



## Maple Syrup Making at North Park

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### HOW SWEET IT IS!

Have you ever tried making “sinzibukwud”? It is easy. All you need are a few simple tools, cold nights (below 32° F), and warm, sunny days (above 32° F), patience....oh yes, and a “sisibaskwatattik”. These are Algonquin and Cree words for maple sugar and maple tree. It is so easy, in fact, and such good fun, that among Native Americans who began the process, even the men took part in the making of maple syrup.

**OLD STORIES FROM THE NATIVE PEOPLE** tell that at one time maple trees gave pure maple syrup. The Native American God, Manabush, thinking this too easy for the good of his people, climbed all the maple trees and poured water into their trunks. This diluted the sweet elixir into its present form in which it takes from 30 to 50 gallons of sap to produce just one gallon of syrup.

**WOKSIS**, an Iroquois Chief, first tasted the sweetness of the maple tree through the ingenuity of his wife, Moqua. Early one cold morning in March, Woksis, about to go hunting, yanked his tomahawk out of the trunk of a maple tree. As the day grew warm, the gash dripped sap into a muk-kuk (birch bark container) that happened to stand close to the trunk. Later that day, Moqua, on her way to the river to get water for cooking the evening meal, came by the tree. Seeing the handy container of water, she decided to save a few steps. That evening, Woksis had a very pleasant surprise upon his return home. Sweet and delicious, the sap had cooked to syrup and had added a wonderful new flavour to the meat. Thus, says the story, maple sugaring began.

### HISTORY

The Native Americans had a unique method of boiling the sap. As they could not put their birch bark containers over the fire, they heated stones to almost a fiery red, then using wooden tongs, dropped them into the sap which was collected in wooden troughs. As the stones cooled, they were replaced with reheated ones, and the water in the sap eventually evaporated, leaving syrup. They would also cook it further to produce sugar, which could be stored longer and also be used as trade.

The early settlers quickly learned the process from the Native People and began making maple syrup and sugar using hand drills to tap the trees and large metal pots for boiling the sap over a fire. Farmers made the syrup, converted some to sugar for their own use, and sold or traded the excess to merchants for various necessities.

The process of maple sugaring steadily improved, and with the invention and use of the flat bottomed pan for boiling the sap, became a major North American industry in the mid 1800's. In the 1970's, the use of plastic tubing to carry sap from the trees to collecting tanks became the new standard for collection and reenergized the industry.

Today, over a million gallons of maple syrup are produced commercially each year. In the U.S.A., these are coming mainly from Vermont, New York, Maine, Wisconsin, Pennsylvania, New Hampshire, Michigan, and Ohio respectively. In Pennsylvania, Somerset County is the center of the maple sugar industry, but commercial and private producers can be found all over the state.

### IDENTIFYING TREES

During spring, summer and early fall, trees are easily identified by using the leaves as a guide. During the winter, when deciduous trees are bare, other methods must be used if you are unsure of the identity of the tree. Size and shape of the tree, texture and colour of the bark and twigs, and the branching system (twig and leaf arrangement) are some of the ways to identify trees without leaves. Maples are one of only 4 families of trees native to Pennsylvania that have an opposite branching system (leaves and branches that grow directly across from one another, in pairs). The others are: ash; dogwood; and horsechestnut (yellow and Ohio buckeye).

## IMPORTANCE OF MAPLE TREES

Many trees in North America produce sap which can be processed into edible syrup: maple; walnut; sugar pine; birch; hickory; sycamore; and, palm. But, traditionally and commercially, maples are the trees normally used.

Of the 150 or so *Acer* (maple) species worldwide, only 13 occur in North America which are native: Sugar (*Acer saccharum*); Black (*A. nigrum*); Red (*A. rubrum*); Silver (*A. saccharinum*); Boxelder (*A. negundo*); Mountain (*A. spicatum*); Striped (*A. pensylvanicum*); Bigleaf (*A. macrophyllum*); Chalk (*A. leucoderme*); Canyon (*A. grandidentatum*); Rocky Mountain (*A. glabrum*); Vine (*A. circinatum*); and Florida (*A. barbatum*). Seven are native to Pennsylvania: Sugar; Black; Red; Silver; Box Elder; Mountain; and Striped, with the more common species being sugar, black, red and silver. Sugar and black, having the highest percentage of sugar to sap (3% to 8%), and budding later than red or silver maples which also allows for a longer tapping season, are used commercially. Although, any species of maple tree of proper size and health may be utilized for home production.

