

Management of Shoot Boring Moths from Genera *Rhyacionia* and *Eucosma* with Attract and Kill Technology

R. Hoffman¹, D. Czokajlo¹, G. Daterman², J. McLaughlin¹, J. Webster³, R. Ryneearson⁴, M. Gray⁵, A. Eglitis⁶, C. Jensen⁶, B. Hughes⁷, P. Flanagan⁷, L. Spiegel⁸, W. Berisford⁹, C. Asaro⁹, S. Cameron¹⁰, J. Seckinger¹⁰, L. Sukovata¹¹, A. Kolk¹¹, W. Strong¹² and P. Kirsch¹.

¹IPM Tech, Inc., 4134 N. Vancouver Ave. #105, Portland, OR, USA 97217, tel. (503) 288-2493, fax. (503) 288-1887, e-mail: ipmtech@ipmtech.com, Web: www.ipmtech.com

²USDA Forest Service, Corvallis, OR, ³Roseburg Resources, Weed, CA,

⁴W.M. Beatty & Associates, McArthur, CA, ⁵Sierra Pacific Industries, Redding, CA,

⁶USDA Forest Service, Bend, OR, ⁷USDA Forest Service, Wenatchee, WA,

⁸US Forest Service, La Grande, OR, ⁹University of Georgia, Athens, GA,

¹⁰International Paper Corp., Savannah, GA, ¹¹Forest Research Institute, Warsaw, POLAND,

¹²BC Ministry of Forests, Vernon, BC, CANADA

This material is based upon work supported by the Cooperative State Research, Education, and Extension Service, U.S. Department of Agriculture under agreement No. 2001-33610-11232.

Introduction

LastCall™ (LC), an attract and kill bait matrix, was deployed for the management of shoot boring moths in pine plantations and seed orchards. The targeted moths were the Western pine shoot borer, *Eucosma sonomana* (WPSB), European pine shoot moth, *Rhyacionia buoliana* (EPSM), Ponderosa pine tip moth, *Rhyacionia zozana* (PPTM), and Nantucket pine tip moth, *Rhyacionia frustrana* (NPTM) in pine plantations and seed orchards. Attract and kill technology very selectively removes male moths of the target species from the ecosystem with negligible impact on non-target organisms. Baits combine the selectivity of pheromone (only 0.21 g/ha, compared to 3.5-20 g/ha for mating disruption) with the rapid toxicity of insecticides (only 7.92 g/ha, compared to 500-800 g/ha for conventional sprays). This bait retains the insecticide within a hydrophobic matrix that precludes run-off or drift, and thus prevents ecosystem contamination and damage.



Results

1. Trap catch shut down was observed on all LC treated plots (Fig. 1).
2. On small experimental plots, WPSB will re-infest pine leaders if not treated for one year (Fig. 2).
3. WPSB damage in California was reduced from 55-78% to 2.5-15% (Fig. 3). EPSM damage was reduced by 30-50% in Poland. This test was limited by the small size of the plot. Studies will be conducted in British Columbia in 2003.

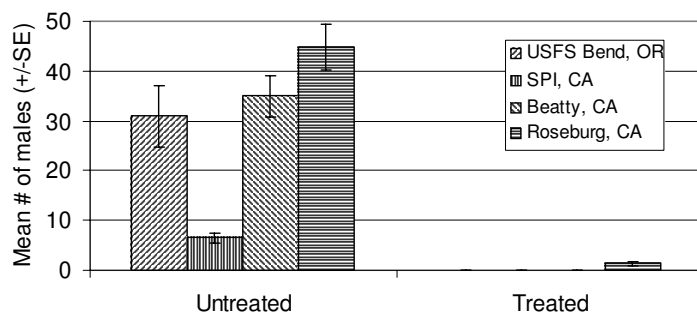


Figure 1.—Trap captures of *Eucosma sonomana* on LastCall™ experimental plots in ponderosa pine, Spring 2002.

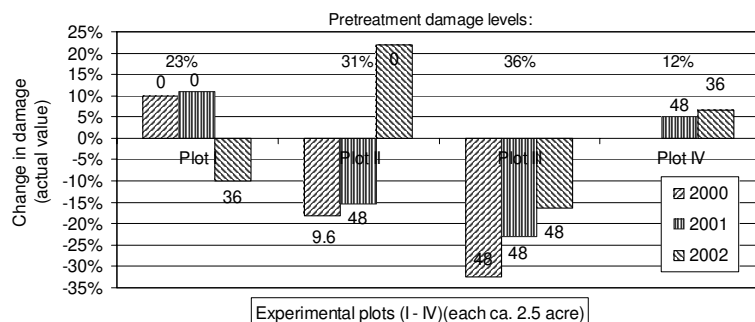


Figure 2.—Year to year *Eucosma sonomana* damage in ponderosa pine under four different treatment regimes with LastCall EusomAK near Bend, OR, 1999-2002. Numbers indicate amount of pheromone (mg/acre) used in the treatment.

