

2017 Cable Barrier Bareground Trial in Louisville

Introduction

Median cable barriers are designed to protect drivers from crossover accidents on interstates and other highways. However, the vegetation under and adjacent to them must be managed for safety and aesthetics. Usually this means using herbicides to maintain a vegetation free (bare ground) zone underneath the barriers. Broad-spectrum soil applied pre-emergence residual herbicides, in combination with a broad-spectrum post-emergence herbicide like glyphosate, are the mainstay for maintaining these bare ground zones. However, there may be turf adjacent to the bare ground zone that should be maintained. Ideally, the residual herbicides will last all season long and not move off-site by downward leaching or across the soil surface (erosive movement of soil particles with adsorbed herbicide).

This trial was part of an ongoing effort to evaluate the vegetation control efficacy and undesirable turf damage potential of a range of herbicides for use in vegetation management under cable barriers.

Materials and Methods

The trial was established under and beside cable barrier with a mixed species turf underneath it in the median of I-265 in Louisville, KY. The 16 treatments with 3 replications each were arranged in a randomized complete block design. Treatments were applied at 25 gallons per acre spray solution onto 6.5 ft wide by 20 ft long plots on June 21, 2017. This was somewhat late in the season. All herbicide treatments, except Roundup ProMax alone (Treatment 1), included Activator 90 at 0.25% v/v (Table 1). Roundup ProMax (glyphosate) has no residual activity so other herbicides were included in the combinations with it to provide residual and pre-emergent control for the bare ground treatments.

The Louisville weather station reported 0.43 inches of rain on June 22 which would have activated the soil applied pre-emergence herbicide treatments. Additional rainfall was recorded on June 23 (1.14 inches). These rainfall events may have contributed to the movement of some of the herbicides from where they were applied and damaged adjacent turf (Figure 1). Species present at application included Buckhorn plantain, which was flowering, plus tall fescue and Kentucky bluegrass both of which had mature seed heads.

Ratings of the proportion (%) of bare ground were taken 21 (7/12/2017) and 309 (4/26/2018) days after treatment (DAT). Visual assessments of the proportion (%) of bare ground, perennial grasses, annual grasses and broadleaf weeds were taken 48 (8/8/2017), 98 (9/27/2017), and 127 (10/26/2017) DAT. Data were analyzed using ARM software and treatment means were compared using Fisher's LSD at $p = 0.05$.

Results and Discussion

All the herbicide treatments (Treatments 1-15) had more bare ground than the control 21 DAT (Table 2). We noted turf damage beyond the sprayed area on some plots indicating movement of the herbicide after application (Figure 1). The extent of this was greatest with the Hyvar

treatment 21 DAT (Treatment 3), especially in rep 3. At the next assessment (48 DAT), turf damage was evident on more plots. At least one plot treated with Sahara, Hyvar, Oust, Viewpoint or AC Polaris Complete (Treatments 2, 3, 4, 7, and 8 respectively) showed damage.

Later in the season (48 DAT), treatments with soil active herbicides (Treatments 2-15) had more bare ground than Roundup ProMax by itself (Treatment 1) (Table 2). All the herbicide treatments had less perennial and annual grass cover than the control. Roundup ProMax by itself (Treatment 1) had a similar amount of broadleaf cover (12%) as the control (19%) while the other treatments ranged from 0 to 2%.

The best group of treatments 98 DAT with soil residual had 91 to 98% bare ground while the next group had 82 to 87% bare ground (Table 3) and were not different from Roundup ProMax by itself (82% bare ground). The best group included Sahara (Treatment 2), Oust (Treatment 4), Perspective + Esplanade (Treatment 5), Viewpoint + Esplanade (Treatment 7), Polaris AC Complete (Treatment 8), Esplanade + Oust (Treatment 9), Streamline + Esplanade + Plateau (Treatment 10), Cleantraxx (Treatment 12) and Esplanade + Oust Extra (Treatment 15). The amount of perennial grass cover ranged from 0 to 18% in the herbicide treated plots but all of these had less cover than the untreated control (50%). Similarly, all herbicide treatments had less annual grass cover (0-4%) than control (30%). Some treatments had similar amounts of broadleaf cover (3-9%) as the control (5%) at this assessment. These included Roundup applied alone (Treatment 1), Oust (Treatment 4), Perspective + Proclipse (Treatment 6), Polaris AC Complete (Treatment 8), Cleantraxx + Milestone (Treatment 11) and Cleantraxx (Treatment 12).

