

# Maple Syrup Digest



Vol. 26A, NO. 4

December 2014



SEASONS GREETINGS  
FROM NAMSC

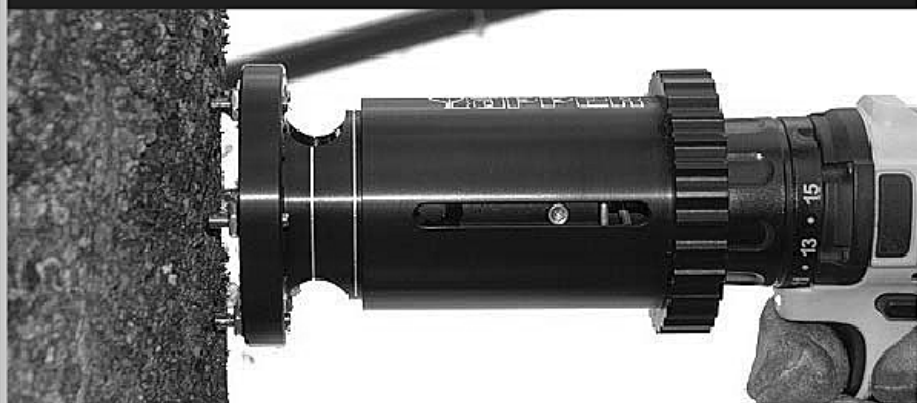


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## Greetings from your President



I just returned from Wolfville, Nova Scotia and the 55<sup>th</sup> annual meeting of the North American Maple Syrup Council. The Maple Producers Association of Nova Scotia did a great job of hosting this event and I congratulate them for their efforts. Next year the meeting will be held in Somerset County, Pennsylvania. If you have never been to an annual meeting, I encourage you to make plans to go to Pennsylvania next fall.

My congratulations also go out to Cécile Brassard Pichette of Quebec for being selected into the Maple Hall of Fame in Croghan, New York. Cécile has given much of her time and efforts for the improvement of the maple industry. She will be inducted in May and will be a great addition to this illustrious group. Debbie Richards of Richards Maple Products in Ohio will also be inducted in the Hall of Fame and I wish to congratulate her as well for her many years of service to the maple world.

Dr. Gary Graham was honored by NAMSC for his outstanding contributions in the advancement of the maple industry, particularly because of his efforts in maple research. This honor was well deserved and was presented in Gary's absence. He will receive the award at the December annual meeting of the Indiana Maple Syrup Association where he is the featured speaker.

On a sad note, news recently reached me that George Fogle of Mason, Michigan has passed away. George was the guiding force behind Sugar Bush Supplies and a great friend of the maple world. My sympathies go out to his daughter, Mary Douglas, and his two sons, Don & Rick Fogle. He will be missed, but as long as someone is remembered they are not truly gone, and George will be remembered for a long time.

For those of us in the western regions of the maple belt the sap could be running as soon as three months from now. It is time to wrap up those changes to the tubing system, the installation of new equipment, additions to the sugar house and other maple-related projects so that we are ready for the first run of the season.

I look forward to serving as your President for another year.

With Best Regards,  
Dave Hamilton, NAMSC President

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Digest electronically?

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**Cover photo:** Mike Girard, NAMSC President, won first place at the annual photo competition with this photo of his sugarhouse in Heath, Massachusetts. See a complete list of winners on page 45.

## MAPLE SYRUP DIGEST

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## You and the NAMSC

As the maple industry grows, the need for an active, engaged trade association grows as well. As a reader of the *Maple Syrup Digest* you are a member of the North American Maple Syrup Council (NAMSC), paying dues through your state or provincial association and playing a role in how NAMSC represents your needs as a sugarmaker.

Since 1959, the NAMSC has been the voice of the maple industry. A network of maple syrup producer associations representing seventeen U.S. states and Canadian provinces, the Council is a non-profit organization established with the purpose of bringing together industry leaders, researchers and affiliated industry groups to share common interests, experience and knowledge for the betterment of the maple syrup industry.

The Council depends largely upon volunteer efforts, as well as the work of an executive director and a treasurer who receive small stipends. The annual budget for the entire organization is only about \$12,000, much less than most local associations and far less than what is needed to run an effective international organization representing such a diverse and active industry. But

with those limited resources, NAMSC does a great deal for our members.

**NAMSC Research Fund:** Since 1987, the NAMSC Research Fund has distributed grants totalling more than \$1,000,000 to researchers and industry professionals for projects that have made great contributions to the industry, from developing best practices for making syrup, to marketing. Funding for these grants comes from generous donations from equipment and supply manufacturers through the Maple

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*"The North American Maple Syrup Council will provide and maintain a forum for its member States and Provinces, associates, affiliates and other members to exchange information; promote research; protect and improve product standards and production methods; and to enhance the marketing and promotion of quality pure maple syrup products. The Council will continue to enhance its position as a leader in education and general resource for the maple industry in the United States and Canada."*

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Research Alliance program. Many individuals and associations also contribute to this fund.

**Maple Syrup Digest:** Since 1962, NAMSC has published the *Maple Syrup Digest* four times a year, distributing it to thousands of

sugarmakers in the U.S. and Canada. This publication provides dependable information including industry reports, research findings, state and provincial events and information on products and services through its advertisers. An effort is underway to put back issues of the *Digest* online, making the entire archives available to our members.

**Policy:** NAMSC communicates and collaborates regularly with other industry groups in identifying and address-

ing industry issues, and works with public agencies to ensure that relevant laws and regulations address the needs of maple producers.

**The North American Maple Syrup Producers Manual:** NAMSC works closely with Ohio State University in updating editions of this publication which guides the industry in forestry, production, technology, maple markets and more. For more than fifty years maple producers have depended on and have been well served by five editions.

**Annual meetings:** NAMSC holds an annual meeting each October, rotating the location through the maple producing states and provinces. These gatherings are opportunities for representatives of each jurisdiction to participate in discussion, planning and resolution of current maple industry issues. Delegates bring the information gleaned from these meetings back to their state and provincial associations, to educate their membership.

**Recognition of maple industry leadership:** The Richard G. Haas Distinguished Service Award and the American Maple Museum Hall of Fame Award are given each year to a leading maple research organization, research professional or Maple Research Alliance Partner in recognition of the recipients' commitment and contributions to the maple syrup industry.

**Communications and networking:** At the NAMSC annual meeting in October 2014, the delegates laid the groundwork for a new initiative to fa-

ilitate information sharing and collaboration among the state and provincial partners.

