

Density dependence of host location behaviour and reproductive behaviour by mountain pine beetle (*Dendroctonus ponderosae*).

Objectives:

During the summer of 2000 I conducted research on host location behaviour of mountain pine beetles (MPB) in Kootenay National Park. Mountain pine beetle attack, and must kill, live lodgepole pine trees in order to successfully reproduce. The objective of my work was to examine whether or not the type of trees that the beetles decide to attack, the amount of energy that the beetle invests in locating a tree to attack, and the beetles reproductive investment changes with the density of the MPB population.



I located sites within Kootenay National Park where MPB were at different population densities. At each site I selected five focal lodgepole pine trees on which I followed MPB attacks and examine the beetles behaviour. I initiated MPB attacks on each tree by implanting 5 female beetles that released aggregation pheromones. On each tree I attached a Plexiglas barrier trap that collected a subset of the MPB that visited each focal tree. During the MPB flight period I visited each of my sites on a bi-weekly bases. On each visit I marked all new MPB attacks on each focal tree and collected beetles from the barrier traps. During each visitation I also excavated a subset of the new MPB attacks. By comparing the condition of beetles that visit a lodgepole pine tree to the condition of beetles that attack the tree I can indirectly examine MPB host location behaviour. Following the beetles flight season I measured host tree availability and condition, and beetle attack densities in the vicinity of each research site.

Links to Decision Making:

Because MPB are considered a destructive pest species there has been considerable work done on MPB biology and the environmental factors that possibly facilitate beetle epidemics. However, very little work has been done to determine the role and importance of beetle behaviour in the transition from low density to epidemic populations. By better understanding beetle behaviour we may improve our ability to determine when and where beetle populations may increase and spread.



Results:

Preliminary data analysis indicates that the ability of beetles to locate host trees, and how selective they are with respect to host tree quality, is dependent on beetle condition and the density of the MPB population. Specifically, beetles with large current energy reserves are better at locating good quality host trees, and tend to be more selective with respect to host tree preference. This suggests understanding the interaction between beetle condition, beetle behaviour, and population density may be important in understanding MPB population dynamics.

Contact Information:

Che Elkin, Department of Biological Science, University of Calgary
Phone: (403) 220-7930 Email: cmelkin@ucalgary.ca