From the Editor

Welcome spring! In this issue, we'll answer some pressing questions... How cold was the winter? (page 7)... How do warm days affect insect development? (page 4) and... What about the balsam fir sawfly? (page 2).

Also note on page 8, the changes to the passive tick survey.

'Til next time,
Jacqui

Editing... a Rewording Activity

Say What and Quotes

It is amazing how quickly the kids learn to drive a car, yet are unable to understand the lawnmower, snowblower or vacuum cleaner.
- B. Bergor

We adore chaos because we love to produce order. - M. C. Escher

"Experience is what you get when you don't get what you want."
- T. Filler

The pessimist may be right in the long run, but the optimist has a better time during the trip. - Unknown

"Hard work spotlights the character of people: some turn up their sleeves, some turn up their noses, and some don't turn up at all."
- S. Ewing

The world is mud-luscious and puddle-wonderful. - e.e. cummings
Insect Focus

Balsam Fir Sawfly (BFS)

Terry White, Mike LeBlanc

As was reported last issue, populations of balsam fir sawfly are on the rise. Based on the egg niche survey results, potentially high defoliation levels could be observed this year in areas of Guysborough, Antigonish, Inverness, and Victoria Counties.

Introduction

The balsam fir sawfly is a native insect that was first recorded in North America in 1910. It also occurs in Quebec, Ontario, New Brunswick and Newfoundland, and in Nova Scotia recorded outbreaks date back to 1942. Outbreaks usually last three to four years with a varying number of years in between.

The principal host is balsam fir but it can also be found on white spruce, black spruce, and red spruce. Beginning infestations usually occur in pre-commercially thinned balsam fir stands before moving to un-thinned areas.

Adult: resembles a small wasp, with four membranous wings; female brown, male black. Lengths: 6-8 mm (female) and 4-5 mm (male).

Egg: Oval-shaped; white. 1 egg is laid in the needle cuticle, producing an egg niche.

Larvae: Cylindrical, elongated; initially green, taking on a blackish colour as it matures. Length when mature: 20 mm.

Pupa: Enclosed in an oval cocoon; dimensions slightly larger than the adult (about the same size as a crisped rice cereal grain.)
Life History
The balsam fir sawfly overwinters in the egg stage. In late summer, the adult female cuts a small slit in the edge of the needle in the current year’s growth with her ovipositor and lays one egg in the leaf cuticle; she can lay up to 35 eggs laid one at a time on needles close to each other.

When the buds open in the spring, the eggs hatch and the larvae feed in colonies of 30 - 100 on the previous year’s growth; they rarely feed on the new shoots. The larvae strip the outside of the needle, leaving a central filament that, in time, shrivels and finally takes on a bright orange colour. The larva goes through six growth stages (instars) before they mature and pupate. This takes about one month.

Pupation occurs around mid-June. The pupae can be found on the ground or among the needles in the foliage. The adults hatch about a month after pupation, mate and lay eggs.

Damage Symptoms
The damage done by the balsam fir sawfly larvae is threefold:
• feeding causes defoliation
• reduced growth
• tree mortality

The damage is only done by one life stage, the larva. The other stages do not cause direct damage to the tree.

Diagnosing the damage can be done in the winter months by examining the upper parts of the fir crown. By then, the branches are bare of all but the current year’s growth.

In the summer, look for the larvae feeding on the previous year’s growth.

Control Options
These insects are attacked by various parasites and diseases that will reduce the length of an outbreak but generally do not reduce the population before the damage and mortality occur.

The naturally occurring virus, NeabNPV - trade name Abietiv™, can also be introduced into the insect population to hasten the collapse of the outbreak. NeabNPV is a nucleopolyhedrovirus belonging to the Baculovirus group. It is a naturally occurring biological control agent of the balsam fir sawfly and is the active ingredient in Abietiv™. Abietiv™ was tested by the Canadian Forest Service and submitted to, and registered by the Health Canada-Pest Management Regulatory Agency for operational use in reducing populations of this sawfly. Much of the field research with this naturally occurring control product was conducted in western Newfoundland.

For specific control in Christmas trees, contact your local Christmas Tree Specialist.

