



MINNESOTA MAPLE SERIES

HOMEMADE MAPLE SYRUP

CARL VOGT

INTRODUCTION

Maple syrup and maple sugar are among the oldest agricultural commodities produced in the United States. When European explorers first arrived on this continent, they found the Northeastern Native Americans managing maple groves, tapping the trees, gathering the sap, and consuming maple syrup and maple sugar. The newcomers soon learned these skills. Today, maple syrup is produced in fourteen northern states and four Canadian provinces. In the United States, Vermont, New York, Wisconsin, and Pennsylvania have the largest maple syrup production. The Canadian province of Quebec produces approximately seventy percent of all maple syrup in the world.

Until recently, maple syrup and sugar have been strictly a sideline farm crop in many areas. With the use of tubing, reverse osmosis, and redesigned evaporators, commercial full-time operations are common and hobby operations often expand into commercial operations.

MINNESOTA MAPLES

Four species of maple can be used for sap production in Minnesota. Commercial producers generally prefer sugar maple or hard maple, (*Acer saccharum*) for the sweetest sap. Sap can also be gathered from red maple

(*Acer rubrum*), silver maple (*Acer saccharinum*), and boxelder (*Acer negundo*). Yard trees, street trees, and open grown trees in pastures or woodlands can be used for maple sap production.

Sugar maple is a common tree throughout the forested regions of Minnesota. It is most abundant in the eastern and northern portions of the state. In addition to producing sap for maple syrup, it has been widely planted as a shade and ornamental tree and is valued for lumber which is used extensively in fine furniture.

EQUIPMENT FOR MAPLE SYRUP PRODUCTION

Maple syrup can be produced with a minimum of equipment. A few standard items, however, increase efficiency of the operation and quality of the product:

- drill with 7/16-inch or 1/2-inch bit
- collection spout for each taphole
- collection container (bucket or plastic bag) or tubing line for each taphole
- metal cans with plastic liners for sap storage
- large pan and heat source for boiling down the sap (size depends on amount of sap)
- large-scale thermometer calibrated at least fifteen degrees above the boiling point of water (candy thermometer)

- wool, orlon, or other type of filters for filtering finished syrup while hot
- storage facilities and containers for the finished syrup

TAPPING THE TREE

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 portion of the state. A tree suitable for tapping must have a trunk diameter no smaller than ten inches measured at four feet above ground level. Recent studies suggest that no more than two taps be placed in any tree greater than twenty inches in diameter. For the best sap production, a tree should have a short bole (trunk) topped with abundant foliage. The key to good maple grove management is cutting practices that favor the development and retention of such trees.

To tap a tree, select a spot on the trunk about two to four feet above the ground in an area of the trunk that appears to contain sound wood. Drill a hole approximately 2 1/2 inches deep into the wood, slanting it slightly upward to facilitate the downward flow of sap. Insert the collection spout and tap it lightly into the tree. Attach a bucket, plastic bag, or a tubing line to the spout. If you are using open buckets for sap collection, a cover should be installed to exclude rainwater and other debris.

COLLECTING THE SAP

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 to day. Normally, a single taphole produces from one quart to one gallon of sap per flow period with a seasonal accumulation of ten to twelve gallons. The flow period may range from a few hours to a day or more.

Sap should be collected and boiled down as soon as possible to produce high quality syrup. During prolonged flow periods when this is not possible, sap should be collected at least every two to three days or more often if required. When temperatures are low and storage conditions are favorable, sap may be kept one to two days with little syrup quality reduction. If sap is allowed to become warm before boiling, a darker, off-flavor syrup of poor quality may result.

PRODUCING MAPLE SYRUP

The process of making maple syrup is essentially one of concentrating the sap (sugar solution) to a predetermined 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 two percent. At that concentration, forty-three gallons of sap are required to produce one gallon of syrup. However, the amount of sap required to produce a gallon of maple syrup varies depending on its initial

sugar concentration. You will need less sap when sugar concentration is above two percent and more sap when it is below two percent to produce standard density syrup.

In large commercial operations a continuous feed evaporation process is used. Sap may also be concentrated using a reverse osmosis (RO) machine prior to final evaporation. In such operations, the evaporation pan is arranged so that sap may be continuously added and drawn off. In small operations, a batch approach is used. The evaporation pan is filled with sap and more sap is added as necessary to replace that lost by evaporation. When a suitable amount of concentrated sap is present, the pan is "finished-off" to produce the correct density syrup.

BOILING THE SAP TO MAKE SYRUP

Fill the evaporating container with sap. A large shallow pan 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 seven degrees 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 improve the appearance of the syrup.

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

MAPLE SYRUP PRODUCTS

Maple syrup may be converted into other highly desirable products. Maple sugar, maple candy, and maple fudge are just a few of the other products which can be made. Basically, these are produced by concentrating finished syrup to a greater density and stirring the highly concentrated syrup.

Recipes for many of these products and additional information may be obtained at your county office of the Minnesota Extension Service or by contacting:

Extension Forester,
Department of Forest Resources,
University of Minnesota,
1530 North Cleveland Ave.
St. Paul, MN 55108-1027.

CARL YOGT IS AN INSTRUCTOR IN THE DEPARTMENT OF FOREST RESOURCES, COLLEGE OF NATURAL RESOURCES, MINNESOTA EXTENSION SERVICE, UNIVERSITY OF MINNESOTA.

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