Dormant Stem Herbicide Applications for Bush Honeysuckle Control

Introduction

Bush honeysuckle is an inclusive term used to describe several species of an invasive woody shrub. These species include Amur honeysuckle (*Lonicera maackii* (Rupr.) Herder), Morrow's honeysuckle (*Lonicera morrowii* Gray), and Tatarian honeysuckle (*Lonicera tatarica* L.). These three species were introduced from Eurasia in the 17 and 1800s and planted as ornamentals. Their spread to rural and forested areas is due to their planting as wildlife food sources and seed dispersal by animals (mostly birds). These deciduous woody shrubs are multi-stemmed, shade tolerant, prolific seed producers, and have the ability to sprout from rootstocks after disturbance. These characteristics aid in its invasibility and ability to dominate a site and create monocultures.

Traditional herbicide screening literature on these species is minimal. Hartman and McCarthy (2004) reported 98% and 94% mortality one year after treatment by utilizing individual stem injections of glyphosate with an EZ-ject and a cut stump treatment of 50% solution of glyphosate, respectively. Literature from conservancy and invasive plant groups commonly recommends foliar sprays of a 1 to 2 % solution of glyphosate and cut stump treatments of a 20 % glyphosate solution. Miller (2004) recommends a 2 % solution of glyphosate as a foliar spray, a 20 % solution of triclopyr ester mixed with basal oil as a individual stem basal treatment, and either a 20 % glyphosate solution or a 10 % imazapyr solution as a cut stump treatment as control options.

Dormant stem herbicide applications may provide operationally effective control of bush honeysuckle while providing several benefits. These treatments may be performed during the winter months allowing crews to remain productive. Unlike individual stem basal treatments, dormant stem applications may be a broadcast treatment and therefore increase the productivity of crews (i.e. acres or plants treated). Public visibility and complaints may be reduced as the effect of brownout would be reduced. Off target damage to desirable species (either woody or herbaceous) may be reduced if the application is performed during the dormant season of these desirables and if selective chemistry is used. These types of herbicide treatments can be cost prohibitive; however, so it would be beneficial to know if plant size (i.e. height or number of stems per rootstock) affected herbicide efficacy to allow for site specific applications. A study was initiated in March 2005 to investigate the ability of broadcast herbicide treatments to dormant stems to provide effective control of Amur honeysuckle. Specifically, the study evaluated 1) the ability of several herbicide treatments to control bush honeysuckle and 2) determine if any relationship existed between either height of target plant or number of stems from a rootstock of a target plant and control levels from dormant stem herbicide treatments.

Methods and Materials

Five treatments were evaluated in a completely randomized design with three replications located in Lexington, KY. Treatments included BK800 (a.i. 2,4 – D, 2,4 – DP ester and dicamba acid) at 3 % v/v plus crop oil concentrate (COC) at 2.5 % v/v, Garlon 4 (a.i. triclopyr ester) at 1.5 % v/v plus COC at 2.5 % v/v, BK 800 at 1 % v/v plus Garlon 4 at 1.5 % v/v plus COC at 2.5 % v/v, BK800 at 3 % v/v plus Garlon 4 at 1.5 % v/v plus COC at 2.5 % v/v, and COC alone at 2.5 % v/v. Each plot included ten bush honeysuckle rootstocks, which were labeled and numbered, and estimated height and number of stems per rootstock were recorded before application. Treatments were applied in early March 2005 while plants were still dormant using a hand gun and entire stems were treated to the point of runoff. Plots were evaluated for percent control (estimated by amount of leafout) at 60 and 120 DAT. Treatment means were compared using Fishers LSD at $p = 0.05$. Simple linear regressions were performed in SAS® by each treatment using height and number of stems as individual regressors to predict control levels at $p = 0.05$ for significant models.

Results

The BK 800 at 3 % v/v plus Garlon 4 at 1.5 % v/v treatment provided significantly higher control levels (85 %) than BK 800 alone (71 %) at 60 DAT. There were no significant difference between the BK 800 and Garlon 4 tank mixes (79 % for BK 800 at 1 % tank mix) and the Garlon 4 alone treatment (78 %) at 60 DAT. The BK800 alone treatment was significantly lower (71 %) than all other treatments at 60 DAT. There was no observable effect at 60 DAT of treating stems with a COC / water mix. There were no significant differences between the BK 800 at 3 % plus Garlon 4 at 1.5 % (89 %), Garlon 4 at 1.5 % (83 %), BK 800 at 1 % plus Garlon 4 at 1.5 % (83 %), and BK 800 at 3 % (81 %) at 120 DAT. Treating bush honeysuckle with COC at 2.5 % resulted in 14 % control at 120 DAT.

