Renz Weed Science
COLLEGE OF AGRICULTURAL & LIFE SCIENCES
UNIVERSITY OF WISCONSIN–MADISON

Extension
UNIVERSITY OF WISCONSIN–MADISON

UW – Madison Weed Science Renz Lab

Efficacy of Alligare Products on Wild Parsnip

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Objective:

Compare selective post emergent herbicides for control of wild parsnip.

Summary:

Applications were broadcasted on April 30th to areas infested with wild parsnip rosettes and seedling that had recently emerged. By June (55 DAT) Everett (2,4-D + triclopyr) and treatments that contained Panoramic (imazapic) at 4 fl oz/A reduced parsnip cover to < 5% and had the lowest density of parsnip plants that were going to flower. This trend continued in July (80 DAT) with the addition of Boulder (triclopyr) providing > 90% control however only Everett had high plant mortality of plants that were to flower (>90%). By fall (September) flowering plants had all senesced therefore ratings only assessed seedlings that emerged in spring and had formed rosettes. Only Everett provided > 90% suppression of seedlings, with other treatments not effectively controlling these cohorts (< 50%).

One year after treatment (376 DAT) wild parsnip rosettes were similar across treatments. While areas treated with Everett were reduced >75% counts did not differ from non-treated control. Seedlings were abundant in each plot (1-3 seedlings/250 ft^2) highlighting that no treatment provided long-term reductions that influenced the seedbank.

Results highlight that while several products can suppress flowering wild parsnip plants, few provide effective control. In this study only Everett (2,4-D + triclopyr) applied in the spring eliminated flowering wild parsnip plants. Rosettes were present in this treatment the following year however that would require follow-up treatment. This study emphasizes the importance of monitoring areas for new plants, as initial results suggested 2 years of control from treatments of Everett, but revisiting the site one year after treatment found surviving plants that require treatment to prevent seed production.

Herbicide Treatments		
Treatment Number	**Treatment**	**Rate**
1	Nontreated Control (NTC)	-
2	Boulder	8 fluid ounces per acre (fl oz/A)
3	Boulder	16 fl oz/A
4	Cleargraze	8 fl oz/A
5	Everett	32 fl oz/A
6	Prescott	8 fl oz/A
7	Triclopyr 3	3 fl oz/A
8	Panoramic	4 fl oz/A
9	Panoramic Whetstone	4 fl oz/A 5 fl oz/A
10	Panoramic	2 fl oz/A
11	Panoramic	1 fl oz/A

***All treatments included non-ionic surfactant at a rate of 0.25% v/v**

Herbicide Application	
Date	April 30th, 2021, 11:30am – 1:00pm
Equipment	CO_2 pressurized 10-foot boom sprayer (20 GPA)
Nozzles & spacing	8 TeeJet 11002 VS nozzles with 15-inch spacing
Regulator PSI	38

Weather Data	
Weather Station	
Temperature	55.1°F – 59.6°F
Wind Speed and Direction	2.2 mph NNW – 2 mph ENE
Relative Humidity	57% - 46%
Cloud Cover	0%
Previous Rain Event Within 48 Hours	None
When ≥ 0.25 inches of precipitation occurred after treatment	May 2nd, 2021, 11:59pm – 0.3 inches

Research Plot Information	
Plot Dimensions	10 feet by 25 feet
Design	Randomized Complete Block, 4 blocks
Soil Type	Richwood Silt Loam
Soil Characteristics	20.8% clay, 1% organic matter, 6.4 pH, 3.5% slope

Plants Present at Application – Developmental Stage		
Species	**Average Height (in)**	**Phenological Stage**
Wild parsnip (*Pastinaca sativa*) seedling	1.6	Vegetative
Wild parsnip rosette	8	Vegetative

Index of Ratings and Results

Wild parsnip control 80 DAT: nontreated control (*above*), and Everett @ 32 fl oz/A (*below*).

