Advancing black walnut syrup production through research and report on optimal tapping practices

Sare Grant FNC23:1372

A SARE Project Report

The Rusted Flatbed Farm

Indianapolis, Indiana

J.R. Elrod

bluetempestllc@gmail.com

The Project

This project aimed to advance black walnut (Juglans nigra) syrup production by testing sustainable tapping practices and collecting performance data through parallel maple and black walnut tapping operations. By running parallel operations on the same sugarbush, the timing and production of the maple and black walnut can be compared. This offers insight into the degree that black walnut should use maple tapping practices.

The project contemplated tapping with both buckets and vacuum tubing. With buckets, data can be analyzed at each tree. With vacuum tubing, higher yields can be drawn. Black walnuts produce substantially less sap than maples, and increasing sap production is one of the biggest challenges for black walnut syrup producers.

The project began in the 2024 season. Sap was collected daily during each run. A digital refractometer was used to measure sugar content. Green tubing was used for the black walnuts and blue tubing for the maples. The project continued in 2025.

The 2024 Season

Trees were marked with numbered tree tags. 15 maples and 23 black walnuts were tapped with nylon taps and tubing into food grade 3.5 gallon buckets.

56 maples and 51 black walnuts were tapped, the maple with poly taps and the black walnut with stainless steel taps. The stainless steel taps would not produce a consistent seal. Attempts to re-tap failed. Thus the tubing did not provide helpful data in 2024.

Two major lessons were learned. First, stainless steel taps for tubing cannot be used on black walnuts.

Second, black walnuts should be tapped between the ridges, not in the ridges. Taps cannot be inserted in a correct and uniform depth if going through the ridges. Also, the crumbly bark of the ridges will clog the taps.

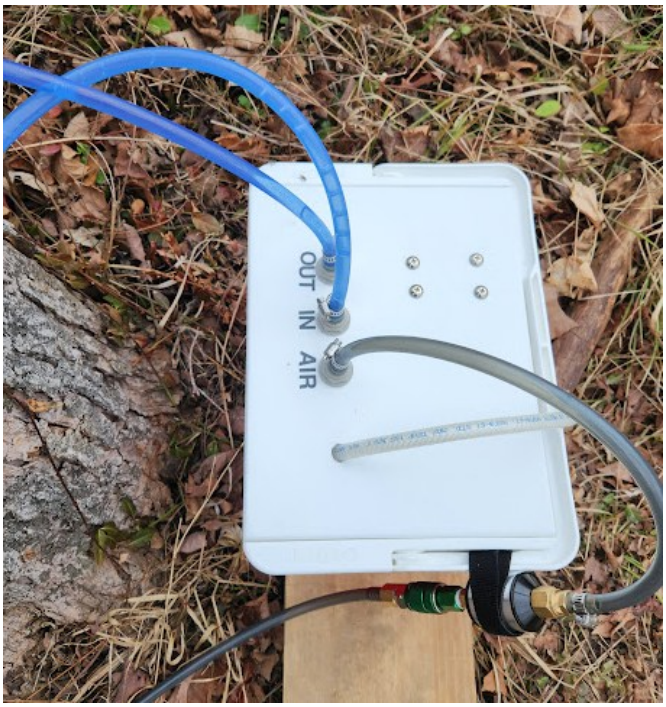
The 2025 Season

The buckets were not repeated in the 2025 season. The 2024 bucket data is probably unusually low as many maple producers had a poor crop, as low as 40% of a typical year.

For 2025, 56 maples and 38 black walnuts were tapped on 5/16" tubing. Additionally, based on another SARE study suggesting higher sap production for black walnuts on 3/16" gravity lines, another 32 black walnuts were tapped.

Unfortunately, the hastily hung 3/16" gravity lines lacked sufficient grade and resulted in poor production.

The 2025 maple and black walnut tubing were both successful during a relatively long season. The black walnut taps avoided the use of "Ys" and the long single strand allowed for the introduction of air to clear the lines.

