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## Maple Sugaring

### Tips for Beginners and Backyard Maple Sugar Producers

#### Tree ID

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- All native maples can be tapped for sap. Maples have opposite branch and bud patterns.
- Sugar Maple – sharp brown buds, brown or chocolate-colored twigs, bark is gray and with scalped furrows.
- Red Maple – round red buds, red twigs, early bud break. Bark is gray to brown, smooth on young trees and shaggy on older trees.

#### Tapping Guidelines

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- Tap trees no smaller than 12" in diameter (38" circumference).
- 1 tap hole in trees 12" to 18" in diameter (38" to 57" circumference).
- 2 tap holes in trees greater than 18" in diameter (57" circumference).
- Place no more than 2 tap holes per tree. The more holes, broken branches, scars, etc., the less pressure can build up in the tree.
- Drill bit should match the tap size (5/16" tap will require a 5/16" bit).
- Drill tap holes at a slight upward angle to prevent sap pooling. Drill "check-valve" spouts at a flat angle.
- Use the smaller-diameter "health spouts" (5/16" or 19/64" spouts). Health spouts are preferred, but the 7/16" spouts are still acceptable and common when using buckets to collect sap.
- Drive spouts with care to avoid splitting the bark and wood.
- For 7/16" spouts, place the tap hole no more than 2½" inches deep and for the smaller-diameter spouts, no more than 1½" inches deep.
- Tap only white, clean wood. To avoid areas of discoloration and decay, don't place new tap holes within 6 inches horizontally and at least 2 feet directly above or below old tap holes.
- Make sure "drops" (tubing attached directly to the spout) are long enough (18" to 36") so tap holes can be placed on all sides of the tree.
- Don't retap existing holes in any given year to expose new wood, or drill new holes to prolong the sap run.
- Don't use a tap-hole sanitizing agent.
- Remove spouts from tap holes immediately after the season.

#### Sap Collection

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- Sap runs with cold nights in the 20's, daytime 40's. Expect 8-10 runs during the season. During each run, one tap will produce about 1 gallon of sap – or 8 to 10 gallons throughout the season.
- Buckets & covers, water jugs or any food grade container can be used to collect sap.
- Gathering pails or new 5 gallon plastic pails can be used to gather/transport sap from tree to backyard (use only clean, food grade vessels). Do not use plastic containers not intended to hold food (i.e. sheetrock mud buckets).
- Tubing can be used instead of buckets.
- Sap tanks can be plastic or stainless steel. Avoid lead solder and only use food grade containers.

## Sap Handling

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- Collect and process sap as soon as possible. Gather daily and boil when you can.
- Keep sap cool and below 40°F. Treat sap like milk – it spoils. Over 50°F it spoils fast.
- Keep sap cool and filter before boiling to remove debris.
- Discard yellow or cloudy sap – do not mix it with good, clear sap.
- Watch for early bud break of red maple. This will cause buddy sap and produce an off-flavor in the syrup.

## Jones Rule of 86

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- To determine the number of gallons of sap required to make one gallon of maple syrup, divide the number 86 by the percent of sugar content (you'll need a sap hydrometer and cup to determine sugar percentage).
- Most sap has about 2% sugar content.  $86/2\% = 43$  gallons of sap needed for 1 gallon of syrup. 34.4 gallons if 2.5%, 28.7 gallons if 3%.

## Sizing the Evaporator or Pan

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Evaporator Size	12"x20"	19"x36"	2'x33"	2'x4'	2'x6'	2'x8'	3'x8'
Evaporation Gal/hour	1	3	5	15	25	35	70

- Use only lead-free soldered or welded stainless steel pans or stock pots. Lead testing kits can be purchased at most hardware stores.
- Have an evaporator of adequate boiling capacity and high sides – about 6-8 inches minimum.
- An example in sizing an evaporator by tap number:
  - ❖ A good sap run will yield about 1 gallon of sap per tap
  - ❖ 25 taps x 1 gallon/tap = 25 gallons
  - ❖ Time available each run to boil sap = 6 hours (you determine this number)
  - ❖ Evaporating capacity needed = 25 gallon / 6 hours = 4.2 gallon/hour
  - ❖ A 2'x33" evaporator (estimated evaporation of 5 gallons/hour) would be needed.

## Boiling Sap

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- If using wood to boil plan on at least 1/2 cord per 50 taps. More will be needed if using hemlock or pine cordwood. Wood should be split into small pieces – about 2 to 3 inches in diameter.
- Before heating your pan, flood it first with sap. Keep a shallow liquid depth, less than two inches, in the pan – this provides better boiling. However, the risk of burning the pan or scorching the syrup is greater if the sap level is too shallow.
- Keep the heat high.
- Don't stir.
- During the boiling process, foam may develop. Use a "defoamer" to reduce the foam. Only use a commercial defoamer or vegetable/canola oil. Just use 1 to 2 drops.
- Watch the sap level in the pan when boiling. If the sap level gets too low, you can burn the pan.
- As the sap boils, the level will drop, the sap will become more concentrated and the boiling temperature will increase. Boiling temperature should start around 212°F.
- When the sap level drops in the pan, add more sap from your collection container to boil down.
- Continue to add more sap to maintain a constant sap level in the pan and to maintain a boiling temperature between 212°F and 218°F.

