Chinese Privet Control with Herbicide Foliar Sprays

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Chinese privet (*Ligustrum sinense* Lour.) is probably the most problematic alien shrub in the 13-states of the southern region, widely invading forests, parks and preserves, pastures, and right-of-ways (Haragan 1996, Miller 1997, Matlack 2002). After a century of planting as an ornamental shrub following introduction in 1852 (Dirr 1998), range expansion has been rapid and far-reaching since about 1960 (NRCS website). This rapid invasion has occurred as birds feed upon abundant fruits produced in early spring and disperse seed during northern migrations. It is widely observed that the habitats most under siege are disturbed areas and bottomland forests (Dirr 1998), while upland forests and pasture margins are steadily being invaded as well. Site dominance occurs through Chinese privet's production of abundant root suckers and clump sprouts, as well as carpets of seedlings in infested areas.

Chinese privet is but one of at least eight nonnative privet species within the region that have escaped into natural habitats. Other widely occurring privet invaders are European privet (*L. vulgare* L.), glossy privet (*L. lucidum* Ait. f.), and Japanese privet (*L. japonicum* Thunb.). Those locally problematic are Amur privet (*L. amuense* Carr.), border privet (*L. obtusifolium* Sieb. & Zucc.), California (originally from Japan) privet (*L. ovalifolium* Hassk.), and waxyleaf privet (*L. quihoui* Carr.), including several varieties of each. Japanese, glossy, and border privet are evergreen while the others are semi-evergreen and retain foliage depending on the severity of the winter and locale. All have opposite leaves, with white flower clusters in spring that yield black to blue-black drupes in fall and winter to spring. The fleshy one-seeded fruit characterize these members of the olive family (Oleaceae).

Herbicides are one tool that can be used to control privets as part of an integrated vegetation management approach. The objective of this investigation was to compare foliar sprays of most herbicides registered for forest use in the southern region for their effectiveness on Chinese privet.

Methods

The study site was located along a riparian area of a perennial stream in east-central Alabama. A uniformly dense stand of Chinese privet had been brush mowed on a 3-year cycle for 9 years before study initiation. The infestation had one year of regrowth, being 4 to 10 ft tall. Sixty-four, 10 x 20-ft plots were established in four blocks. Seven herbicide treatments and a nontreated control were randomly assigned to plots in each block and tested at two intervals, August and September. The first treatment was planned for July, but due to the absence of rainfall for 3 months during the summer, it was applied in August after rainfall commenced with 2 inches in 2 weeks preceding treatment.

Near maximum labeled rates were tested for each herbicide using formulations with a single active ingredient (Table 1). This approach aimed to identify the most effective active ingredients for treating Chinese privet in late-summer and early fall. Applications were by a CO_2-powered backpack sprayer with a

Table 1. Herbicide tests on Chinese privet.

Herbicide *active ingredient (ai)*	Rate[1] per Acre *lbs ai*[2]	1 Year After Treatment	2 Years After Treatment	3 Years After Treatment
Accord *glyphosate*	1.5 gal *6.0*	99a[3]	98a	97a
Arsenal AC *imazapyr*	24 fl oz *0.75*	94a	89a	79ab
Escort *metsulfuron*	3.3 oz *0.12*	81ab	79a	69ab
Garlon 4 *triclopyr*	1.5 gal *6.0*	64ab	44ab	22abc
Oust *sulfometuron*	6.0 oz *0.28*	31abc	32abc	21abc
Vanquish *dicamba*	1.5 gal *6.0*	27abc	25abc	04abcd
Tordon K *picloram*	0.5 gal *1.0*	12abcd	09abcd	05abcd
Transline *clopyralid*	21 fl oz *0.5*	00abcd	00abcd	00abcd

[1] Product per acre. [2] Pounds active ingredient per acre. [3] Results of Tukey's HSD, where values with different letters are significantly different at the 5% level of probability.

Spraying Systems XR 8003 flat-fan nozzle swiveled downward on a 4-foot extended wand. A total spray mixture of 40 gallons per acre (gpa) in water was used except with Accord, which was tested with 30 gpa per label recommendations. A surfactant (Entry II) was added at 0.5 percent to all mixtures except Accord, which contains surfactant. The applicator stood in the middle of half plots and rotated about to uniformly cover all plants, while a guide outside the plot gave directions to assure uniformity (shown above).

Plots were rated 1, 2, and 3 years after treatment using visual estimates of percent volume reduction of standing shrubs. Untreated control plots in each block were used as height references during ratings, while before treatment volumes (average height X cover) were used as co-variants in the analysis. There were no significant differences between the August and September applications and thus these data were combined. According to standard procedures, percent reductions (control) were arsine square root transformed and data were analyzed using Tukey's HSD Test.

Findings

Privet control exceeded 90 percent with Accord (glyphosate) and Arsenal AC (imazapyr) the first year and did not statistically differ from Escort, which averaged 81 percent control (Table 1). Accord gave near complete control for the 3-year post-treatment period to exceed 97 percent with minimal resprouting and seedlings. Garlon 4, Oust, Vanquish, Tordon K, and Transline provided less than 65 percent control. Transline was completely ineffective on privet at these timings and rates.

The most effective herbicide, Accord, is a foliar active herbicide that is deactivated when it reaches the soil and thus presents safety to nearby unsprayed plants. This offers a treatment option to prevent harm to native cohort plants when care in application restricts spray to privet foliage only. The wand extension used in this research permitted effective treatment for privet that was 10 ft tall. The wand could be fitted with a longer extension and a projecting spray tip to treat taller privet.

The active ingredient in Accord is glyphosate, which is available in many formulations including aquatic labeled products permitted for spraying around and over water. The aquatic formulations could be used to eradicate the extensive privet infestations that occur along streamside areas and

partially flooded wetlands. Further tests of aquatic formulations of glyphosate are required since they contain no surfactants, which may lessen control.

Conclusions

Resprouted Chinese privet can be effectively controlled or even eradicated with Accord treatments or other herbicides with similar glyphosate formulations. This offers a treatment option that can be safe to applicators as well as flora and fauna when used according to label directions. Subsequent tests have shown that lower rates are equally effective, as low as 1 quart per acre. Treatments in December are most effective while those in April are only slightly less effective (Harrington and Miller 2005). Arsenal AC and Escort were less effective in this trial, but provided enough control for use in particular locations. All treatments will need to be repeated to achieve eradication, and native plant revegetation fostered to obtain restoration.

Literature

Dirr, M.A. 1998. Manual of woody landscape plants: their identification, ornamental characteristics, culture, propagation, and uses. Stipes Publication, Champaign, IL. 1187 p.

Haragran, D.P. 1996. *Ligustrum vulgare, L. sinense, L. japonicum.* p 58-59. *In:* Randall, J.M and Marinelli, J (Eds.) Invasive plants: weeds of the global garden. Brooklyn Botanic Garden, NYC, 111 p.

Harrington, T. and Miller, J.H. 2005. Effects of application rate, timing, and formulation of glyphosate and triclopyr for control of Chinese privet (*Ligustrum sinense*). Weed Technology 19:47-54.

Matlack, G.R. 2002. Exotic plant species in Mississippi, USA: critical issues in management and research. Natural Areas Journal 22:241-247.

Miller, J.H. 1997. Exotic invasive plants in southeastern forests. p 97-105. In: K.O. Britton (Ed.), Proceedings of Exotic pests of eastern forests. USDA Forest Service and Tennessee Exotic Pest Plant Council. 198 p.