By the end of the season (127 DAT), the best treatments still provided 83 to 97% bare ground (Table 4). The list of treatments not in this top group includes Roundup by itself (Treatment 1), Hyvar (Treatment 3), Perspective + Proclipse (Treatment 6) and Esplanade + Milestone (Treatment 14) with 70 to 80% bare ground. Some herbicide treatments had more perennial grass cover than others but all had less than the control (60%). These included Hyvar (Treatment 3), Perspective + Proclipse (Treatment 6), Method + Esplanade (Treatment 13), and Esplanade + Milestone (Treatment 14). The untreated control plots had the most annual grass cover (28%) but some herbicide treatments had more (0.3 – 7%) than others. These included Roundup alone (Treatment 1), Hyvar (Treatment 3), Oust (Treatment 4), Polaris AC Complete (Treatment 8), Cleantraxx + Milestone (Treatment 11), and Cleantraxx (Treatment 12). Most plots had buckhorn plantain but the ones with the most (2-12%), besides the control (5%), included Roundup alone (Treatment 1), Sahara (Treatment 2), Hyvar (Treatment 3), Oust (Treatment 4), Polaris AC Complete (Treatment 8), and Cleantraxx (Treatment 12). The broadleaf cover increased from the previous assessment and a number of treatments had similar cover as the control (7%). They ranged from 3 to 14% cover and included the treatments mentioned previously with plantain cover but also included Perspective + Proclipse (Treatment 6), Viewpoint + Esplanade (Treatment 7) and Cleantraxx + Milestone (Treatment 11).

At the beginning of the next season (309 DAT), all the herbicide treatments still had more bareground (53-97%) than the control (13%) (Table 5). Treatments in the top group (77-97%) included Roundup alone (Treatment 1), Sahara (Treatment 2), Perspective + Esplanade (Treatment 5), Viewpoint + Esplanade (Treatment 7), Polaris AC Complete (Treatment 8), Esplanade + Oust (Treatment 9), Streamline + Esplanade + Plateau (Treatment 10), Cleantraxx + Milestone (Treatment 11), Cleantraxx (Treatment 12), Method + Esplanade (Treatment 13) and Esplanade + Oust Extra (Treatment 15).

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The vegetation under the cable barrier in this location gave a good test of how well some of these bare ground herbicides can perform over a season and into the next year. It should be noted that the herbicides were applied somewhat late in the season and some of the earlier germinating species, such as some of the summer annual grasses, may have been controlled by the initial glyphosate application. These trials will be continued to provide additional information for roadside managers.

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Table 1. Herbicide Treatments, Active Ingredients and Application Rates for Cable Barrier Bareground Trial.

Trt. No.	Product Name	Rate	Rate Unit	Active Ingredient(s)	Application Rates
1	Roundup ProMax	1.3	QT/A	glyphosate	1.5 LB AE/A
2	Roundup ProMax Sahara	1.3 10	QT/A LB/A	glyphosate diuron + imazapyr	1.5 LB AE/A 6.2 LB + 12.4 OZ/A
3	Roundup ProMax Hyvar	1.3 10	QT/A LB/A	glyphosate bromacil	1.5 LB AE/A 8 LB/A
4	Roundup ProMax Oust XP	1.3 3	QT/A OZ/A	glyphosate sulfometuron	1.5 LB AE/A 2.3 OZ/A
5	Roundup ProMax Perspective Esplanade	1.3 9 3.5	QT/A OZ/A FL OZ/A	glyphosate aminocyclopyrachlor + chlorsulfuron indaziflam	1.5 LB AE/A 3.6 OZ + 1.4 OZ/A 0.7 OZ/A
6	Roundup ProMax Perspective Proclipse	1.3 9 2.3	QT/A OZ/A LB/A	glyphosate aminocyclopyrachlor + chlorsulfuron prodiamine	1.5 LB AE/A 3.6 OZ + 1.4 OZ/A 1.5 LB/A
7	Roundup ProMax Viewpoint Esplanade	1.3 18 3.5	QT/A OZ/A FL OZ/A	glyphosate aminocyclopyrachlor + imazapyr + metsulfuron indaziflam	1.5 LB AE/A 4.1 OZ + 5.7 OZ + 1.3 OZ/A 0.7 OZ/A
8	Roundup ProMax Polaris AC Complete	1.3 2	QT/A PT/A	glyphosate imazapyr	1.5 LB AE/A 16 OZ AE/A
9	Roundup ProMax Esplanade Oust XP	1.3 3.5 3	QT/A FL OZ/A OZ/A	glyphosate indaziflam sulfometuron	1.5 LB AE/A 0.7 OZ/A 2.3 OZ/A
10	Roundup ProMax Streamline Esplanade Plateau	1.3 8 5 5	QT/A OZ/A FL OZ/A FL OZ/A	glyphosate aminocyclopyrachlor + metsulfuron indaziflam imazapic	1.5 LB AE/A 3.2 OZ + 1 OZ/A 1 OZ/A 1.3 OZ AE/A
11	Rodeo Cleantraxx Milestone VM	1.5 3 7	QT/A PT/A FL OZ/A	glyphosate penoxsulam + oxyfluorfen aminopyralid	1.5 LB AE/A 0.5 OZ + 23.6 OZ/A 1.8 OZ AE/A
12	Rodeo Cleantraxx	1.5 4.5	QT/A PT/A	glyphosate penoxsulam + oxyfluorfen	1.5 LB AE/A 0.7 OZ + 35.4 OZ/A
13	Rodeo Method Esplanade	1.5 12 5	QT/A FL OZ/A FL OZ/A	glyphosate aminocyclopyrachlor indaziflam	1.5 LB AE/A 3 OZ AE/A 1 OZ/A
14	Rodeo Esplanade Milestone VM	1.5 6 7	QT/A FL OZ/A FL OZ/A	glyphosate indaziflam aminopyralid	1.5 LB AE/A 1.3 OZ/A 1.8 OZ AE/A
15	Rodeo Esplanade Oust Extra	1.5 3.5 1.5	QT/A FL OZ/A OZ/A	glyphosate indaziflam sulfometuron + metsulfuron	1.5 LB AE/A 0.7 OZ/A 0.8 OZ + 0.2 OZ/A
16	Nontreated Check				

