



Use of Pheromones in Managing Mountain Pine Beetle

John Ball, Forest Health Specialist, South Dakota Department of Agriculture, Extension Forestry Specialist, South Dakota State University Cooperative Extension Service; Kurt Allen, Entomologist, USDA Forest Service, Rapid City Service Center and Brian Garbisch, Forest Health Forester, South Dakota Department of Agriculture.

There has been a tremendous amount of discussion regarding the use of semiochemicals (pheromones) in the management of mountain pine beetle in the Black Hills. This publication will explain how these pheromones work and the difficulties and risks associated with their application.

Pheromones are chemicals released by insects, including bark beetles, to communicate with other insects of the same species. Mountain pine beetles release a chemical referred to as an aggregation pheromone to draw other mountain pine beetles to the same tree. The ability to attack a tree in mass is one of the reasons the beetle is so successful at killing large trees. Mountain pine beetles also produce anti-aggregation pheromones to signal other beetles *not* to attack a tree once a large population of beetles has attacked and there is no longer the need, or room, for other beetles in the tree. Chemical components of mountain pine beetle pheromones have been commercially synthesized and are available for use. However, we do not recommend the use of any pheromones by landowners. The problem is that placing baits (aggregation pheromone) on a tree can work too well and kill far more trees than anticipated. Also placing the verbenone pouches (anti-aggregation pheromone) on trees does not work at repelling mountain pine beetles from attacking ponderosa pines in the Black Hills.

Baits used to aggregate attacks

Baiting can be used by professionals as a management tactic, however, in all instances, the insect is intentionally drawn to certain trees thereby concentrating the attack in a few selected trees rather than having the infestation scattered throughout the stand. The baited trees are then destroyed before the next generation of beetles emerges from those trees.

The baits come in small packages that are stapled on the trunk of a live pine tree. The baits will not work if stapled to other tree species nor will they work if stapled to pine trees that are small. The baited trees must be large diameter healthy pines, thus baiting requires sacrificing the best trees, not the worst. Spill over attacks to trees adjacent to the baited trees is typical even in low populations of beetles. When beetle populations are high in an area, the number of trees killed near baits can be very high.

There are several different methods of baiting used by researchers and industrial foresters and **none are recommended for private landowners to employ during our current epidemic. *The indiscriminate use of baits is the one tactic that can easily make the mountain pine beetle epidemic worse.*** We do not recommend that private landowners use, or allow the use of baits, on their property. Private landowners should

keep in mind that intentionally drawing beetles into an area might create a liability to them if spill-over attacks occur on adjacent property as a result of the baiting activity.

There are three common methods of baiting. These are presented for information only and not as instructions or recommendation:

Spot baiting. This tactic is used to manage a small infestation. Several trees in the center of the infestation are baited to concentrate the attacks into a few trees. The challenges with spot baiting is that some of the surrounding pines, those within 60 feet of the baited trees, may also be attacked and these trees need to be removed as well. If the stand is on a side slope then wind patterns along the slope can result in attacks on pines several hundred feet up or down from the baited trees thus baiting on one property can result in attacks on pines in a neighboring stand. Also baited trees and any nearby pines that become infested will have abnormally high populations of beetles within them. If these trees are not removed and destroyed by burning, milling, chipping or peeling before the following spring the emerging beetle population will quickly overwhelm and kills any pines in the vicinity.

Lethal baiting. This is occasionally used to protect a small high value pine stand within or near an infestation where none of the trees can be sacrificed. Baited trees are sprayed with an insecticide to kill the adult beetles as they land on the baited tree. Ideally this tactic results in reducing the beetle population yet saving the baited tree. However, there are several challenges to the use of this tactic. First, any tree within 60 feet of the baited tree should also be protected with an insecticide as the beetles may attack them as well and the same problem with slopes discussed in spot baiting can also occur. When populations of beetles are high the likelihood of losing untreated trees near the baited and sprayed trees increases. There are also additional costs and environmental concerns with extra insecticide usage.

Grid baiting. This tactic has been used in large infested stands. Trees are baited at intervals along barrier lines running through the stand. Grid baiting has been used in Canada but in lodgepole pines stands that are to be harvested by clearcutting. Baiting on a grid during beetle epidemics can result in the loss of the entire stand, essentially resulting in a clearcut as all the trees in the stand become infested and need to be removed. .

Verbenone pouches to repel beetles from attacking a tree

The use of verbenone pouches to repel beetles from attack is not recommended. These pouches have not been shown to significantly repel beetles from attacking ponderosa pine trees in any testing in the Black Hills. Landowners who desire to protect a few high-value trees on their property are advised to spray the trees with an insecticide rather than depend upon these pouches.

The South Dakota Department of Agriculture and South Dakota State University are recipients of Federal funds. In accordance with Federal law and U.S. Department of Agriculture policy, this institution is prohibited from discriminating on the basis of race, color, national origin, sex, age, or disability (Not all prohibited bases apply to all programs.) To file a complaint of discrimination, write USDA, Director, Office of Civil Rights, Room 326-W, Whitten Building, 1400 Independence Avenue, SW Washington, DC 20250-9410 or call (202) 720-5964 (voice and TDD). USDA is an equal opportunity provider and employer.