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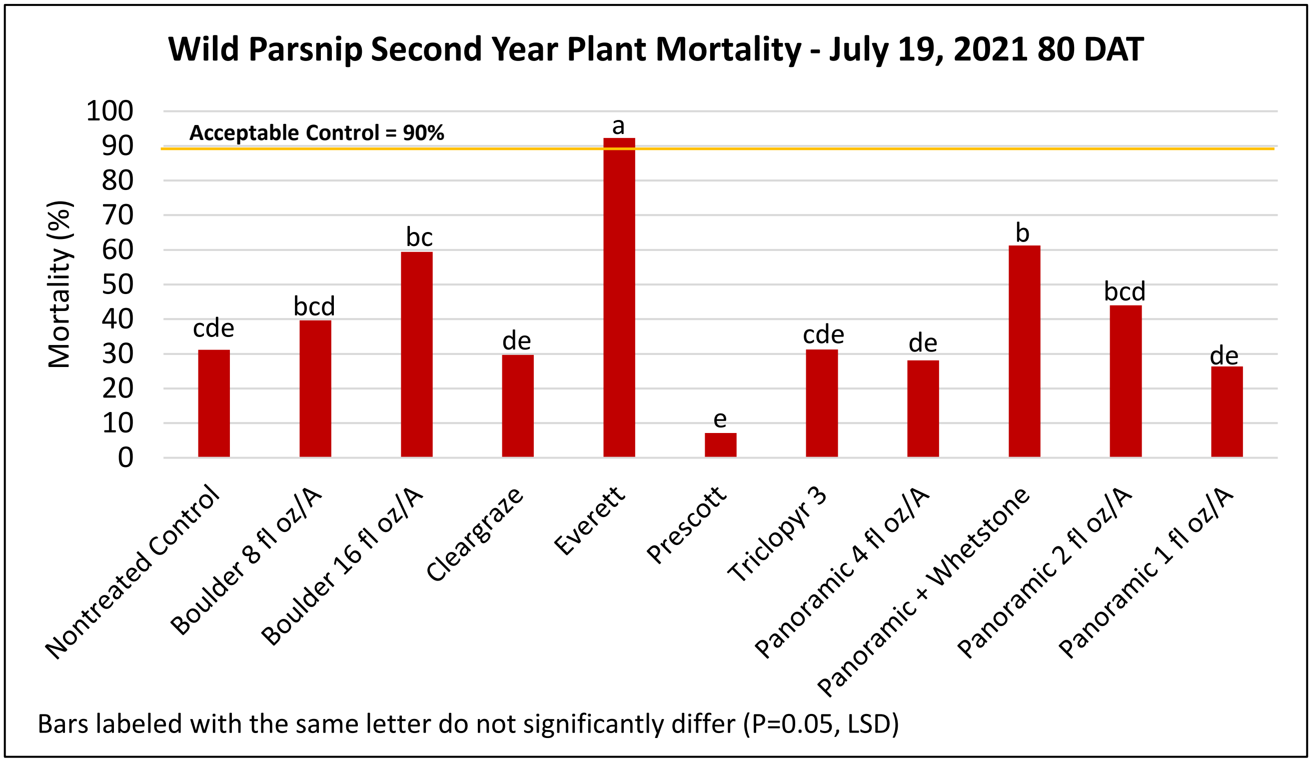
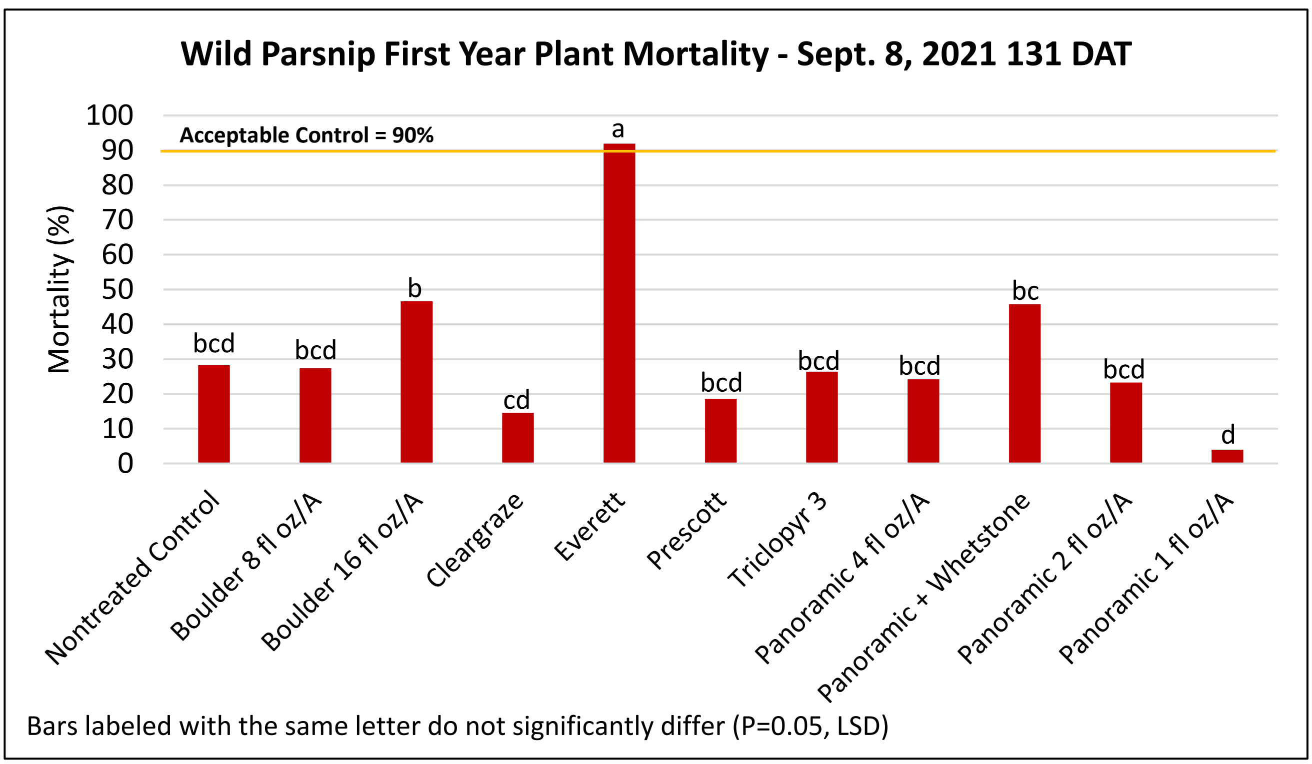
Wild Parsnip Mortality





