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UW – Madison Weed Science Renz Lab

Native Forb Tolerance to Herbicides – Prairie du Sac

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Objective:

Determine the tolerance of native forb species to herbicides commonly used in prairie settings.

Summary:

Interest exists in using herbicides to control invasive plants in native and prairies with high populations of forbs. A lack of information exists on the tolerance of forbs to common herbicides used. We established a trial in July near Prairie du Sac, Wisconsin to evaluate the impact of several herbicides treatments to native forbs when applied in mid-summer. The region experienced a severe drought in 2023 which delayed application and may have impacted injury observed.

Thirty-four days after application herbicide treatments impacted the forb species but drought and insect injury added variability to the data which only allowed for significant differences compared to the nontreated control with two species. Rosinweed (22-50%) and stiff goldenrod (19-37%) showed moderate tolerance to herbicide treatments, but injury was higher than non-treated controls. Prairie rose (11-70% injury), cup plant (24-67% injury) and Culver's root (14-45% injury) all had injuries in treated areas similar to nontreated areas but would be classified as moderately tolerant to moderately susceptible to these herbicides. Rosinweed may be more tolerant to Transline (22% injury) compared to other treatments (35-50% injury).

While initial injury suggest some level of forb tolerance from these herbicides, future data collection in 2024 will be needed to confirm safety. Changes in cover and stem density of these species will be compared one year after treatment to better quantify crop safety.

Notes

Trial was done in a prairie with 6-10 forb species per plot with inconsistency and patchiness throughout the trial area. The most common forb species were rosinweed, prairie rose, cup plant, Culver's root and stiff goldenrod.

This area experienced drought conditions in the summer of 2023 and that may be impacting results.

High injuries were recorded in some of the nontreated control plots for some species (prairie rose, cup plant, and Culver's root). These injuries are due to external factors (drought stress, insects, etc.) and not from herbicide drift.

Herbicide Treatments

Treatment Number	Treatment	Rate
1	Nontreated Control (NTC)	-
2	TerraVue Activator 90	2.13 oz/a 0.25 % v/v
3	TerraVue Activator 90	2.85 oz/a 0.25% v/v
4	Milestone Activator 90	5 fl oz/a 0.25 % v/v
5	Milestone Activator 90	7 fl oz/a 0.25 % v/v
6	SiteVue Activator 90	15 fl oz/a 0.25 % v/v
7	Transline Activator 90	10 fl oz/a 0.25 % v/v

Herbicide Application

Date	July 18, 2023, 11:36 am – 12:27 pm
Equipment	CO_2 pressurized 10-foot boom sprayer
Nozzles & spacing	8 nozzles, TeeJet 11002 VS, with 15-inch spacing
Regulator PSI	48

Weather Data	
Weather Station	KWIPRAIR41
Temperature	82.5°F - 87°F
Wind Speed and Direction	1.3 mph – 2.0 mph
Relative Humidity	44%
Cloud Cover	65%
Previous Rain Event Within 48 Hours	None
When ≥ 0.25 inches of precipitation occurred after treatment	July 22, 2023, 7:50 pm – 0.65 inches

Research Plot Information	
Plot Dimensions	20 x 30 ft
Design	Randomized Complete Block, 4 blocks
Soil Type	Pillot silt loam/ Dakota loam
Soil Characteristics	13.2-20.1% clay, 0.96-1.04% organic matter, 6.4 pH, 4% slope

Plants Present at Application – Developmental Stage	
Species	**Phenological Stage**
Stiff Goldenrod (*Solidago rigida*)	Vegetative
Rosinweed (*Silphium integrifolium*)	Flowering
Cup Plant (*Silphium perfoliatum*)	Flowering
Culver's Root (*Veronicastrum virginicum*)	Flowering
Prairie Rose (*Rosa setigera*)	Fruits formed

