MANAGING GIANT RAGWEED & MARESTAIL IN WHEAT (3-YEAR REPORT – AUGUST 7, 2012)

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INTRODUCTION

Giant ragweed and marestail are examples of weeds that emerge in wheat. While they may sometimes interfere with wheat harvest, the greatest concern is their impact on double-crop soybeans following wheat harvest. Marestail is especially difficult to control since most populations are tolerant to glyphosate.

Limited observations indicate such management practices as a competitive stand of wheat, may aid in the control of weeds that later become a problem in soybeans. It is also believed some of the herbicides used to control cool-season weeds in wheat may improve control of other weeds that occur in soybeans.

OBJECTIVE

This research is a part of a long-term project to evaluate the effect of seeding rate of wheat and certain wheat herbicides on managing giant ragweed and marestail.

RESEARCH METHODS

Trials were conducted during 2009-2010, 2010-2011, and 2011-2012 growing seasons on giant ragweed and marestail in wheat as separate experiments at the University of Kentucky Research and Education Center. Data will be reported for each year separately for 2010, 2011, and 2012. Studies focused on the effect of wheat seeding rate, row spacing and herbicides on controlling these two species.

Seeding Rate Experiments: These studies evaluated the effect of seeding rate of wheat on the heights and number of giant ragweed and marestail plants in late May to early June. Wheat was seeded at a high rate of 31 to 38 seed/ft^2 and a low rate of 17 or 18 seed/ ft^2 and compared with winter fallow plots with no wheat. Giant ragweed and marestail plant counts were determined in four areas of each plot in late May to early June. A quadrate (4 or 9 ft^2) was used to quantify weed density from four random areas within each fallow plot (i.e. 0 seeding rate). Data from the wheat plots were taken the full length of each plot from wide outside skip rows on the left and right side of each plot and from narrow rows from the left and right side of the area to be harvested.

The wide outside skip rows were included to simulate an open canopy effect similar to that caused by tramlines. During the planting process, the drill units adjacent to the outside rows were blocked in order to create the skip rows. Only one unit on each side of the drill was blocked in the 2010 studies. However, in order to more accurately reflect the tramline effect, two units were blocked on each side of the drill in the 2011, and 2012 studies.

In order to compare data between the different sampling areas, the densities were based on plants per 100 ft^2. Heights of marestail and giant ragweed were measured for up to six plants from each sampling area.

Herbicide Experiments: The effect of certain herbicides used in wheat was another component of this research. In the 2010 study, preharvest treatments of glyphosate or tank mixes of glyphosate plus 2,4-D were evaluated the first season. The treatments in the second and third seasons focused on herbicides applied in the fall or spring and varied depending on weed species. Some of the major herbicides compared in these trials included Valor (flumioxazin), Finesse (chlorsulfuron + metsulfuron), Peak (prosulfuron), Harmony

Extra (thifensulfuron + tribenuron), and Huskie (bromoxynil + pyrasulfotole) (Table 5).

RESULTS

Seeding Rate Experiments: The fallow areas were used as a baseline for measuring the impact of wheat on density and plant height of giant ragweed and marestail. When the weed counts were made in late May to early June the average density of weeds in the fallow plots were high and ranged from 404 plants/100 ft^2 to 1,000 plants/100 ft^2 (Table 1). The average marestail density in the fallow areas ranged from a low of 540 plants/100 ft^2 to a high of 5,349 plants /100 ft^2.

In all instances wheat significantly limited the number of giant ragweed and marestail plants when compared with the fallow areas in all three growing seasons (Table 1). The reduction in number of giant ragweed plants due to wheat competition ranged from 82 to 99% in 2010, 54 to 79% in 2011, and 86 to 92% in 2012. When making similar comparisons for marestail, the reduction in number of plants ranged from 95 to 99% in 2010, 83 to 98% in 2011, and 88 to 99% in 2012.

In most instances, the low seeding rate in these studies had similar numbers of giant ragweed and marestail plants. The head counts in Table 3 support the idea that tillering of wheat plants in the low seeding rate enabled wheat to compensate and be equally competitive to that in the high seeding rate. The only situation where there was a statistical difference due to seeding rate of wheat was when the high seeding rate limited density of marestail in the wide row in 2010.

