Maple Syrup Quality Control Manual

Production and Quality Control Guidelines

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Cleanliness and Maple Syrup Quality

The most important contributor to maple syrup quality is cleanliness. Microorganisms, bacteria and yeast are enemies of high quality syrup. They affect both color and flavor. Since these culprits are found on unclean equipment, and may grow rapidly in sap and syrup, careful sanitary practices are critical when you collect sap, and make, pack and store syrup.

Sanitizers and Maple Syrup Quality

Although cleanliness is a "must," most cleaning compounds cannot be used in maple production. Household detergents, and soaps that have any fragrance, and iodine-based dairy sanitizers should not be used to sanitize syrup production equipment. They can ruin syrup flavor, making the syrup unsaleable.

Chlorine bleach or sodium hypochlorite solution should not be used in the sugar house. It is corrosive to both galvanized and stainless steel equipment.

Remember that anything added to sap, even in minute quantities, will become concentrated as the sap is boiled to syrup, causing an off-flavor. Plenty of "elbow grease" and lots of clean, hot water are the best cleaning agents for maple syrup equipment.

Quality Begins in the Sugarbush

The equipment you use will also have a big impact on your final product. Don't use rusty or corroded spouts, buckets, or other maple utensils. Otherwise you may find toxic metals and metallic off-flavors in your syrup.

Spouts

Before using spouts, sanitize them. Clean them thoroughly in hot water. (metal spouts may be boiled in clean water.) A sanitized spout will keep the tap hole open longer, increasing

sap yield, and will help to keep tubing lines free of microorganisms. To maximize production and minimize microbial growth leading to early tap hole closure we recommend the replacement of spouts annually with new seasonal spouts.

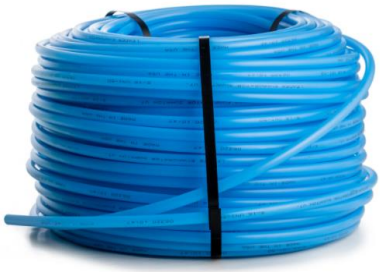
Buckets and Pails

Scrub buckets and pails thoroughly by hand or by machine with hot water. Do this at the end of the season so next year's work is easier to clean, and to prevent metal deterioration.

Pipelines, Tubing, and Conduit

Installing Pipeline for High Quality Production

Pipeline, tubing and conduits helps the sugar maker get the freshest possible sap to the sugarhouse. "Downhill, straight and tight" is a slogan to keep in mind when installing tubing. Pipeline that sags, or is not pitched enough may retain sap, which can develop microorganisms as it ages, lowering syrup quality. Use pipeline that's wide enough to move sap quickly, so you maintain the sap's high quality.



Choosing Tubing for High Quality Production

Install tubing that's specific for maple syrup production. Tubing companies have designed products that move large volumes of sap long distances in favorable conditions. Non-commercial materials, such as black plastic water pipe, which draws heat from the sun, should be used with care or not used at all. Sap flowing long distances in dark pipeline exposed to the sun may reach temperatures as high as 80 degrees, even though air temperatures are much lower.

Warm sap in lines, and later in storage tanks, encourages microorganism growth. To prevent this problem, dark colored pipe may be painted white with a non-toxic paint.

No matter what piping you use, be certain that lines have no sags; sags trap the sap, and permit bacteria growth.

If you use pipe that is not designed specifically for sap collection, it must be of high grade food grade material, the kind that is designed for drinking water. Be certain that all tubing is made of food-grade materials.

Clean Tubing and Quality

Clean tubing is vital to maximize production of high-quality syrup. Sanitize tubing right after the last sap run. Effective tubing cleaning is a two-part process. Flushing the system removes microbial buildup and particles (dirt, wood chips, plastic shavings etc). The second part is to sanitize the tubing, whatever sanitizing technique is used the solution must remain in contact with the tubing per the directions on the commercially available product. You may use a commercially available tubing cleaner or a vinegar and water mixture. They leave this solution in the lines for a day or two, after making certain that the lines are completely filled. Current research from UVM Proctor Maple Research Center has shown chemical cleaning and dry cleaning lead to the highest sap yield vs other techniques or no cleaning.