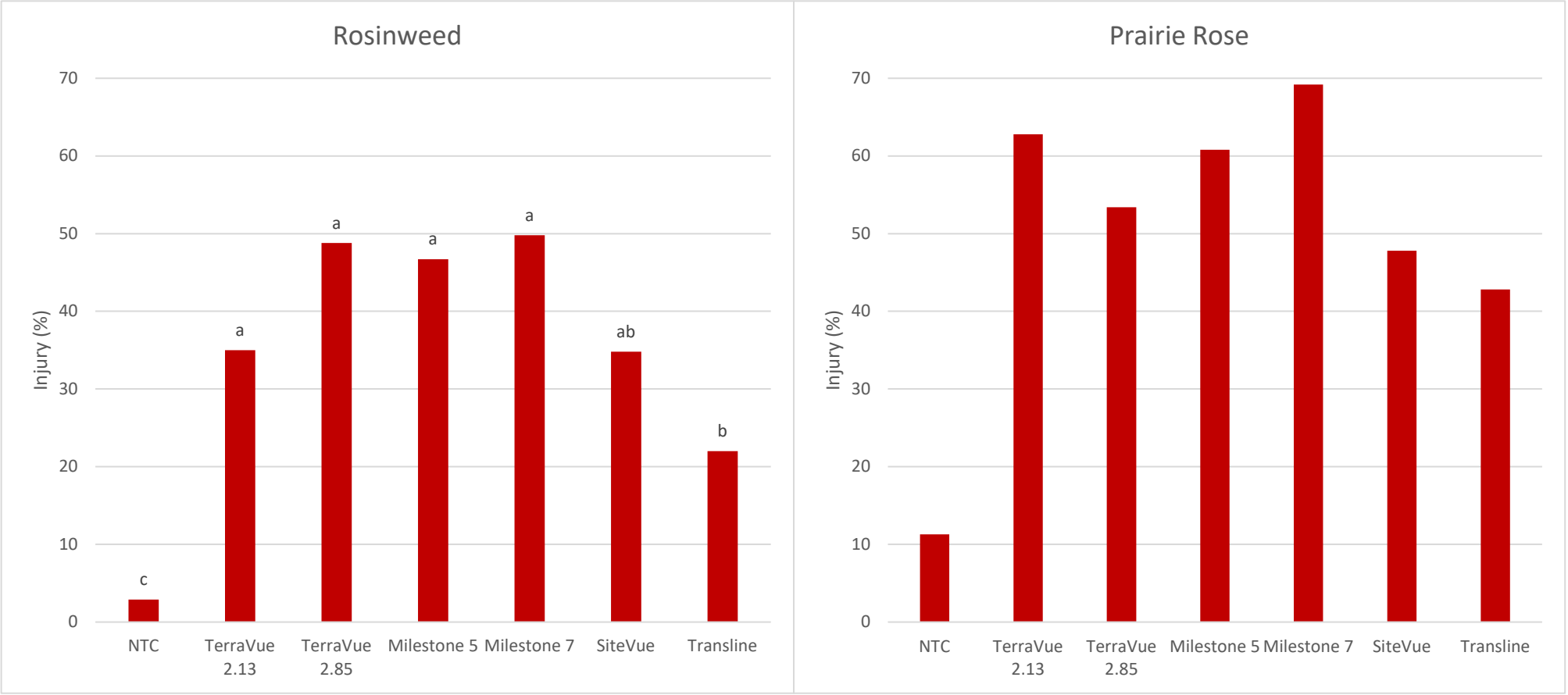
Index of Ratings and Results

Picture to the left showed a nontreated control plot 34 days after application. Notice the amount and diversity of the forb species present.

Picture to the right shows a plot treated with Milestone @ 7 fl oz/a, 34 days after application. Notice the lack of forb diversity and the injury to the cup plant shown by the red circles.

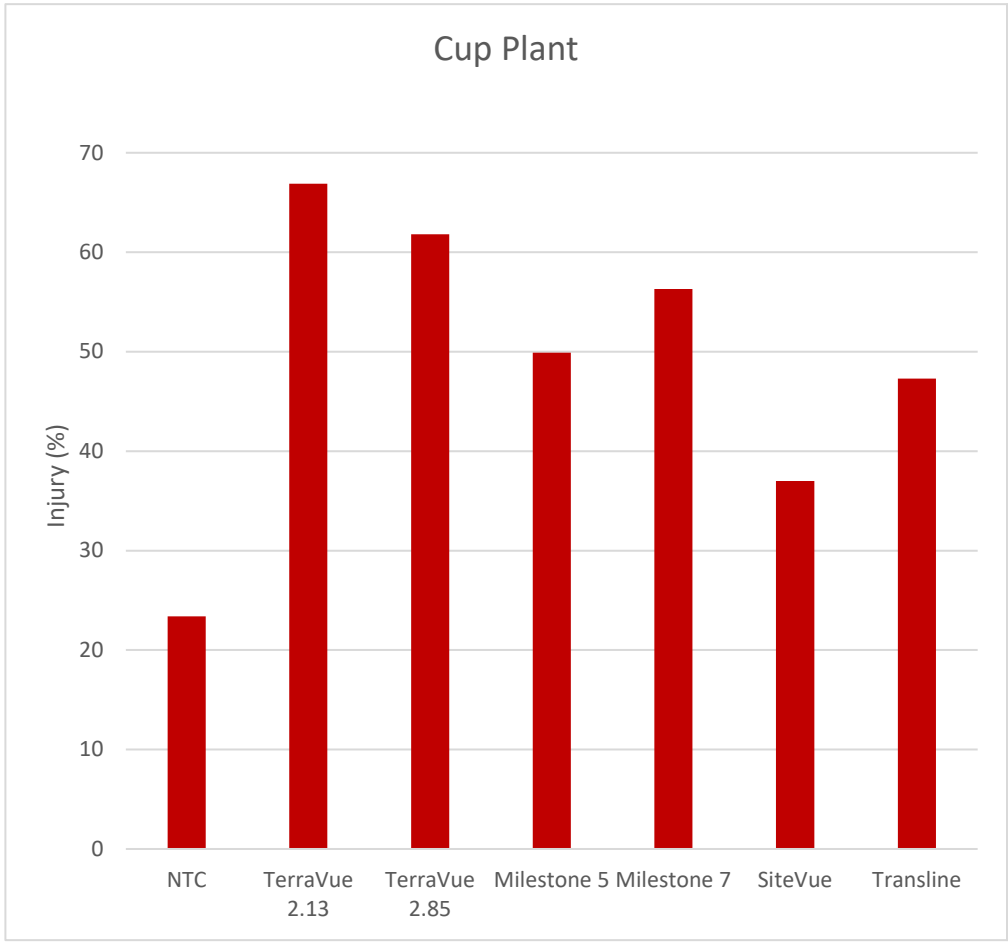
Results:

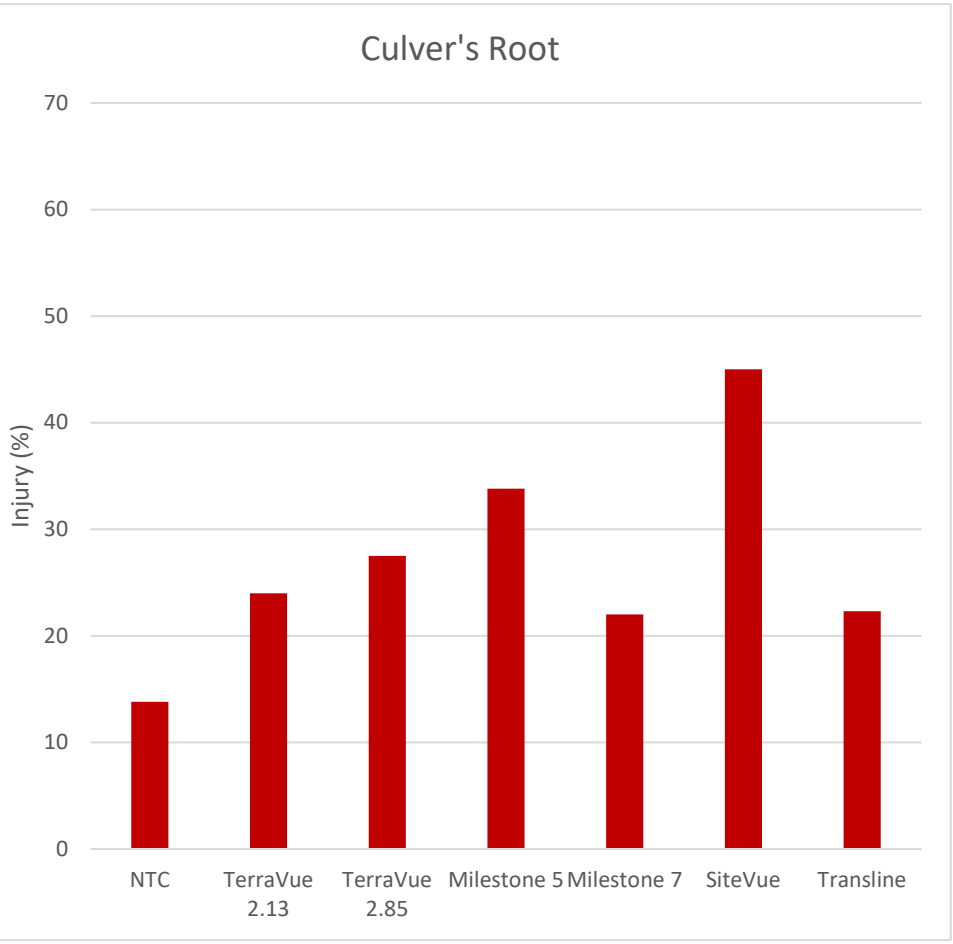
Injury 34 Day After Treatment 1/3



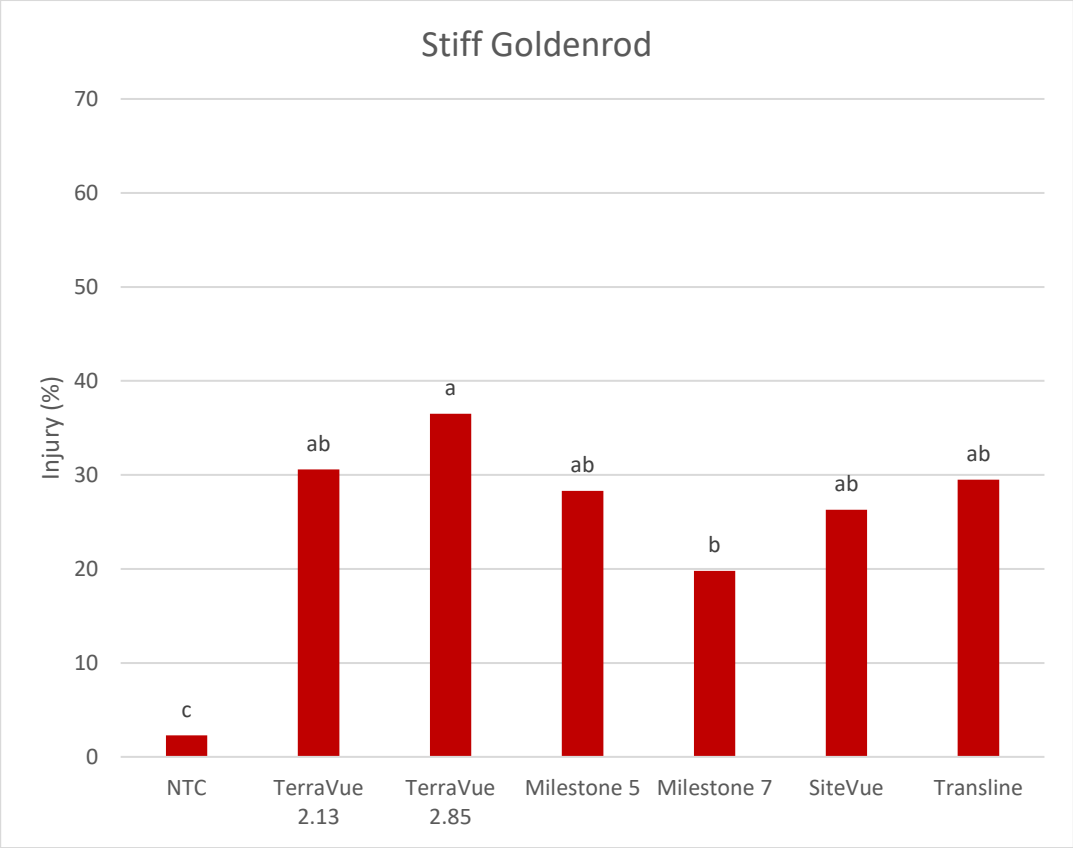
Bars labeled with the same letter do not significantly differ (P=0.05, LSD)

Injury 34 Day After Treatment 2/3





Injury 34 Day After Treatment 3/3



Bars labeled with the same letter do not significantly differ (P=0.05, LSD)

Key to Injury Ratings:				
Tolerant (0-15% injury/mortality)	Moderately Tolerant (16-50% injury/mortality)	Moderately Susceptible (51-75% injury/mortality)	Susceptible (76-100% injury/mortality)	No Data

34 DAT – August 21st, 2023							
Trt. No.	**Treatment**	**Rate**	**Rosinweed Injury (%)**	**Prairie Rose Injury (%)**	**Cup Plant Injury (%)**	**Culver's Root Injury (%)**	**Stiff Goldenrod Injury (%)**