Results:

Pre-Application Rating – April 30th, 2021

Trt. No.	Treatment	Rate	Wild Parsnip Cover (%)	Other Broadleaf Weed Cover (%)	Grass Cover (%)	Bareground/ Litter Cover (%)	Wild Parsnip (Second Year Plants) Density (#/m^2)
1	NTC	-	13 -	2 -	63 -	23 -	3 -
2	Boulder	8 fl oz/A	13 -	3 -	69 -	16 -	3 -
3	Boulder	16 fl oz/A	16 -	2 -	61 -	21 -	3 -
4	Cleargraze	8 fl oz/A	20 -	1 -	54 -	25 -	3 -
5	Everett	32 fl oz/A	13 -	1 -	63 -	24 -	2 -
6	Prescott	8 fl oz/A	16 -	2 -	59 -	23 -	3 -
7	Triclopyr 3	3 fl oz/A	15 -	2 -	59 -	25 -	3 -
8	Panoramic	4 fl oz/A	10 -	2 -	62 -	26 -	3 -
9	Panoramic Whetstone	4 fl oz/A 5 fl oz/A	16 -	1 -	58 -	25 -	3 -
10	Panoramic	2 fl oz/A	13 -	2 -	67 -	19 -	2 -
11	Panoramic	1 fl oz/A	15 -	2 -	51 -	33 -	3 -
Statistics[1]							
Least Significant Difference (LSD) P=.05			10.02	1.36	12.23	11.49	1.01
Standard Deviation			6.94	0.94	8.47	7.96	0.7
Coefficient of Variation (CV)			47.91	54.37	14.05	33.82	24.82
Treatment Prob(F)			0.7857	0.5646	0.1597	0.3788	0.6412

Note: Means followed by same letter or symbol do not significantly differ (P=.05, LSD).