As we strive to serve the maple industry, we also strive to keep the cost of our operations down, but as the prices of postage, printing, and other services have increased, we have decided that we need to ask a bit more of the state and provincial associations that make up our membership. For many years these associations have paid NAMSC \$2 per individual member, annually.

We are asking our members to increase that contribution to \$4 per year, effective either in 2015 or via an annual 50-cent increase for the next four years. We appreciate that the local associations need to bring this issue back to their members, and have encouraged them to gather feedback from you so that we can determine how best to move forward. Please get in touch with your state or provincial delegate or association leadership for more information and to offer your thoughts. For more information on NAMSC, visit our website at [www.namsc.org](http://www.namsc.org).



## À vous tous du Conseil nord-américain du sirop d'érable

Comme l'industrie du sirop d'érable grandit, les besoins afin de la garder active suscitent l'accroissement de l'engagement des associations afin que celle-ci continue. En tant que lecteur du *Digest*, vous êtes membres du Conseil nord-américain du sirop d'érable (CNASE). En effet, vous payez des cotisations par l'intermédiaire de vos associations d'état ou de votre province ; vous jouez un rôle important dans la manière dont le CNASE représente vos besoins en tant que producteurs acéricoles.

Depuis 1959, le CNASE a été la voix de l'industrie acéricole. Étant un réseau d'associations de producteurs représentant 13 états américains et 4 provinces canadiennes, le CNASE est une organisation sans but lucratif créé avec la détermination d'amener les leaders de l'industrie, les chercheurs et les différents groupes à travailler ensemble afin de partager leurs connaissances, leur expérience et leurs intérêts communs permettant l'amélioration de l'industrie du sirop d'érable.

Le CNASE compte grandement sur les efforts volontaires ainsi que sur le travail du directeur général et du trésorier qui reçoivent une infime rémunération. Le budget annuel de

l'organisation est de 12 000 \$, beaucoup moins que certaines organisations locales et beaucoup moins que ce que nécessite une organisation internationale représentant une industrie aussi diversifiée et active. Malgré un si petit budget, le CNASE accomplit beaucoup pour ses membres.

**Fonds de recherche :** Depuis 1987, le fonds de recherche du CNASE a remis au grand total plus de 1 000 000 \$ aux chercheurs et aux professionnels

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*"Le CNASE fournira et soutiendra une tribune pour ses membres, états, provinces, associations et autres membres affiliés, afin de favoriser les échanges d'information et promouvoir la recherche dans le but de protéger et d'améliorer les produits standards et les méthodes de productions ainsi qu'améliorer le marketing et la publicité des produits purs de l'érable. Le CNASE continuera à améliorer sa position de leader en éducation et autres ressources pour l'industrie de l'érable aux États-Unis et au Canada."*

---

de l'industrie dans des projets qui ont grandement aidé l'industrie, en développant de meilleures pratiques dans la fabrication du sirop d'érable et la vente. L'argent ainsi distribué provient de généreux donateurs, de fabricants d'équipements ainsi que des distributeurs

d'équipements par l'intermédiaire du programme « Maple Research Alliance ». Plusieurs producteurs et associations contribuent personnellement au fonds.

**Maple Syrup Digest :** Depuis 1962 le CNASE publie quatre fois par année le *Maple Syrup Digest* et le distribue à des milliers de producteurs acéricoles des États-Unis et du Canada. Ce journal procure différentes informations concernant les rapports de l'industrie, les résultats des recherches, les différents événements survenus tant dans les



états que dans les provinces, ainsi que les différents produits et services offerts par les annonceurs. Des efforts seront faits afin de mettre en ligne le *Digest*, faisant en sorte que toutes les archives seront disponibles pour tous les membres.

**Politique :** Le CNASE communique et collabore régulièrement avec les autres intervenants de l'industrie en examinant et identifiant les problèmes de l'industrie. Il travaille aussi avec les agences publiques afin d'informer les producteurs de sirop d'érable concernant les lois et règlements correspondant à leurs besoins.

**Le manuel des Producteurs de sirop de l'Amérique du nord :** Le CNASE travaille en relation étroite avec l'Université de l'état de l'Ohio afin de mettre à jour le manuel qui oriente l'industrie forestière, la production, la technologie, les marchés du sirop et plus encore. Depuis plus de 50 ans, les producteurs ont fait confiance à cette œuvre et ils ont été bien servis. Nous en sommes à la 5e édition.

**Rencontre annuelle :** Tous les ans, au mois d'octobre, le CNASE tient sa rencontre annuelle en alternance dans différents états ou provinces qui produisent du sirop d'érable. Ces rassemblements sont l'occasion pour les participants de chaque état ou province de participer à la planification de discussions et de résolutions concernant les problèmes actuels de l'industrie. Les délégués rapportent l'information recueillie lors de rencontres dans leur état ou leur association provinciale afin d'informer leurs membres.

**Reconnaissance de leader dans l'industrie de l'érable :** Chaque an-

née, le Richard G. Haas Distinguished Service Award et l'American Maple Museum Hall of Fame Award sont accordés à une organisation de recherche, à un chercheur professionnel ou à une personne impliquée, en reconnaissance de leur engagement et de leur contribution au développement de l'industrie de l'érable.

**Communication et mise en réseau :** Lors de la rencontre du CNASE tenue en octobre 2014, les délégués ont mis de l'avant une nouvelle initiative afin de favoriser le partage conjoint de l'information et la collaboration entre les états et les provinces. Puisque nous tentons de servir l'industrie de l'érable, nous essayons aussi de diminuer les frais d'opération. Cependant, les tarifs postaux, l'imprimerie et les autres services se sont accrus. Nous avons décidé que nous devons demander davantage aux états et aux associations provinciales dont font partie nos membres.

Depuis plusieurs années, les associations paient 2 \$ par membre. Nous demandons à nos membres d'augmenter leur contribution à 4 \$ par année, par membre. Cette augmentation serait effective dès 2015 où nous demanderions 0,50 \$ / année au cours des 4 prochaines années. Nous comprenons que les associations locales aient besoin de consulter leurs membres et nous souhaitons recevoir les résultats de cette consultation, ainsi, nous pourrions déterminer la meilleure façon de faire. S'il vous plaît, informez-vous auprès des délégués de votre état ou de votre province ou du responsable de votre association afin de nous faire part de votre avis. Pour plus d'information, consultez le site web du CNASE au [www.namsc.org](http://www.namsc.org).



## Annual Meeting Research Presentations

The following are summaries of the research presentations made at the NAMSC/IMSI annual meetings in Wolfville, Nova Scotia.

