

Maple Sugaring Curriculum at Albert Bridge School



Curriculum Activities	Possible Overarching Project
<p style="text-align: center;">Kindergarten</p> <p>Forest Days curriculum-one day a week in the woods. Getting comfortable being outdoors.</p> <p>Learning to differentiate between deciduous and coniferous trees</p> <p>Reading children’s literature about sugaring</p> <p>Three-dimensional diagrams of the parts of a tree.</p> <p>Making fairy houses for fairies that protect maple trees.</p>	<p style="text-align: center;">Kindergarten</p> <p>*Tree Songs and Costumes (students become trees) presented as part of Spring Concert.</p> <p>*Parent Tour of the Woods in Winter in March.</p> <p>*Sing songs and write poems for tree spirits or maple tree fairies.</p>
<p>Essential Questions</p> <ol style="list-style-type: none"> How does exploring in the forest help us understand the tree’s seasons? How do poetry and song help us to connect to nature? 	
<p style="text-align: center;">1st and 2nd Grade</p> <p>Introduction to the process of sugaring: drilling tap holes with hand drills in the sugar maple outside of classroom.</p> <p>Learn to identify 6-8 different trees along trail .</p> <p>Trees study re parts of trees—xylem, phloem, cambium.</p> <p>Study sequences by learning about the steps of the sugaring process.</p>	<p style="text-align: center;">1st and 2nd grade</p> <p>* STEM challenge: Make buckets from birch bark to demonstrate the way Abenaki would have collected sap</p> <p>*STEM challenge: create simple chairs with branches and twigs/</p> <p>*Create a guide to 6-8 trees on nature trail.</p> <p>*Create tree cookies from different trees.</p>
<p>Essential Questions</p> <ol style="list-style-type: none"> Why is it important to learn different kinds of trees? How can we create something from natural materials to collect a liquid? 	
<p style="text-align: center;">3rd and 4th grade</p> <p>Math unit on measurement skills required in sugaring process. “How many taps can go</p>	<p style="text-align: center;">3rd and 4th grade</p> <p>*Create a set of math problem cards based on creating maple sugar. (If Tree #7 produced 6 ½ gallons of sap on Monday and</p>

<p>into this tree?" How high off the ground should we tap?</p> <p>Coordinate syrup taste tests and quantification of other taste test in cafeteria. Mrs. Butterworth vs. Local Syrup? Fancy vs. Dark Amber?</p> <p>Learn to interview local community members about their jobs.</p>	<p>then 3 ¾ on Tuesday, how many less gallons of sap did it produce on Tuesday?)</p> <p>*Create posters, using math skills, of results of taste tests.</p> <p>* Prepare for and spend a day doing various tasks at a maple sugar operation.</p>
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Essential Questions

1 What are factors that influence taste?
2. Is local better?

4th and 5th grade	4th and 5th grade
<p>*Be responsible for creating or finding donated evaporator and conducting the boiling off process.</p>	<p>*Create/find an evaporator and conduct a boiling day on school property.</p>
<p>*Coordination of Maple Tapping Day celebration. Different committees for label design, invitations, contacting experts, food and drink.</p>	<p>*Maple Tapping Day Celebration with invitations, speak chorus, food and drink, (carbonated maple sap), sap relay races.</p>
<p>*Collect data on when sugaring season has started and ended over the past 30-40 years. Effects of climate change?</p>	<p>*Honoring of community member who planted the tree.</p>
<p>Learning about other foods created in West Windsor. Field trips to local farms.</p>	<p>*Article in Valley News about Maple Tapping Day</p>

Essential Questions

1. Where do products I consume come from?
2. Are processed foods healthy or not?
3. How does climate change effect our community.
4. How does the design process help us make effective tools

6th grade	6th grade
<p>Tapping other trees to see if they produce sap and compare tastes.</p>	<p>*Create an illustrated dictionary for the school library of sugaring vocabulary.</p>
<p>Technical vocabulary related to sugaring.</p>	<p>*Write and illustrate a guide to the maple sugar operations in Brownsville area.</p>
<p>Procedural writing pieces: steps in the process illustrated in power point or video.</p>	<p>*Coordinate the creation of a cookbook of recipes that use maple syrup—recipes</p>

<p>Make maple ice cream in the classroom.</p> <p>Formal interviews with all the sugar operators in West Windsor</p>	<p>donated by community members.</p> <p>Illustrations by students.</p>
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Essential Questions

1. What do cultural groups have celebrations?
2. What elements would make the vocabulary in an illustrated or online dictionary “come to life” for readers.

