

The Use of Verbenone to Protect Whitebark Pine From Mountain Pine Beetle

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Abstract

Abstract—Verbenone is a known anti-aggregation pheromone of mountain pine beetle (MPB), *Dendroctonus ponderosae* Hopkins, and has been tested in protecting susceptible host trees from attack since 1988. Inconsistent performance of verbenone during field trials caused formulations and release devices to change through time, resulting in three products currently registered with the Environmental Protection Agency—two pouch formulations containing 7 grams of verbenone that are stapled to tree boles (available from Synergy Semiochemicals Corp. and Contech Enterprises, Inc.), and a flake formulation (available from Hercon Environmental) that can be aerially applied or applied on the ground using fertilizer spreaders.

For several years we tested currently registered 7-gram verbenone pouches by placing two per tree on whitebark pine in northern Idaho and western Montana. At least 80 percent protection of treated trees was consistently achieved, even when using tree baits to ensure beetle pressure. Test plots were located in areas with high MPB populations. More recently, the addition of non-host green leaf volatiles (a hexenol/hexanol blend present in many broadleaf plants), has shown promising results in protecting whitebark, lodgepole and ponderosa pine from beetle attack. Although not yet registered, non-host green leaf volatiles have the potential to enhance treatment effectiveness and decrease the cost of verbenone treatments.

Verbenone-releasing laminated flake formulations aerially applied to lodgepole and whitebark pine stands have shown efficacy

in reducing MPB attack over large areas. Tests of flakes applied directly to tree boles have shown similar efficacy to pouches in protecting individual lodgepole pine from beetle attack and are currently being tested on whitebark and limber pines.

Verbenone has been used operationally in many areas to protect high-value, cone-bearing, phenotypically blister-rust-resistant whitebark pine. However, there have been disappointing results in some areas with extreme MPB populations. Unusually warm years may require replacing pouches at mid-season and the clumpy nature of whitebark pine may necessitate using additional pouches per tree or clump of trees. Surrounding clumps of whitebark pine with verbenone pouches has successfully protected trees in some areas. Tree protection in lodgepole pine may be improved by removing currently infested trees in areas of concern and a similar strategy might be considered for protecting whitebark pine in accessible high elevation forests. Ongoing research studies in whitebark pine will determine the efficacy of this treatment tactic.

Verbenone is not the long-sought “silver bullet” and has never protected 100 percent of individual trees or areas of susceptible hosts where it was applied. It should be recognized as another tool useful in reducing beetle-caused mortality (particularly with developing populations) in the short term, with the understanding that environmental conditions and extreme beetle populations may decrease its effectiveness.

The content of this paper reflects the views of the author(s), who are responsible for the facts and accuracy of the information presented herein.