

## Biological Control

### Biological Control of the Cherry Bark Tortrix, *Enarmonia formosana* Scop. (Lepidoptera: Tortricidae)

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The cherry bark tortrix (CBT), *Enarmonia formosana* Scop., is a recent pest of Rosaceous trees and shrubs. Although CBT has been found in apple and cherry orchards in western Washington, CBT is mainly an urban landscape pest. In urban areas such as Bellingham, CBT infests 100% of the sweet cherries, *Prunus avium*. Additionally, CBT has moved into our native flora, such as *Prunus emarginata*, *Malus oregonensis* and *Crataegus douglasii*. Since CBT is ingrained into our landscapes, control of CBT and its expanding range is becoming more difficult to achieve. With new surges southward, CBT will pose a threat to western nurseries and eastern orchards.

Although chemical control is now an option for controlling CBT populations, biological control is still the most practical and economical strategy. For the past two seasons, WSU-Vancouver has been surveying western Washington for endemic natural enemies. This endemic survey is the first phase in the 'classical' biological control approach. CBT achieves pest status rarely and sporadically in its native range; we believe Europe houses a natural enemy complex that regulates CBT populations.

#### ***Trichogramma* Egg Parasitoid Survey**

Three Mount Fuji oriental flowering cherries, *P. serrulata*, were tracked for egg parasitism. The same area of the tree, 2000 cm<sup>2</sup>, was sampled weekly. Counts of total egg deposition and total 'mummified' eggs were taken. When CBT eggs are parasitized with *Trichogramma*, the eggs turn a dark metallic blue as the wasp begins to pupate. Tentatively, the identification is *Trichogramma cacoeciae*, a native, solitary, lepidopteran egg parasitoid in the Northwest. If parasitoids arrive at the tree early in the season, parasitism rates can approach 100%.

#### ***Sleeve Cage Survey***

During the seasons of 1997-98, fifteen sleeve cages were designed for determining areas of parasitoid activity. Cloth sleeve cages were placed into the field at different time intervals. The sleeves were sealed for duration of at least one and a half months to allow any parasitoids to emerge and die. After the duration, the sleeves were cut open along the seam to survey the contents. A good diversity of parasitoids was collected using this method for the 1997 season. In 1998, very few specimens of potential larval/pupal parasitoids have been collected. Up to five sleeve cages were placed in the field weekly. Numbers of weekly set cages were used pending sites available in Whatcom County. Parasitoid occurrence on CBT has been much lower in the

1998 field season.

### **Parasitism Rate**

In 1997, two hundred individual cages, designed to cover and trap emerging moths and parasitoids, were placed in the field throughout the summer months. These data will give us a better idea of parasitoid activity through time. This cage fit over an area to include the larval frass tube, and any other organisms were removed prior to containment. Cages remained in the field for at least 45 days. Upon removal, the contents of the cages were collected and recorded. Total parasitism in the field was 1.7% in 1997; three traps yielded parasitoids.

In 1998, we set 20 cages weekly at various locations. As of October 26, 440 cages were set and collected since mid-April. Only 7 parasitoids have been captured in the boxed-frame cages. Since this year's data included samples during and after CBT flight, parasitization rates were based on the total number of cages used. This gave a seasonal parasitization rate of 1.60%. As of yet, most parasitoid activity occurred in mid-July and early August.

### **Destructive Tree Sampling/or Parasitoids**

Trees were removed bimonthly throughout the season and sectioned into logs. Trees removed were mainly of naturalized sweet cherry (*P. avium*) and wild cherry (*P. emarginata*). Logs were placed into 50-gallon plastic containers. Three wide mouthed jars were placed on the container lid to collect any emerging insects. This sampling method provided the most diversity and abundance of parasitoids in 1997 but yielded no parasitoids in 1998.

### **Foreign Exploration**

Due to CBT's sporadic pest status in Europe, there is little information of natural enemies. Dr. Tanigoshi, in collaboration with Dr. Ulli Kuhlmann (CABI-Bioscience, Delemont, Switzerland), surveyed northern Switzerland and the Rhine River valley of Germany for CBT natural enemies. CBT larvae were collected and transshipped to WSU's Pacific Northwest Insectary and Quarantine Facility. Three pairs of ichneumonid parasitoids were reared from the larvae. Additionally, many ichneumonid cocoons were collected inside CBT galleries and sent for identification.

Currently no natural enemy is offering significant control in the Pacific Northwest. Observations and preliminary collections support the theory that Europe contains natural enemies that keep CBT populations regulated. This program emphasizes classical biological control as the most economic and rational means of gaining population suppression of CBT not only in our urban and orchard landscapes, but also in our widespread and inaccessible reservoir of native hosts.