SPRING 2022 • VOLUME 38 • NO. 2

Northwest Woodlands

A Publication of the Oregon Small Woodlands, Washington Farm Forestry, Idaho Forest Owners & Montana Forest Owners Associations

CAPTURING VALUE FROM YOUR FORESTLAND

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U.S. POSTAGE
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PORTLAND, OR
PERMIT NO. 3142

Northwest Woodlands
P.O. Box 1010
Chehalis, WA 98532

Tapping West Coast Maples for Fun and Profit

By DR. ELAINE ONEIL

With recent news articles about bigleaf maple syrup production and ongoing studies at both the University of Washington (UW) and Oregon State University (OSU), there is plenty of buzz around producing maple syrup—west coast style. This article will provide a general set of guidelines to help you decide if this might be a way to capture value from your forestland.

Do you have the right trees?

Bigleaf maple trees all produce sap, but some of them are better producers than others. In general, larger trees produce more sap, but vigorously growing coppice (multi-stemmed) trees produce more sap than the equivalent cross-sectional area (basal area) of single-stemmed trees. So far, that relationship holds for trees ranging from 5"-25" DBH. Each stem in the clump can have a tap if it is big enough. Currently trees larger than about 8" have been tapped, though there is a book from British Columbia (*Bigleaf Sugaring: Tapping the Western Maple*) that suggests trees as small as 4" will generate reasonable sap flow. There are even a few folks trying to tap vine maple and Douglas maple east of the Cascades. You can try tapping your old-growth maples, but anecdotal evidence from local producers suggest they usually don't generate much sap. Producers suggest you should expect that one third of your trees will not yield appreciable sap and supply will not improve in subsequent years.

Producers who are involved in the UW research have also found that, even comparing trees of the same diameter, some generate more sap and/or have a higher sugar content than others. It may be microsite-dependent, related to soil mineral content or some other factor. Evidence to date suggests trees lower on the slope or nearer the streams are better at producing sap. It is worthwhile to do a few tests on your potential sugar bush trees for a sap run (or two) to see which trees might be your best sources. This is especially relevant if you decide to implement a gravity or vacuum collection system because the line layout should aim to take advantage of your best prospects. Researchers expected to see greater sap flows at higher elevation sites in western Washington because they have more reliable freeze/thaw cycles, but the data from across six Washington sites suggest that even near sea level there are opportunities to produce your own bigleaf maple syrup. Testing your trees for a season is always a good idea.

Do you have enough trees?

The sugar content (Brix) of bigleaf maple sap varies from 0.6 percent to 2 percent between trees and averages about 1.1 percent. It appears that the Brix is higher when the previous summer was cool and wet. Finished maple syrup should have a sugar content of about 67 percent, so 1 gallon of maple syrup requires a lot of sap. There is a rule of 86. Divide 86 by the percent Brix in your sap and that is how many gallons of sap you need to make a gallon of syrup. Expect to lose a little sap during processing. Experienced small-scale producers are finding that for western Washington it takes about 100 gallons of sap to make 1 gallon of syrup on average. Most trees studied these past 2 years produce an average of 5-10 gallons of sap per season, though some will reach 20 gallons. So, expect to tap anywhere from 5-20 trees to produce 1 gallon of syrup. That means for anything beyond a fun backyard adventure, you will need a substantial number of easily accessible bigleaf maple trees to

produce syrup at scale. Easily accessible is a relative term since the lines on gravity flow or vacuum systems make light work of difficult terrain. For example, some UW study sites have tapped trees on slopes greater than 45 percent, but the grade for the lines needs to be lower than that.

Do you have the time?

The heaviest sap runs occur when temperatures drop slightly below freezing followed by thaws well above freezing. Sap runs start heavy and then taper off over a few days. Sap will keep a maximum of 2-3 days if the temperature is near freezing, but only 12-24 hours if it is well above freezing so, however you are collecting the sap, you can expect to be extremely busy for a few days. Once the sap is collected, it needs to be either frozen or boiled to prevent bacterial growth while you are waiting to accumulate enough sap to begin the concentration process. All equipment needs to be scrupulously cleaned so the next sap run isn't contaminated with bacteria.

After collection, it is a long process to concentrate the sap into syrup. In small-scale systems, that is done by boiling it down outside, or at least in an outbuilding so you don't peel the plaster off the ceiling with all the moisture that is removed. Yes, that happened even with windows open and a fan blowing! As the operation gets bigger and more sophisticated a variety of equipment can be purchased to simplify and speed the process.

How to get started

Trees are tapped by drilling a small hole a preset distance into the tree (to tap into the xylem) and placing a plastic or metal spout called a spile in the hole. Ideally trees are tapped the day after a freezing event, which can happen anytime starting in December. Don't tap the trees before this freeze, since trees will generate pitch to close off the hole like any other bark damage. Taps generally last about 3-6 weeks, after which time they will have to be moved to a new location on the same tree—usually 1"-2" to the side and

PHOTO COURTESY: SHUTTERSTOCK

A small-scale collection system can be a good hobby or a test before expanding to a more elaborate system with potential for commercial value.