Be sure all solution is thoroughly rinsed from the lines. In addition to flushing with water, many producers allow the first sap to run onto the ground.

A hot water/air-mixture can be forced through the sap lines as an alternative to the sanitizing process. The turbulence of the air mixed with water is an effective cleaner, and leaves no residue that could contaminate the sap.

Some producers will blow out the lines with forced air and leave lines and taps open during the year to keep them dry. Tubing is then flushed with hot water at the beginning of the season.

Whatever procedure you choose, be absolutely certain to rinse all lines and tanks. Don't let any solution enter the lines that may end up in the evaporator. The most effective tubing sanitation technique may be the replacement of taps, droplines and T's annually.

Tree Tapping

Tap Only in White Wood

Drill all tap holes into healthy, clean, white wood. Generally a depth of not more than 1½ inches is recommended. When dark-colored wood shows in a hole, that tap should not be used. A bad tap hole will yield little or no sap, and may spoil the flavor of large amounts of syrup.

Clean the Tap Holes

Insert spouts right after drilling. Tap them in gently to avoid any unnecessary damage to the tree. When removing wood chips, use a clean tool to brush them out. Blowing into the hole to remove chips is an unsanitary practice. It will contaminate the tap hole.

Warning: Don't use paraformaldehyde pellets. In the past, paraformaldehyde pellets were recommended for use in tap holes; some out-of-date sugaring manuals still suggest their use. Research shows that the use of paraformaldehyde pellets can damage the trees, so they are now illegal. Similarly, the use of denatured alcohol as a disinfectant for tap holes is also illegal in Connecticut.

Sap Collection

Timing is Important

Gather sap promptly, especially when temperatures are above freezing. Fresh, clean sap that has been kept cool during collection and prior to boiling will produce syrup that is one to two grades higher than old, contaminated sap. Since higher quality syrup commands a higher price, it makes sense to collect and boil sap as quickly as possible.

Sap Gathering Pails

Gather sap from buckets in containers that are specifically for that purpose. Don't use pails that have contained non-food products.

Be Observant

Maple sap and syrup pick up off-flavors easily. Be sure that particles

from exhaust pipes of tractors do not float into gathering pails or tanks. If sap has contact with any petroleum product it is especially dangerous.

Sap Ice

Ice formed in sap buckets can help keep sap cool in storage; however, many sugar makers throw it away because they believe that it contains very little sugar. With today's high fuel costs, you may wish to check the sugar content of melted ice before deciding whether or not to keep it.

Sap Filtering

You'll need to filter sap through multiple filters, first through a coarse filter to remove bark, small wood shavings and debris, then through a finer filter. Removing foreign materials from the sap before it is evaporated will usually upgrade syrup by at least one grade, a higher price for a small investment. Change all sap filters often and keep them clean to avoid off-flavors. (Please see manufacturer's information regarding the care of filters.) For filtering sap, many sugar makers use filtering materials that are available from maple equipment suppliers.

Sap Tanks

Keep Tanks Clean Throughout the Season

Rinse and scrub gathering and storage tanks with hot water between runs, when practical. Be cautious if you're using a chlorine solution. Make sure that everything the sap has come in contact with has been thoroughly rinsed, so that no chlorine residue remains. The solution should not be permitted to remain in the tanks, since chlorine has corrosive effects on galvanized metal.

Keep it Cool and Covered

Tanks should be located outside the sugarhouse, preferably on the north or northwest side, away from direct sunlight. A loose covering over the storage tanks will prevent rain and foreign materials from lowering the quality of the sap. Or inside an unheated area of the sugar house.

Storing Sap

Sap should not be left long in tanks when weather is above freezing; the quality of the sap will begin to deteriorate, producing lower-grade syrup.

Quality Continues in the Sugarhouse: Processing Sap

Prompt Processing: One Key to High Quality

For the highest quality syrup, evaporate sap as quickly as possible. Holding sap in buckets or tanks lowers the quality of the syrup produced from that sap. Always try to evaporate sap completely before stopping. Generally, a shallow sap depth and a hot fire make for rapid syrup production, and high-grade syrup.

