

## 2014 / 2015 Johnsongrass Control x Mowing Timing Trials

### *Introduction*

Johnsongrass (*Sorghum halepense*) is a perennial warm season grass, listed as a noxious weed in Kentucky (Kentucky Revised Statutes <http://www.lrc.state.ky.us/KRS/176-00/051.PDF>), and is a common problem on right-of-ways. There are a number of herbicides labeled and available to control johnsongrass on right-of-ways. A key to achieving high levels of johnsongrass control is translocation of the herbicide from the leaves to the rhizomes. However, routine mowing, as part of roadside management, could reduce johnsongrass control by removing leaf material along with the herbicide applied to it before translocation occurs. A practical question from managers is “How long after a herbicide application do we need to wait before mowing without reducing herbicide efficacy on johnsongrass?” We conducted a study in 2014 and repeated it in 2015 to answer this question.

### *Materials and Methods*

The study was initiated August 14, 2014 and repeated August 24, 2015 at an interchange near Bardstown KY. Four herbicide treatments (Outrider [sulfosulfuron] 0.25 oz/A, Fusilade II [fluazifop] 6 oz/A, Acclaim Extra [fenoxaprop] 2.8 oz/A, and Acclaim Extra plus Fusilade II [0.5 and 3.5 oz/A] were applied to 10 ft x 60 ft strips. Applications were made at 30 gallons per acre carrier volume and included either a surfactant or a crop oil concentrate (Table 1). The herbicide treatments were applied when johnsongrass plants were, on average, 36 inches tall with a range from 20 to 48 inches in 2014 while the average height was 36 inches with a range from 30 to 48 inches in 2015. Six mowing treatments, the same day as herbicide treatment, one day after herbicide treatment (AHT), 2 days AHT, one week AHT, two weeks AHT, or no mowing (Table 2) were performed as 10 ft x 40 ft strips across the herbicide treatments in a split block design, replicated three times in 2014 and four times in 2015. Mowing height was 4 inches. Visual assessments of percent johnsongrass control were done 34 (9/17/2014), 70 (10/23/2014), and 350 (7/30/2015) days after herbicide treatment (DAT) for the 2014 trial. Assessments were done 32 (9/25/2015), 45 (10/8/2015), and 53 (10/16/2015) DAT for the 2015 trial. Data were analyzed using ARM software and treatment means were compared using Fisher’s LSD at  $p = 0.05$ .

### *Results and Discussion*

In the 2014 trial, differences in johnsongrass regrowth between herbicide treatments were visible by 14 DAT (Figure 1). There was also an interaction between herbicide treatments and mowing after treatment. These differences were more evident 34 DAT (Table 3). Outrider provided greater control (83%) than the other three herbicides when the johnsongrass was mowed the same day as treatment. Because Outrider can be taken up from the soil as well as the leaves, delaying mowing may not be as critical as for Acclaim and Fusilade II which are only active (absorbed) through the leaves. In addition, it is possible the Outrider was translocated to the rhizomes more rapidly than Acclaim Extra or Fusilade II. However, Outrider provided less control than the other herbicide treatments 34 DAT when the johnsongrass was not mowed.

Control with Acclaim Extra was the most sensitive to mowing. Only by waiting two weeks before mowing was the control with Acclaim equivalent to no mowing 34 DAT. On the other hand, control 34 DAT with Fusilade II or Fusilade II plus Acclaim Extra was the same as the unmowed treatment if mowing was delayed for only one day.

Johnsongrass regrowth was visible in some of the treatment combinations 70 DAT and resulted in lower control ratings than 34 DAT, particularly in plots treated with Acclaim Extra, Fusilade II and Acclaim Extra plus Fusilade II that were mowed the same day as treatment (Table 4). However, there was no difference in control with Outrider between the mowing treatments. As at 34 DAT, mowing the same day as treatment did not reduce control with Outrider. Among the four herbicide treatments, the mowing delays needed for maximum control were as follows: Outrider, 0 days, Fusilade II and Fusilade II plus Acclaim Extra, 1 day, and Acclaim Extra, two weeks. With an appropriate delay in mowing, all treatments provided 88% or better control 70 DAT.

