Control of Amur honeysuckle (Lonceria mackaii L.) Using Different Application Techniques

Introduction

Amur honeysuckle is a non-native federally listed woody invasive species that, originally from Asia, has become extremely problematic in the midwestern United States. In Kentucky, populations of this species are generally concentrated in the central part of the state, stretching from Fayette and surrounding counties north to Kenton and surrounding counties. Although not remarkably tall (plants rarely exceed 20' in height), amur honeysuckle can become problematic due to its prolific seed production and ability to repsrout from rootstocks if cut. Infestations usually become extremely dense and thus form monocultures by outcompeting other species.
Infestations can occur in a variety of sites from roadside rights-of-way, waste areas, parks, and in the understory of a hardwood stand. Due to its ability to survive in a wide array of site conditions, there are several herbicide application techniques available for control. Several trials were installed in 2006 and 2007 to screen 3 different application methods and herbicide combinations for amur honeysuckle control. This includes a cut surface trial combined with a basal or foliar application, a cut surface alone trial, a low volume foliar trial, and a chemical side trimming trial. The following is a summary of the 4 trials.

<u>Cut surface followed by basal or foliar treatments</u>

A trial was installed in the summer of 2006 to examine the efficacy of several cut surface herbicide treatments on amur honeysuckle. The site was located at the intersection of I-275 and Three Mile Road in Campbell County, KY. Slopes on the site ranged from 20 % to 45 %. Initial cutting occurred in late July 2006 at 4 – 8 inches to allow for a follow up cutting at application. After the initial cutting, it was realized that several young (< 1 year old) amur honeysuckle saplings were left standing across the entire site. The treatment list was then altered to pair 6 cut surface treatments with different basal or foliar applications to treat the saplings left (Table 1). Eighteen plots were marked using rebar to mark corners and string to delineate plot edges and plots measured 15' X 15'. The trial was installed as a randomized complete block design with 6 treatments and 3 replications. Amur honeysuckle stumps were cut again August 19, 2006 and treated with cut surface treatments. Young saplings were treated at the same time using a hand held sprayer. Basal treatments were applied to the lower 12-18 inches and foliar treatments were applied at operational standards. Efficacy was not measured in 2006 due to the application being so late in the growing season. Plots were evaluated in July 2007 for percent control of stump sprouting and percent control of saplings. Data were analyzed using ARM software and treatment means were compared using Fisher's LSD at $p = 0.05$.

Results

Table 1: Treatments and Results of Northern Kentucky Amur Honeysuckle Cut Surface Trial

Treatment	Herbicide(s)	Rate	Application Method	325 DAT	
				Percent control sprouts	Percent control saplings
1	Tordon RTU	100 % v/v	Cut surface	92 a	62 a
2	Roundup Pro	25 % v/v	Cut surface	63 a	83 a
	Roundup Pro	2 % v/v	Foliar		
3	Arsenal	20 % v/v	Cut surface	97 a	97 a
	Arsenal + NIS	2 % v/v	Foliar		
4	Garlon 4 + HyGrade	20 % v/v + 80 % v/v	Cut surface	73 a	93 a
	Garlon 4 + HyGrade	20 % v/v + 80 % v/v	Basal		
5	Tordon RTU	100 % v/v	Cut surface	79 a	72 a
	Garlon 3A + Escort + NIS	2 qt/ac + 0.5 oz/ac	Foliar		
6	Roundup Pro + Arsenal	49 % v/v + 1.5 % v/v	Cut surface	83 a	77 a

Note: Treatment means in the same column followed by the same letter are not significantly different using Fisher's LSD at p= 0.05. All mixes contain water except RTU or Garlon 4.

Arsenal at 20 % v/v provided the highest level of control of stump sprouting of bush honeysuckle at 97 %. This was not statistically higher; however, than the lowest level of control of 63 % of Roundup Pro at 25 % v/v. A foliar application of Arsenal at 2 % v/v after stumps were treated with the 20 % Arsenal solution resulted in the highest level of control of amur honeysuckle saplings at 97 %. This was not significantly higher than the lowest control levels resulting from no treatment of the saplings (treatments 1 and 6). A high degree of variability was noted in the results in this trial. This may be due site conditions or root grafting between saplings and cut stumps influencing control levels.

Cut surface alone trial

A trial was installed in the late spring of 2007 to examine cut surface applications on bush honeysuckle. This was a result of the variance in control noticed in the northern Kentucky trial described above. The trial was located on the Spindletop Research Station in Lexington, KY. The site is an approximately 4 acre woodlot dominated by hackberry, white oak, and bur oak in the overstory and amur honeysuckle and wintercreeper in the understory. Plots were installed along the edge of the woodlot by cutting approximately 8 to 15 amur honeysuckle stems and marking stumps with pin flags. A buffer was left between plots to avoid cross contamination and plots were of variable dimensions. Seven treatments were evaluated in a randomized complete block design with 3 replications (Table 2). Plots were initially cut from April through May and the final cut and herbicide

application were made on May 21, 2007. Amur honeysuckle stumps were cut at ground level and the outer cambium layer was treated with a handheld sprayer. All plots were sprayed with 4 % v/v solution of Garlon 4 to control wintercreeper in early June. All attempts were made to avoid treating amur honeysuckle sprouts. Plots were evaluated for sprouting 31 and 109 DAT. Counts of sprouts were taken by plot, converted into a percent, then subtracted from 100 to obtain percent control by plot. Data were analyzed in ARM using Fisher's LSD for treatment means separation at p = 0.05.

