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Early season obliquebanded leafroller monitoring and control

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Obliquebanded leafroller (OBLR) overwinter in the orchard as immature larvae and begin feeding inside bud clusters prior to bloom and on young fruit in May and June. Fruit that do not abort can be deeply scarred and deformed by OBLR feeding. Scouts can monitor overwintering survivors in terminals after petal fall, but signs of leafroller activity often are more readily visible than the actual larva. The name leafroller comes from the larva's habit of rolling leaves to form a shelter. These feeding sites are most often found at the tips of growing shoots. Larvae also will use silk webbing to attach two leaves or a leaf and fruit together to form a shelter. The presence of webbing is a good clue that leafrollers are around.

Controlling the overwintering larvae has proved to be the best strategy for preventing OBLR populations from reaching damaging levels. This is especially true if early scouting indicated high levels of OBLR larval activity, or if an orchard experienced high levels of OBLR injury the previous summer. The incidence of leafroller damage appears to be on the rise in Michigan. It was not uncommon to record 5 to 10% fruit injury caused by this pest in the pre-harvest damage assessments we conducted on over 2,000 acres of apples in 2005. Past failures to control OBLR have in part been attributed to a reduction in susceptibility to insecticides that had proved effective for many years. Indeed, bioassays conducted by our labs from 1998-2000 revealed a reduced susceptibility to many of the compounds used for leafroller control. The major exception was spinosad (SpinTor, or Entrust for organic growers). Spintor, as well as Intrepid and a few other materials, have proved effective for leafroller control over the past several years. However, growers have relied heavily on these insecticides, and it would not be unreasonable to see some decline in their efficacy. Washington State researchers have documented a reduction in OBLR susceptibility to spinosad in recent years.

A good long-term strategy for OBLR control is to rotate among several controls. Bt is a good option, especially as the late afternoon temperatures climb above 70°F. Two new insecticides targeting early codling moth control (Rimon and Proclaim) also provide good to excellent control of overwintering OBLR larvae. Both pests are targeted by an early application of Rimon at biofix plus 100 GDD. The label allows for a wide rate range. In our trials the lower rate of 20 oz acre has proven effective against first generation OBLR and codling moth. A higher rate of 30 oz per acre may be warranted where pest pressure is high. Proclaim will control OBLR, but not codling moth, at this early timing. Either material is a good option for OBLR and codling moth control at the typical first cover timing of biofix plus 250 GDD. Proclaim is registered at a label rate of 3.2 to 4.8 oz per acre. Stick to the higher end of the label rate if codling moth and OBLR are being targeted. Proclaim's activity is aided by the addition of a horticultural spray oil (1 qt/100 gallons) or non-ionic surfactant (0.25% v/v). Refer to *Fruit CAT Alert* article (Vol. 21, No. 6, May 16, 2006) on codling moth, as well as Table 1 in this article, for additional information on these materials.

Table 1. Early season codling moth materials also providing good to excellent control of OBLR.

Compound Trade Name	Chemical Class	Life-stage Activity	Optimal Spray Timing for CM	Mite Flaring Potential
Rimon	IGR (chitin inhibitor)	Eggs, Larvae	Biofix + 100 DD Residue under eggs	M*
Proclaim	Avermectin	Larvae	Biofix + 250 DD	L
* May cause mite flaring in combination with carbaryl or pythrethroids that kill predacious mites.				

Monitoring of summertime OBLR activity begins at the start of the month of June, when growers should have their pheromone-baited traps for the OBLR placed in their orchards to monitor adult activity. One pheromone-baited trap for every 10 acres of orchard is sufficient for monitoring OBLR. In most orchards, traps should be placed in the middle third of the tree canopy. As with codling moth traps, the key considerations for effective trap placement within a block are historical “hot spots,” and location relative to the block perimeter. An area where moth catches or injury to fruit was high the previous season, is a good place to locate a trap. Traps should also be placed in other locations throughout the orchard to represent pest pressure for the whole orchard.

There are two periods of adult activity. In Michigan, the first adult flight typically begins in early June and lasts about six weeks. A second flight takes place from early August to mid-September.

Moth capture in pheromone traps is not a good indicator of leafroller abundance or potential damage, but is essential for tracking biological development with the OBLR degree day model for proper timing of control measures.

Obliquebanded leafroller degree day table.

GDD42 (Post biofix)	Event	Action
Tight cluster	Majority of larvae have emerged from shelters	Examine fruit buds for larval activity
0 DD° = biofix (~900 DD° after Jan 1)	1st sustained moth captures	Set DD° = 0
220-250 DD°	Peak moth flight - overwintering generation	
400-450 DD°	Start of egg hatch	Timing for treatment
1000 DD°	End of egg hatch	
2300 DD°	Peak moth flight - 2nd generation	
2750 DD°	Start of 2nd generation egg hatch	Timing for treatment

Damage occurs at three periods during the growing season. Larvae of the overwintering generation will feed on young fruit in May and June. Fruit that do not abort will be deeply scarred and deformed (Photo 1). Young, summer generation larvae will feed on fruit before moving to growing shoots. Several shallow feeding sites within a small area characterize fruit damaged by young summer generation larvae. Late in the summer, young larvae will feed on the fruit prior to seeking overwintering sites. The pinhole size feeding sites are difficult to detect at harvest, but become noticeable as the fruit ripens in storage.

As the summer progresses, sampling for larvae is a good way to determine if OBLR controls are warranted. If overwintering larvae were found in more than 1 to 2% of the shoots inspected, summer controls likely will be needed. Insecticides may also be required to prevent fruit injury if summer larvae or visuals signs of their presence are detected in fruit clusters or shoots.

Degree day models can aid in timing insecticide sprays by predicting key events in the leafroller's life, such as the start of egg hatch. Using these models relies on the establishment of a biofix and daily temperature records. Biofix is the date when the scout records the date of the first sustained moth capture in pheromone traps, provided that moths are trapped on two successive trapping dates. The model is set to zero, and degree days are accumulated from this date forward based on daily temperatures. The obliquebanded leafroller model calculates degree days based on a minimum developmental threshold of 42°F.