

# **Noncrop and Invasive Vegetation Management Weed Science**

## **2022 Annual Research Report**



**UNIVERSITY  
OF KENTUCKY**

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**College of Agriculture  
Department of Plant and Soil Sciences**

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**INFORMATION NOTE 2022 NCVN-1**

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## Forward

The information provided in this document represents a collaborative effort between the Roadside Environment Branch of the Kentucky Transportation Cabinet and the Department of Plant and Soil Sciences in the College of Agriculture at the University of Kentucky. The main priority of this project was to collect and disseminate information to the KTC REB to increase the efficiency of operations aimed at roadside environment management.

This report contains a summary of research conducted during the 2022 season. This document is primarily for the use of the Kentucky Transportation Cabinet. Other use is allowable if proper credit is given to the authors.

Direct any questions, concerns, complaints, or praise regarding this publication to:

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Other personnel in the Weed Science and Turf Science groups who also aided in this project in terms of labor, equipment, and ideas include Sara Carter, and Dr. J.D. Green. Appreciation is also given to the farm crews at Spindletop Research Station for equipment and plot maintenance.

The research could not have been accomplished if not for the generous contributions of product. Contributors of product used include:

BASF Corporation  
Bayer Crop Science  
Corteva Agriscience  
Nufarm

We sincerely appreciate the effort and continued support of all our cooperators and look forward to future endeavors.



**Species List**

The following is a list of plant species discussed in the following document.

<b>Scientific Name</b>	<b>Common Name</b>
<i>Allium ursinum</i>	Wild Garlic
<i>Ambrosia artemisiifolia</i> L.	Common Ragweed
<i>Avena sativa</i>	Oats
<i>Bidens aristosa</i>	Showy Tickseed
<i>Centaurea cyanus</i>	Tall Blue Cornflower
<i>Conium maculatum</i>	Poison Hemlock
<i>Conyza canadensis</i>	Marestail
<i>Coreopsis lanceolata</i> L.	Lance-leaved Coreopsis
<i>Dactylis glomerata</i>	Orchard Grass
<i>Dipsacus fullonum</i>	Common Teasel
<i>Dipsacus laciniatus</i>	Cutleaf Teasel
<i>Erigeron sp.</i>	Fleabane
<i>Festuca arundinaceum</i> (Schreb.) S.J. Darbyshire	Tall Fescue
<i>Gaillardia pulchella</i>	Indian Blanket
<i>Lamium purpureum</i>	Purple Dead Nettle
<i>Lepidium virginicum</i>	Pepperweed
<i>Lonicera maackii</i>	Amur Bush Honeysuckle
<i>Melilotus officinalis</i>	Sweet Clover
<i>Monarda fistulosa</i>	Bergamot
<i>Papaver rhoeas</i>	Corn Poppy
<i>Plantago lanceolata</i> L.	Buckhorn Plantain
<i>Polygonum cuspidatum</i> Siebold & Zucc.	Japanese Knotweed

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<i>Rhus typhina</i>	Staghorn Sumac
<i>Rudbeckia hirta</i>	Blackeyed Susan
<i>Rudbeckia triloba</i>	Browneyed Susan
<i>Setaria faberi</i> Herrm.	Giant Foxtail
<i>Setaria pumila</i> (Poir.) Roem. & Schult.	Yellow Foxtail
<i>Solidago spp</i>	Goldenrod
<i>Sonchus oleraceus</i>	Sow Thistle
<i>Sorghum halepense</i> (L.) Pers.	Johnsongrass
<i>Stellaria media</i>	Common Chickweed
<i>Trifolium pretense</i> L.	Red Clover
<i>Trifolium repens</i>	White clover

**Herbicide List**

The following is a list of herbicides discussed in the following document.

<b>Product</b>	<b>Active Ingredient(s)</b>	<b>Concentration</b>	<b>Manufacturer</b>
Acclaim Extra	fenoxaprop	0.57 lb per gallon	Bayer
Capstone	aminopyralid + triclopyr	0.1 lb ae + 1 lb ae per gallon	Dow AgroSciences
Cleantraxx	penoxsulam + oxyfluorfen	0.083 lb + 3.93 lb per gallon	Dow AgroSciences
Clearcast	imazamox	1 lb ae per gallon	BASF
Detail	saflufenacil	2.85 lb per gallon	BASF
Dual II Magnum	S-metolachlor	7.64 lb per gallon	Syngenta
Escort XP	metsulfuron methyl	60% w/w	DuPont
Esplanade	indaziflam	1.67 lb per gallon	Bayer
Esplanade Sure	Indaziflam + rimsulfuron	24.3 % + 16.7% w/w	Bayer
Finale	glufosinate	1 lb per gallon	Bayer
Freelexx	2,4-D	3.8 lb per gallon	Dow AgroSciences
Fusilade II	fluazifop	2 lb per gallon	Syngenta
Fusion	fluazifop + fenoxaprop	2 lb + 0.56 lb per gallon	Syngenta
Garlon 4 Ultra	Triclopyr	4 lb ae per gallon	Dow AgroSciences
Hyvar X	bromacil	80% w/w	DuPont
Journey	imazapic + glyphosate	0.75 lb ae + 1.5 lb ae per gallon	BASF
Method	aminocyclopyrachlor	2 lb ae per gallon	Bayer
Milestone VM	aminopyralid	2 lb ae per gallon	Dow AgroSciences
MSMA	monosodium acid methanearsonate	6 lb per gallon	Drexel
Opensight	aminopyralid + metsulfuron	0.525 lb ae + 0.0945 lb ae per gallon	Dow AgroSciences
Oust XP	sulfometuron	75% w/w	DuPont
Oust Extra	sulfometuron + metsulfuron	56.25% + 15% w/w	DuPont
Outrider	sulfosulfuron	75% w/w	Monsanto
Pendulum AquaCap	pendimethalin	3.8 lb per gallon	BASF
Perspective	aminocyclopyrachlor + chlorsulfuron	39.5% + 15.8% w/w	DuPont
Polaris AC Complete	imazapyr	4 lb ae per gallon	Nufarm
Plainview SC	indaziflam + aminocyclopyrachlor + imazapyr	0.18 lb + 0.50 lb ae + 1.51 lb ae per gallon	Bayer
Plateau	imazapic	2 lb ae per gallon	BASF
Proclipse	prodiamine	65% w/w	Nufarm

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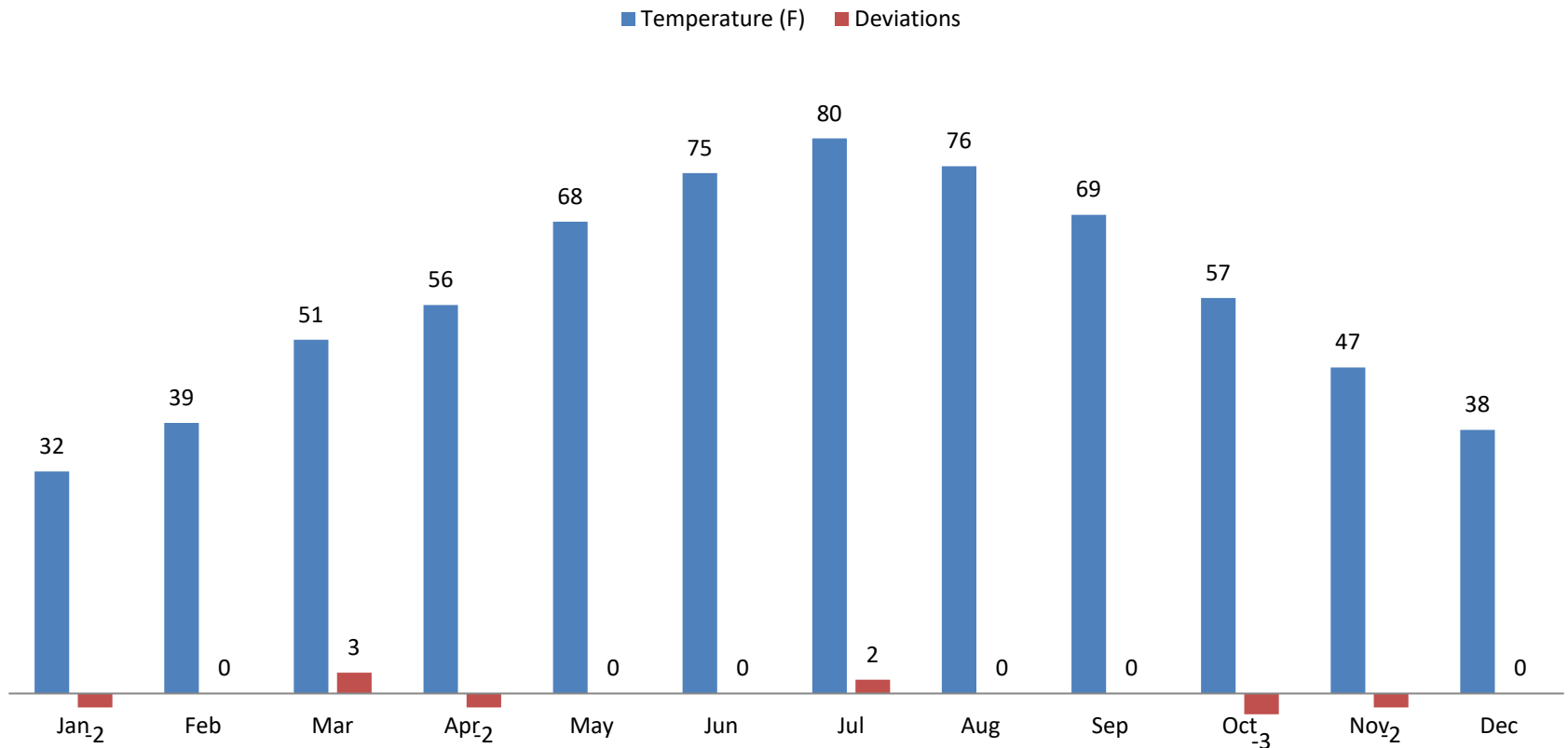
Reward	diquat	2 lb cation per gallon	Syngenta
Rodeo	glyphosate	4 lb ae per gallon	Dow AgroSciences
Roundup ProMax	glyphosate	4.5 lb ae per gallon	Monsanto
Sahara	diuron + imazapyr	62.22% + 7.78% w/w	BASF
Streamline	aminocyclopyrachlor + metsulfuron methyl	39.5% + 12.6% w/w	DuPont
TerraVue	aminopyralid + florpyrauxifen-benzyl	71.01 % + 6.00% w/w	Corteva
Vastlan	triclopyr	4 lb ae per gallon	Dow AgroSciences
Viewpoint	imazapyr + aminocyclopyrachlor + metsulfuron	31.6% + 22.8% + 7.3% w/w	DuPont

# Map of Kentucky Climate Divisions



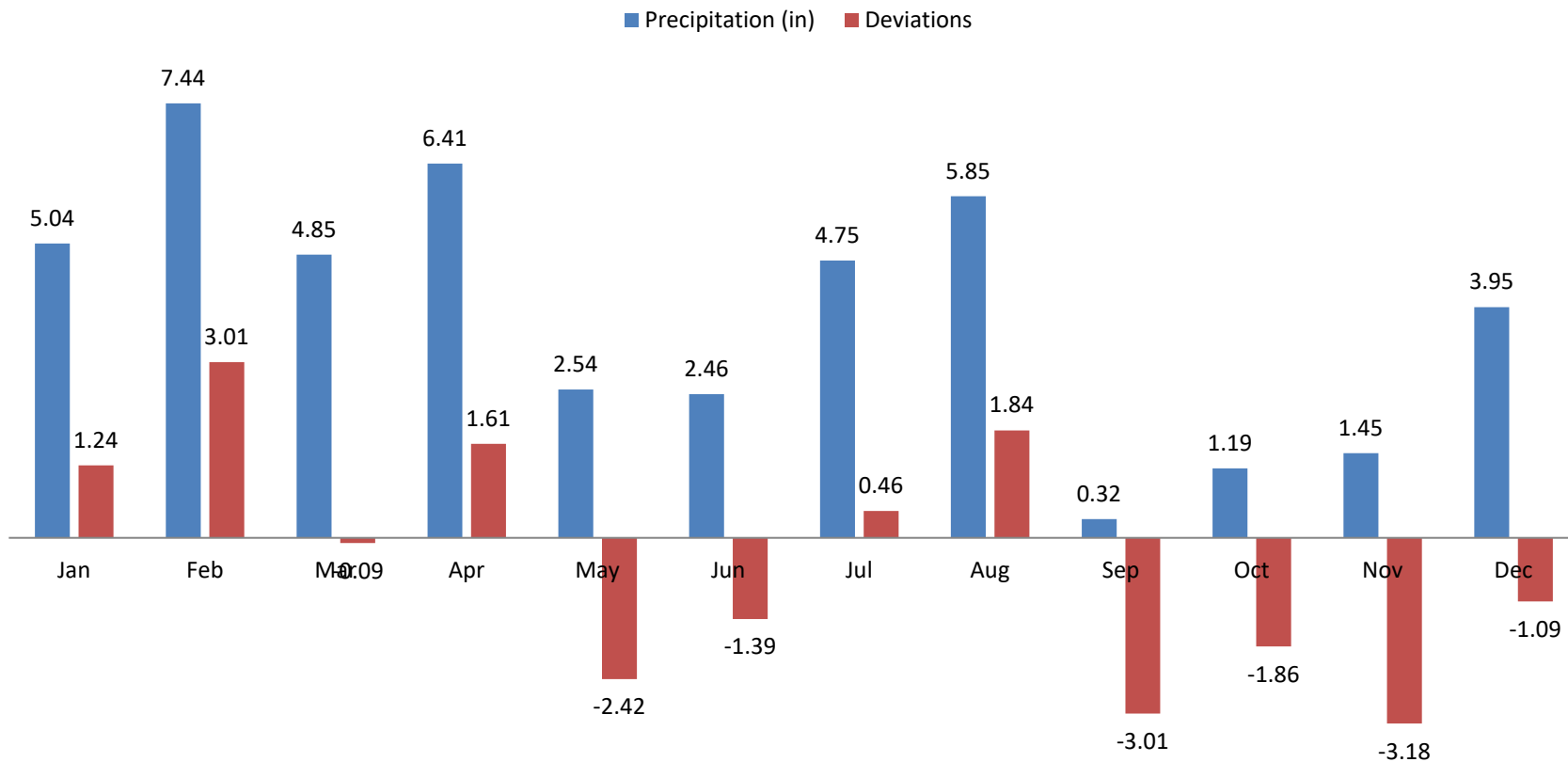
# Princeton (CD1) Monthly Temperatures and Deviations from Normal (UKWAC)

## Summary for 2022 (Princeton) (CD1)



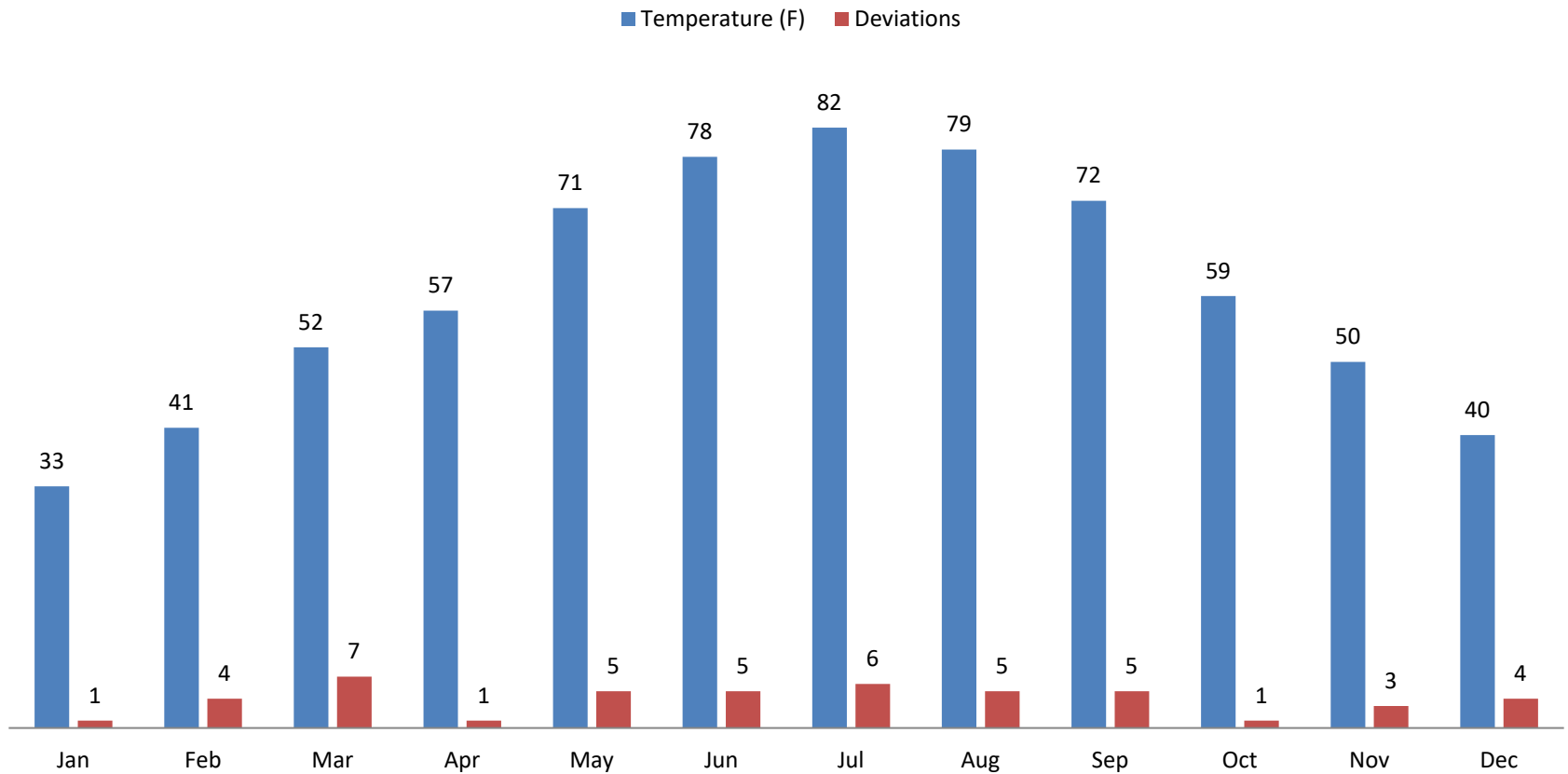
# Princeton (CD1) Monthly Precipitation and Deviations from Normal (UKWAC)

## Summary for 2022 (Princeton) (CD1)



# Louisville (CD2) Monthly Temperatures and Deviations from Normal (UKWAC)

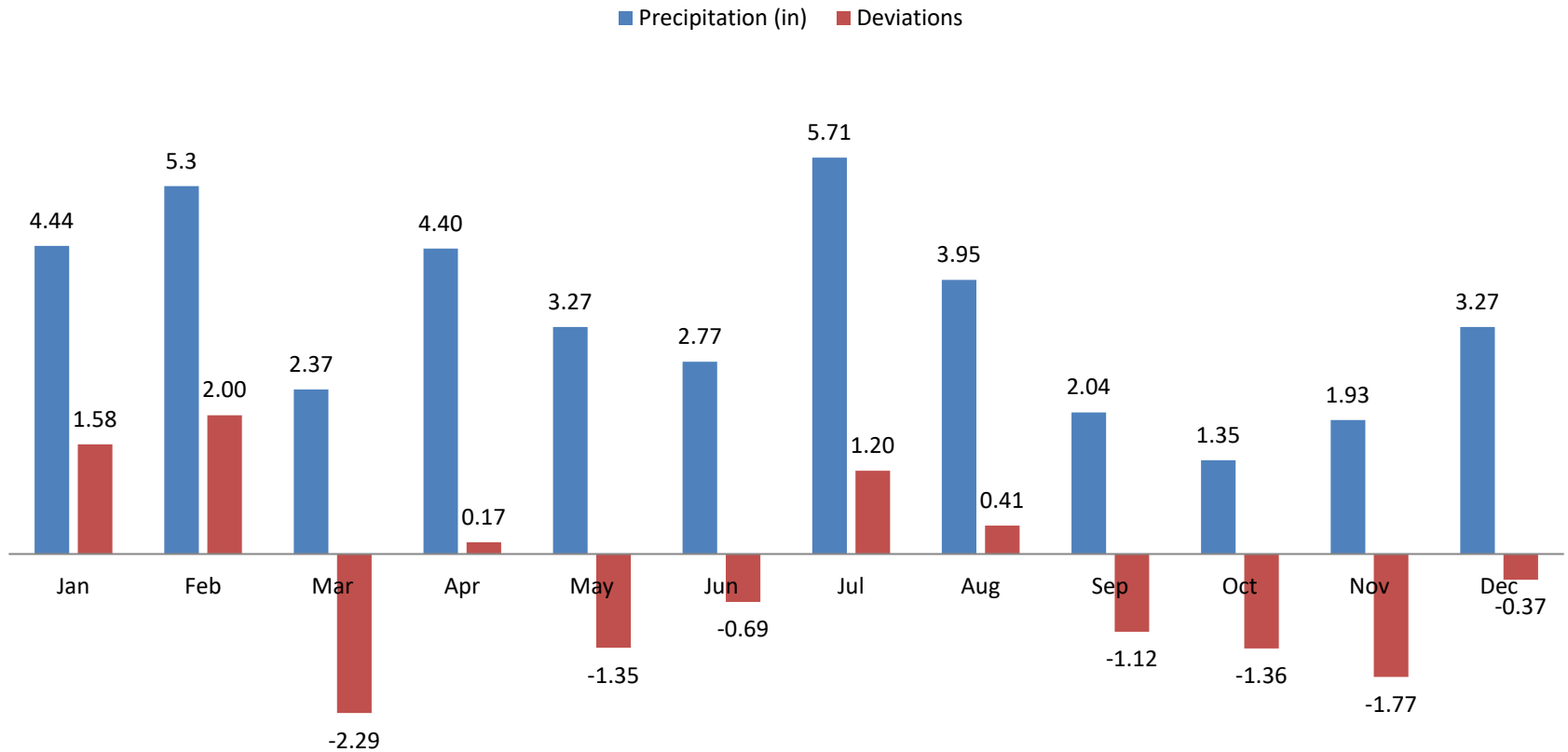
## Summary for 2022 (Louisville) (CD2)





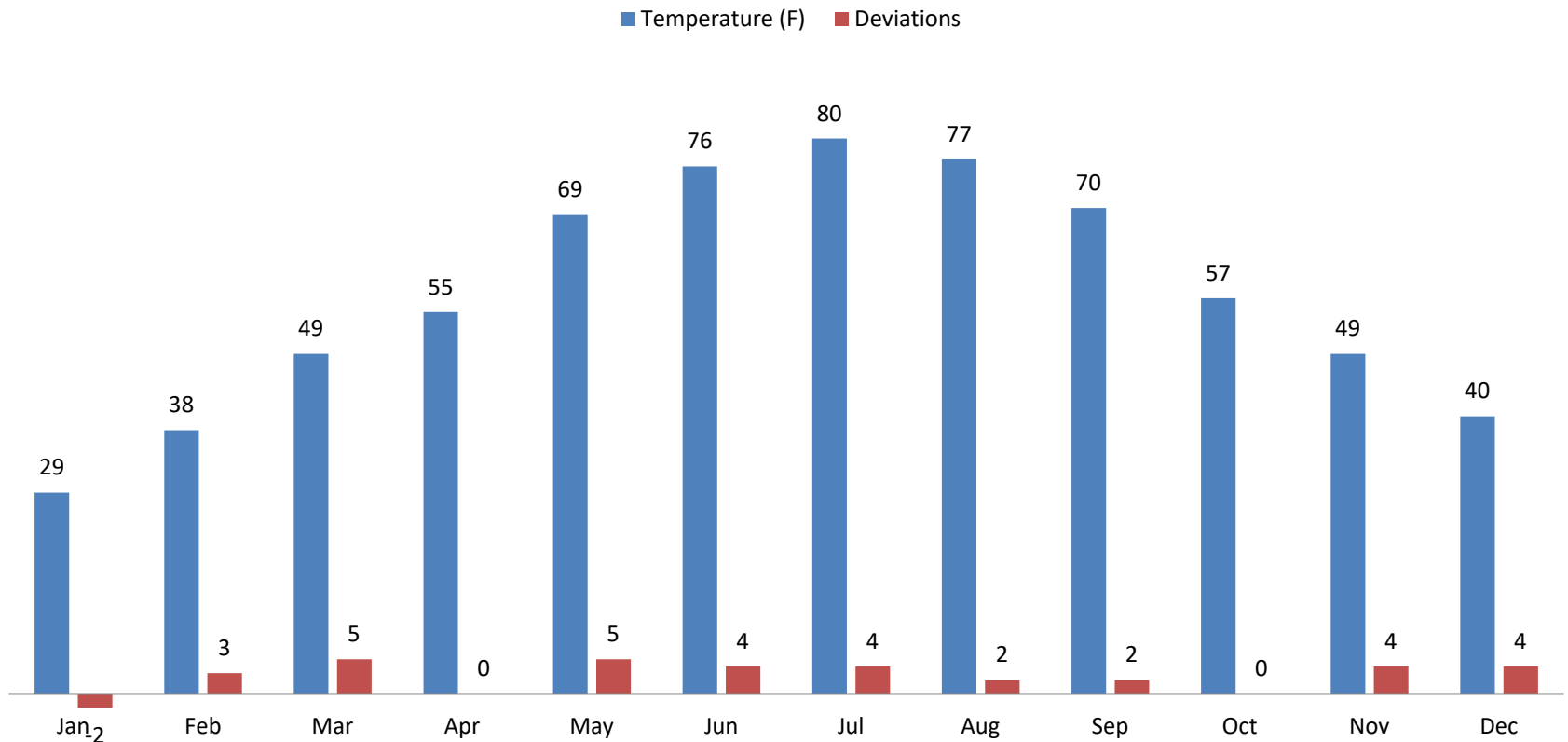
# Louisville (CD2) Monthly Precipitation and Deviations from Normal (UKWAC)

