Leptoglossus Mark-Release-Recapture (MRR) Final Report

March 27, 2009

Executive Summary

The western conifer seed bug, *Leptoglossus occidentalis* Heidemann (Hemiptera: Heteroptera: Coreidae) is a prolific pest in seed orchards in south interior British Columbia and is responsible for varying degrees of seed damage in several conifer species. This report summarizes activities and findings of the first year of research using mark-release-recapture techniques to evaluate movement patterns population sizes of this insect in conifer seed orchards.

The research goals for the 2008 field season were to determine spring immigration patterns, to understand factors influencing within orchard dispersal and to estimate population abundance and the accuracy of a visual monitoring system employed by seed orchard staff.

Insects were released in lodgepole pine orchard 307 to establish an artificial directional invasion effect on the western edge of orchard 307 in an attempt to determine invasion dynamics. The dynamics of the natural population in orchard 307 were also investigated using MRR methods at this time. Low initial recapture rates necessitated the modification of monitoring methods mid project. We were able to increase our recapture rates by intensifying search efforts mid-project. Increased efforts on the natural population dynamics project in orchard 307 may be more effective at revealing edge effect dynamics, therefore the artificial edge experiment will not be repeated in the 2009 field season. Preliminary analysis of naturally occurring edge effects and dispersal within orchard 307 indicates that *L. occidentalis* enters orchard 307 from the south, forming an edge effect which declines a few weeks later. Insect density then intensifies in the centre of the orchard. The study was based on weekly monitoring and the monitoring system was modified mid-season. We wish to confirm our preliminary findings so the MRR studies need to be repeated in 2009 with consistent monitoring methods, intensified monitoring and more frequent monitoring events.

Similar to Blatt and Borden (1998), we found, that *L. occidentalis* had definite clonal preferences in both lodgepole pine and spruce, and we decided that this aspect of *L. occidentalis* behaviour warranted further investigation since it could shed light on host selection mechanisms. Steve Takacs and Gerhard Gries, SFU, graciously agreed to collaborate with us to determine if the infrared (IR) signatures emitted by favoured clones influence *L. occidentalis* attraction. The preliminary results of this collaboration suggest that there is a relationship between the IR profiles of cones and *L. occidentalis* clone preference. We also sampled cones from favoured and unfavoured lodgepole pine clones and sent them to the Ministry of Forests analytical chemistry lab in Victoria for terpene analysis. As with the IR, it appears that there is a relationship between terpene content of cones and *L. occidentalis* attraction. We found that β-phellandrene, β-caryophyllene, bornyl acetate, and limonene were responsible for the majority of difference between favoured and unfavoured lodgepole pine clones. We will repeat this study in 2009 with tighter controls, and we will include spruce to see if there are any similarities with what is found in pine.

To quantify the visual monitoring system used in commercial seed orchards, an intensive MRR project was conducted in one spruce orchard, with concurrent visual monitoring. Data from this trial will be amended in 2009 and analyzed.

377 individuals were marked and released in August to determine whether they return to the same (or nearby) locations after overwintering.