6.7	1.0
msd p=0.05	NS	12.5	4.6	NS	NS	4.6	NS	2.0	NS	NS	7.0	NS
	White clover			Narrowleaf plantain			Field bindweed			Bull thistle		
	-2	13	70	-2	13	70	-2	13	70	-2	13	70
	DAT	DAT	DAT	DAT	DAT	DAT	DAT	DAT	DAT	DAT	DAT	DAT
Control	0.0	0.3	0.0	0.3	0.0	0.0	0.7	0.7	0.3	0.0	0.0	0.0
Killex	0.0	0.0	0.0	0.3	1.7	0.0	1.0	0.0	0.0	0.0	0.0	0.0
WW1 31-480	1.0	1.7	1.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.7	0.3
WW1 47-480	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.0	1.0	0.0	0.0
WW1 62-480	0.0	0.0	0.0	0.7	0.7	0.3	0.0	0.0	0.3	0.0	1.0	0.0
WW1 125-480	1.3	0.3	0.7	0.0	0.3	0.0	0.0	0.0	0.0	1.0	0.3	0.0
WW1 125-120	0.0	0.0	0.0	0.3	0.7	0.3	0.0	0.3	1.0	0.0	0.0	0.0
WW1 187-120	0.0	0.0	0.0	3.0	0.3	1.7	1.3	0.0	1.0	0.0	0.3	0.0
WW1 62-240	0.7	0.3	1.7	3.0	4.3	1.0	0.3	0.0	0.3	0.3	0.0	0.0
WW1 94-240	2.0	1.0	1.3	1.3	1.0	2.0	0.0	0.0	0.0	0.3	0.7	0.0
msd p=0.05	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

¹Percent cover area estimated by point-quadrat weed counts: 100 points per plot x 4 replicates. Bolded columns are statistically significant means comparisons (Tukey's HSD, p=0.05).

in weed that was not present in the more reliable point-quadrat data. Generally, weed control in the better experimental treatments was not significantly different than the standard phenoxy herbicide treatment.

DISCUSSION AND CONCLUSIONS

All experimental treatments provided some broadleaf weed control of all the target species, whether estimated by point-quadrat cover ratings or visual weed ratings. Often the reductions were

not significantly different than the control, particularly at the low concentration x spray volume combinations. The higher concentration x spray volume combinations (e.g. WW1 62-480 and WW1 125-480) had significant weed control, not significantly different from the Killex phenoxy herbicide standard. Visual ratings suggested some limited regrowth in weed populations in all treatments by 62 DAT, but this was generally not reflected in the point-quadrat weed counts at 70 DAT.

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