Maple trees are frequently found on hills and slopes. Two of the most common, the red and silver, are typical of bottom lands and river margins. The sugar and mountain are characteristic of the cooler parts of the Northeast. In the Far West, the Rocky Mountain and vine are the common species. The only conspicuous member of the maple group in the prairies and in other semiarid regions is the boxelder. It is also extensively planted as a shade tree in the West.

Flowering late winter and early spring, maple seeds ripen in the spring, summer or fall depending on the particular species. They, as well as the twigs, leaves, bark, buds, and flowers, provide important resources for many kinds of animals. Squirrels and chipmunks eat the seeds, frequently storing them in caches after removing the hull and wing. Birds use the leaves and seed stalks commonly in nest building. Red maple saplings are favourite nesting sites for the prairie warbler. Rabbits, beaver and white-tailed deer (the Pennsylvania State Mammal) are fond of maple bark, especially in winter. The ruffed grouse (the PA State Bird) eats the buds. Other Pennsylvania species that utilize maples extensively for food include: bobwhite quail; wild turkey; purple finch; goldfinch; evening and rose-breasted grosbeak, red-breasted nuthatch; Carolina and black-capped chickadee; yellow-bellied sapsucker; black bear; porcupine; raccoon; white-footed and meadow mouse; and elk.

Maple trees are valuable commercially not just for maple syrup production. Because of grain, texture, durability and workability, the wood is highly prized in the crafting of: sports equipment; fine furniture; wood flooring; boxes; crates; veneers; toys; handles; woodenware; novelties; spools; bobbins; motor vehicle parts; and musical instruments. The wood is also highly sought for: building lumber; fuel as fire wood; making charcoal; pulpwood; and soap making. Pioneers made ink and cinnamon-brown and black dyes from a bark extract from red maples.

Native hard maples (black, sugar, red) are popular trees for home site planting because they are generally long lived (200 years +), have a lovely size and shape, create shade, are good wind breaks, increase property values and have beautiful fall foliage colouration.

Although maple trees are normally hardy, they are vulnerable to a variety of environmental factors that may affect their health. These factors include wild and domestic animals, insects, disease, fire, weather, and human activities. Maple trees may show decline when combinations of these factors occur or when stressed for several years, such as due to defoliation by insects, or drought. Acid rain, road salt contamination and other pollutants can lead to the loss of maples in certain areas.

## PARTS OF A TREE

- **The leaves** manufacture food (sugar) for the tree by combining water, carbon dioxide and sunlight through a process called photosynthesis.
- **The branches and trunk** give the tree its' shape. They hold the leaves up and out into the sunlight. Through specialized tissues, they transport water and minerals from the roots to the leaves, and food from the leaves to other parts of the tree.
- **The outer bark** insulates the tree from heat and cold, helps to keep out rain, and protects the tree against animal damage.

- **The inner bark (phloem)** carries food from the leaves to the rest of the tree. As it ages, it becomes part of the tree's bark.
- **The cambium** produces new phloem and sapwood tissues annually. These annual rings can be counted to determine the age of the tree and are studied by scientists to learn about past climate conditions and other environmental factors.
- **Young xylem** is called **sapwood**. Sapwood carries water and dissolved minerals from the roots to the leaves, and in winter, returns the extra sugar through the trunk to be stored in the roots.
- **Heartwood** is old, nonfunctioning sapwood and is the central supporting structure for the tree.
- **The roots** anchor the tree to the ground, absorb water and dissolved minerals from the soil, and store sugar in the form of starch during the winter.

### WHAT IS SAP?

Sap is the liquid in a tree. It has a pH between 4 and 8. Maple sap contains 1.5% to 3% solids (mostly sucrose, which varies between .5% to .8% total volume), various acids, minerals and salts. In winter, the sap transports and contains all the stored food energy necessary for early spring flower and leaf growth. Once the leaves open in the spring, they will begin producing food for the tree.

In late winter/early spring, daytime temperatures often rise above freezing and, with the help of solar heating, the sap flows up through the tree by capillary and chemical action to the developing flower and leaf buds. When the temperature drops at night, the sap returns down through the trunk into the roots and the sugar converts to starch to once again await a warm day to begin the flow. In Allegheny County, these fluctuating temperatures occur more consistently from mid-February through the end of March. At this time, it is said, that the sap is "running". This is the season to tap the maple trees and process the sap into syrup.

The sap will reduce in flow as the developing flowers and leaves utilize it for spring growth. Once the buds swell and begin to open, any sap collected and processed will have a bitter taste. The season has ended.