[1] All statistical analyses were conducted in ARM software and assumptions of ANOVA were not evaluated.

24 Days After Treatment (DAT) – May 24th, 2021				
Trt. No.	**Treatment**	**Rate**	**Wild Parsnip Injury (%)**	**Smooth Brome Injury (%)**
1	NTC	-	6 g	1 c
2	Boulder	8 fl oz/A	23 de	1 c
3	Boulder	16 fl oz/A	38 b	20 abc
4	Cleargraze	8 fl oz/A	18 ef	5 c
5	Everett	32 fl oz/A	65 a	19 abc
6	Prescott	8 fl oz/A	15 ef	14 bc
7	Triclopyr 3	3 fl oz/A	11 fg	4 c
8	Panoramic	4 fl oz/A	35 bc	28 ab
9	Panoramic Whetstone	4 fl oz/A 5 fl oz/A	65 a	38 a
10	Panoramic	2 fl oz/A	33 bc	35 a
11	Panoramic	1 fl oz/A	28 cd	6 c
Statistics				
LSD P=.05			8.37	20.65
Standard Deviation			5.8	14.3
CV			19.03	92.53
Treatment Prob(F)			0.0001	0.0038

Note: Means followed by same letter or symbol do not significantly differ (P=.05, LSD).

33 DAT – June 2nd, 2021			
Trt. No.	**Treatment**	**Rate**	**Smooth Brome Height (cm)**
1	NTC	-	69 a
2	Boulder	8 fl oz/A	.
3	Boulder	16 fl oz/A	.
4	Cleargraze	8 fl oz/A	.
5	Everett	32 fl oz/A	.
6	Prescott	8 fl oz/A	.
7	Triclopyr 3	3 fl oz/A	.
8	Panoramic	4 fl oz/A	48 abc
9	Panoramic Whetstone	4 fl oz/A 5 fl oz/A	30 c
10	Panoramic	2 fl oz/A	45 bc
11	Panoramic	1 fl oz/A	53 ab
Statistics			
LSD P=.05			12.4
Standard Deviation			7.6
CV			14.41
Treatment Prob(F)			0.0063

Note: Means followed by same letter or symbol do not significantly differ (P=.05, LSD).

46 DAT – June 15th, 2021			
Trt. No.	**Treatment**	**Rate**	**Smooth Brome Height (cm)**
1	NTC	-	104 a
2	Boulder	8 fl oz/A	.
3	Boulder	16 fl oz/A	.
4	Cleargraze	8 fl oz/A	.
5	Everett	32 fl oz/A	.
6	Prescott	8 fl oz/A	.
7	Triclopyr 3	3 fl oz/A	.
8	Panoramic	4 fl oz/A	38 c
9	Panoramic Whetstone	4 fl oz/A 5 fl oz/A	44 c
10	Panoramic	2 fl oz/A	41 c
11	Panoramic	1 fl oz/A	63 b
Statistics			
LSD P=.05			12.55
Standard Deviation			7.7
CV			12.45
Treatment Prob(F)			0.0001

Note: Means followed by same letter or symbol do not significantly differ (P=.05, LSD).

55 DAT – June 24th, 2021							
Trt. No.	**Treatment**	**Rate**	**Wild Parsnip Cover (%)**	**Other Broadleaf Weeds Cover (%)**	**Grass Cover (%)**	**Bareground/ Litter Cover (%)**	**Wild Parsnip (Second year plants) Density (#/m2)**
1	NTC	-	26 ab	9 -	61 bc	4 -	2.9 a
2	Boulder	8 fl oz/A	15 bc	5 -	77 ab	3 -	2.6 ab
3	Boulder	16 fl oz/A	8 c	7 -	80 ab	5 -	1.7 abc
4	Cleargraze	8 fl oz/A	34 a	13 -	50 c	3 -	2.95 a
5	Everett	32 fl oz/A	2 c	9 -	85 a	5 -	0.25 d
6	Prescott	8 fl oz/A	35 a	9 -	54 c	3 -	2.85 a
7	Triclopyr 3	3 fl oz/A	34 a	11 -	51 c	5 -	2.88 a
8	Panoramic	4 fl oz/A	4 c	13 -	80 ab	3 -	1.33 bcd
9	Panoramic Whetstone	4 fl oz/A 5 fl oz/A	4 c	10 -	79 ab	7 -	0.85 cd
10	Panoramic	2 fl oz/A	5 c	6 -	86 a	3 -	1.83 abc
11	Panoramic	1 fl oz/A	14 bc	19 -	63 bc	4 -	2.03 abc
Statistics							
LSD P=.05			13.94	12.42	19.93	4	1.303
Standard Deviation			9.65	8.6	13.8	2.77	0.902
CV			58.66	86.82	19.85	67.28	44.81
Treatment Prob(F)			0.0001	0.5839	0.0012	0.4898	0.0011