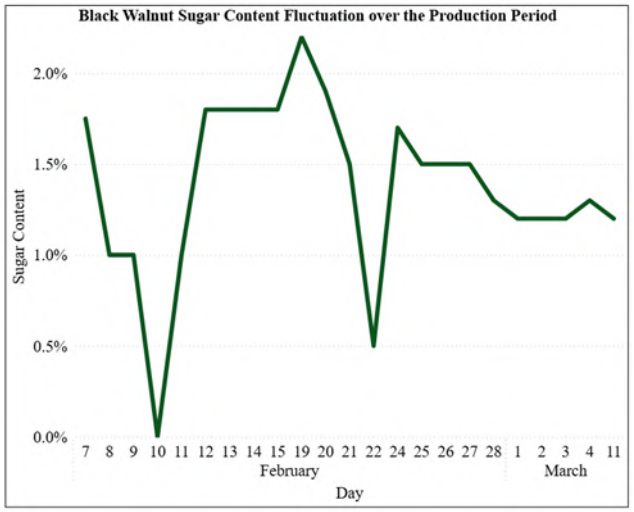


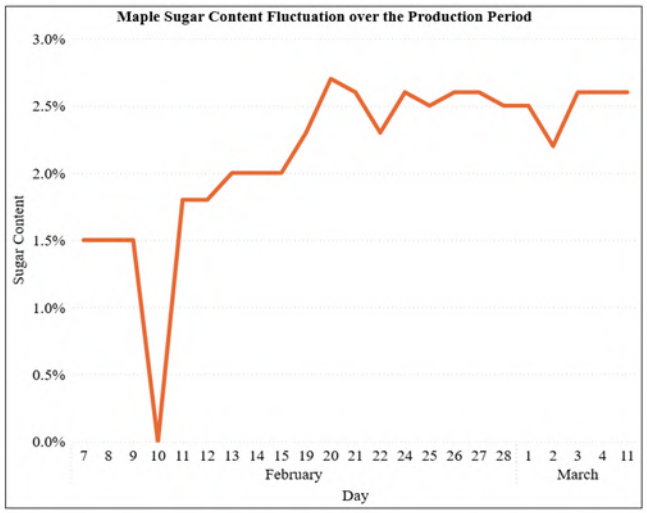
The Tubing Equipment

The Rusted Flatbed Farm used a pneumatic diaphragm pump known as a “Lunchbox Pump.” These are no longer sold, but they can be fairly easily assembled at a cost of under $200. This is substantially cheaper than most diaphragm pumps.

The Lunchbox Pumps are run on an air compressor, and the air line uses the same inexpensive tubing for the taps. The Lunchbox coolers are filled with water to prevent the pump from freezing, and they automatically shut off when the lines freeze. Most diaphragm pumps require both heat and electricity, which can be expensive to run to the sugarbush.

The Lunchbox Pump has a capacity of 100 taps and had no difficulty returning the sap up the hill to the holding tanks.





Sap Content

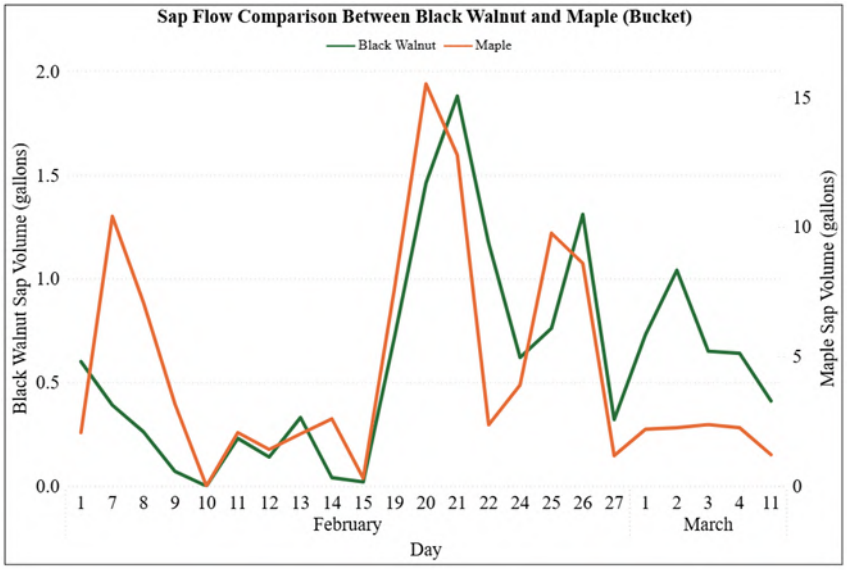
The maples at the Rusted Flatbed Farm ranged from around 2% to 2.5% sugar content. Black walnut syrup ranged from 1% to 1.75%. The zeroes in the chart reflect days when the holding tanks froze and a sugar readings could not be taken. The sharp spikes and drops were the result of half-frozen holding tanks where the liquid has a higher sugar content than the ice.