1	NTC	-	2.9 c	11.3 -	23.4 -	13.8 -	2.3 c
2	TerraVue Activator 90	2.13 oz/a 0.25 % v/v	35 a	62.8 -	66.9 -	24 -	30.6 ab
3	TerraVue Activator 90	2.85 oz/a 0.25% v/v	48.8 a	53.4 -	61.8 -	27.5 -	36.5 ab
4	Milestone Activator 90	5 fl oz/a 0.25 % v/v	46.7 a	60.8 -	49.9 -	33.8 -	28.3 ab
5	Milestone Activator 90	7 fl oz/a 0.25 % v/v	49.8 a	69.2 -	56.3 -	22 -	19.8 b
6	SiteVue Activator 90	15 fl oz/a 0.25 % v/v	34.8 ab	47.8 -	37 -	45 -	26.3 ab
7	Transline Activator 90	10 fl oz/a 0.25 % v/v	22 b	42.8 -	47.3 -	22.3 -	29.5 a
Statistics[1]							
LSD P=.05			12.78	36.83	23.04	26.90	7.97
Standard Deviation			8.11	22.03	14.40	7.66	4.98
CV			23.94	45.71	28.84	31.17	19.92
Treatment Prob(F)			0.0002	0.1691	0.0578	0.3467	0.0003

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.