All herbicide treatments (except trt. #1) contained the adjuvant, Activator 90 at 0.25% v/v.

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Table 2. Results for Cable Barrier Bareground Trial (21 and 48 DAT¹)(July 12 and August 8, 2017).

Trt. No.	Product Name	Rate	Rate Unit	% Bareground	% Bareground	% Perennial Grass	% Annual Grass	% Broadleaves
				21 DAT	48 DAT			
1	Roundup ProMax	1.3	QT/A	97 abc ²	86 c	1.7 bc	0.7 b	12.0 b
2	Roundup ProMax Sahara	1.3 10	QT/A LB/A	97 abc	99 a	0.0 c	0.0 b	0.3 c
3	Roundup ProMax Hyvar	1.3 10	QT/A LB/A	97 abcd	97 ab	1.3 bc	0.0 b	1.3 c
4	Roundup ProMax Oust XP	1.3 3	QT/A OZ/A	99 a	99 a	0.0 c	0.0 b	0.5 c
5	Roundup ProMax Perspective Esplanade	1.3 9 3.5	QT/A OZ/A FL OZ/A	97 abcd	98 ab	2.0 bc	0.0 b	0.0 c
6	Roundup ProMax Perspective Proclipse	1.3 9 2.3	QT/A OZ/A LB/A	95 cd	98 ab	1.7 bc	0.0 b	0.7 c
7	Roundup ProMax Viewpoint Esplanade	1.3 18 3.5	QT/A OZ/A FL OZ/A	98 ab	100 a	0.0 c	0.3 b	0.0 c
8	Roundup ProMax Polaris AC Complete	1.3 2	QT/A PT/A	99 a	99 a	0.0 c	0.0 b	1.3 c
9	Roundup ProMax Esplanade Oust XP	1.3 3.5 3	QT/A FL OZ/A OZ/A	99 a	99 a	0.3 bc	0.0 b	1.0 c
10	Roundup ProMax Streamline Esplanade Plateau	1.3 8 5 5	QT/A OZ/A FL OZ/A FL OZ/A	97 abcd	99 a	0.3 bc	0.0 b	0.3 c
11	Rodeo Cleantraxx Milestone VM	1.5 3 7	QT/A PT/A FL OZ/A	95 cd	97 ab	1.2 bc	0.0 b	1.5 c
12	Rodeo Cleantraxx	1.5 4.5	QT/A PT/A	98 ab	98 ab	0.0 c	0.3 b	1.7 c
13	Rodeo Method Esplanade	1.5 12 5	QT/A FL OZ/A FL OZ/A	96 bcd	94 ab	4.3 bc	0.7 b	0.0 c
14	Rodeo Esplanade Milestone VM	1.5 6 7	QT/A FL OZ/A FL OZ/A	95 d	93 b	7.0 b	0.0 b	0.0 c
15	Rodeo Esplanade Oust Extra	1.5 3.5 1.5	QT/A FL OZ/A OZ/A	97 abcd	97 ab	2.3 bc	0.0 b	0.7 c
16	Nontreated Check			22 e	17 d	53.0 a	12 a	19.0 a

All herbicide treatments (except trt. #1) contained the adjuvant, Activator 90 at 0.25% v/v.