### Centre Acer Maple Research Update

*Dr. Luc Lagacé, research scientist and team leader for the Maple product and processes division*

Centre Acer has been studying the Maxflow sanitizing cap, manufactured by CDL. This cap surrounds the entire spout, rather than just covering the opening, and leaves space to allow the outside of the spout to come in contact with sanitizing solution during tubing cleaning. Other caps don't wash the

outside of the spout, leaving contaminants on parts of the spouts that will later be inserted into tapholes. The Center's research found that spouts cleaned using the Maxiflow cap did eliminate contamination, and that sap yield was comparable to new spouts after just one year of study, and testing will continue to better determine efficacy.

Prior to the 2014 season, Acer published a guide to the use of isopropyl alcohol (IPA) in cleaning tubing. The guide included a significant amount of safety information, since IPA is flammable. The use of IPA for cleaning maple equipment is currently legal in Canada, but not in the United States.



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Acer has also developed an energy efficiency calculator for evaporators. Users can input information about their specific unit and the tool will return information about its efficiency.

Finally, Acer has also released a number of extension products in the last year, including a guide to sugarbush health and a record keeping book for sugar makers to retain their production records. Prior to the 2015 sugaring season, they will release a smartphone app tailored for sugar makers to carry out a range of calculations specific to maple production, such as sap conversion, volume of tubing, and other formulas.

### **Fungi Contaminating Bottled Maple Syrup**

*Scanna Annis, Associate Professor of Mycology, University of Maine*

*Kathryn Hopkins, Extension Professor, University of Maine Cooperative Extension*

Fungi were identified in more than 50 samples of contaminated maple syrup, some with the potential to produce heat tolerant mycotoxins. The researchers found that syrup cools rapidly in small bottles or bottles with large surface area to volume ratios, and so have tested a range of bottling methods to prevent fungal contamination of syrup. Further details of the research findings were published in the June 2014 issue of the *Maple Syrup Digest*.

### **Cornell University Maple Research and Extension Program**

*Dr. Michael Farrell, Director, Uihlein Forest*

The Cornell program has conducted a range of projects over the past year, and Dr. Farrell recapped their findings:

Research into washing tubing and spouts has found that using detergent, chlorine, hydrogen peroxide all at long contact times can indeed clean tubing so that it does not reduce production significantly. The time and expense of such cleaning processes is significant, however.

Research into spouts with embedded silver that is meant to destroy bacteria and yeasts discovered that the spouts do improve production in both gravity and vacuum systems. These spouts are more expensive than disposable spouts, but can be re-used for several years.

Research found that gravity systems using 3/16" tubing can generate significant natural vacuum, particularly on steep slopes. Further details about this research can be found in the October 2014 issue of the *Maple Syrup Digest*.

Farrell is continuing his research into birch syrup production, conducting trials examining vacuum and gravity systems, the yields of different birch species, shelf life, and consumer interest. The first ever conference for birch syrup producers will be held June 12-14, 2015 at Paul Smiths College.

*Reports: continued on page 13*



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**Reports: continued from page 11**

Working with the International Maple Syrup Institute's market study group, Farrell gathered data from Nielsen research about pancake syrup trends. Pure maple syrup commands only 22% of the syrup market by value — 9% by volume — and is dwarfed by sales of imitation maple syrups. But while sales of pourable syrups overall is declining, sales of pure maple syrup were up by 4.7% from 2012-13, showing that these products are growing in market share in a shrinking market, as fewer people eat pancakes and waffles. This data points to the need to educate consumers about the wide range of uses for maple syrup.

**Proctor Maple Research Center,  
University of Vermont**

*Dr. Abby van den Berg, Research Assistant Professor*

Dr. van den Berg offered an overview of recent research at the Proctor Center:

The Center's extensive research into tubing cleaning practices has compared results from a range of methods, with the goal of determining which were most effective at reducing microbial contamination. A range of experiments helped narrow the methods down to a calcium based bleach solution, a blend of hydrogen peroxide and peroxyacetic acid, and 70% isopropyl alcohol. All methods of cleaning and/or replacing various parts of the tubing system show an improvement in sap yield relative to not replacing or cleaning anything, and additional analysis will determine which is most cost effective, comparing the expense of the manage-

ment practice with the potential additional sap yield.

Research into the profitability of birch syrup found that birch syrup can be produced profitably by maple operations in the Northern Forest, and that this can be a way to increase the revenues of existing maple operations. A range of variables for producers to consider include labor costs, number of available taps, and market demand. Detailed results of the research can be found at: <http://goo.gl/fuJSfA>. The Proctor Center is also beginning a project on developing sustainable tapping guidelines for birch trees.

The Center is continuing its work on sap collection from saplings, conducting an economic analysis, developing standard practices, and developing cap systems for sap extraction.

As work begins on a revision to the *North American Maple Syrup Producers Manual*, Proctor Center researchers are focusing on updating the chapters related to sap extraction, syrup production, and syrup filtration, grading, packaging, and storage.

The Center is beginning a ten-year study on the effects of tapping and sap extraction on tree growth. The research seeks to determine whether conservative tapping guidelines are sustainable from the perspective of long-term growth and health of maple trees. As new production practices have more than doubled the amount of sap sugarmakers are extracting from trees, this research is needed to determine wheth-

*Reports: continued on page 14*

*Reports: continued from page 13*

er the carbohydrates lost from sap collection is impacting the trees.

### **Insect Outbreaks in a Changing Climate: Implications for the Maple Syrup Industry**

*Dr. Rob Johns, Canadian Forest Service*

Dr. Johns spoke about the potential impact of climate change on the maple sugaring industry. Warming conditions in the sugaring regions are expected to influence the range, frequency and intensity of insect outbreaks, causing defoliation and, in some cases, death of trees. At the same time, as shifts in climate become more dramatic, trees are stressed and weakened, making them more susceptible to damage from secondary stressors, such as insect damage or drought. Johns said that the 'good news' is that these projected changes are likely to happen over the long term, and so there is time for gradual changes to management practices to help protect sustainability of sugarbushes.

### **Research and Innovation from the Bottom Up: Maple Production Informatics**

*Dr. Rajasekaran R. Lada, Chair, Department of Environmental Science, Dalhousie University*

The Maple Research Program at Dalhousie University in Nova Scotia was established in 2012 in partnership with the Maple Producers Association of Nova Scotia. The Program's approaches involve: a detailed survey of producers, their production, tapping, processing and marketing practices; identifying issues; establishing research priorities; and deciphering the potential causes for lower sap yield and certain production related issues.

### **Sap Exudation in Maple Trees**

*Dr. Isabell Graff, Department of Mathematics, Simon Fraser University*

See the article on this research on page 15 in this issue of the *Maple Syrup Digest*.

