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Morse Farm Maple Sugarworks: Resilience through Technology

Morse Farm Maple Sugarworks belongs to an old sugaring family in Montpelier, Vermont. Sugaring has been a part of the Morse family tradition almost as long as it has been a part of New England tradition. Burr Morse is a 7th generation maple producer. Morse Farm Maple Sugarworks spans 150 acres. Last season, the farm did a total of 3,500 taps, but is looking to expand to 5,000 taps in the coming seasons.

The Maple Industry in New England

The maple industry is a stronghold in the New England economy. In 2014, five New England states, namely Vermont, Massachusetts, New Hampshire, Maine, and Connecticut, contributed 65% of the nation's total maple production. Vermont alone produced 42% of the nation's maple, the indisputable leader of the pack (1). In addition to its contribution to the New England economy, maple production is deeply rooted in New England tradition. For this reason, sustaining maple production in the region is critical to both the region's economy and the culture.

Climate Impacts Seen

According to Dr. Perkins, Director of the Proctor Maple Research Center in Vermont, climate models indicate a decrease in the tapping season by three days. Given that an average season is only 32 days, a 3-day reduction amounts to a 10% decrease (3). A shorter season means less maple, which means less revenue.

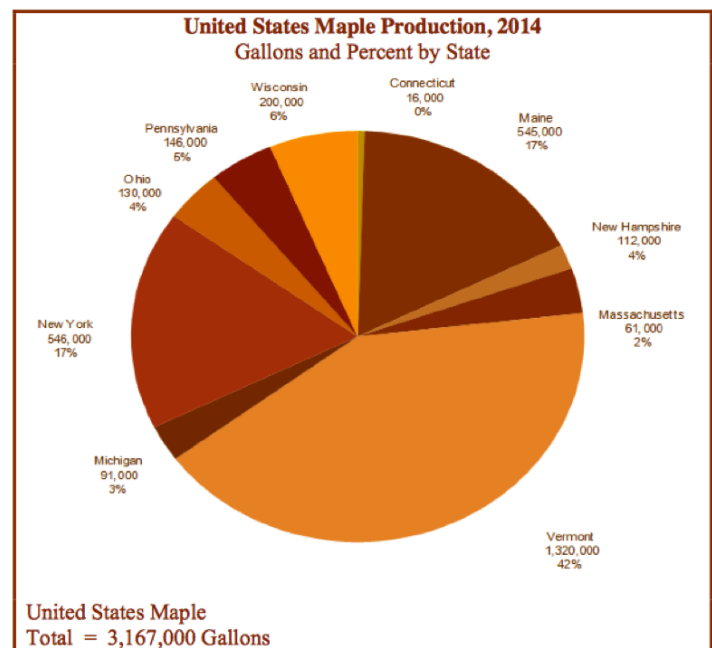


FIGURE 1: Five New England states contribute to 65% of the nation's total maple production (1).

According to Burr, "The weather is less predictable than ever these days." This variability in weather is evident through higher extremes, high winds, drastic rainfall leading to flooding, and extended periods of rainfall that last up to two months. Unpredictable weather patterns are also impacting the length of the season. Several years ago, the season started earlier, sometimes as early as January. However, the last two years were the opposite. Due to a relentless winter, last season started in April, which means the entire month of March was lost.



FIGURE 2: Maple production is a stronghold in New England culture. The Morse family has been producing maple for over 200 years (2).

Another impact is the threat of invasive species; there is an agricultural trend of increased pest pressure with warmer climates (4). The Asian Longhorned Beetle is an invasive species first spotted in Worcester, Massachusetts in 2009. The pest is detrimental to maple production, damaging and killing maple trees. While the pest has not been spotted in other New England states yet, maple producers are fearful of its northward expansion. “Even maple producers who may not believe in climate change are concerned about the Asian Longhorned Beetle,” says Burr.

Technological Advancements

As it becomes more challenging to produce maple the old-fashioned way, a high percentage of sugar markers are signing on to technology. In recent decades, there have been tremendous advancements in technology for maple production. Morse Farm Maple Sugarworks has adopted the following technologies:

- Vacuum pressure tubing systems: The traditional method of sap collection involves hanging a galvanized bucket on a tap and waiting patiently for the tree to give up sap. Now, producers are adopting vacuum pressure tubing systems, a powerful technology that sucks sap out of trees. In the older days, once the trees were tapped, the tree would begin to heal and the holes would close up. With vacuum tubing, the holes do not heal as quickly. Thus, even with wide variability in weather,

producers are still able to get high volumes of sap.

