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Research: Reports

Summaries of Research Presentations from 2015 NAMSC Annual Meeting

National Agricultural Statistics Service Report

U.S. Maple production increased by 6% from 2014-15, due to a 4% increase in taps and a 2% increase in yield, said Gary Keough, director of the New England Field Office of the USDA's National Agricultural Statistics Service (NASS). The 2015 season was three days shorter than 2014. Production in the U.S. has nearly tripled since 2000, and there has been a 73% increase in taps in that time.

Plans are underway to increase the number of states where NASS collects data on maple production. The plans have not been finalized, yet, but they are hoping to add Minnesota, Indiana, and West Virginia to the annual survey. None of the 10 states currently surveyed would be dropped from the process, so this would greatly improve NASS' ability to accurately reflect the size of the maple industry.

Keough reiterated his annual encouragement to sugarmakers to participate in the NASS survey. Data from the survey informs decisions about research, marketing, and financial assistance from the federal government, and if sugarmakers are undercounted, support will not be sufficient to sustain the industry. All sugarmakers with 100 taps or more should participate.

Keough reminded attendees that all survey responses to NASS are strictly confidential, and will not be shared with any other government agency. "You can tell the IRS what you want," he said. "Tell NASS what you did."

December 2015

Supply and Demand: The State of Maple Syrup in 2015

Panelists Bruce Bascom of Bascom Maple Farms, Steve Anderson of Anderson's Maple Syrup, and Simon Trépanier from the Federation of Quebec Maple Syrup Producers all expressed optimism about the outlook for the maple industry. The last 10 years have been marked by stability in prices that hadn't existed before, said Bascom. The Federation has played a role in creating that stability, he said, since prices industry-wide tend to follow its lead.

The industry is still at the whim of the weather though, said Trépanier. The poor crop years of 2004-7 caused the Federation's reserves to go from 60 million pounds to zero. Poor production years could still cause an increase in prices, just as too much production could cause a decline.

Anderson recalled that three years ago he had felt it was not a good time to expand an existing or start a new sugaring operation, because he felt production was growing too fast. With new customers and higher sales, he said there's evidence that the industry is doing a better job of selling syrup, and as a result he thinks this is a good time to consider expanding.

"I think sales are growing faster than production," agreed Bascom. Trépanier said that Quebec is considering adding 500,000 new taps for the 2016 season to increase production to meet rising demand.

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Asked about maple water, the three panelists agreed that rising interest in bottled sap as a beverage could have an impact on the industry over time if it proves to be more than a passing fad. They said that having standards for production and quality of these products will be important over the next few years if it is to succeed.

Current Research at Centre Acer

Centre Acer is currently working on 15 maple projects, said Luc Lagacé, a research scientist and the team leader for the R&D Maple products and processes division at Acer. Projects include:

• Testing taphole diameter reduction impact on sap flow. Smaller tapholes reduce the amount of sap collected, but also reduce the amount of non-conductive wood created in the tree, and so have an impact on long-term productivity of each tree. These findings suggest that smaller tapholes might be a good alternative for sugarbushes with low growth rates or those affected by stresses. The use of high vacuum along with smaller tapholes reduces the decrease in yield to less than the decrease in size of the wound.

• Testing lateral line internal diameter reduction on sap flow. Smaller tubing is less expensive and somewhat easier to work with, though its use did result in a decline in sap production. Gravity systems and low sap flow sugarbushes using vacuum may find a benefit to switching to smaller tubing.

•Buddy syrup. The Centre will release a paper in 2016 on their work to characterize the origins of buddy flavored syrup. They are also working to develop methods to predict when syrup will taste buddy, and ways to treat sap to prevent this off flavor.

• Antifoaming agents. The Centre is evaluating and comparing the effectiveness of a range of defoamers and examining alternative methods, with an eye toward optimizing foaming control for producers.

• Flue pan cleaning. The Center is testing a range of commercial cleaning agents and then testing syrup produced after cleaning for residues.

• SpectrAcer. This automated device for finding taste defects and authenticity in syrup is still in development. It was used to analyze 15,000 samples of syrup in 2015.