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# A Mathematical Model for Maple Sap Exudation

Isabell Graf and John M. Stockie, Simon Fraser University Department of Mathematics, Burnaby, British Columbia, Canada

## Physical Background

Sap exudation refers to the process whereby sugar maple trees (*Acer saccharum*) are capable of generating significant stem pressure in a leafless state, something that occurs to a lesser extent in only a few other related species such as birch and walnut. This exudation pressure is what causes maple sap to flow from a taphole in sufficient quantities to be harvested and processed into syrup. Exudation has been studied for well over 100 years and has been the subject of many scientific studies, but there is as yet no definitive explanation for how such large pressures can be generated in the absence of transpiration (i.e., when no photosynthesis occurs to drive the flow of sap).

Observations clearly show that pressure rises during periods when temperatures oscillate about the freezing point and that significant pressure build-up happens only after several freeze-thaw cycles. Tree physiologists have proposed three mechanisms that could account for the elevated pressure observed in maple trees:

i. A purely physical freeze-thaw mechanism<sup>5</sup>, in which gas is compressed in the sapwood cells as sap freezes, whereas thawing releases the trapped gas to expand and pressurize the sap.

- ii. An osmotic process<sup>5</sup>, in which semi-permeable membranes that separate cells in the sapwood restrict the transport of sugars, hence generating an osmotic pressure difference.
- iii. A vitalistic process<sup>7</sup>, in which some action of living cells initiates sap flow.

It has been demonstrated that none of these processes by itself is capable of generating the pressure levels observed in maple<sup>1,9</sup> and so some combination of the three effects must be responsible.

In 1984, Milburn and O'Malley<sup>8</sup> were the first to propose a plausible physical explanation (based on mechanism i only) that is clearly tied to observed microstructural properties of maple wood. They made use of the fact that the sapwood of deciduous trees like maple is separated into two primary cell types: *vessels* that are filled with sap; and (*libriform*) *fibers* that are filled with gas. During the freezing process, sap is drawn from the vessels into the fibers where it freezes on the inner surface of the fiber walls and thereby compresses the gas contained inside. When temperatures rise above freezing the process reverses, releasing the trapped gas that can then pressurize the vessel sap. Tyree<sup>9</sup> then recognized that it is essential to include mechanism ii in the form of a selective-

*Sap Exudation: continued on page 16*

ly permeable membrane that separates vessels from fibers – this membrane has pores small enough that they permit water to pass through but not sugar molecules, so that the frozen liquid in the fibers in fact consists of pure water. As a result, an additional osmotic pressure difference exists between the fiber and vessel, which is essential for boosting and maintaining the gas pressure at observed levels. They also noted the fact that at such high pressures, a portion of the gas will actually dissolve in the sap. A beautiful explanation for this process that also provides more details can be found in a short article by Tyree<sup>10</sup>. Although this freeze-thaw hypothesis has been well-accepted for the past 30 years, it is complicated enough that there has as yet been no attempt to develop a set of equations that governs the Milburn-O'Malley process. This is where the mathematics comes in.

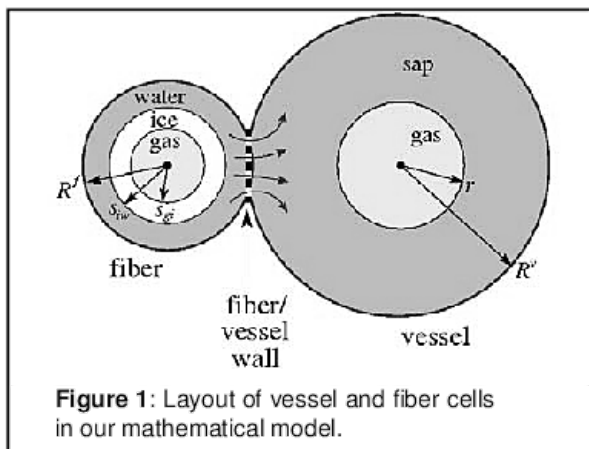
**Overview of the Mathematical Model**

Our initial aim was to develop a set of mathematical equations that capture the Milburn-O'Malley process at the

cellular level. To this end, we focus on a single fiber and vessel as pictured in Figure 1, where we assume the cells both have the shape of circular cylinders. Gas is present in the form of a single bubble centered within each cell, while only the fiber contains ice owing to the fact that the freezing point in the vessel is lowered by the presence of sugar in the vessel sap. Because water is an incompressible fluid, gas is required in both fiber and vessel in order to permit exchange of pressure between them. We emphasize here that Milburn and O'Malley made no mention of gas in the vessel, and it was only during the development of our mathematical model that we were able to recognize the importance of including it.

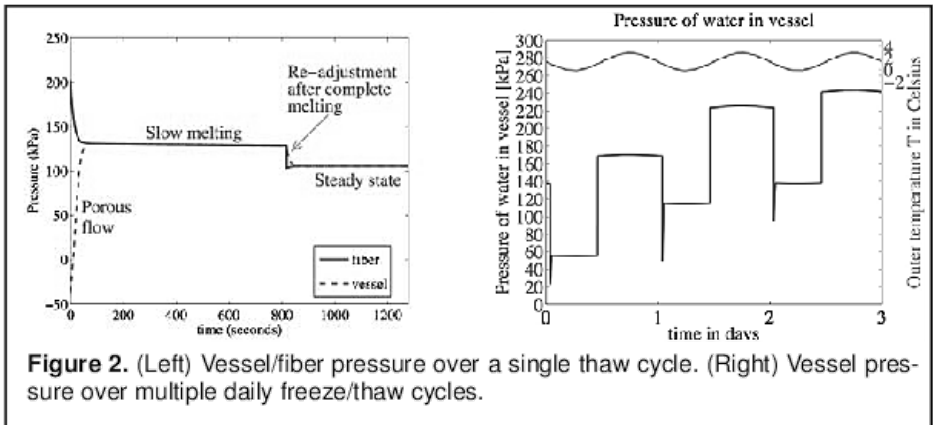
We then proceeded to develop a consistent set of governing equations for the water, ice and gas phases in each cell based on the physical processes described in the previous section. Rather than repeating the equations here, we only summarize a few important features of the model and encourage the interested reader to consult the complete derivation in our recently published paper in *SIAM Journal on Applied Mathematics*<sup>3</sup>.

