

## Maintaining a Healthy Sugarbush

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**P**roducers of rural goods, such as maple syrup, often remind consumers that food doesn't come from the grocery store. That said, some maple producers forget where maple syrup comes from – not from the evaporator, or the RO, or the vacuum pump, but from the sugarbush. Maple producers benefit from spending time, and maybe some money, ensuring they have a healthy and productive sugarbush.

A sugarbush is a special type of woodland. Woodlands include a complex mixture of natural processes and attributes such as soil type, elevation, tree species, types of wildlife, history of use, tree age and more. Foresters can help maple producers gain an in-depth understanding of these factors to achieve a healthy and productive sugarbush, but there are several steps a maple producer can take on their own.

Three principles should guide the way a maple producer looks at a sugarbush. These principles apply to all woodlands. First, managing the sugarbush is really about managing which plants receive sunlight. Sunlight feeds the leaves which are responsible for making sugar, which of course is needed for high quality sap. Second, trees are biological organisms, similar in some respects to a tomato plant, a cow, or a human being. Biological organisms are born, grow and eventually deteriorate with age. They also respond to stressors in their environment, and their vigor determines how well they respond. Third, as trees get larger they

require more space. Because trees can't move as they get crowded, some trees will die as the sugarbush matures.

With these principles in mind, a reasonable goal for a sugarbush is to make sure that trees of good vigor and potential longevity have adequate sunlight, stress events are minimized, and the effects of crowding are controlled by the owner, who selects which trees remain. Following are a few actions that maple producers can take to help keep their sugarbush healthy and productive.

*Monitor crown health.* The leafy part of the tree, the crown, is perhaps the most important part of the tree to monitor. Be alert to evidence of unhealthy crowns. Symptoms of poor crown health may include dead branches in the upper part of the crown, poor leaf color, unusually small leaves, or a transparent crown. There will always be a couple of trees in a sugarbush with poor crown health, but if several trees show these symptoms a problem exists.

While a symptom tells you a problem exists, it doesn't usually identify the cause. Crown health may decline as a result of root problems, such as compaction from machinery. Repeated injury to the crown can also reduce health, for example when defoliation coincides with drought. Crown problems may result in less sugar production and lower yields the following sap season.

In extreme cases, minimize or avoid tapping to allow trees to recover a healthy crown. Unfortunately, the causes of unhealthy crowns often can

be difficult to change, but some of the following actions can help maintain good crown health.

*Assess competition for light among trees.* Trees need light to grow. Although sugar maples are tolerant of shade, they don't thrive in shade. Maple producers need their trees to thrive, not just survive. The appropriate stocking, that is the number of trees of given sizes per acre, is a numeric index of competition for resources, specifically light. There are also visual indications of too much competition for light.

First, if the upper canopy, the collective crowns of the tall trees, is closed and doesn't allow sunlight through, there may be too much competition for light. If the canopy is closed and some trees have rounded crowns yet other crowns are flattened on two or more sides, there is likely too much competition. If the maple trees produce seeds, but there are no seedlings, there is either too much shade or too many deer.

Before taking action, visual cues to competition should be assessed by a forester who will measure stocking. In many cases the state forestry agency can provide a public forester to do the assessment. These foresters are pre-paid – your tax dollars at work. If competition is high, thinning around the best trees will ensure they have enough light to continue to thrive. Look for resources on Crop Tree Management to guide the selection of trees to cut and those to leave.

Woodlot and sugarbush thinning webinars are archived at [www.youtube.com/ForestConnect](http://www.youtube.com/ForestConnect)

*Look for interfering plants.* Interfering plants are either native or non-native (AKA "invasive"), and interfere with something the owner wants to accomplish. Examples of interfering plants include multiflora rose, ferns, beech, striped maple, bush honeysuckle, and many others (Figure 3). For maple producers, interfering plants may complicate access for tubing or buckets. Interfering plants may also impede efforts

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The tree on the right shorter than the tree to the left, and has a smaller crown. The tree on the left is winning in the contest for light, but the shorter tree is still having a negative impact.

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to establish young desirable maple seedlings. In some areas, deer pressure is high and they browse desired plants. This browsing gives a growth advantage to the interfering plants that deer don't browse. Strategies and techniques to control interfering plants depends on the problem plant, its abundance, how thoroughly the maple producer wants to control the plant, and if the producer will use herbicides or organic strategies. The website at [www.forestconnect.info](http://www.forestconnect.info) includes numerous resources to help control interfering plants.

*Monitor tree diameter growth.* Tree diameter growth is critical to maple syrup producers. Diameter growth is an index of crown health. Diameter growth also helps heal tap holes, add new wood for future tapping, and serves as a reservoir for sap. A tree may produce the same amount of wood each year, but the thickness, known as the diameter increment, will decrease because the wood is spread around a bigger tree.