Expectations

1. Each classroom teacher will conduct a maple sugaring related curriculum project for six weeks (one hour/week) by the end of sugaring season.

2. Each teacher will contribute to a schoolwide display of maple sugaring curriculum on a bulletin board to be designated. Each class will have a section of the bulletin board to document their curriculum. Possible components include student work, photographs of students involved in activities, photographs of maple sugar operations in the area, math charts, drawings, final products. Bulletin board will be created near end of sugaring season—ie around 1 April 2019.

Other All School Activities: Consider a Pancake Supper after boiling off day.

For other curriculum ideas, consult the New York State Maple Sugaring Curriculum at: <https://www.nysmaple.com/educational-resources/>

Curriculum matrix created by Albert Bridge School teachers and David Sobel of Antioch University New England, dsobel@antioch.edu

6th Grade Lesson Sketch

Lesson 1 - Folk Tale - Students Read and summarize the folk tale.

LE.L.3: Reading - Analysis & Interpretation - Student can read with purpose.

Student can make meaning from what is read.

4.RL.10: Read and comprehend literature, including stories, dramas, and poetry

**5.RI.02: Determine main ideas of text and how they are supported by details;
summarize**

Lesson 2 - Vocabulary - Student use dictionaries to look up words.

Lesson 3 - Graph and data slides. See Think Wonder

Lesson 4 - Introduce the Boiling Day format. Students brainstorm groups.

Lesson 5-7 - Students work collaboratively to prepare their stations for the school wide sugaring day.

6th Grade Boiling Day Job Choice

This list can easily be generated by students. 6th Graders will be in charge of teaching the school's younger students about Maple Syrup on the day that we boil.

_____ Tree identification - This team will be in charge of teaching younger students about the parts of the tree and how to identify various trees in the schoolyard.

_____ Boiling explanation - This team will introduce students to parts of the evaporator and teach students about the chemical and physical changes taking place.

_____ Sugaring Jeopardy - This team will create a trivia game focusing on history, the building process, etc.

_____ Story Telling - This team will read leveled books to various age groups.

Name: _____

Date: _____

4th -5th Grade Maple Sugaring Unit - Job Choices

Background - We're throwing a party. Friday, April 10th will be Pancakapalooza. We'll welcome members of the Brownsville community to our very own pancake breakfast. In order to make this a successful experience, we must prepare in advance. Review the job descriptions below and indicate your first three preferences for which group you'd like to be in.



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Part 1 - Work Teams/Job Choices

Directions - Indicate your preferences by labeling them with 1, 2, and 3. 1 indicates your first choice.

_____ Invitations Team x2 - This team will be in charge of invitations. Possible tasks include creating the invite list, making the invitations, as well as creating and posting flyers.

_____ Information Brochure Team x3 - This team will make informative brochures on the history of maple syrup, sugaring in Vermont, and the sugaring process itself.

_____ Poetry Team x2 - This team will organize a speak chorus. This is spoken word that will be shared at the event. You may write and share a poem yourselves, or organize a poem with other people and have many speakers. The possibilities are endless. You may even want to work with other classes.

_____ Masters of Ceremony x2 - This team will organize the schedule of events and introduce the different parts of the ceremony, speakers, etc.

_____ Organizing Boiling Supplies Team x3 - This team will be in charge of procuring an evaporator boiling the maple sap and to turning it into syrup.

_____ Organizing Tree Tapping Supplies x2 - At the event, we will tap the sugar maple outside of Ms. Day and Ms. Harris' classrooms. This team will be in charge of organizing those supplies, as well as the supplies to tap other trees at the school.

_____ Photos Journalism Team x2 - This team will contact local newspapers to tell them about the event, take photos of the event and write an article for a local newspaper.

_____ Food and Drink Team x3 - This team will create a menu and make food and drinks for the event. You will probably work with Ms. Day's class to do this.

