Chemical Control of Kudzu (*Pueraria lobata)*

Introduction

Kudzu is an invasive vine native to Japan and China. This species has become naturalized across the southeastern United States and is a severe problem for land managers due to its rapid growth rate and prolific seed production. Control options have been researched heavily in the past 50 years and have included biological control (e.g. goats and seed weevils), chemical control, and structural modification to prevent climbing of the vine.

Although it is unclear exactly how many of acres of Kentucky are infested with Kudzu, there are an estimated 12 million acres in the southern United States. The problem in Kentucky is not as severe as other southern states such as Alabama and Georgia, but it is clear that left unchecked, the problem could be just as great in the near future. To make matters worse, it has been realized that kudzu is a host to soybean rust that has wreaked havoc in South America. It is estimated that this rust will spread in the United States within five years further strengthening the need for kudzu control here in Kentucky.

There are many chemical control options available to deal with kudzu infestations. James Miller (2003) has recommended the following from July through October for successive years on regrowth for complete control: Tordon 101M @ 3 % v/v (a.i. picloram), Torkon K @ 2 % v/v (a.i. picloram), Escort @ 3-4 oz / ac (a.i. metsulfuron), and Transline @ 0.5 % v/v (a.i. clopyralid). Transline controls a narrow spectrum of species and is desirable when nontarget species are present.

The purpose of this trial was to determine efficacy of several compounds to could be used to provide an initial significant burndown of a kudzu infestation. Since eradication of a kudzu infestation will undoubtedly require a multiseasonal approach, an effective initial burndown of the entire area will allow the manager to better understand the scope of the infestation and landscape he or she is dealing with. This may allow for a more site specific follow-up treatment that may be more effective in eradicating the species in a timely and cost effective manner.

Methods and Materials

The study site was located at the KenLake State Park in Marshall County, Kentucky. The area infested was alongside a paved road with the topography sloping downward on either side of the road. A randomized complete block design was installed with three replications (blocks being replicates) with plots being 15' X 30'. Eight chemical treatments and one untreated control (Table 1) were applied on June 29th, 2004 using an ATV equipped with a CO_2 sprayer. A TeeJet boomless tip (size 25) was used to provide a roadside application at 50 GPA. All treatments except for the RoundUp Pro treatment included a nonionic surfactant at 0.5% v/v. All plots had 100% cover of kudzu at application. Evaluations of the plots were conducted at 37 and 82 DAT where visual estimation of percent control (0 – 100 %) was determined. Data were analyzed using ARM software and untreated control measurements were removed from analysis to reduce error variance (all untreated plots had 0 % control). Data failed to pass Bartlett's

test for homogeneity of variance and was transformed using the arcsine transformation to reduce this variance. Results presented here show the untransformed treatment means and transformed data treatment means comparisons. Treatment means were compared using Fisher's LSD at p = 0.05.

Table 1: Treatment list for kudzu trial in KenLake State Park

Treatment	Compounds	Active Ingredients	Rate per acre	Estimated cost per acre
1	Grazon P & D	Picloram + 2,4-D	1 gal	$36.00
2	Escort	Metsulfuron	4 oz	$75.00
3	Banvel + 2,4-D	Dicamba + 2,4-D	96 fl oz	$22.50
4	Stinger	Clopyralid	21 fl oz	$52.00
5	Garlon 4	Triclopyr	2 gal	$175.00
6	Round Up Pro + Arsenal	Glyphosate + imazapyr	1 gal + 16 fl oz	$77.00
7	BK 800	Isoctyl ester of 2,4-D + ethylhexyl ester of 2,4-D + dicamba	2 gal	$98.00
8	Confront	Triclopyr + clopyralid	32 fl oz	$35.00
9	Untreated			

Non-crop labeled products were not available for some of the treatments. As such, Grazon P & D was used in place of Tordon 101M, Stinger was used in place of Transline, and Confront was used in place of Redeem R & P. Costs per acre are included in Table 1 and are **estimated** based on retail costs of the non-crop products.

Results

Grazon P & D, Escort, and Garlon 4 treatments resulted in percent control ratings greater than 90% by 82 DAT (Table 2). The Escort, Banvel, Garlon 4, BK 800, and Confront treatments provided excellent initial burndown at 37 DAT; however, the Banvel, BK 800, and Confront treatments regressed in percent control as the trial continued. Stinger never provided control greater than 68 % through the study. The RoundUp + Arsenal treatment provided satisfactory control at 37 DAT but decreased severely as the trial progressed.

Although the Grazon P & D, Escort, and Garlon 4 treatments produced similar efficacy results, the Escort treatment is recommended for initial burndown for cost considerations (as compared to Garlon 4) and environmental conditions (as compared to Grazon P & D). It is unclear why the clopyralid (Stinger) treatments resulted in low percent control values as clopyralid has been shown to be effective in reducing kudu cover to 3% by 8 WAT (Rader and Harrington 1998). Follow up treatments for regrowth may include Garlon 4 at a 2 % v/v solution for spot spraying or possibly a clopyralid (Transline) solution at 0.5 % v/v.

This study will be re-evaluated in the spring of 2005 to determine residual efficacy of the treatments and possibly retreatment of the plots with follow-up spot treatments.

Table 2: Summary results for Kenlake kudzu trial

Trt No.	Type	Treatment Name	Rate	Rate Unit	Visual Percent Control 37 DAT		82 DAT	
1	HERB	Grazon P & D	1	gal/a	86	a	95	ab
	ADJ	NIS	0.5	% v/v				
2	HERB	Escort	4	oz/a	98	a	96	ab
	ADJ	NIS	0.5	% v/v				
3	HERB	Banvel + 2,4-D	96	fl oz/a	93	a	78	ab
	ADJ	NIS	0.5	% v/v				
4	HERB	Stinger	21	fl oz/a	67	b	68	bc
	ADJ	NIS	0.5	% v/v				
5	HERB	Garlon EC	2	gal/a	98	a	99	a
	ADJ	NIS	0.5	% v/v				
6	HERB	Roundup Pro	1	gal/a	85	ab	37	c
	HERB	Arsenal 2	16	fl oz/a				
7	HERB	BK 800	2	gal/a	96	a	72	abc
	ADJ	NIS	0.5	% v/v				
8	HERB	Confront	32	fl oz/a	93	a	73	abc
	ADJ	NIS	0.5	% v/v				
9	CHK	Untreated Check			0		0	

Note: Treatment means followed by the same letter at the same time interval are not statistically significantly different using Fisher's LSD at p = 0.05.

Literature Cited

Miller, J.H., 2003. Nonnative invasive plants of southern forests. USDA Forest Service Southern Research Station. GTR SRS-62. p. 81.