• Extension work. Centre Acer trained 375 producers in the past year on tasting and grading maple syrup and in the proper use and calibration of maple instruments. They are developing their website to offer more resources, including an English version and a version for mobile devices.

Lagacé reported extensively on a project the Centre is conducting with assistance from a grant from the North American Maple Syrup Council Research Fund: "Evaluation of safety aspects regarding the use of Isopropyl alcohol as a sanitizer of the maple sap collection system." A report on this study is forthcoming, but preliminary findings suggest that the trace presences of chemicals found in sap and syrup after cleaning tubing systems with IPA were not significant enough to pose a problem. The use of IPA for cleaning is not legal in the United States.

Research: continued from page 33 Current Research at University of Maine Extension

Researcher Kathy Hopkins reported on her several years of study of molds that have been found in bottled maple syrup. Her work has identified dozens of fungal contaminations in submitted samples, and found no correlations between the types of fungus found and the syrup's density or other characteristics. The molds can produce mycotoxins that can result in negative health impacts, but the quantities of the toxins found were so small that a significant investment in additional study would be needed to determine what, if any, health impacts they could have.

Since fungi cannot survive boiling, Hopkins said, evidence points to the introduction of these organisms during the bottling process. She emphasized the need for cleanliness when packaging syrup, and stressed that extra care is needed when putting syrup in small bottles, as it is difficult to keep syrup at the required temperatures when filling small glass bottles which have a higher ratio of surface area for the syrup to contact versus the full contents of the bottle. If those bottles are cold, she said, the temperature of the syrup drops immediately as it is being filled.

Hopkins is also undertaking a study, funded in part by the North American Maple Syrup Council Research Fund, to develop processing guidelines for maple sap as a seasonal beverage. The objective of this study is to determine if pasteurization will extend the shelf life of sap, and establish guidance for maple producers interested in producing seasonal sap beverages on a small scale. A full report on this work is forthcoming, but early findings suggested that heat treatment (pasteurization) and the acidification of the sap with lemon juice could give sap a one month shelf life if kept refrigerated below 40 degrees.

Current Research at University of Vermont Proctor Maple Research Center

Research Assistant Professor Dr. Abby van den Berg reported on a number of projects the Proctor Center is undertaking, including:

• Ongoing research into tubing cleaning, measuring which practices result in the greatest increase in yield and has the greatest net value. In comparing a range of cleaning methods, as well as spout and dropline replacement, results were comparable. When factoring in cost, however, spout and



dropline replacement offered the greatest return on investment. The Proctor Center has developed a downloadable spreadsheet tool for sugarmakers to input their costs and determine which cleaning methods are best for their operation.

• The Proctor Center is also researching birch syrup, and the economic value of making it for maple syrup producers. In some cases it can generate more revenue, and the Center has developed a downloadable tool to determine whether or not it makes sense for any particular operation (http:// www.uvm.edu/~pmrc/?Page=birch. html). Researchers are also studying how birch trees differ from maples in terms of stem pressure and healing, and are working to develop sustainable tapping guidelines and best practices for birch syrup production.

• Research into sap collection from saplings, including how to integrate this type of collection with thinning practices in a more traditional sugarbush, is ongoing.

• As part of their work for the upcoming revisions to the North American Maple Syrup Producers Manual, researchers are revisiting and evaluating tapping guidelines, taking into effect issues like wounding, the effects on growth of removing sap each year, and others.

• The Center is in the early stages of a long-term study to examine the effects of tapping and sap extraction on the health and growth of sugar maples.

Extension Maple Specialist Tim Wilmot described his ongoing work with natural vacuum using 3/16" tubing. His most recent experiments involved using a small diaphragm pump that doesn't require a releaser, and found that such a system can generate high vacuum and even yield more sap than a system using 5/16" tubing and a traditional pump.

Wilmot has also conducted research to evaluate taphole injury in red maple trees, a project funded by the North American Maple Syrup Council Research Fund. A full report will be published in the Maple Syrup Digest in coming months, but summary findings indicate that the staining volume for each taphole is less than in sugar maples, and that tapping guidelines for red maples should be similar to those for sugar maples.