Part 2 - Essential Questions

Directions - Answer the following questions in complete sentences.

1. Where do products I consume come from? _____

2. Are processed foods healthy or not? _____

3. How does climate change affect our community? _____

4. How does the design process help us make effective tools? _____

Name: _____

Date: _____

Maple Sugaring Unit - Job Choices

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HT, BKE-Invitations Team x2 - This team will be in charge of invitations. Possible tasks include creating the invite list, making the invitations, as well as creating and posting flyers.

JB, GC-Information Brochure Team x3 - This team will make informative brochures on the history of maple syrup, sugaring in Vermont, and the sugaring process itself.

TP, OD- Masters of Ceremony/Greeters x2 - This team will organize the schedule of events and introduce the different parts of the ceremony, speakers, etc.

JG, AC, NL-Museum Team x3 - This team will design the layout of tables and exhibits in the gymnasium.

KT, ZY, JW- Food and Drink Team x3 - This team will create a menu and make food and

drinks for the event. You will probably work with Ms. Day's class to do this.

108 Hartland Brownsville Rd,
Brownsville VT 05037
March 19, 2019

Hello,

My name is Avery Ducharme. I am in 5th grade at the Albert Bridge school in Mr. Wood's class. My class is doing a unit on maple sugaring. I was wondering if we could tap some of the sugar maple trees on school grounds. It would be very kind and helpful if you could give us permission.

Sincerely,
Avery Ducharme.

Part 3 - MAPLE MYSTERY PUZZLE

Puzzle Piece Requirements - In order to receive your section of the team's Maple Syrup Puzzle, you need to complete several individual tasks in addition to the group work project that you've already selected. These assignments are due on March 22nd. **In 2019 students had 3 weeks to complete these assignments.**

Everyone must complete the following items.

- Read a sugaring article and record reading strategies
- Read and summarize a sugaring article
- Write a legend explaining the discovery of maple syrup
- Make a poster with a flow chart depicting how syrup is produced
- Create a portfolio to store your sugaring documents
- Complete a ratio table showing how much sap is needed to make x gallons of syrup
- Get an 80% on a quiz on the maple sugaring process, history, maple trees, etc.

Everyone must complete 2 of the following

- Contact school board to request permission to tap trees on school grounds
- Interview the person that planted the tapping ceremony tree
- Interview someone who makes syrup
- Track the weather to figure out the best days for tapping

Everyone must complete 3 of the following

- Draw a diagram of an evaporator
- Create a tree biology poster
- Create a leaf comparison poster
- Create a leaf vocabulary poster
- Create a sugar maple tree identification poster

ESSENTIAL QUESTIONS -

1. Where do products I consume come from?
2. Are processed foods healthy or not?
3. How does climate change affect our community?
4. How does the design process help us make effective tools?

Field trip to multiple sugar houses

Legend about maple syrup

Natives' ways of sugaring

Maple Sugaring Doc

Local stuff is cool

Badges

Vermont MS around the world

Tapping Ceremony

2019 Tree Tapping Festival Feedback

Here are some pics from kindergarten classwork, I don't have any of the actual day. I think the day went well and would like to repeat it next year. There are always some improvements that can be made. The tasting line was long, maybe rearranging that a bit would help. The kids loved it, especially the Log Cabin sample! I think parts of the speak chorus were lost, particularly on the young children, they didn't understand the concept and couldn't follow it. I have seen speak choruses standing together or in two groups as they say their lines, and they have worked well. That may be a way of introducing a speak chorus to the little ones. The kindergarten could have been louder. We practiced loud voices speaking slowly, but speaking in front of an audience is a bit scary.

I liked it. It was a bit chaotic during the ceremony but I loved the intent and gathering of community.

I thought it was super cute!

