

Redbanded Leafroller

Argyrotaenia velutinana (Walker)

The redbanded leafroller (RBLR) has been reported to feed on apple since the 1870s, but was not found to be an economic pest of commercial apples in northeastern United States until 1918. It remained a minor pest until the mid-1940s, when it became a major concern to apple growers in New York. Although RBLR is still a potentially serious pest of apples, it has not been considered a major problem since the introduction of azinphosmethyl and similar organophosphate insecticides in the 1960s. At present, it is generally controlled by sprays for other pests.

RBLR feeds on a wide variety of unrelated plants, including tree fruits and small fruits, vegetables, weeds, flowers, and forest or ornamental trees and shrubs. On tree fruits, it is most important on apple, but is also a pest of plum, prune, peach, and cherry. In New York, there are usually two generations per year, but a third brood can occur if the growing season is particularly warm.

Adults

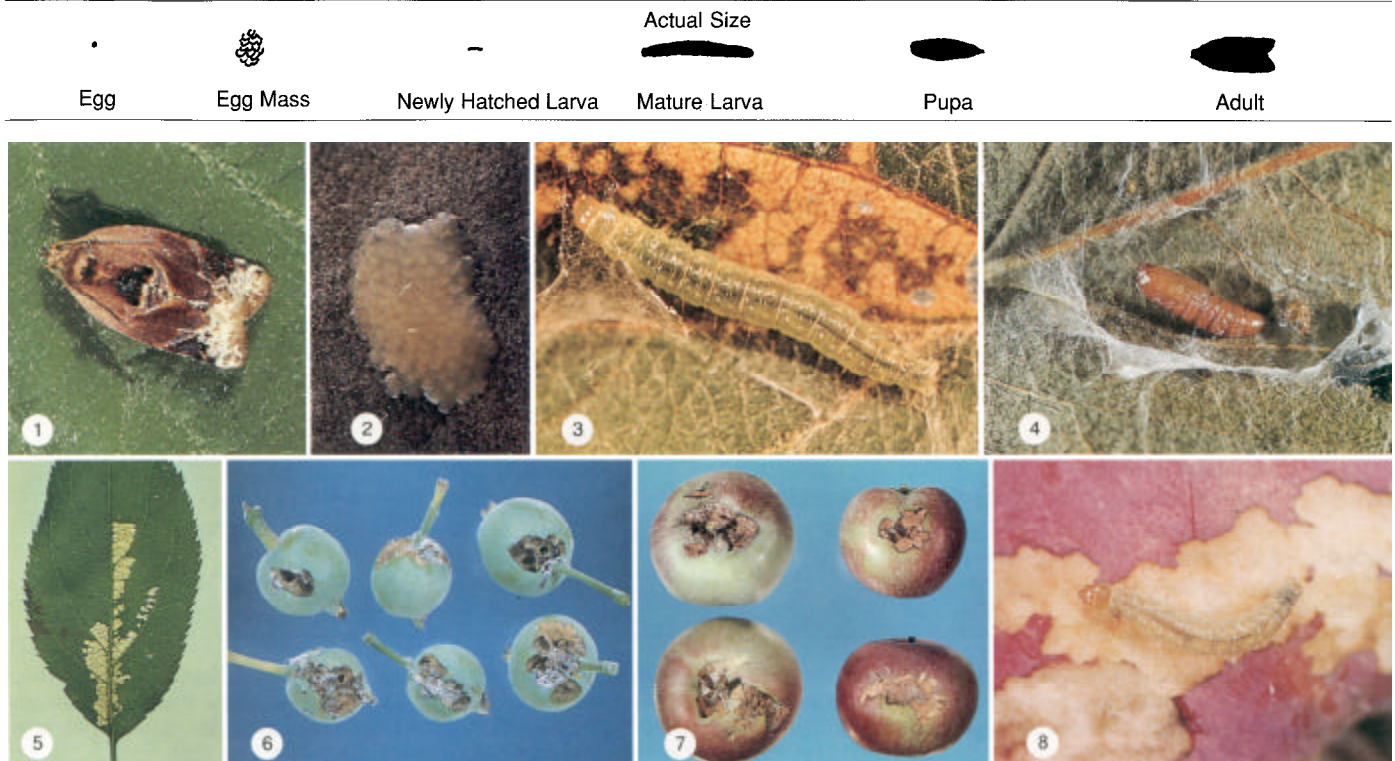
The adult RBLR is reddish-brown with lighter markings of silver, grey, and orange (fig. 1). The name of the pest refers to the distinct reddish-brown band extending across the wings, and its habit of rolling, folding, or attaching leaves together. The RBLR measures 6.3 to 9.5 mm (3/8 to 1/4 in.) long. The male is smaller than the female, and

has a slender, tubular abdomen with a tuft of hairs at the tip. The female's abdomen is wider than the male's, spindle-shaped, and bluntly rounded at the end.

