Preplant Horseweed Control in Reduced Tillage Cotton in the Texas High Plains

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Introduction

Horseweed (*Conyza canadensis*), also known as marestail, is an annual plant native throughout most of North America. It can be found in agricultural fields, meadows, and garden areas and has been declared a noxious weed in some states. Horseweed has become a troublesome weed in the Texas High Plains because of a shift in production practices towards reduced or no-till systems. Horseweed populations resistant to glyphosate have been discovered in the U.S., but even non-resistant populations have an inherent ability to tolerate glyphosate. Davis et al. (Weed Science 24:11-19, 2010) reported that fall applications of non-residual herbicides may increase horseweed's rate of emergence and density when compared to residual treatments. They also found that spring-applied saflufenacil (Sharpen) reduced horseweed densities by greater than 90%. Owen et al. (Weed Technology 23:335-39, 2009) reported that horseweed may be controlled with either fall or spring applications, but fall applications containing a residual herbicide worked best. Norsworthy et al. (Crop Protection 28:62-67, 2009) reported that treatments containing a residual herbicide were needed with preplant burndown treatments to prevent subsequent emergence of horseweed when conditions are favorable. This weed can complete its life cycle as either a winter or summer annual, which adds to the difficulty of control. 2,4-D or glyphosate are standard preplant treatments in this region, but tank-mix combinations and new active ingredients may also be successful at controlling this weed.

Objectives

The objective of this research was to identify effective spring applied preplant burndown treatments for control of early- and mid-season horseweed populations.

Materials and Methods

Field trials were conducted in 2010 and 2011 in Crosby County, Texas in a terminated wheat cotton production system containing an overhead center pivot irrigation system. Plots, 4 rows by 30 feet with three replications, were randomized in a densely populated field containing horseweed. Applications on March 29, 2010 and April 1, 2011 were made using a CO_2-pressurized backpack sprayer calibrated to deliver 10 gallons per acre (GPA) at 3 MPH using water as a carrier. TurboTee 110015 spray tips were used. Horseweed control and cotton injury were observed throughout the growing season. Data were analyzed using ANOVA and means separated using Duncan's new MRT.

Horseweed size at application was 1 to 4 inches in the rosette stage of growth.

"Effective" (left) and "ineffective" (right) horseweed control following spring applications.

Acknowledgement

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Table 1. Horseweed control as affected by preplant herbicide applications[a].

Treatment	Rate[b]	Prod. Rate	2010		2011	
			Apr 26 (28 DAT)	Jun 4 (67 DAT)	Apr 28 (27 DAT)	May 27 (56 DAT)
	lb ai/A	oz/A	----------%----------			
Roundup PowerMax	0.95	22	68	59	8	17
Roundup PowerMax	1.38	32	77	73	22	17
2,4-D Amine	0.475	16	75	67	18	23
2,4-D Amine	0.95	32	63	70	23	22
2,4-D Amine Roundup PowerMax	0.475 0.95	16 22	83	87	40	33
2,4-D Amine Roundup PowerMax	0.95 0.95	32 22	80	94	62	72
Roundup PowerMax Clarity	0.95 0.0625	22 2	62	63	47	75
2,4-D Amine Roundup PowerMax Clarity	0.475 0.95 0.0625	16 22 2	90	87	73	75
2,4-D Amine Roundup PowerMax Clarity	0.95 0.95 0.0625	32 22 2	84	93	85	83
Valor SX Roundup PowerMax + MSO	0.064 0.95	2 22	48	62	3	12
Valor SX 2,4-D Amine + MSO	0.064 0.95	2 32	78	72	23	27
Valor SX 2,4-D Amine Roundup PowerMax + MSO	0.064 0.95 0.95	2 32 22	78	79	15	63
Firstshot Roundup PowerMax + NIS	0.0234 0.95	0.75 22	75	84	43	40
Firstshot 2,4-D Amine Clarity + NIS	0.0206 0.475 0.0625	0.66 16 2	81	83	65	85
Sharpen + MSO	0.0223	1	57	25	15	20
Sharpen Roundup PowerMax + MSO	0.0223 0.95	1 22	75	77	95	98
Sharpen Roundup PowerMax 2,4-D Amine + MSO	0.0223 0.95 0.95	1 22 32	82	63	100	99
Valor SX Sharpen Roundup PowerMax + MSO	0.064 0.0111 0.95	2 0.5 22	72	69	18	72
Valor SX Sharpen Roundup PowerMax + MSO	0.064 0.0223 0.95	2 1 22	80	86	13	60
Sharpen Roundup PowerMax + MSO	0.0223 0.95	1 22	---	---	75	80
Sharpen Clarity + MSO	0.0223 0.188	1 6	---	---	75	80
Outlaw	0.476	24	93	94	88	93
pValue			0.0001	0.0001	0.0001	0.0001
$LSD_{(0.10)}$			18	17	8	11

[a] Abbreviations: DAT, days after treatment; MSO, metholated seed oil; NIS, non-ionic surfactant.
[b] Surfactant rate: MSO added at 1% V/V; NIS added at 0.5% v/v.

Summary of Results

2010

- Horseweed control following 2,4-D or Roundup PowerMax applied alone was similar regardless of rate.
- A tank mix combination of 2,4-D + Roundup (32 + 22 oz) controlled horseweed 94% 67 days after treatment (DAT). The addition of Clarity (2 oz) to this tank mixture did not improve control. Outlaw (2,4-D + dicamba) controlled horseweed 94% at this same evaluation period.
- Valor + Sharpen + Roundup PowerMax (2 + 1 + 22 oz) + MSO, Firstshot + 2,4-D + Clarity (0.66 + 16 + 2 oz) + NIS, Firstshot + Roundup PowerMax (0.75 + 22 oz) + NIS, and 2,4-D + Roundup PowerMax (16 + 22 oz) controlled horseweed at least 80%.
- No treatment caused cotton stand loss or visible injury (data not shown).

2011

- Overall horseweed control in 2011 was reduced due to record heat, drought, and relentless winds.
- 2,4-D alone (16 and 32 oz) and Roundup PowerMax alone (22 and 32 oz) controlled horseweed no greater than 23% at 56 DAT. A tank mix combination of 2,4-D + Roundup PowerMax (32 + 22 oz) controlled horseweed 72% at 56 DAT. The addition of Clarity (2 oz) improved control (83%).
- Sharpen + Roundup PowerMax (1 + 22 oz) + MSO controlled horseweed 98% at 56 DAT. The addition of 2,4-D to this tank mix did not improve control. Outlaw controlled horseweed 88-93% .

In summary, Roundup at 22 oz in a tank-mix combination with 2,4-D (32 oz) or Sharpen + MSO (1 oz + 1% v/v), and Outlaw (24 oz) were most effective at controlling horseweed following spring applications over this two year study. A third study will be conducted in 2012 to help determine the most effective horseweed control following spring-applied tank-mix combinations.