Reverse Osmosis

Reverse osmosis units are becoming more common. They allow the sugar maker to remove large quantities of water before the conventional evaporation process. As with all sugaring equipment, cleanliness is critical. Follow the manufacturer's suggestions for cleaning. If you use an anti-bacterial storage solution, or any sanitizing solution, be sure to rinse thoroughly with clean water before processing sap to avoid off-flavor and/or syrup contamination.

Defoamer

Use as little defoamer as possible, and be sure it's fresh. Old defoamer becomes rancid, and causes a rancid flavor in syrup. Excess use of some defoamers can also cause "fatty" off-flavors.

If you use vegetable oil because of special market requirements (religious or dietary) take care to use the smallest possible amount. In recent years, some off-flavors due to vegetable oil have occurred; the vegetable oil flavor tends to especially affect the light amber grade syrup.

Evaporator Pan

Keep pans clean. Change draw-off sides often to prevent the accumulation of niter (sugar sand), which can cause scorching and off-flavored syrup. In recent years producers have noted an increase in off-flavored syrup due to burnt niter. When evaporating with reverse osmosis concentrate, niter build-up is faster, requiring more frequent change of draw-off sides. Should any scorching occur, shut down and clean up the burned area to prevent off-flavors in the next batch of syrup.

Maple Syrup Quality Control Puts the Accent on Flavor

Maple syrup flavor must be guarded from sap to store shelf. Flavor can be damaged from contaminated, unfiltered, or old sap, new and used filters, caramelized sugar, fermentation and mold, detergents, chemicals and rust.

Syrup Density

Maple syrup must be evaporated to a density greater than 66 percent Brix at 68 degrees F. Remember that syrup having a density reading below 66 percent Brix is illegal. Such syrup is more likely to ferment. Syrup with a density above 68 percent Brix may crystallize, causing consumer complaint. Various instruments can be used to check the density: hydrometers, hydrotherms, refractometers and light transmittance meters. For best results, know how the instrument works and how to protect its accuracy.

Low-Density Syrup

The principal causes of low-density syrup:

1.Not making an adjustment of syrup temperature when checking density with a hydrometer.
2.Using an inaccurate hydrometer.
3.Inaccurate adjustment of heavy-density syrup.
4.Steam condensing on surfaces, and running into the last containers of syrup to be packed. The last syrup in the tank should not be canned unless checked carefully for proper density.

Density Check at Draw-Off

Use a deep container of small diameter (hydrometer cups are convenient) so that the hydrometer may be floated immediately after each draw off. Lower the hydrometer gently. Be sure that the hydrometer does not touch the bottom or sides of the hydrometer cup. Make the reading at the point on the hydrometer stem that is level with the surface of the syrup (not the top of the meniscus).

Syrup Refractometer

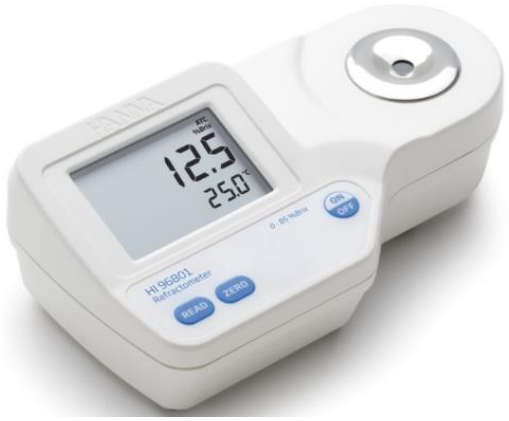
Syrup refractometers are instruments that may be used to test maple syrup density. They are available through maple equipment dealers. If you use a refractomer, be sure to follow instructions. Occasionally, problems can occur that are due to incorrect calibration of the instrument, leading to light or heavy syrup. Also, producers and the Department of Agriculture have found that some instruments do not consistently provide accurate readings when testing hot syrup. You can check a refractometer by comparing measurements to those taken with an accurate, tested hydrometer and a thermometer, or a refractometer.