## Summary for 2022 (Louisville) (CD2)



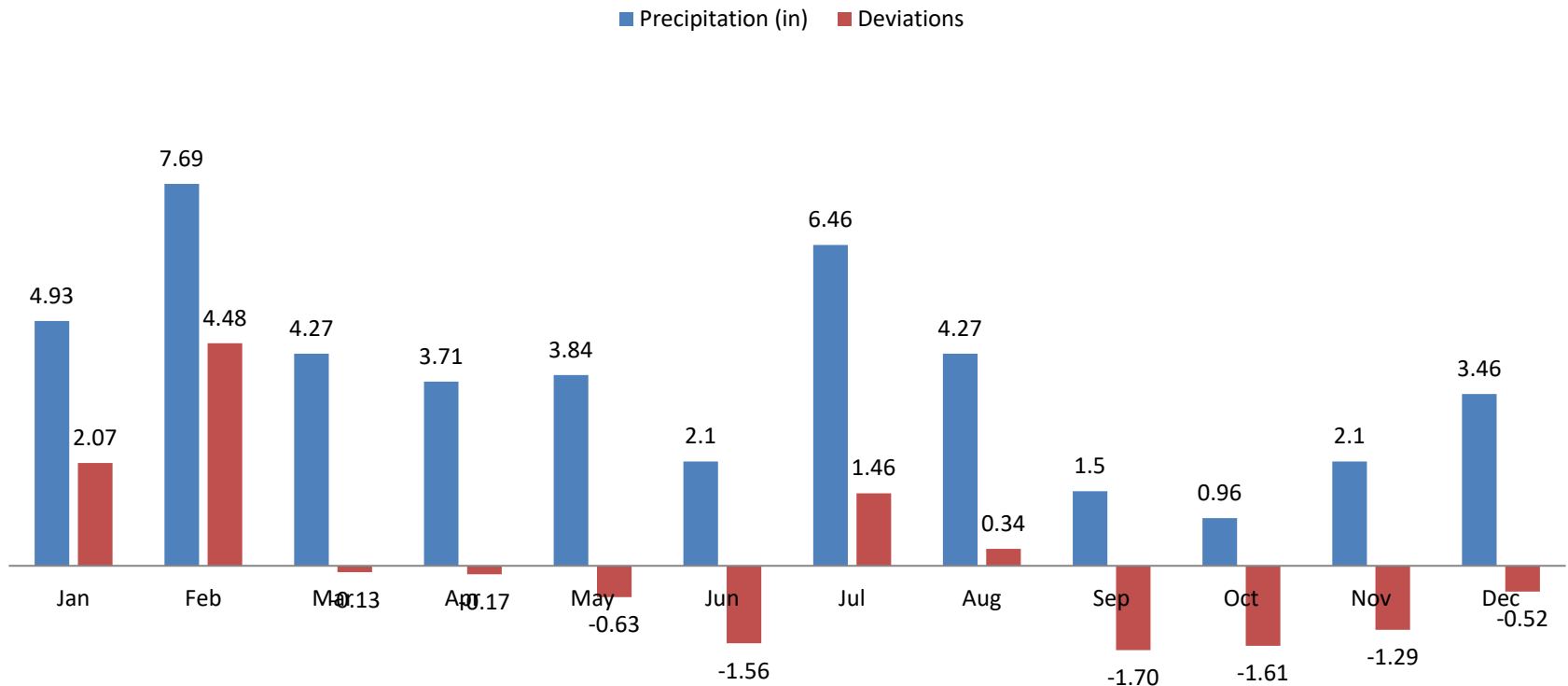
# Lexington (CD3) Monthly Temperatures and Deviations from Normal (UKWAC)

## Summary for 2022 (Lexington) (CD3)



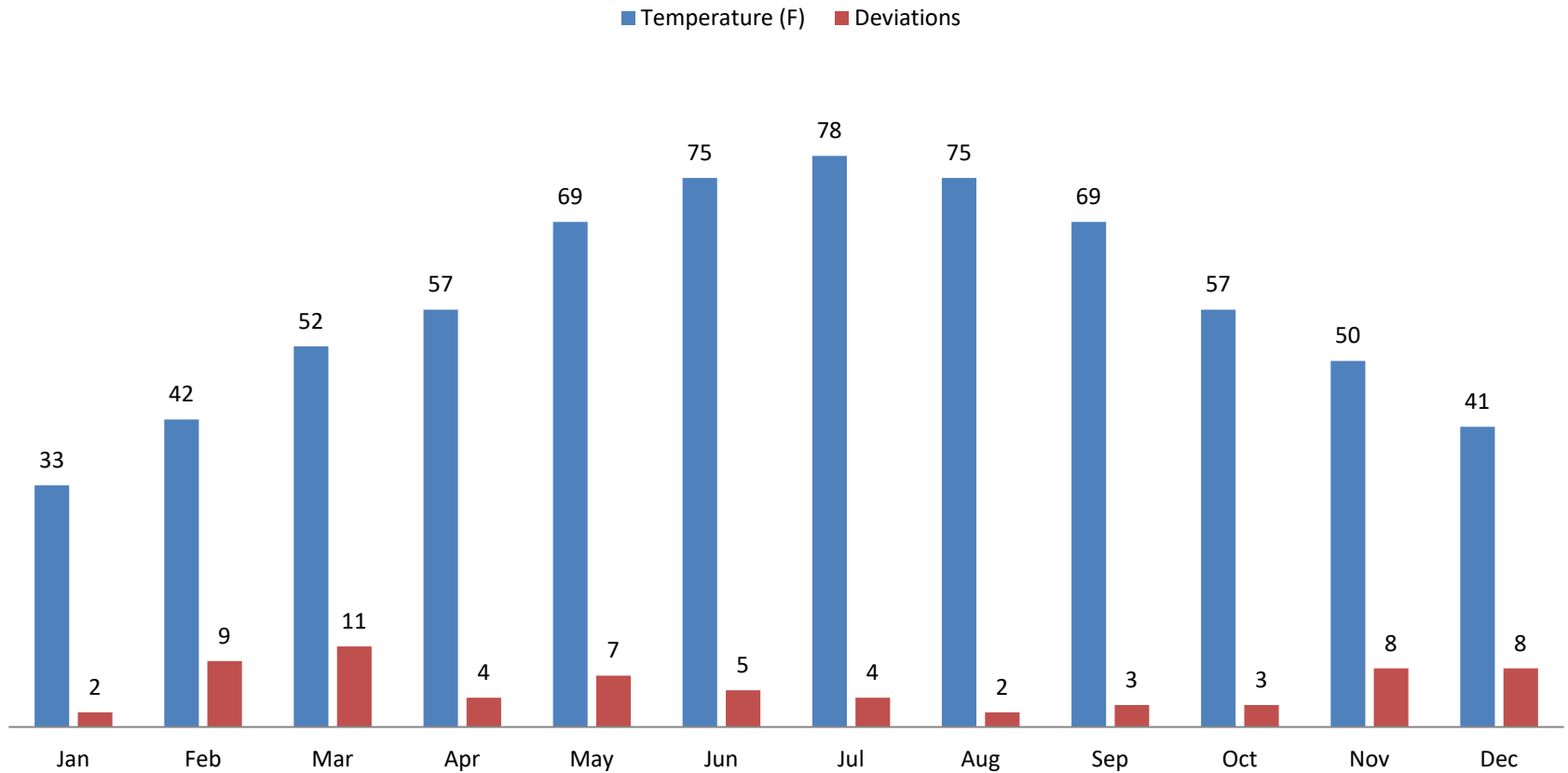
# Lexington (CD3) Monthly Precipitation and Deviations from Normal (UKWAC)

## Summary for 2022 (Lexington) (CD3)



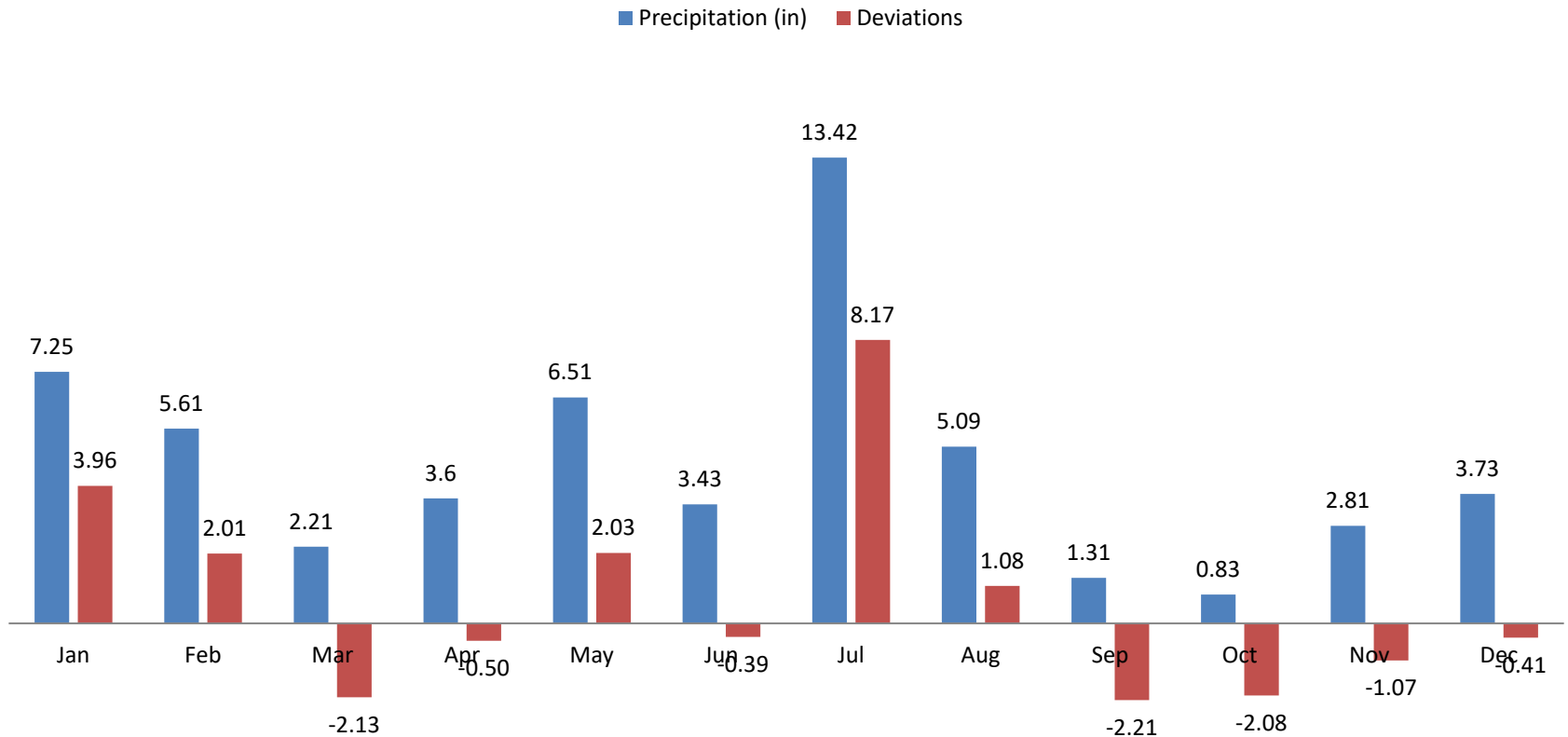
# Jackson (CD4) Monthly Temperatures and Deviations from Normal (UKWAC)

## Summary for 2022 (Jackson) (CD4)



# Jackson (CD4) Monthly Precipitation and Deviations from Normal (UKWAC)

## Summary for 2022 (Jackson) (CD4)



## **2021 Cable Barrier Bareground Trial near Morehead (including 2022 assessment)**

### *Introduction*

Median cable barriers are designed to protect drivers from crossover accidents on interstates and 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 residual herbicides with preemergence activity, in combination with a broad-spectrum post emergence herbicide like glyphosate, are the mainstay for maintaining these bare ground zones. Ideally, the residual herbicides will last all season long (even into early the next spring) and not move off-site by leaching or erosion (movement of soil particles with adsorbed herbicide).

This trial was part of an ongoing effort to evaluate the vegetation control efficacy of a range of herbicide options when used for vegetation management under and beside cable barriers and guardrails.

### *Materials and Methods*

The trial was established in the median of I-64 near Morehead, KY beside a cable barrier which had been recently constructed. The contractor had sown a mix of grasses and legumes on the area between the concrete and the edge of pavement. The 24 herbicide treatments and 3 replications were arranged in a randomized complete block design. Treatments were applied at 25 gallons per acre onto 4 ft wide by 10.5 ft long plots on May 27, 2021 (Figure 1). All treatments, except Roundup ProMax alone (Treatment 1) and Rodeo + Detail + MSO (Treatment 16) included Activator 90 non-ionic surfactant at 0.25% v/v (Table 1a and 1b). Roundup ProMax (glyphosate) has no residual activity so other herbicides were included in the combination treatments to provide residual control for the bare ground treatments. Different herbicide combinations also broadened the weed spectrum controlled and reduced the risk of developing problems with resistant weeds by using different Site of Action (SOA) groups (Table 1a and 1b).

The trial included treatments which have been long term “standards” as well as newer products and combinations currently being used in Kentucky. Industry contacts had recommended for applications near sensitive sites a reduced rate of Method @ 9 fl oz + Esplanade @ 7 fl oz (Treatment 13). NuFilm IR is also still recommended to reduce movement after application, but was not included in these trials. Treatments from previous years included Detail (saflufenacil) @ 6 fl oz (Treatment 16) and a treatment without glyphosate (Method @ 6 fl oz + Escort @ 0.33 oz + Plateau @ 3 fl oz) designed to control broadleaf weeds and suppress grass growth behind guardrails (Treatment 23). Detail may be useful in areas where sensitive crops are growing nearby as it is less persistent than other herbicides. A new product first evaluated in 2020,

Esplanade Sure @ 6 oz (Treatment 19), is also a herbicide product positioned for use near sensitive sites. Esplanade Sure is a combination of indaziflam and rimsulfuron. Other products from 2020 included Terravue @ 5.7 oz/a, which is the bareground rate (Treatment 17), and Plainview SC @ 64 fl oz/a (Treatment 18). Terravue is a combination of aminopyralid and a new chemistry, florpyrauxifen-benzyl, which broadens the range of species controlled. Plainview SC is a combination of indaziflam + aminocyclopyrachlor + imazapyr. Combinations used for fall applications were also included in this year's treatment list. A separate trial was established to evaluate spring and fall timing of bareground applications.

The Grayson weather station reported 1.62 inches of rain May 28 (one day after treatment applications) which helped activate the soil residual herbicide treatments. Species present at application included tall fescue (35 inches with seed heads), orchard grass (36 inches with seedheads), flowering sweet clover (39 inches), flowering white clover (6 inches), sow thistle (24 inches), pepper weed setting seed (16 inches), and flowering buckhorn plantain (21 inches).

Visual assessments of the proportion (%) of bare ground, perennial grasses, annual grasses, marehail, and broadleaf weeds were taken in 2021 on July 29, September 14, and November 1 at 63, 110, and 158 days after treatment (DAT), respectively. In spring 2022, visual assessments of the proportion (%) of bare ground, grasses, and broadleaf weeds were taken on May 19 357 DAT. Data were analyzed using ARM research management software (Gyllings Data Management Solutions, Inc., Brookings, SD) and treatment means were compared using Fisher's LSD at  $p = 0.05$ .

### *Results and Discussion*

Almost all the treatments with glyphosate plus a residual herbicide 63 DAT (Treatments 2 to 22) had more bareground (33 to 97%) except when applied with Detail (18% bareground) (Treatment 16). Bareground observed with Method + Escort + Plateau (Treatment 23) was not different than the Nontreated Check (Treatment 24) (Tables 2a and 2b) (Figure 2). Some of the treatments with soil active herbicides were in the top grouping with 82 to 100% bareground and almost all of them included indaziflam. These were Sahara (Treatment 2), Perspective + Esplanade (Treatment 5), Esplanade + Oust (Treatment 9), Streamline + Esplanade + Plateau (Treatment 10), Esplanade + Oust Extra (Treatment 15), Plainview SC (which includes indaziflam) (Treatment 18), Viewpoint + Esplanade (Treatment 20), and Esplanade + Polaris AC Complete (Treatment 22).

Treatments, in the top two groups, with the most perennial grass cover (28 to 48%) included treatments without glyphosate (Treatments 23 and 24), and Roundup ProMax alone (Treatment 1), Terravue, which primarily targets broadleaf plants (Treatment 17), and Detail (Treatment 16). The treatments with the most annual grass cover (18 to 28%) included the same treatments, as

well as, Viewpoint (Treatment 7). The most marestalk cover (15 to 18%) was observed with the Oust XP (Treatment 4), Cleantraxx alone (Treatment 12), followed by Roundup ProMax alone (Treatment 1). All plots had some broadleaf cover but the greatest (35 to 47%) was with the Esplanade Sure (Treatment 19) and the Untreated Check (Treatment 24) plots. (Tables 2a and 2b)

Later in the season, 110 DAT (Figure 3), the top grouping of treatments with 67 to 88% bareground all included indaziflam as part of the treatment mixture (Tables 3a and 3b). These were Perspective + Esplanade (Treatment 5), Esplanade + Oust (Treatment 9), Streamline + Esplanade + Plateau (Treatment 10), Plainview SC (which includes indaziflam) (Treatment 18), Viewpoint + Esplanade (Treatment 20), and Esplanade + Polaris AC Complete (Treatment 22). Treatments that had a low % bareground (0 to 20%) included Roundup ProMax alone (Treatment 1), those without glyphosate (Treatments 23, and 24), and those with residual herbicides that are less effective at controlling annual grasses (Treatments 11 and 16).

Treatments with the most visible perennial grass cover (13 to 30%) included Perspective + Esplanade (Treatment 5), Streamline + Esplanade + Plateau (Treatment 10), Cleantraxx + Milestone (Treatment 11), and Escort + Esplanade + Method (Treatment 21) (Tables 3a and 3b). Treatments with the most annual grass cover (64 to 85%) were Viewpoint (Treatment 7), Detail (Treatment 16), Terravue (Treatment 17), and Method + Escort + Plateau (Treatment 23). The most marestalk cover (20 to 30%) was with Oust XP (Treatment 4), Cleantraxx by itself (Treatment 12), and Roundup ProMax alone (Treatment 1). The greatest broadleaf cover (47 to 65%) was with the Esplanade Sure (Treatment 19), the Untreated Check (Treatment 24), Roundup alone (Treatment 1), and Method + Esplanade (Treatment 13).

By the end of the 2021 season (158 DAT) (Figure 4) there were only three treatments in the top group with 65 to 83% bareground (Tables 4a and 4b). These were Esplanade + Oust XP (Treatment 9), Plainview SC (Treatment 18), and Viewpoint + Esplanade (Treatment 20). Most of the treatments had increased visible perennial grass cover (8 to 33%) compared to 110 DAT. Treatments not in the top group (3 to 7%) included Oust XP (Treatment 4), Viewpoint (Treatment 7), Polaris AC Complete (Treatment 8), Esplanade + Oust XP (Treatment 9), Viewpoint + Esplanade (Treatment 20), and Esplanade + Polaris AC Complete (Treatment 22). The treatments with the most annual grass cover (43 to 60%) included the four from 110 DAT plus Polaris AC Complete (Treatment 8). Treatments with the most marestalk cover (17 to 23 %) included Oust XP (Treatment 4) and Cleantraxx by itself (Treatment 12). Buckhorn plantain growth had 13 to 22% cover on the treatments that included Roundup ProMax alone (Treatment 1), both Cleantraxx treatments (Treatments 11 and 12), Detail (Treatment 16), and the Nontreated Check (Treatment 24). Treatments with the most broadleaf cover (42 to 58%) included Oust XP (Treatment 4), Polaris AC Complete (Treatment 8), Cleantraxx by itself



(Treatment 12), Esplanade + AC Polaris Complete (Treatment 22), and the Nontreated Check (Treatment 24).

By spring 2022 (357 DAT) (Figure 5) there were no differences in % bareground (22 to 53%) among the treatments (Tables 5a and 5b). Most of the grass cover was perennial and the group of treatments with the greatest cover (42 to 63%) included Streamline + Esplanade + Plateau (Treatment 10), Detail (Treatment 16), TerraVue (Treatment 17), Escort + Esplanade + Method (Treatment 21), Method + Escort + Plateau (Treatment 23), and the Nontreated Check (Treatment 24). The group of treatments with the greatest % broadleaf weed cover (40 to 52%) included Roundup ProMax by itself (Treatment 1), Sahara (Treatment 2), Hyvar (Treatment 3), Oust XP (Treatment 4), Viewpoint (Treatment 7), Esplanade + Oust XP (Treatment 9), Cleantraxx by itself (Treatment 12), Esplanade + Oust Extra (Treatment 15), Viewpoint + Esplanade (Treatment 20), and Esplanade + AC Polaris Complete (Treatment 22).

The vegetation beside the cable barrier at this location provided a good trial on the performance of bare ground herbicides over the course of a year. These trials continue to add to data collected from previous years and provide information for roadside managers.

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**Table 1a. Herbicide Treatments, Active Ingredients, Application Rates, and Site of Action (SOA) Groups for Cable Barrier Bareground Trial. (Part 1 of 2)**

Trt. No.	Product Name*	Rate	Rate Unit	Active Ingredient(s)	ai Rate (per acre)	SOA Groups
1	Roundup ProMax	1.3	QT/A	glyphosate	1.5 LB AE	9
2	Roundup ProMax Sahara	1.3 10	QT/A LB/A	glyphosate diuron + imazapyr	1.5 LB AE 6.2 LB + 12.4 OZ	9 7 + 2
3	Roundup ProMax Hyvar	1.3 10	QT/A LB/A	glyphosate bromacil	1.5 LB AE 8 LB	9 5
4	Roundup ProMax Oust XP	1.3 3	QT/A OZ/A	glyphosate sulfometuron	1.5 LB AE 2.3 OZ	9 2
5	Roundup ProMax Perspective Esplanade	1.3 8 5	QT/A OZ/A FL OZ/A	glyphosate aminocyclopyrachlor + chlorsulfuron indaziflam	1.5 LB AE/A 3.2 OZ + 1.3 OZ/A 1.0 OZ/A	9 4 + 2 29
6	Roundup ProMax Perspective Proclipse	1.3 9 2.3	QT/A OZ/A LB/A	glyphosate aminocyclopyrachlor + chlorsulfuron procliamine	1.5 LB AE 3.6 OZ + 1.4 OZ 1.5 LB	9 4 + 2 3
7	Roundup ProMax Viewpoint	1.3 18	QT/A OZ/A	glyphosate aminocyclopyrachlor + imazapyr + metsulfuron	1.5 LB AE 4.1 OZ + 5.7 OZ + 1.3 OZ	9 4 + 2 + 2
8	Roundup ProMax Polaris AC Complete	1.3 2	QT/A PT/A	glyphosate imazapyr	1.5 LB AE 16 OZ AE	9 2
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 0.7 OZ 2.3 OZ	9 29 2
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 3.2 OZ + 1 OZ 1 OZ 1.3 OZ AE	9 4 + 2 29 2
11	Rodeo Cleantraxx Milestone VM	1.5 3 7	QT/A PT/A FL OZ/A	glyphosate penoxsulam + oxyfluorfen aminopyralid	1.5 LB AE 0.5 OZ + 23.6 OZ 1.8 OZ AE	9 2 + 14 4
12	Rodeo Cleantraxx	1.5 4.5	QT/A PT/A	glyphosate penoxsulam + oxyfluorfen	1.5 LB AE 0.7 OZ + 35.4 OZ	9 2 + 14

\*All herbicide treatments (except trt. #1 & #16) contained the adjuvant, Activator 90 at 0.25% v/v.

Treatment 16 included MSO @ 1%

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**Table 1b. Herbicide Treatments, Active Ingredients, Application Rates, and Site of Action (SOA) Groups for Cable Barrier Bareground Trial (Part 2 of 2)**

Trt. No.	Product Name*	Rate	Rate Unit	Active Ingredient(s)	ai Rate (per acre)	SOA Groups
13	Rodeo	32	FL OZ/A	glyphosate	1 LB AE/A	9
	Method	9	FL OZ/A	aminocyclopyrachlor	2.25 OZ AE/A	4
	Esplanade	7	FL OZ/A	indaziflam	1.5 OZ/A	29
14	Rodeo	32	FL OZ/A	glyphosate	1 LB AE/A	9
	Esplanade	6	FL OZ/A	indaziflam	1.2 OZ/A	29
	Milestone VM	7	FL OZ/A	aminopyralid	1.8 OZ AE/A	4
15	Rodeo	32	FL OZ/A	glyphosate	1 LB AE/A	9
	Esplanade	3.5	FL OZ/A	indaziflam	0.7 OZ/A	29
	Oust Extra	1.5	OZ/A	sulfometuron + metsulfuron	0.8 OZ + 0.2 OZ/A	2 + 2
16	Rodeo	32	FL OZ/A	glyphosate	1 LB AE/A	9
	Detail	6	FL OZ/A	saflufenacil	2.1 OZ/A	14
17	Rodeo	32	FL OZ/A	glyphosate	1 LB AE/A	9
	Terravue	5.7	OZ/A	aminopyralid + florpyrauxifen-benzyl	3.4 OZ AE + 0.34 OZ/A	4 + 4
18	Rodeo	32	FL OZ/A	glyphosate	1 LB AE/A	9
	Plainview SC	64	FL OZ/A	indaziflam + aminocyclopyrachlor + imazapyr	1.44 OZ + 4 OZ AE + 12.1 OZ AE/A	29 + 4 + 2
19	Rodeo	32	FL OZ/A	glyphosate	1 LB AE/A	9
	Esplanade Sure	6	OZ/A	indaziflam + rimsulfuron	1.4 OZ + 1 OZ/A	29 + 2
20	Rodeo	32	FL OZ/A	glyphosate	1 LB AE/A	9
	Viewpoint	14	OZ/A	aminocyclopyrachlor + imazapyr + metsulfuron	3.2 OZ + 4.4 OZ + 1.0 OZ/A	4 + 2 + 2
	Esplanade	7	FL OZ/A	indaziflam	1.5 OZ/A	29
21	Rodeo	32	FL OZ/A	glyphosate	1 LB AE/A	9
	Escort	0.5	OZ/A	metsulfuron	0.3 OZ/A	2
	Esplanade	5	FL OZ/A	indaziflam	1 OZ/A	29
	Method	9	FL OZ/A	aminocyclopyrachlor	2.25 OZ AE/A	4
22	Rodeo	32	FL OZ/A	glyphosate	1 LB AE/A	9
	Esplanade	5	FL OZ/A	indaziflam	1 OZ/A	29
	AC Polaris Complete	10	FL OZ/A	imazapyr	5 OZ AE/A	2
23	Method	6	FL OZ/A	aminocyclopyrachlor	1.5 OZ AE/A	4
	Escort	0.33	OZ/A	metsulfuron	0.2 OZ/A	2
	Plateau	3	FL OZ/A	imazapic	0.75 OZ AE/A	2
24	Nontreated Check					

\*All herbicide treatments (except trt. #1 & #16) contained the adjuvant, Activator 90 at 0.25% v/v.  
Treatment 16 included MSO @ 1%

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Table 2a. Results for Cable Barrier Trial 63 DAT<sup>1</sup> (July 29, 2021) (Part 1 of 2)