Tapping guidelines assume tree growth is sufficient to add new wood and prevent future tapping into columns of stain from prior tapping. "Pattern tapping" helps prevent tapping into a stain column, and so does adequate diameter growth. Producers should expect annual diameter increments of 1/8th to 1/10th of an inch for trees less than 16 inches, 1/10th to 1/12th of an inch per year for trees 16 to 20 inches, and 1/12th to 1/16th of an inch for larger trees. The actual growth necessary to provide a sufficient thickness of new wood depends on depth of tapping and the offset of the tapping pattern between years. "Band tapping" high versus low bands of the tree will reduce the expectation for diameter

growth (but why would you strive for slower growing trees?).

Annual measurements at the same position on the stem with a tape measure will reveal tree growth. Producers can place an aluminum nail in the tree at 12" high, and use a 3.5 ft stick to locate the correct height to measure diameter at breast height (dbh) and thus achieve consistent annual measurements. Measure a minimum of 30 to 40 trees, but at least one per acre. Just as producers should measure sugar concentration, so they need to measure tree diameter growth.

*Consider tree age and longevity.* Sugar maples can be long-lived trees, with some reaching 300 to 400 years of age under ideal conditions. Under normal conditions, maple will likely have reduced production between 150 and 250 years of age. Producers could assess if there are patches of old or otherwise unproductive maples and regenerate small patches every few years. Cutting within patches needs to be sufficiently intense to allow sunlight to the forest floor. Patches could be 0.25 to 0.75 acres, but vigorous trees within the patch could be retained. Young seedlings should be protected from deer by fencing or dense continuous piles of brush around the perimeter. A forester can help assign vigor-ratings to trees, and producers can monitor sap production for individual trees. The location and timing of patch cuts should synchronize with planned changes of tubing and mainline.

*Livestock.* Historically many farm woodlots and sugarbushes allowed cattle and other livestock to free range. In these cases, grazing involved a perimeter fence and then free choice by the livestock. This continuous or set-stock grazing proved detrimental to the ani-

imals, the trees and the land where the stocking rate was too high (same concept as for trees). Sustainable grazing is possible, but requires considerable work.

Silvopasture is a deliberate process of integrating livestock into woodlands while also managing for nutritious forage plants. Management-intensive rotational grazing in small paddocks, with herd/flock movement daily ensures ample rest periods for the land,



Disease and damage can cause weak stems that are prone to failure. Trees like the one pictured should be removed to avoid complications during the season and free growing space for nearby maple trees.

and intensive and restorative grazing of the forages. With careful planning, silvopasture practices can solve some interfering plant problems. Any plans for deliberate grazing should ensure that root damage is avoided – pigs in particular can cause root damage through their tendency to “root.” The website at [www.forestconnect.info](http://www.forestconnect.info) has several references and resources for silvopasture.

*Avoid soil ruts and compaction.* While tree crowns are perhaps the most important part of the tree for producers, tree roots tie for first place or are a very close second place. The roots anchor the tree to the ground, pull water from the ground into the stem for sap, and feed the foliage. Damage to roots by tractors, skidders, or livestock can cause irreparable damage. It is easier to prevent a problem than fix a problem.

Producers with buckets need to access the sugarbush, but they should limit the number of trails. In chronically damp or soggy areas, install corduroy with a continuous matt of small logs and poles to float the tractor. Use as small a machine as possible that is safe and effective, and add high flotation tires if practical. Other types of woods work should allow equipment only during seasons when the ground is firm, usually summer, dry falls, and during cold winters. Repairing ruts with fill or corduroy may help avoid the need for a new trail and new damage in a new area, but this will not repair the damage to the roots.

*Mixtures of species.* Your sugarbush will generally be healthier and more resistant to stresses such as insect defoliation if there is a mixture of species. When thinning a sugarbush to provide

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more light to desired trees, avoid the creating a monoculture. Providing adequate sunlight to keep a thrifty maple healthy may be best accomplished by cutting another maple – there, I said it: it is okay to cut a maple.

Seriously though, most producers can look at a maple with a small crown, weak fork, or old scars from maple borers or tractors and know that tree is not productive or is otherwise risky. Bucket producers have the advantage of truly knowing a tree's productive capacity. Paint or mark a tree of low productivity during the season, and cut that tree later in the year when time permits. When cutting firewood or thinning, set a target for the main canopy to be about 75% sugar maple or red maple and 25%

other species. These aren't hard numbers, but use them as a guideline.

Time, of course, is the biggest obstacle to maple producers working in their sugarbush. Start with the easy tasks, and keep a list of priorities. Use this list to guide a discussion with a forester from your state forestry agency or your consulting forester. Let them know your goal is a productive and healthy sugarbush. A forester can help you develop a plan and a schedule to optimize the use of your time. Finally: be safe in the woods. There are too many stories of maple producers hit by trees and crushed by tractors.

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