

**Test of A Simplified Non-Host Volatile Blend
as a Supplement to Verbenone in Protecting Lodgepole Pines
from Attack by the Mountain Pine Beetle**

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Background

In 1983 it was discovered that verbenone is an anti-aggregation pheromone of the mountain pine beetle *Dendroctonus ponderosae* Hopkins (Ryker and Yandell 1983), and since this discovery, Dr. John Borden has studied the use of the pheromone to deter attack of this forest pest (Borden 1997; Maclauchlan and Brooks 1999). The research being proposed involves a continuation of studies using anti-aggregation pheromones for the protection of lodgepole pine stands from attack by the mountain pine beetle. In past experiments, Dr. Borden has tested a variety of pheromone cocktails, doses and spacing of release devices to determine the most efficient combination for protecting lodgepole pine stands at minimal cost.

Problem Statement

Verbenone has been shown to reduce catches in pheromone-baited traps (Ryker and Yandell 1983; Schmitz and McGreggor 1990) to deter attack on pheromone-baited trees (Borden and Lindgren 1988), and to reduce attack intensity in treated stands (Amman et al. 1989; Lindgren et al. 1989; Shea et al. 1992). However, the efficacy in treated stands has been inconsistent with respect to years, geographic location and species of tree (Bentz et al. 1989; Lister et al. 1990; Gibson et al. 1991; Shea et al. 1992). Because of this variability, verbenone has not been adopted as a standard pest management tool.

There are two approaches to increasing the efficacy of verbenone: 1) increase the dose, and 2) add a supplement that increases and/or stabilizes its bioactivity. Borden et al. (2003) incorporated both approaches. Deploying a new high-dose verbenone pouch (Phero Tech Inc., Delta BC) in combination with a seven-component blend of non-host angiosperm bark volatiles (NHV's) (Huber and Borden 2003) at 10x10 m spacing, they showed that small forest plots could be almost completely protected from attack, even with a pheromone-baited tree in the plot center to challenge the beetles. High-dose verbenone alone was also a significantly effective deterrent, but at a lower level than when it was combined with NHVs.

In efforts to lower the cost of the experiment to make it more operationally feasible while still meeting the objectives of the experiment, a simplified blend of nonhost volatiles that have been developed will be used.

Experimental Procedure

One 10-replicate experiment and one operational trial are proposed. Both will take place within Lignum Limited's operating area in stands with light mountain pine beetle infestation.

The 10-replicate experiment will utilize 40x40 m plots at least 50m apart, with four treatments. Each plot will have a pheromone-baited tree in the exact center to challenge beetles to enter the plot and attack trees therein. One plot in each replicate will be an untreated control with only the pheromone-baited tree in the center. Another plot will have high-dose verbenone pouches affixed to trees at maximum reach from the ground at 16 points on a 10 m grid. The third plot will have two bubble caps (PheroTech Inc.) each releasing the three NHVs affixed in the same manner as

the verbenone pouches. The fourth plot will be treated with high-dose verbenone in combination with the NHVs.

The operational trial will be super-imposed on 10 permanent sample plots in which the continuity of long-term mensurational measurements is threatened by a high risk of mountain pine beetle attack. Each square plot is 31.62 x 31.62 m (1000 m²). Each will be treated on a 10 m grid with high dose verbenone plus the NHV blend, resulting in 12 release points on the plot boundaries, 4 points within the plot, and 20 points in the middle of a 15 m wide buffer strip around the plot.

Progress to Date

As this project extends into the next fiscal year, only the plot establishments have been completed for the 10-replicate experiment. The plots for the selected Permanent Sample Plots will be established in early spring along with the placement of the pheromones of all plots. Final data collection will be completed in the fall of 2003, with a final report produced. This final report will be submitted to a reputable scientific journal for publication by the Research Scientist.