Only two significant models could be produced to predict control levels at 120 DAT of the 10 models tested (2 variables X 5 treatments). The BK 800 at 3 % plus Garlon 4 at 1.5 % treatment could be predicted using stem height at 120 DAT ($y = 107.23x – 2.52$, $p = 0.0233$, $R^2 = 0.1705$) (Figure 1). Even though the model was significant it is of little operational use due to its low coefficient of determination (R^2). The second model produced used the number of stems to predict the effect of COC at 2.5 % 60 DAT. This is of little operational value as well since there were low control levels using COC alone at 120 DAT. The lack of significant models may be the result of variability present in the control data; however, it is more likely that there is no significant relationship between the two physiological variables measured, the herbicides used, the application technique screened here and the level of control produced for any treatment tested.

Evaluation of this trial 1 year after treatment (YAT) resulted in no statistically significant difference between any of the herbicide treatments (Table 1). The only difference between treatments 1 YAT occurred between the COC alone treatment, which resulted in no control 1 YAT, and all other treatments. Control levels of all herbicide treatments are deemed ineffective. Models tested for prediction of response yielded no effective results using either height or number of stems for any herbicide treatment one year after application.

Table 1: Percent control of bush honeysuckle

Treatment	Percent Control		
	60 DAT	120 DAT	1 YAT
BK 800 @ 3%	70.97 b	81.13 a	46.33 a
Garlon 4 @ 1.5 % plus	77.8 ab	83.30 a	38.33 a
BK 800 @ 1 % plus Garlon 4 @ 1.5 %	79.13 ab	83.00 a	58.87 a
BK 800 @ 3 % plus Garlon 4 @ 1.5 %	84.43 a	88.56 a	48.17 a
COC @ 2.5 %	0 c	14.00 b	0 b

Note: Treatment means followed by the same letter are not statistically different using Fishers LSD at p = 0.05

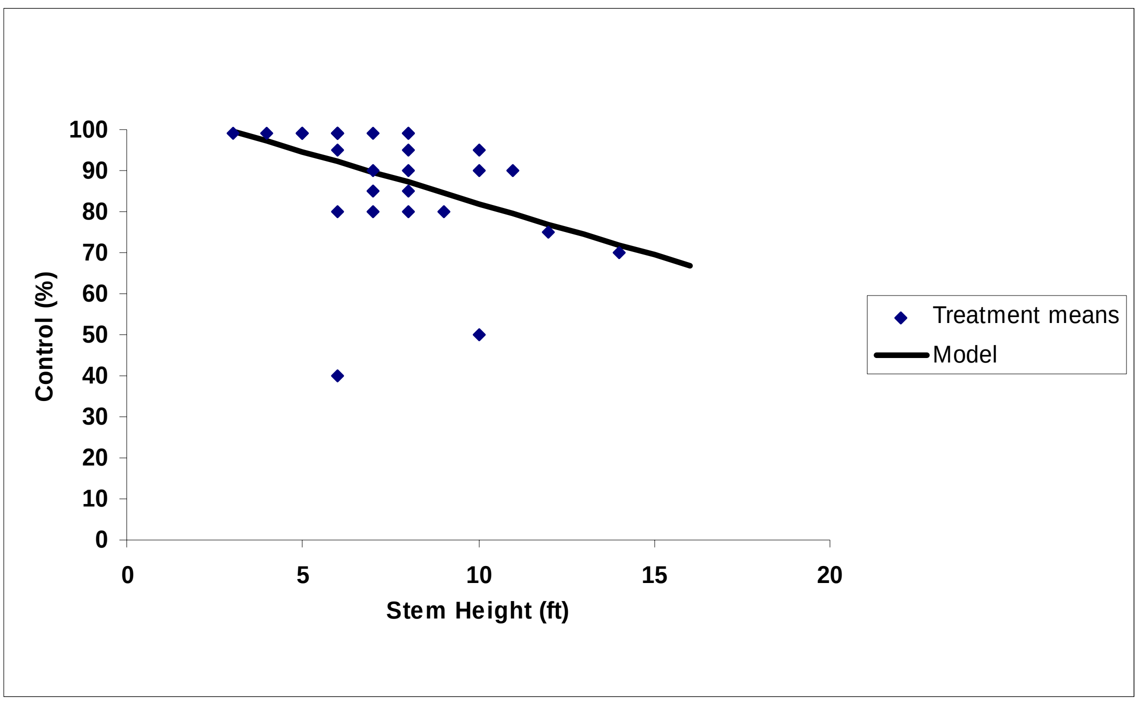

Figure 1: Prediction of Control 120 DAT with BK 800 (3%) + Garlon 4 (1.5%) using Stem Height

Model: $y = -2.52x + 107.23$; $R^2 = 0.1705$, $p = 0.0233$

Literature Cited

Hartman, K.M. and McCarthy, B.C., 2004. Restoration of a forest understory after the removal of an invasive shrub, Amur honeysuckle (Lonicera maackii). Rest. Ecol. 12: 154-156.

Miller, J.H., 2003. Nonnative invasive plants of southern forests. USDA Forest Service Southern Research Station. GTR SRS-62. p.78.