Hydrotherm

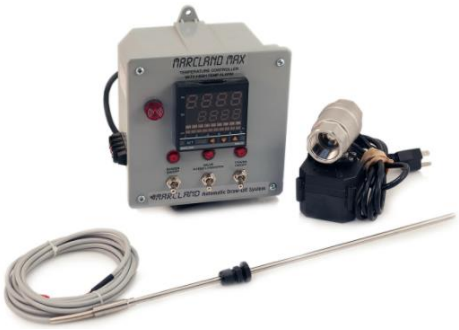
Hydrotherms are special hydrometers with thermometers built in to locate the point on the hydrometer to measure standard density syrup. It is used like a hydrometer but allowed to sit for 30 to 40 seconds for the thermometer column in the hydrotherm to warm or cool to the syrup temperature. The Department of Agriculture does not recommend using hydrotherms because they are not calibrated to a standardized scale.

Light Transmittance Meter

A light transmittance meter is a newer tool that is used to check syrup color. In a light transmittance meter, a syrup sample is checked for color by passing light through the sample. The percent of light transmission is compared to light transmission rates set for different grades. When using one, you need to be sure there are no fingerprints on the syrup test bottle, and that the syrup sample has no bubbles or cloudiness. Any of these conditions may diminish the light that is transmitted through the sample and therefore lowers the grade of the sample.



Automatic Draw-off

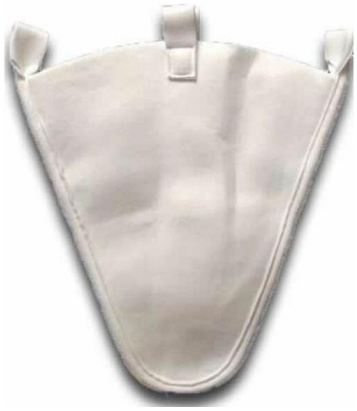


Automatic draw-offs are not completely accurate. Change the draw-off side often, within hours, not days, or when your scoop shows niter beginning to build up in the pan. Using a hydrometer or refractometer, test the first syrup drawn off at the new side. Adjust the draw-off frequently each day, using a hydrometer or refractometer, to establish the right adjustment.

Important Note: Do not scoop near the automatic draw-off until after it shuts off. Scooping near the draw-off will change the density reading of the drawn-off syrup. Clean the control when changing sides. Nylon scouring pads (unscented and soap-free) are helpful. Never use steel wool. It will scratch the pan and speed the build-up of niter.

Syrup Filtering

Care of Filters



Filters can impart off-flavors to syrups, making the product unfit for sale. Do not store filters in mothballs, cedar closets, airtight containers, or near scented materials. Clean filters thoroughly, dry thoroughly, and store in a cloth bag in clean, dry, airy, storage. Chlorine bleach should not be used to clean filters. Despite repeated washings, rinsing and airing out, filters that have been washed with bleach still impart off-flavors to syrup. Scented cleansers, fabric softeners, and “dryer sheets” should not be used either. New filters and pre-filters must be thoroughly boiled in clean water (not in sap pans) and air dried (in the sun if possible). Use the “sniff” test to provide an added check for your filters. Musty old filters, or new chemical-smelling filters should not be used and should be discarded.

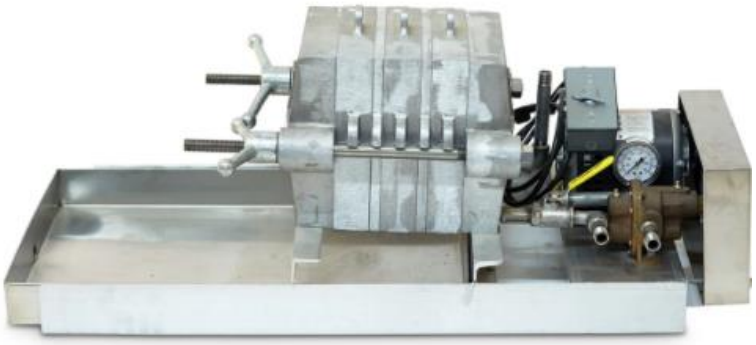
The use of synthetic filters as pre-filters (“cone” type or “flat type” filters) save much labor. When they are used, more effective filtration results, and the heavy filters may be in service longer between cleanings. Wash and dry pre-filters often in pure, hot water.