Notes from Community Forum on Place Based Ed 3/13/19

Participants - Win Johnson, Linda Ley, Karen Giop, Adam Justice, Andrew Wood, Sarah Day, MaryKay Cronin, Martin Butler, Jean Chick

Reflections on Festival

- Promotion not enough - Front Porch Forum, Tom's Column
- At our faculty meeting everyone gave 5's on let's do it again.
- They loved cooking
- Honor our sugar makers
- Hold event closer to Sugaring Day in town.
- Daniel Katy - Local Poet
- Peter Money - Local Poet

Adam introduced new role

- How do ELF and Adam's role connect?
- How do we use this to distinguish the school
- School wide learning theme
- PB Ed is already happening

- Multi age classes
- It would be great if Adam could help teachers make the connections and communication with community experts
- How do we let the community know this is happening and how do we get the community into a building that's locked up

Not So Sweet

Climate Change Means Slow-Growing Sugar Maples, Study Finds



Sap buckets hang from a maple tree as draft horses Bill and Cote walk past in Alton, N.H. in 2016. (Jim Cole/AP)

Originally published on December 4, 2018 8:37 am

It may seem paradoxical, but sugar maple trees need snow to grow.

Each winter, a deep blanket of snow — 8 inches deep or more — covers about 65 percent of northeastern sugar maples. Without this insulating snow, the soil freezes deeper and longer, damaging the trees' shallow roots.

A [study](#) published last week in *Global Change Biology* warns that without the snowpack, maple trees are projected to grow about 40 percent slower. As climate change reduces the amount of deep snow in New England, the study says this spells trouble for the trees — and for humans — as the trees not only give us syrup, but also eat up a chunk of carbon pollution.

“If temperatures keep increasing and the snowpack keeps shrinking, it suggests that our maple forests are going to not grow as much and therefore not sequester as much carbon,” says [Pamela Templer](#), a biology professor at Boston University and senior author on the study.

Templer says as [forests](#) pull carbon dioxide out of the air and store it in trees, plants and soil, they can offset somewhere between 5 to 30 percent of U.S. carbon dioxide emissions.

Damage to maple tree growth, she says, also has more immediate economic consequences.

“Many people in the northeastern United States rely on sugar maple for a living,” Templer says, “and if these forests aren’t growing as much, it’s going to likely affect the livelihoods of the people who rely on this tree species.”

The researchers also found that the amount of northeastern forest with snowpack could shrink by 95 percent by the end of the century — from 33,000 square miles to just 2,000, under the worst-case emissions scenario. That’s dwindling from an area bigger than Maine to one that’s half the size of Connecticut. Even under a lower emissions scenario, the snowpack-covered area will still decline by 49 percent, to 16,500 square miles, says lead study author [Andrew Reinmann](#), a forest ecologist at the City University of New York.

“So if you like skiing, go now,” he says.

The research leading to the maple tree study began a decade ago. For five winters, from 2008 to 2012, Templer and her team shoveled away the first four weeks of winter snow from patches of forest in New Hampshire's Hubbard Brook Experimental Forest. This approximated the diminished New England snowfall expected by the end of the century. (They left the first few inches of snow in place, so they wouldn't accidentally shovel dirt later.) After four weeks of clearing, they allowed snow to accumulate naturally for the rest of the winter.

After five winters of shoveling, and a then a year off to see if the trees would bounce back, the researchers took core samples of the sugar maples and examined their growth rings. The sugar maples' growth slowed by about 40 percent after the first two years of the experiment. They did not recover in the year off.

Reinmann says it's unclear if the trees will return to their normal growth pattern after a few more years with normal snow, or if the damage is permanent.

"Whether or not this means that sugar maples will die or just lose a competitive edge is not quite clear," he says.

The researchers note that warmer winters may have some benefits, like lower heating bills and longer growing seasons. And, adds Templer, maple sugar production has been able to keep up with climate change so far.

"They can still extract sap and make delicious maple syrup," says Templer. "The concern is that over the long term, we might not have maple syrup simply because the conditions that are required for making [it] might disappear."

The History of Maple Syrup

Friday December 8th is Pretend to be a Time Traveler Day. This fun holiday asks that you dress up and stay in character as a time traveler for an entire day. The only rule is that you cannot tell anyone you are a time traveler. Sadly, no one at Maple Valley was able to prepare to celebrate this year.

However, the day inspired us to take a look at the history of maple syrup. After all, how can one pretend to be from another era without knowing more about it? No one knows exactly when maple sugaring began, but whatever era you choose to represent, we hope to provide you with a little more knowledge about our favorite food.

