

## 2014 / 2015 Kudzu Control Trial

### *Introduction*

Kudzu (*Pueraria montana*) is an invasive deciduous twining, trailing, mat-forming, woody leguminous vine that forms dense infestations along forest edges, rights-of-way, old homesteads, and stream banks. It colonizes by vines rooting at nodes and spreads by seed dispersal. The plants have extensive root systems with large tuberous roots that can be 3 to 10 feet deep. Kudzu can dominate a site to the exclusion of other vegetation. Repeated herbicide applications, along with other management measures, are required to reduce the kudzu infestations. Vegetation managers in many states use picloram for kudzu control but it has not been used extensively in KY in recent years. This trial evaluated the efficacy of some potential alternate herbicide options to picloram for kudzu control.

### *Materials and Methods*

This study was initiated on June 24, 2014 by mowing a kudzu-infested abandoned tobacco field near Beattyville KY. The field had been burned in March, 2014 and the dominant vegetation was a mix of kudzu and giant ragweed at the time of mowing. Plots that were 30 feet by 30 feet with 10 foot alleys separating them and were arranged in a 10 treatment randomized complete block design with three replications. On July 25, 2014, after kudzu regrowth, 9 herbicide treatments were applied in 30 gallons per acre carrier. The average kudzu canopy height was 14 inches with a range of 9 to 18 inches. Two of the treatments (Garlon 1.5 gal/A and Rodeo 4 qt/A) were reapplied on September 25, 2014. These same treatments were reapplied on July 23 and September 24 in 2015. We will take final assessments in 2016.

Table 1 lists the treatments, active ingredients and application rates. All treatments were applied at the maximum annual amount specified on the herbicide product label. Garlon 3A and Rodeo can be applied more than once per year so one treatment of each (Treatments 4 and 6) received half the maximum rate in July and again in September. Most treatments included a non-ionic surfactant (Activator 90) at 0.5% v/v except for the Streamline treatment that included methylated seed oil (MSO) at 1% v/v. Visual assessments of percent kudzu control and green vegetative cover (0-100%) were done 32 (8/26/2014) and 62 (9/25/2014) days after initial treatment (DAIT) in 2014. Visual assessments of percent green vegetative cover by kudzu, grasses, and other broadleaves, as well as percent bare ground, were done 363 (7/23/2015) and 426 (9/24/2015) DAIT in 2015. Data were analyzed using ARM software and treatment means were compared using Fisher's LSD at  $p = 0.05$ .

### *Results and Discussion*

In 2014, all the treatments, with the exceptions of Transline and Patron 170, controlled kudzu 98% or better 32 DAIT (Table 2). Control with Transline and Patron 170 was still good 32 DAIT, but only 92%. However, by 62 DAIT, control with Patron 170 declined to 72% while control with Transline was 96% (Table 2). Streamline, Garlon 3A (either as a single or split application), and Opensight all resulted in better control (99-100%) than Transline or Patron 170 62 DAIT. Control with Rodeo (either as a single or split application, 99 and 98%, respectively)

and BK 800 (98%) 62 DAIT was higher than Patron 170 but not significantly different than the other treatments.

Transline and Patron 170 allowed for more regrowth of vegetation than the other treatments, 83 and 70% green vegetation cover, respectively, 32 DAIT (Table 2). However, by 62 DAIT, these treatments, as well as the split Garlon treatment, both Rodeo treatments, and BK 800 had green vegetation cover equal to that of the untreated plots (Table 2). Streamline was the most injurious to other vegetation (13% green cover) followed by Opensight (63% green cover) and the single application (1.5 gal/A) of Garlon (80% green cover).

At the time of the first assessment and reapplication of the treatments in 2015 (363 DAIT), Patron 170 had 83% kudzu cover (Table 3) while the other treatments ranged from 28 to 4% cover. Annual grasses and other broadleaf species covered the areas not dominated by kudzu. Streamline had the most bare ground (21%).

Sixty-three days after the 2015 applications and 426 days after the initial treatments in 2014, the kudzu cover was 67% in plots treated with Patron 170, 8% with Transline and 0-3% for the other herbicide treatments (Table 4). There was 77-93% annual grass cover in the Garlon 3A, Opensight, and BK 800 treatments. Broadleaf cover was highest (73-77%) in plots with either of the two Rodeo treatments. Streamline resulted in higher bare ground than with Transline, Garlon 3A, Opensight, BK800, the split Rodeo treatment or Patron 170 but not the Rodeo at 8 qt/A.

In summary, Transline, Streamline, Garlon 3A, Rodeo, Opensight, and BK 800 provided excellent kudzu control at the end of after two applications spaced one year apart. Patron 170 would not be a recommended treatment for kudzu control. We will make final assessments in 2016.

