

MAPLE SYRUP

SPRING

S & S
(Saps & Syrups)



LIFE FORM
Tree

PART USED
Sap

SCIENTIFIC NAME
Acer saccharum (sugar),
Acer saccharinum (silver),
Acer rubrum (red) ,
Acer negundo (box elder)

COMMON
Maple syrup

OJIBWE
Ziivaagamizigan

SPANISH
Jarabe de arce

Above: Sugar bush, family style. Below left: Unfiltered and filtered syrup. Below right: Boiling maple syrup in the traditional kettle. Photos by D. Wilsey.



UNIVERSITY OF MINNESOTA
EXTENSION

HARVESTER HANDBOOK

Key Characteristics

PRODUCT

- Maple syrup is produced in four Canadian provinces and 14 northern U.S. states, with the largest U.S. producers being Vermont, New York, Maine, Wisconsin and Pennsylvania.
- Maple sap is used to produce syrup, cream and sugar.

HARVEST

- Harvest maple sap when the night temperatures are below freezing and the day temperatures are above freezing.
- Sap harvest ends when leaf buds emerge and open.

SOCIO-ECONOMIC

- It is generally agreed that Minnesota's maple resource is an untapped commercial resource.

REGULATORY

- Permits are required to tap maple on public lands.

Crown: The part of a tree bearing the live branches and/or foliage; often referred to as the top of the tree.

Location

DISTRIBUTION

Maple syrup is produced in 14 northern U.S. states and four Canadian provinces, with Quebec producing approximately 70 percent of all maple syrup in the world. In the United States, Vermont, New York, Maine, Wisconsin and Pennsylvania produce the most maple syrup. It is generally agreed that Minnesota's maple resource is an 'untapped' resource.

HABITAT

Sugar maple is a common tree throughout the forested regions of Minnesota, except in the extreme western counties. It is most abundant in the eastern and northern portions of the state. On better soils, sugar maple will reach heights of 60 to 100 feet, with trunk diameters in excess of three feet.

When sugar maple is growing in a dense forest, it develops a clean or limb-free trunk. If it grows in the open, allowing branches and tree crowns to receive sunlight, it will form a dense, round-topped crown, which is a very desirable tree for sap production.

Identification

DESCRIPTION

There are at least 100 species of maple in the world. Four species of maple found in Minnesota can be used for sap production. With a sugar content of 2 percent, sugar maple or hard maple (*Acer saccharum*) are generally preferred by commercial producers as they produce the sweetest sap. Because sap from other maple species is usually lower in sugar content, it takes approximately twice as much sap to yield the same amount of finished syrup.

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Above: Direct sap consumption. Photo by D. Wilsey.

If processed carefully, syrup from any of the maples described will have good flavor, including sap gathered from red maple (*Acer rubrum*), silver maple (*Acer saccharinum*), and box elder (*Acer negundo*).

Yard trees, street trees and open-grown trees in pastures or woodlands can be used for maple sap production. Maples are easy to identify because of their opposite branching leaf shape and unique fruit, called samaras.

The four maples have leaves of similar shape - a single leaf blade with the characteristic maple shape. The leaves, buds and twigs of all maple species are arranged in pairs opposite each other along the branches. All four produce samaras.

CAUTION (LOOK-ALIKES)

There are ornamental maples, such as the Norway maple and the Schwedler maple,

that have a milky sap and generally cannot be used for syrup production.

Uses

GENERAL

Maple syrup is the primary product created from maple sap. Maple syrup may be converted into other products, including maple candy, maple cream (also referred to as maple butter or maple spread) and maple fudge. Basically, these are produced by concentrating finished syrup to a greater density and stirring the highly concentrated syrup. There is also some interest in using pure maple sap as a natural beverage.

SOCIO-CULTURAL

Maple sugar stands were an important component of the Ojibwe seasonal migration and remain a culturally significant food crop for these communities.

ECONOMIC

Established markets exist for maple syrup, maple cream, maple candy and other confections prepared with maple sweeteners, such as coated nuts. It is believed that supply falls well short of demand.

Harvest

WHEN TO HARVEST

To obtain the earliest runs of sap, tapping should be completed by mid-February in central and southern Minnesota, and by the second week in March in the northern part of the state. One longtime maple tapper says that when the crows return to his sugar bush, he knows that his maple are running.

Sap does not flow from maple trees every day throughout the tapping season. It flows on days when a rapid warming trend in early to midmorning follows a night when the temperature has gone below freezing. Thus, the amount of sap produced varies from day

Opposite branching:

Refers to growth habit of leaves and branches on a tree when they occur directly across from one another. This is in contrast to 'alternate' branching.

Samaras: A fruit type characterized by a seed encased by a papery wing, which enables the seed to disperse from the source more broadly.

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DBH: Diameter at breast height. A common forestry term measuring the diameter of a tree at four feet above ground.