Trt. No.	Product Name*	Rate	Rate Unit	% Bare	% Perennial Grass	% Annual Grass	% Marestalk	% Broadleaves
				63 DAT				
1	Roundup ProMax	1.3	QT/A	30 ij <sup>2</sup>	28 bcd	17 bcde	12 bc	25 bcde
2	Roundup ProMax Sahara	1.3 10	QT/A LB/A	85 abcd	4 g	2 gh	2 ef	9 fghi
3	Roundup ProMax Hyvar	1.3 10	QT/A LB/A	68 cdefg	7 fg	12 cdefg	0 f	13 fghi
4	Roundup ProMax Oust XP	1.3 3	QT/A OZ/A	73 bcdef	0 g	5 fgh	15 ab	20 cdef
5	Roundup ProMax Perspective Esplanade	1.3 8 5	QT/A OZ/A FL OZ/A	87 abc	6 fg	3 gh	0 f	3 ghi
6	Roundup ProMax Perspective Proclipse	1.3 9 2.3	QT/A OZ/A LB/A	68 cdefg	13 efg	2 gh	0 f	5 ghi
7	Roundup ProMax Viewpoint	1.3 18	QT/A OZ/A	67 defg	8 fg	22 abc	0 f	2 hi
8	Roundup ProMax Polaris AC Complete	1.3 2	QT/A PT/A	68 cdefg	5 g	9 defgh	5 def	12 fghi
9	Roundup ProMax Esplanade Oust XP	1.3 3.5 3	QT/A FL OZ/A OZ/A	90 ab	2 g	0 h	4 def	8 ghi
10	Roundup ProMax Streamline Esplanade Plateau	1.3 8 5 5	QT/A OZ/A FL OZ/A FL OZ/A	80 abcde	11 efg	7 efgh	0 f	2 hi
11	Rodeo Cleantraxx Milestone VM	1.5 3 7	QT/A PT/A FL OZ/A	50 gh	22 cde	15 bcdef	0 f	13 efgh
12	Rodeo Cleantraxx	1.5 4.5	QT/A PT/A	67 defg	5 g	2 gh	18 a	27 bcd

\*All herbicide treatments (except trt. #1 & #16) contained the adjuvant, Activator 90 at 0.25% v/v. Treatment 16 included MSO @ 1%

<sup>1</sup> DAT = Days after treatment <sup>2</sup> 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 2b. Results for Cable Barrier Trial 63 DAT<sup>1</sup> (July 29, 2021) (Part 2 of 2)*

Trt. No.	Product Name*	Rate	Rate Unit	% Bare	% Perennial Grass	% Annual Grass	% Maretail	% Broadleaves
				63 DAT				
13	Rodeo	32	FL OZ/A	62 efg <sup>2</sup>	9 efg	0 h	6 cdef	29 bc
	Method	9	FL OZ/A					
	Esplanade	7	FL OZ/A					
14	Rodeo	32	FL OZ/A	73 bcdef	7 fg	4 fgh	0 f	15 defg
	Esplanade	6	FL OZ/A					
	Milestone VM	7	FL OZ/A					
15	Rodeo	32	FL OZ/A	78 abcde	7 fg	3 gh	4 def	12 fghi
	Esplanade	3.5	FL OZ/A					
	Oust Extra	1.5	OZ/A					
16	Rodeo	32	FL OZ/A	18 ij	33 bc	18 abcd	0 f	32 bc
	Detail	6	FL OZ/A					
17	Rodeo	32	FL OZ/A	33 hi	35 ab	25 ab	0 f	7 ghi
	Terravue	5.7	OZ/A					
18	Rodeo	32	FL OZ/A	94 a	1 g	0 h	0 f	4 ghi
	Plainview SC	64	FL OZ/A					
19	Rodeo	32	FL OZ/A	57 fg	5 g	3 gh	8 cde	35 ab
	Esplanade Sure	6	OZ/A					
20	Rodeo	32	FL OZ/A	97 a	2 g	1 h	0 f	1 i
	Viewpoint	14	OZ/A					
	Esplanade	7	FL OZ/A					
21	Rodeo	32	FL OZ/A	73 bcdef	18 def	6 efgh	0 f	2 hi
	Escort	0.5	OZ/A					
	Esplanade	5	FL OZ/A					
	Method	9	FL OZ/A					
22	Rodeo	32	FL OZ/A	82 abcd	2 g	2 gh	5 def	13 efgh
	Esplanade	5	FL OZ/A					
	AC Polaris Complete	10	FL OZ/A					
23	Method	6	FL OZ/A	22 ij	48 a	28 a	1 f	2 hi
	Escort	0.33	OZ/A					
	Plateau	3	FL OZ/A					
24	Nontreated Check			13 j	33 bc	7 efgh	8 cd	47 a

\*All herbicide treatments (except trt. #1 & #16) contained the adjuvant, Activator 90 at 0.25% v/v. Treatment 16 included MSO @ 1%

<sup>1</sup> DAT = Days after treatment <sup>2</sup> 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 3a. Results for Cable Barrier Trial 110 DAT<sup>1</sup> (September 14, 2021) (Part 1 of 2)

Trt. No.	Product Name*	Rate	Rate Unit	% Bare	% Perennial Grass	% Annual Grass	% Marestalk	% Broadleaves
				110 DAT				
1	Roundup ProMax	1.3	QT/A	8 ij <sup>2</sup>	8 bc	33 bcd	20 ab	47 abc
2	Roundup ProMax Sahara	1.3 10	QT/A LB/A	58 bcd	7 bc	7 ef	7 cde	23 defg
3	Roundup ProMax Hyvar	1.3 10	QT/A LB/A	45 cdef	3 c	40 b	0 e	10 fgh
4	Roundup ProMax Oust XP	1.3 3	QT/A OZ/A	28 efghi	2 c	35 bcd	30 a	32 cde
5	Roundup ProMax Perspective Esplanade	1.3 8 5	QT/A OZ/A FL OZ/A	73 ab	13 abc	8 ef	0 e	3 h
6	Roundup ProMax Perspective Proclipse	1.3 9 2.3	QT/A OZ/A LB/A	50 cde	2 c	22 bcdef	0 e	8 fgh
7	Roundup ProMax Viewpoint	1.3 18	QT/A OZ/A	28 efghi	0 c	64 a	1 e	1 h
8	Roundup ProMax Polaris AC Complete	1.3 2	QT/A PT/A	22 ghi	3 c	37 bc	12 bcd	27 def
9	Roundup ProMax Esplanade Oust XP	1.3 3.5 3	QT/A FL OZ/A OZ/A	77 ab	3 c	5 ef	9 cde	13 efgh
10	Roundup ProMax Streamline Esplanade Plateau	1.3 8 5 5	QT/A OZ/A FL OZ/A FL OZ/A	67 abc	13 abc	7 ef	0 e	10 fgh
11	Rodeo Cleantraxx Milestone VM	1.5 3 7	QT/A PT/A FL OZ/A	20 hij	23 ab	40 b	2 de	17 efgh
12	Rodeo Cleantraxx	1.5 4.5	QT/A PT/A	37 defgh	8 bc	13 cdef	28 a	42 bcd

\*All herbicide treatments (except trt. #1 & #16) contained the adjuvant, Activator 90 at 0.25% v/v. Treatment 16 included MSO @ 1%

<sup>1</sup> DAT = Days after treatment <sup>2</sup> 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 3b. Results for Cable Barrier Trial 110 DAT<sup>1</sup> (September 14, 2021) (Part 2 of 2)

Trt. No.	Product Name*	Rate	Rate Unit	% Bare	% Perennial Grass	% Annual Grass	% Maretail	% Broadleaves
				110 DAT				
13	Rodeo	32	FL OZ/A	27 fghi <sup>2</sup>	5 c	3 f	17 bc	65 a
	Method	9	FL OZ/A					
	Esplanade	7	FL OZ/A					
14	Rodeo	32	FL OZ/A	30 efghi	8 bc	28 bcde	0 e	32 cde
	Esplanade	6	FL OZ/A					
	Milestone VM	7	FL OZ/A					
15	Rodeo	32	FL OZ/A	48 cdef	7 bc	22 bcdef	13 bc	23 defg
	Esplanade	3.5	FL OZ/A					
	Oust Extra	1.5	OZ/A					
16	Rodeo	32	FL OZ/A	0 j	7 bc	72 a	0 e	17 efgh
	Detail	6	FL OZ/A					
17	Rodeo Terravue	32 5.7	FL OZ/A OZ/A	10 ij	5 c	80 a	0 e	2 h
18	Rodeo Plainview SC	32 64	FL OZ/A FL OZ/A	82 a	1 c	0 f	2 de	14 efgh
19	Rodeo Esplanade Sure	32 6	FL OZ/A OZ/A	27 fghi	8 bc	12 def	17 bc	53 ab
20	Rodeo Viewpoint	32 14	FL OZ/A OZ/A	88 a	4 c	4 f	0 e	4 h
	Esplanade	7	FL OZ/A					
21	Rodeo	32	FL OZ/A	42 defg	30 a	20 bcdef	0 e	7 gh
	Escort	0.5	OZ/A					
	Esplanade	5	FL OZ/A					
	Method	9	FL OZ/A					
22	Rodeo	32	FL OZ/A	67 abc	2 c	3 f	17 bc	27 def
	Esplanade	5	FL OZ/A					
	AC Polaris Complete	10	FL OZ/A					
23	Method	6	FL OZ/A	3 j	7 bc	85 a	2 de	2 h
	Escort	0.33	OZ/A					
	Plateau	3	FL OZ/A					
24	Nontreated Check			3 j	8 bc	40 b	10 bcde	50 abc

\*All herbicide treatments (except trt. #1 & #16) contained the adjuvant, Activator 90 at 0.25% v/v. Treatment 16 included MSO @ 1%

<sup>1</sup> DAT = Days after treatment <sup>2</sup> 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 4a. Results for Cable Barrier Trial 158 DAT<sup>1</sup> (November 1, 2021) (Part 1 of 2)

Trt. No.	Product Name*	Rate	Rate Unit	% Bare	% Perennial Grass	% Annual Grass	% Marestail	% Buckhorn Plantain	% Broadleaves
				158 DAT					
1	Roundup ProMax	1.3	QT/A	28 defgh <sup>2</sup>	20 abcd	33 bcd	7 bcd	13 abc	33 bcdef
2	Roundup ProMax Sahara	1.3 10	QT/A LB/A	50 cde	8 abcd	15 defg	7 bcd	8 bcd	40 bcde
3	Roundup ProMax Hyvar	1.3 10	QT/A LB/A	30 defgh	20 abcd	28 cde	0 d	3 cd	27 defgh
4	Roundup ProMax Oust XP	1.3 3	QT/A OZ/A	25 efgh	7 bcd	28 cde	17 ab	5 cd	50 ab
5	Roundup ProMax Perspective Esplanade	1.3 8 5	QT/A OZ/A FL OZ/A	53 bcd	27 abcd	7 efg	0 d	2 cd	20 fghij
6	Roundup ProMax Perspective Proclipse	1.3 9 2.3	QT/A OZ/A LB/A	40 cdefg	25 abcd	25 cdef	0 d	3 cd	30 cdefg
7	Roundup ProMax Viewpoint	1.3 18	QT/A OZ/A	22 fgh	7 bcd	60 a	0 d	0 d	17 fghij
8	Roundup ProMax Polaris AC Complete	1.3 2	QT/A PT/A	17 gh	3 d	43 abc	10 bcd	0 d	42 abcde
9	Roundup ProMax Esplanade Oust XP	1.3 3.5 3	QT/A FL OZ/A OZ/A	65 abc	5 cd	5 fg	12 bc	0 d	30 cdefg
10	Roundup ProMax Streamline Esplanade Plateau	1.3 8 5 5	QT/A OZ/A FL OZ/A FL OZ/A	53 bcd	33 a	8 efg	0 d	0 d	8 ij
11	Rodeo Cleantraxx Milestone VM	1.5 3 7	QT/A PT/A FL OZ/A	23 efgh	32 ab	20 defg	2 cd	22 a	28 cdefg
12	Rodeo Cleantraxx	1.5 4.5	QT/A PT/A	30 defgh	12 abcd	7 efg	23 a	22 a	58 a

\*All herbicide treatments (except trt. #1 & #16) contained the adjuvant, Activator 90 at 0.25% v/v. Treatment 16 included MSO @ 1%

<sup>1</sup> DAT = Days after treatment <sup>2</sup> 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 4b. Results for Cable Barrier Trial 158 DAT<sup>1</sup> (November 1, 2021) (Part 2 of 2)

Trt. No.	Product Name*	Rate	Rate Unit	% Bare	% Perennial Grass	% Annual Grass	% Maretail	% Buckhorn Plantain	% Broadleaves
				158 DAT					
13	Rodeo	32	FL OZ/A	43 cdefg <sup>2</sup>	18 abcd	3 fg	8 bcd	0 d	38 bcde
	Method	9	FL OZ/A						
	Esplanade	7	FL OZ/A						
14	Rodeo	32	FL OZ/A	47 cdef	17 abcd	17 defg	0 d	0 d	25 efghi
	Esplanade	6	FL OZ/A						
	Milestone VM	7	FL OZ/A						
15	Rodeo	32	FL OZ/A	50 cde	17 abcd	15 defg	10 bcd	2 cd	27 defgh
	Esplanade	3.5	FL OZ/A						
	Oust Extra	1.5	OZ/A						
16	Rodeo	32	FL OZ/A	5 h	20 abcd	55 ab	0 d	13 abc	25 efghi
	Detail	6	FL OZ/A						
17	Rodeo	32	FL OZ/A	10 h	32 ab	52 ab	0 d	2 cd	7 j
	Terravue	5.7	OZ/A						
18	Rodeo	32	FL OZ/A	78 ab	4 cd	3 fg	0 d	0 d	14 ghij
	Plainview SC	64	FL OZ/A						
19	Rodeo	32	FL OZ/A	50 cde	18 abcd	3 fg	12 bc	2 cd	28 cdefg
	Esplanade Sure	6	OZ/A						
20	Rodeo	32	FL OZ/A	83 a	3 d	5 fg	0 d	0 d	10 hij
	Viewpoint	14	OZ/A						
	Esplanade	7	FL OZ/A						
21	Rodeo	32	FL OZ/A	50 cde	30 abc	10 efg	0 d	3 cd	13 ghij
	Escort	0.5	OZ/A						
	Esplanade	5	FL OZ/A						
	Method	9	FL OZ/A						
22	Rodeo	32	FL OZ/A	48 cdef	6 bcd	2 g	13 b	8 bcd	44 abcd
	Esplanade	5	FL OZ/A						
	AC Polaris Complete	10	FL OZ/A						
23	Method	6	FL OZ/A	5 h	33 a	60 a	0 d	7 bcd	7 j
	Escort	0.33	OZ/A						
	Plateau	3	FL OZ/A						
24	Nontreated Check			3 h	22 abcd	28 cde	8 bcd	18 ab	45 abc

\*All herbicide treatments (except trt. #1 & #16) contained the adjuvant, Activator 90 at 0.25% v/v. Treatment 16 included MSO @ 1%

<sup>1</sup> DAT = Days after treatment <sup>2</sup> 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 5a. Results for Cable Barrier Trial 357 DAT<sup>1</sup> (May 19, 2022) (Part 1 of 2)*

Trt. No.	Product Name*	Rate	Rate Unit	% Bare	% Grass	% Broadleaves
				357 DAT		
1	Roundup ProMax	1.3	QT/A	33	27 cdefgh <sup>2</sup>	40 abcde
2	Roundup ProMax Sahara	1.3 10	QT/A LB/A	42	18 defgh	40 abcde
3	Roundup ProMax Hyvar	1.3 10	QT/A LB/A	37	17 efgh	47 abc
4	Roundup ProMax Oust XP	1.3 3	QT/A OZ/A	23	8 gh	68 a
5	Roundup ProMax Perspective Esplanade	1.3 8 5	QT/A OZ/A FL OZ/A	38	35 bcdef	20 cdefg
6	Roundup ProMax Perspective Proclipse	1.3 9 2.3	QT/A OZ/A LB/A	43	28 cdefgh	28 bcdefg
7	Roundup ProMax Viewpoint	1.3 18	QT/A OZ/A	47	10 fgh	43 abc
8	Roundup ProMax Polaris AC Complete	1.3 2	QT/A PT/A	53	8 gh	38 bcdef
9	Roundup ProMax Esplanade Oust XP	1.3 3.5 3	QT/A FL OZ/A OZ/A	43	3 h	52 ab
10	Roundup ProMax Streamline Esplanade Plateau	1.3 8 5 5	QT/A OZ/A FL OZ/A FL OZ/A	45	42 abcde	12 efg
11	Rodeo Cleantraxx Milestone VM	1.5 3 7	QT/A PT/A FL OZ/A	43	27 cdefgh	30 bcdefg
12	Rodeo Cleantraxx	1.5 4.5	QT/A PT/A	43	13 fgh	43 abc

\*All herbicide treatments (except trt. #1 & #16) contained the adjuvant, Activator 90 at 0.25% v/v. Treatment 16 included MSO @ 1%

<sup>1</sup> DAT = Days after treatment <sup>2</sup> 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 5b. Results for Cable Barrier Trial 357 DAT<sup>1</sup> (May 19, 2022) (Part 2 of 2)

Trt. No.	Product Name*	Rate	Rate Unit	% Bare	% Grass	% Broadleaves
				357 DAT		
13	Rodeo	32	FL OZ/A	30	32 cdefg	38 bcdef
	Method	9	FL OZ/A			
	Esplanade	7	FL OZ/A			
14	Rodeo	32	FL OZ/A	47	33 cdefg	20 cdefg
	Esplanade	6	FL OZ/A			
	Milestone VM	7	FL OZ/A			
15	Rodeo	32	FL OZ/A	27	33 cdefg	40 abcde
	Esplanade	3.5	FL OZ/A			
	Oust Extra	1.5	OZ/A			
16	Rodeo	32	FL OZ/A	30	43 abcd	30 bcdefg
	Detail	6	FL OZ/A			
17	Rodeo	32	FL OZ/A	27	63 a	10 fg
	Terravue	5.7	OZ/A			
18	Rodeo	32	FL OZ/A	53	3 h	37 bcdef
	Plainview SC	64	FL OZ/A			
19	Rodeo	32	FL OZ/A	50	28 cdefgh	22 cdefg
	Esplanade Sure	6	OZ/A			
20	Rodeo	32	FL OZ/A	53	3 h	43 abc
	Viewpoint	14	OZ/A			
	Esplanade	7	FL OZ/A			
21	Rodeo	32	FL OZ/A	27	60 ab	13 defg
	Escort	0.5	OZ/A			
	Esplanade	5	FL OZ/A			
	Method	9	FL OZ/A			
22	Rodeo	32	FL OZ/A	43	15 fgh	42 abcd
	Esplanade	5	FL OZ/A			
	AC Polaris Complete	10	FL OZ/A			
23	Method	6	FL OZ/A	30	63 a	7 g
	Escort	0.33	OZ/A			
	Plateau	3	FL OZ/A			
24	Nontreated Check			22	48 abc	30 bcdefg

\*All herbicide treatments (except trt. #1 & #16) contained the adjuvant, Activator 90 at 0.25% v/v. Treatment 16 included MSO @ 1%

<sup>1</sup> DAT = Days after treatment <sup>2</sup> 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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*Figure 1: View of Plots in the Cable Barrier Trial near Morehead, KY on May 27, 2021 (Day of Treatment)*





*Figure 2: View of Plots in the Cable Barrier Trial on July 29, 2021 (63 Days After Treatment)*





*Figure 3: View of Plots in the Cable Barrier Trial on September 14, 2021 (110 Days After Treatment)*





*Figure 4: View of Plots in the Cable Barrier Trial on November 1, 2021 (158 Days After Treatment)*





*Figure 5: View of Plots in the Cable Barrier Trial on May 19, 2022 (357 Days After Treatment)*





## **2021 Fall Cable Barrier Bareground Compared to Spring Application near Morehead**

For highway safety guardrails need to be kept clear of visual obstructions. Usually that means maintaining a vegetation free zone underneath them. Applications of broad spectrum residual herbicides in the spring have become the mainstay for bareground maintenance operations in combination with a broad spectrum post-emergent herbicide like glyphosate. With applications in the spring, warm season grasses such as johnsongrass often have not yet developed much foliage and will be less affected by foliar herbicides such as glyphosate. Whereas, fall applications may provide better control of johnsongrass when combined with newer less mobile chemistries that have enough residual to control germinating annual weeds next spring. A number of Highway Districts in Kentucky have started using fall bareground applications. This trial was established to compare the efficacy of fall applications compared to spring applications.

### *Materials and Methods*

The trial was established in 2021 in the median of I-64 near Morehead, KY beside a cable barrier which had been recently constructed. The contractor had sown a mix of grasses and legumes on the area between the concrete and the edge of pavement. In the spring 24 treatments with 3 replications were arranged in a randomized complete block design and in the fall 8 treatments in common were established as well. Treatments were applied at 25 gallons per acre onto 4 ft wide by 10.5 ft long plots on May 27 (Figure 1) and September 14, 2021 (Figure 2). All common treatments included Roundup ProMax or Rodeo (glyphosate) for post-emergence control. Glyphosate has no residual activity so other herbicides were included in the combination treatments to provide residual control for the bare ground treatments. Different herbicide combinations also broadened the weed spectrum controlled and reduced the risk of developing problems with resistant weeds by using different Site of Action (SOA) groups (Table 1). Our long-term standard treatment has been the older, high use rate herbicide Sahara (Treatment 2). Esplanade (indaziflam) at rates from 5 to 7 fl oz per acre is included in all common treatments (Treatments 3 to 7). These combinations are being used or have been recommended for fall applications in Kentucky. It should be noted that the weed spectrum and environmental conditions vary across the state.

The Grayson weather station reported 1.62 inches of rain May 28 (one day after spring treatment applications) which helped activate the soil residual herbicide treatments. Species present at application included tall fescue (35 inches with seed heads), orchard grass (36 inches with seedheads), flowering sweet clover (39 inches), flowering white clover (6 inches), sow thistle (24 inches), pepper weed setting seed (16 inches), and flowering buckhorn plantain (21 inches). The Grayson weather station reported 0.83 inches of rain September 15 (one day after fall treatment applications) which helped activate the soil residual herbicide treatments. The predominant species present at application included giant foxtail (45 inches with seedheads), flowering marehail (45 inches), and flowering ragweed (32 inches).

Visual assessments of the proportion (%) of bare ground, perennial grasses, annual grasses, marestalk, and broadleaf weeds were taken in 2021 on July 29, September 14, and November 1 at 63, 110, and 158 days after spring treatment (DAT), respectively. In spring 2022, visual assessments of the proportion (%) of bare ground, grasses, and broadleaf weeds were taken on May 19 at 357 DAT for the spring application. Visual assessments of the proportion (%) of bare ground, perennial grasses, annual grasses, marestalk, and broadleaf weeds were taken in 2021 on November 1 at 48 days after fall treatment (DAT). In 2022, visual assessments of the proportion (%) of bare ground, grasses, and broadleaf weeds were taken on May 19, July 20, and September 26 at 247, 309, and 377 after fall treatment (DAT), respectively. Data for the common spring treatments and the fall treatment trial were analyzed using ARM research management software (Gyllings Data Management Solutions, Inc., Brookings, SD) and treatment means were compared using Fisher's LSD at  $p = 0.05$ .

### *Results and Discussion*

At the first rating for the fall applied treatments on November 1 (48 DAT) all the treatments with residual herbicides (Treatments 2 to 7) had more bareground than the control (Table 2). Almost all the herbicide treatments had less perennial grass cover than control and all had less green annual grass cover than control. Roundup ProMax by itself (Treatment 1) and Sahara (Treatment 2) still had the same marestalk cover as control. Roundup ProMax without residual herbicides (Treatment 1) had the same broadleaf cover as control.

In spring 2022 (May 19 at 247 DAT) (Table 3), the treatments with Esplanade (Treatments 3 to 7) were in the top group with 87 to 93% bareground. Roundup ProMax by itself (Treatment 1) stood out visually with brown mature winter annuals while the competition from existing vegetation likely reduced the amount of winter annual growth in the untreated control. Most of the grasses were perennial and all the herbicide treatments had less than control. All the treatments with Esplanade (Treatments 3 to 7) had less broadleaf weeds than control.

By July 20 (309 DAT) (Table 4), treatments with the most bareground (60 to 67%) were only those with 6 or 7 fl oz per acre of Esplanade (Treatments 4 to 6). Only the control had perennial grasses visible above the annual grass canopy. Treatments with the same annual grass (30 to 48%) and broadleaf weed (28 to 53%) cover as control included Roundup ProMax by itself (Treatment 1), Sahara (Treatment 2), Perspective + Esplanade @ 5 fl oz/ac (Treatment 3), and Escort + Method + Esplanade @ 5 fl oz/ac (Treatment 7).

At the last rating of the season on September 26 (377 DAT) (Table 5), the same three treatments (Treatments 3 to 6) had the most bareground (48 to 63%). No perennial grasses were visible above the annual grass canopy. The greatest annual grass cover (52 to 57%) was with Roundup ProMax by itself (Treatment 1) and the untreated control (Treatment 8). Treatments with the

same broadleaf weed cover (33 to 42%) as control included Roundup ProMax by itself (Treatment 1), Sahara (Treatment 2), and Perspective + Esplanade @ 5 fl oz/ac (Treatment 3).

All common treatments with residual herbicides had more bareground than the control at the first assessment date at both times of application (63 and 48 DAT for spring and fall, respectively) (Tables 6 and 2, respectively). In this trial marehail was present in most plots for the assessments in the 2021 season but not as much in the 2022 season for the fall application trial assessments.

The spring treatments at 63 DAT (July 29, 2021) with the most % bareground are Sahara (Treatment 2), Perspective + Esplanade (Treatment 3), and Viewpoint + Esplanade (Treatment 6) (Table 6). By September 14 (110 DAT) (Table 7) the top treatments for bareground (73 to 88%) are Perspective + Esplanade (Treatment 3) and Viewpoint + Esplanade (Treatment 6). At the end the 2021 season (November 1 at 158 DAT), the only top treatment is Viewpoint + Esplanade (Treatment 6) with 83% bareground (Table 8). By the last assessment for the spring application on May 19, 2022 (357 DAT) only two treatments had more bareground (53 to 47%) than the control (22%) (Table 9). These treatments were Esplanade + Milestone (Treatment 5) and Viewpoint + Esplanade (Treatment 6).

The treatment combination with the consistently greatest % bareground across application timings was Viewpoint + Esplanade (Treatment 6) for these trials. Similar levels of bareground control can be achieved a year after either spring or fall application.