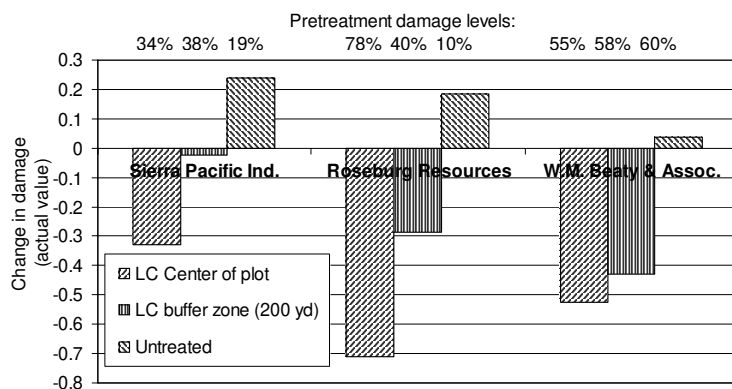


Figure 3.—Change in ponderosa pine damage by *Eucosma sonomana* on LC WPSB treated 250-acre plots in NE California, 2002. Plantations received 60g of LC containing 48mg of pheromone per acre.

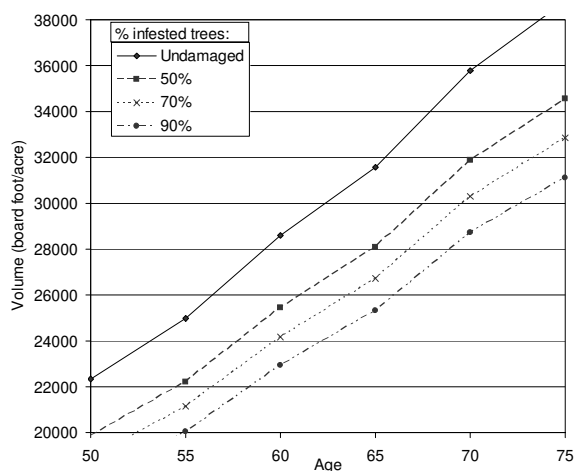


Figure 4.—Growth predictions for model, undamaged, and *Eucosma sonomana*-damaged ponderosa pine in NE California, 2002. The values were calculated for measured, mean 22% reduction in annual elongation of terminal. Site index 80, CACTOS model.

5. Damage by NPTM on LC treated plots in North Carolina was reduced by 58% when compared to untreated plots (Fig. 6).

Discussion

LastCall technology is an effective and environmentally safe method for managing shoot boring moths in the genera *Rhyacionia* and *Eucosma*. With LC treatment, the 60-year harvest rotation of ponderosa pine can be reduced by at least 5 years and timber yield can be increased by at least 3,940 board feet per acre (Fig. 4). Lack of management of *Eucosma sonomana* can lead to a decrease in timber value at the end of the rotation that amounts to at least \$1,181 per acre (Fig. 5). IPM Tech expects EPA registration in Spring 2003 for LC EucosmAK, followed by rapid adoption of this innovative tactic in western ponderosa pine plantations.

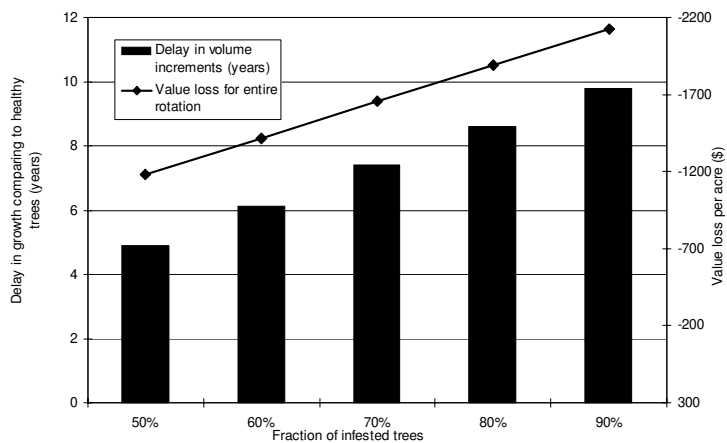


Figure 5.—Growth delay (years) and value loss (\$) of ponderosa pine infested with WPSB at different levels and average 22% loss of terminal elongation. Values calculated for 70 year rotation in NE California, CACTOS model, SI 80, \$300/Mbf. Maximum value = 35,790 bf.

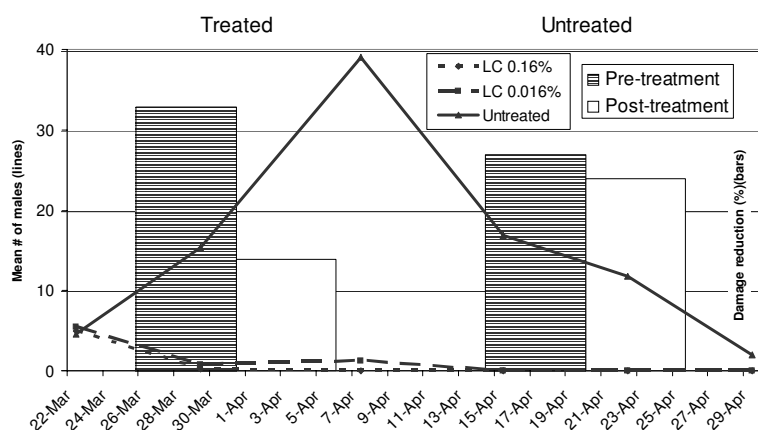


Figure 6.—(1-Lines) Trap catch: *Rhyacionia frustrana*, (2-Bars) Damage reduction (%) on LC 0.16% treated plots, Georgia, 2002.