LECANIUM SCALE: WHAT A STICKY MESS!

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If you have a sugarbush in the Northeast, you may have noticed brown scale insects, sticky dripping honeydew, and black sooty mold on your sugar maple leaves in 2005 and 2006. That most likely was European fruit lecanium scale, Parthenolecanium corni (Bouche). This insect was introduced from Europe many years ago and is now found throughout much of the US and Canada (Johnson & Lyon 1988). It is in the same insect group as aphids and mealybugs, and feeds on the sap of a variety of forest, shade, and ornamental trees, including most importantly to us, sugar maple. Severe lecanium scale infestations can cause defoliation, twig dieback, and premature leaf drop. These effects were seen in numerous maple stands in Vermont during the past few years, and in 2005 their negative effects on sugar maple tree health became particularly severe. In 2005, in response to concerns of sugarmakers, researchers at the Univ. of Vermont's Entomology Research Laboratory began to investigate the problem. A search through the scientific literature netted minimal information on the biology and management of lecanium scale. Considering the significant impact this insect was having in maple trees in Vermont, we felt it was critical to find answers to several key questions:

- What is the life cycle of lecanium scale in the Northeast?
- What is the best way to sample for lecanium scale?
- How is the scale distributed on a tree (lower, middle, or upper branches)?
- How is the scale distributed in a stand?
- What natural enemies occur in sugarbushes?
- What is the population trend for lecanium scale?

The first phase of our research was to gain an understanding of the life cycle of lecanium scale in Vermont. We needed to know when egg laying and hatch occurred and when the immatures moved to the leaves. We also wanted to know when the crawlers (immatures) returned to the twigs to settle down for the winter. The research was conducted at the sugarbush of Mr. R. Vallee, in northwestern Vermont. Observations and collections were made weekly from June 2005 through October 2006 leading us to develop a projected life cycle of lecanium scale for this region (Fig. 1)

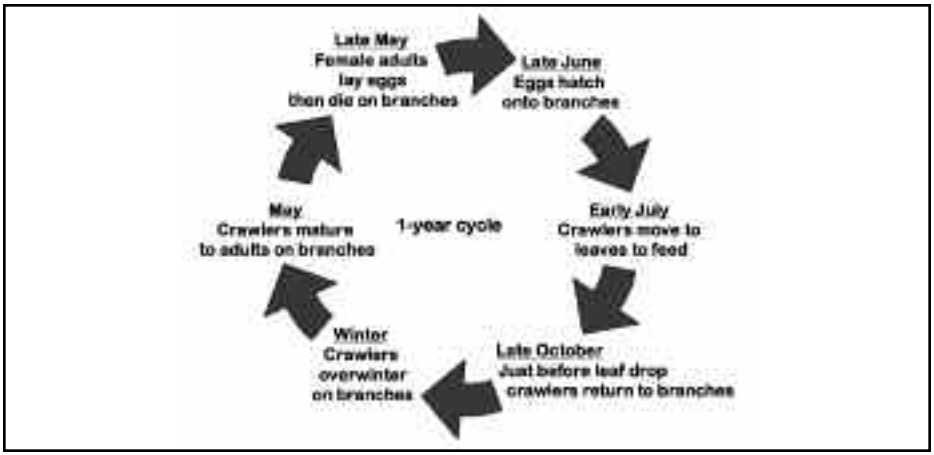

Figure 1. Proposed life cycle of European fruit lecanium scale in Vermont, based on field studies conducted in 2005 and 2006.

Females lay around 1,000 eggs under their hard shell in late spring (Johnson and Lyon 1988). Crawlers, when they first hatch, are about the size of a sesame seed (less than 1/16th in.), transparent or white in color, and very flat and softbodied. They can be seen moving about on the twigs. They soon crawl onto the foliage where they insert their stylet to feed on sap on the undersides of leaves (Fig. 2). They grow only slightly larger over the summer. In 2005, there were many crawlers, which almost completely covered the lower surface of most infested leaves. Some crawlers die during this phase. The dead ones are shriveled up, yellow or brown, and even flatter than healthy crawlers. When the crawlers move back to the twigs in the fall to overwinter they are slightly larger (about 1/16th in.) and reddish-brown.

In the spring, crawlers secrete a hard coating or shell which provides protection. This shell continues to grow larger until May when the crawlers develop into immobile adults under the characteristic dome-shaped reddish-brown scale

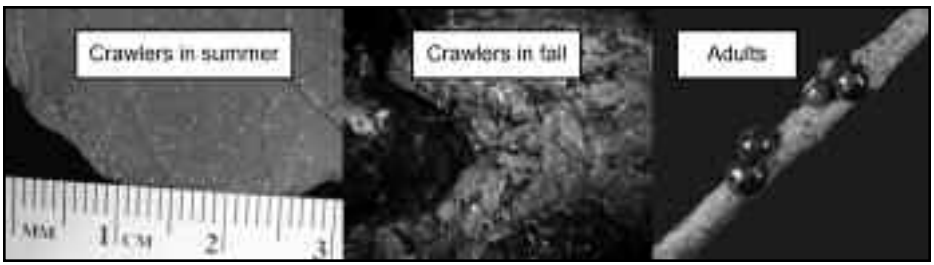

Figure 2. Life stages of the European fruit lecanium scale. Scale crawlers are tiny flat yellowish dots on the undersides of leaves in the summer. Crawlers move back to the twig in the fall, appearing as an oval reddish-orange soft-bodied insect. Adults produce a hardened reddish-brown dome-like shell under which it overwinters and lays its eggs (Photos by R. Kelley).