### EQUIPMENT

1. Measuring tape to measure tree circumference.
2. Drill, brace or auger with 3/8 or 5/16 inch wood bit to make tap hole.
3. Hammer to set nail to attach collecting container to tree.
4. 3 inch nail to hold sap collecting container on tree, one nail for each tap.
5. Spile (hollow tube with same exterior diameter as drill bit) – 3 to 5 inch long, wood, metal or plastic, one for each tap.
6. Sap collecting container for tree; metal or plastic (gallon plastic milk jug works great!), one for each tap.
7. Storage container for sap (straight sided 5 gallon bucket works best).
8. Large surface area pan for reducing sap (roasting pan works well).
9. Smaller pot for finishing syrup.
10. Candy thermometer to help determine when syrup is ready to take off heat.
11. Constant heat source for cooking sap.
12. Felt or cheesecloth for filtering hot syrup.
13. Storage container for finished syrup (canning jars or reuse old jars or bottles).
14. Pancakes and waffles!

### TAPPING TREES

Any healthy maple tree of minimum size can be tapped year after year if done properly. Measure around the tree at 52 inches above the ground (the standard forestry measurement called dbh = diameter at breast height), then, use these measurements as a guide to determine the number of taps (holes drilled) for the tree: 36 inches in circumference – 1 tap; 54 inches – 2 taps; 75 inches – 3 taps. You may drill at any level on the tree, but it is usually easiest between waist and shoulder height. If the tree has been tapped in previous years, locate your new drill site no closer than 6 inches horizontally and/or 2 feet vertically from the nearest old tap. Drill a 3/8 or 5/16 inch diameter hole, no more than 2 inches deep. Drill slightly upward into the trunk to prevent water from settling in the hole that may cause decay. If possible, choose an area over a large tap root or under a large branch, preferably on the sunny

side of the tree, sap generally flows best at these sites. Gently, but firmly, tap the spile into the hole so as not to split or damage the bark and inner layers. Attach the collecting container to the spile. A nail placed above the spile may be needed to support the collecting container if the spile cannot.

Be sure to remove all spiles and nails from the tree at the end of the season, usually early April. Tap holes will close over with scar tissue in 2 to 3 years in healthy trees. Allow the tree to heal the wound on its own, do not plug hole or paint with tar as this will delay the healing process and may allow for decay.

### **COLLECTING AND STORING THE SAP**

Every day throughout the season each tap should be checked and the sap collected. As the sap may not flow daily, due to the air temperature being too warm or too cold, it may be necessary to store the sap in a cold place (refrigerate or freeze) to prevent spoilage until sufficient amounts (about 5 gallons) are collected for the cooking process. On warm, sunny days each tap may produce up to 3 gallons of sap. Ideal sap flow temperatures would be 40° in the day and 20° at night. Approximately 30 to 50 gallons of sap are needed to make one gallon of finished syrup, depending upon the species of maple tree used. During the average season each tap may produce about 1 quart of finished syrup. Initially, you can reduce your cooking volume by concentrating the raw sap: freeze stored sap in straight sided containers (cover and leave outside overnight), in the morning remove and discard the top frozen water layer. This is due to the water being less dense (lighter) and freezing before the sugar in the solution. You may repeat this process two or three times, but this concentrated solution will still need to be heat processed in order to create the characteristic amber colour, maple flavour and thickness. You are now ready to cook your sap.

### **COOKING THE SAP**

You cannot make maple syrup using a microwave. You must use a heat source, such as a wood fire, or an electric or gas cooktop. Place sap in cooking pan, place on heat source and bring to a rolling boil. The larger the surface area of your pan, and the higher and more constant your heat source, the faster your sap will cook, and the higher quality your finished syrup will be. As the sap reduces (water evaporates from the solution) in the pan it may be necessary to remove it and place into a smaller pot to continue cooking. If cooking inside, keep in mind that the large volume of evaporated water may peel wallpaper or paint from walls. Use plenty of ventilation to avoid this from occurring. The syrup is ready to be finished when it reaches a boiling temperature of 7° F above the boiling temperature of water. As this boiling temperature varies with elevation and barometric pressure, it can be figured out by bringing a small pan of water to a boil. Using a candy thermometer, find the temperature of the boiling water and then add 7°. This is the temperature at which your syrup will be done. Also, at this point of completion, the bubbling mass has a tendency to rise quickly and spill out. Have some cream or butter handy, and should the boiling syrup begin to bubble uncontrollably, flick the tiniest bit into the seething pan and, as if by magic, it will subside. Boiling sap should never be left unattended.

### **FINISHING THE SYRUP**

When the syrup reaches the boiling point (approx. 219° F), remove from heat and finish it off by pouring through the filter while hot to remove the harmless grainy particles, called niter, that were created during the heating process. Cool and place in storage containers or preserve by using standard canning methods. Uncanned and opened maple syrup containers should be kept refrigerated. ENJOY!