- The key quantities in this model are the sizes of the gas, ice and water layers in the fiber and vessel (labeled  $s_g$ ,  $s_{iw}$  and  $r$  in Figure 1) as well as the corresponding phase temperatures. These quantities vary in space and time and their dynamics are described by a system of



**Figure 1:** Layout of vessel and fiber cells in our mathematical model.





**Figure 2.** (Left) Vessel/fiber pressure over a single thaw cycle. (Right) Vessel pressure over multiple daily freeze/thaw cycles.

seven nonlinear differential equations.

- Applying various other physical constraints related to volume conservation, osmotic pressure, capillary pressure and dissolved gases leads to a further five algebraic equations.

One other aspect missing from the Milburn-O'Malley process, which is necessary to generate a pressure build-up over multiple freeze-thaw cycles, is root pressure in the form of a root-water reservoir. This feature is consistent with recent experiments by Perkins and van den Berg<sup>2</sup> on plantation-style stands of maple saplings.

Although there are a large number of physical parameters and unknowns, the equations have a "nice" mathematical structure that permits them to be solved using commonly-available numerical algorithms. In particular, we developed a software implementation that makes use of the solvers available in Matlab<sup>®</sup>.

### Application to Maple Sap Exudation

We provide here just a few examples of the typical numerical simulations that are possible using our cell-level model<sup>3,4,6</sup>. We start by taking an initially frozen state, corresponding to a typical morning during harvest season, and consider the thawing half of the freeze-thaw cycle by imposing a constant ambient temperature lying just above the melting point. The resulting dynamics of the pressure transfer from fiber to vessel is pictured in Figure 2 (left). We observe that there is a rapid flow of melt-water (lasting roughly one minute) from fiber to vessel that drives a corresponding rise in the vessel pressure of approximately 130 kPa. The ice layer in the fiber melts over a longer time scale (10-15 minutes) after which only a slight re-adjustment in the pressure occurs.

Consider next a three-day cycle of freezing and thawing, for which the numerical results are pictured in Figure 2 (right). There is clearly a gradual build-up of pressure over the three days and

**Sap Exudation: continued from page 17**

we remark that this is only possible due to the uptake of root water during the freezing portion of the cycle. Furthermore, the magnitude of the pressure difference (100 kPa) is similar in size to what is observed in actual maple trees!

**Future and On-going Work**

We plan to extend our sap exudation model in several ways. First and foremost, we need to “scale up” our equations from the cell level (or micro-scale) to a corresponding set of equations at the whole-tree level that is capable of capturing exudation on the macro-scale. For this purpose, we employ the mathematical technique of *periodic homogenization* for which we have already obtained partial results<sup>6</sup>. Our current

efforts focus on validating our results through a careful comparison between numerical simulations of the homogenized model and experimental results from the literature.

Over the next several years, we plan to apply this model to investigate problems of more practical interest to the maple syrup industry as part of a NAMSC-funded project (2015-2016). This includes answering such questions as: What is an optimal number and location of tap-holes for a given tree? What effect do environmental factors such as wind or snowcover have on sap exudation rate? How might changes in climate (e.g., temperature and snowfall patterns) affect sap yield? Answers to these and other questions are finally attainable now that we have a mathe-

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mathematical model in hand that captures the essential bio-physical processes going on in a maple tree.

## References

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## Acknowledgements

This project was supported in part by grants from the North American Maple Syrup Council, Mitacs Network of Centres of Excellence, and Alexander von Humboldt Foundation.

Deadline for ads and content for the next issue of the *Maple Syrup Digest* is January 1.

## Minutes of the 2014 NAMSC Annual Meeting

The 55th annual meeting of the North American Maple Syrup Council (NAMSC) was hosted by the Maple Producers Association of Nova Scotia (MPANS) at the Old Orchard Inn, Wolfville, NS. The theme for the convention was “Sweet with a Pinch of Salt.” The conference was held in conjunction with the 40th annual meeting of the International Maple Syrup Institute (IMSI).



Meetings began Tuesday October 21 with the informal meeting of the NAMSC officers, delegates, alternate delegates and committee members. The IMSI held their board of directors meeting that day, as did the maple research extension specialists.

Robert Frame, president of MPANS, opened the conference and introduced David Hamilton, president of NAMSC; Yvon Poitras, president of IMSI; and Honorable Keith Colwell, Minister, Nova Scotia Department of Agriculture and Minister, Nova Scotia Department of Fisheries and Aquaculture. Minister Colwell welcomed everyone to Nova Scotia.

Hamilton opened the general session with first order of business recognizing substitute Delegates Jacques Couture from Vermont and Aggie Soijka-Sperry from Ohio. The original state-appointed delegates and alternates from Vermont and Ohio were not able to attend this year’s meeting. Motion was made to approve substitute Delegates. M/S, A. Bentley, E. Randall, motion approved.

**Secretary’s Report:** Joe Polak, secretary, read the roll call of states and provinces. The delegates introduced their respective alternates.

Delegates (D) and Alternates (A) included:

- Maple Syrup Producers Association of Connecticut; J. Mark Harran (D), Robert Dubos (A)
- Indiana Maple Syrup Association; Keith Ruble (D), David Hamilton (A)
- Maine Maple Producers Association; Lyle Merrifield (D), Kevin Brannon (A)
- Massachusetts Maple Producers Association, Inc; Winton Pitcoff (D), Andy Schmidt (A)
- Michigan Maple Syrup Association; Larry Haigh (D), Debbie Thomas (A)
- MN Maple Producers Association, Inc; Ralph Fideldy (D), Stu Peterson (A)
- New Brunswick Maple Syrup Association, Inc; David Briggs (D)
- New Hampshire Maple Producers Association; Bill Eva (D), Mike Moore (A)
- New York State Maple Producers Association; Dr. Eric Randall (D)
- Maple Producers Association of Nova Scotia; Avard Bentley (D), Kevin McCormick (A)
- Ohio Maple Producers Association; Aggie Soijka-Sperry (D)
- Ontario Maple Syrup Association; Bill Robinson (D)
- Pennsylvania Maple Syrup producers Council; Wayne Clark (D)
- Maple Syrup Producers Cooperative of Quebec; (Cooperative de Producteurs de Sirop D’erable du Quebec) Cécile Brassard Pichette (D), Michel Labbé (A)
- Rhode Island Maple Syrup Producers Association; Alfred Scheibenflug (D)

- Vermont Maple Sugar Makers Association; Jacques Couture (D)
  - WI Maple Syrup Producers Association, Inc; James Adamski (D), Joe Polak (A)
- All member states and provinces were present and represented.

The minutes of the 54th Annual Meeting held at Moncton, NB was presented as written by J. Polak. M/S, E. Randall, W. Pitcoff, motion approved.

