

## Members' Corner *continued...*

### News from Upper Trent Valley Chapter

The year 2003 was busier than usual. We started off the year with our spring workshop and AG meeting in April, and then we put a booth in the first annual Havelock Hobo Rendezvous in August. We found the exposure was beneficial, and let some of the folks in town know that the Ontario Woodlot Association exists. In September, our chapter joined the Havelock, Belmont and Metheun Chamber of Commerce. This gives us a second Web site and additional exposure within the community. We are listed under nonprofit. Our annual fall workshop and B.B.Q., held October 4, went off without a hitch this year (2003 started off with a power outage and Walter saved the day putting his generator to work). Everyone enjoyed the event, which included interesting speakers and great food. Our last event of the year was putting a float in the Havelock Santa Claus Parade on December 6. In the photo you can see how bundled up some of the kids were because it was very cold, but a sunny day. Thanks to all our members who volunteered their time making all our events a success. See everyone at our 2004 spring workshop and AG meeting on April 17, 2004 at Walter Kramer's Tree Farm in Havelock.

Ruth Moore, UTV Chapter  
Havelock, ON

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## Management Options for Small-Scale Sugar Bush Operations

Part II – Sugar Bush Health By Mark Richardson

This is the second in a four-part series on how to manage smaller-scale sugar bush operations. Part I focused on traditional management activities like planning, thinning and crop tree selection. Part II introduces aspects of sugar bush health. Part III will focus on those activities associated with collecting sap in the spring: tapping practices, collection techniques and ensuring that syrup is lead free. Part III will also discuss sugar bush safety and liability, an important part of operating a sugar bush. Part IV will introduce some general facts on maple trees, which may be of interest to all landowners – Why does sap flow from maple trees and not others? How is syrup graded? What makes syrup taste so good? Why do maple trees dominate this part of North America?

### What defines a “healthy” sugar bush?

The question of how to define sugar bush health can be a complex one linked to a number of

processes that occur in the forest ecosystem. Some of these processes are natural, like regeneration, defoliation and growth, while others are unnatural, brought about by human intervention. Harvesting is a good example of an unnatural process that can have a long-term impact on the condition of the sugar bush. So is the tapping of maple trees to produce sap. This complexity of processes has led to an assortment of definitions of forest health that are often confusing and contradictory, and not that applicable to the average sugar bush operator.

For the purpose of this article, a specific definition of sugar bush health is not as important as the idea that improved and/or sustained sugar bush health is a management objective that should be just as important as producing sap. Management actions should always improve the future forest condition, not just meet the immediate needs of the landowner. Maple trees, although resilient, are subject to

stress, and this stress impacts on the long-term viability of the maple operation. Declining forest health could mean lower sap yields over time.

The production of maple syrup is one of the best examples of true forest sustainability-- where it is possible to extract an annual crop of sap from a woodlot over many generations. In Ontario, there are numerous examples of sugar bushes that have been in constant production for more than 100 years. If this fact is true, it is important to recognize that most of these sugar bushes have probably not been "healthy" throughout their years of production. Management actions, insects, disease and weather events have all served to impact on the overall health of each woodlot. These impacts have increased or decreased the potential number of taps available within each sugar bush. However, one fact remains clear – proper management provides the necessary tools to get the trees growing to the best of their ability.

## The Nature of Sugar Bush Change through Disturbance

Regardless of its size, every sugar bush is in a constant state of change or evolution. This is a dynamic process where the growth or death of one tree impacts on, and is impacted by, the growth or death of its neighbours. Therefore, disturbances that have a direct impact on one tree have an indirect effect on the growth of other trees in the forest as well. Sugar bush management is an attempt to guide or influence the evolution of a sugar bush by controlling which trees live and which trees die. As mentioned in Part I of this series, removing some of the trees frees up space for the remaining ones. This



The saddled prominent have a saddle-shaped mark on their back.

increase in space should result in an increase in growth for the remaining trees. In most cases, this increased growth results in an improvement in forest health.

Unfortunately, insects, disease, drought, storms and other weather events, as well as poor management practices, can all serve to cause an unwanted change in the sugar bush. Sugar bush managers work to minimize the impacts of these unwanted disturbances, which can negatively influence the ability of the woodlot to produce maple sap. In most cases, these disturbances do not have a

long-term impact on the sugar bush, and most of the trees tend to recover with only a minor slowdown in growth.

