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HOW TO KEEP YOUR SUGAR BUSH HEALTHY

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Planning & Maintenance Edition

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Maintaining a Healthy *Sugar Bush*

A maple sugar maker's most valuable resource is their trees. Without trees there's no sap, and if the trees aren't healthy it takes more labor and resources to extract each drop of sap. Following recommended tapping guidelines to avoid overstressing the trees is important, but the health of a forest really depends on understanding the resources therein and knowing which trees to retain and nurture and which ones to remove.

According to Peter Smallidge, New York state extension forester and former director of the Cornell University Maple Program, the first step in sugar bush management is learning how to identify plants, insects and diseases. This means being able to tell a maple tree from a non-maple, he said, and also understanding the value of non-maples to your woodlot. Species diversity helps to increase the resiliency and value of a forest, he explained, providing stability against insect defoliation. Maples are finicky and demand deep, moist, well-drained soil—they can survive in thinner topsoil with bedrock below, or poor or excessively drained soils, but won't be as healthy. Indicator species that grow where maples are likely to thrive include northern red oak, basswood and white ash, as well as understory plants such as Christmas fern, ginseng, jack-in-the-pulpit and trillium.

Good management also means being able to spot and determine how to eliminate vegetation that interferes with maple growth and sugar bush maintenance. Smallidge noted there are several low-story plants that are not browsed by deer; left unchecked, they will restrict a sugar maker's access to maple trees and inhibit the ability of sugar maples to regenerate. These include beech trees, many ferns, hop hornbeams, barberry, multiflora rose, autumn olive and buckthorn.

While not all insects pose a threat to maple trees, Smallidge advised sugar makers to take particular note of forest tent caterpillars, saddled prominent caterpillars and pear thrips, all of which can cause significant damage to the foliage of maple trees. "If you have a year where you see a few of these, and understand what the species requires to survive, you can anticipate whether or not there will be a full-blown outbreak the following year," he said. Producers should be on the lookout for more invasive bugs, including the Asian longhorned beetle and even the

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Healthy Sugar Bush

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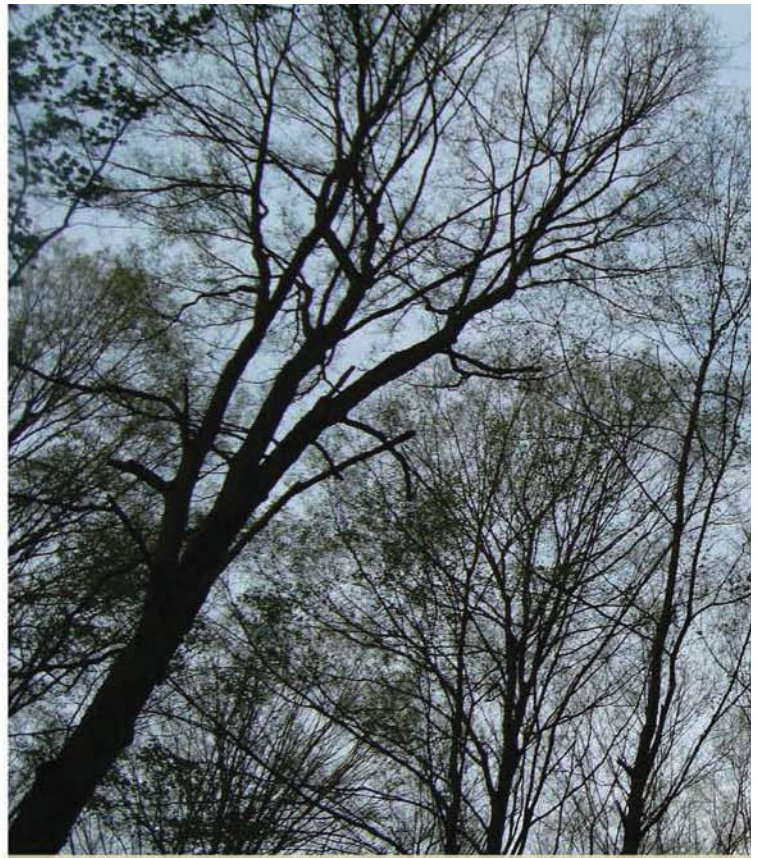
emerald ash borer (EAB). While not a threat to maple trees, EAB can quickly destroy ash trees, which are often companion trees to maples in northeastern forests.

As for disease, watch for foliar symptoms early in the season, he said, such as small leaves or leaf deformations, and learn the signs of anthracnose, Phloeospora leaf spot, and other common maple diseases. Any holes or spots on leaves later than mid-August won't have an impact on tree health, because by then the tree has gotten what it needs out of the leaves and is preparing to drop them, moving resources out of the leaves and into the stem for winter. Most diseases that affect leaves don't have an impact on the long-term health of the tree, but as leaves are destroyed the tree loses part of the engine that creates sugar for the following year's sap. Most of these diseases spread in canopies that remain wet—a good reason to thin trees to promote air circulation.

Simply knowing what you have in your forest is also critical to maintaining a healthy sugar bush, Smallidge said. As he put it: "Measure what you want to manage. It's no different from figuring out your product inventory when you're selling syrup. You manage product to optimize income; you should manage your woods to optimize outcome." Part of that is being able to numerically describe what is present in your sugar bush.

To do so requires measuring the basal area—the area of a cross section of a tree at 4.5 feet above the ground—of all trees in 1 acre. Resources such as the northern hardwood stocking chart can tell how much wood per acre a forest can sustain unmanaged. Smallidge said that a reasonable goal for a managed forest geared toward maximum production of sap should be 65 to 75 percent of that number.