Old, threadbare filters will cause cloudy syrup. Hold filters up to bright light to check for filter problems (cloudy syrup must be graded substandard). Remember to filter hot syrup (210 degrees F) immediately after removal from the pan. Do not stir syrup through the filter.

Pressure filters

Clean all pressure filter parts thoroughly with hot water prior to each reassembly.

Filter plates have numbers or patterns that indicate how the filter press should be assembled. Line up each numbered plate and smooth each cloth so that there are no creases. Put a thin rod through the plates during assembly to help maintain the correct position. Care taken with the assembly of pressure filter units will help to prevent niter in finished syrup, and loss of finished syrup.



Experiment to find the exact amount of filter aid (food grade Diatomaceous Earth specifically designed for maple syrup) needed to filter the syrup.

Filter papers should be changed often enough and the pressure regulator should be watched to avoid building up of pressure and bursting of filter paper; careful monitoring of the filter press will help to avoid cloudy syrup.

Quality Continues in the Sugarhouse: Syrup Packing

Most sugarmakers will find it advantageous to pack some syrup in consumer-size containers during the producing season. However, at least part of the crop should be packed in bulk containers for later reheating and packing. Bulk containers offer these advantages when used for long-term storage:

- Packing syrup closer to the date of sale reduces the possibility of grade change in the consumer size container. This is especially important when packing in plastic jugs.
- The potential of metallic flavors from cans is reduced.
- Reheating at packing time renews the fresh maple flavor.
- The possibility of rusty containers is lessened.
- The producer has greater versatility in meeting the current market demand for a specific container size and style, but also maintain the potential for bulk sale.
- The potential of waste due to leftover, unwanted sizes is eliminated.
- You can blend different "runs" to achieve greater uniformity of product.
- For small producers, five-gallon cans offer similar advantages to the 30-gallon barrel.

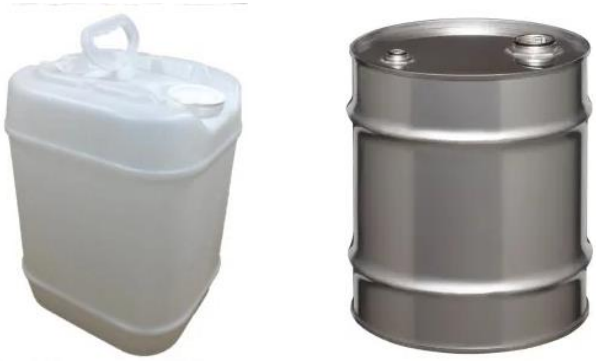
Packing in Bulk

Here are some tips for successful bulk packing:

- Always examine bulk containers before filling.
- More bulk syrup is downgraded or ruined due to storage in drums that are in poor condition than by any other single storage cause.
- Use a flashlight to examine the interiors of drums.
- Use only bulk storage barrels or five-gallon cans that are rust-free, clean and dry. Steam cleaning is the best assurance of completely clean barrels.
- "Sniff" test the barrel and do not use if a foreign odor is present.
- If you are buying new barrels, purchase stainless steel barrels.

Filling Drums

For the best results fill containers or drums with hot syrup (above 180 degrees), and fill them full. Any air space in the drum may cause problems. Use new gaskets; tighten bungs as soon as possible. Keep a sample from each drum in your freezer and identify each sample and its drum number. Then you can repack the syrup without opening additional drums. Remember to store drums in a cool, dry place, and to educate your bulk customers in the proper storage and handling of bulk syrup.



Filling Retail Containers

Here is a list of suggestions that will help you ensure a high-quality product ready for retail sale.

- Open the cartons in which syrup cans are packed so that the empty cans are upside down. Keep the cans in that position until they are filled, so foreign material can't get inside.
- Closely examine all containers. Return any that are damaged by excess flux or solder, dents or other imperfections. Do not fill cans that have any rust.
- "Sniff" test empty containers. This will sometimes help you cull out unusable containers.
- Fill containers full to assure correct volume for the consumer, and to minimize airspace, that contributes to product spoilage.

