

## Tapping survey results 2013

This year there were a little over 200 participants. The vast majority of producers in this survey were from Vermont; every county except Grand Isle was represented, with the most from Windsor, Lamoille, Chittenden, Orleans, Windham and Franklin. There were also 20 from New Hampshire and a few from other surrounding states. All the data below refer just to the 200 participants in this year's survey

The total tap count of all participants was 936,849, and this excludes 4 producers who sold sap only. The total syrup made was 373,303 gallons (that averages to .398 gallons/tap but that is not the average production of the producers in this survey, it is the average of all taps in the survey). Sap was collected by 18,710 buckets (2% of total taps), 31,393 taps on gravity tubing (3.3% of total taps) and the remainder with vacuum pumps. Below are the yields for different systems in 2013. Only those producers who had a system that was mostly buckets, gravity or vacuum are counted in the table below.

Method	Buckets	Tubing w/o pump	Tubing w/ pump < 600 taps	Tubing with pump 600-4000 taps	Tubing with pump >4000 taps
# sugarmakers	11	33	15	55	56
Gallons syrup/tap	0.202	0.177	.318	.379	.397

Producers not represented in the above table had mixed systems—buckets, gravity tubing and/or vacuum tubing, and didn't fall into any of the above categories. I arbitrarily broke the pumped group into <600 taps or >600 taps, as this is about the size where many producers start using a more efficient and powerful pump, and I also wanted to see if the largest producers did better.

There were 21 producers who made at least a half gallon of syrup per tap this year.

While there does not seem to be much difference in average yields of the larger vacuum systems, it is apparent that the largest producers really influence syrup production in this region--in this survey there were 19 producers with 10,000 or more taps; they had 53% of all taps among producers in the survey and made 56% the syrup.

While we all hear about very large sugaring operations in Vermont, I think it's interesting to see data from some of operations that are more typical of the sugarmakers across the state. Here are results from 25 producers starting in 2008; they include 1 entirely bucket operation, 4 with only gravity tubing, and the rest on vacuum, -- 5 with over 5000 taps (the largest was 7780 taps).

Year	2008	2009	2010	2011	2012	2013
Gallons syrup/tap	.346	.315	.286	.342	.192	.343

This is a slightly different set of producers from the ones I selected last year. This year's group shows that the sap yields for 2008, 2011, and 2013 were all virtually identical--but this refers just to these 25 producers. Also, changes have occurred among these operations between 2008 and 2013 as many have expanded: the total tap count for this group has increased by almost 25%, with many more taps on vacuum tubing and fewer on gravity.

## COMMERCIAL SYRUP

A total of 19, 246 of the 373K gallons of syrup made was reported to be commercial, which was 5.2% of the syrup made. 33 producers made at least 10% of their crop as commercial syrup. In general, anyone who boiled after 4/19 and reported no commercial syrup was in the northern counties and above 1200'. In the southern counties, quite a bit of commercial syrup was made after 4/8.

## TAPPING DATE

14 Vermonters tapped at least some trees in January, and 11 had their first boil by February second. (including 5 producers in Franklin County). 5 of these 11 had their last boil 4/20 or later. It would be instructive to know if the taps from January were still producing in April, but most of the early-tappers had larger operations, with tapping occurring over several weeks, and it's unknown if the early tapped trees were still producing in late April. In any case, Town Meeting Day in Vermont certainly wasn't the tapping date this year, as 83% of producers tapped before March 1. 16 producers felt they tapped too early, 20 felt that they tapped too late, and the vast majority felt that their tapping date was just about right, even though their first boil was often several weeks after tapping—further evidence that tapholes can be viable for a long time when the weather stays cold (and new spouts are used).

## LAST BOIL

The latest anyone reported boiling was 4/29, and elevation had more to do with how late the boiling went than latitude. There was no apparent relationship between amount of snow and the date of the last boil, but in terms of elevation, almost everyone who boiled after 4/19 was at 1200' or higher.

## SAP SWEETNESS

15% of producers said sap sweetness averaged below normal, 64% said it was about normal, and 21% said it was above normal. It was certainly low at the end of the season for most people.

