Future Generations University

MAPLE INITIATIVE

Research, Learning, Action for Inclusive & Sustainable Change Worldwide

SYCAMORE
SAP AND SYRUP FIELD TRIAL

JANUARY-MARCH 2019

Conducted in partnership with the West Virginia Department of Agriculture

by Mike Rechlin

A SYCAMORE STORY

Theoretically, every "diffuse porous hardwood," (maple, beech, birch, sycamore, poplar, etc.) when tapped will exude a sweet sap. Sycamore is a diffuse porous hardwood, but I had never met anyone who had tapped one. I mentioned this at a November 2018 maple seminar in Nichols county WV. Two women attending the program announced that they both grew up on sycamore syrup. Both unrelated women said that their Granddad always had a bottle of Sycamore syrup in the cupboard.

Jeremy Ray was at that seminar. He went home, was working with an excavator around his yard, and knocked off a sycamore branch. He immediately called me to let me know the sycamore sap was running. He then tapped a few sycamore trees and collected the sap, which his son in the photo enjoyed drinking. After an unusual warm spell that February, I tapped 4 sycamores, collected sap in buckets and made just enough to taste; it was sweet.

This field trial was designed to learn more about the timing of sycamore sap flow, the sweetness of the sap, and the way it should be concentrated. In 2019, we set up a 3/16-inch sap line and hooked it to a diaphragm pump and controller. On January 18th, 18 sycamore trees were tapped with 25 spouts. Later we tapped two additional trees and hung buckets, following that up late in the season with 3 more trees on buckets, and finally, 5 bags.

SAP FLOW

Date collected	Volume of sap gal.
1/23	20
1/24	15
1/29	20
2/4	20
2/5	10
2/6	8
2/7	8
2/13	10
Total	111 gallons

2019

The first sap flow was January 24th, with regular sap flows on warm days preceded by cold nights. This continued until February 15th, when it stopped completely. Over the season 4.4 gallons of sap were collected per tree from the trees on vacuum tubing. One of the trees with buckets gave a quart and the other did not produce any sap. The three trees tapped late season never produced any sap, same with the with the last 5 sap bags. For those on lines, sap flow decreased dramatically when the vacuum was off.

The differences in buckets vs vacuum lines in 2019 is interesting because when the 4 trees were tapped late in the 2018 season—one spout per tree—and collected in buckets, they gave an average of 2.2 gallons of sap per tree.

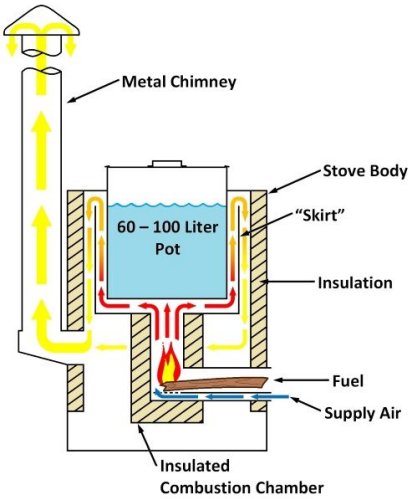
2018 SYCAMORE SAP FLOW

Date collected	Volume of sap (gal.)
2/12	2.25
2/19	1.25
3/1	2.25
3/13	3.0
Total	8.75 gallons

What is further interesting is that in 2019 the sap flow season ended much earlier than it did in 2018 despite the continuation of favorable sap flow weather. 2018 was an unusual season, and tapping was postponed until after a 7-day February warm period, much later than the 2019 season. This would indicate that it was tap hole closure that stopped the sap flow in 2019, not the time of the year. So, on February 15th the tap holes were deepened from 1.5 inches to 2.5 inches and clear CDL polycarbonate spouts were replaced with white CDL spouts. The sap flow season was not lengthened. Deepening the holes, or "bumping the spouts" as the WV maple producers say, should have exposed new vascular tissue, resulting in continued sap flow. It did not.

In desperation to get more sap, and figure out the cause of flow stoppage, we tapped 5 additional sycamores in Mid-March (the same day we added 5 more trees to the walnut study). The late tapped walnut produced well, the sycamore did nothing.

Remember the picture of John Ray taking a big drink of sycamore sap. That was in November!



SYRUP MAKING

The average Brix of the sycamore sap collected was 1.0 degrees, and it took approximately 86 gallons of sap to make a gallon of syrup. The sap was concentrated to from 2 to 4 Brix with multiple passes through a small-scale "Bucket RO," greatly reducing the boiling time. The sycamore sap that was collected was boiled in an experimental small-scale evaporator built following "rocket stove" principles. This stove design is energy efficient and provides maximum heat to the pan. It was designed as a cook stove for use in developing countries, as a way of reducing deforestation. Although the maximum heat may not be ideal for

sautéing vegetables, it is ideal for boiling sap. The syrup was then moved to a propane burner and finally finished off on a kitchen stove.

We know that the sugars in maple sap are primarily sucrose, and that in birch sap they are primarily fructose. Birch sap requires a different evaporation technique to bring out the best flavor without scorching the syrup. More investigation into the sugar type in sycamore and how that might affect evaporation strategies would be pertinent.

PUMP AND CONTROLLER

Vacuum was maintained with a "Mountain Maple" diaphragm pump and controller. The pump was powered with a 12-volt marine battery, which was kept charged with a battery tender. The controller turned the pump off and drained it when the temperature was below freezing in order to save battery power and protect the diaphragm from freezing. Early in the sap flow season, the controller kept shutting the pump off unexpectedly. As sap flow was appreciable at best when the pump was on, this frustration needed to be remedied. Eventually, the problem was traced to the battery tender, which would shut off if a load was placed on the system while charging. This allowed the battery to run down, causing the controller to malfunction. The battery tender had to be unplugged and plugged back in to reset it. The solution came with putting a timer on the tender, so it shut off and restarted twice as day. With this, the system worked well for the remainder of the season.

Although 21 inches of mercury vacuum was achieved at the pump, it never rose over 8 inches at the end of the line. In the event that this was a tap sealing problem correlated to wood density, the polycarbonate taps were set harder and eventually replaced with the more tapered white CDL spouts. The end of line vacuum did not improve. Like walnut, sycamore has a soft wood, and it is possible that a spout designed for softer wood might seal better keeping more vacuum in the lines.

SUMMARY

This study showed that sycamore does produce a sweet sap flow that can be boiled down to produce a syrup. That syrup had a nice taste, that some people say has a butterscotch like flavor. This is a new sap and syrup product, that will need more work to develop taping strategies that could lead to its commercial production. Likewise we need more information on the sap and syrup chemistry before we can provide guidance to potential syrup producers.

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