Legendary Origins

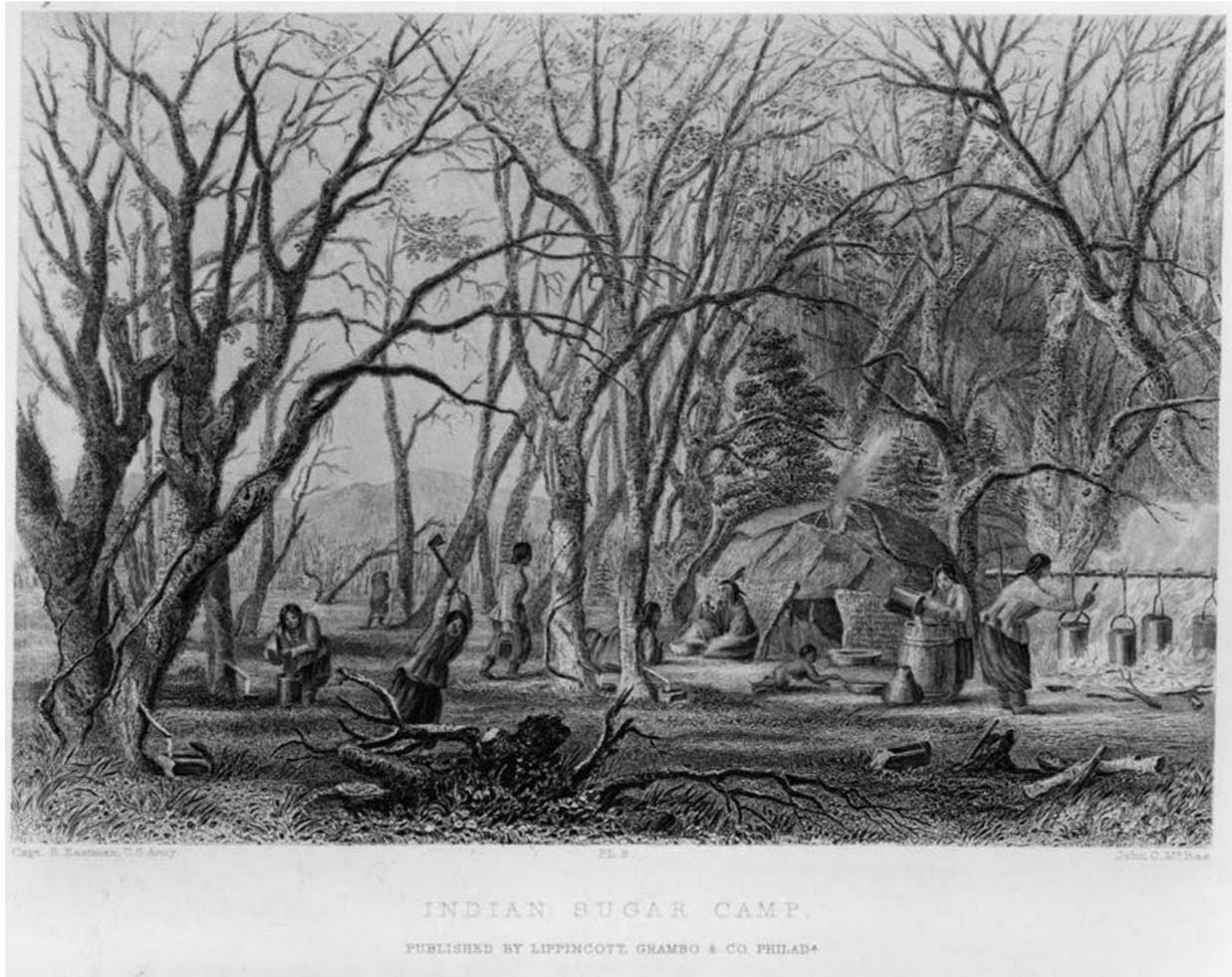


“Indian woman tapping maple sap”; Reed, Roland, 1864-1934, photographer; 1908; courtesy of Library of Congress

The origins of maple sugaring (the practice of making maple syrup from sap) are steeped in legend. Native Americans began the practice long before Europeans arrived in North America. However, no one knows what tribe first discovered it. There are multiple legends regarding its discovery.