Results

Table 2: Treatments and Results of Spindletop Amur Honeysuckle Cut Surface Trial

Treatment	Rate (v/v)	Percent Control	
		31 DAT	109 DAT
Garlon 4 + Ax-it Oil	15 % + 85 %	87 a	91 a
Stalker + Ax-it Oil	3 % + 97 %	86 a	64 b
Stalker + HyGrade Oil	3 % + 97 %	91 a	91 a
Garlon 4 + Stalker + Ax-it Oil	15 % + 3 % + 82 %	100 a	100 a
Tordon RTU	100 %	92 a	100 a
Accord + water	50 % + 50 %	91 a	98 a
Cut	n/a	4 b	24 c

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

All herbicide treatments resulted in greater than 80 % control of sprouting and there were no statistical differences across herbicide treatments 31 DAT . The Garlon 4 + Stalker tank mix resulted in 100 % control of sprouting at 31 DAT and maintained these control levels through 109 DAT. Tordon RTU resulted in 100 % control 109 DAT. Stalker at 3 % v/v combined with Ax-it oil decreased in control between 31 and 109 DAT from 86 to 64 % and was statistically lower at 109 DAT than all other herbicide treatments. Accord at 50 % v/v mixed with water resulted in excellent control 109 DAT. This trial will be reevaluated in the summer of 2008 for 1 YAT information.

Foliar application trial

A trial was initiated in the summer of 2007 to examine the efficacy of Escort and Krenite, both alone and in combination, for amur honeysuckle control in a low volume foliar broadcast application. The site was located at River Hill Park which is owned and managed by the Lexington-Fayette Urban County Government Parks and Recreation. A dense stand of amur honeysuckle had been mowed 2 – 3 years prior in between two fence rows approximately 15' apart. Twenty one plots were marked measuring 15' X 30'. Six herbicide treatments and 1 untreated check were installed in a randomized complete block design with 3 replications (Table 3). Plots were treated at 40 GPA on July 3, 2007 using a CO_2 powered sprayed and an adjustable cone nozzle handgun. Percent brownout and defoliation was evaluated at 48 and 86 DAT. Data were analyzed using ARM and Fisher's LSD was used for treatment means separation at p = 0.05.

Results

Table 3: Treatments and Results for Amur Honeysuckle Foliar Trial

Treatment	Rate per acre	Percent Brownout / Defoliation	
		48 DAT	86 DAT
Escort	1 oz	77 a	78 a
Escort	2 oz	72 a	63 a
Escort	3 oz	83 a	70 a
Krenite	128 fl oz	12 b	12 b
Krenite	256 fl oz	7 b	18 b
Escort + Krenite	1 oz + 128 fl oz	80 a	72 a
Untreated	n/a	0	0

Note: Treatment means in the same column followed by the same letter are not significantly different using Fisher's LSD at p = 0.05. All treatments included a non-ionic surfactant at 0.25 % v/v.

All Escort alone treatments resulted in acceptable levels of brownout and defoliation at 48 DAT (Table 3). These levels did not improve from 48 to 86 DAT. Krenite alone did not result in acceptable levels of brownout and both treatments were significantly lower than the Escort alone or the Escort / Krenite tank mix. This was to be expected; however, as Krenite does not show visual symptomology in the same season as application on woody plants except pines. Escort at 1 oz / ac was the only treatment of the Escort treatments that did not decrease in control from 48 to 86 DAT. The decrease in control in the other treatments is indicative of resprouting and may be a rate response (i.e. too high of a rate will not allow for complete translocation and result in 'flashback'). The trial will be reevaluated in the spring of 2008 to obtain 1 YAT ratings. Further testing is also needed in the rate response of amur honeysuckle to lower rates of Escort alone and in combination with other herbicides.

Chemical side trimming trial

Due to its propensity to occur along roadsides, a trial was installed in the summer of 2008 to examine the efficacy of several herbicides as a chemical side trim option for amur honeysuckle. The study was located at Spindletop Research Station in Lexington, KY in an approximately 4 acre woodlot dominated by amur honeysuckle in the understory. Amur honeysuckle, ranging from 10 to 20 feet in height, dominated the understory along the perimeter of the woodlot which allowed for realistic side trim application. Seven herbicide treatments were evaluated in a randomized complete block design with 3 replications (Table 4). Plots were linear, measuring 50' in length, and were treated with a boomless tip mounted on an ATV with a 20' extension which allowed for a 15' effective spray swath. Plots were treated on July 3, 2007 at 30 GPA. Percent necrosis and defoliation were recorded 48 and 86 DAT for the area treated, not the entire plant. Data were analyzed using ARM and Fisher's LSD for treatment means separation at p = 0.05.

Results

Table 4: Treatments and Results for the Spindletop Chemical Side Trim Trial

Treatment	Rate per acre	Percent Necrosis / Defoliation	
		48 DAT	86 DAT
Krenite	3 gal	5 c	10 d
Krenite + Escort	3 gal + 1 oz	90 a	83 a
Krenite + Arsenal	3 gal + 12 fl oz	32 b	25 cd
Escort + Arsenal	1 oz + 12 fl oz	32 b	38 bc
Escort	1 oz	50 b	53 b
Arsenal	12 fl oz	3 c	12 d
Milestone	7 fl oz	0 c	5 d

Note: Treatment means in the same column followed by the same letter are not significantly different using Fisher's LSD at p = 0.05. All treatments included a non-ionic surfactant at 0.25 % v/v.

Krenite in combination with Escort resulted in the highest level of brownout / defoliation at 48 DAT with 90 %. This was significantly higher than all other treatments. This level of control decreased only slightly from 48 to 86 DAT. Escort alone resulted in 50 % burndown at 48 DAT which was significantly higher than Krenite alone, Arsenal alone, and Milestone. Escort alone maintained this level of control from 48 to 86 DAT. The results for Krenite alone are to be expected. This trial will be reevaluated in the spring of 2008 to obtain information of 1 YAT.