¹ DAT = Days after treatment

² Means within a column followed by the same letter are not different according to Fisher's LSD at $P < 0.05$.

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Table 3. Results for Cable Barrier Bareground Trial (98 DAT¹)(September 27, 2017).

Trt. No.	Product Name	Rate	Rate Unit	% Bareground	% Perennial Grass	% Annual Grass	% Broadleaves
				98 DAT			
1	Roundup ProMax	1.3	QT/A	82 d ²	5.7 b	4.0 b	8.7 a
2	Roundup ProMax Sahara	1.3 10	QT/A LB/A	91 abcd	7.3 b	1.7 b	0.3 b
3	Roundup ProMax Hyvar	1.3 10	QT/A LB/A	87 bcd	4.7 b	1.0 b	7.3 a
4	Roundup ProMax Oust XP	1.3 3	QT/A OZ/A	92 abc	0.3 b	0.7 b	3.8 ab
5	Roundup ProMax Perspective Esplanade	1.3 9 3.5	QT/A OZ/A FL OZ/A	98 a	2.3 b	0.0 b	0.0 b
6	Roundup ProMax Perspective Proclipse	1.3 9 2.3	QT/A OZ/A LB/A	83 cd	10.0 b	1.0 b	5.7 ab
7	Roundup ProMax Viewpoint Esplanade	1.3 18 3.5	QT/A OZ/A FL OZ/A	99 a	0.3 b	0.0 b	0.3 b
8	Roundup ProMax Polaris AC Complete	1.3 2	QT/A PT/A	93 ab	0.0 b	0.3 b	6.3 ab
9	Roundup ProMax Esplanade Oust XP	1.3 3.5 3	QT/A FL OZ/A OZ/A	98 a	1.0 b	0.0 b	0.7 b
10	Roundup ProMax Streamline Esplanade Plateau	1.3 8 5 5	QT/A OZ/A FL OZ/A FL OZ/A	99 a	1.0 b	0.0 b	0.0 b
11	Rodeo Cleantraxx Milestone VM	1.5 3 7	QT/A PT/A FL OZ/A	85 bcd	9.3 b	0.3 b	5.3 ab
12	Rodeo Cleantraxx	1.5 4.5	QT/A PT/A	94 ab	2.0 b	0.0 b	3.0 ab
13	Rodeo Method Esplanade	1.5 12 5	QT/A FL OZ/A FL OZ/A	83 cd	16.7 b	0.0 b	0.0 b
14	Rodeo Esplanade Milestone VM	1.5 6 7	QT/A FL OZ/A FL OZ/A	82 d	18.0 b	0.0 b	0.3 b
15	Rodeo Esplanade Oust Extra	1.5 3.5 1.5	QT/A FL OZ/A OZ/A	92 abc	7.3 b	0.2 b	0.2 b
16	Nontreated Check			12 e	50.0 a	30.0 a	5.0 ab

All herbicide treatments (except trt. #1) contained the adjuvant, Activator 90 at 0.25% v/v.

¹ DAT = Days after treatment

² Means within a column followed by the same letter are not different according to Fisher's LSD at P < 0.05.

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Table 4. Results for Cable Barrier Background Trial (127 DAT)¹(October 26, 2017).