One story states that Prince Glooskap found his people lazily drinking maple syrup right from the trees instead of working. As punishment, he added water to the syrup and made the sap only available in spring. Now, the people would have to boil down the sap instead of being lazy. Similarly, another story puts Kokomis, the son of the Earth

Mother, in the role of Prince Glooskap. A third story, from the Chippewa and Ottawa tribes of Michigan states that the god NenawBozhoo cast the spell. [1]



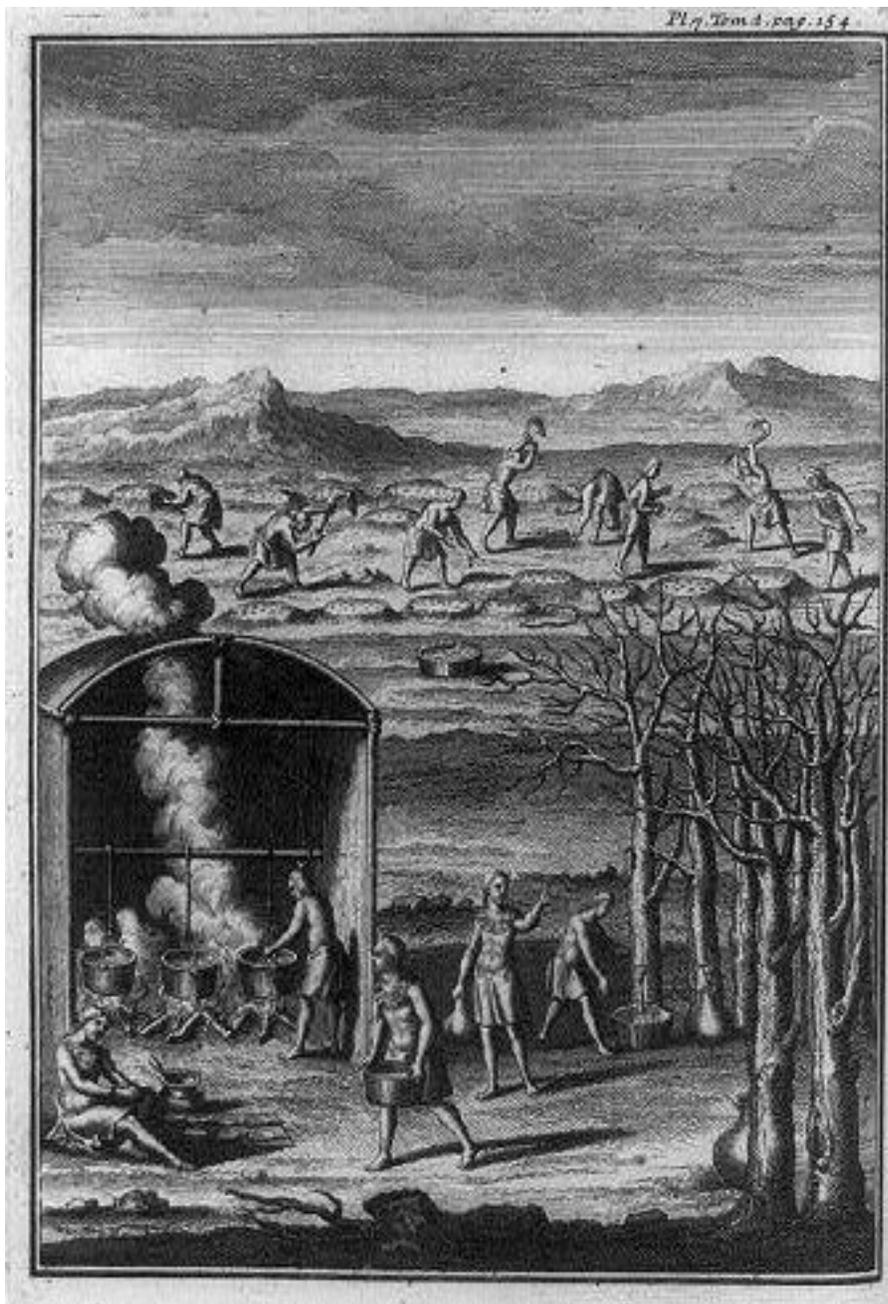
“Indian sugar camp / Capt. S. Eastman, U.S. Army” ; John C. McRae.; McRae, John C., engraver; 1853; courtesy of Library of Congress

A different legend, retold in The Atlantic Monthly’s April of 1896 issue, tells of a woman named Moqua. It states that she was cooking moose for her husband Woksis. When her boiling pot ran out of water, she refilled it with maple sap. The boiled down sap formed syrup in the pot. [1]

There is one other legend that tells of a chief who threw his tomahawk into a tree. The tree began to drip with sap. This sparked the idea for his wife to cook meat in the sap.

