

Emerging Practices for Invasive Species Management in the Metro Vancouver Region

Li Ma (July 2016)

Invasive species are one of the biggest threats to native ecosystems throughout the world. They can negatively impact biodiversity, ecological function, human health, the economy and infrastructure.

Metro Vancouver's Regional Invasive Species Task Force identified a need to connect with the scientific community regarding effective control methods for the following priority invasive species in Metro Vancouver: knotweeds [Japanese knotweed (*Fallopia japonica*), Bohemian knotweed (*Fallopia x bohemica*), Giant knotweed (*Fallopia sachalinensis*) and Himalayan knotweed (*Polygonum polystachyum*)], English holly (*Ilex aquifolium*), garlic mustard (*Alliaria petiolata*), gorse (*Ulex europaeus*) and wild chervil (*Anthriscus sylvestris*). Therefore, Metro Vancouver retained Li Ma, Ph.D. candidate from the Plant Science Department at the University of British Columbia, to investigate the latest scientifically-tested and locally-relevant invasive plant control methods. The specific objectives of this project were to: 1. investigate the control strategies locally available for each of those priority species with consideration of local conditions, constraints and unintended consequences; 2. provide recommendations for effective control methodologies within the Metro Vancouver region; 3. identify gaps in current regional knowledge for future research.

This report summarizes the current state of science and recommends the most effective control techniques for these plant species in Metro Vancouver. Techniques range from mechanical, manual, cultural, biological and chemical control. Where knowledge gaps remain, this report also identifies opportunities for future research.

Due to extensive rhizome growth, mechanical control (e.g., cutting) is not an effective control method on its own for knotweeds. Mechanical control can be combined with chemical control, but the removed plant material must be disposed properly to avoid further spread. Foliar application of 2.5 to 3% glyphosate or 1% imazapyr is effective. However, imazapyr, which is more effective than glyphosate, is not currently permitted for this application in British Columbia. Integrated management practises are

recommended to avoid the development of herbicide resistance. Research on the impact of application timing and weather conditions on effectiveness of chemical control methods and the environmental impact of various herbicides in Metro Vancouver are needed. The effectiveness of cultural control by grazing and the destruction efficiency of knotweed seeds also merit further study.

Small English holly plants can be pulled or dug up by hand when soil is moist. Stem injection with imazapyr capsules using the EZ-Ject lance tool (EZ-Ject 2011) is the most effective and time-efficient application method for large plants. Frilling or stem injection with triclopyr is also very effective. However, confirmation is needed whether these chemical control methods are permitted in British Columbia. The effectiveness of different concentrations of imazapyr and triclopyr on English holly deserves future study.

For gorse, seedlings and small shrubs can be pulled by hand before they fully establish. Cut stump treatment with triclopyr is very effective for large plants with low risk of applicator and non-target plants exposure. Herbicide should be applied to the stump within a few seconds of cutting the stems when cut stump treatment is applied. Repeated treatment will likely be necessary to achieve complete control. Additional research is needed regarding the efficacy of various gorse control methods in Metro Vancouver, including glyphosate application, biological control options and control method comparison studies.

For wild chervil, tillage alone may be effective. An integrated control strategy using herbicide, tillage and grass seeding is recommended for excellent control and re-vegetation. The importance of timing for tillage and herbicide application and biological control options for wild chervil in Metro Vancouver region deserve further research.

In the case of garlic mustard, individual plants can be pulled, removing as much root as possible. Flowering plants can be cut at ground level if pulling is not possible and seed production should be prevented for up to 5 years to exhaust the seed bank. Spot application of 1% glyphosate-based herbicide by foliar spray in spring is recommended for larger infested areas. Research comparing the effectiveness of different control methods and biological control options for garlic mustard in Metro Vancouver region is needed.