



Evaluation of the Efficacy of Saflufenacil Tank-Mixes and Sequential Applications Applied in Early Fall for the Control of Plantain (*Plantago* spp.) and Field Bindweed (*Convolvulus arvensis*) in Alfalfa Fields

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RATIONALE & OBJECTIVES

- In 2020-2023, field trials were conducted in New Mexico to evaluate Sharpen® (saflufenacil) tank-mixed with other herbicides (initial and sequential applications) as potential options for control of plantain and field bindweed in dormant-season alfalfa.

Objectives:

Compare the weed control performance of initial and sequential applications of Sharpen® alone or in combination with commercially available herbicide standards on both plantain and field bindweed under field conditions.

Evaluate the effects on alfalfa biomass as a result of the applications of single or multiple applications of Sharpen® alone or in combination with other commercially available herbicide products.

STUDY DESCRIPTION

Plot Layout:

Plantain, field bindweed, and alfalfa studies were all randomized complete block designs located in either Los Lunas, Bosque, or Las Cruces, NM.

Factors:

Alfalfa varieties in both locations were not Roundup Ready®

Los Lunas alfalfa: Initial application of treatments Nov. 1, 2021; sequential Apr. 12, 2022 (23 weeks after initial treatment (WAIT))

Las Cruces alfalfa: Initial application of treatments Dec. 14, 2021; sequential Apr. 15, 2022 (16 WAIT)

- Thirteen herbicide treatments including non-treated control (NTC)
 - High rates of Sharpen® alone or tank-mixed with high rates of other commercially-available herbicides.
- Harvest biomass data
 - Los Lunas – Jun. 1, 2022 (29 WAIT); Jul. 12, 2022 (35 WAIT)
 - Las Cruces – May 2, 2022 (20 WAIT); Jun 20, 2022 (27 WAIT)

Plantain study: Same thirteen herbicide treatments including NTC as used in alfalfa trials. Percent cover (%) of plantain and herbicide injury (%) collected every 2 weeks

- Los Lunas - Applied Oct. 6, 2020; sequential Apr. 16, 2021 (27 WAIT)

- Bosque – Applied Nov. 1, 2021; sequential Apr. 12, 2022 (28 WAIT)

Field bindweed study: Same thirteen herbicide treatments including NTC as used in alfalfa trials, same data collections as plantain studies.

- Los Lunas (year 1) - Applied Oct. 6, 2020; sequential Apr. 16, 2021 (27 WAIT)
- Los Lunas (year 2) – Applied Oct. 21, 2022; sequential May 3, 2023 (28 WAIT)

Analysis:

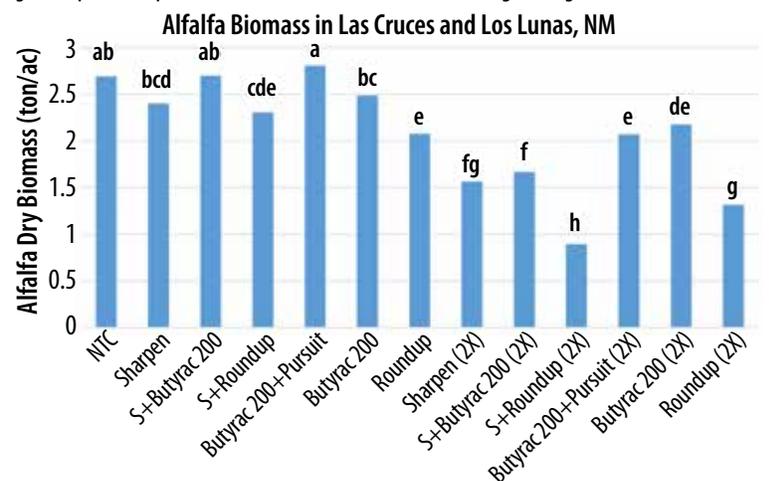
Data were subjected to an analysis of variance (ANOVA) using SAS Proc Mixed followed by multiple comparisons of means using Fisher's LSD test at the $\alpha=0.05$ probability level.

RESULTS

Field Trial Results:

- The single fall application (1X) treatments included only Sharpen®, Butyrac 200®, and Pursuit®, either alone or tank-mixed produced alfalfa biomass that was not different from the non-treated control for both ASC and LSC locations (Figure 1).
 - All treatments containing Roundup® (1X) and all sequential (2X) treatments had significantly reduced total alfalfa biomass compared to the non-treated control.

Figure 1. Alfalfa dry biomass weights (ton/ac) in response to applications of initial and sequential tank-mixes of Sharpen® combined with other commercially available herbicides at the New Mexico State University (NMSU) Leyendecker Plant Sciences Center at Las Cruces, NM, and the NMSU Agricultural Science Center at Los Lunas, NM, from 2021-2022. Initial applications were made in the fall following final harvest, and in the spring following spring alfalfa and weed green-up. Chart represents total biomass for the first two cuttings averaged across both locations.



Bars having the same letters are not significantly different at $\alpha=0.05$, least significant difference (LSD)=0.30; NTC=non-treated control; S=Sharpen®; 2X=initial+sequential application of herbicide treatment in the spring.

