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Forestry Research Applications

Canadian Forest Service - Sault Ste. Marie | Technical Note No. 111

Detection of emerald ash borer in urban environments using branch sampling

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The emerald ash borer (EAB), *Agrilus planipennis* Fairmaire (Fig. 1), a non-native insect pest of Asian origin, presently infests large numbers of ash (*Fraxinus* spp.) trees in Ontario and Québec and could soon spread to other provinces.

Fig. 1. Adult emerald ash borer.

One of the many requirements for effective management of EAB is early detection of infestations, when densities are still low and before signs and symptoms are obvious. *Visual surveys* rely on external signs and symptoms (e.g., exit holes, larval tunnels seen through cracks in the bark, feeding by woodpeckers or squirrels) that may not be noticeable for 2 to 3 or more years after the arrival of the population, particularly if the infestation begins in the upper part of the tree. *Sticky traps* baited with an attractant have the potential to detect EAB adults in an area before signs or symptoms become visible, but may not necessarily provide information on the infestation status of individual trees.

Ryall et al. (2010) sampled many ash trees with **no** obvious sign or symptom of EAB attack (Fig. 2) and showed that *branch sampling* was an effective method of detecting EAB-infested trees; indeed, 74% of the infested trees would have been discovered if the method described below had been used. The purpose of this note is to describe this basic sampling technique.

Fig. 2. Healthy-looking ash trees with no visible sign or symptom, but determined to be infested with EAB using branch sampling.

DESCRIPTION OF THE BRANCH SAMPLING METHOD

This method is suitable for sampling open-grown ash in any landscape, but it is of particular value in urban areas with high-value ash trees (Fig. 2). Branch sampling can be performed at any time between September and May; however, because larvae continue to feed and grow in size in early fall, their galleries are easiest to see if branches are sampled after October. This technique can be performed using the following steps:

1. Select an open grown black, red, green, European or white ash, 19.7-59 feet (6-18 m) tall and 5.9-19.7 inches (15-50) cm DBH (diameter at breast height) with large open crown;

2. Identify **two** live branches in the mid-crown preferably 2-2.8 inches (5-7 cm) in diameter at the base ((minimum 1.2 inches (3 cm)7; maximum 3.9 inches (10 cm)) ideally from the south side of the tree. **NOTE**: Be sure to follow appropriate safety procedures and to cut branches using proper tree pruning methods.

3. Cut each branch at its base using a pole, chain or pruning saw (see Fig. 3a);

4. Measure off 29.5 inches (75 cm) from the base and cut the branch again at this point. Remove any lateral branches from this piece (Fig. 3b);

5. Secure the 29.5 inch (75 cm) piece in a vise (Fig. 3c);

6. Peel (whittle) the bark in thin strips (.04 -.08 inch (1-2 mm) thickness) from the basal 19.7 inches (50 cm) of the branch using a good quality draw- or paring-knife (Fig. 3d);

7. Examine the branch carefully, looking for EAB galleries and/or larvae. Remember that gallery length varies from about 1 inch (a few millimetres) to (Fig. 4a) approximately 8 inches (several centimetres) (Fig. 4b).

If the objective is only to detect EAB, then sampling can stop when the first gallery is found. If the objective is to assess densities, then it is important to count all EAB galleries and living larvae on the sample. Counts take 2-3 times longer to carry out than presence/absence sampling.

The branch sampling technique can be done concurrently with other tree management activities, such as pruning. Samples from ash trees could be rerouted to a centre where whittling is performed. Because ash tree material can contain live EAB, **it must <u>not</u> be moved outside of regulated areas established by the Canadian Food Inspection Agency (CFIA). In non-regulated areas, discovery of EAB galleries or of a live specimen must be reported to the CFIA**. Procedures for **movement and disposal** of ash wood are available at: http://www.inspection.gc.ca/english/plaveg/pestrava/agrpla/regrestrice.shtml.