## SPOUTS

Among gravity tubing producers, operations with 0-66% new spouts or tips averaged .156 gal/tap and operations with 75% or more new spouts or tips averaged .202 gal/tap. Among vacuum producers, operations with 0-70% new spouts or tips averaged .312 gal/tap and operations with at least 80% new spouts or tips averaged .397 gal/tap.

Among producers with tubing, 58 operations used at least 75% polycarbonate spouts, 61 operations used at least 75% stub spouts with adaptor, and 16 operations used at least 75% black spouts. This survey cannot serve as an evaluation of which spouts are best, other than reporting some anecdotal information. The most common issues reported were with stub spouts—either coming loose from the adaptor with freezes, or hard to separate from the adaptor at the end of the season. Some polycarbonate users reported breakage of some spouts, and some people reported that pushing tubing onto a seasonal spout in cold weather was difficult. In terms of preference, the most commonly

mentioned spouts were the CDL Smart Spout, and the Check Valve adaptor or new polycarbonate Check Valve. Several people like a clear non-check valve adaptor that goes on the stub spout.

Among the producers who made .5 gal/tap or better, all used 100% new spouts or spout tips, except one using stainless steel, and one using 97% new tips. 6 used 100% polycarbonate spouts and the rest used stub spouts and adaptors, except for the one with stainless. Five used check valve spouts, 6 used something else, and the rest did not report spout preference.

## BROWN WOOD

Hitting brown (nonfunctional) wood when tapping generally means a less productive hole, perhaps much less productive, although it will leak sap in most cases. When encountering brown wood frequently, this may indicate that the tapping intensity is too high in relation to the growth rate of the tree, or that not enough of the tapping band is being used. Bucket producers are more likely to hit brown wood because the tapping band is very restricted vertically—buckets are very inconvenient when placed overhead. Thirty three percent of the bucket producers in this survey reported hitting brown wood in at least 10% of the tapholes, and 7% of the tubing users reported hitting brown wood that often. Producers tapping in bushes that have been sugared for decades and/or have many trees that are quite old are more likely to hit brown wood, as was true when I compared the percent of brown-wood tapholes to the data from questions 23 (many trees old and/or decrepit?) and 24 (health of the forest and number of years observation). Sugarmakers tapping very small trees, especially with slower growth rates, are also more likely to see a lot of brown wood.

Abby van den Berg of the UVM Proctor Center completed a study that models the likelihood of hitting brown wood, based on tree size, growth rate, tapping depth and dropline length. Her full report is here <http://nsrforest.org/sites/default/files/uploads/vandenberg10full.pdf>

## TUBING

A surprising 43% of tubing users said that in their opinion, the type or brand of tubing used for drops and laterals made no difference; this group included 17 producers with over 4,000 taps. Only 18% said that tubing type or brand made a lot of difference. The strongest opinions were about rigid tubing—some people love it, some really don't. Among producers who had a strong opinion about tubing, semi-rigid of various manufacturers was overwhelmingly preferred.

## TAPS PER LATERAL

There is a movement to put in fewer and fewer taps per lateral; in this survey 25% of vacuum pump users averaged 4.5 taps per lateral or fewer and more than half of these producers would install fewer taps per lateral on their new lines.

Among producers who made .5 gal/tap or better this year, the average number of taps per lateral was 5.3.

As many people know, I have been studying gravity tubing for several years, including gravity induced vacuum in 5/16" tubing as well as in smaller diameter (3/16") tubing. Most vacuum pump users run their laterals straight up the slope, and for years we have been convinced that this will provide some natural (gravity) vacuum in addition to that provided by the pump, at least at times of high sap flow. In many experiments with gravity, I have not seen vacuum produced in 5/16" tubing on a slope with less than 10 taps per lateral—it really takes more taps than this for a 5/16" line to produce good vacuum even at times of high flow. Thus, while there may be other reasons for running 5/16" laterals straight up the slope instead of across, gaining natural vacuum with 5 or 6 taps is not a likely benefit. On the other hand, 3/16" tubing can generate very high vacuum on a slope with as few as 4 taps on a line.

