

Making Maple Syrup in a Land of Funnel Cakes and Pulled Pork

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Maple syrup country invokes an imagery of snowshoeing through snow-covered woods to tap out, horse drawn sap sleighs, and steam rising in the cold night air. In 1999 I left that world, and a 20 plus year career with the Forestry Division at Paul Smith's College in the Adirondacks of New York State, to take a new job with the Biology Department of Principia College in southern Illinois. Paul Smith's runs a 1, 400 tap sugar bush and offers students the opportunity to take a sugar bush course as part of their forestry education. I had for years tapped 15 to 20 trees on the hill beyond my home on Osgood pond; cooking up enough syrup for my family's needs. Upon hearing that sugar maples could be found in the cool moist ravines of southern Illinois' predominantly oak-hickory forests, I packed up 17 sap buckets, a few handfuls of spiles and headed south. This article is based on the observations and experiences of a "north country refugee" making maple syrup near the southern end of the sugar maple range.

Principia is located on the bluffs overlooking the Mississippi River, approximately 30 miles upstream from St. Louis, Missouri. In the past five years those 17 buckets have grown to a student run sugar bush of 140 taps, with the sap being concentrated on a Hobby Special evaporator. The syrup produced is sold in the College's bookstore. After arriving, I found one other small-scale producer, Mason Hollow Maple Syrup, four miles away in the town of Grafton, Illinois. Richard Hindelang and Fred Venardos put in approximately 165 taps, and have been sugaring for the past 11 years. The nearest large scale commercial operation is in the middle of the state, 150 miles north. Just outside of Bloomington-Normal is the home of Funk's Grove Maple Syrup. Mike and Debbie Funk tap 7,500 trees in a maple stand that has been part of a family sugaring operation since 1891. Funk's Grove is as high a production and technologically up-to-date a sugaring operation as anything you would find in New England.

The good news from the near south is that, although the "Mason Hollow boys" don't sound much like those New England farmers, sap does, in fact, boil in this country just about the same as it does up north. From there on, though, differences begin to emerge. In southern Illinois, getting sap out of the trees and into the sugarhouse proves to be more of a challenge. In this article we compare weather patterns and production records of the Principia College sugar bush to that of Paul Smith's College for the past three sap seasons. The

contrasting data presented illuminates the problems of sugaring just north of the Mason-Dixon line. Now if global warming is more fact than fiction, what we deal with down here may be a glimpse into the future that you northern folks can expect to see coming your way. And, as you will see, it might not be as sweet a future as you expect.

DATA ANALYSIS AND DISCUSSION

The most noticeable difference between sugaring down here and up north is that we are tapping out the third week of January, a time when you northern folks are still thinking about ice fishing. During the three years of this study, Paul Smith's had a very consistent syrup production. Principia's production, on the other hand, varied wildly (Table 1). Production differences can be attributed to three factors; the number of freeze-thaw cycles, length of the sap season, and consecutive days with above freezing temperatures. For this analysis a good freeze-thaw cycle was defined as a day when the temperature reached 40° F or higher, and was preceded within a day by a low of at least 25° F. Temperature data for this study was collected at the respective College's weather stations, with area national recording sites filling in any missing information.

The 2003 sap season at Principia was an exceptional year. As seen in Table 1 the Principia sugar bush produced 1.32 quarts of syrup per tap, way outpacing the 0.78 quarts per tap of Paul Smith's. I thought I had landed in maple syrup heaven. Both Principia and Paul Smith's had 15 freeze-thaw cycles that year. However, to get those 15 cycles we had a 16 day longer season.

The next year was just the opposite. While Paul Smith's produced 0.87 quarts per tap, Principia produced only 0.37 quarts per tap. We had only four freeze-thaw cycles conducive to good sap runs as opposed to the 16 cycles at Paul Smith's (Table 2), and, as shown in Table 3, we also had a six day period in February when the temperatures never dropped below freezing. The 2005 season again brought us close to Paul Smith's in syrup production. But this year our meager eight freeze-thaw cycles were spread out over a 49-day period. Paul Smith's had 15 cycles within a 27-day season.

Table 1. Sap season and production from the Principia and Paul Smith's Sugar bush operations.