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**Table 1. Herbicide Treatments, Active Ingredients, Application Rates, and Site of Action (SOA) Groups for Cable Barrier Fall vs Spring Bareground Trial**

Trt. No.	Product Name*	Rate per acre	Active Ingredient(s)	ai Rate (per acre)	SOA Groups
1	Roundup ProMax	1.3 qt	glyphosate	1.5 LB AE/A	9
2	Roundup ProMax Sahara	1.3 qt 10 lb	glyphosate diuron + imazapyr	1.5 LB AE/A 6.2 LB + 12.4 OZ/A	9 7 + 2
3	Rodeo Perspective Esplanade	32 fl oz 8 oz 5 fl oz	glyphosate aminocyclopyrachlor + chlorsulfuron indaziflam	1 LB AE/A 3.2 OZ + 1.3 OZ/A 1.0 OZ/A	9 4 + 2 29
4	Rodeo Method Esplanade	32 fl oz 9 fl oz 7 fl oz	glyphosate aminocyclopyrachlor indaziflam	1 LB AE/A 2.25 OZ AE/A 1.5 OZ/A	9 4 29
5	Rodeo Esplanade Milestone VM	32 fl oz 6 fl oz 7 fl oz	glyphosate indaziflam aminopyralid	1 LB AE/A 1.2 OZ/A 1.8 OZ AE/A	9 29 4
6	Rodeo Viewpoint Esplanade	32 fl oz 14 oz 7 fl oz	glyphosate aminocyclopyrachlor + imazapyr + metsulfuron indaziflam	1 LB AE/A 3.2 OZ + 4.4 OZ + 1.0 OZ/A 1.5 OZ/A	9 4 + 2 + 2 29
7	Rodeo Escort Esplanade Method	32 fl oz 0.5 oz 5 fl oz 9 fl oz	glyphosate metsulfuron indaziflam aminocyclopyrachlor	1 LB AE/A 0.3 OZ/A 1 OZ/A 2.25 OZ AE/A	9 2 29 4
8	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 Fall Application Trial 48 DAT<sup>1</sup> (November 1, 2021)**

Trt. No.	Product Name*	Rate per ac	% Bare	% Perennial Grass	% Annual Grass	% Marestalk	% Plantain	% Broadleaves
			48 DAT Fall Application (November 1, 2021)					
1	Roundup ProMax	1.3 qt	77 b <sup>2</sup>	0 b	0 b	7 a	0 b	23 a
2	Roundup ProMax Sahara	1.3 qt 10 lb	92 a	0 b	0 b	5 a	0 b	8 b
3	Rodeo Perspective Esplanade	32 fl oz 8 oz 5 fl oz	95 a	3 b	0 b	0 b	0 b	0 c
4	Rodeo Method Esplanade	32 fl oz 9 fl oz 7 fl oz	95 a	5 ab	0 b	0 b	0 b	0 c
5	Rodeo Esplanade Milestone VM	32 fl oz 6 fl oz 7 fl oz	96 a	3 b	0 b	1 b	0 b	1 c
6	Rodeo Viewpoint Esplanade	32 fl oz 14 oz 7 fl oz	98 a	1 b	0 b	0 b	0 b	0 c
7	Rodeo Escort Esplanade Method	32 fl oz 0.5 oz 5 fl oz 9 fl oz	94 a	4 b	2 b	0 b	0 b	0 c
8	Nontreated Check		43 c	10 a	17 a	5 a	8 a	27 a

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

<sup>1</sup> DAT = Days after treatment <sup>2</sup> 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 Fall Application Trial 247 DAT<sup>1</sup> (May 19, 2022)**

Trt. No.	Product Name*	Rate per ac	% Bare	% Grass	% Broadleaves
			247 DAT Fall Application (May 19, 2022)		
1	Roundup ProMax	1.3 qt	63 b <sup>2</sup>	8 b	28 a
2	Roundup ProMax Sahara	1.3 qt 10 lb	53 b	7 b	40 a
3	Rodeo Perspective Esplanade	32 fl oz 8 oz 5 fl oz	93 a	4 b	3 b
4	Rodeo Method Esplanade	32 fl oz 9 fl oz 7 fl oz	93 a	4 b	3 b
5	Rodeo Esplanade Milestone VM	32 fl oz 6 fl oz 7 fl oz	94 a	2 b	4 b
6	Rodeo Viewpoint Esplanade	32 fl oz 14 oz 7 fl oz	97 a	2 b	1 b
7	Rodeo Escort Esplanade Method	32 fl oz 0.5 oz 5 fl oz 9 fl oz	87 a	5 b	8 b
8	Nontreated Check		45 b	28 a	27 a

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

<sup>1</sup> DAT = Days after treatment <sup>2</sup> 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 Fall Application Trial 309 DAT<sup>1</sup> (July 20, 2022)**

Trt. No.	Product Name*	Rate per ac	% Bare	% Perennial Grass	% Annual Grass	% Broadleaves
			309 DAT Fall Application (July 20, 2022)			
1	Roundup ProMax	1.3 qt	10 cd <sup>2</sup>	0 b	45 ab	45 ab
2	Roundup ProMax Sahara	1.3 qt 10 lb	17 bcd	0 b	30 ab	53 a
3	Rodeo Perspective Esplanade	32 fl oz 8 oz 5 fl oz	35 b	0 b	37 ab	28 abc
4	Rodeo Method Esplanade	32 fl oz 9 fl oz 7 fl oz	67 a	0 b	20 b	13 c
5	Rodeo Esplanade Milestone VM	32 fl oz 6 fl oz 7 fl oz	62 a	0 b	20 b	18 c
6	Rodeo Viewpoint Esplanade	32 fl oz 14 oz 7 fl oz	60 a	0 b	20 b	20 bc
7	Rodeo Escort Esplanade Method	32 fl oz 0.5 oz 5 fl oz 9 fl oz	27 bc	0 b	43 ab	30 abc
8	Nontreated Check		5 d	17 a	48 a	30 abc

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

<sup>1</sup> DAT = Days after treatment <sup>2</sup> 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 Fall Application Trial 377 DAT<sup>1</sup> (September 26, 2022)**

			% Bare	% Perennial Grass	% Annual Grass	% Broadleaves
Trt. No.	Product Name*	Rate per ac	377 DAT Fall Application (Sept 26, 2022)			
1	Roundup ProMax	1.3 qt	10 d <sup>2</sup>	0	52 ab	42 ab
2	Roundup ProMax Sahara	1.3 qt 10 lb	17 cd	0	32 cd	52 a
3	Rodeo Perspective Esplanade	32 fl oz 8 oz 5 fl oz	33 bc	0	33 cd	33 abcd
4	Rodeo Method Esplanade	32 fl oz 9 fl oz 7 fl oz	60 a	0	18 d	22 cd
5	Rodeo Esplanade Milestone VM	32 fl oz 6 fl oz 7 fl oz	63 a	0	20 d	17 d
6	Rodeo Viewpoint Esplanade	32 fl oz 14 oz 7 fl oz	48 ab	0	25 cd	27 bcd
7	Rodeo Escort Esplanade Method	32 fl oz 0.5 oz 5 fl oz 9 fl oz	40 b	0	40 bc	20 cd
8	Nontreated Check		5 d	0	57 a	38 abc

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

<sup>1</sup> DAT = Days after treatment <sup>2</sup> 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 6. Results for Cable Barrier Common Spring Application Trial 63 DAT<sup>1</sup> (July 29, 2021)**

Trt. No.	Product Name*	Rate per ac	% Bare	% Perennial Grass	% Annual Grass	% Marestalk	% Broadleaves
			63 DAT Spring Application (July 29, 2021)				
1	Roundup ProMax	1.3 qt	30 d <sup>2</sup>	28 ab	17 a	12 a	25 b
2	Roundup ProMax Sahara	1.3 qt 10 lb	85 ab	4 d	2 b	2 b	9 cd
3	Roundup ProMax Perspective Esplanade	32 fl oz 8 oz 5 fl oz	87 a	6 cd	3 b	0 b	3 d
4	Rodeo Method Esplanade	32 fl oz 9 fl oz 7 fl oz	62 c	9 cd	0 b	6 ab	29 b
5	Rodeo Esplanade Milestone VM	32 fl oz 6 fl oz 7 fl oz	73 bc	7 cd	4 b	0 b	15 c
6	Rodeo Viewpoint Esplanade	32 fl oz 14 oz 7 fl oz	97 a	2 d	1 b	0 b	1 d
7	Rodeo Escort Esplanade Method	32 fl oz 0.5 oz 5 fl oz 9 fl oz	73 bc	18 bc	6 b	0 b	2 d
8	Nontreated Check		13 e	33 a	7 ab	8 ab	47 a

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

<sup>1</sup> DAT = Days after treatment <sup>2</sup> 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 7. Results for Cable Barrier Common Spring Application Trial 110 DAT<sup>1</sup> (September 14, 2021)**

			% Bare	% Perennial Grass	% Annual Grass	% Marestalk	% Broadleaves
<b>Trt. No.</b>	<b>Product Name*</b>	<b>Rate per ac</b>	<b>110 DAT Spring Application (Sept 14, 2021)</b>				
1	Roundup ProMax	1.3 qt	8 ef <sup>2</sup>	8 b	33 ab	20 a	47 ab
2	Roundup ProMax Sahara	1.3 qt 10 lb	58 bc	7 b	7 bc	7 cd	23 bcd
3	Roundup ProMax Perspective Esplanade	32 fl oz 8 oz 5 fl oz	73 ab	13 ab	8 bd	0 d	3 d
4	Rodeo Method Esplanade	32 fl oz 9 fl oz 7 fl oz	27 de	5 b	3 c	17 ab	65 a
5	Rodeo Esplanade Milestone VM	32 fl oz 6 fl oz 7 fl oz	30 de	8 b	28 abc	0 d	32 bc
6	Rodeo Viewpoint Esplanade	32 fl oz 14 oz 7 fl oz	88 a	4 b	4 c	0 d	4 d
7	Rodeo Escort Esplanade Method	32 fl oz 0.5 oz 5 fl oz 9 fl oz	42 cd	30 a	20 abc	0 d	7 cd
8	Nontreated Check		3 f	8 b	40 a	10 bc	50 ab

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

<sup>1</sup> DAT = Days after treatment <sup>2</sup> 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 8. Results for Cable Barrier Common Spring Application Trial 158 DAT<sup>1</sup> (November 1, 2021)**

Trt. No.	Product Name*	Rate per ac	% Bare	% Perennial Grass	% Annual Grass	% Maretail	% Plantain	% Broadleaves
			158 DAT Spring Application (Nov 1, 2021)					
1	Roundup ProMax	1.3 qt	28 bc <sup>2</sup>	20 abc	33 a	7	13 ab	33 abc
2	Roundup ProMax Sahara	1.3 qt 10 lb	50 b	8 bc	15 bc	7	8 abc	40 ab
3	Roundup ProMax Perspective Esplanade	32 fl oz 8 oz 5 fl oz	53 b	27 ab	7 c	0	2 bc	20 bcd
4	Rodeo Method Esplanade	32 fl oz 9 fl oz 7 fl oz	43 b	18 abc	3 c	8	0 c	38 ab
5	Rodeo Esplanade Milestone VM	32 fl oz 6 fl oz 7 fl oz	47 b	17 abc	17 bc	0	0 c	25 abcd
6	Rodeo Viewpoint Esplanade	32 fl oz 14 oz 7 fl oz	83 a	3 c	5 c	0	0 c	10 d
7	Rodeo Escort Esplanade Method	32 fl oz 0.5 oz 5 fl oz 9 fl oz	50 b	30 a	10 c	0	3 bc	13 cd
8	Nontreated Check		3 c	22 abc	28 ab	8	18 a	45 a

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

<sup>1</sup> DAT = Days after treatment <sup>2</sup> 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 9. Results for Cable Barrier Common Spring Application Trial 357 DAT<sup>1</sup> (May 19, 2022)**

Trt. No.	Product Name*	Rate per ac	% Bare	% Grass	% Broadleaves
			357 DAT Spring Application (May 19, 2022)		
1	Roundup ProMax	1.3 qt	33 abc <sup>2</sup>	27 bc	40 ab
2	Roundup ProMax Sahara	1.3 qt 10 lb	42 abc	18 bc	40 ab
3	Roundup ProMax Perspective Esplanade	32 fl oz 8 oz 5 fl oz	38 abc	35 ab	20 ab
4	Rodeo Method Esplanade	32 fl oz 9 fl oz 7 fl oz	30 bc	32 abc	38 ab
5	Rodeo Esplanade Milestone VM	32 fl oz 6 fl oz 7 fl oz	47 ab	33 abc	20 ab
6	Rodeo Viewpoint Esplanade	32 fl oz 14 oz 7 fl oz	53 a	3 c	43 a
7	Rodeo Escort Esplanade Method	32 fl oz 0.5 oz 5 fl oz 9 fl oz	27 bc	60 a	13 b
8	Nontreated Check		22 c	48 ab	30 ab

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

<sup>1</sup> DAT = Days after treatment <sup>2</sup> 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 Plots in the Cable Barrier Trial near Morehead, KY on May 27, 2021 (Day of Spring Treatment)*





*Figure 2: View of Plots in the Cable Barrier Trial near Morehead, KY on September 14, 2021 (Day of Fall Treatment)*



## 2021 Johnsongrass Control Trial [Lexington] (including 2022 assessment)

### *Introduction*

Johnsongrass (*Sorghum halepense*) is a perennial warm-season grass, often listed as a noxious weed, that can be a common problem on Kentucky right-of-ways. There are a number of herbicides labeled and available to control johnsongrass on right-of-ways. However, some of these are nonselective or are selective for johnsongrass but can still damage desirable cool-season turf, such as tall fescue. One of the safer johnsongrass control herbicides to use on tall fescue is Fusion but a label change in 2012 made it unapproved for use on right-of-way sites. This trial is a continuation of the evaluation of herbicide options for johnsongrass control or suppression.

### *Materials and Methods*

The trial was established on an old hay field with regular mowing and a stand of johnsongrass along Citation Blvd in Lexington, KY on August 8, 2021. The trial contained 19 treatments with 3 replications arranged in a randomized complete block design with 7 ft by 20 ft plots. Blank (unused) plots were included within each block due to variable distribution and height of johnsongrass plants. Application volume was at 30 gallons /acre. The johnsongrass canopy was 36 inches tall with 50% flowering plants at time of application. Johnsongrass control was assessed 16 (8/24/2021), 48 (9/25/2021), 79 (10/26/2021), and 312 (6/16/2022) days after treatment (DAT). Data were analyzed using ARM software (Gyllings Data Management Solutions, Inc., Brookings, SD) and treatment means were compared using Fisher's LSD at  $p = 0.05$ .

Table 1 lists the treatments, active ingredients and application rates. The Fusion labeled rates prior to 2012 for selective control of johnsongrass were 7 to 9 fl oz/A (Treatments 1 and 2). The labeled Fusilade II rates are 16 to 24 fl oz/A (Treatments 3 and 4). The Acclaim Extra label lists 20 oz/A per acre to control seedling johnsongrass 12 to 24 inches tall (Treatment 5); 39 fl oz/A to control rhizome johnsongrass 24 to 60 inches tall (Treatment 6); and a combination of Acclaim Extra plus Fusilade II (7 plus 14 fl oz/A), for improved turfgrass tolerance and to control rhizome johnsongrass 10 to 25 inches tall (Treatment 7). The Outrider labeled rates for selective johnsongrass control in tall fescue turf are 0.75 to 1 oz/A (Treatments 8 and 9). The combination of Outrider and Garlon 4 Ultra (Treatment 10) was added as this treatment was used by NaturChem on the area close to Shelbyville where tolerant johnsongrass was observed. One possibility is the growth regulator herbicide (triclopyr) may have interfered with the activity of the grass herbicide? Treatment 11 was MSMA applied alone and Treatment 12 was MSMA applied in combination with Outrider at 0.75 oz/A. Clearcast (Treatment 13) has an aquatic label and may be used close to waterways. The high rate of Plateau used in Treatment 14 will often severely damage tall fescue. Detail + Plateau was suggested as a combination (Treatment 15) with enhanced control of johnsongrass. The combination of Method + Detail + Plateau (Treatment 16) was one suggested to suppress johnsongrass growth, in areas such as behind

guardrails. Roundup ProMax (Treatment 17) and Journey (Treatment 18) are non-selective herbicide options.

### *Results and Discussion*

At the first evaluation 16 DAT the range of control observed was from 13 to 80%, which is early for observing the full expression of symptoms and final control for most treatments (Table 2). It should be noted that the johnsongrass plants were larger than the label range to achieve good control with some of the treatments. The most effective group of treatments had 75 to 80% control. They included both treatments with MSMA (Treatments 11 and 12), and Roundup ProMax (Treatment 17).

By 48 DAT the range of control was from 20 to 88%. The top treatments (63 to 88% control) included the high rate of Fusilade II (Treatment 4), the high rate of Acclaim Extra (Treatment 6), both rates of Outrider by itself (Treatments 8 and 9), the Outrider + MSMA combination (Treatment 12), Roundup ProMax (Treatment 17), and Journey (Treatment 18). The combination of Outrider and Garlon (Treatment 10) displayed 25% less control than Outrider at 1 oz/a (Treatment 9). MSMA (Treatment 11) had lots of regrowth and a lower control rating.

At the end of the season, 79 DAT, the range of control was from 17 to 92%. The most effective group of treatments (83 to 82% control) included the high rate of Fusilade II (Treatment 4), both rates of Outrider by itself (Treatments 8 and 9), the Outrider + Garlon 4 Ultra combination (Treatment 10), Roundup ProMax (Treatment 17), and Journey (Treatment 18).

In spring 2022 (312 DAT), the range of control was from 58 to 99%. The most effective group of treatments (88 to 99% control) included the high rate of Fusilade II (Treatment 4), both rates of Outrider by itself (Treatments 8 and 9), both MSMA treatments (Treatments 11 and 12), Clearcast (Treatment 13), both high rate Plateau treatments (Treatments 14 and 15), Roundup ProMax (Treatment 17), and Journey (Treatment 18).

The treatments showing aboveground control more quickly may not necessarily be the herbicides that provide the best long-term control.



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**Table 1. Herbicide Treatments, Active Ingredients and Application Rates.**

Trt. No.	Product Name*	Rate	Rate Unit	Active Ingredient(s)	AI Rate (per acre)	SOA Group(s)
1	Fusion Activator 90	7 0.25	FL OZ/A % V/V	fluazifop + fenoxaprop	1.75 oz + 0.49 oz	1 + 1
2	Fusion Activator 90	9 0.25	FL OZ/A % V/V	fluazifop + fenoxaprop	2.25 oz + 0.63 oz	1 + 1
3	Fusilade II Activator 90	16 0.25	FL OZ/A % V/V	fluazifop	4 oz	1
4	Fusilade II Activator 90	24 0.25	FL OZ/A % V/V	fluazifop	6 oz	1
5	Acclaim Extra Activator 90	20 0.25	FL OZ/A % V/V	fenoxaprop	1.4 oz	1
6	Acclaim Extra Activator 90	39 0.25	FL OZ/A % V/V	fenoxaprop	2.78 oz	1
7	Acclaim Extra Fusilade II COC	7 14 1	FL OZ/A FL OZ/A % V/V	fenoxaprop fluazifop	0.5 oz 3.5 oz	1 1
8	Outrider Activator 90	0.75 0.25	OZ/A % V/V	sulfosulfuron	0.563 oz	2
9	Outrider Activator 90	1 0.25	OZ/A % V/V	sulfosulfuron	0.75 oz	2
10	Outrider Garlon 4 Ultra Activator 90	1 20 0.25	OZ/A FL OZ/A % V/V	sulfosulfuron triclopyr	0.75 oz 10 oz ae	2 4
11	MSMA	32	FL OZ/A	monosodium acid methanearsonate	24 oz	27
12	Outrider MSMA	0.75 32	OZ/A FL OZ/A	sulfosulfuron monosodium acid methanearsonate	0.563 oz 24 oz	2 27
13	Clearcast MSO	32 1	FL OZ/A % V/V	imazamox	4 oz ae	2
14	Plateau MSO	8 1	FL OZ/A % V/V	imazapic	2 oz ae	2
15	Detail Plateau MSO	1 8 1	FL OZ/A FL OZ/A % V/V	saflufenacil imazapic	0.36 oz 2 oz ae	14 2
16	Method Detail Plateau MSO	6 1 3 1	FL OZ/A FL OZ/A FL OZ/A % V/V	aminocyclopyrachlor saflufenacil imazapic	1.5 oz ae 0.36 oz 0.75 oz ae	4 14 2
17	Roundup ProMax	22	FL OZ/A	glyphosate	12.4 oz ae	9
18	Journey MSO	21.3 1	FL OZ/A % V/V	imazapic + glyphosate	2 oz ae + 4 oz ae	2 + 9
19	Nontreated Check					

\*Adjuvants applied with herbicide treatments included Activator 90 (nonionic surfactant), Crop Oil Concentrate (COC), or Methylated Seed Oil (MSO)

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**Table 2. Herbicide Treatments and % Control 16, 48, 79, and 312 Days After Treatment (DAT)<sup>2</sup>**

Trt. No.	Product Name	Rate	Rate Unit	16 DAT	48 DAT	79 DAT	312 DAT
1	Fusion Activator 90	7 0.25	FL OZ/A % V/V	35 c <sup>1</sup>	45 efg	43 fg	78 cd
2	Fusion Activator 90	9 0.25	FL OZ/A % V/V	27 cde	60 bcde	53 def	72 de
3	Fusilade II Activator 90	16 0.25	FL OZ/A % V/V	27 cde	43 efg	52 def	78 cd
4	Fusilade II Activator 90	24 0.25	FL OZ/A % V/V	25 cdef	63 abcde	87 ab	91 abc
5	Acclaim Extra Activator 90	20 0.25	FL OZ/A % V/V	33 c	47 defg	27 gh	78 cd
6	Acclaim Extra Activator 90	39 0.25	FL OZ/A % V/V	48 b	77 abc	47 ef	82 bcd
7	Acclaim Extra Fusilade II COC	7 14 1	FL OZ/A FL OZ/A % V/V	25 cdef	55 cdef	63 de	80 cd
8	Outrider Activator 90	0.75 0.25	OZ/A % V/V	18 ef	67 abcde	90 a	91 abc
9	Outrider Activator 90	1 0.25	OZ/A % V/V	23 cdef	78 abc	83 abc	88 abc
10	Outrider Garlon 4 Ultra Activator 90	1 20 0.25	OZ/A FL OZ/A % V/V	20 def	52 cdef	83 abc	82 bcd
11	MSMA	32	FL OZ/A	75 a	28 fg	17 hi	87 abcd
12	Outrider MSMA	0.75 32	OZ/A FL OZ/A	80 a	83 ab	68 bcd	96 ab
13	Clearcast MSO	32 1	FL OZ/A % V/V	20 def	40 efg	67 cd	88 abc
14	Plateau MSO	8 1	FL OZ/A % V/V	15 ef	48 def	67 cd	90 abc
15	Detail Plateau MSO	1 8 1	FL OZ/A FL OZ/A % V/V	20 def	53 cdef	67 cd	90 abc
16	Method Detail Plateau MSO	6 1 3 1	FL OZ/A FL OZ/A FL OZ/A % V/V	13 f	20 gh	67 cd	58 e
17	Roundup ProMax	22	FL OZ/A	77 a	88 a	92 a	96 ab
18	Journey MSO	21.3 1	FL OZ/A % V/V	32 cd	73 abcd	92 a	99 a
19	Nontreated Check			0 g	0 h	0 i	0 f

<sup>1</sup> Means within a column followed by the same letter are not different according to Fisher's LSD at  $P < 0.05$ .

<sup>2</sup> Herbicide treatments applied August 26, 2020. Visual evaluations taken 16 DAT (Aug 24, 2021), 48 DAT (Sept 25, 2021), 79 DAT (Oct 26, 2021), and 312 DAT (June 16, 2022).

**2021 Tall Fescue Damage Relative to Johnsongrass Control Options  
(including 2022 assessments)**

*Introduction*

Johnsongrass (*Sorghum halepense*) is a perennial warm-season grass, listed as a noxious weed in Kentucky, that is a common problem on right-of-ways. There are a number of herbicides labeled and available to control johnsongrass on right-of-ways. However, some of these are nonselective or are selective for johnsongrass but can still damage desirable cool-season turf, such as tall fescue. Fusion herbicide is one of the safer johnsongrass control options to use on tall fescue but it is no longer available for use on right-of-way sites due to a labeling change in 2012. The objective of this trial is a continuation of the evaluation of a range of herbicide options for johnsongrass control/suppression options and how they affect tall fescue.

*Materials and Methods*

A field study was established August 8, 2021 at Spindletop Research Farm near Lexington, KY on a tall fescue field when the plants were 11 inches high. The trial had 19 treatments with 3 replications of each arranged in a randomized complete block design with 3.5 ft by 10 ft plots and 1.5 ft wide unsprayed buffers between each of the plots. Application was at 30 gallons per acre carrier volume. Tall fescue color was assessed by comparison to the running check strips. The color rating ranges from 0 (dead) to 9 (full green). The color of the non-treated check strips was set at 8. Plots were assessed in 2021 on August 24, September 25, and October 27 at 16, 48, and 80 days after treatment (DAT), respectively. In spring 2022 tall fescue stand density (0 to 10) was assessed on May 9, May 24, and June 9 at 274, 289, and 305 DAT, respectively. Data were analyzed using ARM software (Gyllings Data Management Solutions, Inc., Brookings, SD) and treatment means were compared using Fisher's LSD at  $p = 0.05$ .

Table 1 lists treatments evaluated, active ingredients and application rates. Prior to 2012 the labeled Fusion rates for selective control of johnsongrass were 7 to 9 fl oz/A (Treatments 1 and 2). The labeled Fusilade II rates are 16 to 24 fl oz/A (Treatments 3 and 4). The Acclaim Extra label lists 20 fl oz/A per acre to control seedling johnsongrass 12 to 24 inches tall (Treatment 5); 39 fl oz/A to control rhizome johnsongrass 24 to 60 inches tall (Trt. 6); and a combination of Acclaim Extra plus Fusilade II (7 plus 14 fl oz/A), for improved turfgrass tolerance and to control rhizome johnsongrass 10 to 25 inches tall (Treatment 7). The Outrider label rates for selective johnsongrass control in tall fescue turf were 0.75 to 1 oz/A (Treatments 8 and 9). The combination of Outrider and Garlon 4 Ultra (Treatment 10) was added as this was used by NaturChem on the area close to Shelbyville where tolerant johnsongrass was observed. One possibility is that the growth regulator herbicide (triclopyr) may have interfered with the activity of the grass herbicide? Treatment 11 was MSMA applied alone and Treatment 12 was MSMA applied in combination with Outrider at 0.75 oz/A. Clearcast (Treatment 13) has an aquatic label and may be used close to waterways. The high rate of Plateau used in Treatment 14 will often severely damage tall fescue. Detail + Plateau was suggested as a combination (Treatment 15) for enhanced control of johnsongrass. The combination of Method + Detail + Plateau (Treatment 16) was suggested to suppress johnsongrass

growth, in areas such as behind guardrails. Roundup ProMax (Treatment 17) and Journey (Treatment 18) are non-selective herbicide options.

### *Results and Discussion*

Some treatments showed good safety on tall fescue with color ratings that were not different from the nontreated check at all three assessments (Table 2). These included both rates of Fusion (Treatments 1 and 2), both rates of Acclaim Extra (Treatments 5 and 6), the Acclaim Extra and Fusilade II combination (Treatment 7), the high rate of Outrider and in combination with Garlon 4 Ultra (Treatments 9 and 10), and MSMA by itself and in combination with Outrider (Treatments 11 and 12). Treatments that did not differ from the Nontreated Check by the end of the season (80 DAT) included the low rate of Fusilade II (Treatment 3), Detail + Plateau (Treatment 15), and Method + Detail + Plateau (Treatment 16). Non-selective treatments that had lower color ratings at all assessments included Clearcast (Treatment 13), Plateau (Treatment 14), Roundup ProMax (Treatment 17), and Journey (Treatment 18).

Some of the treatments with the best safety also had the greatest fescue stand densities 274 DAT (Table 3). These included the high rate of Fusion (Treatment 2), both rates of Acclaim Extra (Treatments 5 and 6), and the Acclaim Extra and Fusilade II combination (Treatment 7). By the second rating (289 DAT) most of the treatments had stand densities similar to the untreated check except for Clearcast (Treatment 13) and Roundup ProMax (Treatment 17). At the last rating (305 DAT) the only treatment still with lower stand density than control was Clearcast (Treatment 13).