Unlike maples, which tend to increase in sugar content as the season progresses, black walnuts seem to decrease in sugar content. This might suggest tapping earlier in the season for black walnuts.

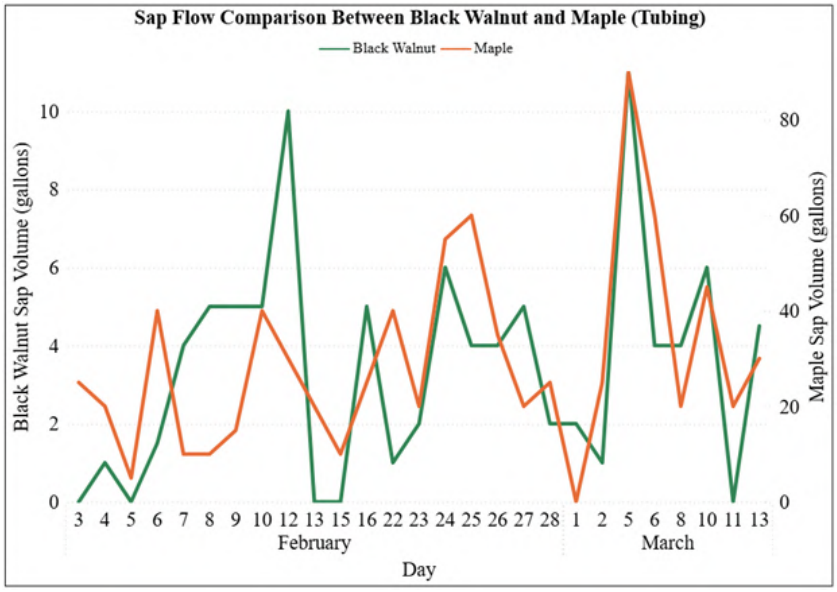
Black walnut sap has a distinct flavor, somewhat like iodine, which is very different from maple sap that has only a pure sugar flavor. Black walnut sap may also have a tint to it.

Sap Production

The sap production for black walnuts on buckets in 2024 was frustrating. The low numbers probably reflect poor tapping as well as a historically bad season for production due to warm temperatures. The result was an average of .6 gallons per tap for the entire season.

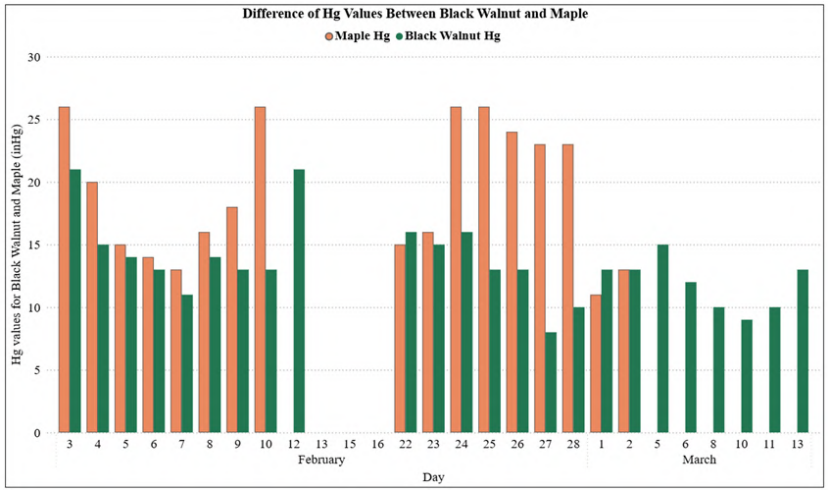


On vacuum tubing in 2025, the black walnuts achieved an average of 2.45 gallons per tap for the entire season.