**Financial Report:** Report of the General Fund FYE August 31, 2014 was presented by J Polak, treasurer.

- Fund balance in checking account: \$20,986.20.
- Cash receipts \$51,883.00 and disbursements were \$49,546.03, leaving net gain of \$2,336.97.
- Total investments (CDs) \$101,299.63.
- Income is based solely on dues from member states and provinces. \$12,552.00 was billed last year, an increase of \$308.00.

M/S, C. Pichette, A Sojka-Sperry, motion approved subject to Audit/Review committee report.

**Maple Syrup Digest Report:** Roy Hutchinson, editor *Maple Syrup Digest* (retired) reported income of \$26,817.00 and expenses of \$28,962.16, a loss of \$2,145.16. He noted \$773.40 was received after the end of the fiscal year. M/S M. Harran, B. Eva, motion approved subject to Audit/Review committee report.

Winton Pitcoff, editor (new), suggested associations send a bundle of material to every new member. The bundle should include a *Maple Syrup Digest*. Back issues will soon be accessible online. The four most recent issues will not be available online. Classified advertisements for members will be free. Winton is looking for information from states and provinces, local newsletters, and local sugar houses to be published in the *Digest*.

**Executive Director's Report:** Strategic Plan: Mike Girard reported that substantial progress has been made with our Strategic Plan over the years. The present version is a result of input from Council Officers, Delegates, Alternates and Committee chairs at the Connecticut planning session in 2012. Progress made on the Objectives and Strategies over the past year was noted in a handout for the Delegates' review and approval. M/S K. Ruble, W. Pitcoff approved.

Job Description Updates: Mike Girard presented Committee Guidelines for the proposed Communications Committee which will merge the present Website, Newsletter and *Digest* Advisory Committees together plus add a member communication component to the charge of this new committee. The present committee guidelines in place for the *Digest* Advisory Committee would be removed from the Council's Job Descriptions and Committee Guidelines of record.

Mike also presented Committee Guidelines for the proposed Policy Committee which was formed and appointed last year. M/S E. Randall, J. Couture approved.

**Maple Policy Committee Report:** Winton Pitcoff reported on last year's committee activity including the Council's support of the new grading regulations. Comments and letters of support have been posted online from US and Canada. He discussed new FDA Food Safety regulations in US. M/S C. Pichette, R. Fideldy, approved.

**NAMSC Minutes: continued from page 21**

**Research Committee Report :** Financial report was submitted by J. Polak. Income: \$43,129.81, expenses: \$41,981.51, net increase: \$1,148.30. Committee Chairman, W. Pitcoff made the following recommendation to fund selected maple research projects:

- "Exotic, Invasive Earthworms: A Clear and Present Danger to Regeneration in Our Northeastern Sugarbushes," University of Vermont, Bruce L. Parker, \$11,314.00.
  - "Numerical Optimization of maple Sap Flow Using a Novel Freeze/Thaw Model for Sap Exudation," Simon Frasier University, John Stockie, \$7,500.00.
  - "Developing Processing Guidelines for Maple Sap as a Seasonal Beverage," University of Maine Extension, Kathryn Hopkins, \$7,106.00.
  - "Is Tapping Below the lateral Line an Effective Tool to Increase the Size of the Tapping Band?," University of Vermont, Proctor, Timothy L Perkins, \$18,462.00.
- M/S B. Robinson, K. Ruble, approved.

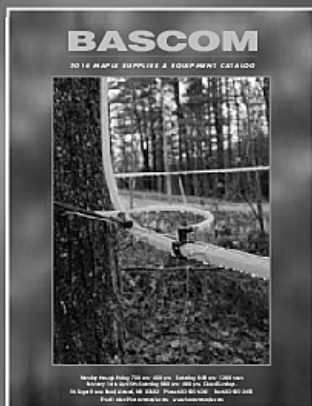
**Website Committee Report:** The websites [www.northamericanmaple.org](http://www.northamericanmaple.org) and [www.maplesyrupdigest.org](http://www.maplesyrupdigest.org) are undergoing changes, as reported by webmaster Karl Zander. An electronic directory will soon be online to enhance communication for our officers, members and associations. The NAMSC website will have a dedicated server. In the past we were using Karl's personal server. *Maple Syrup Digest* archives (200 past issues) will be scanned and posted on the NAMSC website accessible to the public. The Council presently has nine domain names and all are variations of the above two. A funding package was presented for approval. M/S W. Pitcoff, L. Merrifield, funding approved.

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**Convention Committee Report:** Joe Polak reported that the packet of information to the host state or province consists of two parts. The first is general information including a timeline for organizing their convention. The second is more specific regarding numbers of people to expect and number and sizing of rooms. For more information on this Joe asked that they contact him by email or phone.

**Educational Program Calendar:** Part of the website updates will include a list of scheduled educational programs held around the maple regions and speakers at these events. Joe Polak stated this will allow the maple community to see the maple education opportunities and schools at a glance.

**Communications Committee Report:** Mike Girard reported that the present Website, Newsletter and *Digest* Advisory Committees will be merged into the new Communication Committee. In addition, this committee will include a new member communication component. The intent is to encourage communication between leadership of local state and provincial associations and provide the means to communicate through listserv, conference calls, newsletter sharing, etc. The topics could include association management, marketing techniques, news events, industry needs and any other topics of interest that could assist our local state and provincial member associations to grow and provide benefit to their members. This committee will oversee the *Maple Syrup Digest* at an advisory level; facilitate communications among delegates, alternates and state and provincial association leaders; oversee the use and content of the NAMSC websites and encourage associations to share knowledge in every aspect of the industry.

**Policy Committee Report:** Mike Girard reported that this committee was put in place last year. Committee responsibilities are:

- Stay informed on policy, legal, legislative and regulatory issues that relate to the maple industry.
- Identify, review and offer comments on proposed government policies and regulations that affect maple.
- Keep Council members informed.
- Facilitate sharing among states and provinces examples of laws and regulations as they relate to the maple industry.

**Finance Committee Report:** Joe Polak presented list of estimated costs for improvements and / or changes to the NAMSC website which are expected to be done in the coming year. They include but are not limited to the following:

- Electronic Directory est. \$1,500.00
- Listserv est. \$500.00+
- Website \$500.00
- Hosting website \$480.00 /year
- Cost of Domain names est. \$162.00 / year.

The *Maple Syrup Digest* Archive will be digitized and placed online at an estimated cost of \$5,000.00. Motion was made to fund this project with monies from the Richard G. Haas Memorial Fund. M/S C. Pichette, L. Haig, approved to fund.