The final result was a delicious syrupy meal. It is said that this chief was the first to use the word *Sinzibuckwud* which means “drawn from trees”. Native Americans often used this word to refer to maple syrup. [1]

Early Methods



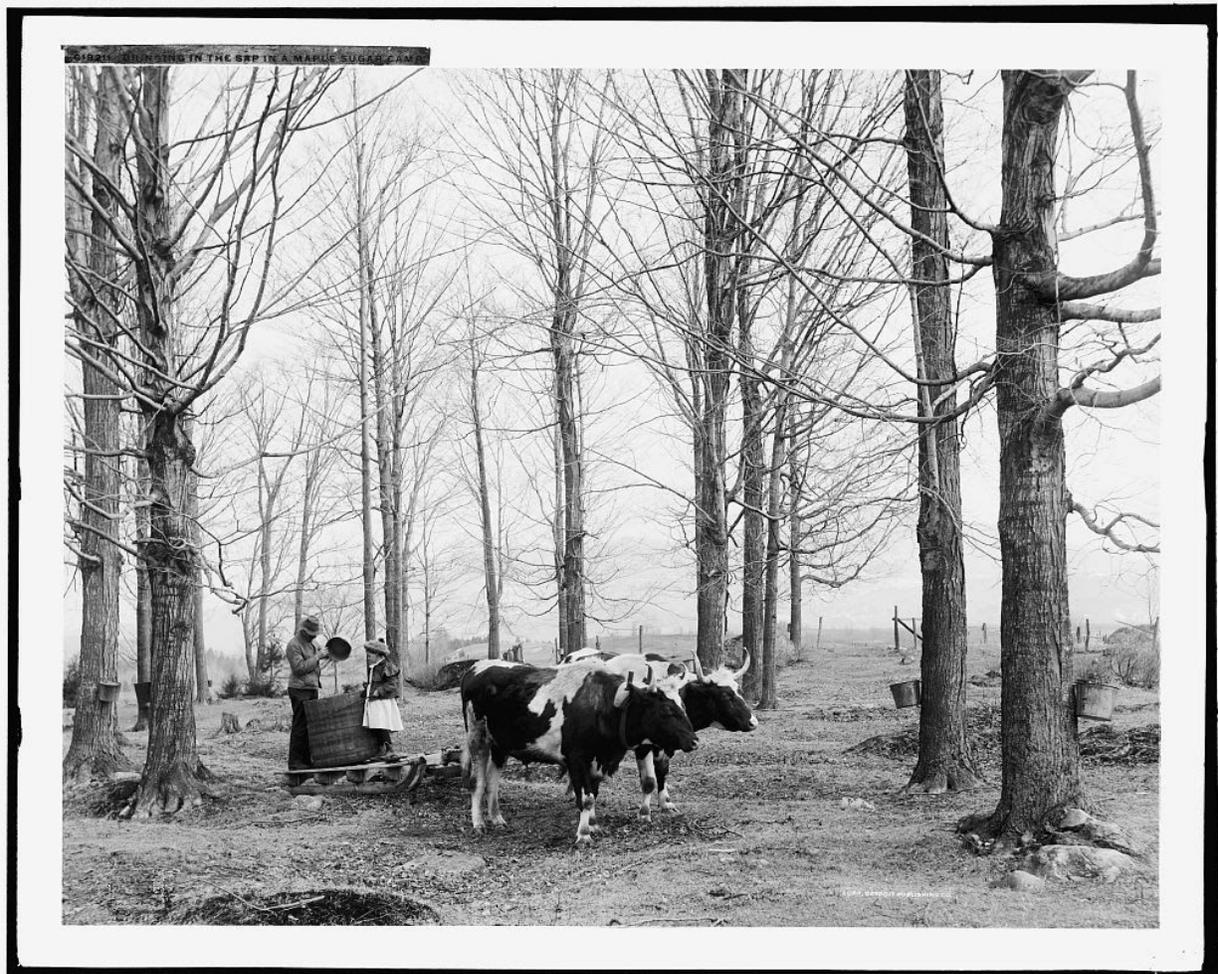
“Native Americans

collecting sap and cooking maple syrup in pots, tilling soil into raised humps, and sowing seeds, North America”; 1724; courtesy of Library of Congress

