

## Biological Control

### PARASITISM OF OBLIQUEBANDED LEAFROLLER, *CHORISTONEURA ROSACEANA* (HARRIS) (LEPIDOPTERA: TORTRICIDAE), IN MICHIGAN APPLE ORCHARDS

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### Introduction

The obliquebanded leafroller (OBLR), *Choristoneura rosaceana* (Harris), is an economically important pest in Michigan apple production, damaging both foliage and fruit. OBLR resistance to organophosphate insecticides has prompted the need for alternate methods of control for this pest. Biological control by parasitoids in the orchard ecosystem is an option currently being evaluated.

### Methods

Five apple orchards in the Southwest and Fruit Ridge/Belding regions of Michigan were surveyed in 1999 and 2000. OBLR were collected during a timed sample from an average of two blocks per orchards. Blocks varied in the variety of apple and in the type of treatment they were receiving for insect control (pheromones, insect growth regulators, and conventional insecticide).

Each orchard was sampled once a week. Length of time spent searching for OBLR depended on the abundance of insects within a block. A fixed sample time of 2 total person-hours per block was used. Sampling in a block was discontinued after 10 minutes if the rate of larval collection indicated that the minimum sample size of 11 larvae/block would not be achieved during the sampling period. OBLR larvae were reared in the laboratory on artificial diet at 25°C and 16L:8D until the emergence of an adult OBLR or parasitoid.

### Results

Percent parasitism increased from the overwintering to first generations in both the Southwest (16% to 26%) and Fruit Ridge/Belding regions (5% to 20%) during 1999. A similar pattern was observed during 2000 with percent parasitism increasing from the overwintering to first generations in both the Southwest (3% to 21%) and Fruit Ridge/Belding regions (26% to 37%).

The Braconid parasitoid *Bassus dimidiator* and two species of Tachinidae were the predominant parasitoids, frequently comprising more than 50% of the total parasitism in both

generations for 1999 and 2000. The Eulophid parasitoid *Colpoclypeus florus*, absent from the overwintering generation, parasitized first generation OBLR in both regions of the state, with percent composition increasing from less than 5% in 1999 to more than 10% in 2000. Parasitoids making up less than 5% of the parasitoid complex are yet to be identified but likely represent eight additional species. An unidentified Braconid (subfamily Ichneutinae) was prevalent during the overwintering generation in both regions of Michigan in 1999 but was either absent or comprised less than 5% of the total parasitism in subsequent surveys.

### **Discussion**

Future focus will be centered on the potential of *Bassus dimidiator* as an effective biological control agent of OBLR in Michigan apple orchards. While *B. dimidiator* is reported to parasitize the eye-spotted bud moth, *Spilonota ocellana*, it has not previously been reported from OBLR. *Bassus dimidiator* is an endoparasitoid and is thought to be a holarctic species. Dondale (1954) reports that *B. dimidiator* attacks second to third instar eye-spotted bud moth larvae, which is consistent with our observations for OBLR.

The presence of *Colpoclypeus florus* in the Midwest was previously undetected until the 1999 OBLR parasitoid survey. *C. florus* is a European species that was introduced into Canada and has become well established and a major mortality factor of Lepidopteran pests in orchards on the west coast of the United States. *C. florus* in Michigan apple orchards will continue to be monitored for increased levels of parasitism.