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**Table 1. Herbicide Treatments, Active Ingredients and Application Rates.**

Trt. No.	Product Name*	Rate	Rate Unit	Active Ingredient(s)	AI Rate (per acre)	SOA Group(s)
1	Fusion Activator 90	7 0.25	FL OZ/A % V/V	fluazifop + fenoxaprop	1.75 oz + 0.49 oz	1 + 1
2	Fusion Activator 90	9 0.25	FL OZ/A % V/V	fluazifop + fenoxaprop	2.25 oz + 0.63 oz	1 + 1
3	Fusilade II Activator 90	16 0.25	FL OZ/A % V/V	fluazifop	4 oz	1
4	Fusilade II Activator 90	24 0.25	FL OZ/A % V/V	fluazifop	6 oz	1
5	Acclaim Extra Activator 90	20 0.25	FL OZ/A % V/V	fenoxaprop	1.4 oz	1
6	Acclaim Extra Activator 90	39 0.25	FL OZ/A % V/V	fenoxaprop	2.78 oz	1
7	Acclaim Extra Fusilade II COC	7 14 1	FL OZ/A FL OZ/A % V/V	fenoxaprop fluazifop	0.5 oz 3.5 oz	1 1
8	Outrider Activator 90	0.75 0.25	OZ/A % V/V	sulfosulfuron	0.563 oz	2
9	Outrider Activator 90	1 0.25	OZ/A % V/V	sulfosulfuron	0.75 oz	2
10	Outrider Garlon 4 Ultra Activator 90	1 20 0.25	OZ/A FL OZ/A % V/V	sulfosulfuron triclopyr	0.75 oz 10 oz ae	2 4
11	MSMA	32	FL OZ/A	monosodium acid methanearsonate	24 oz	27
12	Outrider MSMA	0.75 32	OZ/A FL OZ/A	sulfosulfuron monosodium acid methanearsonate	0.563 oz 24 oz	2 27
13	Clearcast MSO	32 1	FL OZ/A % V/V	imazamox	4 oz ae	2
14	Plateau MSO	8 1	FL OZ/A % V/V	imazapic	2 oz ae	2
15	Detail Plateau MSO	1 8 1	FL OZ/A FL OZ/A % V/V	saflufenacil imazapic	0.36 oz 2 oz ae	14 2
16	Method Detail Plateau MSO	6 1 3 1	FL OZ/A FL OZ/A FL OZ/A % V/V	aminocyclopyrachlor saflufenacil imazapic	1.5 oz ae 0.36 oz 0.75 oz ae	4 14 2
17	Roundup ProMax	22	FL OZ/A	glyphosate	12.4 oz ae	9
18	Journey MSO	21.3 1	FL OZ/A % V/V	imazapic + glyphosate	2 oz ae + 4 oz ae	2 + 9
19	Nontreated Check					

\*Adjuvants applied with herbicide treatments included Activator 90 (nonionic surfactant), Crop Oil Concentrate (COC), or Methylated Seed Oil (MSO)

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**Table 2. Herbicide Treatments and Tall Fescue Color (0-9) 16, 48, and 80 Days After Treatment (DAT)<sup>2</sup>**

Trt. No.	Product Name	Rate	Rate Unit	16 DAT	48 DAT	80 DAT
1	Fusion Activator 90	7 0.25	FL OZ/A % V/V	7.5 ab <sup>1</sup>	7.7 abc	7.5 abc
2	Fusion Activator 90	9 0.25	FL OZ/A % V/V	7.8 a	8.0 a	8.0 a
3	Fusilade II Activator 90	16 0.25	FL OZ/A % V/V	6.7 bcd	6.2 cd	6.5 abcde
4	Fusilade II Activator 90	24 0.25	FL OZ/A % V/V	6.7 bcd	6.8 abc	6.0 cdef
5	Acclaim Extra Activator 90	20 0.25	FL OZ/A % V/V	7.9 a	8.0 a	8.0 a
6	Acclaim Extra Activator 90	39 0.25	FL OZ/A % V/V	8.0 a	8.0 a	8.0 a
7	Acclaim Extra Fusilade II COC	7 14 1	FL OZ/A FL OZ/A % V/V	7.0 abc	6.5 abc	6.7 abcd
8	Outrider Activator 90	0.75 0.25	OZ/A % V/V	6.5 bcde	6.7 abc	6.2 bcdef
9	Outrider Activator 90	1 0.25	OZ/A % V/V	7.3 abc	6.7 abc	7.2 abcd
10	Outrider Garlon 4 Ultra Activator 90	1 20 0.25	OZ/A FL OZ/A % V/V	7.2 abc	7.0 abc	7.3 abcd
11	MSMA	32	FL OZ/A	8.0 a	7.8 ab	7.8 ab
12	Outrider MSMA	0.75 32	OZ/A FL OZ/A	7.2 abc	6.8 abc	7.2 abcd
13	Clearcast MSO	32 1	FL OZ/A % V/V	5.5 ef	1.8 g	3.3 g
14	Plateau MSO	8 1	FL OZ/A % V/V	6.3 cde	4.2 ef	4.8 efg
15	Detail Plateau MSO	1 8 1	FL OZ/A FL OZ/A % V/V	6.3 cde	4.7 de	6.3 abcdef
16	Method Detail Plateau MSO	6 1 3 1	FL OZ/A FL OZ/A FL OZ/A % V/V	7.2 abc	6.3 bc	7.7 abc
17	Roundup ProMax	22	FL OZ/A	4.5 f	2.5 g	4.7 fg
18	Journey MSO	21.3 1	FL OZ/A % V/V	5.8 de	3.0 fg	5.7 def
19	Nontreated Check			8.0 a	8.0 a	8.0 a

<sup>1</sup> Means within a column followed by the same letter are not different according to Fisher's LSD at  $P < 0.05$ .

<sup>2</sup> Herbicide treatments applied August 26, 2020. Visual evaluations taken 16 DAT (Aug 24, 2021), 48 DAT (Sept 25, 2021), and 80 DAT (Oct 27, 2021).

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**Table 3. Herbicide Treatments and Tall Fescue Density (0-10) 274, 289, and 305 Days After Treatment (DAT)<sup>2</sup>**

Trt. No.	Product Name	Rate	Rate Unit	274 DAT	289 DAT	305 DAT
1	Fusion Activator 90	7 0.25	FL OZ/A % V/V	5.3 bcde <sup>1</sup>	8.0 ab	8.2 ab
2	Fusion Activator 90	9 0.25	FL OZ/A % V/V	5.8 abc	7.5 ab	8.2 ab
3	Fusilade II Activator 90	16 0.25	FL OZ/A % V/V	5.5 bcd	7.3 ab	6.5 bcd
4	Fusilade II Activator 90	24 0.25	FL OZ/A % V/V	5.5 bcd	7.3 ab	7.8 abc
5	Acclaim Extra Activator 90	20 0.25	FL OZ/A % V/V	6.5 ab	7.7 ab	7.5 abc
6	Acclaim Extra Activator 90	39 0.25	FL OZ/A % V/V	6.0 abc	8.3 ab	8.5 ab
7	Acclaim Extra Fusilade II COC	7 14 1	FL OZ/A FL OZ/A % V/V	7.0 a	7.8 ab	7.5 abc
8	Outrider Activator 90	0.75 0.25	OZ/A % V/V	4.7 cdef	7.2 ab	7.3 abc
9	Outrider Activator 90	1 0.25	OZ/A % V/V	3.3 fg	7.7 ab	7.7 abc
10	Outrider Garlon 4 Ultra Activator 90	1 20 0.25	OZ/A FL OZ/A % V/V	3.7 fg	8.7 a	8.3 ab
11	MSMA	32	FL OZ/A	5.3 bcde	8.3 ab	8.8 a
12	Outrider MSMA	0.75 32	OZ/A FL OZ/A	5.3 bcde	7.3 ab	7.8 abc
13	Clearcast MSO	32 1	FL OZ/A % V/V	2.7 g	5.0 d	5.0 d
14	Plateau MSO	8 1	FL OZ/A % V/V	3.3 fg	7.3 ab	7.0 abcd
15	Detail Plateau MSO	1 8 1	FL OZ/A FL OZ/A % V/V	4.3 def	7.0 bc	6.7 abcd
16	Method Detail Plateau MSO	6 1 3 1	FL OZ/A FL OZ/A FL OZ/A % V/V	4.0 efg	8.2 ab	7.2 abcd
17	Roundup ProMax	22	FL OZ/A	3.8 fg	5.5 cd	5.8 cd
18	Journey MSO	21.3 1	FL OZ/A % V/V	4.0 efg	6.8 bc	6.8 abcd
19	Nontreated Check			6.0 abc	7.3 ab	7.8 abc

<sup>1</sup> Means within a column followed by the same letter are not different according to Fisher's LSD at  $P < 0.05$ .

<sup>2</sup> Herbicide treatments applied August 26, 2020. Visual evaluations taken 274 DAT (May 9, 2022), 289 DAT (May 24, 2022), and 305 DAT (June 9, 2022).

## 2022 Cut Stubble Control in Louisville

### *Introduction*

Controlling the growth of woody vegetation like bush honeysuckle (*Lonicera sp*) is an ongoing challenge along roadsides. It can grow considerably in a season and regrow rapidly after mechanical removal, especially if no other management options are utilized. Extending the time between mechanical removals and using herbicide applications to suppress or control brush growth would be desirable. Using equipment such as forestry heads to mulch and grind down the stumps is far less labor intensive than cutting and treating the stumps with herbicides. Cut stubble treatments are herbicides applied over the cleared area and they are not without risk of damage to non-target vegetation.

The AC Polaris Complete Label on Cut Stubble states “This product can be applied within 2 weeks after mechanical mowing or cutting of brush. Cut stubble applications are made to the soil and cut brush stumps. This type of application may increase ground cover injury. However, vegetation will recover. Making applications of this product directly to the soil can increase potential root uptake causing injury or death of desirable trees. Efficacy can be increased and root uptake by desirable vegetation can be decreased if the brush is allowed to regrow and the foliage is treated.”

In many situations the soil is covered by wood debris (Figure 1) which the herbicide must move through first before getting to the soil surface. Products with imazapyr, such as AC Polaris Compete, are often used for cut stubble as they have foliar activity, as well as water soluble moving down into the soil with precipitation to provide some residual activity through the roots.

This trial was established to test some recommended herbicide mixes on suppressing brush regrowth after recent mechanical grinding / removal.

### *Materials and Methods*

We scouted potential sites on November 23, 2021 that had been mechanically cut, but were unable to find any that had been cleared within the recommended 2 week window. An on ramp from I-264 West to I-64 North in Louisville, KY was selected with enough room for a small trial. It had been cleared earlier that summer and NaturChem had applied Garlon 4 + Escort recently onto the regrowing foliage. It was decided to wait until the spring when new foliage appeared, and active root growth was likely before application.

The trial was established on May 11, 2022 that consisted of 4 treatments with 3 replications arranged in a randomized complete block design with 20 ft by 20 ft plots. Application volume was 25 gallons per acre. There was considerable regrowth (Figure 2) with a relatively clear swath down the center of the trial area. The average height of the bush honeysuckle plants were 32 inches with 25 inches for the patch of staghorn sumac. Although growth regulator type injury was observed on older growth of some plants, no symptoms was observed on new growth at time of application. Damage/control ratings were taken 35 (6/15/2022) and 145 (10/3/2022) days after treatment (DAT). Recent foliar injury was visible on the bush



honeysuckle plants along the chain link fence at the 145 DAT rating, so notes were only taken on the plants closer to the pavement. Data were analyzed using ARM software (Gyllings Data Management Solutions, Inc., Brookings, SD) and treatment means were compared using Fisher's LSD at  $p = 0.05$ .

The Louisville weather station reported 0.73 inches of rain within 7 days of application which should have helped activate the soil residual herbicide treatments but the herbicides also had to move through the wood debris before reaching the soil. There was 2.42 inches of precipitation reported within 16 days of application. Table 1 lists the treatments, active ingredients, and application rates. The herbicide mixtures were ones recommended by our industry representative. They all have foliar and soil residual activity and have the potential to move down through the soil profile which also carries the risk of non-target injury. Treatment 3 included Escort (metsulfuron) to provide more foliar control.

### *Results and Discussion*

At the first evaluation 35 DAT (Figure 3) the range of control observed was from 15 to 43% with the best control with Method + Milestone + Polaris AC Complete + Escort (Treatment 3) (43%) (Figure 4) (Table 2). This treatment had brown leaves still attached to the plants. There was considerable regrowth on the control plots (Figure 5).

By the next evaluation 145 DAT the range of control / suppression was 10 to 37% with the best control using Method + Polaris AC Complete (Treatment 2) (37%) (Table 2). The brown leaves on the plots with the treatment including Escort (Treatment 3) had fallen off and the assessed control ratings were lower (13%). The growth of the plants in the staghorn sumac patch was considerable with few foliar symptoms or visible growth reduction.

Managing brush regrowth after mechanical clearing using cut stump herbicides is a challenge. We'll continue to assess these plots through the 2023 season.

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**Table 1. Herbicide treatments, active ingredients, and application rates.**

Trt. No.	Product Name	Rate	Rate Unit	Active Ingredient(s)	ai Rate (per acre)
1	Method	16	FL OZ/A	aminocyclopyrachlor	4 OZ AE
	Milestone	7	FL OZ/A	aminopyralid	1.75 OZ AE
	Polaris AC Complete	8	FL OZ/A	imazapyr	4 OZ AE
2	Method	16	FL OZ/A	aminocyclopyrachlor	4 OZ AE
	Polaris AC Complete	6	FL OZ/A	imazapyr	3 OZ AE
3	Method	16	FL OZ/A	aminocyclopyrachlor	4 OZ AE
	Milestone	7	FL OZ/A	aminopyralid	1.75 OZ AE
	Polaris AC Complete	6	FL OZ/A	imazapyr	3 OZ AE
	Escort	2	OZ/A	metsulfuron	1.2 OZ
4	Untreated Check				

All herbicide treatments contained the adjuvant, Activator 90 at 0.25% v/v.

**Table 2. Herbicide treatments and data.**

Trt. No.	Product Name	Rate	Rate Unit	Bush Honeysuckle Control (%)	
				35 DAT (June 15, 2023)	145 DAT (Oct 3, 2023)
1	Method	16	FL OZ/A	15 b <sup>1</sup>	10 bc
	Milestone	7	FL OZ/A		
	Polaris AC Complete	8	FL OZ/A		
2	Method	16	FL OZ/A	17 b	37 a
	Polaris AC Complete	6	FL OZ/A		
3	Method	16	FL OZ/A	43 a	13 b
	Milestone	7	FL OZ/A		
	Polaris AC Complete	6	FL OZ/A		
	Escort	2	OZ/A		
4	Untreated Check			0 c	0 c

All herbicide treatments contained the adjuvant, Activator 90 at 0.25% v/v.

<sup>1</sup> Means within a column followed by the same letter are not different according to Fisher's LSD at  $P < 0.05$ .

***Figure 1: Overall View of Trial Site December 7, 2021***

Some regrowth that had been sprayed visible above the wood debris from the clearing operation.





***Figure 2: Overall View of Plots at Time of Application May 11, 2022***

Considerable regrowth observed along fence and towards the pavement with relatively clear swath down the center of the trial area.





*Figure 3: Overall view of plots on June 15, 2022*





*Figure 4: Damage on Trt 3 plot, June 15, 2022. Note the brown leaves still attached to the plants.*





*Figure 5: Control Plot June 15, 2022*



## 2022 Common Teasel Control near Kenton

### *Introduction*

Common teasel (*Dipsacus fullonum*) is a biennial forb that remains a basal rosette during its first year of growth and later grows a two- to eight-foot-tall flower stem. The number of years the plant takes to bolt strongly depends on how large the rosette grows. The stems are prickly and branch near the top. After flowering, the stems become woody and persist through the following winter. Common teasel reproduces by seeds that tend to fall within five feet of the parent plant. The seeds do not persist in the soil.

Basal rosette leaves are puckered with scalloped edges. Stem leaves appear similar, but they are smaller and opposite, and their bases fuse to form a cup around the stem. Flowers are very small and pack into dense, cone shaped heads. They are lavender in color.

It occupies sunny and open sites, such as riparian areas, meadows, grasslands, savannas, forest openings, and disturbed sites. It is listed as a noxious weed in Kentucky and is a common problem on rights-of-way. This trial evaluated a number of herbicide control options.

### *Materials and Methods*

The trial was established April 26, 2022 on an area that was being managed with only mowing in Kenton County KY along KY17 (Figure 1). The trial had 8 treatments with 3 replications arranged in a randomized complete block design with 7 ft by 15 ft plots. Application was at 25 gallons per acre. The herbicide treatments, active ingredients, and application rates are listed in Table 1. Lower volatility (choline) formulations of 2,4-D (Freelexx) (Treatment 1) and triclopyr (Vastlan) (Treatment 7) were chosen. Two rates of Method (9 and 15 fl oz/ac) (Treatments 5 and 6) were included as movement from the site of application might be a concern with the higher rate. TerraVue (aminopyralid + florasulam) (Treatment 4) is a relatively new product on the market. The average height of the teasel rosettes was 9 inches growing among 18-inch tall, tall fescue (Figure 2). Plots were assessed 38 (6/3/2022) days after treatment (DAT) (Figure 3). Data were analyzed using ARM software and treatment means were compared using Fisher's LSD at  $p = 0.05$ .

### *Results and Discussion*

Most of the herbicide treatments had 100% control on these common teasel rosette plants 38 DAT (Table 2). We did not even find remains of dead plants in these plots. Freelexx (Treatment 1) had 85% control while Vastlan (Treatment 7) only had 63% control. Ester formulations of these herbicides have been observed to act more quickly than the less volatile amine and choline formulations. Early spring applications resulted in excellent control of common teasel.



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**Table 1. Herbicide treatments, active ingredients, and application rates.**

Trt. No.	Product Name	Rate	Rate Unit	Active Ingredient(s)	ai Rate (per acre)
1	Freelexx	4	PT/A	2,4-D	30.4 OZ AE
2	Milestone	5	FL OZ/A	aminopyralid	1.25 OA AE
3	Opensight	2.5	OZ/A	aminopyralid + metsulfuron	1.31 OZ AE + 0.24 OZ
4	TerraVue	2.85	OZ/A	aminopyralid + florasulfuron	1.71 OZ AE + 0.17 OZ
5	Method	9	FL OZ/A	aminocyclopyrachlor	2.25 OZ AE
6	Method	15	FL OZ/A	aminocyclopyrachlor	3.75 OA AE
7	Vastlan	1.1	QT/A	triclopyr	17.6 OZ AE
8	Nontreated Check				

All herbicide treatments contained the adjuvant, Activator 90 at 0.25% v/v.

**Table 2. Herbicide treatments and data.**

Trt. No.	Product Name	Rate	Rate Unit	Control (%)
				38 DAT (June 3, 2023)
1	Freelexx	4	PT/A	85 b <sup>1</sup>
2	Milestone	5	FL OZ/A	100 a
3	Opensight	2.5	OZ/A	100 a
4	TerraVue	2.85	OZ/A	100 a
5	Method	9	FL OZ/A	100 a
6	Method	15	FL OZ/A	100 a
7	Vastlan	1.1	QT/A	63 c
8	Nontreated Check			0 d

All herbicide treatments contained the adjuvant, Activator 90 at 0.25% v/v.

<sup>1</sup> Means within a column followed by the same letter are not different according to Fisher's LSD at  $P < 0.05$ .

*Figure 1: Overall View of Trial Site at time of application (April 26, 2022)*





*Figure 2: Teasel at time of application (April 26, 2022)*





*Figure 3: Control Plot June 3, 2022*





## 2022 Cutleaf Teasel Control near Bloomfield

### *Introduction*

Cutleaf Teasel (*Dipsacus laciniatus*) is a monocarpic perennial (produce seed only once in a lifetime) that forms basal rosettes for at least one year until enough resources are acquired to send up flower stalks. Rosettes develop oblong, hairy leaves and large tap roots. The small, dense white flowers occur on oval-shaped, terminal heads enclosed by stiff, spiny bracts. Flower stalks may grow to over 7 feet in height. Blooming occurs from July through September. After flowering and seed production, the plants die. Leaves on the flowering stalks are large, deeply-lobed, opposite, and wrap around the stem forming cups that can hold water. Both the leaves and stems are very prickly. Teasels also exhibit a characteristic shared by many weedy species – elasticity – that enables it to quickly produce abundant seeds on very short stalks after mowing.

Cutleaf teasel grows in open, sunny habitats such as roadsides and pastures. It prefers disturbed areas, but can invade high quality areas such as prairies, savannas, seeps, and sedge meadows. It seems to be more prevalent in recent years and has recently been listed as a noxious weed in Kentucky and is a common problem on rights-of-way. This trial evaluated a number of herbicide control options.

### *Materials and Methods*

The trial was established May 12, 2022 along the roadside at the intersection of KY 55 and US 62 near Bloomfield, KY (Figure 1). The trial had 8 treatments with 3 replications arranged in a randomized complete block design with 7 ft by 15 ft plots. Application was at 25 gallons per acre. The herbicide treatments, active ingredients, and application rates are listed in Table 1. Lower volatility (choline) formulations of 2,4-D (Freelexx) (Treatment 1) and triclopyr (Vastlan) (Treatment 7) were chosen. Two rates of Method (9 and 15 fl oz/ac) (Treatments 5 and 6) were included as movement from the site of application might be a concern with the higher rate. TerraVue (aminopyralid + florpiauxifen-benzyl) (Treatment 4) is a relatively new product on the market. The teasel plants had bolted and the stems were an average of 12 inches in height. The rosettes had an average diameter of 30 inches. Plots were assessed 27 (6/8/2022) (Figure 2) and 89 (8/9/2022) (Figure 3) days after treatment (DAT). Data were analyzed using ARM software and treatment means were compared using Fisher's LSD at  $p = 0.05$ .

### *Results and Discussion*

The herbicide treatments had control ratings from 70 to 92% 27 DAT (Table 2). The top group of treatments (82 to 92% control) included Milestone (Treatment 2), Opensight (Treatment 3), TerraVue (Treatment 4), and the high rate of Method (Treatment 6). The choline formulations, Freelexx (Treatment 1) and Vastlan (Treatment 7) only 70 to 72% control. Ester formulations of these herbicides have been observed to act more quickly than the less volatile formulations (amine and choline).

All the herbicide treatments had 100% control at the 89 DAT rating (Table 2). Early spring applications resulted in excellent control of cutleaf teasel.

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**Table 1. Herbicide treatments, active ingredients, and application rates.**

Trt. No.	Product Name	Rate	Rate Unit	Active Ingredient(s)	ai Rate (per acre)
1	Freelexx	4	PT/A	2,4-D	30.4 OZ AE
2	Milestone	5	FL OZ/A	aminopyralid	1.25 OA AE
3	Opensight	2.5	OZ/A	aminopyralid + metsulfuron	1.31 OZ AE + 0.24 OZ
4	TerraVue	2.85	OZ/A	aminopyralid + florpyrauxifen-benzyl	1.71 OZ AE + 0.17 OZ
5	Method	9	FL OZ/A	aminocyclopyraclor	2.25 OZ AE
6	Method	15	FL OZ/A	aminocyclopyraclor	3.75 OA AE
7	Vastlan	1.1	QT/A	triclopyr	17.6 OZ AE
8	Nontreated Check				

All herbicide treatments contained the adjuvant, Activator 90 at 0.25% v/v.

**Table 2. Herbicide treatments and data.**

Trt. No.	Product Name	Rate	Rate Unit	Control (%)	
				27 DAT (June 8, 2023)	89 DAT (Aug 9, 2023)
1	Freelexx	4	PT/A	70 d <sup>1</sup>	100 a
2	Milestone	5	FL OZ/A	88 ab	100 a
3	Opensight	2.5	OZ/A	92 a	100 a
4	TerraVue	2.85	OZ/A	88 ab	100 a
5	Method	9	FL OZ/A	78 bcd	100 a
6	Method	15	FL OZ/A	82 sbc	100 a
7	Vastlan	1.1	QT/A	72 cd	100 a
8	Nontreated Check			0 e	0 b

All herbicide treatments contained the adjuvant, Activator 90 at 0.25% v/v.

<sup>1</sup> Means within a column followed by the same letter are not different according to Fisher's LSD at  $P < 0.05$ .

*Figure 1: Overall view of trial at time of application (May12, 2022)*





*Figure 2: Overall View of Trial Site June 8, 2022*





*Figure 3: Cutleaf Teasel Flowers, Aug 9, 2022*



## 2022 Poison Hemlock Control near Maysville

### *Introduction*

Poison hemlock (*Conium maculatum*) is a highly toxic biennial, listed as a noxious weed in Kentucky, that is a common problem on rights-of-way. Infestations occur along roadsides, field margins, ditches, marshes, meadows, and low-lying areas, but this plant prefers shaded areas with moist soil. It can grow up to ten feet tall. The stems are smooth and hollow with purplish streaks or splotches, which are characteristic for identification compared to other plant species in the Carrot (Apiacea) plant family. Poison hemlock flowers in early summer and reproduce by seeds that drop near the plant, but can disperse via fur, birds, water, and, to a limited extent, wind. Although the plant is classified as a biennial indicating that it may survive more than one year, often it will germinate in the fall forming a rosette and subsequently bolt and produce flowers the following spring similar to the life cycle typical of winter annuals.

This trial evaluated a number of herbicide control options.

### *Materials and Methods*

The trial was established April 28, 2022 in a dense stand of poison hemlock next to a pollinator planting along US 68 near Maysville, KY (Figure 1). The trial had 8 treatments with 3 replications arranged in a randomized complete block design with 7 ft by 15 ft plots. Application was at 25 gallons per acre. The herbicide treatments, active ingredients, and application rates are listed in Table 1. Lower volatility (choline) formulations of 2,4-D (Freelexx) (Treatment 1) and triclopyr (Vastlan) (Treatment 7) were chosen. Two rates of Method (9 and 15 fl oz/ac) (Treatments 5 and 6) were included as movement from the site of application might be a concern with the higher rate. TerraVue (aminopyralid + florasulam) (Treatment 4) is a relatively new product on the market. The hemlock plants had bolted and their heights ranged from 30 to 50 inches, with an average of 45 inches. There were no flower buds visible yet. Also present was plantain (24 inches), Canada thistle (15 inches), and a mix of orchard grass / tall fescue (16 inches) plants within the trial area. Plots were assessed 47 (6/14/2022) (Figure 2) days after treatment (DAT). When a site visit was made on August 2, 2022 (Figure 3) all the poison hemlock plants were brown, and the site was covered by johnsongrass and giant foxtail plants. Data were analyzed using ARM software and treatment means were compared using Fisher's LSD at  $p = 0.05$ .

