An alternative to processing and marketing maple syrup is renting the right to tap maple trees. Prices paid for tap hole rental by processor range from 25 to 50 cents per tap with higher rates paid for roadside and more accessible trees. DEM, Division of Agriculture maintains a list of maple syrup producers who may be interested in renting tap holes.

Other Sources of Information

Extension_Notes_English/agforestry/ftyapid.html. Last accessed 8/01.

online.agohio-state.edu/for-fact/f-36-97.html. Last accessed 8/01.


Organizations

University of Vermont Extension Maple Pages
Adams House 601 Main St.
University of Vermont
Burlington, VT 05404-3419
www.uvm.edu/~trev/maple/

Proctor Maple Research Center
P.O. Box 235
Harvey Road
Underhill, VT 05402
(802) 899-9926

Other Sources of Information

Extension_Notes_English/agforestry/ftyapid.html. Last accessed 8/01.

online.agohio-state.edu/for-fact/f-36-97.html. Last accessed 8/01.


RI DEPARTMENT OF ENVIRONMENTAL MANAGEMENT & THE RURAL LANDS COALITION SUBCOMMITTEE PARTICIPANTS INCLUDE: Rhode Island DEM: Office of Sustainable Watersheds Division of Forest Environment Division of Agriculture Rhode Island Forest Conservators Organization Southern New England Forest Consortium USDA, Natural Resources Conservation Service

FOR MORE INFORMATION CONTACT: RI DEM, Division of Forest Environment (401) 637-3367 or visit our website at: www.statustrustprograms.usda.nrcs.usda.ruralexchange.org

Producing Maple Syrup

MAPLE SYRUP: A NATURAL FOREST PRODUCT

Native Americans gathered the bark of maple trees, collected the sap, and boiled it to evaporate water and concentrate the sugar. Early settlers copied this technique and processed it into syrup and sugar. “Sugaring” became part of the spring routine in New England since the sugaring season (late February to early March) is a time of year when there were few other farm activities. Maple syrup was an important food product until after the Civil War, when cane sugar became the dominant sweetener, and maple syrup became a specialty product.

Why Do Trees Produce Sap?

Maple trees become dormant in the winter and store food within the tree as liquid starches and sugars. Maple sap flow can occur anytime during the dormant season when air temperatures fluctuate above and below freezing.

Maple sugaring time occurs in late winter or early spring (February and March) when warm days and cool nights stimulate sap flow. This period lasts until leaves emerge, which occurs as early as mid-March for red maple or later for sugar maple.

Trees To Tap

Only maple trees found in North America have suitable sugar content to produce maple syrup. Sugar maple is the preferred species for producing maple products since the sap has higher sugar content than other species. The high sugar content means less sap has to be collected and boiled to produce maple syrup. Sugar maple sap averages about 2.5 percent sugar, although some trees have sugar content as high as 4 percent. About 34 gallons of sap are required to make 1 gallon of syrup or 8 pounds of sugar.

Sugar maple is native to northern New England, but is uncommon in Rhode Island where it was planted by farmers. Although sugar maple (Acer saccharum) is the preferred species for syrup production, other species of maple are also suitable. Red maple (Acer rubrum) is common in Rhode Island and also produces marketable syrup.

Also found in Rhode Island are Norway maple (Acer platanoides) and silver maple (Acer saccharinum). These are normally planted as ornamental and street trees, but can also produce syrup. These species are rarely tapped in other areas but are used in Rhode Island because other suitable maples may be scarce.

Although high quality syrup can be produced from trees other than sugar maple, the economics are not as favorable. The sugar content of red maple is 1/2 that of sugar maple, requiring more sap to be collected and processed to produce syrup. This results in higher production costs and lower profits.

What would pancakes and waffles be without maple syrup? There are multitudes of imitation syrups to choose from, but maple syrup is the real deal! It is made from the natural goodness of maple trees (Acer sp.)

Producing maple syrup can also be a viable and profitable alternative use for your forestland. This publication will provide you with a look at the facts behind the enterprise.

Sponsored by Rhode Island Department of Environmental Management, in cooperation with the Rhode Island Rural Lands Coalition. Project funding provided through a grant from the USDA Forest Service – Rural Development through Forestry Program. Programs and activities are available to all persons without regard to race, color, sex, disability, religion, age, sexual orientation, or national origin.

Printed with vegetable-based inks on 100% post-consumer waste recycled paper.
The size of the evaporator needed and the time required to process sap will vary with the number of trees tapped and the sugar concentration of the sap.

As the sap is boiled longer, the color becomes darker. Syrup is graded based on the color. Lighter colored syrup is considered higher quality, while darker syrup is assigned a lower grade.