Hot Packing

"Cold" pack has caused more spoilage of syrup than almost any other factor. Always pack syrup hot! When packed at the right temperature, the hot syrup will sterilize its container, preventing spoilage. Then, when properly sealed, a vacuum will be created, preventing contamination.

The lowest safe temperature for packing syrup is 180 degree F when the cap goes on. Syrup that is left uncapped for a few moments can cool sufficiently and collect enough yeast and mold spores from the air to spoil some cans in an otherwise perfect lot.

Research by Dr. Maria Franca Morselli of the University of Vermont Proctor Maple Research Center indicates that packing syrup at temperatures higher than 180 degrees F (but not higher than 200 degrees F) will result in fewer trouble-causing microorganisms. However, if temperatures are raised too high for too long, new niter may precipitate, causing cloudiness. (Refiltering reheated syrup can eliminate cloudiness.) Continue to check temperature with a sterile thermometer immediately prior to filling the container.

For best results when heating syrup, use a continual flow method rather than heating a large volume of syrup in a vat. Some syrups may deteriorate in both color and flavor when heated in

large vats or pans, and held until canned in retail containers. If the syrup is continually flowing through several compartments, while heating, it will retain most of the original flavor and quality. This also makes it easier to maintain the correct packing temperature (180 degrees and above).

Remember, the last container filled from any batch may not be of correct density. When a cover is used on filter tanks, condensation may cause the last syrup to be thin. If no cover is used, the last syrup may be heavy.

When sealing plastic containers, be sure inner seals are in container caps when they are put on.

When containers are cool, spot checking a few cans for density, color and flavor is strongly recommended. This will insure that the syrup meets the standards for which it is labeled.

Avoid "Stack Burn"

"Stack burn" is grade change caused by hot containers of newly canned syrup stacked together, intensifying the heat, and prolonging the cooling time. Stack burn can change a low Grade A Medium Amber syrup to Grade A Dark Amber. This is a common cause of grade violations.

To prevent stack burn, make sure you cool cans quickly. Space cans apart so that air may circulate around them. Do not place cans in cartons or on pallets until cool. A fan may help to speed the cooling process.

Code All Syrup

Code each batch of syrup as it is packed. If problems are found later, positive identification will allow you to recall only the syrup from the lot that is defective.

Grading Syrup for the Retail Container

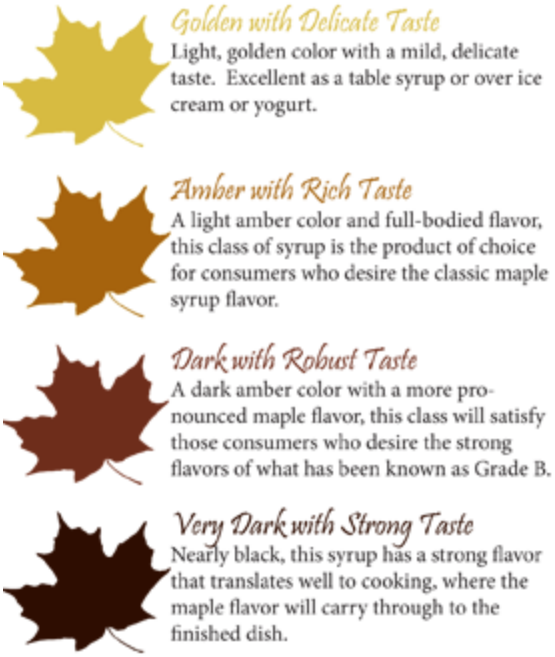
Grading Kits

Grading is an important step in your production process. First, be sure that your grading kit is accurate, and right for your operation. You can't grade a round bottle of syrup in a kit intended for square bottles, or by using bottles of different sizes. This can cause off-grade syrup. Also, colored glycerin grading guides fade with age. After one year, most of these temporary guides are off-grade. Check old kits, or replace them. The development of new electronic grading meters has greatly enhanced accurate grading and are now available at a price making them affordable for even hobby producers. These devices remove mistakes in grading that resulted in faded kits or poor lighting when grading.