Of course, every forest is different, and there's rarely such a thing



Photos courtesy of Peter Smallidge, unless otherwise noted.

A crowded canopy is one sign that a sugar bush needs thinning.





When thinning, always use correct directional felling techniques and wear personal protective equipment.

as an “average acre” in a woodlot. “That’s the art part of the science,” Smallidge said. To get to that ideal stocking level, he said sugar makers have to be skilled at looking at individual trees and identifying which ones are healthy and show the most promise for long-term production.

The crown is the most important part of the tree for sugar makers, because the leaves produce the carbohydrates that make sap sweet. “You want a big, full crown,” Smallidge said, which means selecting trees that have a deep, wide set of branches. Yard or roadside trees tend to be the best examples of these, with branches often covering as much as 80 percent of the trunk. In the woods that number tends to be lower, as shade from neighboring trees stunts the growth of lower branches.

While established sugar maples will typically not grow new branches below the base of an existing crown, releasing the crown by removing trees that are crowding the maple will allow it to grow wider. The tree will continue to gain in height and the overall crown will grow taller.

When inspecting trees in the woods, the crowns can be telling about overall tree health. Branches dying at the top of the crown, for instance, are often an indicator of problems with the roots being stressed or constricted, while dieback of lower branches is normal, since those limbs get insufficient light to produce leaves each year.

While inspecting the root system of trees poses some obvious challenges, there are visible signs that can suggest how healthy the roots might be. Roots that are under paths traversed regularly by tractors or skidders are likely stressed. Scars at the base of a tree quickly become entry points for decay organisms to find their way into the roots. Trees can usually handle a single stress, Smallidge said, but it is harder for them to cope with subsequent injuries. A tree with a compromised root system may be able to survive, he added, but it will be more vulnerable than other trees if there’s a drought or insect infestation.

Keeping this in mind, skid trails and other travel corridors should

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Trees that are diseased or crowding each other will not be productive and should be removed to foster the growth of healthier trees.

Healthy Sugar Bush

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be well-defined and designated and should occupy less than 10 percent of your forest area. Trails should be positioned to minimize passage through wet areas, and they should be as straight as possible so logs being skidded are less likely to scrape against standing trees when turning corners. Keep tubing systems in mind when creating logging trails, so they can serve a dual purpose. Avoid logging and using machinery around retained trees in spring and early summer when bark is loose and can come off more easily if bumped, potentially resulting in a wound that could prove fatal to a tree.

Finally, it is important to inspect the tree's stem for structural integrity—will it be able to stand up to wind and ice loads? Look for evidence of damage from bugs or disease. Learn how to identify cankers, lichen, fungus and mushrooms that are indicators of tree death and decay. Keep an eye on weak forks that could break and limit a tree's value as a sap producer.

Assessing trees individually gives a woodlot manager an opportunity to classify each one as acceptable growing stock with long-term potential, or as unacceptable trees that have no long-term value and are taking sunlight, water and soil nutrient resources away from the desirable trees. That assessment leads to the final stage of sugar bush management: thinning.



Thinning will open up the canopy and allow for trees to broaden their crowns, which will help them to produce more sugar in the next year's sap crop.

When making decisions about thinning a sugar bush, Smallidge advised focusing on what you want to leave behind rather than what you're taking out in order to avoid cutting more than necessary. An ideal sugar bush should have about 75 percent maples and 25 percent other hardwoods, he said. Conifers pose two particular challenges for sugar makers, he explained: They shade tubing, causing it to stay frozen longer, and they provide homes for squirrels, which enjoy chewing on tubing.

When thinning, favor trees with vigorous, deep, wide crowns and those with single stems. Select against shorter trees that are being denied sunlight by taller trees. "It's like weeding a garden," Smallidge said. "You're taking out the lower-value, underproductive plants that are taking away resources from the others." Younger trees benefit the most from management, so releasing the crowns of trees that are less than 10 inches in diameter will have a greater impact on that tree over the long term than doing so on a much larger tree. Where the canopy is entirely closed, with branches at the tops of trees touching each other, release the crowns of the best trees by cutting neighboring trees so the crown has several feet to expand on at least two sides.

As the forest grows, some trees have to die to make way for others to get bigger. Smallidge said that by not thinning, sugar makers lose the opportunity to choose which trees to nurture and preserve. An overstocked sugar bush will suffer from crown dieback and lose trees to wounds and damage. In addition, none of the trees will produce sap to their full potential because they'll be competing with each other for resources. By following good management practices, woodlot owners can ensure that the best trees remain and grow properly.

Smallidge cautioned against overcutting. Removing more than 20 to 30 percent of the basal area at once causes shock to the remaining trees, resulting in a brief but slight increase in sugar concentration and then a decrease for a number of years while the trees recover.

While some research has discovered limited success at increasing growth rate and sugar yield of maple trees with applications of lime, potassium and magnesium to correct deficiencies in soils, such fertilization is not a replacement for proper sugar bush management. It also costs more than other management practices, but likely yields less return, Smallidge said.

Most of the Northeast has relatively even-aged forests, land that was cleared for farming in the 1800s but abandoned over time. A maple producer needs to be aware of how their trees are aging and make some conscious decisions about the future. A sapling takes 30 years or so to grow to tappable size, and a sugar bush's life span is upwards of 150 years. While that may seem like a long time for most sugar makers, most want to ensure that their children and grandchildren can tap trees and produce maple syrup, so conscious sugar bush management is a priority. **F**

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