The next year, 350 DAT, the growth between replications for individual treatments was very variable making it difficult to statistically separate treatment effects. Control ranged between 43 to 92% for the top group of treatments (Table 5). Outrider gave the numerically highest control (55%) when mowing was done the same day as treatment. Some plots that had good johnsongrass control earlier had a smaller number of individual plants but they were larger and this resulted in lower visual control ratings. While not statistically significant, it appeared that a 1 or 2 day mowing delay after Fusilade II and Fusilade II plus Acclaim Extra application or a 1 to 2 week mowing delay after Acclaim Extra treatment were necessary for best johnsongrass control.

In the 2015 trial, regrowth of johnsongrass after mowing was slower than in 2014. One reason may be the timing of rainfall. There were 6.3 inches of rain in August 2014 but only 2.8 inches in August 2015 (long term rainfall average for August, for this region, is 3.5 inches). Environmental variability between years is one reason experiments should be conducted in more than one year. Overall control was higher in 2015 than 2014, especially for the Acclaim Extra treatment. Also, mowing after treatment in 2015, compared to 2014, had less effect on johnsongrass control from any treatment at any of the evaluation dates (32, 45 or 53 DAT). However, regrowth was less in 2015 45 DAT. A notable exception is loss of control from Acclaim Extra when mowed the same day (Tables 6 and 8). Final assessments will be done in 2016.

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**Table 1. Herbicide Treatments and Active Ingredients for Mowing x Johnsongrass Control Trial**

<b>Treatment</b>	<b>Product Name</b>	<b>Rate</b>	<b>Rate Unit</b>	<b>Active Ingredient(s)</b>	<b>ai Rate (per acre)</b>
1	Outrider Activator 90	1 0.25	OZ/A % V/V	sulfosulfuron	0.25 oz
2	Fusilade II Activator 90	24 0.25	FL OZ/A % V/V	fluazifop	6 oz
3	Acclaim Extra Activator 90	39 0.25	FL OZ/A % V/V	fexoxaprop	2.8 oz
4	Acclaim Extra Fusilade II COC	7 14 1	FL OZ/A FL OZ/A % V/V	fexoxaprop fluazifop	0.5 oz 3.5 oz

**Table 2. Timing of Mowing Treatments**

<b>Mowing Treatment</b>	<b>Timing of Mowing Treatment</b>
1	Same day as herbicide application
2	1 Day after herbicide application
3	2 Days after herbicide application
4	1 Week after herbicide application
5	2 Weeks after herbicide application
6	No Mowing

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**Table 3: Johnsongrass Control (%) 34 Days Treatment in 2014**

<b>Mowing Time after Application</b>	<b>Outrider</b>	<b>Fusilade II</b>	<b>Acclaim Extra</b>	<b>Acclaim + Fusilade</b>
Same day	83 <i>cd</i> <sup>1</sup>	39 <i>gh</i>	45 <i>g</i>	30 <i>h</i>
1 Day	97 <i>ab</i>	90 <i>abcd</i>	65 <i>f</i>	87 <i>bcd</i>
2 Days	98 <i>a</i>	91 <i>abcd</i>	68 <i>f</i>	91 <i>abcd</i>
1 Week	99 <i>a</i>	92 <i>abcd</i>	72 <i>ef</i>	93 <i>abc</i>
2 Weeks	99 <i>a</i>	95 <i>ab</i>	83 <i>cd</i>	93 <i>abc</i>
No Mowing	70 <i>f</i>	87 <i>bcd</i>	82 <i>de</i>	87 <i>bcd</i>

<sup>1</sup>Means followed by the same letter are not different according to Fisher's Protected LSD at  $P < 0.05$ .

**Table 4: Johnsongrass Control (%) 70 Days after Treatment in 2014**

<b>Mowing Time after Application</b>	<b>Outrider</b>	<b>Fusilade II</b>	<b>Acclaim Extra</b>	<b>Acclaim + Fusilade</b>
Same day	88 <i>ab</i> <sup>1</sup>	0 <i>f</i>	17 <i>ef</i>	14 <i>ef</i>
1 Day	99 <i>a</i>	94 <i>a</i>	37 <i>de</i>	96 <i>a</i>
2 Days	100 <i>a</i>	97 <i>a</i>	47 <i>cd</i>	98 <i>a</i>
1 Week	100 <i>a</i>	97 <i>a</i>	67 <i>bc</i>	99 <i>a</i>
2 Weeks	100 <i>a</i>	100 <i>a</i>	94 <i>a</i>	99 <i>a</i>
No Mowing	93 <i>a</i>	99 <i>a</i>	92 <i>a</i>	97 <i>a</i>

<sup>1</sup>Means followed by the same letter are not different according to Fisher's Protected LSD at  $P < 0.05$ .