Color

Proper grading can only be done against a correct background. A clear, blue sky is ideal; a fluorescent light is better than a regular incandescent bulb.

Syrup should not be graded too close to the minimum. Allow a little extra premium color, especially when packing in plastic or ceramic containers. Stored syrup tends to darken in color, particularly when packed in plastic and ceramic jugs.



Care and Storage of Canned Syrup

The three main enemies of all stored syrup are temperature, air, and time.

Temperature: Store syrup in a clean, dry place of cool (if not refrigerated), uniform temperature. Some producers use a household air conditioner in the storage room to retain syrup quality, protecting grade and price.

Air: Even small heads of air in containers can cause problems. Be sure to completely fill all containers.

Time: When packing or repacking into retail-size containers, plan to fill only the amount that you will sell within the next few weeks. Retail containers may lose their sales appeal, and the syrup may lose flavor, color and grade when stored for long periods. (Grade loss is especially true of plastic containers, in which syrup has been found to darken as much as one grade in only three months.)

Reducing Lead in Syrup

The lead content of most maple syrup is extremely low, even when made with lead containing equipment. However, the only way to know the lead content of your syrup is to have it tested. If tests show your syrup has lead levels within acceptable levels (below 250 ppb in Vermont), then your use of older equipment is satisfactory, provided you manage your equipment properly and retest periodically.

Samples sent for lead testing should be representative of most of your syrup. Try to sample syrup from several syrup batches and try to sample syrup made at the beginning and end of a sap run. Sample only syrup that has received the final filtering. Collect samples in a clean glass or plastic container and combine into one lot. Send the required amount, usually only a few ounces, to the lab of your choice.

Lead does not come from trees. Sap collected using lead-free plastic materials has virtually no lead in it. Sap collecting and syrup making materials that contain lead include: 50/50 solder, used before 1995 for evaporators, tanks and some buckets (Leader Evaporator switched to lead-

free solder in 1991); galvanized equipment made before 1994; most brass and bronze; and terneplate, an alloy with a high lead content used for some older equipment.

Sugar sand concentrates any lead in the sap as it is formed so it should also be treated as lead containing. Roadside dust and dirt may also contain lead. In tests of several models, all older metal spouts added lead to maple sap. Very old spouts may be made of terneplate and will leach large amounts of lead into the sap. Lead-free metal spouts are now available. Not all buckets are equal when it comes to lead. In tests, Wheeling buckets added the least amount of lead, while old "tin" buckets added the most. Some old buckets have shinier terneplate bottoms; beware of these.

Lead containing buckets begin to leach lead into sap within the first few hours, and continue to add lead to sap as long as it is in contact with metal surfaces. Storage of sap in buckets for several days, which may occur when sap runs slowly, can result in very high sap lead concentrations.

Galvanized and lead-soldered tanks also add some lead to sap, although usually less than buckets, because their surface-to-volume ratio is smaller.

In an evaporator, a lead-soldered back pan adds more lead than a lead-soldered front pan, due to the many solder seams. The lead content of partially made syrup often decreases in the front pan, as lead is precipitating and sticking to the pan in the form of sugar sand.

After the evaporator is shut down, lead will continue to accumulate in the partially boiled syrup from lead solder. Draining the front pan into buckets and adding the syrup again once boiling resumes, reduced lead accumulation.

Cleaning the front pan with water may remove some of the sugar sand (source of lead) but also re-expose lead solder (source of lead). Water cleaning had little effect on syrup lead concentration. Frequently cleaning a lead-soldered pan with acid will likely result in higher syrup lead content.

Sugar sand may contain extremely high amounts of lead, depending on the concentrations of lead in the evaporator. Good filtering is essential for keeping lead out of syrup.

In tests, cone filters were as effective as filter presses in removing lead. A large percentage of lead in syrup is in a dissolved form, however, which is not filterable.

Bronze used in the manufacture of gear pumps usually contains lead, and these pumps can add lead to sap and syrup. Unnecessary pumping, particularly of sap, should be avoided. Other pump models are available which contain little or no lead.

Old milk cans frequently contain terneplate, an alloy with a high lead content, and should never be used for syrup filtering or storage.

