Q&A: How climate change is impacting the maple syrup industry

February 14 2024, by Lauren Milideo

Mark Isselhardt (center) of UVM's Proctor Maple Research Center says the maple industry has changed tremendously over time. Credit: University of Vermont

In the depths of winter, sugar on snow is a yearly treat many Vermonters eagerly anticipate. But with winters warming and snow barely on the ground in some parts of the state, climate change presents a host of challenges for Vermont's iconic maple industry.

Loss of suitable growing conditions, coupled with increasing pressure from invasive insects and plants, are creating "real threats," says University of Vermont maple specialist Mark Isselhardt. But maple syrup has never been a predictable crop, he says, and producers are adopting new strategies, from improved technologies to boost production to forest management practices to keep the sap flowing in our warmer, wetter future.

How is climate change affecting maple production in Vermont, Quebec, and the surrounding region?

Vermont is among the fastest-warming states in the U.S., along with the rest of the Northeast. The biggest short-term threats to maple producers include high wind events, late frost, or sudden, extreme warming episodes, such as those seen in 2012 and 2021, which can end the sap run prematurely for the year.

Over the long term, the loss of ideal conditions for both recruitment of regeneration and growth of established crop trees, which have made Vermont the top domestic syrup producer and responsible for half of all the syrup made in the United States, will play a significant role in determining whether sugaring remains sustainable long-term.

Are there other ways in which a warming climate affects the maple industry?

Sugar maple seeds germinate at one of the lowest temperatures compared to other species, which is considered a competitive strategy but could become a disadvantage if other species can germinate better than cold-adapted maple in our warming climate.

As our winters warm even faster than our summers, a reduced snowpack

means losing an important insulator that preserves maple's shallow, fine roots. Sugar maple also doesn't tolerate saturated soils, and there are indications that flooding will become more common in Vermont and the northeast as the climate warms.

Another threat comes from invasive species, which have the potential to be more disruptive in an altered climate. Invasive earthworms, for example, consume the protective organic duff layer on the forest floor—the layer that, together with snow, protects roots as well as seeds in the soil. Any invasive plant that shades the forest floor can prevent the establishment of new maple seedlings.

What about the timing of the sap season?

It's important to remember that sap is not produced uniformly over the season. A few ideal days, long slow freezing events followed by moderate temperatures in the 40's (Fahrenheit), can yield 20% of the entire crop for the year. Research shows the sugaring season is starting earlier and ending earlier—and the duration is getting compressed.

But the season has never been predictable. In the past, with smaller maple operations using a couple hundred buckets collected by hand, producers could be more responsive to temperature. Most syrup is not made that way anymore, just like most milk is not made by milking by hand anymore.

Now, 80% of the crop is produced by about 20% of the operations, and the average size of operations is increasing. A 50,000- or 100,000-tap operation, which was virtually unheard of just 40-50 years ago, is now more common. Such operations are large enough to begin tapping trees in December or January, which is necessary given the combination of an earlier end to winter and challenges finding labor. S

o maple syrup is being made in December or January, but not due solely to warm weather in these months, and the changes occurring in large operations do not represent changes happening across the whole industry. Instead, smaller operations still function more similarly to how they have in the past but risk losses if they stick to a traditional calendar date to begin tapping.

How are producers responding to climate change?

Again, historical context plays a role. A sugarbush is often comprised solely of sugar maple trees because, over the decades, it was common to remove other trees and leave the sugar maples, even if the soil or other conditions were not ideal for maple. This created stands of forest composed only of sugar maple—monocultures.

Now, those stands, which were not thriving, to begin with, tend to be most at risk from altered climates, novel climate stress events, and drought—all those things that we expect to be coming our way. But red maple may provide some level of mitigation. It grows in the same forests as sugar maples, but red maple is a very different species and can thrive in a wider variety of conditions.

Red maple sap can be boiled into syrup, too. Maintaining both varieties together can disrupt the movement of sugar maple pests, including native pests like forest tent caterpillars, which may otherwise spread easily in a warming climate.

Another mitigation strategy involves technology, which has gotten progressively better over time. Research, done in part at UVM, found that collecting sap via a combination of tubing and pumps allows the operator to continue gathering sap even in less-than-optimal temperatures while also allowing a syrup operation to take full advantage of a good sap run.

This can double the sap volume collected over the course of a season, assuming the tubing system is well-maintained, and the pumps are managed in a way to harvest sap during each run. Sugar-makers remain concerned about the threats posed by climate change but are committed to incorporating strategies and technology to manage as best they can.

Provided by University of Vermont

Citation: Q&A: How climate change is impacting the maple syrup industry (2024, February 14) retrieved 27 April 2024 from https://phys.org/news/2024-02-qa-climate-impacting-maple-syrup.html