Pear Thripes Are Threat To Sugar Maples

WELLSBORO (Tioga) — Sugar Maple foliage throughout much of northeastern United States was damaged this spring by a very small insect known as pear thrips, Taeniothrips inconsequens (Uzel). To residents of northern Pennsylvania, this damage is common and has been occurring for nearly a decade. Other more northerly states are experiencing their first encounter with thrips damage.

Foliage damaged by thrips resembles late frost injury. Light to moderately damaged leaves are 30-50 percent smaller than normal, which makes the tree crown appear thin. The individual leaves have a puckered appearance and are mottled yellow to pale green. Heavily damaged leaves are reduced in size by nearly 70 percent and will be more severely puckered and mottled. The leaf margins have a tattered or torn appearance. The tree crown has a brownish cast to it and is noticeably thin.

What effect is this insect having on sugar maples and what implications does it have for syrup producers? Very little research has been conducted to measure the impact of the thrips on the health of infested sugar maples. However, based on what we know about a tree's food production system, we can make some assumptions.

A tree needs foliage to produce the food it needs for both the current season's growth and some to store in the root system to fuel foliation the following spring. It is probably safe to assume that thrips damaged foliage, which is subnormal in both quality and quantity, will alter the food production capability of a tree. Also that repeated attacks over a number of years will result in lower overall vigor of the tree. Compound this with other stresses such as deficient rainfall (as in 1988), frost damage, and defoliation by other insects, and the prognosis is not good.

Unfortunately, there are no practical controls for this insect, chemical or otherwise. Until suitable controls for this insect become available, forest managers must attempt to control the other factors that influence a tree's vigor. For example, tapping, cultural practices, and damage by insects are stresses that often can be modified. Some suggestions for stressed stands are:

- Monitor trees periodically for damaging agents or signs of stress.
- Identify those trees with such signs of stress as branch dieback, defoliation, reduced sap production or sugar content.
- Limit tapping on stressed individuals.
- Forego thinning operations or operating heavy equipment in affected stands. The initial effect of thinnings and root compaction are stressful to residual trees.
- Intervene when insects such as fall cankerworm or forest tent caterpillar pose a further threat to tree vigor.

Work is underway to look for answers to the multitude of questions we have about thrips. Several states and the U.S. Forest Service have formed the "Regional Pear Thrips Committee." The objectives of this consortium are:

1. To gather and disseminate pertinent information about pear thrips impact, surveys, control, biology, and research action on sugar maple.
2. To coordinate training, survey methods, management recommendations, and research activities on sugar maples.
3. To identify needed research and training.

In addition, research is being initiated by the states of Vermont, Pennsylvania, and Massachusetts and the U.S. Forest Service to investigate ways to survey for pear thrips and methods to control the effect of pear thrips. Investigation into the biology and control of pear thrips will not yield results quickly. There is only one generation of thrips in a year. This species gives us only a fleeting glimpse of the adults, the larvae are quite small and furtive, and for about nine months of the year, they are completely secretive because they are in the ground. **None of these habits are conducive to easy observation.**

Until we have answers to the pear thrips mysteries, forest managers and sugar bush operators are advised to do what they can to limit other stresses on these trees. Perhaps it will be possible to have our maples and eat them too.

Detective Work

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cult. And the scientists are looking for more than circumstantial evidence.

To prove that nematodes are the vectors, Evans must demonstrate transmission by nematodes in the greenhouse. To do this, he collects nematodes from soil surrounding infected plants, a labor-intensive process. Using a microscope to see the small organisms and very fine needles to pick them up, an experienced person can collect 30 nematodes per hour on a good day. The nematodes are added to sterile soil, and plants are grown in this infected soil and watched closely for symptoms of the disease.

"We've done this experiment twice, with 30-40 nematodes per plant, and still haven't been able to transmit the virus," Evans says. "To ensure infection, we need lots and lots of nematodes to carry the disease. Although 30 nematodes per plant might be the minimum threshold needed to cause disease in the field, we'll probably need a minimum of 100-200 per plant in the greenhouse."

Evans says one of the problems in going from the field to the greenhouse is that after nematodes are disturbed, many refuse to feed. That means the disease won't be transmitted. So Evans is now building a greenhouse nematode population in large crocks of field soil planted with Sudan grass, in the hopes of producing well above the minimum number of nematodes per plant needed to transmit the disease.

While the scientists continue to investigate this unusual disease, they're also helping soybean farmers deal with it. They have identified soybean varieties that are most susceptible to infection by the virus -- Verde, Avery and Essex. They have also identified three resistant cultivars -- HT-5203, A 5149 and Sparks -- that are essentially immune to it under normal field conditions.

In addition, the researchers plan to experiment with crop rotation to control dagger nematodes in the soil and thus limit the disease. By rotating soybeans with non-host plants such as corn, wheat or sorghum, they may be able to eliminate the nematode vector.

What motivates Evans and his colleagues to continue their pursuit of this disease?

"We've shown photo slides of the infected plants at national meetings and no one else seems to recognize the symptoms," he says. "The disease appears to be peculiar to Delaware and based on symptomatology, it is a new disease of scientific merit."

And so the detective work continues.