Note: Means followed by same letter or symbol do not significantly differ (P=.05, LSD).

61 DAT – June 30th, 2021			
Trt. No.	**Treatment**	**Rate**	**Smooth Brome Height (cm)**
1	NTC	-	99 a
2	Boulder	8 fl oz/A	.
3	Boulder	16 fl oz/A	.
4	Cleargraze	8 fl oz/A	.
5	Everett	32 fl oz/A	.
6	Prescott	8 fl oz/A	.
7	Triclopyr 3	3 fl oz/A	.
8	Panoramic	4 fl oz/A	69 ab
9	Panoramic Whetstone	4 fl oz/A 5 fl oz/A	49 b
10	Panoramic	2 fl oz/A	73 a
11	Panoramic	1 fl oz/A	72 a
Statistics			
LSD P=.05			22.59
Standard Deviation			13.85
CV			17.93
Treatment Prob(F)			0.0439

Note: Means followed by same letter or symbol do not significantly differ (P=.05, LSD).

80 DAT – July 19th, 2021 (1/2)					
Trt. No.	**Treatment**	**Rate**	**Smooth Brome Height (cm)**	**Density of Wild Parsnip First Year Plants (#/m^2)**	**Density of Wild Parsnip Second Year Plants (#/m^2)**
1	NTC	-	98 -	2 -	1.8 abc
2	Boulder	8 fl oz/A	.	2 -	1.6 bcd
3	Boulder	16 fl oz/A	.	0.85 -	0.95 de
4	Cleargraze	8 fl oz/A	.	2 -	2 ab
5	Everett	32 fl oz/A	.	0.18 -	0.18 e
6	Prescott	8 fl oz/A	.	1 -	2.5 a
7	Triclopyr 3	3 fl oz/A	.	2 -	1.8 abc
8	Panoramic	4 fl oz/A	62 -	1 -	1.6 bcd
9	Panoramic Whetstone	4 fl oz/A 5 fl oz/A	45 -	1 -	0.88 de
10	Panoramic	2 fl oz/A	73 -	0.9 -	1.2 cd
11	Panoramic	1 fl oz/A	76 -	3 -	1.7 bcd
Statistics					
LSD P=.05			26.11	1.419	0.786
Standard Deviation			16.01	0.983	0.545
CV			21.03	67.36	37.26
Treatment Prob(F)			0.0607	0.0734	0.0001

Note: Means followed by same letter or symbol do not significantly differ (P=.05, LSD).