References
To quantify the potential impact of BFS on the local forest resource and to identify monitoring priorities, the Forest Protection Division conducted an analysis to identify those forested stands capable of supporting serious balsam fir sawfly infestations and ranked these stands relative to their proximity to known 2010 balsam fir sawfly egg survey points. The individual characteristics thought to be indicative of stand vulnerability were balsam fir dominance, an early stand development class and pre-commercial thinning. The outcome of this analysis is a map estimating the vulnerability index for forest stands to possible balsam fir sawfly infestation and defoliation for 2011.

So, what does this mean to landowners, woodlot owners, or Christmas tree producers in these areas? Keep an eye on stands in the high risk areas.
Spring is in the air and you’re not the only one watching the mercury rise!

Insect growth is dependent upon two main factors, temperature and time. Since insects are cold-blooded, their body temperature is determined by the temperature of their surrounding environment. Each insect has an optimum range of temperatures during which growth will occur, the upper and lower developmental thresholds. For growth to occur the temperature must be at or above the minimum developmental threshold (a.k.a. the base temperature) for that insect. This base temperature is known for only a few insect pests however, 10°C (50°F) can be used as a reasonable approximation for many species. Insect growth continues to increase as temperatures rise to the maximum developmental threshold. Above this threshold no additional growth occurs.

Degree days are the amount of heat accumulated over the specified base temperature during a 24 hour period. One degree-day results when the daily average temperature is one degree above the base temperature. Over a period of time, the daily accumulation of degree days can be added together and used to estimate insect development and time pest management activities. Accumulation of degree days can begin in one of two ways; either on an arbitrary calendar date such as January 1 or using a biofix. A biofix is a biological marker such as the first occurrence of the insect or the capture of an adult in a trap that initiates the beginning of degree day calculation.

There are many different methods for calculating degree-days but the easiest is the average method. Simply add the daily maximum and minimum temperatures together and divide by two. Then, subtract the base temperature for that particular insect.

\[
\text{Degree-days} = \left(\frac{\text{max temp} + \text{min temp}}{2}\right) - \text{base temp}
\]

For example if the minimum temperature was 8°C and the maximum temperature was 22°C, then the average daily temperature was \((8+22)/2 = 15°C\). If the base temperature was 10°C, then 5 degree-days would have been accumulated. Zero degree days are accumulated or no development occurs if the maximum daily temperature does not exceed the base temperature. Also, negative degree-days are not calculated since insect development does not happen in reverse.
Although degree-days are simple to calculate, monitoring degree-days on a daily basis can be cumbersome and time consuming. So an alternative approach is to let plants do the work for you. Since plant development is also temperature dependant plants respond to degree day accumulation in the same way that insects do. This means that certain events in a plant’s development such as bloom time or bud burst can be used as indicators of insect development. For example, when timing their monitoring and control strategies for the balsam twig aphid (*Mindarus abietinus*) Christmas tree growers in Nova Scotia look to the serviceberry (*Amelanchier sp.*). They have determined that the bloom time of the serviceberry is synchronized with the appearance of first generation twig aphid nymphs. This also represents the beginning of the sampling window and best time for applying control measures if necessary.

**References**


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In the spring, I have counted 136 different kinds of weather inside of 24 hours. - M. Twain

Spring is when you feel like whistling even with a shoe full of slush. - D. Larson

Spring is nature's way of saying, "Let's party!" - R. Williams
Cecropia Cocoons
Jacqui Gordon

The Cecropia moth is the largest native moth we have in Nova Scotia. It overwinters as a pupa in a cocoon, usually formed at the intersection of two twigs. I found these two cocoons in Stewiacke in April. The one on the left appears to be from a previous year (i.e., moth already emerged: empty cocoon), while the one on the right is current and contains a mature pupa just waiting for a bit more warm weather.

When the moth will emerge from the pupa in May, it does not feed. The eggs will hatch in June. The larvae will actively feed from June to September on a variety of hardwood foliage. The last instar of the larva spins the cocoon and overwinters.