### Sugar Bush Health Generalization #1:

*Sugar bushes that are growing at their optimum rate tend to be healthier than those which are over or understocked.*

For example, species of caterpillars like the saddled prominent are always present in low numbers in a sugar bush. However, every 12 to 15 years, their populations can grow exponentially, resulting in periods of severe defoliation. Trees impacted by defoliation tend to fully recover unless the woodlot is acted on by another secondary stressor.

### Sugar Bush Health

Insects and disease can be looked at as natural catalysts of change within the sugar bush. In the absence of human intervention, they would combine with other stressors like weather events and fire to change the forest naturally over time. In our settled landscape these processes are often compounded by human intervention. Poorly managed woodlots are more susceptible to stress, and an incident such as a major outbreak

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### **Sugar Bush Health Generalization #2:**

*Native insects and diseases are a naturally occurring part of the sugar bush.*

of caterpillars could have a disastrous effect. It is important to recognize that insects and disease are an important (and unavoidable) part of the healthy sugar bush ecosystem. The well-managed sugar bush, however, should be able to ride out the stress with minimal long-term impact on health.

As a tree grows it competes with its neighbours for an ever-diminishing number of resources. This competition causes stress, and often these stresses combine to compound the overall impact on the tree. This in turn weakens the tree further, making it more susceptible to other stressors. As the amount of stress accumulates, the tree eventually passes a point where it can't

recover; it succumbs to the numerous stresses which have impacted it.

As introduced previously, individual tree death is seldom the result of only one stressor. A large maple may be completely defoliated each spring over a number of years during an outbreak of forest tent caterpillar. This alone would usually not be enough to kill the tree outright, as the tree has adapted to this type of stress over eons of evolution. However, it does weaken the tree, making it more susceptible to other stressors like drought. Often it is this combination of stressors which cause the tree to begin to decline and then to eventually die, as it becomes incapable of producing enough energy to support itself.

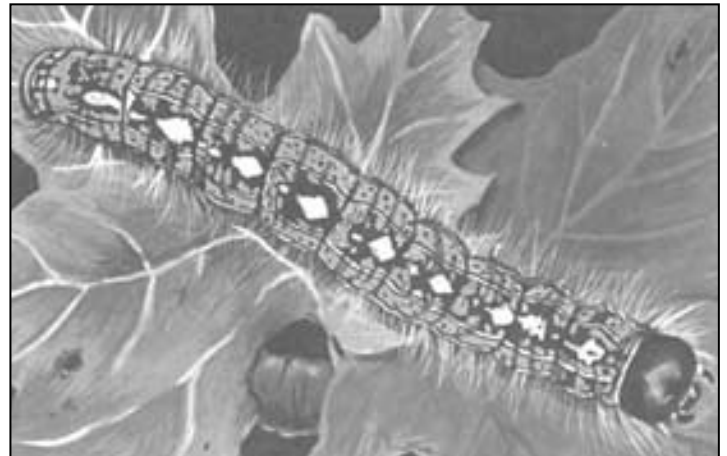
### **Sugar Bush Health Generalization #3:**

*Trees seldom die from one stressor alone. Usually it is a combination of stresses, which slow the growth rate down to a point where the tree can no longer support itself.*

Sugar bush health is a function of the amount of stress impacting the sugar bush – the more the stress, the poorer the overall health of the woodlot. Therefore, it stands to reason that proper management

### **Sugar Bush Monitoring**

Just as it is important to keep yearly records of production, it is equally important to monitor and record what is happening within the sugar bush. Knowing



**The forest tent caterpillar can be easily identified by the keyhole-shaped white spots on its back.**

techniques reduce stress and provide health benefits in addition to increasing tree growth rate. Thinning can be viewed as a means of reducing the amount of stress impacting an overstocked sugar bush. Mother Nature would eventually thin out the weaker trees. Why not capitalize on tree growth as a means of improving the overall health of the sugar bush?

what is happening from season to season and from year to year will allow the sugar bush operator to fine-tune any management prescriptions to help mitigate the effect of cumulating stresses. Keeping detailed records about what is happening in the sugar bush provides a perspective on the potential trends of the factors influencing growth and mortality. It is also an important means of identifying problems before they become significant.