Although statistical analysis for comparing the wide rows to narrow rows were not made, there was a strong trend in fewer weeds in the narrow rows. When compared with the wide rows, the narrow rows had 44, 46 and 20% fewer giant ragweed plants for 2010, 2011, and 2012, respectively. When making similar comparisons for marestail, there were approximately 80 , 71, and 94% fewer plants in the narrow rows than in the wide rows for 2010, 2011, and 2012, respectively.

Both giant ragweed and marestail plants that were able to survive in wheat were numerically shorter compared with those in the fallow areas in all instances (Table 2). However, the differences were not statistically different for marestail in both wide and narrow rows in 2010 and for the narrow rows in 2012. The height of giant ragweed and marestail plants in wheat tended to be slightly smaller in the high seeding rate than in the low seeding rate, but the differences were small and were often not statistically significant. Row spacing have very little, if any, affect on height of surviving giant ragweed and marestail plants.

Wheat stand counts in the fall, head counts and grain yields are reported in (Table 3). The number of heads and yield of the wheat in the high seeding rate were often numerically greater than those in the low rate, but the differences were not statistically significant in most instances except for wheat yield in 2011.

Herbicide Experiments: It was difficult to assess the impact of preharvest herbicide treatments on giant ragweed and marestail due to dry weather after wheat harvest in the 2009-2010 studies (data not shown). A slight improvement in control appeared to occur in some instances with herbicides. The addition of 2,4-D ester with glyphosate did not appear to improve control of either giant ragweed or marestail in wheat but improved control in the fallow areas.

The herbicide trials that were conducted during the 2010-2011 season had very few giant ragweed and marestail plants; consequently, no control ratings for these species were made. However, data were collected on weed species that were present (Table 4).

Visual control ratings of henbit and percent infestation ratings for honeyvine milkweed

were done in the spring of 2011 for study 1 (the trial originally targeted for giant ragweed). Finesse provided superior control of henbit; whereas, Peak provided only 63% control of this weed. Wheat yields in this study were equal for all treatments, including the non-treated check.

Visual estimates of percent infestation of dandelion were done in the spring of 2011 for study 2 (the trial originally targeted for marestail). The herbicide treated plots had approximately half the infestation of dandelion compared with the check plots. The fact Roundup WeatherMAX (glyphosate) was applied as a burndown to all herbicide treated plots may have helped limit dandelion growth. The fact there were no statistical differences in wheat yield in study 1 indicated competition from henbit was not a limiting factor. In study 2 all herbicide treatments had similar wheat yields and exceeded the yield of the non-treated check by 13.8 to 21.2 bu/A. The level of dandelion infestation was sufficient to limit wheat yield and did warrant use of herbicide treatments (Table 4).

The herbicide trials in 2011-2012 had very few weeds in the harvest area of the plots, due to dry weather. However, there were a few weeds in the wide rows and near the outside edge of plots to evaluate for efficacy. Harmony Extra applied alone at 0.9 oz/A provided 78% control of marestail and 83% control of giant ragweed (Table 5). The addition of 2,4-D and Clarity to Harmony Extra in the spring significantly improved giant ragweed and marestail control. Spring applications of Huskie alone or in combination with other herbicides provided at least 94% control of giant ragweed and marestail. Huskie is currently not registered in Kentucky. The label requires a minimum of 4 months after application before planting soybeans.

SUMMARY

• The vegetative cover that wheat provided throughout the winter and early spring helped control of giant ragweed and marestail by limiting the number of plants when compared with the fallow areas.

• The low seeding rate in these studies provided equal control to the high seeding rate; consequently, it is believed a lower seeding rate of wheat is needed in order to find a minimum threshold for seeding rate.

• There was a strong trend in fewer giant ragweed and marestail in narrow rows than in the wide rows.

• In many cases wheat also improved weed control by limiting size of surviving weeds, especially giant ragweed.

• Row spacing had very little affect on height of giant ragweed and marestail.

• Limited results from the herbicide studies indicated the addition of 2,4-D and Clarity to Harmony Extra in the spring significantly improved giant ragweed and marestail control. Spring applications of Huskie alone or in combination with other herbicides provided at least 94% control of giant ragweed and marestail.