### *Results and Discussion*

There was quite a range of control ratings with the herbicide treatments, from 8 to 100% control 47 DAT (Table 2). The top group of treatments (93 to 100% control) included TerraVue (Treatment 4), both rates of Method (Treatments 5 and 6), and Vastlan (Treatment 7). The major difference in the performance observed between aminopyralid by itself (Milestone – Treatment 2) (8% control) and aminopyralid + metsulfuron (Opensight – Treatment 3) (91% control) was not anticipated. Poison hemlock is not one of the weeds listed on the Milestone label for control while it is included on the Opensight label. There are several herbicide options for effective control of poison hemlock with early spring applications. Furthermore, based on past experiences more consistent control is often obtained when herbicide applications are made in late winter/early spring when poison hemlock plants are still in the rosette stage of growth.

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**Table 1. Herbicide treatments, active ingredients, and application rates.**

Trt. No.	Product Name	Rate	Rate Unit	Active Ingredient(s)	ai Rate (per acre)
1	Freelexx	4	PT/A	2,4-D	30.4 OZ AE
2	Milestone	5	FL OZ/A	aminopyralid	1.25 OA AE
3	Opensight	2.5	OZ/A	aminopyralid + metsulfuron	1.31 OZ AE + 0.24 OZ
4	TerraVue	2.85	OZ/A	aminopyralid + florasulfuron	1.71 OZ AE + 0.17 OZ
5	Method	9	FL OZ/A	aminocyclopyraclor	2.25 OZ AE
6	Method	15	FL OZ/A	aminocyclopyraclor	3.75 OA AE
7	Vastlan	1.1	QT/A	triclopyr	17.6 OZ AE
8	Nontreated Check				

All herbicide treatments contained the adjuvant, Activator 90 at 0.25% v/v.

**Table 2. Herbicide treatments and data.**

Trt. No.	Product Name	Rate	Rate Unit	Control (%)
				47 DAT (June 14, 2023)
1	Freelexx	4	PT/A	78 c <sup>1</sup>
2	Milestone	5	FL OZ/A	8 d
3	Opensight	2.5	OZ/A	91 b
4	TerraVue	2.85	OZ/A	100 a
5	Method	9	FL OZ/A	98 ab
6	Method	15	FL OZ/A	98 ab
7	Vastlan	1.1	QT/A	93 ab
8	Nontreated Check			0 d

All herbicide treatments contained the adjuvant, Activator 90 at 0.25% v/v.

<sup>1</sup> Means within a column followed by the same letter are not different according to Fisher's LSD at  $P < 0.05$ .



*Figure 1: Overall view of trial at time of application (April 28, 2022)*





*Figure 2: Overall view of trial June 14, 2022*





*Figure 3: Overall view of trial (Aug 3, 2022)*





## **2022 Pollinator Plot Trial near Maysville**

### *Introduction*

Successfully establishing and maintaining primarily perennial plant pollinator / wildflower plots is a challenge. The seed mix developed by Roundstone Native Seed for KYTC (Kentucky Transportation Cabinet) is a diverse mixture of plants and it can take 70 to 80 days for most of the seeds to germinate and establish (Table 1). Good site preparation is important to reduce early competition from annual weeds and one of the management options could be the use of selective pre-and post-emergence herbicides. Annual weedy grasses, such as giant foxtail and yellow foxtail, can become dominant in newly planted pollinator plots, especially if they're planted in the spring without sufficient site preparation. One of the challenges when selecting herbicide options is the combination of desirable monocot (i.e. grasses) and dicot (i.e. broadleaf plant) species within the seed mixture.

Our report on the “2017 Greenhouse Screening of Potential Herbicides for Wildflower Plantings” explored some pre- and post-emergence options. “We were unable to identify any ideal herbicide options for application at the time of seeding for the pollinator mix in this study. There are Plateau Safe seed mixes that are compatible with Plateau use that one may want to consider. There are a number of options for pre-emergence control of weeds after all the pollinator/wildflower species have emerged and established. These include Pendulum AquaCap, Proclipse, Esplanade, Gallery and, possibly, Dual II Magnum. For selective control of grasses in plots with established pollinator plants, which are predominantly broadleaves, one can use Fusilade II, Select Max, Poast Plus or Acclaim Extra.”

In recent years KYTC has been contracting with Roundstone to do the site preparation, seeding, and ongoing maintenance of the pollinator plantings. The site preparation usually involves two years of herbicide applications (glyphosate and/or 2,4-D) to control annual and perennial weeds as well as woody vegetation (if necessary). Most of the plots are planted in the fall with an oat nurse crop. Winter annuals such as common chickweed and purple dead-nettle can carpet a recently planted site. Do these winter annual weeds have a detrimental effect on the pollinator planting in the near and long term? What effect(s) would early spring management options have on the planting?

### *Materials and Methods*

This trial was established to answer the questions posed above at a pollinator planting along US68 near Maysville, KY. The site was prepared with three applications of herbicides (broadcast and/or spot applied) in 2020 and 2021 with the last application on 9/10/2021. The combined seed mix (Tables 1 and 2) was drilled on 10/5/2021.

The trial was sprayed April 22, 2022, on the pollinator planting (Figure 1). The trial had 9 treatments with 3 replications arranged in a randomized complete block design with 10 ft by 30 ft plots. Application was at 25 gallons per acre. The common chickweed and purple dead-nettle plants were 6 inches tall and flowering at time of application (Figure 2). The coreopsis plants were 8 inches, wild garlic was 15 inches, and the oats were 12 inches tall. The Williamstown weather station reported 0.58 inches of precipitation between 4/22 and 4/27 which should have been enough to activate the pre emerge products. Chickweed control and oat and coreopsis / cornflower damage were assessed 6 (4/28/2022) days after treatment (DAT). The oat stand (% of full) and % ground cover of different components of the canopy were

visually assessed 53 DAT (6/14/2022). The proportion of bare ground and cover from different species were assessed 103 (8/3/2022) and 159 (9/28/2022) DAT. Sometime before the last rating of the season the whole area had been mowed and the plots had to be reflagged at 159 DAT. Data were analyzed using ARM software and treatment means were compared using Fisher's LSD at  $p = 0.05$ .

Table 3 lists treatments evaluated, active ingredients and application rates.

- Treatment 1: The Plateau (imazapic) label lists a number of wildflower species that are tolerant to pre- and post-emerge applications at the 4 fl oz per acre rate, but most of the species in our seeding mix are not included on the product label . This herbicide treatment would probably affect sensitive wildflower seeds not yet germinated, emerged, and established. At this application rate the label indicates pre-emerge control of foxtails as well as post-emergence control of small seedlings.
- Treatment 2: Pendulum AquaCap (pendimethalin) at 4 pt per acre is the short term (2 to 4 months) pre-emerge rate for non-turfgrass sites, on the label. This herbicide treatment may inhibit the germination and emergence of wildflower seeds that have not yet emerged, until its concentration in the top layer of soil has declined.
- Treatment 3: The combination of Plateau + Pendulum AquaCap is on the Plateau label for wildflower establishment, with possible damage and thin stands indicated for a few species.
- Treatment 4: Dual II Magnum (S-metolachlor) is not labelled for wildflowers but was included in a 2017 greenhouse screening trial. It showed minimal damage post-emerge and was effective pre-emerge against foxtail.
- Treatment 5: Reward (diquat) is a contact herbicide without soil residual activity. The label lists broadcast rates of 1 to 2 pt per acre. The 1 pt per acre rate was used in the hope that smaller plants would be killed while larger plants might recover.
- Treatment 6: The combination of Reward + Pendulum AquaCap had the contact herbicide for emerged vegetation and the pre-emerge herbicide for seeds in the soil.
- Treatment 7: Finale (glufosinate) is a contact herbicide without soil residual activity . The lowest rate listed on the label is 3 qt per acre for weeds less than 6" in height or diameter. The anticipation at this application rate was that smaller plants would be killed while larger plants might recover.
- Treatment 8: The combination of Finale + Pendulum AquaCap consist of the contact herbicide for emerged vegetation and the pre-emerge herbicide for seeds in the soil .



## *Results and Discussion*

At 6 DAT, the effects of the quick acting herbicides were quite evident (Figure 3). Whereas, common chickweed and purple dead nettle were still flowering and more oats were visible in the control plots (Figure 4). Chickweed / dead nettle control ranged from 0 to 99% with the Reward treatments (5 and 6) being in the top group (98 to 99% control) (Table 4) (Figure 5). The Finale treatments (7 and 8) had 90 to 93% control. The Plateau treatments (1 and 3) only had 5% control but the chickweed flower petals were not as noticeable. The Pendulum AquaCap treatment (2) had slightly less common chickweed flowers than the control, but did not differ in control compared to the nontreated plots. Damage to the oats ranged from 0 to 57% with Finale treatments (7 and 8) in the top group with 57% damage. The Reward treatments (5 and 6) had from 20 to 22% damage. The Reward treatments (5 and 6) had the most coreopsis / cornflower damage (80 to 83%) with the Finale treatments (7 and 8) at 32 to 33% damage. Dual II Magnum (Treatment 4) did not affect growth of the emerged chickweed / deadnettle complex, oats, or coreopsis / cornflower.

By 53 DAT, the common chickweed / dead nettle cover had matured, and the oats were maturing (Figure 6). An interesting observation was that the chickweed plants with the Pendulum AquaCap treatment (2) were still green and flowering. Most of the treatments had other plants that germinated and filled in the areas where chickweed / deadnettle had previously occupied (Figure 7). Whereas, Plateau (Treatment 1), Plateau + Pendulum AquaCap (Treatment 3) (Figure 8), and Finale + Pendulum AquaCap (Treatment 8) had the most bareground (20 to 28%) (Table 5). Treatments with Pendulum AquaCap (Treatment 2) and Reward (Treatment 6) had the same % of full oat stand as the control, while the treatments with Plateau (1 and 3) had the lowest oat stand (6 to 12% of full stand). Another interesting observation was that the oat plants treated with Finale (Treatment 7) were stunted and still green. The vegetation near the ground (i.e. low ground cover) was a combination of clovers, other young broadleaf plants, and some grasses. The range of % cover ranged from 72 to 98% with the top group ranging from 90 to 98% which included most of the treatments. The Reward + Pendulum AquaCap treatment (6) recovered quite well (Figure 9) compared to how it looked previously (Figure 5). The group with the lowest % cover were the same as those with the most bare ground (Treatments 1, 3, and 8). Wildflower plants were predominantly cornflower as they were taller than the rest of the canopy and many were flowering. There were also some Rudbeckia and poppy flowering plants visible. Many of the coreopsis plants bloom in their second year, so none were visible. The % wildflower plants coverage ranged from 45 to 60% for the nontreated plots and most herbicide treatments (Table 5). However, the Finale treatments (Treatments 7 and 8) only had 15 to 20% cover. At 6 DAT the initial damage to cornflower was lower than with the Reward treatments but it seems they did not recover as well. The majority of the cornflower plants were flowering (50 to 60%) for Treatments 2, 4, 5, and 6. Whereas, only 5 to 23% were flowering in treatments that included the Plateau (Treatments 1 and 3) and the Finale (Treatments 7 and 8).

By the next rating, 103 DAT, the cornflower plants were fully mature, and the predominant wildflowers were Blackeyed Susan (Figure 10). The amount of bareground ranged from 0 to 20% (Table 6). Marestail and ragweed % coverage was greater in some of the treatments compared to the untreated plots. The group of treatments with the greatest % marestail cover (8 to 20%) included the ones with Plateau

(Treatments 1 and 3), Pendulum AquaCap (Treatment 2), and the ones with Reward (Treatments 5 and 6). The group of treatments with the greatest % common ragweed cover (7 to 18%) included Plateau (Treatment 1), Pendulum AquaCap (Treatment 2), Dual II Magnum (Treatment 4), and the ones with Reward (Treatments 5 and 6). Grass cover was predominantly giant foxtail and the treatment with the most % cover (10%) was Finale (Treatment 7). The wildflower plants was predominantly Blackeyed Susan with some flowering Philadelphia fleabane and bergamot, which ranged between 20 to 60% cover. The highest % cover of wildflower plants (50 to 60%) included treatments with Plateau (Treatments 1 and 2), Reward + Pendulum AquaCap (Treatment 6), and Untreated Control (Treatment 9). Blackeyed Susan is listed as tolerant to both pre- and post-emerge applications on the Plateau label. The white / red clover % cover ranged from 0 to 45%. The treatments with the greatest % cover (28 to 45%) included Dual II Magnum (Treatment 4), Reward (Treatment 5), treatments with Finale (Treatments 7 and 8), and Control (Treatment 9). Other broadleaf plant cover ranged from 0 to 12%.

Additional evaluations were taken at 159 DAT after the site had regrown from an earlier mowing (Figure 11). Bareground ranged from 0 to 13% with the most bareground (12 to 13%) on the treatments with Plateau (Treatments 1 and 3) (Table 7). The grass cover was predominantly foxtail and ranged from 2 to 8%. There were clumps of oats that were growing after mowing and ranged from 0 to 25% cover. The least oats cover (0 to 5%) was with the treatments including Plateau (1 and 3), and Finale + Pendulum AquaCap (Treatment 8). The flowering wildflowers were predominantly Brown-eyed Susan, Indian Blanket, and Showy Tickseed with some goldenrod as well. Wildflower plant cover ranged from 18 to 35% with the lowest group (18 to 22%) including Dual II Magnum (Treatment 4), Reward (Treatment 5), and Nontreated Control (Treatment 9). Maretail cover, after mowing, ranged from 0 to 15% with the highest group (10 to 15%) including the Plateau treatments (1 and 3). Ragweed cover, after mowing, ranged from 2 to 8% with no statistical difference among treatments. The mixture of white / red clover coverage ranged from 25 to 35%. This was not included in the seed mix but was likely in the seedbank. Cover of other broadleaf plants ranged from 7 to 13%.

The different herbicide treatments affected the establishment and progression of pollinator plants compared to the nontreated control. Lower rates of Reward and Finale may have resulted in good control of common chickweed and purple dead nettle with less damage on other emerged plants. Leaving them alone early in the establishment year is likely the best management strategy. These plots will continue to be monitored throughout 2023.

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**Table 1. KYTC Pollinator Mix: Species Composition and Seeding Rate per Acre.**

Common Name	Botanical Name	oz/ac	lbs/ac	lbs
<b>KYTC Pollinator</b>	\$ -			27.000
Butterfly Milkweed	<i>Asclepias tuberosa</i>		1.182	
Common Milkweed	<i>Asclepias syriaca</i>		1.120	
Swamp Milkweed	<i>Asclepias incarnata</i>		0.625	
Whorled Milkweed	<i>Asclepias verticillata</i>		0.072	
Smooth Beardtongue	<i>Penstemon digitalis</i>		0.122	
Lance Leaved Coreopsis	<i>Coreopsis lanceolata</i>		0.253	
Blackeyed Susan	<i>Rudbeckia hirta</i>		0.209	
Hoary Mountain Mint	<i>Pycnanthemum incanum</i>		0.078	
Slender Mountain Mint	<i>Pycnanthemum tenuifolium</i>		0.078	
Early Goldenrod	<i>Solidago juncea</i>		0.166	
Bergamot	<i>Monarda fistulosa</i>		0.166	
Spiked Blazing Star	<i>Liatris spicata</i>		0.209	
Greyheaded Coneflower	<i>Ratibida pinnata</i>		0.188	
Purple Coneflower	<i>Echinacea purpurea</i>		0.253	
False Sunflower	<i>Heliopsis helianthoides</i>		0.188	
Browneyed Susan	<i>Rudbeckia triloba</i>		0.188	
Joe-Pye Weed	<i>Eupatorium fistulosum</i>		0.100	
Iron Weed	<i>Vernonia altissima</i>		0.122	
Sneezeweed	<i>Helenium autumnale</i>		0.122	
Narrow-Leaved Sunflower	<i>Helianthus angustifolius</i>		0.122	
New England Aster	<i>Aster novae-angliae</i>		0.144	
White Wingstem	<i>Verbesina virginica</i>		0.166	
Indian Grass	<i>Sorghastrum nutans</i>		0.209	
Little Bluestem	<i>Schizachyrium scoparium</i>		0.428	
Partridge Pea	<i>Cassia fasciculata</i>		0.078	
Compass Plant	<i>Silphium laciniatum</i>		0.188	
Cardinal Flower	<i>Lobelia cardinalis</i>		0.056	
Lance-Leaved Goldenrod	<i>Euthamia graminifolia</i>		0.084	
Boneset	<i>Eupatorium perfoliatum</i>		0.084	
Oats	<i>Avena sativa</i>		20.000	

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**Table 2. KYTC Premier Seed Mix: Species Composition and Seeding Rate per Acre.**

Common Name	Botanical Name	oz/ac	lbs/ac	lbs
<b>KYTC Premier Seed Mix</b>				12.500
Cosmos	<i>Cosmos bipinnatus</i>		2.139	
Zinnia-Cut and Come again	<i>Zinnia elegans</i>		2.139	
Tall Blue Cornflower	<i>Centaurea cyanus</i>		2.139	
Clasping Coneflower	<i>Rudbeckia amplexicaulis</i>		1.293	
Gray Stripe Sunflower	<i>Helianthus annuus</i>		1.070	
French Marigold	<i>Tagetes patula</i>		0.535	
Lupine	<i>Lupinus perennis</i>		0.464	
Purple Coneflower	<i>Echinacea purpurea</i>		0.450	
Lance Leaved Coreopsis	<i>Coreopsis lanceolata</i>		0.348	
Blackeyed Susan	<i>Rudbeckia hirta</i>		0.271	
Butterfly Milkweed	<i>Asclepias tuberosa</i>		0.221	
Shasta Daisy	<i>Chrysanthemum maximum</i>		0.192	
Plains Coreopsis	<i>Coreopsis tinctoria</i>		0.187	
Mexican Hat	<i>Ratibida columnaris</i>		0.176	
Showy Tickseed	<i>Bidens aristosa</i>		0.132	
Baby's Breath	<i>Gypsophila elegans</i>		0.111	
Four O'Clock	<i>Mirabilis jalapa</i>		0.111	
Scarlet Flax	<i>Linum grandiflorum rubrum</i>		0.111	
Corn Poppy	<i>Papaver rhoeas</i>		0.056	
Indian Blanket	<i>Gaillardia pulchella</i>		0.056	
Sulphur Cosmos	<i>Cosmos sulphureus</i>		0.056	
Tree Mallow	<i>Lavatera trimestris</i>		0.056	
Common Milkweed	<i>Asclepias syriaca</i>		0.054	
Annual Phlox	<i>Phlox drummondii</i>		0.042	
Spiked Blazing Star	<i>Liatris spicata</i>		0.028	
Scarlet Sage	<i>Salvia coccinea</i>		0.019	
Gilia	<i>Ipomopsis rubra</i>		0.014	
Purple Moss Verbena	<i>Verbena tenuisecta</i>		0.014	
Lemon Mint	<i>Monarda citriodora</i>		0.009	
Leavenworth's Tickseed	<i>Coreopsis leavenworthii</i>		0.007	
New England Aster	<i>Aster novae-angliae</i>		0.004	

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**Table 3. Herbicide treatments, active ingredients, and application rates.**

Trt. No.	Product Name	Rate	Rate Unit	Active Ingredient(s)	ai Rate (per acre)
1	Plateau	4	fl oz/a	imazapic	1 oz ae
2	Pendulum AquaCap	4	pt/a	pendimethalin	30.4 oz
3	Plateau	4	fl oz/a	imazapic	1 oz ae
	Pendulum AquaCap	4	pt/a	pendimethalin	30.4 oz
4	Dual II Magnum	1.33	pt/a	S-metolachlor	20.3 oz
5	Reward	1	pt/a	diquat	4 oz ae
6	Reward	1	pt/a	diquat	4 oz ae
	Pendulum AquaCap	4	pt/a	pendimethalin	30.4 oz
7	Finale	3	qt/a	glufosinate	28.1 oz
8	Finale	3	qt/a	glufosinate	28.1 oz
	Pendulum AquaCap	4	pt/a	pendimethalin	30.4 oz
9	Nontreated Check				

All herbicide treatments contained the adjuvant, Activator 90 at 0.25% v/v.

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**Table 4. Herbicide treatments and data from 6 DAT (April 28, 2022).**

Trt. No.	Product Name	Rate	Rate Unit	Chickweed / Dead Nettle Control (%)	Oats Damage (%)	Coreopsis / Cornflower Damage (%)
				6 DAT (April 28, 2022)		
1	Plateau	4	fl oz/a	5 d <sup>1</sup>	1 c	2 c
2	Pendulum AquaCap	4	pt/a	2 d	0 c	0 c
3	Plateau	4	fl oz/a	5 d	1 c	0 c
	Pendulum AquaCap	4	pt/a			
4	Dual II Magnum	1.33	pt/a	0 d	0 c	0 c
5	Reward	1	pt/a	99 a	22 b	83 a
6	Reward	1	pt/a	98 ab	20 b	80 a
	Pendulum AquaCap	4	pt/a			
7	Finale	3	qt/a	90 c	57 a	33 b
8	Finale	3	qt/a	93 bc	57 a	32 b
	Pendulum AquaCap	4	pt/a			
9	Nontreated Check			0 d	0 c	0 c

All herbicide treatments contained the adjuvant, Activator 90 at 0.25% v/v.

<sup>1</sup> 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. Herbicide treatments and data from 53 DAT (June 14, 2022).

Trt. No.	Product Name	Rate	Rate Unit	Bare Ground (%)	Oats (% of full stand)	Low Ground Cover (%)	Wildflower Plants Cover (%)	Wildflower Plants Flowering (%)
				53 DAT (June 14, 2022)				
1	Plateau	4	fl oz/a	27 ab <sup>1</sup>	12 ef	73 cd	45 a	12 bc
2	Pendulum AquaCap	4	pt/a	3 cd	90 ab	97 ab	57 a	60 a
3	Plateau	4	fl oz/a	28 a	6 f	72 d	50 a	5 c
	Pendulum AquaCap	4	pt/a					
4	Dual II Magnum	1.33	pt/a	10 bcd	37 de	90 abc	50 a	57 a
5	Reward	1	pt/a	2 d	83 ab	98 a	48 a	50 a
6	Reward	1	pt/a	5 cd	67 bc	95 ab	48 a	57 a
	Pendulum AquaCap	4	pt/a					
7	Finale	3	qt/a	8 cd	67 bc	92 ab	20 b	23 b
8	Finale	3	qt/a	20 abc	45 cd	80 bcd	15 b	15 bc
	Pendulum AquaCap	4	pt/a					
9	Nontreated Check			5 cd	100 a	95 ab	60 a	60 a

All herbicide treatments contained the adjuvant, Activator 90 at 0.25% v/v.

<sup>1</sup> 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 6. Herbicide treatments and data from 103 DAT (August 3, 2022).

Trt. No.	Product Name	Rate	Rate Unit	Bare Ground (%)	Marestail Cover (%)	Ragweed Cover (%)	Grass Cover (%)	Wildflower Plants Cover (%)	Clover Cover (%)	Other Broadleaf Cover (%)
				103 DAT (August 3, 2022)						
1	Plateau	4	fl oz/a	12 ab <sup>1</sup>	20 a	7 abc	2 b	53 abc	7 cd	0
2	Pendulum AquaCap	4	pt/a	12 ab	8 ab	8 abc	0 b	45 bcd	18 bcd	8
3	Plateau	4	fl oz/a	10 ab	20 a	0 c	2 b	67 a	0 d	5
	Pendulum AquaCap	4	pt/a							
4	Dual II Magnum	1.3 3	pt/a	20 a	3 b	15 ab	2 b	20 e	37 ab	3
5	Reward	1	pt/a	0 b	13 ab	18 a	3 b	28 de	33 ab	3
6	Reward	1	pt/a	3 ab	15 ab	10 abc	0 b	60 ab	3 d	10
	Pendulum AquaCap	4	pt/a							
7	Finale	3	qt/a	2 b	3 b	3 bc	10 a	43 bcd	37 ab	2
8	Finale	3	qt/a	0 b	3 b	5 bc	3 b	32 cde	45 a	12
	Pendulum AquaCap	4	pt/a							
9	Nontreated Check			5 ab	5 b	3 bc	2 b	50 abc	28 abc	7

All herbicide treatments contained the adjuvant, Activator 90 at 0.25% v/v.

<sup>1</sup> 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 7. Herbicide treatments and data from 159 DAT (September 28, 2022).

Trt. No.	Product Name	Rate	Rate Unit	Bare Ground (%)	Grass Cover (%)	Oats Cover (%)	159 DAT (September 28, 2022)				
							Wildflower Plants Cover (%)	Marestail Cover (%)	Ragweed Cover (%)	Clover Cover (%)	Other Broadleaf Cover (%)
1	Plateau	4	fl oz/a	12 a <sup>1</sup>	5 ab	2 bc	33 a	10 ab	3	30	7
2	Pendulum AquaCap	4	pt/a	5 b	2 b	13 abc	35 a	8 b	5	25	7
3	Plateau	4	fl oz/a	13 a	3 ab	0 c	27 ab	15 a	7	27	8
	Pendulum AquaCap	4	pt/a								
4	Dual II Magnum	1.33	pt/a	0 b	5 ab	18 ab	22 b	0 c	5	40	10
5	Reward	1	pt/a	0 b	7 ab	25 a	18 b	5 bc	3	33	8
6	Reward	1	pt/a	2 b	5 ab	18 ab	25 ab	2 c	8	33	7
	Pendulum AquaCap	4	pt/a								
7	Finale	3	qt/a	3 b	8 a	15 abc	28 ab	2 c	3	33	7
8	Finale	3	qt/a	3 b	7 ab	5 bc	33 a	2 c	2	35	13
	Pendulum AquaCap	4	pt/a								
9	Nontreated Check			2 b	7 ab	27 a	22 b	0 c	3	28	12

Note: early flowering wildflowers senesced by rating date

All herbicide treatments contained the adjuvant, Activator 90 at 0.25% v/v.

<sup>1</sup> Means within a column followed by the same letter are not different according to Fisher's LSD at  $P < 0.05$ .

*Figure 1: Overall view of trial at time of application (April 22, 2022)*





*Figure 2: Common chickweed and coreopsis (April 22, 2022)*





*Figure 3: Overall view of trial 6 DAT (April 28, 2022)*





*Figure 4: Closeup of Control plot (flowering common chickweed and purple dead nettle plus oats) (April 28, 2022)*





*Figure 5: Closeup of Trt 6 diquat + pendimethalin (April 28, 2022)*



6



*Figure 6: Overall view of trial 53 DAT (June 14, 2022)*





**Figure 7: Treatment 9 Control 53 DAT (June 14, 2022)**

The yellow lines mark the edges of the plot with the blue flag at the center.





**Figure 8: Plateau + Pendulum AquaCap (Treatment 3) (June 14, 2022)**

. The yellow lines mark the edges of the plot with the blue flag at the center of the plot..





**Figure 9: Reward + Pendulum AquaCap (Treatment 6) (June 14, 2022)**

. The yellow lines mark the edges of the plot with the yellow flags at the center of the plot..





