# DETECTION OF THE BROWN SPRUCE LONGHORN BEETLE, *TETROPIUM FUSCUM* (F.) WITH SEMIOCHEMICAL-BAITED TRAPS, TREE BANDS, AND VISUAL SURVEYS

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## ABSTRACT

The brown spruce longhorn beetle, *Tetropium fuscum* (F.) (Coleoptera: Cerambycidae), (BSLB) native to northern and central Europe, has been the focus of a containment and eradication program by the Canadian Food Inspection Agency in the city of Halifax, Nova Scotia, since May 2000. Surveys are conducted using host volatile-baited traps and visual ground surveys. Detection of BSLB-infested trees is done mainly by visual inspection of stems for typical signs of infestation, such as excessive resin flow or characteristic elliptical exit holes about 4 mm in diameter. In the first couple of years of the BSLB survey and eradication program, there were many trees with obvious signs of infestation, likely caused by several years of re-infestation. Most such trees have been removed and the challenge now is to detect the presence of BSLB in trees with less obvious signs of infestation. Some infested hosts such as windfelled trees and freshly cut logs do not display resinosis. It is also possible that the presence or extent of resin flow on the bole varies with species (e.g., *Picea rubens* vs. *P. glauca*) and level of moisture stress. If this is true, then these hosts could be missed in visual surveys. Guscott (unpublished data) showed that burlap bands wrapped around the stem of "suspect" infested trees were useful at BSLB adults. In 2004, as part of a field experiment testing *Beauveria bassiana* for infection of BSLB adults, we found that a band of polyester quilt batting wrapped around a spruce trunk was very effective at trapping BSLB adults. The present study was conducted to determine the accuracy of visual surveys for detection of BSLB-infested trees and to test relationships in BSLB population estimates obtained from visual surveys, polyester tree bands, volatile-baited traps, and destructive sampling.

In early May 2005, a total of 151 white spruce trees larger than 10 cm DBH were selected (by coin toss) in five plots (30-31 trees per plot) on McNabs Island located in Halifax harbor. Each tree was tagged, numbered, and wrapped at breast height with a 20-cm-wide band of polyester quilt batting to act as a trap for foraging adult BSLB. Two Intercept™ – PT (Advanced Pheromone Technologies Inc.) traps, each baited with an ultra high release (UHR) rate BSLB kairomone lure and UHR ethanol lure (PheroTech) were hung 30 m apart on opposite sides of each plot. Quilt bands and volatile-baited traps were checked for adult BSLB every 2 weeks until late August. In late summer each sample tree was "blindly" inspected by an operational survey crew from the Canadian

Food Inspection Agency (CFIA) and designated as BSLB-positive or negative, based on typical signs of infestation, e.g., unexplained resin flow on the stem or characteristic exit holes. In mid-October, all 151 trees were felled and a 5-ft-long basal log collected for destructive sampling. A 4-ft-section of each basal log was milled into 1-cm -thick slabs to expose mature BSLB larvae in pupal cells; the remaining 1-ft-long bolt was incubated at 20-22 ºC for 12 weeks to rear out adult BSLB. Data on BSLB infestation of individual trees from the destructive samples (slabbing, rearing) were compared with that predicted from quilt bands and visual signs to determine the number and percentage of false negatives (failure to detect an infested tree) and false positives (falsely designated an uninfested trees as BSLB-infested).

Volatile-baited traps captured BSLB adults in all five plots. Quilt bands detected BSLB adults on 38 of 151 trees with numbers per band ranging from 1 to 20. CFIA inspectors designated 17 of 151 trees as BSLB-infested based on visual signs. The destructive samples indicated that only 7 of 151 trees (5%) were infested with BSLB. The numbers of adults per quilt band was positively related to: 1) the number of larvae per tree (in the basal log); and 2) tree diameter. All seven infested trees were included in the BSLB-positive trees detected by visual inspection and quilt bands, i.e., neither method missed infested trees, both scored 0 percent false negatives. On the other hand, visual inspection and quilt bands falsely designated 10 (7%) and 28 trees (19%), respectively, as BSLB positive. Too many false positives can waste time and money for unnecessary tree removal. However, when surveying for a quarantine pest, failing to detect an infested tree (false negative) is far more serious an error than mistakenly declaring an uninfested tree as infested (false positive), so in this regard both survey methods performed well. A similar survey was conducted at five sites near the edge of the BSLB quarantine zone where BSLB populations are much lower and more difficult to detect but results will not be known until destructive sampling is completed in February 2006.