Fig. 3. Cutting (a), measuring and trimming (b) ash branches. Branches, cut to a length of 29.5 inches (75 cm), are placed in a vise and bark is whittled off the basal 19.7 inches (50 cm) (c) (1.5 m piece shown here). Whittling removes bark in thin .04-.08 inch (1-2 mm)

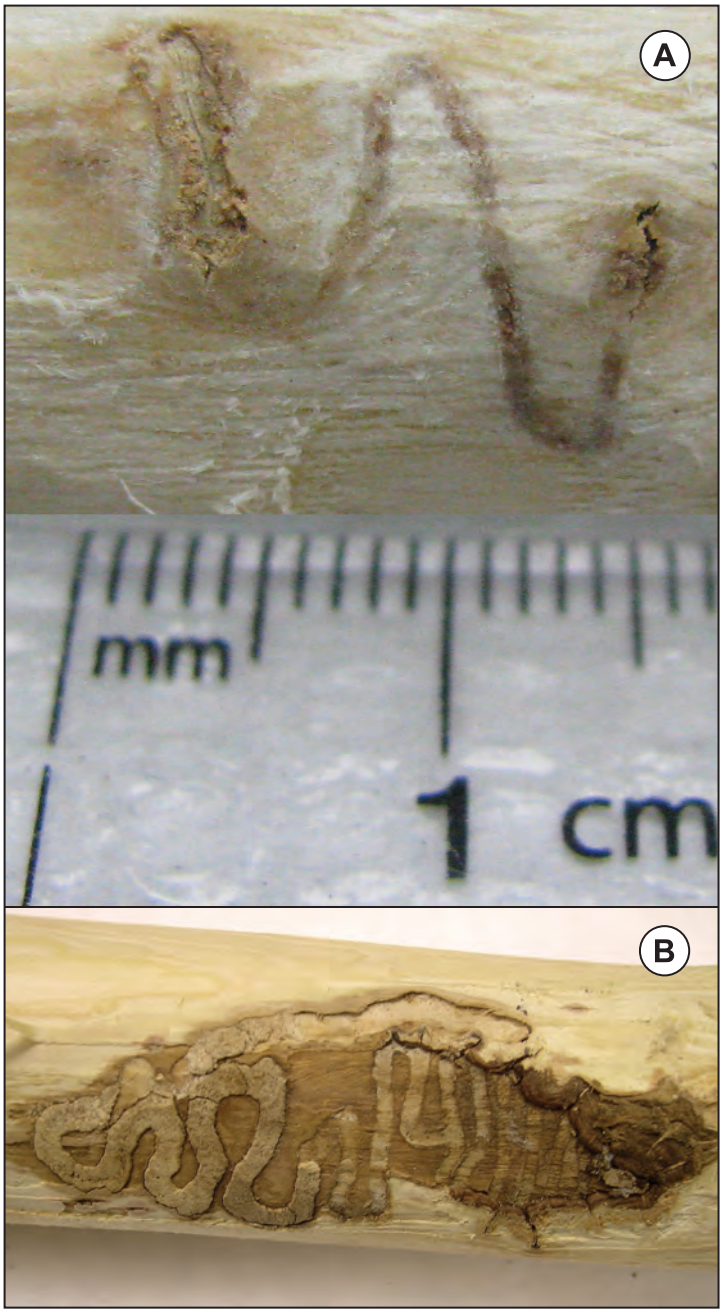

Fig. 4. Early (a) and late (b) stage serpentine galleries made by EAB larvae, found by branch sampling.

CAVEATS

This technique was developed using open-grown urban trees. Its efficacy for use in woodlots has not been tested. Similarly, sampling of much larger or smaller branches and trees than those recommended herein may result in lower detectability of EAB infestations.

CONCLUSIONS

Branch sampling is a highly effective tool for detection of incipient EAB populations, before outward signs or symptoms become apparent. Early detection of EAB populations can provide managers with additional time to identify and implement management options before unacceptable ash mortality occurs. This technique can be used for early detection of incipient EAB populations; to provide estimates of EAB density on infested trees and to delimit the extent of outbreaks. Ongoing research is developing area-wide detection and delimitation survey protocols, is relating EAB density to severity of visual signs and symptoms, and is calibrating effectiveness of baited traps as another early detection tool.

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ACKNOWLEDGEMENTS

Developed by Natural Resources Canada, Canadian Forest Service, in collaboration with Canadian Food Inspection Agency and Ontario Ministry of Natural Resources. We are grateful to the cities of Toronto, Pickering and Sault Ste Marie for permission to sample trees.

ADDITIONAL READING

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Catalogue No. Fo123-1/111E
ISBN 978-1-100-17111-1