Today on Across the Fence tracing the history of Vermont's most famous product. From the sugar bush to the sugar house we will see and hear about changes in the Vermont maple industry. Good afternoon and thanks for joining us, I am Judy Simpson. Vermont maple syrup is of course organic it's all natural there's nothing added and it's been that way since maple was first discovered by native Americans. But the equipment and methodology used in sugaring have certainly changed over the last few decades. We're going to find out more. We called on one of Vermont's maple experts Tim Wilmot is a maple specialist with University of Vermont Extension and he's based at the university's Procter Maple Research Center in Underhill. It's nice to have you with us again.

Tim.: Thanks Judy.

Judy.: What ways is a visit to a Vermont sugar house or sugar bush different today than it was maybe 30 years ago? Or even 10 years ago?

Tim.: There are huge amounts of changes that might baffle a lot of visitors. A lot of it has to do with efficiencies and changes that have made it possible to meet the global demand which is increasing greatly and old technology that just would not be capable of meeting that demand.

Judy.: What about syrup has not changed?

Tim.: A number of things. Basically we're taking the sap from the maple tree and boiling it over a hot fire. The final product is subject to the same laws that have always been in place for decades. Looking at some of these pictures first we see the traditional or nostalgic view.
Judy.: Buckets and taps.

Tim.: When a visitor comes to one of these operations and sees the size of one of these they're like what in the world is going on or an evaporator here looks baffling and yet what we're basically doing is we're taking the sap and boiling it over a hot fire. It's really the same thing that we've always done.

Judy.: So while different methodologies are being used it’s the same product.

Tim.: Absolutely and a lot of the equipment in there might have to do with some of the additional technology. For instance reverse osmosis where you see all this piping but it's needed. Here's the evaporator at the Procter Center which is a moderate size. You can see its all stainless steel clean looking but it's basically the same as a hot fire underneath there that is boiling the sap. Again we start with sap from the tree that's where it's all coming from. The percentage of sugar in the sap hasn't changed. We need to bring it to the sugar house somehow whether it's a tubing system or from carrying it by a tractor it’s all got to get to the sugar house. There's some sort of fuel that needs to heat that syrup in the pan. Whether it's wood or oil we end up with this beautiful boiling sap that's going to look like this no matter what the evaporator looks like on the outside inside it's going to look like this. Steam is still going to come out of the sugar house. Whether it's a small sugar house or a bigger sugar house a huge sugar house this is a sign that we're removing water. We're not adding anything we're taking it away. Here is an example of a very energy inefficient evaporator using the old style evaporator might take as much as one cord of wood to make 20 gallons of syrup. That kind of energy efficiency just can't be sustained. Or with oil this is an older evaporator using oil it takes something like 4 gallons of oil to make 1 gallon of syrup you can imagine with today's price of oil what that would do to the price of syrup. This is an example of research taking place at the Procter Center. Research has driven a lot of the changes. Research is critical for the many pieces of equipment that manufacturers are constantly supplying to sugar makers for us to find out how they best work whether they change are going to change chemistry or flavor of syrup. They shouldn't. Here is one more example of how huge some of these operations are. Huge tanks but it's all the same thing collecting sap that is going to be boiled over a hot fire.

Judy.: So the project itself hasn't changed. The sap from the tree gets boil down its a 40:1 ratio I think as I recall and the product itself at the end is the same just how it gets there has changed.

Tim.: That's correct yes.

Judy.: Tell me about we look to some of the pictures but what about in the woods what's changed in the sugar bush itself?

Tim.: Again we saw initially pictures of the buckets and the taps and a lot of people like to look at that. 95% of syrup is made using tubing and probably almost all of that tubing has a vacuum
to collect it. For instance the spouts here's an example of one of many spouts. Most of them are plastic polycarbonate high strength nylon there's all kinds of products. It's a subtle change you don't see but the hole is generally smaller that we use in the tree. There's a whole lot of plastic that goes into the woods. It's expensive to put up a tubing system. They don't last forever they require quite a bit of maintenance but it's much more efficient. There are really particular ways of doing these things using a lot of different parts. It's an art and a skill that is required to set them up properly. One of the things that can make it difficult is once you get the tubing in place you're all set. Tubing systems are constantly subject to limbs falling on them animals gnawing on them and so on. There's constant checking for leaks that you need to do and when there's deep deep snow as there is now it's an awful lot of work to go out there and maintain them constantly. Their specialized fittings for just about everything here is an example of one. And there are specialized ways which are constantly being revised of attaching all of these pieces together but it's all for the efficiency of moving the sap more better and better to the sugar house.

Judy.: Once again we were talking about the evaporator the old fashioned evaporators the wood stoves. That's the old way to do it there constantly changing that as well.

