

Using Verbenone to Protect Whitebark Pine from Mountain Pine Beetle Attack

Kegley, Sandra J.¹; and Gibson, Kenneth E.²

¹ USDA Forest Service, Forest Health Protection, Coeur d'Alene Field Office, 3815 Schreiber Way, Coeur d'Alene, ID

² USDA Forest Service, Forest Health Protection, Missoula Field Office, P.O. Box 7669, Missoula, MT

Whitebark pine (*Pinus albicaulis* Engelm.) is currently declining in many areas due to a variety of factors including white pine blister rust, fire suppression, forest successional processes, and periodic outbreaks of mountain pine beetle (*Dendroctonus ponderosae* Hopkins).

In 2005 in northern Idaho and Montana, mountain pine beetle killed nearly 630,000 mature whitebark pine trees on about 142,000 acres. Many of these stands have also been impacted by white pine blister rust. Seed is collected from phenotypically blister rust-resistant “plus” trees which are now under threat of mountain pine beetle attack. Silvicultural methods such as thinning, used to manage mountain pine beetle in other hosts, may not be applicable in less-dense whitebark pine stands. Individual, high-value trees can be protected from beetle attack with topical treatments of insecticides applied to tree boles with high-pressure spray equipment. However, spraying is not practical in inaccessible areas or on a large scale. Using beetle pheromones to protect high-value trees from attack has been shown to be a viable management option.

We tested the efficacy of verbenone, an anti-aggregation pheromone for mountain pine beetle, in protecting individual whitebark pine trees from beetle attack for three years. EPA-registered 5-gram verbenone pouches, replaced at mid-season, were tested along with new thicker membrane (longer lasting) pouches, and larger (7.5-gram) pouches. All were compared to untreated controls.

In 2002, we tested verbenone on 150 whitebark pine in northern Idaho. Treatments were: two, 5-gram pouches per tree; four pouches per tree; and untreated controls. To ensure equal beetle pressure, each tree was baited with a mountain pine beetle attractant tree bait. Pouches were replaced mid-season due to their short elution period. After beetle flight, trees were rated as mass attack, strip attack, pitch out, or no attack. “Mass attack” means the tree was overcome by beetles and killed. “Strip attack” is a tree successfully attacked on a portion of its bole, but the tree is not killed. A “pitch out” is one unsuccessfully attacked. “No attack” is an unattacked tree.

All untreated trees were killed while over 90% of treated trees survived. There was no statistical difference between the use of two or four pouches per tree (figure 1).

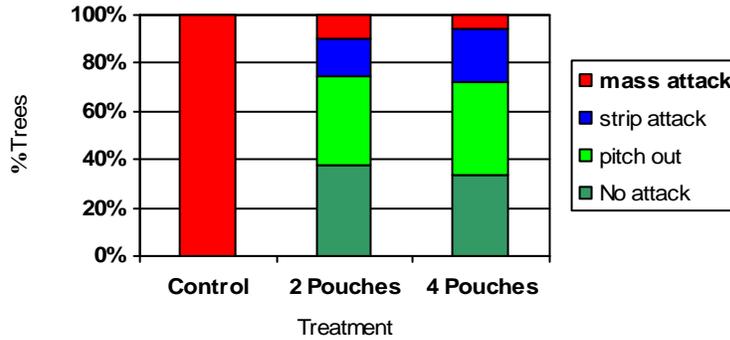


Figure 1. A test of whitebark pine trees treated with two or four verbenone pouches per tree in North Idaho in 2002.

In 2003, we treated 150 whitebark pine in western Montana. Treatments were: two standard 5-gram pouches per tree; two experimental longer-lasting 5-gram pouches per tree; and untreated controls. Only standard pouches were replaced mid-season. Attractant tree baits were placed 10-15 feet from each tree. Results were comparable to 2002. A total of 42% of control trees were killed while over 90% of the treated trees survived (figure 2). There was no significant difference between the two pouches.

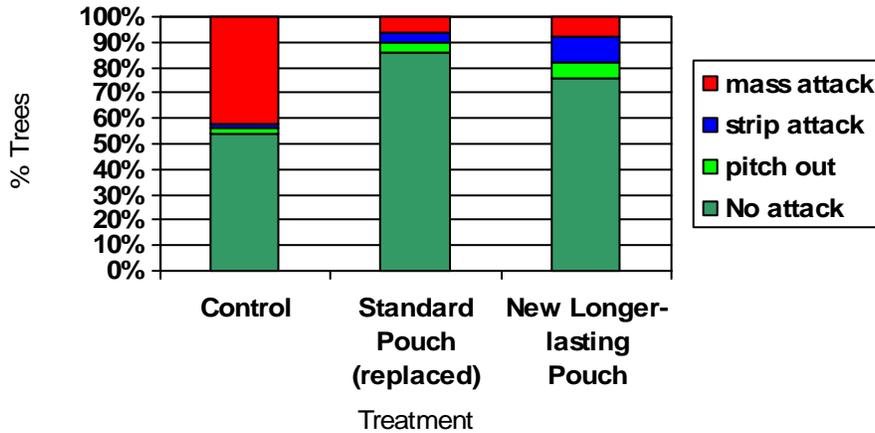


Figure 2. Whitebark pine test in 2003 in western Montana using two standard verbenone pouches that were replaced mid-season, and two experimental longer lasting pouches per tree.

In 2004, 100 whitebark pine were treated in northern Idaho. Treatments were two, experimental 7.5 gram pouches per tree and untreated controls. The pouches were not replaced mid-season. Attractant tree baits were placed 5-10 feet from each tree. Treated trees were protected from mass attack (figure 3). While 77% of control trees were killed, 87% of treated trees survived.

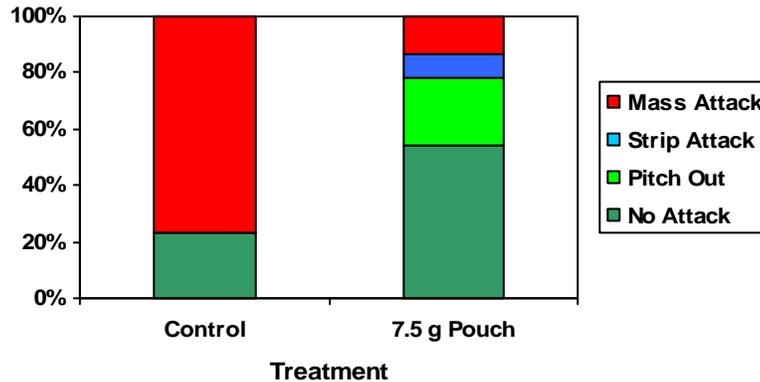


Figure 3. Whitebark pine test in North Idaho in 2004 using two 7.5 gram verbenone pouches per tree.

In summary, most individual whitebark pine trees, subjected to the presence of a mountain pine beetle attractant pheromone, were protected from mass beetle attacks. Treating individual whitebark pine trees with either two registered or two experimental pouches significantly reduced mountain pine beetle attacks when compared to untreated controls. These tests provide strong evidence that individual pine trees can be protected from mountain pine beetle attack using verbenone. Standard (5-gram) verbenone pouches are currently registered and available for use. Used operationally, they have successfully protected whitebark pine plus trees from mountain pine beetle attack, even in areas of high beetle populations.