

Presence of long-lasting peripheral adaptation in the obliquebanded leafroller, *Choristoneura rosaceana* (Harris) and absence of such adaptation in the redbanded leafroller, *Argyrotaenia velutinana* (Walker)

L.J. Gut, L. L. Stelinski, and J. R. Miller  
Department of Entomology and Center for Integrated Plant Systems  
Michigan State University, East Lansing, MI 48824

The obliquebanded leafroller (OBLR), *Choristoneura rosaceana* (Harris), and the redbanded leafroller (RBLR), *Argyrotaenia velutinana* (Walker), share the major components of their pheromone blends; Z11-14:Ac and E11-14:Ac in 98:2 ratio for OBLR and 93:7 ratio for RBLR. The RBLR is reported to be easily disrupted, in some cases using only the main pheromone component, Z11-14:Ac. In contrast, the OBLR is often described as difficult to disrupt in the field as measured by lowered captures of males by synthetically baited traps and fruit and foliar damage investigations, and possibly requiring the full natural blend of pheromone components. We seek to understand the underlying explanations for the differences in susceptibility to mating disruption between these two sympatric tortricids.

Electroantennograms (EAGs) performed on moths prior to and post exposure to pheromone for various time intervals were used to characterize differences in the capacity for “long-lasting” peripheral adaptation and disadaptation between OBLR and RBLR. Pre-exposure of male OBLRs’ to Z11-14:Ac and traces of E11-14:Ac for durations of 15 and 60 min in sealed Teflon chambers with continuous air exchange significantly reduced peripheral sensory responses to these compounds as measured by EAGs. The EAG responses of OBLR to pheromone were lowered by as much as 60 % and made a linear recovery to 70-100% of the pre-exposure amplitude within 12.5 min at a rate of 3-4 % / min. In contrast, EAG responses of RBLR after pheromone exposure for up to 60 min yielded no long-lasting peripheral sensory adaptation as measured by EAGs.

Additional EAGs were performed on male OBLR after 24 h of exposure to pheromone under field conditions. Caging OBLR males in apple trees adjacent to 1,2 or 4 Isomate OBLR/PLR Plus (Pacific Biocontrol Corporation) pheromone dispensers for 24 h periods resulted in long-lasting adaptation similar to that observed in laboratory experiments. Adaptation was not observed for moths caged at a distance of 2 m from dispensers in 1 ha plots that were treated with 500 dispensers per ha.

We postulate that the long-lasting peripheral adaptation observed for OBLR is a mechanism that impedes central nervous system habituation in this species. In contrast, RBLR may be more susceptible to central nervous system habituation because it lacks the capacity for minutes-long adaptation. We propose that “long-lasting” adaptation may be a mechanism explaining some of the variation in efficacy of pheromone-based mating disruption across taxa.