A Strategy for Sustainable Management of Invasive Plants as a Model for Private Landowners

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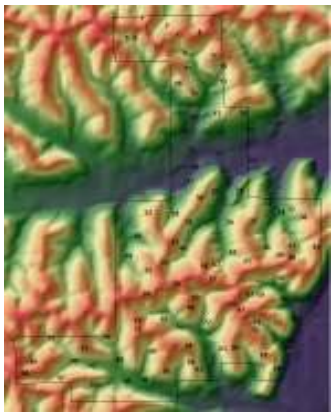
Introduction

Invasive plant species cause Americans billions of dollars in annual economic damages. Many private landowners do not have the time, resources, or knowledge to deal with exotic invasive species. This project explores cost effective and efficient ways for private landowners to control invasive plants. Exotic invasive plant species encountered during this project include Bush Honeysuckle (*Lonicera* spp.), Autumn Olive (*Elaeangus umbellata*), Tree-of-Heaven (*Ailanthus altissima*), Multi-flora Rose (*Rosa multiflora*), and Garlic Mustard (*Alliaria petiolata*).

This research was conducted at the McCully Heritage Project (MHP), encompassing 940 acres of timber, prairie, and agricultural land located in Calhoun County, Illinois. The MHP is a private, non-profit environmental and cultural heritage center open to the public for recreational and environmental education. The MHP also serves as a real-life model of private land stewardship, providing other landowners with information about land management and environmental issues.

The 100 Plots



Scenic overlook of Illinois River Valley from the MHP

The silver colored bottom side of the leaves of Autumn Olive

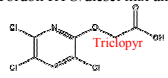
One of the 100 sample plots

Methods

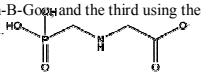
A stratified-random sampling method was applied to the entire 940 acres of the MHP. One hundred sample plots were created to identify and record exotic invasives on the MHP property. The GIS program Idrisi was utilized to generate the 100 sample plots and to create maps which guided and provided insight into the invasive problem throughout the project.

A Garmon Venture Cx GPS unit was utilized to locate the sample plots. A pin flag was inserted into the center of the plot and labeled with the sample plot number as well as the new waypoint number. A "dog-leash" method was used to define the limits of the sample plots. A ten meter rope was stretched out in four directions, creating a circle-shaped plot with a 20 meter diameter and an area of 314 m^2. Therefore, nearly 1% of the entire area of the property was surveyed. These plots were marked with flagging tape, usually tied onto tree branches so the outline of the plots were easier to see, as well as to relocate the plots later without much difficulty.

Along with surveying and applying eradication methods to the 100 plots, some trail edge plots were created to measure the amount of time needed to clear some of the trails of invasive plants. Three 20mx10m adjacent plots were created on a trail, in which all three plots had different chemical methods applied to them. The first plot was treated with Crossbow foliar spray, the second using the cut stump method with Brush-B-Gon, and the third using the Tordon RTU/diesel mix and cut stump method.



Triclopyr



Isopropylamine salt of Glyphosate

Five herbicides, which use two different control methods (Auxin mimics and Amino Acid inhibitors), were utilized during the project to exterminate undesirable invasive species:

- Tordon RTU is a picloram* and 2,4-d mix produced by Dow Agrosciences.
- Crossbow is a 2,4-d and triclopyr mix also produced by Dow Agrosciences.
- Brush-B-Gon is a triclopyr mix produced by Ortho.
- Gly-4 is a glyphosate mix produced by Universal Crop Protection Alliance.
- Pronto is an isopropylamine salt of glyphosate mix produced by PBI/Gordon.

*Do not use picloram unless absolutely needed, it penetrates limestone, leeches into underground water sources and is persistent in the environment.

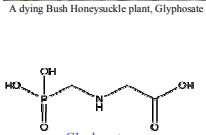
Red: Auxin Mimics, Blue: Amino Acid Inhibitors

Non-chemical control methods include either physically pulling or digging the entire plant out of the ground, including the root crown and roots.

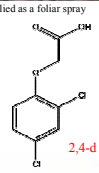
Foliar spray applied to Multiflora Rose

The hack and squirt method applied to a large Tree-of-Heaven

A dying Bush Honeysuckle plant, Glyphosate was applied as a foliar spray



Glyphosate



2,4-d

Objectives

- Determine extent of invasion on the MHP property.
- Determine implications of geographic distribution, such as speed and direction of colonization.
- Identify habitat most affected by invasives.
- Control invasives and determine effort and costs to control.
- Determine a management strategy.
- Provide a model for private landowners to aid in identification and control of invasive plants.

Recommendations

- Do not attempt to apply herbicides two hours or less prior to rain.
- Do not contaminate local water sources or drainages with herbicides. Isopropylamine salt of glyphosate (Rodeo, Pronto, etc.) is the only herbicide which is recommended for use near water sources, though do not apply directly to water.
- If the plant is small enough to pull or dig out with little effort, perform this method in an attempt to limit herbicide use.
- Read and follow MSDS and product labels of herbicides.
- Control the most problematic areas first and leave lightly infested areas for later control.
- Undiluted herbicide applications rarely need to be applied to be effective, diluting the herbicide will not only prolong the use of the herbicide and save money but will also be less harmful to the environment.

Results

Cutting, bagging, and burning Garlic Mustard seems the only effective method without spreading chemicals to plants which are not planned for control. However, the time of year this is performed is very important.

At least a 3% glyphosate mix is effective for eradication of Multiflora Rose and effective for control of Bush Honeysuckle, conversely ineffective for Autumn Olive.

Basal bark treatments with 50:50 Tordon RTU/diesel fuel is ineffective for eradication of Bush Honeysuckle, however effective for control. However, the cut stump and the hack and squirt methods with the Tordon mix is effective on Bush Honeysuckle, Tree-of-Heaven, and Autumn Olive.

Basal bark treatments with 50:50 Brush-B-Gon/diesel fuel is effective for control of Bush Honeysuckle and Autumn Olive.

At least a 3% Crossbow mix is effective for eradication of Tree-of-Heaven, Multiflora Rose, Autumn Olive, and Bush Honeysuckle when applied as a foliar spray.

Plant	Pull	Cut stump	Basal bark	Foliar spray
Bush Honeysuckle	300/hr	69/hr	168/hr	230/hr
Autumn Olive	--	28/hr	--	--
Multiflora Rose	136/hr	--	--	50/hr
Tree-of-Heaven	200/hr	200/hr	--	--

Number of plants treated/removed per hour by treatment method.

The 100 plot survey results were entered into a GIS database allowing spatial analysis of the distribution and extent of invasive plants on the MHP property [refer to map images below]:

- Autumn Olive concentrated on the north side of the property.
- Multiflora Rose and Bush Honeysuckle distributed throughout the entire property.
- Tree-of-Heaven concentrated in four main areas of the property; mainly on the south-side.
- Garlic Mustard concentrated on one hill in the central portion of the property.

Bush Honeysuckle plots

Multiflora Rose plots

Autumn Olive plots