For producers without a pump, most people in this survey had 6-10 taps per lateral and most would use fewer in a new installation. Some of these producers even run their gravity lines across the slope. This is not the way to have a good sap yield, and it's one of the main reasons why gravity producers made less syrup than even bucket producers this year (and in most years). Gravity producers, it is possible to do much better! All that is needed for success is some slope (10' per 100' would work, and most Vermonters have this) and diligence in keeping the line leak free. This year I had a number of gravity 5/16" lines (with 30 taps or more) and 3/16" lines (with 4 to 30+ taps) which each produced over 30 gallons of sap per tap, with the 3/16" lines doing the best. Other producers now using 3/16" lines for gravity are also reporting good success (I have no financial stake in the use of this tubing by anyone). Almost all my 3/16" lines reach at least 25" vacuum at the top of the line, which is why I was surprised to see that most gravity producers skipped question 19 about areas with less vacuum, or wrote NA—indeed it is applicable and you should have vacuum in your gravity lines, although you may not be measuring it. For more about gravity and 3/16" tubing, see this article from 2012; <http://www.uvm.edu/~pmrc/highvacuum.pdf> I have more information from 2013, and would be willing to teach gravity producers in workshops if there is interest.

Although I had not anticipated a use for 3/16" tubing with a pump, some pumped-tubing producers are now reporting that using 3/16" laterals increases the vacuum at the top of the line over what is in the mainline by several inches Hg, and this may be useful in areas where the pump cannot deliver enough vacuum, such as beyond a sap ladder. It could even lead to the use of smaller pumps if gravity and the pump work together. There will be many more experiments with 3/16" tubing in pumped lines in the future.

## RED MAPLES

Sixteen percent of the producers who answered the question about how they tap red maples say the "don't", and many others did not answer this one, so there are probably more people who don't. In 2010 when I asked about the number of red maples tapped, fully 1 out of 6 taps in the survey was from a red maple. There is no good reason not to tap them, although some smaller reds with smooth bark tend to split when the spout is driven in.

Most people tap them using the same guidelines as sugar maple, although the guidelines were never developed for red maples. A few people said they tapped reds that were smaller than sugar maples.

## COMMON ISSUES

Frequent animal damage was mentioned by almost half the producers. This is a subject that may need more research or advice from experts—preventing squirrels and other critters from damaging tubing. Ice jams in mainlines and falling limbs were also very common. A lot of people commonly have problems with their releaser—another good subject to pursue.

## THE HEALTH OF YOUR MAPLE FOREST

Forty out of 182 who answered this question said that their forest had become less healthy since they had been sugaring, based on an average observation time of 28 years. These stands were located in almost every county, with the majority in the southern counties. The most common reasons given for a decline in health were wind damage, insect damage, drought, poor maple regeneration, and invasive plants. Fifty five out of 182 said that their forest had become more healthy since they had been sugaring, based on an average observation time of 20 years. Many people attributed this to an active thinning program.

## VMSMA VOLUNTARY CERTIFICATION PROGRAM

We anticipated that this program would appeal mainly to the larger producers, at least initially.

For producers with less than 1000 taps, 7 have or will become certified, 15 may do so, and 23 said no.

For producers with 1000-1999 taps, 9 have or will become certified, 8 may do so, and 6 said no.

For producers with 2000+ taps, 49 have or will become certified, 19 may do so, 9 said no.

To date, 21 Vermont producers have been inspected and all have passed certification. For more details, contact Mary Croft, Secretary/Treasurer of the Vermont Maple Sugar Makers' Association, at 802-763-7435.

## RESEARCH SUGGESTIONS

All of your research suggestions were passed on to Tim Perkins, Director of the UVM Proctor Maple Research Center. Below are a few of your research questions that I thought were especially important.

- High vacuum impact on long term tree health—many people mentioned this. It is the subject of long-term research at the Proctor Center, along with many other projects like tubing cleaning.
- Bacteria control in plastic storage tanks.
- Tapping below the lateral line.
- Regeneration/ deer issues need solution
- Better organic defoamer.
- Designing new tubing systems for a long life span to cut down on waste and labor.
- How do we filter late season syrup/ commercial syrup.

- More about how to deal with niter in the pans
- Strategies for varying R.O. concentration as a season progresses to offset stronger flavor development
- Economic viability of off-grid power production for sugar producers.

Thanks for participating—Tim Wilmot, UVM Extension