

Biological Control

Mass Releases of Two Eurasia Parasitoids of Codling Moth

Thomas R. Unruh
USDA-ARS, Wapato, WA

Keywords: codling moth, *Cydia pomonella*, *Liotryphon caudatus*, *Mastrus ridibundus*, apple, pear

Mating disruption of codling moth is proving to be a highly successful alternative to a conventional insecticide program in apple and pear production in the Northwest. Unfortunately, this complex management approach still does not meet the requirement of management of apple and pear insects without neurotoxic insecticides, a goal of organic growers and a growing segment of conventional orchardists. Enhancement of biological control is one possible part reaching this goal. Here I present results of a field trial for suppression of overwintering codling moth in problem areas of 6 orchards managed with mating disruption.

Codling moth is a Eurasia insect that colonized North America without its complement of natural enemies. We have imported several species of parasitoids in an attempt to establish them in unmanaged host habitats. A second aspect of this work has been to test the value of mass releases of two of these parasitoids into organically managed orchards to remediate codling moth problems. In 1996 we conducted releases of *Liotryphon caudatus* and *Mastrus ridibundus*, at rates of 1,000 females per acre, either as single species or 50% of each species. These wasps both attack cocooned larvae, the overwintering stage of codling moth. Releases were variously timed with the earliest releases made September 4 and the latest on October 16. The efficacy of releases was assessed from trap bands placed in study sites in mid-August and from sentinel host cocoons placed in trees at the time of release.

Results of the trials were highly variable and depended strongly on release timing. The early releases produced up to 60% parasitism of codling moth, 10% by *Liotryphon* and the remaining 50% by *Mastrus*. At sites where releases were later parasitism was 10% or less. The results clearly demonstrated the value of making releases early in fall or in late summer, to allow enough warm days for parasitoids to find and parasitize codling moth. A second result from the 1996 studies is that these parasitoids are highly mobile; parasitism in 1-acre blocks adjacent to release sites showed parasitism rates approaching that in release blocks. In 1997 both summer generation and fall generation codling moth will be targeted for release, trap band assessments will cover much larger areas than the release blocks, and releases will occur earlier in the fall generation. The 1997 trials will emphasize *Mastrus* because this gregarious species is reared more economically on codling moth than is the solitary *Liotryphon* species.