Minogue, P.J., S.F. Enloe, A. Osiecka, and D.K. Lauer. 2011 Comparison of aminocyclopyrachlor to common herbicides for kudzu (*Pueraria montana*) management. *Invasive Plant Sci. Management*. 4: 419-426.

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**Table 1. Treatments and Active Ingredients for Kudzu Control Trial**

Treatment	Product Names	Rate	Rate Unit	2014/15 Application Dates	Active Ingredient(s)	ai Rate (per acre)
1	Transline Activator 90	21 0.5	FL OZ/A % V/V	7/25/2014 7/23/2015	clopyralid	7.9 oz ae
2	Streamline COC	11.5 1	OZ/A % V/V	7/25/2014 7/23/2015	aminocyclopyrachlor + metsulfuron	4.5 oz + 1.4 oz
3	Garlon 3A Activator 90	3 0.5	GAL/A % V/V	7/25/2014 7/23/2015	triclopyr	9 lb ae
4	Garlon 3A Activator 90 Garlon 3A Activator 90	1.5 0.5 1.5 0.5	GAL/A % V/V GAL/A % V/V	7/25/2014 7/23/2015 9/25/2014 9/24/2015	triclopyr triclopyr	4.5 lb ae 4.5 lb ae
5	Rodeo Activator 90	8 0.5	QT/A % V/V	7/25/2014 7/23/2015	glyphosate	8 lb ae
6	Rodeo Activator 90 Rodeo Activator 90	4 0.5 4 0.5	QT/A % V/V QT/A % V/V	7/25/2014 7/23/2015 9/25/2014 9/24/2015	glyphosate glyphosate	4 lb ae 4 lb ae
7	Opensight Activator 90	3.3 0.5	OZ/A % V/V	7/25/2014 7/23/2015	aminopyralid + metsulfuron	1.7 oz ae + 0.3 oz
8	BK 800 Activator 90	2 0.5	GAL/A % V/V	7/25/2014 7/23/2015	2,4-D + 2,4-DP + dicamba	3.78 lb ae + 1.88 lb ae + 0.94 lb ae
9	Patron 170 Activator 90	6.9 0.5	PT/A % V/V	7/25/2014 7/23/2015	2,4-D + 2,4-DP	1.47 lb ae + 0.75 lb ae
10	Untreated Check					

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**Table 2: Results for Kudzu Control Trial (2014)**

Treatment	Product Names	Rate	Rate Unit	2014 Application Date	% Kudzu Control		% Green Vegetation Cover	
					32 DAT <sup>1</sup>	62 DAT	32 DAT	62 DAT
1	Transline Activator 90	21 0.5	FL OZ/A % V/V	7/25	92 <i>b</i> <sup>2</sup>	96 <i>b</i>	83 <i>ab</i>	100 <i>a</i>
2	Streamline COC	11.5 1	OZ/A % V/V	7/25	100 <i>a</i>	100 <i>a</i>	2 <i>e</i>	13 <i>d</i>
3	Garlon 3A Activator 90	3 0.5	GAL/A % V/V	7/25	100 <i>a</i>	100 <i>a</i>	10 <i>de</i>	80 <i>b</i>
4	Garlon 3A Activator 90	1.5 0.5	GAL/A % V/V	7/25	98 <i>a</i>	100 <i>a</i>	38 <i>c</i>	97 <i>a</i>
	Garlon 3A Activator 90	1.5 0.5	GAL/A % V/V	9/25				
5	Rodeo Activator 90	8 0.5	QT/A % V/V	7/25	100 <i>a</i>	99 <i>ab</i>	25 <i>cde</i>	97 <i>a</i>
6	Rodeo Activator 90	4 0.5	QT/A % V/V	7/25	98 <i>a</i>	98 <i>ab</i>	30 <i>cd</i>	96 <i>a</i>
	Rodeo Activator 90	4 0.5	QT/A % V/V	9/25				
7	Opensight Activator 90	3.3 0.5	OZ/A % V/V	7/25	98 <i>a</i>	99 <i>a</i>	18 <i>cde</i>	63 <i>c</i>
8	BK 800 Activator 90	2 0.5	GAL/A % V/V	7/25	99 <i>a</i>	98 <i>ab</i>	28 <i>cd</i>	98 <i>a</i>
9	Patron 170 Activator 90	6.9 0.5	PT/A % V/V	7/25	92 <i>b</i>	72 <i>c</i>	70 <i>b</i>	100 <i>a</i>
10	Untreated Check				0 <i>c</i>	0 <i>d</i>	100 <i>a</i>	100 <i>a</i>

<sup>1</sup> DAT = Days after treatment

<sup>2</sup> Means within a column followed by the same letter are not different according to Fisher's Protected LSD at  $P < 0.05$ .