*Figure 10: Overall view of trial 103 DAT (August 3, 2022)*





*Figure 11: Overall view of trial after recent mowing 159 DAT (September 28, 2022)*



## 2022 Tall Fescue PGR at Spindletop

Tall fescue is a widely adapted species and is cool-season grass commonly grown on roadsides, as well as, in areas of unimproved turf. Frequent mowing is the most common management regime for departments of transportation. Plant Growth Regulators (PGRs) are potential tools to reduce growth of turf grasses such as tall fescue and promote seed head suppression. Furthermore, PGRs can be an effective means to reduce mowing for the first cycle and aid in keeping roadways safe for travelers. They are normally applied in the early spring and usually only one PGR is applied at a time. Class D PGRs are herbicidal and may cause excessive damage to the turf. The addition of a growth regulator herbicide (Group 4) to the mixture can act as a safener to reduce yellowing (damage) of the turf as well as expanding the spectrum of weeds controlled.

The objectives of this repeated trial were to evaluate options of PGR mixtures and the timing of their application for roadside management.

### *Materials and Methods*

A trial was established in 2022 at Spindletop Research Farm in Lexington KY arranged as a complete block design with 13 PGR treatments and three replications. Plots were 7 ft by 20 ft with running unsprayed checks (3 ft wide) between each of the plots. The treatments were 4 PGR combinations applied at three times in the spring plus an untreated control (Table 1). All four primary treatments consisted of Plateau (imazapic) applied alone or combined with three other treatments that contained Escort (metsulfuron methyl) at each application timing. Method (aminocyclopyrachlor) and Milestone (aminopyralid) were also included in combination with Plateau and Escort in two of the four treatments, as potential safeners. The first application was before any fescue stem extension on April 20 while the second application was when some tillers had emerging seedheads on May 9. The third application was when many of the plants had emerging seedheads on May 24, 2022. The optimum timing for seedhead suppression would often be at the first timing but that may not always be feasible across all the miles of roadway to be treated. Sometimes there could be benefits of later application timings, such as weed control.

All applications were at 25 gallons per acre and included a non-ionic surfactant at 0.25% v/v. Tall fescue was 10" tall at the first application date on April 20. Tall fescue color was assessed every two weeks by comparison to the running check strips. The color rating ranges from 0 (dead) to 9 (full green). The color of the check strips was set at 8. Tall fescue heading (%) was assessed and canopy heights were measured every two weeks as well. Color, height, and % heading was assessed 19 (5/9/2022), 34 (5/24/2022), 47 (6/6/2022), and 63 (6/22/2022) days after the first application timing (DAT1). At 76 (7/5/2022), 90 (7/19/2022) and 104 DAT1 (8/2/2022) color and green canopy height were assessed. Data were analyzed using ARM software (Gyllings Data Management Solutions, Inc., Brookings, SD) and treatment means were compared using Fisher's LSD at  $p = 0.05$ .

### *Results and Discussion*

Each application timing are discussed separately to best highlight the observations that were made. With the first application timing, all the treatments had lower color ratings and height than control 19 DAT1 (Table 2). There was also no heading with the treatments while the control had 47%. By 34 DAT1 (Figure 1), all the treatments from the first application timing still had lower color ratings (4.5 to 5.0) than



the untreated control but Plateau alone (Treatment 1) (Figure 2) had recovered somewhat with a rating of 6.0 (Table 2). The combination of Plateau + Escort (Treatment 2) displayed greater damage to tall fescue (Figure 3). All the treatments were still shorter than control and had almost no heading while the control was at 100% heading (Figure 4). At 47 DAT1 most of the treatments had color ratings similar to control except for the Plateau + Escort treatment (number 2) (Table 3). All the treatments were still shorter than control and had almost no plants heading. By 63 DAT1, all the treatments had recovered their color and all even had ratings numerically higher (8.5 to 8.7) than untreated control (8.0) (Table 3). A greater greening is sometimes observed after PGR seedhead / growth suppression. Growth reduction and seedhead suppression continued with all treatments shorter than control and with almost no heading. At 76 DAT1, the control plot tall fescue seedheads and tillers had matured and the plants had put on regrowth, so the height of this green canopy was measured for the rest of the season (Table 4). All the treatments had color similar to control and even had ratings greater than 8.0 at 76, 90, and 104 DAT1. They were also all shorter than control 76 and 90 DAT1. This was also the case 104 DAT1 for most treatments, except for Plateau + Escort + Milestone (Treatment 4) which was the same height as control.

With the second application timing most of the treatments had lower green color ratings than control except for Plateau alone (Treatment 5) 15 DAT2 (Table 2). All the treatments were shorter than control but only Plateau + Escort + Method (Treatment 7) and Plateau + Escort + Milestone (Treatment 8) had less heading than control. At 28 DAT2, all the treatments had lower color ratings (6.3 to 6.8), were shorter, and had lower % heading ratings than control (Table 3). By 44 DAT2, all the treatments had even lower color ratings (3.3 to 4.2) than control. They were still shorter than control but were also at 100% heading. At 57 DAT2 all the treatments still had lower color ratings (3.5 to 5.3) and the green canopy was still shorter than control (Table 4). By 71 DAT2 color ratings were recovering with Plateau + Escort + Milestone (Treatment 8) being similar to control but all the treatments were still shorter. At the last rating of the season (85 DAT2) all the color ratings were similar to control and Plateau + Escort (Treatment 6) and Plateau + Escort + Method (Treatment 7) were similar in height to control.

With the third application timing most of the treatments had lower green color ratings than control except for Plateau + Escort + Method (Treatment 11) 13 DAT3 (Table 3). They were all somewhat shorter than control but all were also at 100% heading. At 29 DAT3 only the Plateau (Treatment 9) and Plateau + Escort (Treatment 10) treatments had lower color ratings than control. Only the Plateau + Escort (Treatment 10) and Plateau + Escort + Method (Treatment 11) treatments were shorter than control. By 42 DAT3 only the Plateau + Escort (Treatment 10) treatment had a color rating similar to control (Table 4). All the treatments were shorter than control at this rating date. Treatment 10 was similar to control in color again 58 DAT3 with the other treatments lower and ranging from 3.3 to 6.5. They were all shorter than control. By the last rating of the season, 70 DAT3, color ratings had recovered to being similar to control at all the treatments except for Plateau (Treatment 9). Only two of the treatments, Plateau + Escort (Treatment 10) and Plateau + Escort + Method (Treatment 11) were still somewhat shorter than control.

This trial had similar results to the 2021 trial. All treatments resulted in similar height reductions and seedhead suppression within an application timing. The first timing was optimal for seedhead suppression while the second timing stopped further seedhead emergence and growth and would probably be acceptable. However, the third timing would not be recommended if seedhead and growth suppression were the primary objectives.



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**Table 1. Herbicide Treatments, Application Timing, Active Ingredients and Application Rates.**

Trt. No.	Product Name	Rate	Rate Unit	Timing <sup>1</sup>	Active Ingredient(s)	AI Rate (per acre)
1	Plateau	3	FL OZ/A	A	imazapic	0.75 OZ AE/A
2	Plateau Escort	3 0.33	FL OZ/A OZ/A	A	imazapic metsulfuron	0.75 OZ AE/A 0.2 OZ/A
3	Plateau Escort Method	3 0.33 6	FL OZ/A OZ/A FL OZ/A	A	imazapic metsulfuron aminocyclopyrachlor	0.75 OZ AE/A 0.2 OZ/A 1.5 OZ AE/A
4	Plateau Escort Milestone	3 0.33 5	FL OZ/A OZ/A FL OZ/A	A	imazapic metsulfuron aminopyralid	0.75 OZ AE/A 0.2 OZ/A 1.25 OZ AE/A
5	Plateau	3	FL OZ/A	B	imazapic	0.75 OZ AE/A
6	Plateau Escort	3 0.33	FL OZ/A OZ/A	B	imazapic metsulfuron	0.75 OZ AE/A 0.2 OZ/A
7	Plateau Escort Method	3 0.33 6	FL OZ/A OZ/A FL OZ/A	B	imazapic metsulfuron aminocyclopyrachlor	0.75 OZ AE/A 0.2 OZ/A 1.5 OZ AE/A
8	Plateau Escort Milestone	3 0.33 5	FL OZ/A OZ/A FL OZ/A	B	imazapic metsulfuron aminopyralid	0.75 OZ AE/A 0.2 OZ/A 1.25 OZ AE/A
9	Plateau	3	FL OZ/A	C	imazapic	0.75 OZ AE/A
10	Plateau Escort	3 0.33	FL OZ/A OZ/A	C	imazapic metsulfuron	0.75 OZ AE/A 0.2 OZ/A
11	Plateau Escort Method	3 0.33 6	FL OZ/A OZ/A FL OZ/A	C	imazapic metsulfuron aminocyclopyrachlor	0.75 OZ AE/A 0.2 OZ/A 1.5 OZ AE/A
12	Plateau Escort Milestone	3 0.33 5	FL OZ/A OZ/A FL OZ/A	C	imazapic metsulfuron aminopyralid	0.75 OZ AE/A 0.2 OZ/A 1.25 OZ AE/A
13	Untreated Check					

All herbicide treatments contained the adjuvant, Activator 90 at 0.25% v/v.

<sup>1</sup>Timing A: April 20 – before stem extension

Timing B: May 9 – some tillers had emerging seedheads

Timing C: May 24 – many plants had emerging seedheads

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**Table 2. Herbicide Treatments, Turf Color, Tall Fescue Heights and % Heading after First Two PGR Applications**

Trt. No.	Product Name	Rate	Rate Unit	Timing	May 9, 2022			May 24, 2022		
					Color (0-9)	Ht (in)	Heading (%)	Color (0-9)	Ht (in)	Heading (%)
					19 DAT1 <sup>1</sup>			34 DAT1 <sup>1</sup> , 15 DAT2 <sup>2</sup>		
1	Plateau	3	FL OZ/A	A	4.0 b <sup>3</sup>	12 b	0 b	6.0 c	12 c	0 c
2	Plateau	3	FL OZ/A	A	3.7 b	13 b	0 b	4.5 d	11 c	0 c
	Escort	0.33	OZ/A							
3	Plateau	3	FL OZ/A	A	3.7 b	11 b	0 b	5.0 d	10 c	1 c
	Escort	0.33	OZ/A							
	Method	6	FL OZ/A							
4	Plateau	3	FL OZ/A	A	4.0 b	12 b	0 b	4.8 d	12 c	1 c
	Escort	0.33	OZ/A							
	Milestone	5	FL OZ/A							
5	Plateau	3	FL OZ/A	B				7.2 ab	24 b	80 ab
6	Plateau	3	FL OZ/A	B				6.7 bc	26 b	80 ab
	Escort	0.33	OZ/A							
7	Plateau	3	FL OZ/A	B				6.7 bc	25 b	58 b
	Escort	0.33	OZ/A							
	Method	6	FL OZ/A							
8	Plateau	3	FL OZ/A	B				6.3 bc	23 b	73 b
	Escort	0.33	OZ/A							
	Milestone	5	FL OZ/A							
9	Plateau	3	FL OZ/A	C						
10	Plateau	3	FL OZ/A	C						
	Escort	0.33	OZ/A							
11	Plateau	3	FL OZ/A	C						
	Escort	0.33	OZ/A							
	Method	6	FL OZ/A							
12	Plateau	3	FL OZ/A	C						
	Escort	0.33	OZ/A							
	Milestone	5	FL OZ/A							
13	Untreated Check				8.0 a	22 a	47 a	8.0 a	34 a	100 a

<sup>1</sup> DAT1 = Days after first PGR treatment (April 20, 2022)

<sup>2</sup> DAT2 = Days after second PGR treatment (May 9, 2022)

<sup>3</sup> 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. Herbicide Treatments, Turf Color, Tall Fescue Heights and % Heading after PGR Applications**

Trt. No.	Product Name	Rate	Rate Unit	Timing	June 6, 2022			June 22, 2022		
					Color (0-9)	Ht (in)	Heading (%)	Color (0-9)	Ht (in)	Heading (%)
					47 DAT <sup>1</sup> , 28 DAT <sup>2</sup> , 13 DAT <sup>3</sup>			63 DAT <sup>1</sup> , 44 DAT <sup>2</sup> , 29 DAT <sup>3</sup>		
1	Plateau	3	FL OZ/A	A	7.8 ab <sup>4</sup>	12 d	0 d	8.5 ab	14 e	0 c
2	Plateau Escort	3 0.33	FL OZ/A OZ/A	A	7.2 de	13 d	0 d	8.6 ab	14 e	0 c
3	Plateau Escort Method	3 0.33 6	FL OZ/A OZ/A FL OZ/A	A	7.8 ab	12 d	2 c	8.7 a	16 e	0.3 b
4	Plateau Escort Milestone	3 0.33 5	FL OZ/A OZ/A FL OZ/A	A	8.0 a	11 d	0 d	8.6 ab	15 e	0 c
5	Plateau	3	FL OZ/A	B	6.8 ef	26 c	80 b	3.7 de	28 c	100 a
6	Plateau Escort	3 0.33	FL OZ/A OZ/A	B	6.7 fg	24 c	80 b	3.3 e	24 cd	100 a
7	Plateau Escort Method	3 0.33 6	FL OZ/A OZ/A FL OZ/A	B	6.3 g	25 c	80 b	3.3 e	24 cd	100 a
8	Plateau Escort Milestone	3 0.33 5	FL OZ/A OZ/A FL OZ/A	B	6.5 fg	25 c	80 b	4.2 d	23 d	100 a
9	Plateau	3	FL OZ/A	C	7.3 cd	38 b	100 a	7.0 c	40 ab	100 a
10	Plateau Escort	3 0.33	FL OZ/A OZ/A	C	7.5 bcd	39 b	100 a	7.0 c	36 b	100 a
11	Plateau Escort Method	3 0.33 6	FL OZ/A OZ/A FL OZ/A	C	7.7 abc	39 b	100 a	7.8 b	37 b	100 a
12	Plateau Escort Milestone	3 0.33 5	FL OZ/A OZ/A FL OZ/A	C	7.5 bcd	39 b	100 a	7.8 b	38 ab	100 a
13	Untreated Check				8.0 a	44 a	100 a	8.0 ab	43.a	100 a

<sup>1</sup> DAT1 = Days after first PGR treatment (April 20, 2022)

<sup>2</sup> DAT2 = Days after second PGR treatment (May 9, 2022)

<sup>3</sup> DAT3 = Days after third PGR treatment (May 24, 2022)

<sup>4</sup> 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. Herbicide Treatments, Turf Color, and Green Tall Fescue Canopy Heights after PGR Applications**

Trt. No.	Product Name	Rate	Rate Unit	Timing	July 5, 2022		July 19, 2022		August 2, 2022	
					Color (0-9)	Green Canopy Ht (in)	Color (0-9)	Green Canopy Ht (in)	Color (0-9)	Green Canopy Ht (in)
					76 DAT1 <sup>1</sup> , 57 DAT2 <sup>2</sup> , 42 DAT3 <sup>3</sup>		90 DAT1 <sup>1</sup> , 71 DAT2 <sup>2</sup> , 58 DAT3 <sup>3</sup>		104 DAT1 <sup>1</sup> , 85 DAT2 <sup>2</sup> , 70 DAT3 <sup>3</sup>	
1	Plateau	3	FL OZ/A	A	8.4 a <sup>4</sup>	14 bcd	8.2 ab	15 bc	8.2 a	12 c
2	Plateau Escort	3 0.33	FL OZ/A OZ/A	A	8.5 a	14 bc	8.2 ab	13 cd	8.2 a	13 bc
3	Plateau Escort Method	3 0.33 6	FL OZ/A OZ/A FL OZ/A	A	8.7 a	14 bc	8.3 a	15 b	8.2 a	13 bc
4	Plateau Escort Milestone	3 0.33 5	FL OZ/A OZ/A FL OZ/A	A	8.5 a	14 bc	8.4 a	14 bc	8.2 a	15 abc
5	Plateau	3	FL OZ/A	B	4.3 de	11 def	6.5 de	13 cd	7.7 a	13 bc
6	Plateau Escort	3 0.33	FL OZ/A OZ/A	B	3.5 a	10 f	7.0 cd	12 def	8.0 a	14 abc
7	Plateau Escort Method	3 0.33 6	FL OZ/A OZ/A FL OZ/A	B	4.5 cde	12 cdef	7.2 bcd	12 de	8.1 a	15 abc
8	Plateau Escort Milestone	3 0.33 5	FL OZ/A OZ/A FL OZ/A	B	5.3 cde	11 ef	7.8 abcd	12 def	8.2 a	13 bc
9	Plateau	3	FL OZ/A	C	5.7 cde	13 bcde	3.3 f	10 ef	6.8 b	14 abc
10	Plateau Escort	3 0.33	FL OZ/A OZ/A	C	6.7 abc	13 bcde	7.0 cd	11 def	8.0 a	13 bc
11	Plateau Escort Method	3 0.33 6	FL OZ/A OZ/A FL OZ/A	C	5.5 cde	15 b	6.5 de	10 f	7.8 a	13 bc
12	Plateau Escort Milestone	3 0.33 5	FL OZ/A OZ/A FL OZ/A	C	5.8 bcd	14 bc	5.8 e	11 def	8.0 a	15 ab
13	Untreated Check				8.0 a	19 a	8.0 abc	18 a	8.0 a	16 a

<sup>1</sup> DAT1 = Days after first PGR treatment (April 20, 2022)

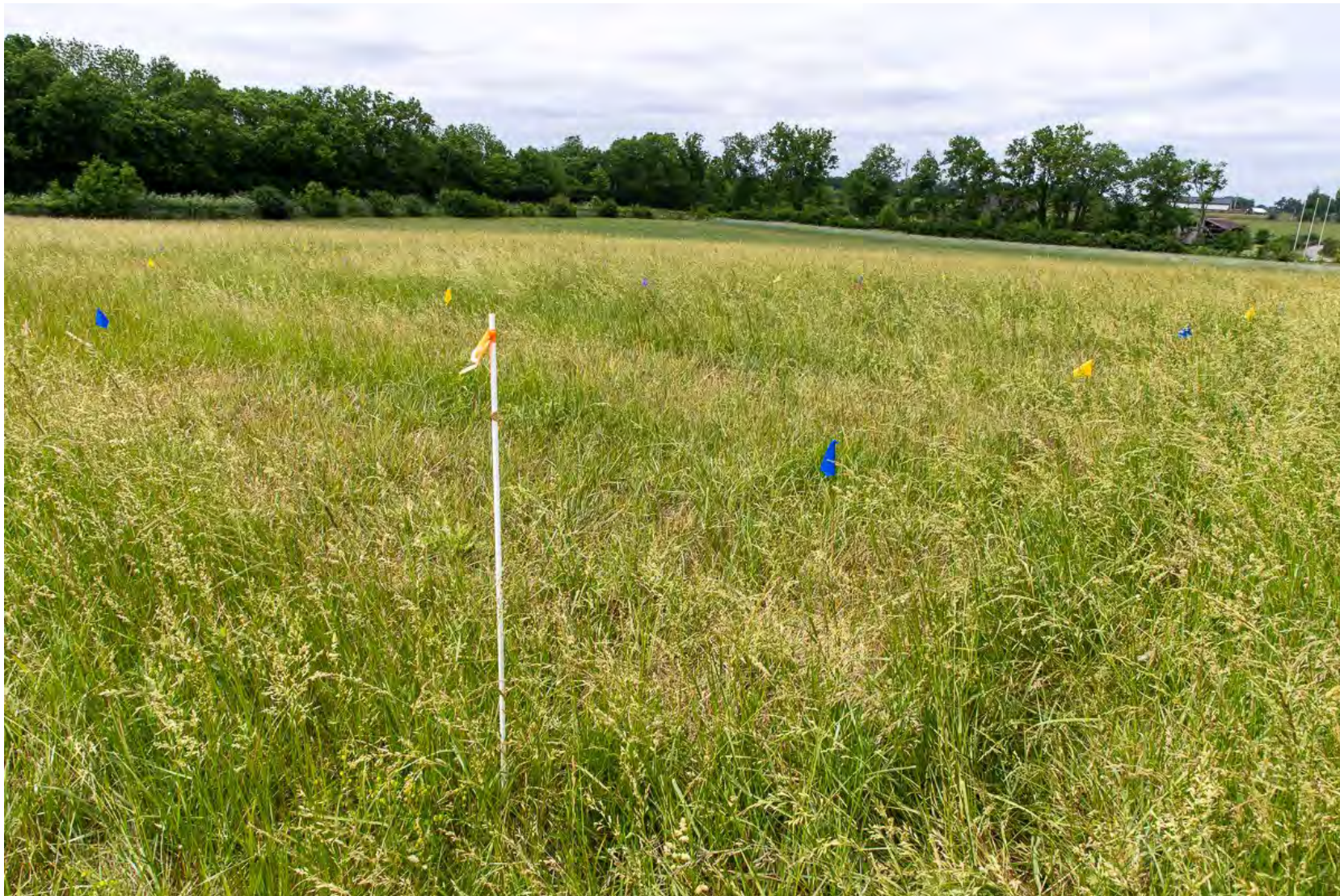
<sup>2</sup> DAT2 = Days after second PGR treatment (May 9, 2022)

<sup>3</sup> DAT3 = Days after third PGR treatment (May 24, 2022)

<sup>4</sup> Means within a column followed by the same letter are not different according to Fisher's LSD at  $P < 0.05$ .

***Figure 1: Overall View of Plots in the Fescue PGR Trial on May 24, 2022***

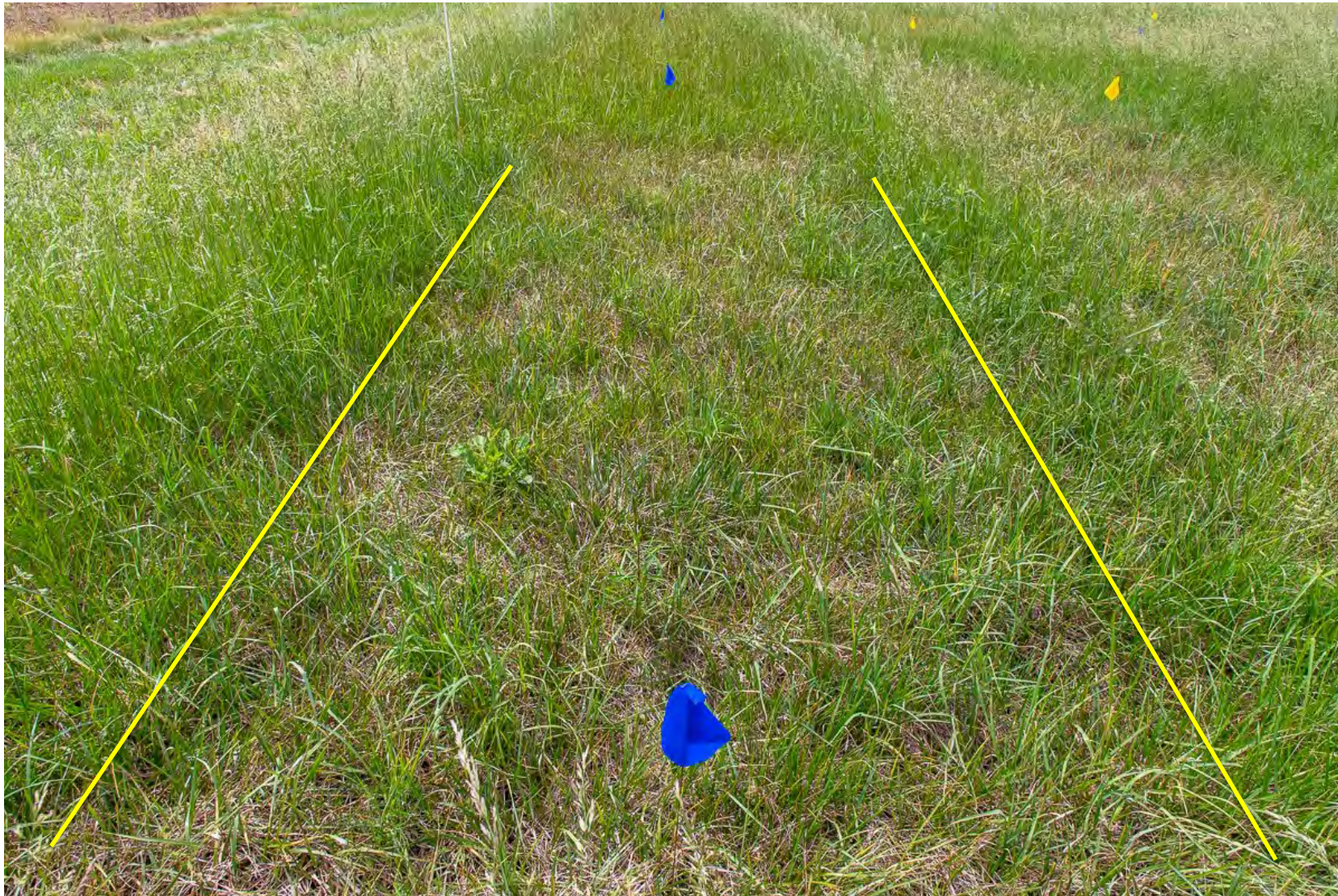
The blue and yellow flags mark the center of the plots. Different heights of the grass canopy were observed.





**Figure 2: View of Plateau Treatment (No. 1) in the Fescue PGR Trial on May 24, 2022 (34 Days After First Treatment)**

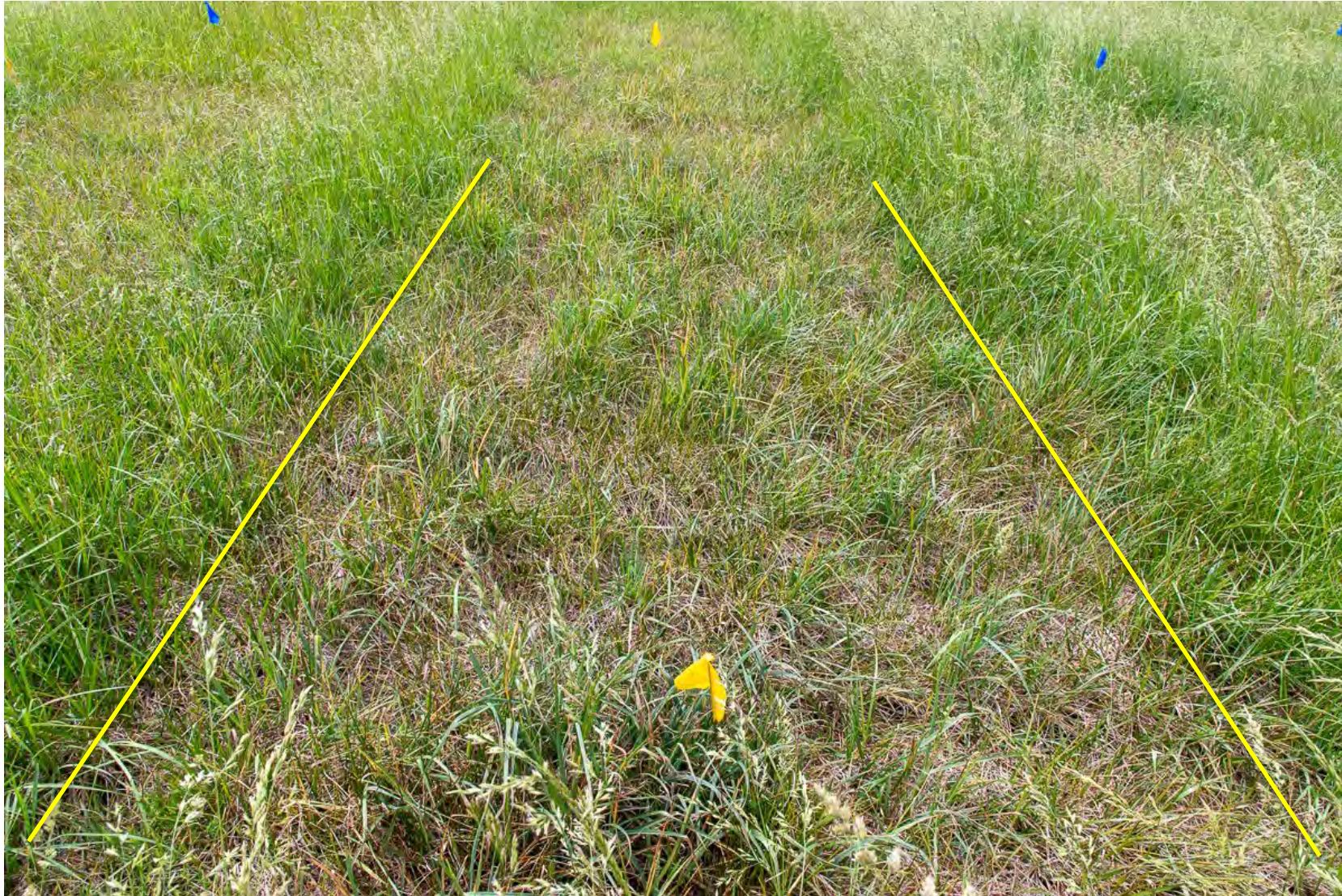
The yellow lines mark the edges of the spray pattern with the unsprayed check strips on either side. Note the suppressed growth and lack of seedheads within the plot. The recovering grasses are putting on new growth.