**Table 5: Johnsongrass Control (%) 350 Days after Treatment in 2014**

<b>Mowing Time after Application</b>	<b>Outrider</b>	<b>Fusilade II</b>	<b>Acclaim Extra</b>	<b>Acclaim + Fusilade</b>
Same day	55 <i>abcdefgh</i> <sup>1</sup>	8 <i>h</i>	13 <i>gh</i>	40 <i>bcdefgh</i>
1 Day	75 <i>abcde</i>	78 <i>abc</i>	27 <i>efgh</i>	28 <i>defgh</i>
2 Days	68 <i>abcdef</i>	88 <i>ab</i>	35 <i>cdefgh</i>	50 <i>abcdefgh</i>
1 Week	72 <i>abcde</i>	92 <i>a</i>	43 <i>abcdefgh</i>	55 <i>abcdefgh</i>
2 Weeks	72 <i>abcde</i>	33 <i>cdefgh</i>	20 <i>fgh</i>	38 <i>cdefgh</i>
No Mowing	62 <i>abcdefg</i>	76 <i>abcd</i>	58 <i>abcdefg</i>	61 <i>abcdefg</i>

<sup>1</sup>Means followed by the same letter are not different according to Fisher's LSD at  $P < 0.05$ .

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**Table 6: Johnsongrass Control (%) 32 Days after Treatment in 2015**

<b>Mowing Time after Application</b>	<b>Outrider</b>	<b>Fusilade II</b>	<b>Acclaim Extra</b>	<b>Acclaim + Fusilade</b>
Same day	89 abcde <sup>1</sup>	89 abcd	84 cdef	86 bcdef
1 Day	94 ab	92 abc	97 a	95 ab
2 Days	95 ab	94 abc	97 a	95 ab
1 Week	95 ab	94 abc	95 ab	97 a
2 Weeks	97 a	95 ab	97 a	98 a
No Mowing	80 def	76 f	80 def	78 ef

<sup>1</sup>Means followed by the same letter are not different according to Fisher's Protected LSD at P < 0.05.

**Table 7: Johnsongrass Control (%) 45 Days after Treatment in 2015**

<b>Mowing Time after Application</b>	<b>Outrider</b>	<b>Fusilade II</b>	<b>Acclaim Extra</b>	<b>Acclaim + Fusilade</b>
Same day	90 ab <sup>1</sup>	90 ab	84 b	84 b
1 Day	90 ab	91 ab	92 ab	95 a
2 Days	92 ab	93 ab	94 ab	93 ab
1 Week	96 a	93 ab	93 ab	92 ab
2 Weeks	93 ab	93 ab	92 ab	87 ab
No Mowing	89 ab	89 ab	92 ab	84 b

<sup>1</sup>Means followed by the same letter are not different according to Fisher's LSD at P < 0.05.

**Table 8: Johnsongrass Control (%) 53 Days after Treatment in 2015**

<b>Mowing Time after Application</b>	<b>Outrider</b>	<b>Fusilade II</b>	<b>Acclaim Extra</b>	<b>Acclaim + Fusilade</b>
Same day	81 abc <sup>1</sup>	85 abc	72 c	75 bc
1 Day	83 abc	91 a	91 a	90 ab
2 Days	93 a	89 ab	90 ab	87 ab
1 Week	90 ab	86 abc	88 ab	93 ab
2 Weeks	87 ab	88 ab	89 ab	91 a
No Mowing	89 ab	87 ab	95 a	96 a

<sup>1</sup>Means followed by the same letter are not different according to Fisher's LSD at P < 0.05.

*Figure 1: Strip Mowed Same Day as Treatment 14 Days Afterwards in 2014 Trial.*

