Leafroller at petal fall
Leafroller (LR) overwinter as 2nd or early 3rd instar larvae. They emerge in the spring when the tree breaks dormancy, first attacking buds then moving to leaves. Visual monitoring for leafroller feeding injury is the best method of detecting their presence and density. It is possible to detect feeding injury as early as the pink stage of flower development, but it is better to delay monitoring until the petal fall period - just prior to determining the need for a control treatment.

Which species of LR is in your orchard?
Obliquebanded Leafroller (OBLR) are displacing Pandemis Leafroller (PLR) in many areas. OBLR occurs later in the spring and has a more spread out summer generation, which results in different timing for treatments. OBLR are more proliferous and harder to kill with pesticides.

PLR larvae have a light green to tan head capsule. OBLR larvae have a brown to black head capsule.

PLR bands are outlined in lighter color. PLR moths are in the range of 1/2 to 3/4 inch long. OBLR bands’ outline is darker. OBLR are in the range of 3/4 to 1 inch long.
Insecticides in the petal fall period

There are several insecticides that will control overwintering leafroller larvae when applied in the petal fall period. Some of these insecticides will control more than one pest in this period if the applications are timed appropriately. Other pests of concern should be considered when choosing a product to use at this time.

Bacillus thuringiensis (Bt) should be applied when daily high temperatures are expected to be 65 degrees or more for three consecutive days. Two or three applications of Bt products are usually required to achieve acceptable control of leafroller.

Esteem, Intrepid, Rimon, and Altacor can be very efficient tools when used in the petal period because they are effective against both codling moth (CM) and LR. These insecticides work as ovicides, killing CM eggs that are being laid in the orchard at this time, and also control of feeding LR larvae. Overwintering LR larvae and CM eggs overlap in the period between 250 and 375 CM DD past January 1. When these materials are used within this window, both LR larvae and CM eggs are controlled. Esteem should be applied when the last stage of LR larvae are present but before pupation has begun. The WSU Decision Aid System (DAS - http://das.wsu.edu) can help optimize the timing of this product against leafroller. Esteem, Intrepid, Rimon, and Altacor can be used as part of a management strategy to delay the first larvicide application against codling moth.

Delegate is highly effective against LR larvae when applied in the petal fall period. Delegate may also provide control of Western flower thrips when used at this time. Recent research suggests that the optimum application timing to prevent oviposition damage from Thrips is from the start of petal fall to 5mm fruit size. Though research with Delegate on Thrips is limited, Delegate is in the same chemical class, and has the same mode of action as Success, which provides good control of Thrips when applied at this time. Using Delegate from the start of petal fall to 5mm fruit size will provide control of both Thrips and LR. While Delegate does not directly kill codling moth eggs it has a strong ovi-larvicidal activity, which means it kills codling moth larvae exiting eggs. Therefore, if Delegate is applied just prior to CM egg hatch (ca. 375 CM DD from Jan. 1) it will control LR and can also be used as part of a management strategy to delay the first larvicide application against codling moth.

Belt is in the same chemical class as Altacor and is very effective for control of leafroller larvae. However, Belt does not have ovicidal activity against codling moth eggs laid on its residues and therefore cannot be used as part of a strategy to delay the first larvicide treatment for codling moth. Use the LR models on the WSU DAS for the optimum timing for this product against leafroller. Initial research with Belt suggests that it may also be effective against SJS and woolly apple aphid (WAA) when applied at petal fall period and again 14 days later.
**Codling moth at petal fall**

If a product that has ovicidal activity against codling moth eggs (*Esteem, Intrepid, Rimon, or Altacor*) is used in the petal fall period, the first larvicide application can be delayed by at least 100 CM DD. Codling moth degree-day model predictions show that average codling moth egg-hatch begins approximately 425 DD past January 1. The hatching of deposited eggs starts off slowly and in the first 10-15 days (100 DD) only 12-15% of the total egg hatch occurs. The rate of egg hatch then becomes more rapid and in the 21d period after 525 DD almost 70% of the eggs hatch. After this period of peak activity, the rate of egg hatch slows and the final 15-20% of the first generation egg hatch occurs over about a two-week period.

By applying an ovicide prior to the onset of the egg-hatch period and delaying the larvicide application to 525 DD the most active larvicide residues coincide with the most active egg-hatch period. In this strategy the ovicide kills eggs that would have hatched in the period starting at 425 DD allowing growers an opportunity to delay the first larvicide application until 525 DD, which is the beginning of the period of peak egg-hatch activity. This strategy also shortens the period of time that larval control is necessary, which may be more accommodating to the new larvicides that, in general, have a shorter residual life than the OP insecticides that they are replacing.

Using a CM ovicide in the petal fall period can prevent CM eggs from hatching and allow delaying the first larvicide application until 525 DD, which shortens the period of time that larval control is necessary.