Evaluation of the Efficacy of Various Herbicides for the Control of Broadleaf (*Plantago major*) and Buckhorn (*Plantago lanceolata*) Plantain in Alfalfa

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RATIONALE & OBJECTIVES

- In 2017-2018, field and greenhouse trials were conducted in New Mexico to evaluate Sharpen® (saflufenacil) and other herbicides as potential options for control on broadleaf and buckhorn plantain in dormant-season alfalfa.

Objectives:

Compare weed control performance of safufenacil against commercially available herbicide standards under greenhouse conditions.

Evaluate the effects on alfalfa regarding damage symptoms and yield reduction as a result of the application of saflufenacil against commercially available herbicide products.

STUDY DESCRIPTION

Plot layout:

Field Study: Randomized complete block design, Los Lunas, NM.

Greenhouse Study: Randomized complete block design, Las Cruces, NM.

Factors:

Field Study: mature, 6+ year old alfalfa (Reward II).

Ten herbicide treatments including non-treated control (NTC) for comparison applied on December 1, 2017.

- Low and high label rates of Sharpen®, high label rates of comparison commercially-available herbicides.

Harvest yield data.

- 1st cutting harvest – 172 days after initiation of treatment (DAIT).
- 2nd cutting harvest – 216 DAIT.

Prior to harvest cuttings, visible herbicide injury and reduction in canopy density and plant height was observed for Roundup® treatments following application.

Greenhouse Study: broadleaf and buckhorn plantain seeded into flats with potting soil, then transplanted into cone-tainers.

Twelve herbicide treatments including NTC for comparison applied on December 20, 2017.

- Low and high label rates of Sharpen®, high rate of Sharpen® in combination with high label rates of Raptor® or Pursuit®, high label rates of comparison commercially available herbicides alone.

Percentage of injury data collected visually once a week after application for 40 DAIT.

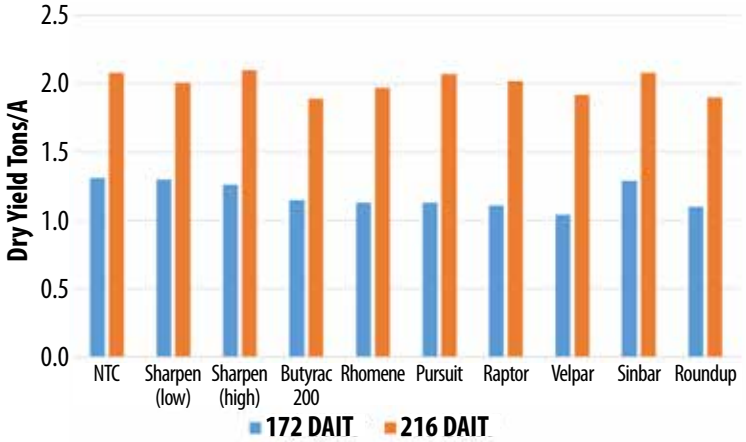
Analysis:

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 α=0.05 probability level.

FIELD TRIAL RESULTS

- Average dry weight yields (tons/A) for the172 DAIT and 216 DAIT alfalfa harvests did not result in measurable significant differences among the herbicide treatments, including Sharpen® (Figure 1). This is noteworthy as all herbicide applications were made while there was still active (although slowed) growth of the alfalfa on December 1, 2017.
- Applications of Sharpen® did not negatively affect alfalfa harvest and yield amounts for both cuttings compared to the NTC.

Figure 1. Alfalfa dry matter (DM) yields for 2 cuttings in 2018 in response to application of selected herbicides on December 1, 2017 at Los Lunas, NM.