The first RBLR moths emerge in the spring from overwintered pupae in the ground cover, before or soon after the green-tip stage of apple (early April). This first flight peaks in the tight cluster to pink bud stages. The moths can be found resting on trunks and scaffold limbs, and can sometimes be flushed from the ground cover. The second adult flight occurs from mid-June to mid-July, and the third flight, if it occurs, is from from late August to mid-September.

Eggs

Eggs are laid in groups of a few to nearly 150, but a typical egg mass usually contains about 40 eggs deposited in oval patches (fig. 2) that measure 3.0 by 5.0 mm (1/16 by 3/16 in.). The eggs resemble overlapping scales in the patch, and are pale yellowish or cream colored. Each egg is about 0.8 mm (1/32 in.) in diameter. First brood eggs appear in the pink to early-bloom periods, and are laid primarily on the trunk and scaffold limb bark; hatch coincides with the petal fall stage of apples (mid-May). The summer brood eggs, which are more difficult to find, are laid mostly on the upper surfaces of leaves.



Larvae

The larva (fig. 3) is small, unmarked, and green to pale yellow, depending on the food consumed. The head capsule and thoracic shield (the hardened plate behind the head) are the same color (green to yellow) as the rest of the body. This is important in distinguishing RBLR from other leafrollers, in which the head and thoracic shield are darker than the rest of the body. Newly-emerged larvae are about 1.6 mm (1/16 in.) long; the last larval stage is about 16 mm (5/8 in.) long.

First brood larvae crawl along trunks and limbs in search of leaves to eat; watersprouts are readily accepted as food. Small larvae feed on leaf undersides near the midrib or large veins, and spin a flimsy web, which expands as the larva grows. Larvae are more likely to feed on fruit as they grow. As with the first brood larvae, those of the second brood feed on the undersides of leaves within a web. In late August and early September they begin to move about on the tree and feed more on fruit, and this feeding may continue until October, when they fold a leaf around themselves and pupate within.

Pupae

Pupae (fig. 4) are initially greenish-brown, but later turn a deep brown. They are 9.5 to 12.8 mm (3/8 to 1/2 in.) long. RBLR overwinters as a pupa in a folded leaf in the ground cover, whereas summer brood pupae can be found on the tree in folded leaves or in two leaves fastened together.

Damage

RBLR damages both foliage and fruit, but foliar damage is not significant except in cases of very severe infestations. Leaf-feeding by young larvae produces a skeletonized band near the midrib (fig. 5) or veins. The young larval stages of all broods tend to feed on the leaves, but they prefer fruit as they become larger. Damage to the fruit causes concern and economic loss to the grower. Fruit damage by the first brood larvae is likely to occur when two

apples are tied together with webbing, and can be quite deep (fig. 6), because the apples are small. These damaged areas eventually cork over, resulting in deformed fruit (fig. 7).

Damage to the larger fruit by the summer broods is typically shallow and irregular (fig. 8); in contrast, other leafrollers have deeper feeding patterns. These later broods of RBLR tend to tie a leaf to an apple and feed on the apple under its protection. Damage by the summer broods can be late enough in the season that corking may not occur, leaving exposed tissue (fig. 8). Such exposed tissue is susceptible to rot diseases and moisture loss, and the injured apples do not store well.

Monitoring and Management

Examine the bark of major scaffold limbs for eggs prior to bloom, particularly on the underside of limbs with smooth bark. By tagging these egg masses and observing them regularly, precise time of egg hatch can be observed. However, detection of egg masses is a difficult task. A reliable monitoring technique is to estimate egg hatch by counting ten to twelve days from the first adult catch in pheromone traps. Watch for the presence of larvae on foliage, particularly watersprouts, in late June, early August, and September. Pupating larvae and pupae can be located by searching for folded leaves.

Egg parasites are very effective biological control agents in unsprayed trees, but are apparently eliminated by the sprays applied in commercial orchards.

Chemical sprays directed at RBLR larvae in apple orchards are typically applied at petal fall and in cover sprays according to action thresholds. Thorough coverage is essential for good control. In extreme cases, sprays are sometimes applied against overwintering brood adults at half-inch-green stage, although researchers express doubts about the need for this approach. During the last several years, pink and petal fall sprays have adequately controlled this pest. For correct pest management procedures, growers should consult local Cooperative Extension recommendations.

GUIDE TO STAGES

Stage		Timing	Where to Look
Adults	1st flight	Green tip to fruit set	Trunk and scaffolds
	2nd flight	Mid-June to Mid-July	Trunk and scaffolds
	3rd flight (if present)	Late August to early September	Trunk and scaffolds
Egg	1st brood	Early bloom	Trunk and scaffold limbs
	2nd brood	July	Upper leaf surface
	3rd brood (if present)	September	Upper leaf surface
Larvae	Younger larvae	Mid-April to September	Leaf undersides near midrib
	Older larvae	May to September	Between 2 tied apples or under leaf webbed to apple
Pupae	1st brood	June to September	Leaves on tree, folded or fastened
	2nd brood and possible 3rd brood	July to October	In folded leaf in ground cover litter if overwintering; if not, leaves on tree, folded or fastened