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Table 1. Density of Giant Ragweed and Marestail in Skip Rows and Harvest Rows of Wheat Seeded at a High Rate and a Low Rate. (UKREC 2009-2010, 2010-2011, and 2011-2012)

		Giant Ragweed Study[a] Density (Plants/100Ft^2)		Marestail Study[a] Density (Plants/100Ft^2)	
YEAR	**Seeding Rate**	Wide Row	Narrow Row	Wide Row	Narrow Row
2010	High	67 b	31 b	15 c	3 b
	Low	74 b	48 b	25 b	5 b
	Fallow	404 a		540 a	
2011	High	452 b	279 b	151 b	29 b
	Low	461 b	215 b	212 b	76 b
	Fallow	1,000a		1,238 a	
2012	High	72 b	60 b	629 b	47 b
	Low	55 b	42 b	372 b	13 b
	Fallow	501 a		5,349 a	

[a] Means with a different letter are statistically different when comparing yearly data within the wide row or narrow row to the fallow area

Table 2. Height of Surviving Giant Ragweed and Marestail Plants in Skip Rows and Harvest Rows of Wheat Seeded at a High Rate and a Low Rate. (UKREC 2009-2010, 2010-2011, and 2011-2012)

		Giant Ragweed Study [a] Plant Height (Inches)		Marestail Study [a] Plant Height (inches)	
YEAR	**Seeding Rate**	Wide Row	Narrow Row	Wide Row	Narrow Row
2010	High	24.6 c	22.8 c	13.3 a	14.1 a
	Low	25.1 b	26.6 c	14.6 a	17.3 a
	Fallow	63.4 a		18.1 a	
2011	High	20.7 b	17.5 b	6.2 c	3.1 b
	Low	22.7 b	18.1 b	8.2 b	3.6 b
	Fallow	29.8 a		10.6 a	
2012	High	7.6 b	4.9 b	5.75 b	9.4 a
	Low	7.3 b	8.4 b	6.75 b	10.4 a
	Fallow	25.8a		11.7 a	

[a] Means with a different letter are statistically different when comparing yearly data within the wide skip row or narrow row to the fallow area

Table 3. Wheat Stand Counts, Head Counts, and Yield for the High and Low Seeding Rates in Giant Ragweed and Marestail Studies. (UKREC 2009-2010, 2010-2011, and 2011-2012)

		Giant Ragweed Study			Marestail Study		
YEAR	**Seeding Rate**	Stand Counts (Plants/Ft^2	Head Counts (Heads/ft^2)	Yield (Bu/A)	Stand Counts Plants/Ft^2	Head Counts (Heads/ft^2)	Yield (Bu/A)
2010	High	23 a	71 a	92.8 a	29 a	101 a	105.7 a
	Low	15 b	71 a	87.6 a	16 b	94 a	108.6 a
2011	High	32 a	108 a	103.2 a	32 a	82 a	72 a
	Low	16 b	102 a	91.4 b	20 b	72 a	64.9 a
2012	High	34 a	97 a	100.2 a	41 a	97 a	117 a
	Low	19 b	88 a	98.3 a	19 b	86 a	113 a

[a] Means with a different letter are statistically different when comparing yearly data for the high seeding rate to the low seeding rate.

Table 4. Herbicide Trials on Broadleaf Weeds in No-till Wheat (2010-2011)[1]

Herbicide [2]	Rate	Timing	STUDY # 1			STUDY # 2	
			Henbit Control (%) (4-20-2011)	Honeyvine Milkweed Infestation (%) (06-10-2011)	Wheat Yield (Bu/A)	Dandelion Infestation (%) (06-10-2011)	Wheat Yield (Bu/A
Non-treated Check			0	12	87.4	49	66.8
Valor	2 oz/A	-7 Days EPP	-NA-	-NA-	-NA-	10	85.9
Finesse	0.5 oz/A	Pre	98	14	97.5	12	88
Finesse	0.4 oz/A	Fall Post	100	7	97.9	10	88
Peak	0.5 oz/A	Fall Post	63	5	85.8	20	86.7
Huskie	13.5 oz/A	Spring Post	89	8	97.5	2	86
Harmony Extra Clarity 2,4-D Ester	0.9 oz/A 4 oz/A 0.75 pt/A	Spring Post Spring Post Spring Post	90	9	89	3	80.6
Huskie Clarity	11 oz/A 4 oz/A	Spring Post Spring Post	91	10	86.2	12	83.5
LSD (0.05)			9	NS	NS	23	7.7

