

# Sugar *From* Trees

*For hundreds of years, people have*

*been making syrup*



*from the sap*

*of maple trees. If you have a tree in the*

*maple family*



*in your yard, you can*

*make syrup for your pancakes too!*



Sap, a liquid that carries sugar and other nutrients through the inside of trees, is boiled to make syrup. Boiling evaporates excess water and concentrates the sugar into thick, sweet syrup.

IT'S A LATE-WINTER afternoon in a maple forest. The sun has been shining all day, and the snow looks sparkly blue in the shadows. A few chickadees make their rasping song. A deer noses in the brush for a meal. A crow calls from a treetop. If you listen carefully, you might hear a *plink! plink!* sound nearby. That's the sound of sap, dripping from a maple tree into a bucket.

Suddenly, the deer stops browsing and looks up. Footsteps crunch through the snow in the woods. A man stops by a bucket hanging on a nail in the tree trunk. He pours what looks like water from the bucket into a

larger bucket on his sled, then replaces the bucket and moves on. He is collecting sap to make maple syrup.

This scene has played in our state for centuries, by people ranging from the Ojibwe, Cree, and Dakota Indians, to pioneers, who learned the craft from the Indians, to family-run businesses that produce maple syrup we can buy in stores today.

Read on to learn more about working in a *sugar bush*—as maple woods are sometimes called—and to find out how to make maple syrup from trees in your yard.

LEFT PAGE: MAPLE SYRUP JAR, DEBORAH ROSE, DNR; TREE SILHOUETTE, AMY BEYER;  
RIGHT PAGE: DEBORAH ROSE, DNR

*By Teresa Marrone*

Young  
Naturalists

## First Sugar Bushes

Hundreds of years ago, American Indians used natural signs, not thermometers, to tell them when it was time to start making syrup. For example, when the crows and eagles started to return to Minnesota from their winter grounds, the Ojibwe Indians knew that the sap would soon start flowing, so they moved their camps to the sugar bush. They cut wedges in the trees, then used hollowed-out sumac stems, or carved pieces of cedar, to funnel

the dripping sap into a container, typically made of birch bark.

Then they collected the sap in a hollowed-out log or a birch-bark container. They cooked the sap in a clay pot or birch-bark container. Some historical accounts say they pulled red-hot rocks from a fire and dropped them into a container to heat the sap. When enough water had boiled away, the sap was sweet and thick and ready to use as syrup.

Often, Indians continued boiling the syrup until so much of the liquid had evaporated that the mixture became grainy and solid after it cooled. This maple sugar was popular because it was easy to store and transport. Indians, and later European settlers, used maple sugar throughout the year to sweeten berries, to season meats and other foods, and to enjoy as a candy. With the addition of water, the sugar could become syrup again.

## Early Maple Trade

Maple syrup and sugar were among the first foods exported from the United States. European explorers who visited New England in the 1600s brought back reports of the native people collecting sap and cooking it to make maple syrup and sugar. Soon, fur traders and other Europeans were trading cloth, metal pots, and other goods for maple products. Indians used their new metal

pots to boil sap over a fire.

Colonists relied on maple sugar because it cost less than the cane sugar imported from the West Indies, which was heavily taxed. Later, sugar plantations in the southern states also provided cane sugar. Quakers and other abolitionists advocated producing and using maple sugar as a replacement for cane sugar produced by slaves.

MINNESOTA HISTORICAL SOCIETY



Near Mille Lacs Lake in 1925, two Ojibwe women fill birch-bark containers with maple syrup and sugar. Long before Europeans arrived in North America, American Indians used tree sap to make syrup and sugar.





## What's Sap?

Have you ever been close to a freshly cut tree? The wood is damp and has a sweet smell. This is because the wood is filled with *sap*, a fluid that flows through the trunk and into the branches. Sap carries sugar and other nutrients to the buds, nourishing them so they develop into leaves and flowers. In the fall, after the leaves drop, the sugar is stored in the wood over the winter.

Most plants in Minnesota stop growing and become *dormant* in winter. In late winter, as the sun becomes warmer, the trees begin to awaken. They draw water from the ground, pulling it up toward the branches. As water travels through the wood, it picks up stored sugar and other nutrients, carrying them to the buds.



On warm days, sap flows out of holes in the tree.

AMY BEYER, DNR

## Pumping Sap

If you've ever opened up a bottle of juice that's been sitting in the sun, you probably noticed a rush of air coming out of the bottle as the pressure was released. In late winter, pressure in maple trees causes sap to flow out of any hole in the wood, or even to drip from a broken branch. When temperatures drop below freezing at night, the pressure changes to suction and the trees suck moisture from the ground. This moisture replenishes the sap. As the sun rises and warms the trees, pressure builds and sap flows again. This cycle of pressure and suction makes the tree act like a pump, drawing up moisture and then releasing it.