Syrup kept in older, heavy galvanized barrels have a much higher lead content after 8 months of storage. Newer galvanized barrels do not add appreciable lead in the same amount of time.

Standards for Lead Concentration

Standards for lead concentration are based on models of the maximum syrup consumption by children. Standards vary within the maple producing regions of the U.S. and Canada. Syrup producers and health officials share the goal of a healthy and fine tasting product that is safe from contaminants. We are committed to the words "Pure Maple Syrup" that we put on our

cans.

Reprinted with permission from T. R. Wilmot and T.D. Perkins, Keeping Lead Out of Maple Syrup: A Guide to the Use of Sap Collecting and Syrup Making Equipment (Burlington: University of Vermont, 2000). Available at www.uvm.edu/~pmrc/LeadOut.pdf.

After Sugaring: Quality Begins for the Next Season

To ensure quality for next year, clean all equipment as soon as possible at the close of the maple season.

Care of Evaporators

Some producers allow sap to ferment in English tin or stainless steel pans. If this method is used, watch the fermenting action carefully. When scale loosens, scrub with a nylon pad. If fermenting sap is left in pans too long, serious damage may result. Rinse with clear water, and dry. If chemical cleansers are used, be sure to rinse thoroughly to prevent possible damage to the pan and off-flavors next season.

Materials that collect on the underside of the evaporator during the season are generally corrosive to metal; if corrosive deposits are permitted to remain until the next season, holes may result in the bottom of the front pan, or in the flues. To avoid damage, clean the underside of the front pan, and use a brush to clean the flues. You can buy special flue brushes from maple equipment suppliers.

Painting Equipment

If sap tanks or other equipment needs to be painted, use a non-toxic epoxy paint. Paint meeting these standards is available from a maple equipment dealer. Painting at the close of the season, as opposed to the beginning of a new season, allows time for odors to dissipate, reducing the possibility of off-flavored syrup.

Storing Equipment

Store all equipment where it will remain dry, lessening the potential of rust.

Cleaning Pipelines

There are many different ways sugarmakers have developed to clean tubing. The following three are probably the most common:

1. Pulling Up and Cleaning: To do the best job, laterals should be rolled up and tied in bundles, taken to the sugarhouse for cleaning and then stored under cover. Before doing this, number the system so it can be rehung the next year. This is best done by painting numbers or letters on trees and putting a tag with a corresponding number or letter on the tubing. You don’t have to number each tree, usually every fifth or sixth one is adequate. There are countless variations of identification systems, but the important thing is that the laterals go up in the same place next year. Once the laterals are numbered, roll them up into bundles of about 25 taps. Take each bundle to a tank filled with cleaning solution and fill the bundle with solution. This can be done

by pumping solution into the bundle or mounting the bundle on a rack that rotates the bundle through the solution. Let the bundles sit in the sun for one or two days and flush them with clean water. As an added precaution, some sugarmakers let the first sap run through the lines onto the ground. The same procedure works well for cleaning main lines. The rinse step is particularly important in preventing off-flavors.

2. Cleaning in Place: Many sugarmakers leave their tubing up in the woods year round and clean it in place. They usually do this by hooking up a vacuum pump to the lower end of the line, going to the top with a bucket of cleaning solution, pulling a spout, placing it in the bucket so solution is sucked through the tubing, then capping the spout and moving to the next. Some tubing manufacturers make fittings that are tight under positive pressure as well as vacuum. With this type of fitting, the cleaning solution can be pumped from the lower end of the line back up the system.

3. Commercial Systems: Maple equipment suppliers have commercial pipeline cleaning equipment which consists of a portable compressor pump that injects air with the cleaning solution, thus increasing the turbulence in the tubing, and improving the cleaning action. Some producers have purchased these in conjunction with one or more other sugarmakers to share the expense.

Summary

The most important contribution to the production of high quality maple syrup and syrup products is cleanliness and attention to detail in all parts of the production process. Producers should be careful to protect their efforts and financial investment to produce the highest quality syrup possible. A high quality product adds to the image of Connecticut-produced maple products as well as to the producers' profit level.

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