4"-6" up or down. Some producers tap only half the stems in a maple clump, and then when they re-tap mid-season they will tap the remaining stems.

For a small-scale system, a bag or pail is connected to the spout to collect the sap. The bags are picked up every few days as they fill. Bags made explicitly for this purpose are available at maple syrup equipment providers, but some people have started their experiment with tapping bigleaf maples using only a one-gallon water jug and a tree spile. It doesn't have to be complicated. Since you will have to carry those bags or jugs out for processing, the trees would need to be relatively accessible on foot and by vehicle (e.g., ATV) to effectively recover the sap. It wouldn't take too many trees before this approach would become too time-consuming to be viable. A better system is needed for anything more than making enough maple syrup for your own pantry.

If you have tapped for fun for a few years and decide to move to the next level, you will need to install either a gravity-assisted or a vacuum pump system. In gravity-fed, 3/16" tubing systems, the line needs to have a 30'-40' drop from the uppermost point of

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the line to the tank to obtain maximum natural vacuum. Vacuum pump systems can handle flatter terrain, like along your low gradient streams, but in both instances the lines must be kept taut to ensure sap does not sit in them and begin to mold. In both systems, the trees are tapped per the conventional method, but instead of bags or pails, each tap is connected to a 3/16" food grade plastic tubing that flows into a central collection tank. Here we show plastic tanks, but research participants have determined that stainless steel tanks are easier to clean and therefore have fewer problems with mold.

The tubing needs to be set up to avoid having animals, people or equipment accidentally running into them. It is possible to work around game trails, or even roads, if you take advantage of terrain breaks and use drop lines to continue the line at a lower elevation point. The completed system is a series of brightly colored tubing anywhere from 3'-7' off the ground depending on the terrain. That tubing will remain up year-round, though it needs to be cleaned at the end of each season and repaired at the beginning of the next season. Gravity-assisted systems will not need electricity, whereas vacuum pumps will need electrical connections as the pumps pull more energy than most battery systems can handle. Using a vacuum system did demonstrate better flow than gravity systems in some instances, but in others the gravity system worked better. Sometimes that is because there is a hidden leak somewhere in the line that breaks the suction.

PHOTO COURTESY: VICTOR NIEMCZIEK

This 250-gallon tank is fed by a 3/4" mainline (500' of blue piping) and five lateral lines (3/16" green piping). The lines drain 30-40 taps and can fill the tank on a good day.

Using a vacuum system with about 125 taps can collect as much as 50 gallons in a few hours and over 200 gallons over two days. When weather conditions are favorable for flow, plan to stay close to home or your tanks will overflow.

Do you have the resources?

For a small-scale system, you will need a drill, a twist drill bit (not a spade bit), a hammer, spiles, collection devices (e.g., bags or pails) and some way to boil the sap down to make syrup. Some simple tools like a Brix meter are handy so that you can tell when the syrup is close to done.

Once you transition to a larger-scale system, plan for a substantial capital investment. The most inexpensive part of the operation will be the collection system of tubing and spiles. Choose stainless steel, bottom-draining tanks to minimize any sap left in the tanks and make cleaning easier. Vacuum pumps can be finicky but should deliver superior results when working properly according to the one commercial producer in the UW research study.

PHOTO COURTESY: KENT WHEILER

Five natural gravity vacuum lines flow into this 300-gallon collection tank from about 100 taps

Once the sap is collected the real work begins. Tanks must be emptied and cleaned every few days (maybe every day if the sap is really running or it is warm). Cleaning is critical since leftover sap will start to grow bacteria and ruin the next batch. That can be a tedious job without the right equipment. Handling 200 or more gallons of sap within a few days requires a lot of boiling or specialized equipment to streamline the process. Relying on boiling away the excess water is a tried-and-true method, but going from 1 percent sugar content in the sap to 67 percent sugar content in the syrup takes a lot of heat. Reverse osmosis machines can be used to concentrate the sap by passing it through the membranes, doubling the sugar content with each cycle. This concentration step reduces the amount of time it takes to cook the sap down in an evaporator to its final state as maple syrup, but cleaning the reverse osmosis machine can be tricky.

Is it all worth it?

Neil's Bigleaf Maple Syrup company in Acme, Washington, taps several thousand trees and has scaled up sufficiently to make an economic venture out of producing bigleaf maple syrup. What is less certain is if it can be done at scale in other regions of Washington that have warmer climates and fewer maple trees than Neil's has been able to access. Tapping the trees is the easy part. The investment required to process sap and the permitting required to sell commercial grade products makes this a daunting process for the small-scale producer. Conversations around cooperative ownership of processing facilities, or the equivalent of crop sharing agreements, would make this opportunity more accessible to more forestland owners.

Bigleaf maple syrup tastes similar to east coast maple syrup, but it has its own distinct flavors and notes. So, whether you are a backyard enthusiast tapping a few trees for the pantry, or looking at a small-scale operation, tapping bigleaf maples is a sweet treat that can add value to your tree farming experience; it just might not be economic value unless the operation can be developed at scale. ■

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