Saw-toothed Grain Beetle
Jeff Ogden

The saw-toothed grain beetle, *Oryzaephilus surinamensis* (Linn.), is an introduced species to Canada and is found throughout the country, including Nova Scotia. It is a common household pest of stored products such as cereals, rice, pet food and bird seed and is occasionally found in grain elevators. The adult is a brown, slender beetle about 3 mm long. It can be identified by the six saw-like projections on each side of the thorax, hence its name. Prevention is the best approach to control the pest. Store all dried food products in air tight bags and containers to avoid infestation. If an infestation does occur, first vacuum the affected sites to ensure the collection of tiny eggs and larvae then disinfect with a 10% bleach solution (read label and follow instructions). At this time, place remaining products in air tight containers or bags to determine if any pests remain.

Reference
# And Just How Cold Was It?

Jeff Ogden

Table 1. NS DEPT. OF TRANSPORTATION AND INFRASTRUCTURE RENEWAL WEATHER STATION DATA.

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<th>Winter 06/07</th>
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** n/a indicates that data was not available from this tower because it was a newly established tower.

I thought it was an old-fashioned Nova Scotia winter . . . lots of snow and cold temperatures. That is until I checked the NS Department of Transportation and Infrastructure Renewal weather stations and found that the low winter temperatures really weren’t that different from last year’s temperatures. Add to this good snow cover and you have what should have been a good winter for insect survival.
**Passive Tick Surveillance 2011**

Jeff Ogden

As of May 2011 there will be an important change to the passive tick surveillance. The purpose of identifying ticks in Nova Scotia helps to identify new areas where the blacklegged tick has become established in the province. As a result of the past few years of tick submissions, NSDNR, PHAC (Public Health Agency of Canada) and NS Department of Health and Wellness have identified four areas in which blacklegged ticks have become established.

These areas include:

1. The area surrounding Admirals Cove Park, Bedford
2. Churchover and surrounding area of Shelburne county
3. A large portion of southern Lunenburg county including Mahone Bay, Luneburg, Blockhouse, Blue Rocks, Heckmans Island, East LaHave and all areas in between.
4. A large portion of northern Pictou county including areas around Big Island, Merigomish, Melmerby Provincial Park, Pine Tree, and Thorburn.

As these areas are already known to have established blacklegged ticks, the purpose of testing does not aid our surveillance program at this time. Effective immediately we will be no longer accepting ticks from these areas for identification or testing. Each office will be supplied with a map of the excluded area along with a letter from the NS Dept. of Health and Wellness explaining the rationale for the change.

So, don’t cancel your outdoor plans, but take the following precautions, especially in areas where blacklegged ticks and Lyme disease are known to be established:

- wear light-coloured long-sleeved shirts and pants (so ticks are more visible), light-coloured socks and enclosed shoes while working or playing outside or hiking in the woods;
- pull socks up over pant legs and tuck in shirts;
- spray clothing and exposed skin with an insect repellant containing DEET;
- check clothing and exposed skin for ticks after working or playing outside or in the woods and remove any ticks attached to the skin;
- DEET should not be applied to pets, however, pets should be checked for ticks regularly in areas where blacklegged ticks and Lyme disease are known to be established;
- keep grass well cut to minimize suitable habitat for ticks on your property.
**The Last Laugh . . .**

A sloth calls the police to report that he was attacked and robbed by a gang of turtles. When the police ask him to describe the attack, he replies:

"I . . . Doooon't . . . knoooow . . . it . . . all . . . happened . . . soooooo . . . fasssst . . . "

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TEACHER: George, go to the map and find North America.

GEORGE: Here it is!

TEACHER: Correct. Now, class, who discovered America?

CLASS: George!

TEACHER: How can you prevent diseases caused by biting insects?

JOSE: Don’t bite any.

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A tourist is traveling with a guide through one of the thickest jungles in South America, when he comes across an ancient Mayan temple. The tourist is entranced by the temple, and asks the guide for details. To this, the guide states that archaeologists are carrying out excavations, and still finding great treasures. The tourist then queries how old the temple is. "This temple is 1503 years old", replies the guide. Impressed at this accurate dating, he inquires as to how he gave this precise figure. "Easy", replies the guide, "the archaeologists said the temple was 1500 years old, and that was three years ago."