Research Association Mark Isslhardt reported on the Proctor Center's study entitled "Is tapping below the lateral line an effective tool to increase the size of the tapping band?" Funding for this project came from the North American Maple Syrup Council Research Fund. The expected concerns about sap quality and yield appeared to be unfounded in the experiments done during the 2015 season, and researchers intend to continue this project through the 2016 season. Final findings will be published in the *Maple Syrup Digest*.

Current Research at Cornell Maple Program

Stephen Childs, New York State Maple Specialist reported on a number of maple related research and extension projects. The most extensive project is being conducted in cooperation with the Proctor Maple Center in Vermont and involves testing a variety of cleaning and replacement options for maple spouts and droplines. These tests have shown significant increases in sap yield when spouts and drops are cleaned with *Research continued on page* 36

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proper contact times with the various sanitizers. The second area of tubing research is with the new 3/16" tubing: yields increase with the increase in elevation drop in these systems and vacuum is created without the aid of a vacuum pump or releaser. Just where these systems are best suited needs further study. Other research includes the use of low cost, limited area fencing to exclude deer with the hope that areas of sugarbush regeneration can be accomplished in over-browsed forests. Research on various spouts, lines and vacuum for birch production have been conducted for two years at the Arnot research forest and will continue in 2016. Research on improving the quality and labor efficiency of making maple value-added products is a continuing priority of the Cornell Maple Program.

In addition to research, the Cornell Maple Program is involved in several extension projects. The largest is the development of K-6th grade curriculum to improve maple education through NY Ag in the Classroom. This project creates age appropriate worksheets, videos, smartboard programs and whole class activities for each elementary grade. The Cornell Maple Program has also developed a series of recipe brochures for point of sale education of consumers on the variety of ways to use maple syrup and maple sugar. Third, the Program has developed training videos to instruct small and back yard maple producers in making and managing reverse osmosis machines for more energy and time efficient maple production.

Research: Invasives

Is there Another Invasive Pest in your Sugarbush?

Bruce L. Parker, Margaret Skinner and Donald Tobi, University of Vermont Entomology Research Laboratory

Josef Görres, University of Vermont Plant & Soil Science Department

ears ago my Dad told me that earthworms were good not just for fishing but for the soil too. I believed everything he told me and I still do...that is most things. Earthworms are exotic species coming from Europe and Asia – everything seems to come from there these days. If it isn't an insect pest, it's something like chicken flu. These worms are disrupting the natural mix of plant species in our forests and becoming a serious threat to the biodiversity in our sugar maple forests. NO, they don't kill the trees we are tapping, but they will change the structure of the forest floor and its chemistry. What does this mean? Suddenly, and I mean suddenly, you may notice bald spots in your stands and little or no regeneration of sugar maples. These worms are aggressive and like other species reproduce rapidly allowing their populations to expand. The most destructive ones we call snake worms (Amynthas sp.), because of their wiggling behavior. In 2010 we found a sugar maple stand in Shelburne, Vermont with areas having no understory plants at all. When we investigated further we found significant populations of snake worms devouring the organic matter (leaf litter and other plant debris), causing soil conditions that discouraged growth of understory native plant species. Little is known about their distribution or even the total impact they have on our trees. They are spreading though in Vermont and other northern states. With funding from NAMSC we

are looking at their distribution in maple stands throughout the region relative to forest management practices, and assessing their impact on understory diversity, maple regeneration and various soil characteristics.

How are we doing it? We have identified numerous sugar maple stands with active maple sugaring operations in USDA plant coldhardiness zones 3, 4 and 5 in New York, New Hampshire and Vermont. Some of these sites were established for a prior research project (funded in part by NAMSC and the Chittenden County Sugarmakers Association, VT) studying the relationship between the occurrence of insects and diseases and sugarbush tree composition. At each location, eight sub-plots were used. Earthworm damage was determined first using the Invasive Earthworm Rapid Assessment Tool (IERAT) and then earthworm abundance by hand-sorting and counting earthworm middens (mounds of debris created by Lumbricus terrestris, the nightcrawlers). Eleven additional sugarbushes in central to southern Vermont were surveyed for worm diversity and density and vegetation data were taken to increase the possibility of finding damaging levels of invasive worms. Worms were then collected, preserved, and keyed to species. The abundance of worms by species, and their density and biomass on an area basis will now be determined.

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