Early Native American methods of sap collection involved cutting a V shape into the bark of the maple tree and placing a wedge at the bottom of the cut. Sap would flow out of the wedge and into baskets that were placed at the base of the tree. Sometimes, Native Americans made these baskets of wood hollowed out with a hatchet. They used these year after year. Others were made of bark and were only used for one season. The sap was collected and slowly boiled until it became syrup. At this point, they would

allow it to cool and it would be kept in baskets. Generally, the gathering and boiling of sap was done by women in the tribe. [2]

Colonist Methods



“Bringing in the sap in a maple sugar camp”; Detroit Publishing Co.; between 1900 and 1906; courtesy of Library of Congress

When European colonists settled in the area, they learned how to tap maple trees from the indigenous people. However, instead of using a wedge to extract sap, they would drill holes in the trees using augers. They would then insert wooden spouts into the

holes and hang buckets from them to collect sap. Colonists made these buckets by hollowing segments of a tree to create a seamless container. [3]



“Making maple syrup in the good old fashioned way”; Detroit Publishing Co.; 1906; courtesy of Library of Congress

Draft animals were used to haul larger sap-filled containers to a central point (the sugar shack) where it was boiled down to make sugar & syrup. Maple sugar was much more

popular in those times due to the huge expense of importing non-native cane sugar from other locations. [3]

1800s and Beyond



“Gathering and processing maple syrup, ca. 1900”; 1900; courtesy of Library of Congress

The 1800s saw many innovations in sap boiling. Around the year 1850, large flat metal pans became available. The increased surface area proved to be much more efficient than the previously used iron kettles. In the late 1800s a two pan evaporator became

available which cut even more time from the process. Then, around 1900, the tin in the bottom of the pan was made to form flues which increased surface area even more. [3]



Because of the increased availability of cane sugar during the 1800s, producers switched their focus from maple sugar to maple syrup. Further technological innovations made it easier for them to produce larger quantities of this syrup. Soon, plastic bags

replaced the buckets that were hung from taps. Also, tractors began to replace the draft animals used to haul large quantities of sap from trees to the sugar shack. In addition, producers sometimes used motor-powered tappers and metal tubing systems to simplify the transfer of sap from trees to evaporator. There were also more fuel options available for heating; in addition to wood, oil, natural gas, propane, and steam were also available. Finally, filtration was also improved for a purer final product. [3]

The Modern Era



In the 1970s, technical advances gave producers even more options to streamline their process. For example, newly available vacuum pumps moved sap through the now popular plastic tubing systems that stretched from tree to sugar shack. In addition, producers started using reverse osmosis machines to remove water from the sap before

boiling occurred. Storage containers became larger and more effective. Finally, they created pre-heaters to reduce heat loss. [3]



Today, there are many options available to producers. Depending on which method they use, they are able to greatly increase production and efficiency in their production,

thus lowering cost for customers. However, at it's most basic level, the process has not changed much from the original method used by early Native Americans.

The Future

The immediate future of maple sugaring could bring more innovations as the process grows in popularity. [The Proctor Maple Research Center](#) at the University of Vermont has an entire staff dedicated to maple research and the advancement of the trade. For example, in 2016 [they published a study](#) done on collecting sap from saplings. This new method could make maple syrup production possible in small acreage without naturally occurring maple forests. If you could time travel in to the future, perhaps you would find this method to be the latest trend in maple sugaring.

As a long time lover of maple syrup, this was most interesting and educational. One of the things on my "bucket list" was to go to Vermont for a "sugaring off". With the modernization of the process, I am sure it won't be quite the same as when I first read about it as a kid growing up in Massachusetts.