Spotted tentiform leafminer (STLM) has been reported in the northwest for a number of years. It was not a commercial fruit pest until it was identified in the Columbia Gorge near Roosevelt, Washington, in Klickitat County in 1980. Since then the pest has spread to the Tri-Cities (1981) and to areas north of Wenatchee in north central Washington (1981). This pest is now a serious problem in some orchards in Benton and Franklin Counties. Infestations also occur in parts of the Yakima Valley, Walla Walla, and the Milton-Freewater area of Oregon. This insect will probably appear in most orchard areas within the next few years.

The STLM, *Phyllonorycter elmaella* (Doganlar & Mutuura), has 3–4 generations each year in Washington. The first generation develops on apple leaves at the tight bud cluster stage through 2-3 weeks after bloom. Later generations develop through the summer until leaf drop. The entire life cycle requires 35–55 days, depending on weather conditions.

### Actural Size

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![Images of STLM life stages]
Adults

STLM adults are slender brown moths with distinct silver to cream colored bands on the upper wings (Fig. 1). Their length (2.4–4.0 mm) varies between sexes and generations. The moths that emerge in the early spring from overwintering pupae tend to be larger and darker than adults of the other generations.

Adults begin emerging from overwintering sites in leaf litter at the 1/2-inch green or tight cluster stage of bud development. Mating and egg laying occur in the evening. A female will lay an average of 25 eggs.

The Eggs

STLM eggs are small (0.3 mm in diameter), elliptical, and creamy to transparent (Fig. 2). The eggs are laid on the under sides of leaves and, depending on temperature, hatch in 5–16 days.

The Larvae

STLM larvae have five instars (stages). The first three instars are referred to as the “sap feeding stage” because they feed on the sap from the spongy mesophyll of the leaves (Fig. 3). In the process of feeding, they separate the outer layer of the leaf undersurface from the tissue above. The mines are only visible from the under leaf surface (Fig. 4). The fourth and fifth instars feed more on the leaf tissues and are referred to as the “tissue feeding stage” (Fig. 5). Their feeding gives the mines a tent-like appearance with visible spots where the green tissue has been removed (Fig. 6).

When full grown, the larvae are about 4 mm long, cylindrical, and white to pale green. Prior to pupation, the larvae turn yellow. Larval development takes about 24 days to complete for the first and second generations and considerably longer for the succeeding generations.

The Pupae

STLM pupae are 3–4 mm long and change from yellow, when first formed, to dark brown (Fig. 7). The pupal period lasts about 1.5 weeks for the first three generations and extends through the winter for the fourth generation. Prior to emergence as an adult, the pupa cuts through and partially protrudes from the lower leaf surface of the mine. The pupal skin remains attached to the leaf after the adult has emerged.

Injury

STLM injury, from feeding within the mines, reduces the photosynthetic capability of the leaves and disrupts the growth regulating and ripening processes governed by hormones produced in the leaves. Severe STLM infestations may cause premature leaf drop, ripening, and fruit drop. Information from New York indicates that mining may also sensitize the leaf tissues, making them more susceptible to spray injury (Fig. 8). This phenomena has not been noticed in Washington.

Control

Several parasites and predators attack the STLM; however, knowledge of these beneficial insects is not complete at this time. Spray programs aimed at control of the STLM and other pests usually reduce or eliminate the control available from these beneficial species in commercial orchards.

Chemical control of the STLM is recommended for the first and second generations only. Injury from succeeding generations develops on most apple varieties too late in the season to be adequately controlled. Also, not using pesticides against the third and fourth generation encourages the establishment of natural enemies.

Consult Crop Protection Guide for Tree Fruits in Washington, EB0419, for recommendations about the best materials and spray timings for your area.