[1] Study # 1 was targeted for Giant Ragweed and Study # 2 was targeted for Marestail; however, infestations of giant ragweed and marestail were not sufficient to obtain meaningful evaluations. Henbit control ratings reflect percent reduction in biomass; whereas, infestation of honeyvine milkweed and dandelion represent percent infestation or ground cover occupied by these weeds.

[2] Roundup Weather Max was applied as a burndown in all treatments in the marestail study, but was not applied to the Giant Ragweed Study. Additives were included with treatments according to the herbicide labels. Dates for the Giant Ragweed Study were: Planting on 10-15-2010; Pre on 10-27-2010, Fall Post on 10-12-2010; and Spring Post on 3-18-2011. Dates for the Marestail study were: -7 Days Early Preplant on 11-05-2010; Planting and Pre on 11-12-2010; Fall Post on 12-10-2010; Spring Post on 4-8-2011.

Table 5. **Herbicide Options for Managing Marestail and Giant Ragweed in Wheat Prior to Double Crop Soybeans (UKREC – 2011-2012)**

Herbicide [1]	Timing [2]	GIANT RAGWEED STUDY				MARESTAIL STUDY			
		Giant Ragweed Control		Wheat		Marestail Control		Wheat	
		04-04-2011 (%)	04-18-2012 (%)	Test Wt (lb/Bu)	Yield (Bu/A)	04-18-2011 (%)	05-24-2012 (%)	Test Wt (lb/Bu)	Yield (Bu/A)
Valor (2 oz/A)	Epp	NA	NA	NA	NA	68	73	53.4	101
Valor (2 oz/A)	Ep (wheat 2-4Lf)	NA	NA	NA	NA	68	65	53.7	86.6
Finesse (0.5 oz/A)	Pre	0	0	57.6	103.3	65	68	53.7	95.9
Finesse (0.4 oz/A)	Fall Post	0	0	57.6	95.2	65	75	54.1	90.6
Peak (0.5 oz/A	Fall Post	0	0	57.2	93.3	63	63	54.2	98.1
Harmony Extra (0.9 oz/A)	Spr Post	80	83	57.9	101.2	83	78	53.9	94.3
Harmony Extra (0.9 oz/A) Clarity (4 oz/A) 2,4-D ester (0.75 pt/A)	Spr Post	100	100	58.1	83.1	94	95	54.1	92.7
Huskie (13.5 oz/A)	Spr Post	95	97	56.7	98.9	95	96	53.8	93.8
Huskie (15 oz/A)	Spr Post	97	98	57.4	94.7	99	99	54.1	99.3
Huskie (13.5 oz/A) Harmony Extra (0.9 oz/A)	Spr Post	95	98	57.5	97.7	99	99	54.4	97.5
Huskie (13.5 oz/A) Clarity (4 oz/A)	Spr Post	100	98	58.1	90.1	98	99	54.2	87
Huskie (13.5 oz/A) Osprey (4.75 oz/A)	Spr Post	95	95	56.9	98.2	95	94	53.9	89.8
Non-Treated		0	0	58.2	92.8	0	0	53.6	85
LSD $_{(0.05)}$		7	5	1.2	9.4	10	10	NS	NS

[1] Additives were included according to herbicide label.

[2] 10-10-11: Applied paraquat over entire study for preplant burndown.
10-13-11: Planted and applied Pre
11-17-11: Fall Post
03-19-12: Spr Post

[1] Additives were included according to herbicide label.

[2] 10-10-11: Applied paraquat over entire study for preplant burndown.
10-11-11: Epp
10-17-11: Planted wheat & applied Pre
11-17-11: Ep (2-4 Lf Wheat)
11-17-11: Fall Post
03-19-11: Spr Post