

Ask Proctor



How long can I store sap?

During the season, producers often wonder how long they can store maple sap and still make good syrup. The answer to this question is, "it depends." Sap is a highly perishable natural product. Unfortunately it doesn't come with an expiration date stamped on it.

Within the tree, sap it is essentially sterile. Once it comes out of the tap hole, it is subject to contamination by a variety of microorganisms found in the woods and in the tubing system such as bacteria, yeasts, fungi, and molds. These microbes feed upon the predominant sugar in sap, sucrose, a large 12-carbon molecule. In doing so, they cleave the sugar into two 6-carbon sugars, fructose and glucose, which are called "invert" sugars. Invert sugars are very reactive in Maillard reactions during storage and in caramelization processes during boiling, developing strong flavor and color during these changes. It takes only a small amount of invert sugars for color/flavor formation to occur. All this to say that during sap storage, sap degradation occurs. This means there will be more microbes and therefore less sugar in your sap, and the longer the sap sits and the warmer it becomes, the darker and stronger in flavor the syrup you make.

If you need to store sap, the basic rule is to treat it as if it were milk.

Keep it cold and keep it clean. The best way to do this is to do a good job filtering your sap before or while it goes into the storage tank and then keep the sap as cold as possible. Filtering or UV treatment can help reduce the starting microbial load in the sap and delay or slow sap spoilage. Use clean filters and change them frequently.

The warmer the sap, the faster the microbes will reproduce and "eat" your sugar and make your syrup end up darker. Producers can keep sap cold and clean by storing it in clean, open-top, stainless steel tanks on the northern or shady sides of the sugarhouse or in a ventilated sap shed. Why stainless steel? Because plastic tanks are slightly permeable, and microbes can colonize the surface and become very difficult to clean off. Poly tanks are also notoriously difficult to drain completely. Any microbes in the walls of your poly tank or in sap remaining in the tank will inoculate the next batch of sap going in the tank and kick-start the spoilage process. In addition, many poly tanks are closed and allow in light, creating a nice and cozy greenhouse-like incubator for microbes to enjoy. One approach is to bank up snow around the tank to keep the sap cold. Alternatively, some producers will freeze sap and place it back into the tank like large ice cubes.

If you're using an RO, concentrate is even more perishable as the higher sugar content is nice high-quality food

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for microbes, which will then multiply very quickly. Recirculating sap through an RO warms the liquid due to the action of the pumps, making it an even more hospitable place for microbes to grow as the sap gets sweeter and sweeter and warmer and warmer.

As the season progresses and the temperatures get warmer, keeping sap cold and tanks clean becomes more difficult, requiring rapid processing of sap to make high quality syrup. It is also important at this point to clean tanks regularly to keep microbial growth to a minimum.

Besides making darker syrup, another possible effect of sap spoilage is stringy or ropey sap. If you've ever had this problem you understand when I say that you don't ever want to deal with that again. The sap gets so filled with microbial slime that it is difficult to boil, hard to get to proper density, nearly impossible to filter, and not pleasant to consume. Dumping of any affected product and a thorough cleaning of your entire operation is required to keep this problem from recurring.

If you have stored sap and aren't sure of its quality when you're ready to boil, just take a little bit and boil it in a saucepan until it is reduced to near syrup and give it a taste (you can do the same thing to test if the sap is buddy). If it's OK, then go ahead and process it. If not, dump the sap, clean the filters and tanks, and wait for the next sap run.

Strangely enough, sometimes you'll boil sap that has sat around for a while and find that you made what seems to be really light syrup, but with a bad taste. This can happen when you have "sour sap" that fermented during storage, or fermented while sitting in the

sap lines between runs on a hot day. It can seem "fizzy" or very tart tasting and unpleasant. But why is it so light? Sap typically has a neutral pH or is slightly acidic. When sap boils, the pH goes up, forming niter, which precipitates out, and the pH drops again. During the time that sap is above pH 7, it goes through what is called the "alkaline degradation phase" where lots of natural chemical reactions occur, some of which result in flavor and color (and niter) formation. When heavily fermented, sap starts out at a very low pH. When this sap is boiled, it may never get to a high enough pH to enter this phase (or it may get there only briefly). This is also why sometimes you find less niter being formed at the end of the season, and why dark syrup sometimes is a bit tart in flavor.

Despite all these possible problems, with some care it is possible to delay the spoilage of sap and to make good quality syrup even if you can't boil right away. Sap spoilage processes can be hard to predict given all the variables involved and the diversity of sugaring operations. With a little bit of experimentation and testing, you'll determine what is acceptable for your operation and taste buds.

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Ask Proctor is a feature in the Maple Syrup Digest, where researchers from the University of Vermont's Proctor Maple Research Center will answer questions about sugaring. If you have questions you'd like to submit for consideration for use in this column, please send them to editor@maplesyrupdigest.org.