How is maple syrup made?

Where does maple syrup come from? Yes, maple trees, specifically the sap in maple trees. Sap flow is the mechanism by which trees transport water and nutrients from their roots to their buds and other tissue. In maples, this flow is triggered in late winter when temperatures fluctuate below and above freezing. This causes expansion and contraction of gases which draws sugar-rich sap into the wood, forcing it up toward the branches and buds. When a small hole is made, some of the pressurized sap escapes out.

The sugar content of sap ranges from 1% to 4%, here at Hopkins Forest we average about 2.5%. This sugar content makes sap taste a little sweet and eventually gives maple syrup its delicious flavor!!

In order to find the sap we have to “tap” a tree. We can do this by drilling a hole in the tree and putting a “spile” into the tree. What do you think a “spile” is? Then you can hang a bucket on the spile to collect the sap! (see image to the right)

So now, how do we go from sap to maple syrup? We boil it! Boiling sap makes the water evaporate leaving behind the sugar and other solids. This increases the proportion of sugar making it taste sweeter. Take a guess: what percentage of sugar is in maple syrup? 66%! How many gallons of sap are needed to make 1 gallon of syrup? ~35 gallons of sap!

At Hopkins Forest, we use an evaporator to boil down the sap to maple syrup. What do you notice about the evaporator? Pictured here is the continuous evaporator at Hopkins Forest, which has multiple chambers. These chambers allow the syrup to gradually get denser as it moves from the sap intake at the flue pan to the syrup outtake at the in the front (syrup) pan. This means that as the water gets boiled off, the sap gets heavier, flowing down toward the front (syrup) pan. Can you tell which end is the flue pan and which is the front pan? (Hint-look for a clear tube on end and a spigot at the other).

How do you know when the maple syrup is ready?
There are three main techniques for this: density, temperature elevation, or sheeting.
Density-use a hydrometer (based on buoyancy) to determine the density of the syrup
Temperature Elevation-Syrup boils at 7 degrees (Fahrenheit) higher than water, if the boiling temperature of water is 212 degrees Fahrenheit, what is the boiling point of syrup?
Sheeting-dip a spoon into the maple syrup, hold it up and if the drips cling together and drip off in sheets, it’s ready!

Enjoy some maple syrup by making it in your own backyard or purchasing some Hopkins Forest Maple Syrup from the Rosenburg Center or from the Class of ‘66 Environmental Center on Williams College campus.

Homemade Maple Syrup Activity

Materials-
-drill with a 5/16 or 7/16 bit
-a spile or a short piece of PVC pipe or a hollowed out stick with a pithy core, diameter size of drill bit
-hammer
-hook to hang the bucket
-bucket
-bucket lid or something to cover the bucket
-large pot, preferably with a flat bottom
-spoon
-stove

Instructions-
1-Identify a sugar maple tree in your yard. Below are some resources suggestions to help you identify a sugar maple. The best time to tap a tree is between mid-February and mid-March as sap flows when temperatures reach over 32°F.

2-Locate a smooth part of the tree about 3-4 feet off the ground and drill a hole the size of your spile. Some spiles require either a 5/16 or 7/16 bit. Drill the hole 2" to 2.5" deep, clear any wood shavings from the hole and tap the spile into the hole, hang the bucket on the spile and cover.

3-Once the bucket is nearly full (because it will require a lot of sap!), pour the sap into a large pot and place over medium heat. Check the pot frequently and stir occasionally to make sure the sap doesn't burn; this is especially important as it approaches syrup thickness. Test to see if the syrup is ready, by either using a candy thermometer and waiting until the temperature reaches 219°F dipping a spoon into the syrup and holding it up to let the syrup drip off. If the drips cling together and fall off in sheets, it's ready! If the drips fall independently, it needs more time. Below is a video that demonstrates the sheeting technique.

Optional step-filter the hot syrup by pouring it through a fine cheesecloth.
4-When it has reached syrup consistency, enjoy now or save for later!

How to identify a sugar maple in the winter-
https://ferrinbrookfarm.wordpress.com/2016/02/12/identifying-maple-trees-in-winter-to-tap-for-maple-syrup-2/

Sheeting Technique
https://www.youtube.com/watch?v=f6oMQn_PtZc

More detailed instructions-
https://tapmytrees.com/tap-tree/

https://tapmytrees.com/collect-sap-make-syrup/