Tim.: We're going to look at evaporators in a minute first for getting the sap to the sugar house and I'll show you some of the new technology. There's a stage between the woods and the evaporator that is more or less new and I want to show you that with this next set of slides. By the way I want to acknowledge the photographer for number of these slides many of them are not mine. I'd like to thank people like Catherine Stevens Gary Graham staff of the Procter Center George Cook supplied some of these.

Judy.: There we have some tanks.

Tim.: And again we're talking about a lot of equipment in a lot of cases it's not a tank is a little tank it's a big tank has its holding a lot of sap. The vacuum pump here is a series of vacuum pumps. We're no longer using an old dairy pump these are modern very efficient vacuum pumps and vacuum is greatly assisting our ability to collect sap. We're using a lot of vacuum and people ask if it harms the trees and we did a lot of studies that it's not harming the trees. After the vacuum pump there's a piece of equipment you often see this in the sap houses, this is an extractor. It's basically keeping a closed system capable of bringing sap in but moving it into a bigger tank. It's just one more piece of equipment that is needed. There's pumps and so on to move the sap around in the sugar house once is collected. Some of this looks really complicated I know but it's basically moving sap filtering it in some cases. Here is another piece of equipment that's really become critical. This is the reverse osmosis which is basically a piece of equipment that forces sap through a membrane to concentrate it before it gets to the evaporator. This is done with electricity. Electricity is much more energy efficient in doing this then it to take raw sap and boil it over the fire. These reverse osmosis machines come in all different sizes. We saw a small one and they can be enormous but it's the same principle. It's very expensive technology they are subject to breaking down and so on but it enables much less time to be used much less energy to be used in the production of syrup.
Judy.: Much more efficient.

Tim.: Absolutely much more efficient.

Judy.: Do all these changes affect the flavor of the maple?

Tim.: That's a question we get asked all the time and I know there are some people who think that they can taste the difference between syrup that's made with reverse osmosis and not reverse osmosis and they can taste syrup that's made over wood fire vs. an oil fire and so I participate as a judge and many other people have judged in fairs and festivals where we have many people who have entered their syrup it is a blind contest in which we don't know who it came from we pick the best flavor and oftentimes it's someone using very new technology that has the best flavor so that's one good indication that it's not changing. Here we're looking at some of the fuels for evaporators and when we're using wood, wood evaporators are inefficient. There are wood evaporators that are very efficient that use much less wood to make a gallon of syrup. This particular person is boiling using wood chips which are very inexpensive fuel and could be a wave of the future. And again the results of all of this is the hot fire the boiling. Oftentimes you'll see people standing on ladders at their evaporator and that's because there's a piece of equipment on top of the flu pan the back pan that is a steam recovery device. What it is actually doing is taking some of the waste steam that would normally go out the stack and using that to pre-concentrate even start the boiling process so it's an additional efficiency. You'll see an evaporator pans in various configurations and this is a person with switches in the front that just operate blowers that are going to make the fire better. Here again we see this steam recovery device on top of a small evaporator. This is an evaporator at the Proctor Center and you see a lot of electronic equipment which I will explain in a minute but basically just to make it work better. Some of these evaporators look like race cars or jet planes. They've become very slick. Here is an oil fired evaporator. Many of the really large operations are using oil because it becomes impractical to use tremendous amounts of wood that are needed. This particular evaporator is actually run off steam. There's a steam boiler that makes it very efficient way. This is equipment that senses when syrup is ready to draw instead of using the scoop it actually opens a valve when the syrup is at the right density to be drawn off the evaporator.

Judy.: Incredible. Is it hard to learn all of this new technology if things are changing so quickly for people who are making syrup?

Tim.: It would be a big jump if you went from traditional methods to the most modern methods. We have for instance we have educational programs that Extension and Proctor Center and the sugar maker association run. We had some very large maple schools in January where we have discussions about presentations about a whole lot of this different technology for instance. Talking about reverse osmosis and maintaining those machines or the best a vacuum system setup and so on.
Judy.: It must be very popular because if you can be more efficient and produce more syrup obviously that's a good thing.

Tim.: It is a good thing and again if we can meet the global demand then either the demand will end up shrinking or it would make the price of syrup go too high. Of course we have a big competitor north of the border so we need to stay ahead of their technology.

Judy.: Before we go we want to point out a couple of key websites regarding Vermont maple. The Vermont Maple Sugar Makers Association website is the first one listed on your screen and another interesting site is UVM'S Proctor Maple Research Center. That site has maple research information as well as links to important maple publications. That's our program for today; I'm Judy Simpson will see you again next time on Across the Fence.

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