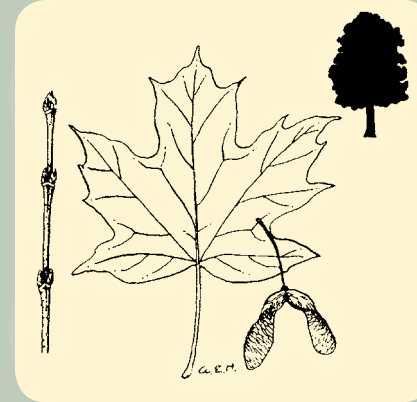
## Which Trees Are Sweet?

All living trees have sap. Have you ever touched a pine tree and gotten sticky, gooey stuff on your hands? That's pine sap. It's much thicker than maple sap and has a strong pine smell. You probably wouldn't want to put pine

sap on pancakes. The sap of maple trees is much thinner and has no smell. Maple sap looks clear like water. If you sample it, it will taste slightly sweet.

The very best syrup is made from maple sap. Minnesota has four pre-

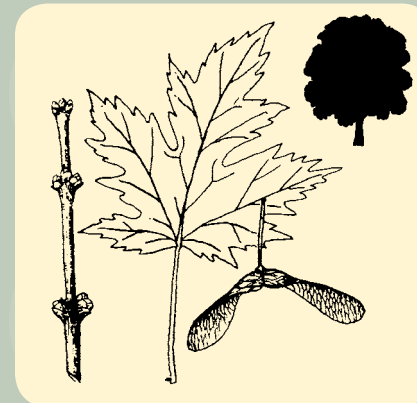
dominant native maples that grow large enough to tap for syrup: red, sugar, and silver maples and boxelder. Sap from all of them makes sweet syrup; but the sugar maple is the favorite for syrup makers, because its sap is sweetest.



*Sugar Maple*



*Red Maple*



*Silver Maple*



*Boxelder*

LEAVES: UNIVERSITY OF MINNESOTA EXTENSION SERVICE; TREE SILHOUETTES: AMY BEYER



Plastic jugs, metal buckets, and specially designed bags like these can be used to collect sap for making syrup.

## Catch the Sap Run

Tree sap flows from late winter through late fall. To make tasty syrup, people have learned that they must catch maple sap when it first begins to run. They go to the sugar bush to collect sap when temperatures rise above freezing during the day but fall

below freezing at night. In southern Minnesota the sap usually begins to flow in early to mid-March. In northern Minnesota, where winter lasts longer, syrup makers usually have to wait until late March or early April.

Once the weather stays

above freezing at night and buds appear on the trees, syrup made from the sap won't taste very good any more. The sap no longer drips freely because the tree is no longer acting like a pump. The syrup season soon ends—sometimes after just a few weeks.

## Sugar Bush Basics

Here's how maple syrup is made today by small-scale producers and home syrup makers.

**Tap the tree.** First, someone drills a hole—not too big or too deep—into the tree trunk. Then the tree tapper pounds a short, hollow tube, called a *spile*, into the hole and hangs a jug or bucket from the spile or from a nail just above it. Maple sap drips through the spile into the jug. A large tree can produce several gallons of sap per day when the weather is right—that's a lot of drips!

**Turn sap into syrup.** The syrup maker collects the watery sap and puts it over a fire to boil. As the water boils away, the remaining liquid becomes sweeter as the sugar becomes more concentrated.

Finished maple syrup boils at 7 degrees Fahrenheit above the boiling temperature of water (typically 212 degrees). The syrup maker watches the temperature of the liquid. When it reaches 219 degrees, it's done.

How much water has to evaporate? A lot! It usually takes 40 gallons of sap to make a gallon of syrup.

TERESA MARRONE

## Make Your Own Syrup

If you have a good-sized maple tree in your yard, you can make maple syrup. Find a tree at least 10 inches in diameter (about 32 inches around). Tapping smaller trees might injure them.

Now find an adult to



be your partner. You'll be working with a large quantity of boiling liquid, so you need help from an adult. While cooking the sap, be very careful around the fire and make sure not to spill any of the hot sap on yourself.

### 1. Collect Your Tapping Tools

For your first syrup-making experience, start with just one or two taps. (Once you learn how to make syrup, you can put out more.)

#### One or two spiles

4-inch pieces of plastic or copper pipe (Buy ½-inch PVC water-supply pipe at a hardware store, cut it into pieces, and use a file to smooth the rough edges. Some hardware stores will cut pipe to length for you.)