Bole: The trunk of a tree.

Spile: A small peg used to draw sap from the tree. Historically spiles were notched wood but today they tend to be made from hollow metal or plastic.



*Maple "cookie" - a cross section of a tree that has been tapped numerous times.
Photo by D. Wilsey.*

to day. Normally, a single tap hole produces from one quart to one gallon of sap per flow period, with a seasonal accumulation of 10 to 12 gallons. Sap runs for a few hours to a day or more.

A tree suitable for tapping must have a trunk diameter no smaller than 10 inches measured at four feet above ground level. This measurement is known as "**DBH**" or diameter at breast height. Use of one tap is typical and recent studies suggest that no more than two taps should be placed in any tree greater than 20 inches in diameter. For the best sap production, a tree should have a short **bole** topped with abundant foliage.

HOW TO HARVEST

Maple sap is harvested by tapping the trunk of mature maple trees and collecting the sap in containers. Harvest technique has developed from the use of wooden spiles, often

carved from sumac, and birch bark buckets to use of metal and, more recently, plastic spiles and food-grade plastic buckets and bags. Commercial operations sometimes employ vacuum tubing that allows for more efficient collection at a central location. Taps are set by drilling holes in the tree to reach the sapwood. New taps must be set each collection season as the wounds heal.

Handling

STORAGE, PREPARATIONS AND PROCESSING

Sap is perishable and should be collected and boiled down as soon as possible to produce high quality syrup. When this is not possible, sap should be collected at least every two to three days. When temperatures are low and storage conditions are favorable, sap may be kept one to two days with minimal reduction in quality. If sap is allowed to become warm before boiling, a



Above: Sap frozen in the early morning before the thaw. Photo by J. Peterson.

darker, off-flavor syrup of poor quality may result.

TOOLS

Maple syrup can be produced with minimal equipment. A few standard items, such as those listed below, will increase efficiency of the operation and quality of the product:

- Drill with 5/16" bit.
- Collection spouts (5/16" tree saver spiles, taps) for each tap hole.
- Collection container (bucket or plastic bag) or tubing line for each tap hole—use food grade material only!
- Metal cans with plastic liners (food grade) for sap storage.
- Large food grade stainless steel boiling container and heat source for boiling down the sap.
- Large-scale thermometer calibrated at least 15 degrees above the boiling point of water (candy thermometer).
- Wool, orlon or other type of filters for

filtering finished syrup while it is hot.

- Storage facilities and containers for the finished syrup (use metal, glass or plastic food grade only).

Producing Maple Syrup: The process of making maple syrup is essentially one of concentrating the sap to a pre-determined level by boiling it. The heat applied in the process develops the characteristic color and flavor that makes maple syrup highly desirable. The average sugar concentration of sap is 2 percent. At that concentration, 43 gallons of sap are required to produce one gallon of syrup. You will need less sap when the sugar concentration is high.

Boiling the Sap to Make Syrup: Fill the evaporating container with sap. A large pan (food grade stainless steel) with high sides is preferred. Begin heating the sap. As the level of sap in the pan is reduced through evaporation, add more sap. Occasionally skim the surface of the boiling liquid to remove surface foam and other materials. Boiling should be done outdoors or in a well-ventilated area to allow large amounts of steam to escape.

Continue the process until the sap changes color and the boiling point begins to rise above the boiling point of water. Finished syrup boils at 7 degrees Fahrenheit above the boiling point of water. As the temperature of the boiling sap approaches this point, boiling should be carefully controlled to prevent burning and overheating. The process may take several hours to complete.

Once the desired boiling point has been reached, the syrup is ready for filtering and packaging. The hot syrup should be poured through a suitable pre-filter paper and a wool or orlon filter designed for maple syrup. Filtering will remove most suspended particles, some sugar sand, and will improve

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the appearance of the syrup. After filtering, the syrup should be packaged at a temperature above 185 degrees Fahrenheit so that the heat sterilizes the container. The preferred temperature is 190 degrees Fahrenheit. Lay filled and capped containers on one side so the hot syrup sterilizes the cap. After cooling, store in a cool, dry place.

CAUTION

Take necessary steps to minimize the time between sap collection and processing, and ensure that sap remains cold during delays.

Markets

There is a growing interest in specialization within the maple industry. Examples include

specializing in sap collection or in the processing of large volumes of sap consolidated from various sap collectors within a network.

CAUTION

As with any natural-resource-based enterprise, the availability of raw materials, in this case sap, varies with annual weather and other conditions. Larger syrup operations tend to require substantial capital investments, and yearly profitability can be highly vulnerable to variations in annual sap runs.

Regulations

Permits are required to tap maple on public lands. Check with the appropriate land manager (city, county, state, federal) for details.



Multiple sap lines running from the sugar bush into a pump house in a vacuum-tap commercial operation. Photo by D. Wilsey.