### **Sugar Bush Health Generalization #4:**

*Healthier trees are able to withstand more stress than unhealthy ones.*

In many cases nothing can be done to avoid the problem, but knowing what is coming may help prevent additional problems through planned management actions. For instance, if a producer was unaware that the sugar bush had been defoliated over a number of years by an outbreak of saddle prominent, a planned winter harvesting operation or even the day-to-day activities associated with tapping may compound the stress on the sugar

bush. This could result in unplanned and probably avoidable mortality.

### **Sugar Bush Stressors**

The following section introduces some of the more serious stressors that may impact a maple operation. It is by no means complete, and the reader is encouraged to seek out additional information on the various topics. There are many good books and Web sites available which will help identify the variety

of insects and diseases impacting Ontario sugar bushes. In particular, the Canadian Forest Service has a comprehensive Web site on forest insects and disease and is soon to release a site specific to sugar bush owners. The CFS Web site is located at <[http://www.glfc.cfs.nrcan.gc.ca/foresthealth/index\\_e.html](http://www.glfc.cfs.nrcan.gc.ca/foresthealth/index_e.html)> This site offers the most up-to-date information available and provides detailed information on management options for sugar bush owners who have been impacted.

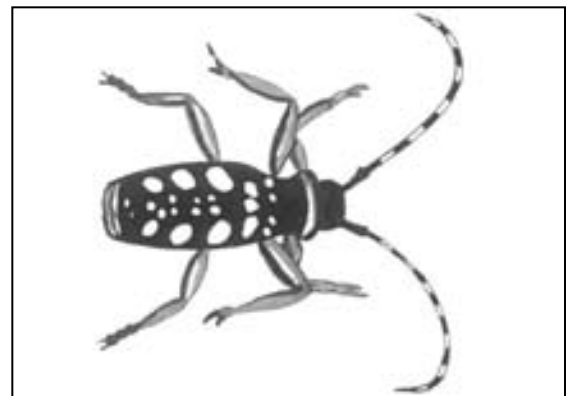
### **Insects**

There are two main types of insects that can affect sugar bush operations: defoliating insects (caterpillars) that eat the green leaf material and boring insects that tunnel under the bark of the tree. These insects can be further classified into native and non-native (invasive) pests. Further information

on individual species, their biology and identification can be found at the Web site listed above.

### **The Asian Longhorned Beetle: An Insect of Special Concern**

Of all these insects, one in particular has the forestry community very worried. The Asian longhorned beetle (ALHB), introduced in the last issue of the S&W Report represents an enormous threat not only to sugar bushes, but to all of Ontario's



**The Asian longhorned beetle is an exotic, invasive species recently found in Toronto.**

hardwood forests. This insect warrants special attention because none of the previous discussions on compounding stress or natural processes applies to the ALHB. Our forests probably will not have

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**Table 1: Insects That May Affect Sugar Maple**

Level of Risk	Defoliator	Borer
Major Threat	Forest tent caterpillar Saddle prominent Bruce spanworm Fall cankerworm Gypsy moth <sup>1</sup>	Sugar maple borer Asian longhorned beetle <sup>1</sup>
Minor Threat	Greenstriped mapleworm Orangehumped mapleworm Linden lopper Maple leafcutter Maple trumpet skeletonizer Maple webworm Maple leafroller Maple petiole borer Maple gall mites Pitted ambrosia beetle	

<sup>1</sup> Denotes invasive species, not native to Canada.

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time to evolve a natural defence mechanism that will eventually allow them to coexist with the beetle, and the Asian longhorned beetle has no natural predators.

If a single ALHB-infested tree were found in a sugar bush it would probably be the end of that sugar bush, as all the susceptible trees within several hundred metres of the infested tree(s) would be cut down and chipped or burned. The landowner has no say in what happens on the property and will see his or her investment and property value disappear. In this case, the threat to our native forests far outweighs the property rights of the individual. This is not a minor forest pest, and it could be argued that the ALHB represents the most significant threat to the Ontario maple industry ever. In light of this it is important to understand what each and every sugar bush owner can do.