TREE TRUNK AND MAPLE SYRUP JAR, DEBORAH ROSE



### Spiles of Many Styles

Many different kinds of tools can be used to collect sap for making syrup. Once a hole is drilled into a tree, a spile directs sap into a container. The blue plastic spile (bottom left) funnels sap through a hose and into a bag. The metal and plastic spiles (top) are designed to hold a bucket on the hook beneath them. Another style of metal spile (center) collects sap in a bag or other container slid onto it.





### **One or two 1-gallon plastic jugs**

Wash milk or water jugs. Near the handle at the top, cut a hole just big enough for a spile to fit snugly.

**Nails and stiff wire** for hanging the jugs from the trees. Be sure to remove nails and wire at the end of each season.



**Drill** (electric or hand powered) with a 5/8-inch spade bit.



**Wooden mallet** You can use a regular hammer, but be sure to put a piece of wood over the end of the spile before pounding, so you don't damage it.

**Large bucket** (opposite page) or camping water jug for collecting sap from the jugs.

## **2. Tap Trees**

Holding the drill at a slight upward angle, make a hole about 2 inches deep. The spile can be placed at any height, but if the tree will be tapped again in following years, succeeding taps should spiral upward from previous taps. With a wooden mallet, tap a spile into the hole until it is snug. If it is loose, take it out and wrap a little duct tape around one end, then tap it back in.

Fit the jug's side hole over the spile, then loop a wire around the jug handle. Pound a nail into the tree above the spile, and hang the wire over the nail to hold the jug.



LAKE MARIA STATE PARK BY DEBORAH ROSE, DNR

## **3. Collect Sap**

At first you might not get much sap. That's okay. Collect the sap each day, pour it into another clean jug or bucket, and store it in a cold place until you have three to four gallons. Be sure to keep the sap cold, because it could turn sour if it gets too warm. When the sap is really flowing, you might get four gallons each day from a single tree, so check the jugs often.



#### 4. Set Up Your Outdoor Kitchen

When you have three to four gallons of sap, you're ready to begin boiling it. You and your adult partner should do this outside, because you'll be cooking off a lot of water and you don't want all that sticky steam inside the house!

##### Here's what you'll need:

- \* Fire pit, electric hot plate, or

propane burner (turkey fryer)

- \* Big cooking pot, such as a 4-gallon pot used to make soup

- \* Large strainer or colander

- \* Clean, cotton fabric, such as an old clean pillowcase (about 1 square yard)

- \* Heavy 1-gallon pot

- \* Large metal spatula or spoon

- \* Clean canning jars and lids.



Because sap is mostly water, making one gallon of syrup typically requires about 40 gallons of sap.

#### 5. Boil It Down

Cook three to four gallons of sap in the big cooking pot down to about two quarts. This takes a long time (usually three to six hours), so make sure you have enough fuel. Have your partner remove the pot from the heat and strain the boiled sap through a strainer lined with clean, cotton fabric into the heavy 1-gallon pot.

PHOTOGRAPHS BY TERESA MARRONE



Syrup makers may use a candy thermometer to measure the boiling point of pure water, which varies with daily atmospheric pressure. The boiling point of syrup (left) is 7 degrees higher than water's boiling point. When finished, syrup should be thick enough to slide off a spatula (right) in a small sheet.

#### 6. Finish Cooking Indoors

Continue boiling your partially cooked sap on the kitchen stove. When the sap has cooked down to about two cups, it's nearly ready. Keep boiling, but watch it carefully so it doesn't boil over. If the sap boils up and starts rising, the adult partner should quickly move it off the burner and slightly reduce the heat before putting the pot back on.

When small bubbles cover the surface and begin to foam, carefully dip a cool metal spatula or large spoon into the syrup and hold it over a plate and watch it drip. The syrup will drip off quickly at first, but the last bit should slide off in a small sheet—this is called *aproning*. If your syrup doesn't apron, keep cooking and test it again in a few minutes.

Have your adult partner pour the hot syrup into a clean canning jar, and cover it with a clean lid. When the jar

is cool, store it in the refrigerator.

Your syrup might form some fine particles called *sugar sand* in the bottom of the jar after a few days. Just pour off the clear syrup into a different jar, leaving the sugar sand behind. Enjoy your pure maple syrup on pancakes or oatmeal or ice cream! 🍷

#### Sweet Days in State Parks

Many state parks offer syrup-making events in March. To learn more, go to [www.mndnr.gov/state\\_parks](http://www.mndnr.gov/state_parks).

#### A NOTE TO TEACHERS

Find links to teachers guides, information on the new book *Trees and Shrubs of Minnesota*, and a primer on Minnesota's forests and trees at [www.mndnr.gov/young\\_naturalists](http://www.mndnr.gov/young_naturalists).