**Asian Longhorned Beetle:** Ray Bonenberg reported that the position paper on Asian Longhorned Beetle was finalized and distributed. A new ALB outbreak was confirmed near Toronto.

**Food Safety: US:** Winton Pitcoff talked about U.S. Food and Drug Administration proposed Food Safety Modernization Act regulations. There are 8,000 comments on FDA website in response to the first draft regarding produce and distribution and the handling of produce. Maple syrup would be exempt under the proposal. The status of maple cream and candy are unknown at this point. If your gross annual sales are under \$1 million you are exempt, however you are required to register with the FDA regardless of the size of operation.

**Maple Hall of Fame Committee:** Gary Gaudette, chairman, reported that there are now 83 inductees in the Maple Hall of Fame which was established in 1977. In 2014 Jacques Couture, and Don and Betty Walker were inducted. The annual induction ceremony coincides with opening of the American Maple Museum in Croghan, NY. It is held on the third Saturday in May.

**Maple Producers Manual Committee:** Dr. Abby van den Berg reported that the updated third edition of the Maple Producers Manual is planned for release in the fall of 2016. Several chapters will be revised on sap and syrup production, syrup filtration, packaging, storage, and economics. Also, there will be a new chapter on food safety.

**International Maple Syrup Month:** Mike Girard and Dave Chapeskie reported on a joint marketing effort to promote March as International Maple Syrup Month. The effort would include a website that would promote local maple events during the sugaring season. There are a number of other resources that could be provided to consumers, schools and other groups to promote pure maple products. This is in the planning stages and it was requested that there be a committee appointed to further develop this and review options.

**Maine Maple Task Force:** Kathryn Hopkins reported on the Maine Maple Task Force which was established 2011 to study the Maine maple industry. Some of the Task force efforts to date include working with the Department of Agriculture Conservation and Forestry to streamline the licensing process; work with the trust for public land to protect maple producing areas, work with the Bureau of Parks and Land to increase and develop flexibility in leasing options; promote legislative action and to help establish commission for maple in state statute.

**NAMSC Dues Increase:** A dues increase was proposed for NAMSC to meet rising operational costs such as postage, printing, translation and other administrative expenses. In order to meet these needs the Council is proposing an annual dues increase of \$2.00 per member. The last dues increase was in 2010 when the dues went from \$1.00 per local association member to \$2.00. Although this “doubled” the 2010 dues revenue the net dues income for the 6,271 local members in 2014 totaled \$12,552.00. Dues are the only source of operating revenue for the Council and doubling the dues again will only raise the net annual dues revenue to \$25,084.00.

The Strategic Plan states the dues structure be reviewed in 2015 and with the expanding efforts of the Council there is a need to compensate people for many services once provided by volunteers. This is a much needed step for continued growth of this international organization. The proposal to raise the dues an additional \$2.00 in September 2015 was approved by the Council but the terms of the increase are yet to be decided. There are two options to implement the increase and



the Delegates will vote on these options electronically at a special meeting to be called in February 2015.

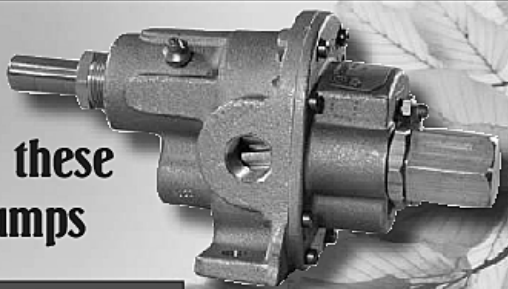
- Option 1 - Dues to be increased by \$.50 (fifty cents) per local association member in each of the next 4 years; or
- Option 2 - Dues to be increased once in September 2015 in the amount of \$2.00 (two-dollars) per local association member. The net increase with either option is \$2.00 per member with new dues being \$4.00 per local association member.

Therefore it was moved that the Council enact a dues increase of \$2.00 per member making the NAMSC Dues \$4.00 per member effective September 2015. That will either be a one-time two dollar increase or a fifty cent increase each year for each of the next four years. M/S E. Randall, W. Pitcoff approved.

**New England Agricultural Statistics Service Report:** Gary Keogh, director New England Agricultural Statistics Service reported in 2012, 2.62 million gallons of syrup was produced from 11 million taps and sales were \$78.1 million. 10,000+ tap operations are increasing in number and size. 2014 the number of taps was down slightly and a decrease in production and the value \$131.8 million is up 77% from 2012. The average price per gallon is \$37.50. Value of production Canada and the US is \$5 billion. All data can be found at [www.nass.usda.gov/nh](http://www.nass.usda.gov/nh), then go to Quick Stats. Please remember to report your production for the benefit of the maple industry. Gary's full presentation is available at <http://goo.gl/Mg3zTW>.

NAMSC Minutes: continued on page 26

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**Maple Specialists Report:** Dale McIsaac reported for maple specialists who would like to discuss increased funding from NAMSC. There is a need to update contact list.

**Maple Tap Act:** Mike Farrell talked about the Maple Tap Act or Acer Access Development Program. Congress authorized \$20 million but did not appropriate the funds. It is suggested we continue to talk to our US representatives to encourage appropriations in future years.

**Review/Audit Committee:** The Audit Committee chair Mark Harran reported that they have reviewed the data and find no inconsistencies in reporting. We are not auditors and hold no credentials for making an auditor's assessment. We do find these records acceptable for the purposes by which they are presented. M/S Jacques Couture, J. Adamski, approved.

**Nominating Committee Report:** Slate of nominees were presented as follows: Officers: President- Dave Hamilton, Vice President-Eric Randall, and Secretary/Treasurer-Joe Polak. No nominations from the floor. M/S E. Randall, B. Eva approved. Life Members nominated: Mary Ellen McCoy/Hutchinson, Hank Peterson, Dr. Gary Graham and Avarid Bentley. M/S B. Eva, W. Clark approved. Associate Members nominated: Luc Lussier, PQ; Tom McCrumm, MA; Rick Marsh, VT; Gary Gaudette, VT; Roy Hutchinson, NH; Richard Norman, MA; Norman Anderson, WI; Paul Palmer, VT; Henry Marckres, VT; Martin Plante, PQ; Karl Zander, WI; Yvon Poitras, NB; Gary Keogh, NH; Dr. Natalie Martin, PQ; Dr. Abby van den Berg, VT; Tim Wilmot, VT; Benoit Pepin, VT; Ron Wenzel, CT; Mary Douglas, VT. M/S E. Randall, L. Haigh, approved.

