

Effect of Timing of Mowing after Herbicide Application on Johnsongrass (Sorghum halepense L.) Control

Introduction

Johnsongrass is an invasive grass species distributed throughout continental United States. It is a common and problematic weed in forests, roadside rights-of-way, and pastures. Several herbicides have been shown to be effective at suppressing or controlling johnsongrass. Roadside vegetation managers have the unenviable task of timing herbicides applications along their rights-of-way in between mowing cycles. Lack of communication can confound this problem if one task, spraying for example, is performed by in house crews and mowing is performed by contract crew. A study was initiated in the summer of 2007 to examine the effect that timing of mowing johnsongrass after a herbicide application would have on herbicide efficacy.

Methods and Materials

The trial was located at the University of Kentucky Spindletop Farm in Fayette County, Kentucky in a moderately uniform and dense stand of johnsongrass. The study design was a 2-way factorial with timing of mowing after herbicide application and herbicide application as the 2 factors. Timing of mowing included same day after herbicide application, 24 hours after application (HAA), 48 HAA, 1 week after application (WAT), 2 WAT, and no mowing after application. Herbicide application was Outrider at 0.5 oz / ac or 1 oz / ac. Twelve treatments with 4 replications were marked off in 10' X 30' plots. The plots were treated with 2,4-D amine at 2 qt / ac approximately 3 weeks before the Outrider application to prevent broadleaf weeds from being released. Outrider applications were made June 12, 2007 with mowing regimes beginning immediately after. An 8' mower was used in the 10' plots which allowed for an unmowed but treated running check for comparison and evaluation. Plots were evaluated 37, 71, and 92 days after treatment (DAT) for visual percent control of johnsongrass. Data were analyzed using ARM software for factorial analysis and treatment means were separated using Fishers LSD at $p = 0.05$.

Results

Due to the 2-way factorial design of this trial, results will be discussed in 3 parts: effect of mowing on johnsongrass control, effect of herbicide rate on johnsongrass control, and the combined effect of the 2 factors on johnsongrass control.

Effect of Timing of Mowing Regardless of Herbicide Treatment

Johnsongrass control levels ranged from 80 % to 91 % at 37 DAT (Table 1). Mowing did not have a significant treatment effect at this time ($p(F) > 0.05$). Control levels resulting from mowing 24 HAA were lower than those of mowing 48 HAA, 1 WAT, and the no mowing treatments. A significant treatment effect from timing of mowing did appear at 71 and 91 DAT ($p(F) < 0.05$). Control levels ranged from 11 %

(mowing immediately after application) and 59 % (no mowing after application). Mowing immediately after application resulted in lower control than all other mowing timings except 24 HAA. At 91 DAT, mowing immediately after application or 24 HAA resulted in the lowest control levels at 11 % for both timings. The highest levels of control were realized with the 48 HAA and the no mowing timings (45 % and 42 %, respectively) and were higher than the immediately following application and the 24 HAA timings. Regardless of mowing timing, johnsongrass control decreased from 37 DAT through 92 DAT. This is attributed to the extreme drought that occurred in the summer of 2007 and its effects on herbicide efficacy.

Table 1: Results and statistics for timing of mowing after herbicide application on johnsongrass control

Mowing Timing	Percent Control of Johnsongrass		
	37 DAT	71 DAT	92 DAT
Immediately	84	11	11
24 HAA	80	26	11
48 HAA	89	49	45
1 WAT	91	50	32
2 WAT	87	39	20
No Mowing	89	59	42
<i>LSD</i> _(0.05)	7.6	21.8	25.6
<i>Treatment prob(F)</i> _{0.05}	0.0637	0.0008	0.0305

Effect of Herbicide Treatment Regardless of Mowing Timing

Johnsongrass control levels with Outrider at 1 oz / ac were significantly higher than Outrider at 0.5 oz / ac at 37, 71, and 92 DAT (Table 2). These results coincide with past research on Outrider efficacy trials on johnsongrass control. A significant treatment effect was present for herbicide application throughout the entire trial as well. As with timing of mowing above, control levels decreased throughout the trial, regardless of herbicide rate. This again is attributed to the drought in 2007.

Table 2: Results and statistics for herbicide application on johnsongrass control

Treatment	Rate per acre	Percent control of johnsongrass		
		37 DAT	71 DAT	92 DAT
Outrider	0.5 oz / ac	81	22	12
Outrider	1 oz / ac	93	57	42
<i>LSD</i> _(0.05)		4.4	12.8	14.8
<i>Treatment prob(F)</i> _{0.05}		0.0001	0.0001	0.0002

Note: Herbicide treatments included a non-ionic surfactant at 0.25% v/v.

Effect of timing of mowing in combination with herbicide treatment

There was no significant treatment interaction between mowing and herbicide at any time during the entire trial ($\text{prob}(F) > 0.05$) (Table 3). This allows the treatments listed below to be statistically compared. Trends in data follow the same trends presented above. There were high levels of control noted at 37 DAT and these levels all decreased

throughout the trial regardless of combination of mowing and herbicide treatment. Control levels appear to be the highest from the high rate of Outrider and waiting at least 48 HAA for mowing.

Table 3: Results and statistics for the effect of timing of mowing after herbicide application on johnsongrass control

Mowing timing	Outrider rate per acre	Percent control of johnsongrass		
		37 DAT	71 DAT	92 DAT
Immediate	0.5 oz / ac	78 de	3 d	0 d
Immediate	1 oz / ac	90 abc	20 cd	26 bcd
24 HAA	0.5 oz / ac	69 e	5 d	3 d
24 HAA	1 oz / ac	91 abc	46 abc	20 bcd
48 HAA	0.5 oz / ac	83 cd	30 cd	25 bcd
48 HAA	1 oz / ac	96 a	68 ab	65 a
1 WAT	0.5 oz / ac	86 a-d	39 bc	15 cd
1 WAT	1 oz / ac	95 a	61 ab	50 abc
2 WAT	0.5 oz / ac	83 bcd	5 d	0 d
2 WAT	1 oz / ac	91 abc	73 a	40 abc
No mow	0.5 oz / ac	85 a-d	48 abc	30 a-d
No mow	1 oz / ac	94 ab	71 a	54 ab

Recommendation

The drought of 2007 confounded the results of this trial and will therefore be repeated in 2008. However, trends are apparent in the data presented above that indicates that extending the time period between herbicide application and mowing of johnsongrass beyond 48 hours will improve efficacy versus less than 24 hour. The best control of johnsongrass will undoubtedly result from not mowing the treated stand of johnsongrass in the same season as herbicide application.