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Summary

Eleven postemergence herbicide treatments were applied to teff grown for forage to evaluate Palmer amaranth and kochia control, as well as crop tolerance. Effective Palmer amaranth control was achieved with all herbicide treatments, while less than satisfactory kochia control was obtained with atrazine and Harmony. Clarity, 2,4-D, and Huskie applied alone appeared to control kochia, but kochia density was low in the plots. Had the kochia population been higher, similar efficacy ratings may have been attained. Huskie or atrazine caused the most injury to teff. The first harvest suggests these herbicides reduced forage yield to less than 3,000 lb/a.

Introduction

Teff, a warm-season annual grass native to Africa, is gaining popularity as a forage crop in the United States. Since teff is a warm-season crop, kochia and Palmer amaranth competition can have a negative impact on stand establishment and yield. A field experiment was conducted to evaluate 11 postemergence herbicide treatments for kochia and Palmer amaranth control and crop tolerance.

Procedures

A field in north-central Ford County was selected for the herbicide evaluation on teff. On June 20, 2014, the plot area was planted no-till, using a grain drill delivering 12 lb/a of 'Tiffany' teff grass seed. The plot area was a dryland field that had been no-till for the past 10 years and was weed-free at the time of planting. The experimental design was a randomized complete block, replicated 4 times, and individual plot size was 10 ft wide by 30 ft long. Treatments were applied postemergence on July 23, 2014, when the teff was at the tillering stage of growth. Applications were made with a backpack sprayer delivering 15 gal/a at 34 psi traveling 3 mph. Weed control and crop injury visual evaluations were conducted at 5 and 21 days after treatment (July 28 and August 13, 2014) (Table 1).

A forage biomass sample was harvested from a 1-meter square area within each plot on August 19 and September 11, 2014, to determine if the herbicide treatment affected yield (Table 2). No untreated plot was included in the study, but an untreated border area was harvested as a comparison to the treated plots.

Results

On July 23, 2014, the day of herbicide treatment application, about 30 percent of the study area had high Palmer amaranth density, with most plants 15 to 20 inches tall and some smaller plants 4 to 8 inches tall. Palmer amaranth population density was high enough to provide a good evaluation of herbicide efficacy in most of the plots. Kochia plants were present at the time of application but sparse, with most plants 4 to 8 inches and occasionally up to 12 inches tall. The overall kochia population was not high enough to allow for all plots to be rated for control; therefore, no statistical analysis was conducted on kochia control. All treatments were very effective at controlling Palmer amaranth 3 weeks after the postemergence herbicide applications. This suggests that no ALS-, triazine-, or HPPD-resistant Palmer amaranth were present at this location. Kochia control was only 85% with 1 lb ai atrazine and 30% with 0.5 lb ai atrazine while Harmony SG alone only controlled 30% of the kochia. This suggests that possible ALS- and triazine-resistant kochia were present at this location. Clarity, 2,4-D, or Huskie seemed to control kochia, but with the low kochia populations in the study area this information cannot be considered totally reliable since 2,4-D often does not adequately control kochia.

Treatment yields from the first harvest, which fell below 3,000 lb/a dry matter, were most likely due to crop injury from the herbicide treatments. Huskie at 15 oz/a and Atrazine at 1 lb/a seemed to have caused the greatest level of crop injury (Table 1). Clarity, 2,4-D, or Harmony treatments all appeared to be safe and did not affect yield (Table 2).

Table 1. Kochia and Palmer amaranth control and teff injury.

			Kochia		Palmer Amaranth		Teff Injury	
			July 28	Aug. 13	July 28	Aug. 13	July 28	Aug. 13
Trt. no.	Treatment	Rate	Control %				Injury %	
1	Atrazine COC	0.5 qt/a 1 % v/v	30	30	50	93	7a	1
2	Atrazine COC	1 qt/a 1 % v/v	30	85	56	95	7a	8
3	2,4-D LV Ester	1 pt/a	50	100	60	99	0c	1
4	2,4-D Amine	1 pt/a	50	100	59	99	0c	1
5	Clarity	4 fl oz/a	40	85	53	99	0c	1
6	Clarity	8 fl oz/a	50	100	60	100	0c	1
7	2,4-D Amine Clarity	1 pt/a 4 fl oz/a	60	90	60	99	0c	1
8	Harmony-SG NIS	0.9 oz wt/a 0.25 % v/v	40	30	46	100	0c	0
9	Harmony-SG Clarity NIS	0.9 oz wt/a 4 fl oz/a 0.25 % v/v	40	100	54	100	0c	0
10	Huskie NIS NPAK AMS	15 fl oz/a 0.25 % v/v 1 lb ai/a	60	100	68	100	30c	2
11	Huskie Clarity NIS NPAK AMS	13 fl oz/a 4 fl oz/a 0.25 % v/v 1 lb ai/a	60	85	64	100	22c	1

Table 2. Teff forage dry matter yield (lb/acre).

			Harvest Date		
Trt. no.	Treatment	Rate	Aug. 19	Sept.11	Total Yield
1	Atrazine COC	0.5 qt/a 1 % v/v	2925 ab	163 a	3126 a
2	Atrazine COC	1 qt/a 1 % v/v	2069 b	330 a	2424 a
3	2,4-D LV Ester	1 pt/a	4230 ab	96 a	4374 a
4	2,4-D Amine	1 pt/a	4079 ab	166 a	4272 a
5	Clarity	4 fl oz/a	4708 a	119 a	4844 a
6	Clarity	8 fl oz/a	3897 ab	292 a	4240 a
7	2,4-D Amine Clarity	1 pt/a 4 fl oz/a	3050 ab	84 a	3167 a
8	Harmony-SG NIS	0.9 oz wt/a 0.25 % v/v	3739 ab	188 a	3999 a
9	Harmony-SG Clarity NIS	0.9 oz wt/a 4 fl oz/a 0.25 % v/v	4340 ab	110 a	4489 a
10	Huskie NIS NPAK AMS	15 fl oz/a 0.25 % v/v 1 lb ai/a	2457 ab	289 a	2760 a
11	Huskie Clarity NIS NPAK AMS	13 fl oz/a 4 fl oz/a 0.25 % v/v 1 lb ai/a	3111 ab	185 a	3318 a
	Untreated area*		2588	206	2794

*The untreated area was not included in the plot area and therefore not included in data analysis.