

## **Verbenone Suppression of Mountain Pine Beetle in Lodgepole Pine at the Sawtooth National Recreation Area in Central Idaho**

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The antiaggregation pheromone verbenone was operationally tested for five years to deter mass attack by the mountain pine beetle (MPB) on lodgepole pine in campgrounds and administrative areas surrounding Redfish and Little Redfish Lakes at the Sawtooth National Recreation Area in central Idaho. Each year, five-gram verbenone pouches were placed in an even distribution (approximately 10m apart) within seven of fourteen 0.2 ha plots. During the first two years of the study a median of 12% of the host trees >13cm dbh were attacked and killed on the treated plots, whereas trees on the untreated plots incurred a median mortality of 59%. When approximately 50% of the trees on the untreated plots were killed a detectable beetle response to verbenone on the treated plots dramatically declined. After five years, MPB had killed a median of 87% of the lodgepole pine trees >13 cm in untreated plots and 67% in plots containing verbenone pouches. Beetle pressure was higher on untreated plots in 2000 and 2001, nearly equal between treatments in 2002, higher on verbenone treated plots in 2003 and similar between treatments in 2004. It is hypothesized that the lack of response to verbenone after two years may be related to both population size and spatial scale, i.e. large numbers of vigorous beetles in a local area with a reduced number of preferred large-diameter trees become crowded and stressed, causing a decline in the response to verbenone. The two-year delay in widespread pine mortality caused by verbenone would have given land managers time to use other management tactics to deter catastrophic loss of trees caused by MPB.

Whitebark pine (*Pinus albicaulis*) does not grow in contiguous forest across the landscape like lodgepole pine. Rather, it occurs at high elevations in dispersed small stands or as open-growing individuals. This lack of stand connectivity could help verbenone may be more effective in deterring mountain pine beetle attack in whitebark pine. An active management regime may be the best approach to protect whitebark from attack by mountain pine beetle. The ability of verbenone to divert mountain pine beetles seeking a suitable host may be most effective in isolated stands and where the beetles have an alternate source of attraction. Individual tree protection with verbenone may be of merit for small groups of trees or isolated individuals. In these areas, the application of verbenone in combination with a beetle sink (trap trees or baited traps) and removal of currently infested trees, would most likely show the most promise.