(up to 3/16 in. diameter). At this stage the scales are still actively feeding and secreting sticky honeydew that attracts ants. Black sooty mold often grows on the honeydew too. These adults that you commonly see are females--males aren't needed for reproduction. Little was known about male lecanium scale until this spring when an observant Canadian naturalist, Rob E. Lee, noticed large numbers of males on Leatherwood and Ironwood trees, though in Vermont they have not been observed (Lee 2007). Mr. Lee began to differentiate males from females in mid-May when as many as 70% of the immature scales he was following developed a pair of white, thread-like tails and, upon lifting their protective shells, he discovered winged insects unlike the stationary females described above (Fig. 3). The immature male scales have a whitish, translucent elongate covering, and the adults have a brownish head and thorax and one pair of whitish wings (Fig. 3). These males were not observed on sugar maples in the same area. The life cycle we observed in Vermont is likely to be similar to that of European fruit lecanium scale found in stands in other areas of the country, but the exact dates may vary depending on the specific climate and other environmental factors in those areas.

In sugarbushes with heavy scale infestations, sugar maple tree health appeared to be significantly affected. Many of the infested trees showed signs of twig dieback and general decline. In 2005, complete mortality of small sugar maple seedlings and almost complete dieback of larger seedlings and saplings in the understory were reported for some sugarbushes (Decker et al. 2007). In some stands we visited in 2005, it was unclear, however, if the symp-

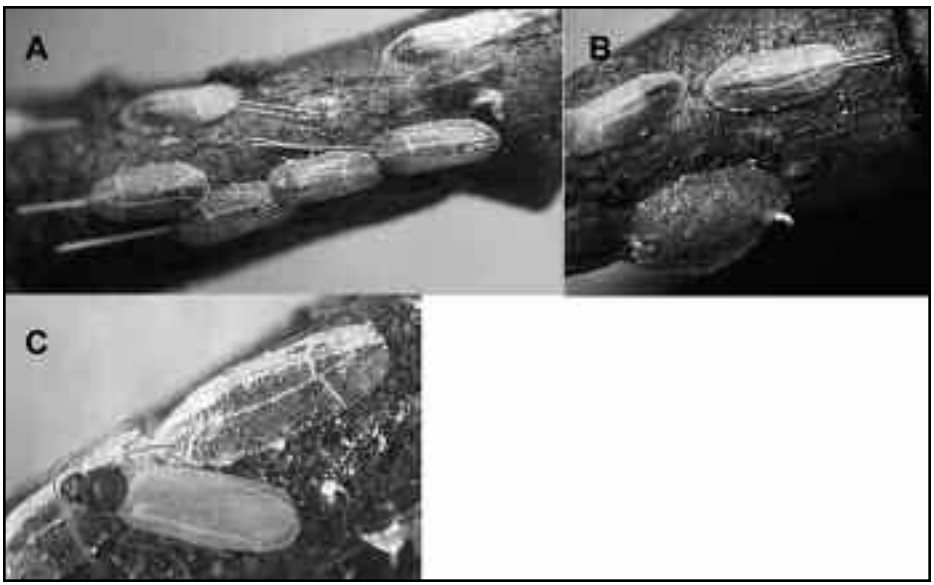

Figure 3. Male European fruit lecanium scale; A. immature male scales; B. two immature male scales (top) beside one female scale; C. Adult male that emerged from the scale (Photos by R. Lee).

toms of decline we observed were the result of feeding by the scale alone or early spring feeding by pear thrips, Taeniothrips inconsequens, which continues to cause intermittent damage from year to year.

In future articles, we will report on data generated on the distribution of European lecanium scale within a tree, and the natural enemies of this insect pest. These biological control agents appear to have a significant impact on scale in some years. Some sugarmakers in our region have noted that scale populations have declined in their sugarbushes, but the problem is not over, as scale populations remain high in other Vermont stands. It is unknown what factors triggered the outbreak we observed in 2005, nor what the impact might have been to the health of the maples. However, this unforeseen scale population explosion couldn't have come at a worse time. Many of the affected maples in 2005 had been struck by pear thrips in the early spring, followed by the attack of both scale and forest tent caterpillar later in the season. Even the healthiest maple has a hard time defending itself from these many assaults.

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