

“How Do I Get Rid Of It?” Developing Weed Control Recommendations

Imagine this scene: A client comes to you with a plant for identification. She tells you that her plant bears pretty yellow flowers in the spring and beautiful year-round variegated foliage, so when her friend offered her a start two years ago, she gratefully accepted and transplanted it into her garden. The pretty little transplant apparently found conditions in her garden to its liking, because it has completely engulfed her perennial bed (and half the neighbor’s!) and is now licking its leafy chops as it spreads into the tree-lined hillside behind her house. You identify her plant as yellow archangel (*Lamium galeobdolon*, family Lamiaceae), but even before she asks it, you can guess her next question: “How do I get rid of it?”

Did you ever wonder what’s involved in developing that recommendation for control? Let’s use this species as an example as to how weed researchers come up with answers to “How do I get rid of it?”



First, a little about the weed in question. Yellow archangel is a Class C noxious weed in Washington, added to the state noxious weed list in 2007. It is a densely-growing perennial ground cover primarily found near former horticultural plantings, from which it spreads to infest nearby sites. It also spreads by plant fragments, which, when accidentally moved into new sites via lawn clippings or yard waste, can quickly form adventitious roots and grow to form new infestations. The plant grows well in full sun to full shade, making most moist sites susceptible to invasion.

As early as 2000, I started getting questions from people whose initial attempts at controlling this species were not successful, and they wanted to know what they could spray to kill the darn thing. Being in the mint family has its advantages, at least to the plant. Mints are notoriously hard to kill with herbicides—particularly perennial mints. Still, there are herbicides on the market that potentially could help, and we wanted to identify those products. The first step was to set up a greenhouse trial, where many different herbicides could be tested for efficacy in a relatively small space, a so-called “herbicide screen”. In April of 2007, wild-type yellow archangel was collected from a large infestation (never mind where!) and four cultivated ‘Hermann’s Pride’ plants were purchased (never mind where!) and their stems were clipped into four-inch lengths and placed in moist potting soil. Pots were misted for the first three weeks after transplanting to maintain high humidity and slow shoot desiccation until cuttings rooted. Transplants were then maintained in the greenhouse until well-established and wild-type shoots were about two feet long. Nearly all the cuttings successfully rooted, and the resulting 400 plants were grown in four-inch pots until stems were about two feet long. In the mean time, many herbicide labels were read and products that offered control of mint family plants, and 32 were selected for the trial.

Six pots each of the wild-type and ‘Hermann’s Pride’ yellow archangel were randomly selected for treatment. These plants were taken outside and sprayed, left outside to dry, then returned to the greenhouse. Plants were not watered for 24 hours after application to minimize herbicide loss from foliage. The plants were rated for injury at one and two months after treatment. Following the second evaluation, top-growth was removed and plants were allowed to re-grow for six weeks. The re-grown plants were clipped and the fresh clippings were weighed, then dried and weighed again. Plants were allowed to re-grow for an additional four months and a final clipping was made and foliage was dried

and weighed as before. Because plants often respond differently to herbicides under slightly different conditions, the entire greenhouse trial was repeated in 2008. Results from those trials are listed below.

But as we know, plants in the field grow differently than they do in the greenhouse. We therefore wanted to test some of the most successful herbicides from the greenhouse trial on a real-world infestation. A good field site at Kirkland's McAuliffe Park was found by Sasha Shaw and Frances Lucero of the King County Noxious Weed Control Board. What makes a good field site? First, the weed infestation has to be fairly extensive. For perennial weeds like yellow archangel, individual plots should be 8 feet by 8 feet in size, and larger may be even better. In addition, a minimum of three replications of each treatment needs to be included in order to make statistically valid inferences from the control data. So a field trial of twelve treatments (plus one non-treated check for comparison) would require an infestation of about 2500 square feet. Second, the weed must be evenly distributed over the infested area, with plants of similar size and level of health. This is important because if there are "weak spots" in the infestation at evaluation time, it may be difficult to tell whether the plants were injured by herbicide activity (a good thing!) or whether the plot simply contained fewer plants than the rest of the infestation, leading a researcher to falsely conclude that the herbicide was effective when it really wasn't. Third, a site should have a uniform slope, exposure, shade, soil type, pH, and other physical factors. All these factors influence plant growth as well as herbicide uptake and efficacy, and we want to minimize their impact on weeds in the trial.



The McAuliffe Park site was identified and permission obtained to conduct the field herbicide trial. The top ten herbicides from the 2007 greenhouse trial were included in the trial, as well as two non-synthetic contact herbicides: clove oil and vinegar (20% acetic acid). Plots were marked and treatments applied in June of 2008. Clove oil and vinegar were re-applied to the same plots in September, and a fall Casoron treatment was applied in October. Since the time of initial application, the plots have been visually rated for control five times, and vegetation samples were clipped and weighed in December. One additional control rating and one more biomass clipping are scheduled to occur this month, which should give us good efficacy data at one year after initial treatment.

So data from two years of greenhouse trials and field data two years after treatment have been collected. What can we conclude so far? Garlon 3A (triclopyr) gave very good control the first summer and fall (up to 95% kill), as did two applications of the natural herbicides. By April, however, control with Garlon had slipped to about 80%, while the natural herbicides were closer to 50% control. Four other herbicides were giving fair (60 to 75%) control in April, including Habitat (imazapyr), Milestone (aminopyralid), Roundup (glyphosate), and Escort (metsulfuron), which is interesting since control increased substantially for these products from the previous September (20 to 40% control). Interestingly, one application of Habitat, Milestone, Escort, or Oust when combined with Roundup gave the same amount of control as two applications of those herbicides applied without Roundup or Roundup alone. Therefore, it is these combination treatments that are the best recommendations resulting from the field research plots.

The bottom line is that determining how to control established perennial weeds is a long process! Three years of work is generally necessary to identify appropriate herbicides or other techniques for controlling a weed species. Fine-tuning of these recommendations generally occurs continually (what

rate, timing of application, mixtures of herbicides, temperature/moisture impacts, minimizing the effects of treatments on adjacent plants, etc.), so it is not unusual for rock-solid recommendations to be five to ten years in the making. Which is a very good reason why gardeners ought to be very careful about what they plant—prevention is still the best policy for noxious weeds.

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