**Figure 3: View of Plateau + Escort Treatment (No. 2) in the Fescue PGR Trial on May 24, 2022 (34 Days After First Treatment)**

The yellow lines mark the edges of the spray pattern with the unsprayed check strips on either side. Note the suppressed growth and lack of seedheads along with damaged (yellow) foliage within the plot. The recovering grasses are putting on new growth.





**Figure 4: Control Plot in the Fescue PGR Trial on May 24, 2022**  
Mixture of tall fescue and orchard grass observed.





## 2022 Japanese Knotweed Control near Hall's Gap

### *Introduction*

Japanese knotweed (*Polygonum cuspidatum* Siebold & Zucc.) is a problem for land managers and along roadsides due to its aggressive nature and reproductive potential. It is a tall perennial canelike shrub 3 to 10 ft in height, freely branching and dense, with often clonal infestations. Hollow-jointed, reddish stems, similar to bamboos, survive only one season while roots can survive decades. Dead tops remain standing during winter. Japanese knotweed spreads along streams by stem and root fragments and is also spread along roadsides by mowing (Miller, et al. 2010).

### *Materials and Methods*

This trial was established beside a guardrail along US 27 near Halls Gap, KY. The trial had 11 treatments with 3 replications of each arranged in a randomized complete block design. On July 15, 2022 (Figure 1), three treatments (mid-season) (Timing A) were applied with a spray volume of 50 gallons per acre using a directed spray swath over the canopy beside the guardrail for a plot width of 7 ft and length of 12 ft (two areas between guardrail posts per plot). The plants were flowering, and the canopy height was 9 ft with the spray swath at 7.5 ft. All herbicide treatments included LI 700 (aquatic labelled non-ionic surfactant) at 0.25% v/v. The seven late-season treatments (Timing B) were applied August 18, 2022 (Figure 2) and the plants were still flowering.

The herbicide treatments, active ingredients and application rates are listed in Table 1. The mid-season applications of Rodeo (Treatment 1) and AC Polaris Complete (Treatment 2) may not have been optimum for control from a single application as applications later in the season generally result in greater translocation to the roots. Rodeo was applied at 4 qt per acre which is half of the yearly maximum allowed on the label which is higher than normally recommended, but good results have been observed in previous trials at this application rate. The AC Polaris Label recommends 1.5 to 2 pt per acre to control knotweed. The Capstone (Treatment 3) label recommends applying 8 to 9 pt per acre in early summer on knotweed plants that are 3 to 4 feet in height. The optimum timing and plant height was missed in this trial. The late season application was closer to optimum for Rodeo (Treatment 4) and AC Polaris Complete (Treatment 5). Milestone was applied at the maximum broadcast rate (7 fl oz per acre) (Treatment 6) and at the spot treatment rate (14 fl oz per acre) (Treatment 7). The two TerraVue treatments consisted of a broadcast rate (2.85 oz per acre) (Treatment 8) and the spot treatment rate (5.7 oz per acre) (Treatment 9). The combination of Vastlan + TerraVue (Treatment 10) was from a treatment tested in another trial.

Visual assessments of percent knotweed control were done 34 (8/18/2022) and 77 (9/30/2022) days after the mid-season treatment (DAT1) and 43 DAT2 for the late-season trial (Figures 3 to 5). Japanese knotweed plants were no longer flowering at the end of season rating and the foliage had not yet senesced. Data were analyzed using ARM software (Gyllings Data Management Solutions, Inc., Brookings, SD) and treatment means were compared using Fisher's LSD at  $p = 0.05$ .



### *Results and Discussion*

At 34 DAT1 the greatest control was with Capstone (Treatment 3) (58%) while Rodeo (Treatment 1) and AC Polaris (Treatment 3) had 2 to 10 % control, respectively (Table 2). At 77 DAT1 Capstone had similar control (57%) while Rodeo and AC Polaris provided only 12 to 15% control. Rodeo (Treatment 4) and AC Polaris (Treatment 5) at the late-season timing 43 DAT2 provided 33 to 60% control. The top group of treatments (67 to 90% control) included the spot treatment rate for Milestone (Treatment 7), both rates of TerraVue (Treatments 8 and 9), and Vastlan + TerraVue (Treatment 10).

Additional assessments will be done next spring and summer to evaluate how well the treatments controlled the overwintering roots.

### *Literature Cited*

*Miller, J.H., S.T. Manning, and S.F. Enloe. 2010. A management guide for invasive plants in southern forests. USDA Forest Service Southern Research Station. GTR SRS-131.*

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**Table 1. Herbicide treatments, active ingredients, and application rates.**

Trt. No.	Product Name	Rate per acre	Timing	Active Ingredient(s)	ai Rate (per acre)
1	Rodeo	4 qt	A	glyphosate	64 oz ae
2	AC Polaris Complete	2 pt	A	imazapyr	16 oz ae
3	Capstone	9 pt	A	aminopyralid + triclopyr	1.8 oz ae + 18 oz ae
4	Rodeo	4 qt	B	glyphosate	64 oz ae
5	AC Polaris Complete	2 pt	B	imazapyr	16 oz ae
6	Milestone	7 fl oz	B	aminopyralid	1.75 oz ae
7	Milestone	14 fl oz	B	aminopyralid	3.5 oz ae
8	TerraVue	2.85 oz	B	aminopyralid + florpyrauxifen-benzyl	1.71 oz ae + 0.17 oz
9	TerraVue	5.7 oz	B	aminopyralid + florpyrauxifen-benzyl	3.42 oz ae + 0.34 oz
10	Vastlan TerraVue	1.5 qt 2.85 oz	B	triclopyr aminopyralid + florpyrauxifen-benzyl	24 oz ae 1.71 oz ae + 0.17 oz
11	Untreated Control				

All herbicide treatments contained the adjuvant, LI 700 at 0.25% v/v.

**Table 2. Herbicide treatments and data**

Trt. No.	Product Name	Rate per acre	% Control	
			(Aug 18) 34 DAT1	(Sept 30) 77 DAT1, 43 DAT2
1	Rodeo	4 qt	10 b <sup>1</sup>	12 fg
2	AC Polaris Complete	2 pt	2 b	15 fg
3	Capstone	9 pt	58 a	57 cde
4	Rodeo	4 qt		60 bcde
5	AC Polaris Complete	2 pt		33 ef
6	Milestone	7 fl oz		53 de
7	Milestone	14 ft oz		90 a
8	TerraVue	2.85 oz		67 abcd
9	TerraVue	5.7 oz		87 ab
10	Vastlan TerraVue	1.5 qt 2.85 oz		83 abc
11	Untreated Control		0 b	0 g

All herbicide treatments contained the adjuvant, LI 700 at 0.25% v/v.

<sup>1</sup> Means within a column followed by the same letter are not different according to Fisher's LSD at  $P < 0.05$ .

*Figure 1: Overall view of plots at time of first application (July 15, 2022)*





*Figure 2: Overall view of plots at time of second application (August 18, 2022)*





*Figure 3: Overall view of plots at end of season rating (September 30, 2022)*





*Figure 4: Control plot (Treatment 11) (Sept 30, 2022)*





***Figure 5: Vastlan + TerraVue (Treatment 10) (September 30, 2022)***  
Note the dead leaves still attached to stems.







Joe Omielan  
University of Kentucky



## INTRODUCTION

For highway safety guardrails need to be kept clear of visual obstructions. Usually that means maintaining a vegetation free zone underneath them. Applications of broad spectrum residual herbicides in the spring have become the mainstay for bareground maintenance operations in combination with a broad spectrum post-emergent herbicide like glyphosate. Fall applications using newer less soil mobile chemistries may have some advantages.

## OBJECTIVE

Compare the efficacy and timing of some herbicide combinations for total vegetation control.

## MATERIALS & METHODS

The trial was established beside cable barrier near Morehead, KY in 2021. In the spring 24 treatments with 3 replications were arranged in a randomized complete block design and in the fall 8 treatments in common were established as well. Treatments were applied at 233 L/ha onto 1.2 m by 3.2 m plots on May 27 (Figure 1) and Sept 14, 2021 (Figure 2).

All common treatments included Roundup ProMax or Rodeo (glyphosate) for post-emergence control. Our long-term standard treatment has been the older, high use rate herbicide Sahara (diuron + imazapyr). Newer low use rate products and combinations tested included Escort (metsulfuron), Milestone (aminopyralid), Method (aminocyclopyrachlor), Perspective (aminocyclopyrachlor + chlorsulfuron), Viewpoint (aminocyclopyrachlor + metsulfuron + imazapyr), and Esplanade (indaziflam) (Table 1). Visual % bareground ratings were taken 63 (7/29), 110 (9/14), and 158 (11/1) days after treatment (DAT) for the spring application and 48 (11/1) DAT for the fall application. Data were analyzed using ARM software and treatment means were compared using Fisher's LSD at  $p = 0.05$ .

All common treatments with residual herbicides had more bareground than the control at the first assessment date at both times of application (Table 2). Further assessments in 2022 will be done to evaluate these management options.



Figure 1: Overall view of cable barrier plots and surrounding area at time of Spring Application (May 27, 2021).



Figure 2: Overall view of cable barrier plots and surrounding area at time of Fall Application (September 14, 2021).

## RESULTS & DISCUSSION

Table 1. Herbicide treatments, active ingredients and application rates.

Trt. No.	Product(s)	Rate per ac	Active Ingredient(s)	ai Application Rate (per ha)	MOA Groups
1	Roundup ProMax	1.3 qt	glyphosate	1.68 kg ae	9
2	Roundup ProMax	1.3 qt	glyphosate	1.68 kg ae	9
	Sahara	10 lb	diuron + imazapyr	6.95 kg + 869 g	7 + 2
3	Rodeo	32 fl oz	glyphosate	1.12 kg ae	9
	Perspective	8 oz	aminocyclopyrachlor + chlorsulfuron	224 g + 91 g	4 + 2
	Esplanade	5 fl oz	indaziflam	70 g	29
4	Rodeo	32 fl oz	glyphosate	1.68 kg ae	9
	Method	9 fl oz	aminocyclopyrachlor	158 g ae	4
	Esplanade	7 fl oz	indaziflam	105 g	29
5	Rodeo	32 fl oz	glyphosate	1.68 kg ae	9
	Esplanade	6 fl oz	indaziflam	84 g	29
	Milestone VM	7 fl oz	aminopyralid	126 g ae	4
6	Rodeo	32 fl oz	glyphosate	1.68 kg ae	9
	Viewpoint	14 oz	aminocyclopyrachlor + imazapyr + metsulfuron	224 g ae + 308 g + 70 g	4 + 2 + 2
	Esplanade	7 fl oz	indaziflam	105 g	29
7	Rodeo	32 fl oz	glyphosate	1.68 kg ae	9
	Escort	0.5 oz	metsulfuron	21 g	2
	Esplanade	5 fl oz	indaziflam	70 g	29
	Method	9 fl oz	aminocyclopyrachlor	158 g ae	4
8	Nontreated Check				

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

Table 2 Data from First Assessments of Spring and Fall Applications.

Trt. No.	Product Name	63 DAT <sup>1</sup> Spring Application (July 29, 2021)				48 DAT Fall Application (November 1, 2021)			
		% Bare	% Perennial Grass	% Annual Grass	% Broadleaves	% Bare	% Perennial Grass	% Annual Grass	% Broadleaves
1	Roundup ProMax	30 d <sup>2</sup>	28 ab	17 a	25 b	77 b	0 b	0 b	23 a
2	Roundup ProMax Sahara	85 ab	4 d	2 b	9 cd	92 a	0 b	0 b	8 b
3	Rodeo Perspective Esplanade	87 a	6 cd	3 b	3 d	95 a	3 b	0 b	0 c
4	Rodeo Method Esplanade	62 c	9 cd	0 b	29 b	95 a	5 ab	0 b	0 c
5	Rodeo Esplanade Milestone VM	73 bc	7 cd	4 b	15 c	96 a	3 b	0 b	1 c
6	Rodeo Viewpoint Esplanade	97 a	2 d	1 b	1 d	98 a	1 b	0 b	0 c
7	Rodeo Escort Esplanade Method	73 bc	18 bc	6 b	2 d	94 a	4 b	2 b	0 c
8	Nontreated Check	13 e	33 a	7 ab	47 a	43 c	10 a	17 a	27 a

<sup>1</sup> DAT = Days after treatment <sup>2</sup> Means within a column followed by the same letter are not different according to Fisher's LSD at  $P < 0.05$

## INTRODUCTION

Japanese knotweed (*Polygonum cuspidatum* Siebold & Zucc.) is a problem for land managers and along roadsides due to its aggressive nature and reproductive potential. It is a tall perennial canelike shrub 1 to 3.5 m in height, freely branching and dense, with often clonal infestations. Hollow-jointed, reddish stems, similar to bamboos, survive only one season while rhizomes survive decades. Dead tops remain standing during winter. Japanese knotweed spreads along streams by stem and rhizome fragments and is also spread along roadsides by mowing (Miller, et al. 2010).

## OBJECTIVE

Compare the efficacy of some herbicide combinations for controlling Japanese Knotweed.

## MATERIALS & METHODS

This trial was established beside guardrail along US 27 near Halls Gap, KY. The trial had 11 treatments with 3 replications of each arranged in a randomized complete block design. On July 15, 2022 (Figure 1), three treatments (mid-season) were applied with a spray volume of 486 L ha<sup>-1</sup> using a directed spray swath over the canopy beside the guardrail for a plot width of 2.1 m and length of 3.7 m (two areas between guardrail posts per plot). Canopy height was 3 m with the spray swath at 2.5 m. All herbicide treatments included LI 700 at 0.25% v/v. The seven late-season treatments were applied August 18, 2022 (Figure 2).

Rodeo @ 9.5 L ha<sup>-1</sup> (glyphosate) and AC Polaris Complete @ 2.3 L ha<sup>-1</sup> (imazapyr) were applied at both spray timings while Capstone @ 10.5 L ha<sup>-1</sup> (aminopyralid + triclopyr) was only applied at mid-season. The remaining late-season treatments included Milestone (aminopyralid) at both the broadcast (0.5 L ha<sup>-1</sup>) and spot treatment (1 L ha<sup>-1</sup>) rates; TerraVue (aminopyralid + floryprauxifen-benzyl) also at both the broadcast (200 g ha<sup>-1</sup>) and spot treatment (400 g ha<sup>-1</sup>) rates and Vastlan @ 3.5 L ha<sup>-1</sup> (triclopyr) + TerraVue @ 200 g ha<sup>-1</sup>.

Visual assessments of percent knotweed control were done 34 (8/18/2022) and 77 (9/30/2022) days after the mid-season treatment (DAT1) and 43 DAT2 the late-season for the trial (Figures 3 and 4). Data were analyzed using ANOVA software and treatment means were separated using Fisher's LSD at  $p < 0.05$ .



Figure 1: Plots at time of first application (July 15, 2022)



Figure 2: Plots at time of second application (August 18, 2022)

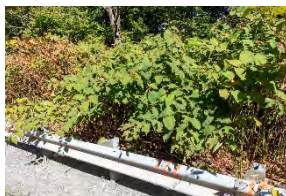


Figure 3: Control plot (Sept. 30, 2022)



Figure 4: Trt. 10 plot with many leaves still attached (Sept. 30, 2022)

## RESULTS & DISCUSSION

Table 1. Herbicide treatments, active ingredients and application rates.

Trt. No.	Product Name	Rate per acre	Active Ingredient(s)	ai Rate (per ha)
1	Rodeo	4 qt	glyphosate	4.48 kg ae
2	AC Polaris Complete	2 pt	imazapyr	1.12 kg ae
3	Capstone	9 pt	aminopyralid + triclopyr	126 g ae + 1.26 kg ae
4	Rodeo	4 qt	glyphosate	4.48 kg ae
5	AC Polaris Complete	2 pt	imazapyr	1.12 kg ae
6	Milestone	7 fl oz	aminopyralid	123 g ae
7	Milestone	14 fl oz	aminopyralid	246 g ae
8	TerraVue	2.85 oz	aminopyralid + floryprauxifen-benzyl	120 g ae + 12 g
9	TerraVue	5.7 oz	aminopyralid + floryprauxifen-benzyl	250 g ae + 24 g
10	Vastlan	1.5 qt	triclopyr	1.68 kg ae
	TerraVue	2.85 oz	aminopyralid + floryprauxifen-benzyl	120 g ae + 12 g
11	Untreated Control			

Table 2. Initial results in 2022.

Trt. No.	Product Name	Rate per acre	% Control	
			(Aug 18) 34 DAT1 <sup>1</sup>	(Sept 30) 77 DAT1, 43 DAT2
1	Rodeo	4 qt	10 b <sup>2</sup>	12 fg
2	AC Polaris Complete	2 pt	2 b	15 fg
3	Capstone	9 pt	58 a	57 cde
4	Rodeo	4 qt		60 bcde
5	AC Polaris Complete	2 pt		33 ef
6	Milestone	7 fl oz		53 de
7	Milestone	14 fl oz		90 a
8	TerraVue	2.85 oz		67 abcd
9	TerraVue	5.7 oz		87 ab
10	Vastlan	1.5 qt		83 abc
	TerraVue	2.85 oz		
11	Untreated Control		0 b	0 g

<sup>1</sup> DAT1 = Days after first treatment timing and DAT2 = Days after second treatment timing

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

At 34 DAT1 the greatest control was with Capstone (58%) while Rodeo and AC Polaris had 2 to 10% control. At 77 DAT1 Capstone had similar control (57%) while Rodeo and AC Polaris had 12 to 15% control. Rodeo and AC Polaris at the late-season timing 43 DAT2 had 33 to 60% control ratings. The top group of treatments (67 to 90% control) included the spot treatment rate for Milestone, both rates of TerraVue, and Vastlan + TerraVue.

Assessments will be done next spring and summer to see how well the treatments controlled the rhizomes.

### Literature Cited

Miller, J.H., S.T. Manning, and S.F. Enloe. 2010. A management guide for invasive plants in southern forests. USDA Forest Service Southern Research Station. GTR SRS-131.



**Vegetation Management for Highway Rights of Way Workshop  
Tuesday July 26, 2022 at Spindletop Research Farm, Lexington KY  
3250 Iron Works Pike, Lexington, KY 40511**

**Agenda**

- 8:30 – 9:00 a.m. Registration (coffee and donuts)
- 9:00 – 10:00 a.m. Weed ID (Dr. JD Green) plus Pollinator Planting management discussion (Mike Smith & Robert Hoffman) (Group A) & Herbicide Injury and Technology Demo plus PGR trial (Dr. Joe Omielan) (Group B) (Cat. 3, 6, 10)
- 10:00 – 11:00 a.m. Weed ID (Dr. JD Green) plus Pollinator Planting management discussion (Mike Smith & Robert Hoffman) (Group B) & Herbicide Injury and Technology Demo plus PGR trial (Dr. Joe Omielan) (Group A) (Cat. 3, 6, 10)
- 11:00 – 12:00 p.m. Updates on Pollinator Stakeholder Initiatives, Activities, Meetings, and Plots (Tammy Potter) (General)
- 12:00 – 12:45 p.m. Lunch (Red State BBQ)
- 12:45 – 1:00 p.m. Closed Loop Systems – containers and pumps (Brock Shockley, Steve Gray) (General)
- 1:00 – 1:45 p.m. Roadside Sprayer Demo – Calibration, Loading, Cleaning a spill at the Barn (sprayer from D7) (Paul Hayse) (General)
- 1:45 – 2:15 p.m. Truax Drill Demo (drill from D7) (Sid Brantly) (General)
- 2:15 – 3:00 p.m. Pollinator Garden (Drew Epperson) and Turf Plots (Joe Omielan) (General)

*CEU's in this workshop: 3 General and 2 Specific (Categories 3, 6, 10) (approved)*

*For more information contact Joe Omielan at 859-967-6205, e-mail [joe.omielan@uky.edu](mailto:joe.omielan@uky.edu)*

Dr. JD Green will provide information and practice in identifying crops and weeds and Mike Smith will discuss the latest recommendations on Pollinator Plot maintenance (Cat. 3, 6, 10)

Dr. Joe Omielan will lead the group in an exercise examining herbicide injury symptoms on different crop species as well as talk about new soybean herbicide technologies. We will also discuss a seedhead suppression PGR trial (Cat. 3, 6, 10)

Tammy Potter will update the group on Pollinator Stakeholder Initiatives, activities, meetings, and plots. (General)

Brock Shockley and Steve Gray will show and discuss components of closed loop systems and Paul Hayse, with the assistance of the D7 spray truck crew, will demonstrate sprayer calibration, loading the sprayer, and cleaning a spill at the Barn. (General)

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Sid Brantly will use D7's Truax drill to demonstrate its features and operation. (General)

Drew Epperson will discuss features of and management options for a Pollinator Garden while Dr. Joe Omielan will discuss some of the turf trials at the Turf Research Center. (General)

**Attendance: 55 KYTC, 1 KDFWR, 6 UK, 2 Industry**

**Breakdown of KYTC attendance: Central Office (3), D2 (5), D3 (4), D4 (4), D5 (4), D6 (7), D7 (9), D8 (5), D9 (11), D10 (2), D11 (1)**

**2022 KYTC Tree Management Workshop**

**Tuesday September 13, 2022 at Harold R Benson Research & Demonstration Farm  
(1525 Mills Ln, Frankfort KY 40601)**

**Agenda**

- 8:30 – 9:00 a.m. Registration along with coffee and donuts
- 9:00 – 9:15 a.m. Introduction and Virtual Tour of Programs at KSU Farm (Megan Goins, KSU)
- 9:15 – 10:15 a.m. Forest Health Issues – Emerging Insect Pests & invasive Plants (Alexandra Blevins, KY Division of Forestry)
- 10:15 – 11:15 a.m. An Overview of the International Society of Arboriculture Tree Risk Assessment Qualification. (Dr. Bill Fountain, UK (retired))
- 11:15 – 12:00 p.m. Chainsaw Maintenance, Safety & Ergonomics (Dan Loch from Bryan Equipment)
- 12:00 – 12:45 p.m. Lunch
- 1:00 – 4:00 p.m. Tour and Outdoor Demonstrations (*please bring your hard hats and other safety gear*)
- 1:00 – 1:45 p.m. Continuation of Dan’s Chainsaw Presentation/Demonstration (including battery operated equipment)
  - 1:45 – 4:00 p.m. Discussion of Risk of Tree Failure, Landscape Trees (alternatives to Ash and what to plant under utilities) (Dr. Bill Fountain)
    - Discussion / Demonstration of Skytrim Mini (Hal Acree, Progress Rail)
    - Discussion / Demonstration of Green Climber with forestry type attachment (Marty Halm, Green Climber)
    - Proper tree planting (Cindy Marquel and Cindi Sullivan).

*Pesticide CEU’s for this workshop: 2 general and 1 specific (Categories 2, 6, 10) (approved)*

*Arborist CEU’s: 5.5 CEU’s approved*

*Engineering PDH’s: 5 hours approved*

*For more information contact Joe Omielan at 859-967-6205, e-mail [joe.omielan@uky.edu](mailto:joe.omielan@uky.edu)*

**Attendance: 30 KYTC, 3 KDF, 10 KYSU, 1 UK, 2 Industry**

**Breakdown of KYTC attendance: Central Office (5), D3 (3), D4 (2), D5 (4), D6 (1), D7 (2), D8 (5), D9 (8)**



**Topics to be covered in the Workshop**

Forest Health Issues – Emerging Insect Pests & invasive Plants (Alexandra Blevins, KY Division of Forestry)

- An update on the current status of major forest pests and health threats including Emerald Ash Borer, Asian Longhorned Beetle, Hemlock Woolly Adelgid, Thousand Cankers Disease, and Laurel Wilt. Alexandra will also provide information on common invasive plant species in our forests.

An Overview of the International Society of Arboriculture Tree Risk Assessment Qualification. (Dr. Bill Fountain, UK)

- TRAQ is an ISA qualification program that trains arborists how to use the methodologies outlined in the ISA Best Management Practices for Tree Risk Assessment. This qualification promotes the safety of people and property by providing a standardized and systematic process for assessing tree risk. The results of a tree risk assessment can provide tree owners and risk managers with the information to make informed decisions to enhance tree benefits, health, and longevity. Bill will also present information about tree failure profiles and appraisal values of landscape trees.

Chainsaw Maintenance, Safety & Ergonomics (Dan Loch from Bryan Equipment)

- Dan will discuss the safety features of a saw and proper PPE as well as proper starting and handling and continue this outdoors after lunch. He will also bring examples of internal combustion and battery-operated tools from Stihl.

**Outdoor Demonstrations and Hands-On Opportunities** (*please bring your hard hats and other safety gear*):

Chainsaw Maintenance, Safety & Ergonomics (Dan Loch from Bryan Equipment)

- Dan will continue this outdoors.

Tour nearby trees and discuss Risk of Tree Failure along with demonstration of Tree Assessment, Landscape Trees (alternatives to Ash and what to plant under utilities) (Dr. Bill Fountain)

Demonstration of Skytrim Mini telescoping boom and saw-type cutter head (Hal Acree, Progress Rail)

- See the saw cut and trim trees. Discuss its operation and maintenance.

Demonstration of Green Climber with forestry type attachment (Marty Halm, Green Climber)

- See the remote mower in action. Discuss its operation and maintenance.

Proper tree planting (Cindy Marquel and Cindi Sullivan)

- We're planning to demonstrate how to properly plant a container tree and a B&B (balled & burlapped) tree and Cindi will discuss the importance of trees to infrastructure!