- Sanitation: Improvements in sanitation measures have led to increased yields, specifically by reducing microbial contamination at the tap hole through spout and tube replacements. Sanitation improvements also allow producers to tap at an earlier start date and capture sap in the early thaw periods.
- Reverse osmosis: Morse Farm Maple Sugarworks also uses a reverse osmosis machine, which separates water from sugar and minerals. Reverse osmosis increases the sap’s sugar content. This machine, while an expensive investment, reduces energy costs significantly. Increased sugar content means less boiling during processing which means reduced energy consumption.

The widespread adoption of technology in the maple industry serves as a unique case. The technologies were developed to improve yields, not as an adaptation measure. Thus, while the technology worked to mitigate climate impacts, this happened incidentally. The technologies were simply adopted at the same time the weather started becoming more unpredictable.

According to Burr, even though producers may say they are adopting technology for higher yields, a big reason is to counter the effects of weather.



FIGURE 3: Traditional methods of sap extraction, such as these galvanized buckets, are giving way to newer technologies that provide higher yields (5).

Challenges

A big challenge is managing the more radical storms. Across New England, extreme weather events are projected to become more frequent as a result of changing climate (4). Another challenge is the threat of the Asian Longhorned Beetle. While the pest has only been spotted in Worcester, Massachusetts, maple producers are troubled over its northward invasion. The pest has the potential to cripple the maple industry. “The Asian Longhorned Beetle cannot be allowed to come up further north,” says Burr assertively.

A last challenge is the high cost of modernization. The adoption of technology comes with a sizable price tag. To be competitive, a maple producer cannot continue to produce maple through traditional means. Thus, balancing the cost of capitalization with the market price can be challenging.

Research Needs

Given technology’s boon to the maple industry, Burr places a lot of hope in future research and technological advancements. Burr provides concrete recommendations on further research. He is uncertain about current research at the Proctor Maple Research Center focused on small maple sapling systems planted in ‘plantation style’ rows. On reaching a small diameter, the tree is cut and the sap is sucked out of the system. Burr says that this research is unnerving to maple producers, as it takes tradition



FIGURE 4: Technologies like vacuum pressure tubing allow maple growers to offset impacts from changing weather patterns (6).

completely out of the equation.

Instead, Burr advocates for a shift in research towards better vacuum pressure tubing systems and better reverse osmosis machines, specifically making these technologies more cost-effective.

Lastly, Burr calls for further research on decreasing energy use, specifically choosing the proper fuel when boiling sap to syrup. He mentions some chatter around a small tubing system that creates its own vacuum, thus eliminating the need for electricity. Any advancement in decreasing energy consumption has tremendous potential to further transform an industry already revolutionized through technology.

To learn more, visit www.morsefarm.com



FIGURE 5: The Asian Longhorned Beetle damages and kills Maple trees. maple producers are fearful of its northward expansion (7).

Climate models indicate a decrease in the tapping season by three days. Given that an average season is only 32 days, a 3-day reduction amounts to a 10% decrease (2). A shorter season means less maple, which means less revenue.

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Climate Change and the New England Food System Case Study Series

This briefing was researched and written by the UNH Sustainability Institute's 2015 Climate Fellow, Ravdeep Jaidka. Ravdeep's fellowship focused on documenting and communicating climate impacts and adaptation strategies for New England farmers and fishermen. Ravdeep graduated from the Agriculture, Food, and Environment Master's program from Tufts University this May. She is currently the Supply Chain Coordinator at Equal Exchange, importing fair trade bananas from small producer groups in Latin America. The fellowship was based at the Sustainability Institute and hosted in collaboration with Food Solutions New England (FSNE). FSNE is a regional, collaborative network organized around a single goal: to transform the New England food system into a resilient driver of racial equity and food justice, health, sustainable farming and fishing, and thriving communities. Learn more at www.foodsolutionsne.org.