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Canadian Forest Service – Great Lakes Forestry Centre

Emerald ash borer: economic models for homeowners and municipalities

INTRODUCTION

The emerald ash borer (EAB), an invasive alien pest that has spread throughout much of North America since first being introduced sometime prior to 2002, is having a significant impact on urban trees. Many communities have a high proportion of ash trees. Municipalities and homeowners are faced with inevitable costs for treatment or removal and replacement. For example, estimated costs for urban areas in the eastern United States affected by emerald ash borer infestation are as high as $12 billion.

Unfortunately, signs and symptoms of infestation are not readily apparent at the early stages, so by the time the insect is detected, damage can be fairly advanced and treatment may not be effective. Typically, within five years of an infestation beginning in an area, up to 98% of ash trees have succumbed to this insect. Available treatment options include a naturally derived product from neem tree seeds and a chemical control product, which must be either injected or inserted into the tree periodically to provide protection from this alien invasive insect.

GREAT LAKES FORESTRY CENTRE ROLE

Along with basic research on the biology, ecology and detection of EAB, Great Lakes Forestry Centre (GLFC) researchers are studying the economic impact of EAB. They have developed models to help estimate the financial impact at both the national and homeowner scale.

A treatment decision tool for homeowners

GLFC researchers have developed an Ash Protection Model to assist homeowners make the decision to treat or remove ash trees on their property when EAB moves into an area. Treatment of individual trees may seem like a costly alternative, but tree removal and replacement can also be expensive. The model allows a user to compare the ongoing cost of treatment versus the one-time costs associated with removal and replacement. Trees can add value to a home in other ways. The model includes an option that allows the user to add extended benefits including property resale value, energy savings due to shading and windbreak effects, and benefits trees provide to society at large, such as slowing storm-water runoff and taking up air pollutants. Mature trees also need care and incur ongoing maintenance costs for activities such as pruning, leaf cleanup and disposal, and even damage to water, drainage, or sewage lines – again the model allows a user to include these aspects if desired. The model provides default values that describe average costs that could be expected in Canada, these defaults can be overridden by users if better information is available for their own location and situation.

Removal of a dead ash trees in an urban setting

An interactive version of the model is available at: gmaps.nrcan.gc.ca/apm/index.php?lang=e

Model outputs

Once all the values have been entered, the model produces graphs that show all the costs and benefits, as well as the financial gain or loss associated with the treatment approach for each year over a 30-year time period. Using the default costs, the model shows a positive treatment gain value that lasts for about 10 years for a medium-sized ash tree with average treatment, removal, and replacement costs. The model also produces graphs that show the extended benefits and costs, which increase as a tree grows. When these benefits and costs are taken into account, positive treatment gains for the same medium-sized ash tree last for about 20 years. Local circumstances may of course be different but the model can provide users with a much better sense of the flow of both costs and benefits associated with treating their ash trees.

Treating an ash tree with TreeAzin®

Estimates of the costs of EAB to Canadian municipalities

GLFC modelers have also estimated the economic costs attributed to tree mortality from emerald ash borer for street and backyard trees in Canadian municipalities for a 30-year time horizon. Because of the inherent uncertainty in the actual spread of EAB, the expected arrival times of the pest in each community was based on three spread rates: slow (10 km/year), medium (30 km/year), and fast (50 km/year). Ash density along urban roads was estimated from a variety of sources, including a recently developed survey that allows rapid assessments of street tree composition (contact author(s) for more information). Based on the 30 km/year spread rate, a standard economic discount rate of 4% and assuming that 10% of trees are treated, the costs for street trees was estimated to be about $524 million; this value increases to roughly $890 million when costs associated with backyard trees are included. Alternate discount and treatment rates were also used. The estimates are conservative because they focus only on damage to street and backyard trees, but they do highlight the magnitude of damage this invasive pest is causing.

CONCLUSION

These models are useful decision support tools regarding the costs and economic implications of emerald ash borer. Homeowners and municipalities can make more informed decisions regarding treatment of ash trees. While it may not be practical or feasible to save all trees, the model allows for assessment on an individual tree basis and brings to light hidden values such as energy savings, increased property values and pollution reduction. Municipalities can be better prepared for the arrival of emerald ash borer and on a provincial or national level, resource managers can justify investments to slow the spread of emerald ash borer in Canada.

SUGGESTED READING

McKenney, D.W.; Pedlar, J.H.; Yemshanov, D.; Lyons, D.B.; Campbell, K.L.; Lawrence, K. 2012. Estimates of the potential cost of emerald ash borer (*Agrilus planipennis* Fairmaire) in Canadian municipalities. Arboriculture & Urban Forestry 38(3):81-91.

McKenney, D.W.; Pedlar, J.H. 2012. To treat or remove: an economic model to assist in deciding the fate of ash trees threatened by emerald ash borer. Arboriculture & Urban Forestry 38(4): 121-129.

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