Comparison of Non-crop Herbicides for Johnsongrass (Sorghum halapense L.) Control

Introduction

Johnsongrass is a perennial warm season grass common to row-crop, pasture, and right-of-way sites. There are a large number of herbicides labeled and available for control in all of these sites. These range for the nonselective herbicide glyphosate, grass specific (ACCase family) herbicides such as clethodim, fluazifop, and fenoxyprop, and broadleaf and grass herbicides such as imazapyr and imazapic. All of the products available for johnsongrass control can be effective; however, each 'group' does come with some limitations. For example, glyphosate is nonselective and will damage all vegetation it comes in contact with. The ACCase herbicides can damage fescue, bluegrass, or other desirable grasses if treated. Imazapyr and imazapic can damage desirable species as well as be persistent in the soil environment. Given that each 'group' has limitations a trial was installed to compare several herbicides for johnsongrass control. The trial was designed to compare several herbicides from the aforementioned groups for strictly johnsongrass control. This may allow the end-user to decide which herbicide(s) would be appropriate for a given site.

Methods and Materials

The study was located at the University of Kentucky Research and Education Center in Princeton, KY. Previous management was a wheat research field that had been recently harvested and remaining vegetation mowed. The site was dominated by johnsongrass, volunteer wheat from the previous crop, and tall fescue. Sixteen treatments were installed in a RCBD with 3 replications with plots measuring 10' X 30'. Applications were made on August 14, 2007 using a CO_2 powered sprayer mounted on an ATV. Johnsongrass was approximately 6 – 10 inches tall when treated. The site was under extreme drought conditions prior and following application. Plots were evaluated for visual percent control at 9 and 28 DAT. Data were analyzed using ARM and treatment means were separated using Fisher's LSD at $p = 0.05$.

Results

Arsenal at 2 pt / ac provided the highest level of control (75 %) 9 DAT (Table1). There was a high degree of variance noted at this evaluation interval as the Arsenal treatment was only significantly higher than 2 other treatments, Fusion at 7 fl oz / ac an Envoy at 13 fl oz / ac, 9 DAT. This result did not persist 28 DAT as control levels for Arsenal decreased to 63 % and was not statistically different than any other treatment at that evaluation interval.

All 3 rates of Outrider tested resulted in consistent levels of control (45 – 50 %) 9 DAT; however all 3 rates decreased in control at 28 DAT (Table 1). The high rate of Fusion tested, 7 fl oz / ac, resulted in higher, although not statistically different, control levels than Fusion at 7 fl oz / ac 9 DAT. This difference was not apparent 28 DAT as both rates of Fusion resulted in 50 – 55% control. There was no statistical difference

between the 3 rates of Envoy 9 DAT and the only treatment to increase in control from 9 DAT to 28 DAT was the high rate of Envoy, 27 fl oz / ac.

There were no statistical differences between the 3 rates of Roundup Pro tested 9 DAT and all 3 treatments decreased in control from 9 to 28 DAT (Table 1). Plateau at 12 fl oz / ac and Journey at 32 fl oz / ac resulted in similar control (45 % for each) at 9 DAT. Plateau increased its control levels to 58 % 28 DAT while Journey held steady at 45 % 28 DAT. This may be indicative of the higher concentration of imazapic in 12 fl oz of Plateau as compared to 32 fl oz of Journey as well as the relatively low concentration of glyphosate in 32 fl oz of Journey as compared to 48 fl oz of Roundup Pro although no statistical difference existed between any Roundup Pro treatment, Plateau, or Journey at 28 DAT. The 2 rates of MSMA tested, 32 and 64 fl oz / ac, showed similar results 9 DAT (58 and 63 % respectively). The higher rate of MSMA decreased in control 28 DAT more drastically than the low rate of MSMA although no statistical difference was apparent.

The severe drought in western Kentucky in 2007 affected the results of this trial. A high degree of variability was noted especially at 28 DAT. This trial, although not resulting in the expected control levels, does show what effects an extreme drought can have on herbicide efficacy. It is the intent of researchers at the University of Kentucky to repeat this trial in the summer of 2008.

Table 1: Treatments and Results for Western Kentucky Johnsongrass Trial

Treatment	Rate per acre	Percent control	
		9 DAT	28 DAT
Outrider	0.5 oz	50 abc	38 a
Outrider	0.75 oz	45 abc	41 a
Outrider	1 oz	48 abc	35 a
Fusion	7 fl oz	28 c	50 a
Fusion	9 fl oz	45 abc	55 a
Envoy	13 fl oz	40bc	40 a
Envoy	20 fl oz	58 abc	45 a
Envoy	27 fl oz	53 abc	60 a
Roundup Pro	16 fl oz	66 ab	58 a
Roundup Pro	32 fl oz	55 abc	40 a
Roundup Pro	48 fl oz	65 ab	55 a
Arsenal	3 pt	75 a	63 a
Plateau	12 fl oz	45 abc	58 a
Journey	32 fl oz	45 abc	45 a
MSMA	32 fl oz	58 abc	50 a
MSMA	64 fl oz	63 ab	33 a

Note: Treatment means in same column followed by the same letter are not statistically different using Fisher's LSD at p = 0.05. All treatments except Roundup Pro included NIS at 0.25 % v/v.