Trt. No.	Product Name	Rate	Rate Unit	% Bareground	% Perennial Grass	% Annual Grass	% Plantain	% Broadleaves
				127 DAT				
1	Roundup ProMax	1.3	QT/A	75 cde	6.7 cdefg	6.7 b	6.0 ab	11.7 abc
2	Roundup ProMax Sahara	1.3 10	QT/A LB/A	88 abc	9.3 cdef	0.0 c	1.7 ab	2.3 abc
3	Roundup ProMax Hyvar	1.3 10	QT/A LB/A	70 e	11.7 bcd	2.3 bc	11.7 a	16.0 a
4	Roundup ProMax Oust XP	1.3 3	QT/A OZ/A	83 abcde	0.0 g	2.3 bc	5.0 ab	14.0ab
5	Roundup ProMax Perspective Esplanade	1.3 9 3.5	QT/A OZ/A FL OZ/A	96 a	3.0 defg	0.0 c	0.0 b	1.3 bc
6	Roundup ProMax Perspective Proclipse	1.3 9 2.3	QT/A OZ/A LB/A	72 de	15.0 bc	0.0 c	0.7 b	13.3 abc
7	Roundup ProMax Viewpoint Esplanade	1.3 18 3.5	QT/A OZ/A FL OZ/A	97 a	0.0 g	0.0 c	0.0 b	4.0 abc
8	Roundup ProMax Polaris AC Complete	1.3 2	QT/A PT/A	85 abcd	0.7 fg	0.3 bc	10.0 ab	13.0 abc
9	Roundup ProMax Esplanade Oust XP	1.3 3.5 3	QT/A FL OZ/A OZ/A	97 a	1.0 efg	0.0 c	0.3 b	1.7 bc
10	Roundup ProMax Streamline Esplanade Plateau	1.3 8 5 5	QT/A OZ/A FL OZ/A FL OZ/A	98 a	1.7 efg	0.0 c	0.0 b	0.7 bc
11	Rodeo Cleantraxx Milestone VM	1.5 3 7	QT/A PT/A FL OZ/A	83 abcde	10.0 cde	1.0 bc	0.0 b	5.7 abc
12	Rodeo Cleantraxx	1.5 4.5	QT/A PT/A	92 ab	5.0 defg	0.7 bc	2.0 ab	3.0 abc
13	Rodeo Method Esplanade	1.5 12 5	QT/A FL OZ/A FL OZ/A	85 abcd	15.0 bc	0.0 c	0.0 b	0.0 c
14	Rodeo Esplanade Milestone VM	1.5 6 7	QT/A FL OZ/A FL OZ/A	80 bcde	19.3 b	0.0 c	0.0 b	0.7 bc
15	Rodeo Esplanade Oust Extra	1.5 3.5 1.5	QT/A FL OZ/A OZ/A	95 a	4.3 defg	0.0 c	0.0 b	0.3 bc
16	Nontreated Check			8 f	60.0 a	28.3 a	5.0 ab	6.7 abc

All herbicide treatments (except trt. #1) contained the adjuvant, Activator 90 at 0.25% v/v.

¹ DAT = Days after treatment

² Means within a column followed by the same letter are not different according to Fisher's LSD at $P < 0.05$.

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Table 5. Results for Cable Barrier Bareground Trial (309 DAT¹)(April 26, 2018).

				% Bareground
Trt. No.	Product Name	Rate	Rate Unit	309 DAT
1	Roundup ProMax	1.3	QT/A	83 abc
2	Roundup ProMax Sahara	1.3 10	QT/A LB/A	78 abcd
3	Roundup ProMax Hyvar	1.3 10	QT/A LB/A	57 de
4	Roundup ProMax Oust XP	1.3 3	QT/A OZ/A	68 cde
5	Roundup ProMax Perspective Esplanade	1.3 9 3.5	QT/A OZ/A FL OZ/A	91 ab
6	Roundup ProMax Perspective Proclipse	1.3 9 2.3	QT/A OZ/A LB/A	53 e
7	Roundup ProMax Viewpoint Esplanade	1.3 18 3.5	QT/A OZ/A FL OZ/A	95 ab
8	Roundup ProMax Polaris AC Complete	1.3 2	QT/A PT/A	81 abc
9	Roundup ProMax Esplanade Oust XP	1.3 3.5 3	QT/A FL OZ/A OZ/A	97 a
10	Roundup ProMax Streamline Esplanade Plateau	1.3 8 5 5	QT/A OZ/A FL OZ/A FL OZ/A	95 ab
11	Rodeo Cleantraxx Milestone VM	1.5 3 7	QT/A PT/A FL OZ/A	78 abcd
12	Rodeo Cleantraxx	1.5 4.5	QT/A PT/A	78 abcd
13	Rodeo Method Esplanade	1.5 12 5	QT/A FL OZ/A FL OZ/A	77 abcd
14	Rodeo Esplanade Milestone VM	1.5 6 7	QT/A FL OZ/A FL OZ/A	73 bcde
15	Rodeo Esplanade Oust Extra	1.5 3.5 1.5	QT/A FL OZ/A OZ/A	92 ab
16	Nontreated Check			13 f

All herbicide treatments (except trt. #1) contained the adjuvant, Activator 90 at 0.25% v/v.

¹ DAT = Days after treatment

² Means within a column followed by the same letter are not different according to Fisher's LSD at $P < 0.05$.

Figure 1: View of Plot Damage in the Cable Barrier Trial from Rep 3 on July 12, 2017 (21 Days After Treatment)

The plot in the foreground is Trt 3 (Hyvar) and movement of its active ingredient (bromacil) beyond the initial spray swath and subsequent damage to the turf is evident.