#### **Tips for high quality syrup:**

1. Collect and save enough sap to cook down all at one time, usually at least 5 gallons. Five gallons of sap will make about 1 pint of syrup.
2. Although sap is a sterile solution in the tree, once collected, you should store your raw sap away from sunlight, and keep refrigerated or frozen until ready to cook, as it will degrade and spoil with age. Raw sap will keep in the refrigerator for up to a week. The fresher the sap, the higher quality the finished product will be.
3. Cook sap in batches. Once you have started cooking a batch, do not add any more raw sap to it during the cooking process.
4. If you must stop cooking a batch to resume at another time, refrigerate or freeze until ready to continue.

5. Never leave boiling sap unattended, especially as it nears completion. If left on a heat source too long, the syrup will scorch and pan may catch on fire.
6. To make it easier to filter your finished syrup, wet your filter material in warm sap first, then strain your syrup while hot.

### MAPLE SYRUP GRADES AND COMPOSITION

Grading standards are based primarily on colour, but must also meet set Federal (United States Department of Agriculture) and State standards of density, clarity and flavour.

In 2015, the USDA established a new national standard for the U.S.A.; maple syrup is now classified into 2 grades: Grade A and Processing Grade. Grade A is generally sold to the public in stores or at roadside stands and is divided into 4 colours: Golden (Fancy); Amber; Dark, and Very Dark. Grade A Golden is made from the early season sap run; lighter, more delicate in flavour and more expensive than the darker colours. Very Dark, now more available directly to consumers, would have been previously listed as Grade B and not generally sold to the public, but to be used in commercial food processing. The Processing Grade syrup is generally not sold to the public but is also used for commercial food manufacturing and would have been classified as Commercial Grade under the old standards.

U.S.D.A. standards require that all grades of maple syrup be 66 - 68.9% maple sugar, with a weight of 11 pounds per gallon.

Maple syrup is more expensive than corn syrup pancake syrup due to the high expenditures in the collecting and reducing processes. It is a high manpower/energy production that cannot be simplified or mechanized much further to reduce costs.

### MAPLE SYRUP COMPARISONS

**Comparisons**, per tablespoon (15 ml), of: maple syrup; table sugar (sugar cane); honey; and pancake syrup (primarily corn syrup).

	MAPLE SYRUP	TABLE SUGAR	HONEY	PANCAKE SYRUP
Kcalories	50	110	50	100
Carbohydrates gm	13.4	28.5	19.7	13
Calcium mg	13.4	0.3	1.5	0
Iron mg	0.25	0	0	0
Sodium mg	.60	0.3	1.5	75
Phosphorus mg	.40	0.6	1.0	0
Potassium mg	50	0.5	13.0	0
Manganese mg	.66	0	0	0
Zinc mg	.83	0	0	0
Magnesium mg	3	0	0	0
Choline	.31	0	0	0
Riboflavin mcg	.90	0	0	0
Niacin mcg	4.14	0	0	0
Selenium mcg	.12	0	0	0
Chromium mcg	.49	0	0	0
Pantothenic Acid mcg	9	0	0	0
Glycemic Index	54	68	50	75

Maple syrup also contains amino acids, antioxidants, Folic Acid, Thiamin (B1), Biotin, Pyridoxine (B6), and Vitamin A.

**MAPLE SYRUP IS GREAT!**

When considering nutritional values and caloric content, for you and your family, there is no doubt that maple syrup is the superior choice when up against any brand of pancake syrup. Maple syrup is a natural food, a natural sugar, with absolutely no preservatives, nor additives of flavouring or colouring.

Maple syrup is also great when cooking or baking. Check out the hundreds of recipes that are available in books and on the internet. Use maple syrup in a new recipe each week!

Nice recipes: <https://vermontmaple.org/recipes/>

There are many maple syrup resources available through state extension offices, libraries, bookstores, and the internet. In addition, there are many great children's books that have maple syrup as part of their subject.

Great information on the internet:

[www.massmaple.org](http://www.massmaple.org)                      [www.pamapleassociation.com](http://www.pamapleassociation.com)

[www.pamaplefestival.com](http://www.pamaplefestival.com)              [www.extension.psu.edu](http://www.extension.psu.edu)

**Making maple syrup is a great family activity. We hope you give it a try!**

**Plant a tree this spring or fall and discover for yourself the wonders, beauty and joy of nature!**

Original text by Joe Grom 1970, revised 2010/2014/2017/2018/2019/2020 by Meg Scanlon