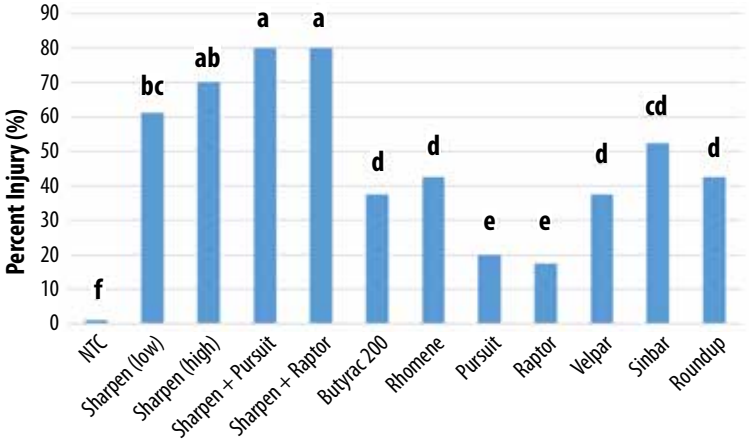


Within cutting, data are not significantly different according to Fisher's LSD test (α=0.05), LSD = 0.24 (127 DAIT) and 0.38 (216 DAIT); LSD = least significant difference.

GREENHOUSE TRIAL RESULTS

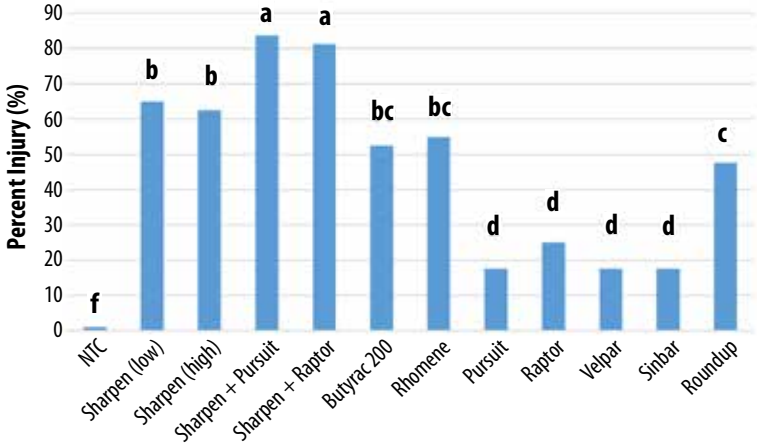
- After 21 DAIT, the amount of injury (%) observed as a result of all herbicide treatment applications was significantly greater than the NTC for both broadleaf (Figure 2) and buckhorn (Figure 3) plantain.
- After 21 DAIT, the amount of injury observed on broadleaf plantain for the high rate of Sharpen®, as well as Sharpen® combined with Pursuit® or Raptor®, were significantly higher than all other commercially available herbicide treatments.
- After 21 DAIT, the amount of injury observed in buckhorn plantain for Sharpen® combined with Pursuit® or Raptor® were significantly higher than all other herbicide treatments, including Sharpen® alone at both the high and low label rates.

Figure 2. Average herbicide injury (%) to broadleaf plantain observed visually 21 DAIT in response to herbicide treatments applied on December 20, 2017 in the greenhouse at Las Cruces, NM.



Means followed by the same letter are not significantly different ($\alpha = 0.05$), LSD value = 15.35; LSD = least significant difference.

Figure 3. Average herbicide injury (%) to buckhorn plantain observed visually 21 DAIT in response to herbicide treatments applied on December 20, 2017 in the greenhouse at Las Cruces, NM.



Means followed by the same letter are not significantly different ($\alpha = 0.05$), LSD value = 14.02; LSD = least significant difference.

CONCLUSIONS

- Field observations of dry yield in response to applications of Sharpen® in comparison to the NTC, as well as other commercially available herbicide options, indicated that Sharpen® may be applied in semi-dormant alfalfa with minimal affects to yield.
- Observations of the amount of injury from applications of Sharpen® alone indicated a potential viable candidate for control of broadleaf and buckhorn plantain in semi-dormant alfalfa. However, injury levels were not high enough for complete control with no potential for regrowth or recovery over time.
- Combinations of Sharpen® with other commercially available herbicides, such as Pursuit® or Raptor®, increased the amount of injury observed on both broadleaf and buckhorn plantain in the greenhouse. Future research is needed to further observe how herbicide tank-mixes or sequential applications can enhance control of plantain with minimal injury to semi-dormant alfalfa.

Alfalfa
U.S. Alfalfa Farmer Research Initiative

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