Effect of Timing of Application with Imazapyr and Fosamine for Japanese Knotweed Control

Introduction

Japanese knotweed is a perennial herbaceous to semi-woody plant common in eastern and central Kentucky. This invasive plant has prolific reproduction capabilities from seed or rhizomatous sprouts with sprouts being more problematic. Dense stands of knotweed can form along roadsides decreasing line of sight and aesthetic value. Mowing of infestations will increase stand density and promote the spread and establishment of new stands via cutting transport and deposit.

The majority of Japanese knotweed roadside infestations in eastern Kentucky occur on two lane secondary roads where encroaching brush can compound the line of sight issue. It would be beneficial to have a control option for Japanese knotweed in a roadside setting that could provide a secondary benefit such as encroaching brush control. Krenite (a.i. fosamine) is the primary tool used for roadside brush control as it prevents unsightly brownout issues and is an excellent chemical side trimming option for several hardwood and coniferous species.

Chemical control options have included glyphosate and imazapyr. Research performed at the University of Kentucky in 2005 showed 95 % control of Japanese knotweed 1 YAT with 3 pt / ac of Habitat® (a.i. imazapyr) applied at 50 GPA in June (Blair and Witt 2006). Combinations of imazapyr and fosamine have been shown to provide greater than 90 % control of knotweed when applied late in the growing season (Hipkins and Witt 2003). A trial in 2006 to examined the effect that timing of imazapyr and fosamine applications for Japanese knotweed control.

Methods and Materials

The study area was located on a roadside in Perry County, KY. Plots were 30' long X 10' deep. The entire study area was evenly populated with Japanese knotweed approximately 5-8 feet tall at initiation. All applications were made with a CO_2 sprayed mounted on an ATV using a TeeJet® BoomJet nozzle at 50 GPA.
Seven herbicide treatments were installed in a randomized complete block design with three replications. All treatments included Activator surfactant at 0.25 % v/v. The trial consisted of two treatments (Habitat alone and Habitat tank mixed with Krenite) applied at three different times (May, July, and August) and one treatment (Aquamaster) applied once (Table 1). The original study design was for the same rates of the three timing treatments; however, a clerical error changed the trial for a Habitat / Krenite treatment at 1 % v/v and 4 % v/v respectively in May while the July and August treatments were applied at 1 % v/v and 1 % v/v respectively.

Data collected were visual percent control of Japanese knotweed at each application timing and at the end of the growing season. Data were analyzed using ANOVA with Fisher's LSD test at p = 0.05 for treatment mean separation. Treatments not applied (i.e. July and August) were removed from analysis at appropriate evaluation times.

Results

May Applications

There was no significant difference in the May applied treatments at 42 DAT (Table 1). Control (i.e. leaf necrosis) levels ranged form 15 % (Habitat alone) to 28 % (Habitat plus Krenite at 4 %). These control levels increased to 55 % and 72 % respectively at 97 DAT. The Aquamaster alone treatment increased control to 37 % at 97 DAT and this was significantly lower than the Habitat / Krenite tank mix. The Habitat at 1 % plus Krenite @ 4 % tank mix again provided significantly higher control than the Aquamaster treatment 134 DAT. The Habitat alone treatment resulted in 77 % control 134 DAT; this was statistically similar to the Habitat / Krenite tank mix and the Aquamaster alone treatments.

July Applications

There were no significant differences among the treatments applied in July when evaluated 36 DAT (Table 1). The Habitat alone treatment and the Habitat plus Krenite at 1 % tank mix treatment resulted in 28 and 32 % control respectively. These treatments increased control to 60 and 80 % control, respectively, when evaluated 72 DAT. There was no significant difference among the treatments applied in May when evaluated on August 21 (97 DAT) and treatments applied in July when evaluated on August 21 (36 DAT). When evaluated in September (134 DAT for the May applications and 72 DAT for the July applications), the Habitat and Krenite at 4 % tank mix applied in May (91 %) was significantly higher than Aquamaster treatment applied in May (55 %) and the Habitat alone treatment applied in July (60 %).

August Applications

The Habitat alone treatment applied in August (32 %) was significantly lower than the Habitat / Krenite tank mix applied in August (72 %) when evaluated 37 DAT. The Habitat / Krenite at 1 % tank mix applied in August resulted in statistically similar results as the Habitat / Krenite at 4 % tank mix when applied in May. The August applied tank mix also resulted in a higher control level at 37 DAT (72 %) than the May application of the 4 % tank mix when evaluated 42 DAT (28 %).

Summary

There appears to be some benefit to applying the Habitat / Krenite tank mix late in the season as compared to early in the season for rapid burndown of Japanese knotweed. The Habitat alone treatment applied in May did provide statistically similar results as the tank mixes applied in May, July, and August; however, the Habitat alone treatment applied in August resulted in significantly lower control that the tank mixes applied at all three timings. This is indicative to the slow burndown effect that imazapyr has shown in the past on most species.

The trial will be reevaluated 1 YAT to determine control levels of application timings.

Table 1: Summary Statistics for Japanese Knotweed Control

Trt No.	Type	Treatment Name	Rate	Rate Unit	Appl Description			
						42 DAT	97 DAT	134 DAT
1	HERB	Habitat	1	% V/V	MAY	15a	55a	77ab
	ADJ	NIS	0.25	% V/V	MAY			
2	HERB	Habitat	1	% V/V	MAY	28a	72a	91a
	HERB	Krenite	4	% V/V	MAY			
	ADJ	NIS	0.25	% V/V	MAY			
							36 DAT	72 DAT
3	HERB	Habitat	1	% V/V	JULY		28a	60bc
	ADJ	NIS	0.25	% V/V	JULY			
4	HERB	Habitat	1	% V/V	JULY		32a	80ab
	HERB	Krenite	1	% V/V	JULY			
	ADJ	NIS	0.25	% V/V	JULY			
								37 DAT
5	HERB	Habitat	1	% V/V	AUGUST			32c
	ADJ	NIS	0.25	% V/V	AUGUST			
6	HERB	Habitat	1	% V/V	AUGUST			72ab
	HERB	Krenite	1	% V/V	AUGUST			
	ADJ	NIS	0.25	% V/V	AUGUST			
						42 DAT	97 DAT	134 DAT
7	HERB	Aquamaster	2	% V/V	MAY	27a	37a	55bc
	ADJ	NIS	0.25	% V/V	MAY			
LSD (P=.05)						14.6	45.2	29.3
Standard Deviation						6.5	24.0	16.5
CV						27.66	53.7	24.72
Grand Mean						23.33	44.67	66.57
Bartlett's X2						0.332	6258	4.235
P(Bartlett's X2)						0.847	0.181	0.645
Replicate F						0.800	0.055	0.431
Replicate Prob(F)						0.5102	0.9468	0.6596
Treatment F						3.800	1.741	4.246
Treatment Prob(F)						0.1189	0.2338	0.0159

Means followed by same letter do not significantly differ (P=.05, LSD)

Literature Cited

Blair, M.P. and Witt, W.W. 2006. Evaluation of Imazapyr, Glyphosate, and Triclopyr for Japanese Knotweed (Polygonum cuspidatum Seib. & Zucc.) Control. In: *Noncrop and Industrial Vegetation Management Weed Science 2005 Annual Research Report. Information Note 2006 NCVM-1.*

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