- Be proactive to ensure that this invasive pest is eradicated from our continent before it escapes into the forest; containment or control is not a

viable option for this pest. Call and write to your MP and MPP indicating your concern and demand that they provide the appropriate funding to combat this pest. Speak to your neighbours and your friends about this pest.

- Do not be complacent about the capability of the Canadian Food Inspection Agency to eliminate the problem by removing all susceptible trees in the infested zone. Canada is a huge country, which is currently fighting a battle with other invasive species like BSE, West Nile Virus and the emerald ash borer, another exotic tree-killing species. It is unsure whether current efforts will be adequate. The ALHB was discovered in Toronto, not through



**Nectria canker (also known as target canker) is a parasitic disease.**

the efforts of our beleaguered forest health networks, but by accident by a father helping his child with a school science project. There is a significant chance that some of the many trees that were cut down in the infested area over the past four to six years have been transported with live larvae outside of Toronto.

- Learn to identify the pest and report it if it is seen. Even if a misidentification is made, it is better to get it wrong than not to take the chance that it is right. If the ALHB is found outside its current boundaries, early detection offers the only hope of eradication.
- Burn all pallets immediately unless their origin is known to be from outside of Asia. Do not take a chance with pallets from overseas; the original infestation in Toronto probably came from a pallet containing live larvae.



**Fruiting bodies found on the trunk of a tree are an indicator of decay.**

## Sugar Bush Diseases

There are three important diseases and a number of minor wood rot fungi that are common to sugar bushes in Ontario. Two of the diseases, eutypella and nectria are perennial stem cankers that can develop in wounds made during felling, skidding operations or during sap collection. Seldom do these cankers kill a large tree outright. Instead they tend to weaken the tree, making it more susceptible to wind breakage and infection from wood-decay fungi, like mossy-topped fungi. Trees under 10 cm in diameter are often girdled and killed by canker infection.

The third type of disease, Armillaria root rot (sometimes called shoestring root rot) is a root decay fungi which affects a number of species, including maple. It can be a very destructive disease, often killing previously stressed trees in a short time. Armillaria can be a big problem in sugar bushes impacted by drought or successive years of defoliation. The fruiting bodies of Armillaria are also known as honey mushrooms and are edible.

Decay problems usually associated with damaged and stressed trees can have an impact on tapping operations. Decays can make large areas of the stem unusable for tapping and can seriously weaken the tree, making it

dangerous in a windstorm. Most stem decays attack the heartwood of the tree and don't often slow down the overall growth of the tree. Often the presence of decay is only known when the fruiting bodies manifest themselves on the side of the tree. Decaying trees do not make good sawlogs, but can usually provide many years of sap production, even though the affected area can be quite significant. Decays at the base of the tree in contact with the ground tend to be more severe. It is easy to minimize the impact of decay on a sugar bush by reducing the amount of mechanical damage inflicted during management operations.

### Options for Improving

### Sugar Bush Health

Many of the health items discussed in this article are not easily controlled by the sugar bush operator. It is possible, however, to minimize the overall impact of these stressors on the woodlot through proper management and by minimizing the physical impacts of management on the woodlot. As mentioned, by getting the trees to grow at their best possible rate, syrup producers can help improve forest health and increase resistance to the impacts of other stressors. To improve sugar bush health and help minimize future stress impacts, operators need to:

- Manage their sugar bush properly;
- Keep cattle out of the woodlot (which can cause root compaction and destroy regeneration);
- Tap according to recognized guidelines. (Tapping will be covered in the next article in this series.);
- Keep heavy equipment out of the sugar bush (especially when there is a chance of rutting);

- Monitor the sugar bush for insects and disease;
- Choose diseased and infected trees first when marking the sugar bush for thinning;
- Harvest carefully, avoiding injury to crop trees; and
- Harvest only when the trees are not growing and when there is little chance of site damage.

This article has focused on sugar bush health issues. It was intended to give the reader a perspective on how sugar bushes change over time and how this change can be directed through good management techniques. For identification and life cycle information on the numerous insects and diseases that could impact Ontario sugar bushes, check out the CFS Web site.

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A well-planned harvesting operation will help mitigate potential problems such as rutting damage.