The sugar content of the syrup determines the amount of sap required to make a gallon of syrup. It would take 21.5 gallons of sap to produce a gallon of syrup if the sugar concentration was 4%, but 86 gallons if the concentration was 1%. Generally, sap sugar content ranges from 1-4%. The sugar content of sugar maple is generally 2.0-2.5%, while the content of red maple is less. The sugar content varies from tree to tree, and is affected by the weather and growing conditions.

Process the sap also results in the production of mineral compounds that impart a gritty texture and can cause syrup to appear cloudy or dark. Syrup which is to be marketed commercially must be filtered, increasing the production cost.

The sweetens of the sap and the amount of sap produced are also determined by the size of the tree, genetics, weather conditions, and other factors that affect the health of the tree.

### Tapping Guidelines

<table>
<thead>
<tr>
<th>Tree Diameter (4.5 feet above ground)</th>
<th># taps</th>
</tr>
</thead>
<tbody>
<tr>
<td>10-15’</td>
<td>1</td>
</tr>
<tr>
<td>15-20’</td>
<td>2</td>
</tr>
<tr>
<td>20-25’</td>
<td>3</td>
</tr>
<tr>
<td>25’</td>
<td>4</td>
</tr>
</tbody>
</table>

### Collecting Sap

A major goal in maple syrup production is to gather and process the sap as quickly as possible. Collecting sap and transporting it to the sugar house for processing are the most labor intensive and time consuming parts of the operation. Once the sap is flowing from the trees, the operation demands constant attention because sap can become contaminated and ferment. To minimize contamination, sap should spend no more than a few hours in the bucket, especially during warm periods.

Traditionally, sap has been collected in containers, such as wooden buckets, suspended directly under the spout. The sap is then transferred to holding containers. Technology has progressed to the point of using plastic tubing attached to the spouts to carry sap to a collection tank or to the sugarhouse for processing. This permits sap from all the tapholes in a sugaring bush to flow into a common network and eliminates the need to visit every tree to collect it.

### Processing the Sap Into Syrup

Maple syrup is produced by boiling the water off of the collected sap. Initially, syrup was produced by boiling sap on kettle over an open fire. In the 1850’s, the use of evaporators, became common. Sap is transferred into the sap pan and finished syrup is removed from the syrup pan. During the evaporation process, chemical reactions cause the sap to become more concentrated and raise sugar levels to about 66 percent. The flavor and color also change during this process.

### Economics

Few forestry activities have the potential to produce as much income on an annual basis as maple syrup production. Like any other business, the net profit is the difference between income and expenses. Fixed costs include the sugarhouse, storage tanks, and sap collection equipment. Variable costs depend on the amount of sap produced and collected and include fuel and labor.

To produce large quantities of syrup, a large quantity of sap needs to be collected. Minimum levels for profit are estimated at anywhere from 30-90 taps per acre; the widely accepted minimum is 40 taps per acre. At lower densities, the trees are too scattered to offset the increased collection cost. The exception to this is trees along roads.

### Sugarbush Management

An area managed for maple syrup production is referred to as a sugarbush. A sugarbush is not necessarily distinguished by the number of trees, but by the number of taps available. To promote sap production a sugarbush must be managed to enhance the growth and health of suitable trees.

Thinning involves removing some trees to reduce competition between the trees for growing space. Trees with large, full crowns are healthy and produce the most sap. As a rule of thumb, for maple syrup production trees should be spaced at least 25 feet apart.

Thinning should be started early in the life of the stand, removing less desirable trees to concentrate growth on the trees with the most potential as sap producers. This will keep the trees healthy and vigorous and decrease the time needed for the tree to reach a tapable size.

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### Tapping Trees

Wounding the sapwood (wood just inside the bark) of the trees results in a flow of sap that can be collected. Early in the history of sugaring, trees were wounded by gashing the bark and wooden troughs served as collection containers. This has evolved to making a tap hole with an auger and using wooden or metal spouts to collect sap in buckets. Technology has now advanced to the point that plastic tubing and collection tanks are sometimes used.

The trees are tapped early in the spring for the first flow of sap, which usually has the highest sugar content. Tapping involves drilling a 7/16-inch diameter hole 2-3 inches into the tree and inserting the tap. Tap holes are generally located 2-4 feet above the ground. Spouts are inserted into the tap hole to transfer sap from the tree to the container.

Proper tapping requires using techniques to minimize injury to the tree. The number of taps should be reduced for trees that are in less than excellent health or have major defects in the stem. (Tapping guidelines shown below).

Spouts should be removed immediately after the tapping season, before the tree begins to grow again.

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