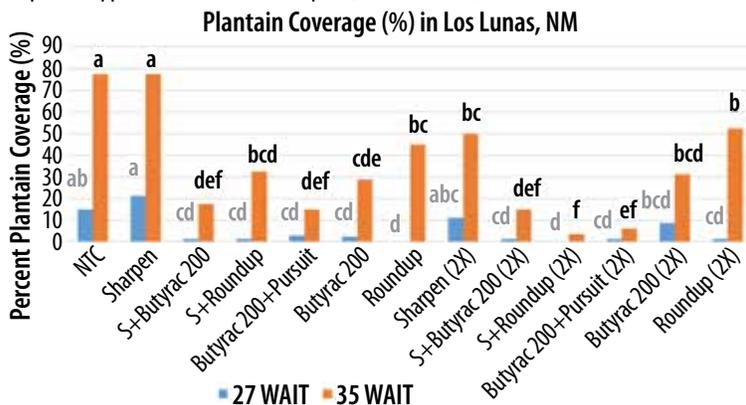
Weed injury caused by herbicides:

For both plantain and field bindweed studies, while average visual percentage estimates for injury caused by herbicide treatments did yield significant results, they were not indicative of overall weed control abilities of the treatments (*Data not shown*).

Plantain Study: Final weed coverage (%) rating date indicated that all herbicide treatments applied alone or in combination with Sharpen® 1X or 2X decreased plantain coverage compared to non-treated control with the exception of Sharpen® alone 1X (Figure 2).

- Applications of Butyrac 200® tank-mixed with either Sharpen® or Pursuit® and applications of Roundup® tank-mixed with Sharpen® effectively decreased plantain coverage compared to non-treated control.
- Applications of Sharpen® and Butyrac 200® (1X and 2X) tank-mixed together or with the other herbicide treatments, was observed to reduce plantain coverage compared to their applications alone at 1X or 2X.
- Applications that included a tank-mix with Sharpen® or Pursuit® seemed to have some residual impacts to prevent the germination of plantain seed in the soil later in the growing season.

Figure 2. Visual ratings for percent plantain coverage (%) in response to applications of initial and sequential tank-mixes of Sharpen® combined with other commercially available herbicides at the private producer alfalfa field in Los Lunas, NM. Initial applications were made on Oct. 6, 2020, and sequential applications were made on Apr. 16, 2021 (27 WAIT).

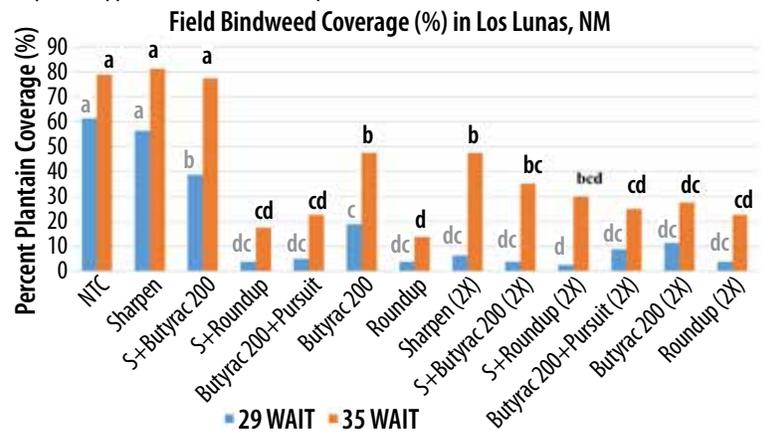


Letters in gray correspond with 27 WAIT data, and letters in black correspond with 35 WAIT data. Bars having the same letters are not significantly different at $\alpha=0.05$, least significant difference (LSD)=10.4 (27 WAIT) and 23.6 (35 WAIT); NTC=non-treated control; WAIT=weeks after initiation of herbicide treatment; S=Sharpen®; 2X=initial+sequential application of herbicide treatment 27 WAIT.

Field Bindweed Study: While all treatments, with the exception of Sharpen® alone or tank-mixed with Butyrac 200®, decreased field bindweed coverage following the spring sequential application at 29 WAIT, no treatment managed to prevent some regrowth or recovery of field bindweed in plots by 35 WAIT (Figure 3).

- It was observed that tank-mixing Sharpen® with the other herbicide treatments did not decrease field bindweed coverage with a spring sequential treatment (2X) compared to the initial fall treatment alone (1X). The same was observed with Butyrac 200® tank-mixed with Pursuit®.

Figure 3. Visual ratings for percent plantain coverage (%) in response to applications of initial and sequential tank-mixes of Sharpen® combined with other commercially available herbicides at the private producer alfalfa field in Los Lunas, NM. Initial applications were made on Oct. 6, 2020, and sequential applications were made on Apr. 16, 2021 (27 WAIT).



Letters in gray correspond with 29 WAIT data, and letters in black correspond with 35 WAIT data. Bars having the same letters are not significantly different at $\alpha=0.05$, least significant difference (LSD)=15.4 (29 WAIT) and 19.8 (35 WAIT); NTC=non-treated control; WAIT=weeks after initiation of herbicide treatment; S=Sharpen®; 2X=sequential application of herbicide treatment 29 WAIT.

CONCLUSIONS/SUGGESTIONS

- This research indicates that applications of Sharpen® tank-mixed with other commercially available herbicides may provide adequate injury of plantain and field bindweed when applied during accelerated fall growth of the weeds.
- Applications of Butyrac 200® alone and tank-mixed with Pursuit®, as well applications of Roundup® tank-mixed with Sharpen®, helped to decrease plantain and field bindweed coverage with fall and sequential spring applications.
- Applications that included a tank-mix with Sharpen® or Pursuit® seemed to have some residual impacts to prevent seed germination of plantain seed later in the growing season. However, no herbicide treatment was able to prevent eventual regrowth and recovery of field bindweed.
- Spring sequential applications of Sharpen® alone or tank-mixed with the other herbicide treatments negatively impacted alfalfa biomass, as did all treatments that included Roundup® since the treated alfalfa was not Roundup Ready®.
- Sharpen® does not have a label for spring applications in alfalfa; however, Sharpen® applications tank-mixed with the other herbicides or sequentially in the spring may be applicable in fallow or grass forage rotational cropping systems. And Roundup® applications may be applicable for perennial weed management in Roundup Ready® alfalfa systems.