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**Table 3: Results for Kudzu Control Trial (2015) (before 2015 applications 363 DAIT)**

Treatment	Product Names	Rate	Rate Unit	% Vegetation Cover			
				% Kudzu	% Grass	% Other Broadleaves	% Bare Ground
1	Transline Activator 90	21 0.5	FL OZ/A % V/V	28 <i>b</i> <sup>2</sup>	38 <i>abc</i>	33 <i>abcd</i>	0 <i>b</i>
2	Streamline COC	11.5 1	OZ/A % V/V	4 <i>c</i>	36 <i>abc</i>	40 <i>abc</i>	21 <i>a</i>
3	Garlon 3A Activator 90	3 0.5	GAL/A % V/V	5 <i>c</i>	52 <i>ab</i>	30 <i>bcd</i>	13 <i>ab</i>
4	Garlon 3A Activator 90 Garlon 3A Activator 90	1.5 0.5 1.5 0.5	GAL/A % V/V GAL/A % V/V	17 <i>bc</i>	65 <i>a</i>	15 <i>cd</i>	3 <i>ab</i>
5	Rodeo Activator 90	8 0.5	QT/A % V/V	17 <i>bc</i>	15 <i>bc</i>	65 <i>a</i>	3 <i>ab</i>
6	Rodeo Activator 90 Rodeo Activator 90	4 0.5 4 0.5	QT/A % V/V QT/A % V/V	8 <i>bc</i>	30 <i>abc</i>	62 <i>ab</i>	0 <i>b</i>
7	Opensight Activator 90	3.3 0.5	OZ/A % V/V	20 <i>bc</i>	53 <i>ab</i>	17 <i>cd</i>	10 <i>ab</i>
8	BK 800 Activator 90	2 0.5	GAL/A % V/V	20 <i>bc</i>	68 <i>a</i>	10 <i>cd</i>	2 <i>ab</i>
9	Patron 170 Activator 90	6.9 0.5	PT/A % V/V	83 <i>a</i>	3 <i>c</i>	13 <i>cd</i>	0 <i>b</i>
10	Untreated Check			98 <i>a</i>	0 <i>c</i>	2 <i>d</i>	0 <i>b</i>

<sup>1</sup> DAIT = Days after initial treatment

<sup>2</sup> Means within a column followed by the same letter are not different according to Fisher's Protected LSD at  $P < 0.05$ .

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**Table 4: Results for Kudzu Control Trial (2015) (63 days after 2015 applications 426 DAIT)**

Treatment	Product Names	Rate	Rate Unit	2015 Application Date	% Vegetation Cover			
					% Kudzu	% Grass	% Other Broadleaf	% Bare Ground
1	Transline Activator 90	21 0.5	FL OZ/A % V/V	7/23	8 <i>c</i>	65 <i>b</i>	23 <i>b</i>	3 <i>b</i>
2	Streamline COC	11.5 1	OZ/A % V/V	7/23	0 <i>d</i>	35 <i>c</i>	3 <i>c</i>	44 <i>a</i>
3	Garlon 3A Activator 90	3 0.5	GAL/A % V/V	7/23	0 <i>d</i>	77 <i>ab</i>	10 <i>bc</i>	13 <i>b</i>
4	Garlon 3A Activator 90 Garlon 3A Activator 90	1.5 0.5 1.5 0.5	GAL/A % V/V GAL/A % V/V	7/23  9/24	0 <i>d</i>	88 <i>ab</i>	7 <i>bc</i>	3 <i>b</i>
5	Rodeo Activator 90	8 0.5	QT/A % V/V	7/23	3 <i>cd</i>	2 <i>d</i>	73 <i>a</i>	22 <i>ab</i>
6	Rodeo Activator 90 Rodeo Activator 90	4 0.5 4 0.5	QT/A % V/V QT/A % V/V	7/23  9/24	2 <i>cd</i>	7 <i>d</i>	77 <i>a</i>	13 <i>b</i>
7	Opensight Activator 90	3.3 0.5	OZ/A % V/V	7/23	0 <i>d</i>	93 <i>a</i>	2 <i>c</i>	5 <i>b</i>
8	BK 800 Activator 90	2 0.5	GAL/A % V/V	7/23	2 <i>cd</i>	80 <i>ab</i>	9 <i>bc</i>	8 <i>b</i>
9	Patron 170 Activator 90	6.9 0.5	PT/A % V/V	7/23	67 <i>b</i>	20 <i>cd</i>	13 <i>bc</i>	0 <i>b</i>
10	Untreated Check				95 <i>a</i>	0 <i>d</i>	5 <i>bc</i>	0 <i>b</i>

<sup>1</sup> DAIT = Days after initial treatment

<sup>2</sup> Means within a column followed by the same letter are not different according to Fisher's Protected LSD at  $P < 0.05$ .