Sugar bush	Year	Tapped	First Run	Last Run	Seas. Length	No. Taps	Gal. Produced	Qts./Tap
Principia	2003	1/16	1/28	3/12	44	106	35	1.32
	2004	1/23*	1/23	2/18	27	130	12	0.37
	2005	1/18**	1/20	3/9	49	145	27.6	0.76
Paul Smith's	2003	3/11	3/19	4/15	28	1,300	255	0.78
	2004	3/9	3/11	4/17	38	1,400	304.8	0.87
	2005	3/15	3/21	4/16	27	1,400	276.9	0.79

*Reamed holes 2/10/04 **deepened holes 3/3/05

Note: The Paul Smith's bush is on vacuum whereas the Principia bush is not.

Table 2. Freeze thaw cycles during the sap season

Sugar bush	Year	Jan.	Feb.	Mar.	April	Total
Principia	2003	4	5	6		15
	2004	1	3			4
	2005	2	3	3		8
Paul Smith's	2003			9	6	15
	2004			6	10	16
	2005			7	8	15

One of the daunting challenges in running a sugar bush in southern Illinois can be seen in Table 3. Sap runs at Principia are interspersed with extended periods of above freezing temperatures. Whereas a sugar bush may freeze-up for extended periods in the north, down here it is just as likely to warm-up for extended periods. During those warm spells the microorganisms and the tree defenses are working overtime to seal the tap holes. Single 24-hour periods with temperatures above freezing do not seem to have much of a negative effect. The Paul Smith's sugar bush experienced multiple single day warm-ups in each of the three years, and Principia's bush had 5 single day thaws in our bumper year of 2003. The poor 2004 season, however, was another story. The season only lasted 27 days, during which we had six consecutive days of above freezing temperatures. With so little sap collected, and in desperation to bring in some sap for the students to boil, we reamed out our tap holes after the six-day thaw. This was done by initially tapping with a 3/8ths bit and then coming back to drill again with a 7/16ths inch bit. The reaming was close to totally ineffective in increasing sap flow.

The 2005 season again saw Principia with two three-day thaws, and two four-day thaws. During this 49-day season, we had only eight freeze-thaw cycles conducive to producing good sap runs; far short of the 15 cycles they had at Paul Smith's. Even with these conditions, though, we had an acceptable production of 0.76 quarts per tap. What saved the day at Principia was a tapping innovation. Remembering the ineffectiveness of the reaming exercise the year before, we initially drilled our tap holes only two inches deep with a 3/8ths inch bit. Tapping guidelines call for tap holes to be drilled 2½ to three inches deep. In early March we came back with a 7/16ths inch bit and deepened each hole to three inches. The extra inch of depth exposed fresh sapwood, significantly increasing sap flow. We were able to catch two good sap runs in March; runs that our neighbors at Mason Hollow, who relied on reaming their holes, missed.

Now, that may work just fine on a student run sugar bush, where labor is plentiful and free. However, for those of you with taps numbering in the thousands, the thought of deepening all your tap holes to rescue a season should cause more than a little concern.

**Table 3. Consecutive Days Above Freezing
(Daily high and low temperatures above 32°F)**

	Year	Month	1	2	3	4	5	6	7
Principia	2003	Jan	1						
		Feb	2		1				
		Mar	2						
	2004	Jan							
		Feb						1	
	2005	Jan	1						
		Feb	1		2	1			
		Mar				1			
Paul Smith's	2003	Mar	3	1					
		Apr	1						
	2004	Mar	1						
		Apr	1						
	2005	Mar	1						
		Apr	2	1					

CONCLUSIONS

As you can see, making maple syrup in the mild climate of southern Illinois is less predictable and more work. The sap seasons are longer, there is an almost certain need to freshen the tap holes, and the freeze-thaw cycles are less predictable. You can have bumper crop years, but you can also have years where production is miserably low, with a short sap season and few freeze-thaw cycles. The good news, however, is that the economic law of supply and demand is on our side. We can sell a 12-ounce bottle of Principia's finest maple syrup for \$10, and have trouble meeting demand. After deducting the cost of the bottle and labels it leaves us with a "profit" of 71 cents an ounce, bringing in a cool \$90.88 per gallon.

If our climate is heading your way though, and it just hardly seems worth the effort to continue, there are some options out there. During those long warm periods without a sap flow, I have often thought of just filling that front pan with cooking oil and frying up a mess of those good Mississippi catfish. Of course, then again, you could always just decide to re-plumb the thing and evaporate a little corn.

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