80 DAT – July 19th, 2021 (2/2)								
Trt. No.	**Treatment**	**Rate**	**Wild Parsnip Control (%)**	**Wild Parsnip Cover (%)**	**Grass Cover (%)**	**Other Broadleaf Weeds Cover (%)**	**Bareground/ Litter Cover (%)**	**Wild Parsnip Second Year Plant Mortality (%)**
1	NTC	-	48 cd	27 ab	65 bcd	8 -	0.3 -	31 cde
2	Boulder	8 fl oz/A	53 bcd	23 abc	71 abc	6 -	0.5 -	40 bcd
3	Boulder	16 fl oz/A	93 a	7 cd	83 a	9 -	0.8 -	59 bc
4	Cleargraze	8 fl oz/A	59 bc	29 ab	58 cd	12 -	2 -	30 de
5	Everett	32 fl oz/A	99 a	1 d	87 a	11 -	1 -	92 a
6	Prescott	8 fl oz/A	25 d	40 a	52 d	8 -	0.3 -	7 e
7	Triclopyr 3	3 fl oz/A	48 cd	27 ab	60 cd	13 -	0.5 -	31 cde
8	Panoramic	4 fl oz/A	78 ab	13 bcd	80 ab	6 -	1 -	28 de
9	Panoramic Whetstone	4 fl oz/A 5 fl oz/A	93 a	7 cd	85 a	6 -	1. -	61 b
10	Panoramic	2 fl oz/A	75 abc	13 bcd	82 ab	4 -	2 -	44 bcd
11	Panoramic	1 fl oz/A	60 bc	25 abc	61 cd	13 -	2 -	26 de
Statistics								
LSD P=.05			29.71	18.34	17.72	9.22	1.27	28.688
Standard Deviation			20.57	12.7	12.27	6.39	0.88	19.866
CV			31.03	66.22	17.22	74.15	91.91	48.52
Treatment Prob(F)			0.0002	0.0042	0.0009	0.5848	0.1328	0.0002

Note: Means followed by same letter or symbol do not significantly differ (P=.05, LSD).

131 DAT – September 8th, 2021					
Trt. No.	**Treatment**	**Rate**	**Wild Parsnip First Year Plant Mortality (%)**	**Wild Parsnip First Year Plant Count (#/plot)**	**Smooth Brome Height (cm)**
1	NTC	-	28 bcd	50 ab	79 -
2	Boulder	8 fl oz/A	27 bcd	54 ab	.
3	Boulder	16 fl oz/A	47 b	51 ab	.
4	Cleargraze	8 fl oz/A	15 cd	84 a	.
5	Everett	32 fl oz/A	92 a	6 c	.
6	Prescott	8 fl oz/A	19 bcd	83 a	.
7	Triclopyr 3	3 fl oz/A	26 bcd	58 ab	.
8	Panoramic	4 fl oz/A	24 bcd	55 ab	50 -
9	Panoramic Whetstone	4 fl oz/A 5 fl oz/A	46 bc	42 bc	52 -
10	Panoramic	2 fl oz/A	23 bcd	50 ab	48 -
11	Panoramic	1 fl oz/A	4 d	78 ab	65 -
Statistics					
LSD P=.05			31.384	38.47	22.12
Standard Deviation			21.733	26.64	13.57
CV			68.13	48.18	22.42
Treatment Prob(F)			0.0005	0.0175	0.0663

Note: Means followed by same letter or symbol do not significantly differ (P=.05, LSD).

376 DAT – May 11th, 2022				
Trt. No.	**Treatment**	**Rate**	**Wild Parsnip Seedling counts (#/250ft²)***	**Wild Parsnip Second Year Plant Count (#/250ft²)**
1	NTC	-	2.3 -	64.5 -
2	Boulder	8 fl oz/A	2.5 -	90.8 -
3	Boulder	16 fl oz/A	2.3 -	65.3 -
4	Cleargraze	8 fl oz/A	3.0 -	96.8 -
5	Everett	32 fl oz/A	1.2 -	15.8 -
6	Prescott	8 fl oz/A	2.0 -	78 -
7	Triclopyr 3	3 fl oz/A	1.8 -	122.5 -
8	Panoramic	4 fl oz/A	1.5 -	84 -
9	Panoramic Whetstone	4 fl oz/A 5 fl oz/A	1.8 -	78.8 -
10	Panoramic	2 fl oz/A	2.3 -	67 -
11	Panoramic	1 fl oz/A	2.3 -	90 -
Statistics				
LSD P=.05			1.56	58.54
Standard Deviation			1.08	40.54
CV			51.76	52.26
Treatment Prob(F)			0.7214	0.1251

*Data shown as a range from 0 to 4 (**0** = 0 seedlings, **1** = 1-5, **2** = 6-10, **3** = 11-20, **4** = 20+) for the number of parsnip seedlings for that plot (250ft²).