- To finish the syrup making process, stop adding sap and watch the boiling temperature very closely. In order to make syrup, the sap/syrup needs to boil at a temperature 7.5°F above the boiling temperature of water OR about 219°F.
- Boiling sap may need to be transferred to a smaller boiling vessel/pan in order to keep the pan covered completely in sap and to prevent scorching or burning the pan. Do this when sap level gets below 1 inch in depth. A smaller stainless stock pot is a good option.

## Finishing Syrup

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- It is very difficult to finish syrup on a large flat pan over an open fire. Remove the pan with the concentrated sap from the fire before syrup is made. The sap should be at a boiling temperature around 217°F to 218°F. Transfer the concentrated sap to a smaller boiling pan or pot and complete the finishing process on a controlled heat source such as a gas burner, camp stove or kitchen range.
- When the syrup reaches a boiling temperature 7.5°F above the boiling temperature of water (about 219°F), the syrup is finished.
- Turn off the heat, remove from burner and cover. This method provides better control, avoids further water loss from the syrup and maintains proper density.

## Proper Density

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- Syrup density is measured with a syrup hydrometer and cup.
- Standard density maple syrup is 67° Brix at 60°F in NH and VT. Syrup at this density consistently boils at 7.5°F above the boiling temperature of water.
- Heavy syrup (syrup that is too dense – over 67° Brix) forms crystals at the bottom of the container.
- Light syrup (syrup that isn't dense enough – under 67° Brix) can spoil and develop mold.
- It may be impractical to measure syrup density in a backyard operation - rely on boiling temperature instead to determine proper syrup density.

## Temperature

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- Boiling temperature is a function of density. The denser a liquid, the higher the boiling temperature.
- Syrup is denser than water. Syrup boils at 7.5°F above the boiling temperature of water – or 219°F.
- Use a good candy thermometer to measure boiling temperatures. A thermometer that can read accurate temperatures from 50°F to 300°F is needed.
- When finishing syrup, check the boiling point of water; add 7.5°F to the observed boiling point of water for the correct temperature to have the proper density syrup.

## Filtering and Syphoning

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- Filtering removes niter (sugar sand) and other debris that may have been in your sap during the boiling process.
- Wool felt /Orlon filters are available. Paper inserts for the wool filters work well too.
- Filter the syrup hot, and cover to stop evaporation and to retain heat.
- Wash/rinse filters in hot water only. No soap or detergents.
- Filters can absorb a lot of syrup. When producing small volumes of syrup, syphoning works well. Allow the syrup to settle and the niter and debris will drop to the bottom of the container. Syphon the top majority of the syrup out of one container to another – leaving a small portion of the syrup in the original container with the niter and debris.
- When syphoning, be sure the syphon does not touch the niter or the bottom of the original container to prevent the transfer of unwanted debris into the new container.

## Packing

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- Syrup must be packed hot – 185°F to 190°F. Refilter if syrup is reheated to over 195°F
- Only use new, clean containers.
- Put the cap on immediately and place the container up-side-down to seal it and then on its side to cool.
- Store in a cool dry place. Packed syrup can be frozen for longer storage.
- Syrup that is not hot packed can be kept in the refrigerator or freezer.

## Cleaning

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- Use lots of hot water – triple rinse.
- Let filters air dry and do not use detergent.
- Only use non-metallic scrub brushes.

## Grading

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- Use an accurate grade kit, temporary ones fade over time.
- Grade is based upon syrup color with good flavor.
- If you sell your syrup in NH, your name, address, volume and grade must be on it - check with your state department of agriculture.

## Caution

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- Hot sap and syrup can cause severe burns, use gloves and/or protective gear when handling hot syrup and equipment.
- Beware of the wildfire hazard, contact local fire warden about fire permits and always extinguish the fire.

## Checklist of Equipment and Supplies Needed

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- Healthy maple trees.
- Collecting vessels – sap buckets, covers, spring water jugs, 5 gallon pails. Food grade vessels only.
- Tapping – taps, drill and bits and hammer.
- Collection and storage – new, clean plastics, stock tanks, and used juice concentrate barrels, etc.
- Thermometer – good candy or maple thermometer calibrated in 1/4°F with a range of 50°F to 300°F.
- Hydrometers – sap and syrup hydrometers and test cup (not needed if you have a good thermometer).
- Evaporating pan and smaller finishing pans or pots. Lead-free – Stainless steel is the best.
- Arch, fire pit, woodstove, or gas grill.
- Dry cordwood.
- Synthetic or wool, flat or cone filters and paper pre filters for sap and syrup.
- Containers, plastic or Mason jars, new caps and lids. Food grade containers only.
- Safety equipment – fireproof gloves, fire extinguisher, personal protective equipment.
- Most equipment can be purchased used at considerable savings.

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