The charts reveal how closely maple and black walnuts react to changes in the weather and the resulting pressure in the trunks. The buckets in 2024 seemed to suggest that the black walnuts ran slightly ahead of the maples. But in the 2025 tubing, the black walnuts seemed to be slightly delayed overall.

The maples achieved significantly higher vacuum levels on the Lunch-box Pump due to the 5/16" tubing filling completely and adding a gravity effect. The black walnut had insufficient sap to fill the tubing, and added no additional vacuum.



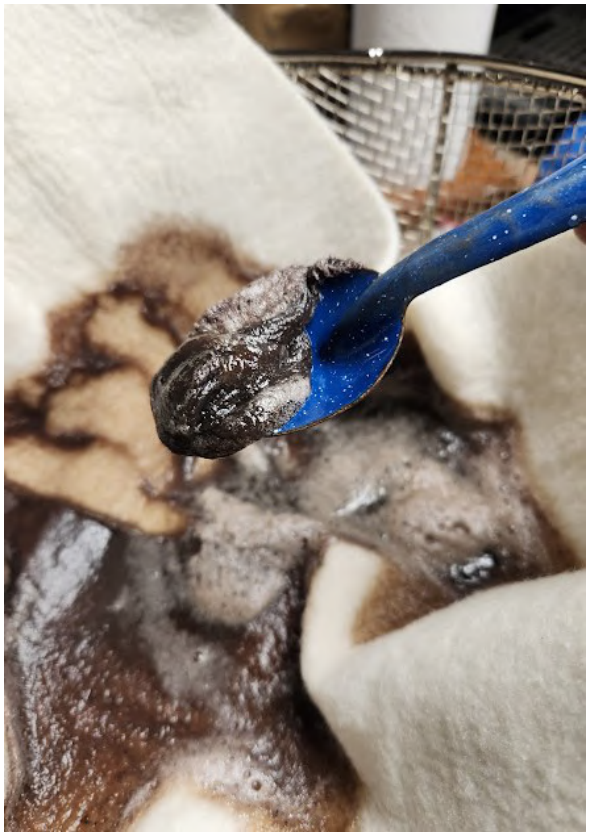
RO and Evaporators

The Rusted Flatbed Farm used a “Bucket RO” assembly for concentrating the sap prior to boiling. RO, or reverse osmosis, removes water from sap through a membrane, saving many hours of boiling. Typically the black walnut was concentrated up to about 8%.

Due to the law volume of sap from the black walnuts, the sap was boiled on a propane-fired fish fryer. Most runs had 3-5 gallons of concentrated sap. A best practice is using a canner with a valve to allow the sap to drip into the fish fryer, resulting in maximum efficiency and minimal supervision.

The maple sap was boiled on a Lapierre small raised flue, continuous flow evaporator.

Both the maple and the black walnut were finished indoors on a kitchen range.



Filtering and Bottling

Because black walnut syrup has a natural pectin-like substance, it cannot be run through a filter press. Gravity cloth filtering must be used instead (or a vacuum filter).

Some black walnut producers have had luck removing the pectin by filtering halfway through the filtering process. But that was not attempted at the Rusted Flatbed Farm.

The pectin is edible and has a taste and consistency similar to apple butter. It goes well on English muffins.

In order to place in glass bottles, syrup must be carefully filtered. Otherwise dark clouds and and debris will form.

Future Studies

For the 2026 season, the Rusted Flatbed Farm intends to convert its black walnut 5/16” tubing to 3/16” for the Lunchbox Pump to see if higher vacuum and sap production can be achieved. Likewise, gravity 3/16” lines will be run on a portion of the sugarbush where there should be sufficient grade.