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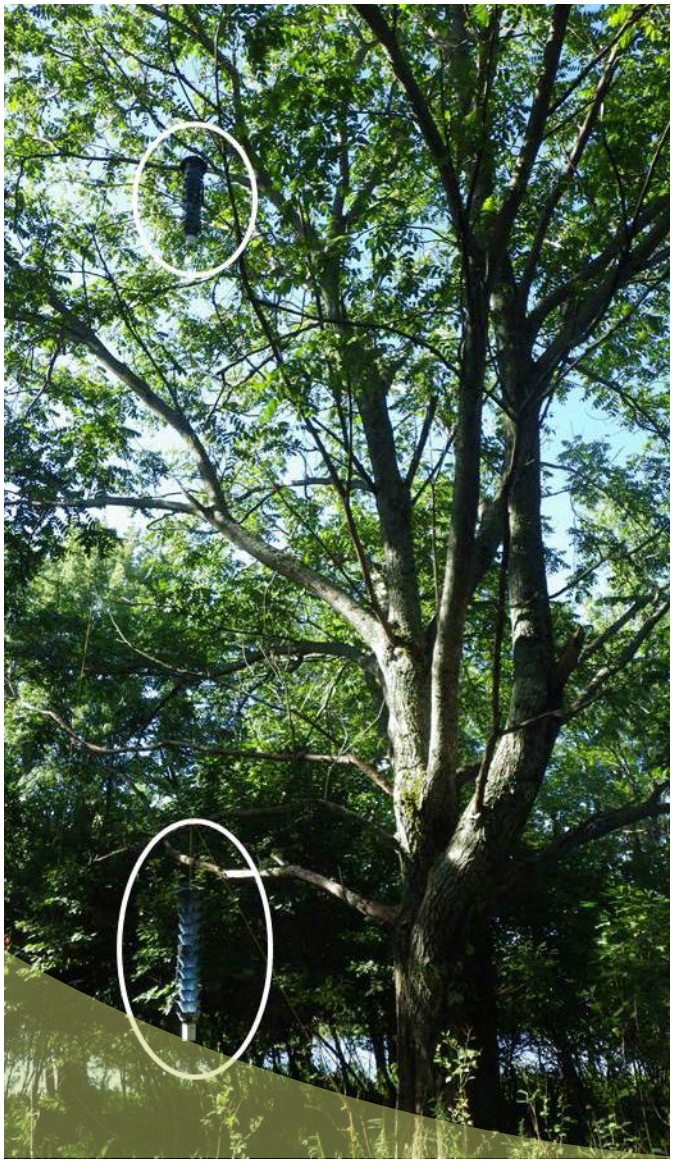
Canadian Forest Service

Atlantic Forestry Centre – Making a Difference

Impact Note No. 62

Monitoring of exotic insect pests at home and abroad

Exotic pests are causing havoc all over the world. A more effective monitoring system will increase the likelihood of early pest detection and may provide regulatory agencies with sufficient time to intervene with an eradication or containment strategy before pest populations spread.



Traps located at different levels will capture different species.

The threat of introduction of exotic pests, and in particular those that live under the bark or in the wood of trees, has never been greater. Although exotic pests have been threatening our forests from the time the first Europeans arrived, the risk has increased in recent years because of the huge volume of goods shipped in solid wood packaging material. Recent phytosanitary regulations such as those requiring the treatment or fumigation of solid wood packaging materials have reduced but not eliminated the threat of exotic insects entering the country.

Regulatory agencies such as the Canadian Food Inspection Agency (CFIA) and the Animal Plant and Health Inspection Service (APHIS) in the United States conduct trapping surveys in port cities and other high risk areas. Although these surveys have successfully detected some exotic pests, many species were not discovered until people noticed sick and dying trees many years after the pests were established. Such insects include the emerald ash borer, the Asian longhorned beetle and the brown spruce longhorn beetle.

Since 2008, Dr. Jon Sweeney, a research scientist with the Canadian Forest Service (CFS) at the Atlantic Forestry Centre (AFC), has been leading a project that is developing better methods to detect invasive forest pests. The project is supported by CFIA, APHIS, Natural Resources Canada, the Atlantic Canada Opportunities Agency, Forest Protection Limited, the Quebec Ministry of Natural Resources, the Nova Scotia Department of Natural Resources and the Ontario Ministry of Natural Resources and Forestry. Sweeney and CFS scientists Dr. Peter Silk (AFC) and Dr. Jeremy Allison (Great Lakes Forestry Centre) are collaborating with other scientists and technicians. They are examining ways to increase the efficacy of monitoring systems to increase the likelihood of detecting the presence of exotic insect pests as early as possible. The sooner an established exotic pest is detected, the greater the chances it can be eradicated or contained before it spreads very far.

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Sweeney and his team are testing a variety of lures (including pheromones) both singly and in combination to determine which products are most effective. The team is also looking at trap placement (understory versus crown; interior versus edge of stand), trap design, trap colour, and the number of traps that are necessary to capture most of the species present.

Thanks to the collaboration of many scientists, the experiments are being replicated in Canada and the United States as well as sites in Europe and China. This method not only tests how well the lures and traps perform across a wide range of sites and conditions but also directly measures the effectiveness of lures and traps for detecting species native to Europe and Asia that pose a risk of becoming exotic pests in North America.

So far, the research has determined that:

- Placing traps in the upper tree canopy often catches more species and different species than traps placed in the understory (i.e. 1 to 2 metres above ground). Best results are obtained when traps are placed in both the upper canopy and understory.
- Combining different lures on the same trap often increases the number of species that are detected but certain combinations have a negative effect. More research is needed to determine the best lure combinations.
- Adding pheromone lures to traps baited with standard host volatiles (e.g. ethanol) significantly increases the detection of longhorn beetles without adversely affecting the detection of beetles attracted to only ethanol. As a result, the CFIA started using longhorn beetle pheromones in their operational trapping surveys in 2012.
- Using more than one trap colour increases the total number of species detected. For example, green traps are better than black or purple traps at detecting certain species but the reverse is true for other species.
- The number of traps deployed in a site greatly affects the number of species that are detected. Species accumulation curves indicate that the operational densities of six to nine traps per survey site may fail to detect at least half of the bark- and wood-boring beetle species present.

This international research by Sweeney and his team will provide better tools for monitoring exotic pests to North American regulatory agencies such as CFIA and APHIS, as well as to similar agencies in Europe and China.

Trap colour increases the number of species detected.

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