**Committee Appointments:** Audit-Eric Randall, chairman, David Briggs, Bob Dubos and Cecile Brassard Pichette; Communications-Eric Randall, chairman, Winton Pitcoff, Karl Zander, David Briggs, Cecile Brassard Pichette and Mike Girard; Convention Planning-Joe Polak, chairman, Ralph Fidely, Mike Girard, Rick Marsh and Dave Hamilton; Finance-Cecile Brassard Pichette, chairman, Eric Randall, Mike Girard, Joe Polak and Avarid Bentley; International Maple Day- Mike Girard, chairman, Dave Chapeskie, Lyle Merrifield, Aggie Sojka-Sperry, Eric Randall and Winton Pitcoff; Maple Hall of Fame-Richard Norman, chairman, Gary Gaudette, Avarid Bentley, Roy Hutchinson, Norman Anderson and Luc Lussier; Maple Manual- Mike Girard, chairman, Winton Pitcoff, chairman, Eric Randall, Joe Polak and Dave Hamilton; Nominating-Dave Hamilton, chairman, Larry Haigh and Wayne Clark; Policy-Winton Pitcoff, chairman, Mike Girard, Yvon Poitras, Eric Randall, Dave Chapeskie, Dave Hamilton and Mike Farrell; Research-Winton Pitcoff, chairman, Eric Randall, Jacques Couture, Joe Polak, Mike Girard, Ron Wenzel, Tom McCrumm, Luc Lussier, Frank Chaikowski and Henry Marckres; Strategic Planning-Mike Girard, chairman, Martin Plante, James Adamski, Bill Robinson, Joe Polak and Paul Palmer; Translation-David Briggs, chairman, Cecile Brassard Pichette and Yvon Poitras; Executive Director-Mike Girard.

**Maine Maple Producers Association:** L. Merrifield presented request from Maine Maple Producers Association to host NAMSC/IMSI conference in 2023. M/S J. Couture, R. Fidely, approved.

**Pennsylvania 2015:** Matt Emerick invited NAMSC/IMSI to Seven Springs Mountain Resort, Somerset County Pennsylvania, October 19-21 2015.

**Banquet Program and Recognitions**

**Maple Hall of Fame:** Gary Gaudette reported that the inductees for 2015 will be Cecile Brassard Pichette (QC) and Debbie Richards (OH).

**The Richard G. Haas Distinguished Service Award:** Presented to Dr. Gary Graham, (OH) by Mike Girard, Cecile Brassard Pichette and Joe Polak. This award was given to a leading research professional and state maple specialist in recognition and gratitude for outstanding contributions to the maple industry.

**NAMSC Special Recognition Award:** Presented to Roy Hutchinson and Mary Ellen Hutchinson in appreciation of their 24 years of service as editors of the Maple Syrup Digest.

**Golden Maple Leaf Award:** Presented by Dave Chapeskie and Yvon Poitras to Jean Marie Chabot, president of CDL.

**Lynn Reynolds Memorial Leadership Award:** Given by Yvon Poitras and Dave Chapeskie to Henry Marckres, chief, Consumer Protection Section, Vermont Agency of Agriculture, Food and Markets, for his service to the maple industry.

*Submitted by Joe Polak, Secretary/Treasurer, NAMSC. This draft version of the minutes has been edited for space, and is unofficial until approved by the delegates at the next meeting.*

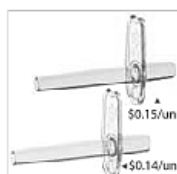
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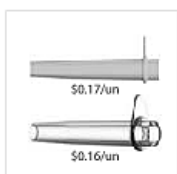
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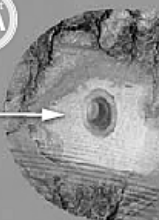
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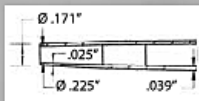
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## International Maple Syrup Institute Activity

The International Maple Syrup Institute (IMSI) strives to represent the maple products value chain from the producer and producer cooperatives through packers, equipment suppliers and research institutions, all the way to the final consumer. Collaboration and cooperation with the North American Maple Syrup Council is very important in the advancement of the IMSI's work program activities. Listed below are some of the significant IMSI activities and accomplishments in 2014.

### California Proposition 65 Legal Settlement Reached

The IMSI, with the support and collaboration of nine packers and packer cooperatives, helped reach an agreement with the State of California in regard to Proposition 65 requirements. This agreement allows maple syrup to be sold in California without a health warning on the label related to occasional and trace amounts of lead that may be present due to some lead-containing production and packing equipment that remains in use but is in the process of being phased out of production. This settlement will have long-term implications for the North American maple syrup industry. (For more information please refer to the more detailed article on page 38 of this issue of the *Maple Syrup Digest*.)

### Standardized Maple Grading System

IMSI continues to provide input into the approval process and pending acceptance of the new maple grading system at the federal levels in both Canada and the U.S. The new grades were approved for implementation in Vermont in 2014 and other jurisdictions are ex-

pected to implement the new standard in 2015 or 2016, depending on their progress made to date in working towards approval. The IMSI will continue to keep members and others abreast of the status of the regulatory approval process.

### Certified Organic Compared to Non-Certified Organic Maple Syrup

The IMSI has developed a document, with input from leading academic authorities and governmental agencies, that explains the differences between organic and non-organic maple syrup. If you wish to receive a copy of this document, please contact Dave Chapeskie.

### Asian Long-Horned Beetle Issue

The IMSI published and distributed a white paper to the federal governments of Canada and the U.S. and all state and provincial governments, on the maple industry's position regarding the Asian Long-Horned Beetle. This white paper was recently endorsed by NAMSC. Follow-up will include development of an implementation plan.

### IMSI Sponsored Grading School

IMSI continues to sponsor the very popular two-day maple grading schools, with the latest one held in Nova Scotia in conjunction with the recent international maple meetings. Participants from the CFIA, USDA and Centre Acer attended the school.

### Misrepresentation of Maple in the Marketplace

IMSI created a position statement on

*IMSI Report: continued on page 32*

### ***IMSI Report: continued from page 31***

the problem of food manufacturers and food service establishments offering for sale products that deceptively “suggest” that they contain real maple syrup through the use of the word “maple” or maple syrup related imagery when in fact they do not. It includes a standard of identity for maple syrup and specifications for how product names and flavors are presented in a “total disclosure” fashion that will hopefully be adopted by various state, provincial and federal government agencies. The North American Maple Syrup Council has endorsed the Position Statement.

### **IMSI Market Study Group**

IMSI has formed a group of industry leaders to develop an overall marketing strategy, along with execution elements, that can be adopted and used by individual maple producers, various

maple producer associations and even a united North American industry to spur sales of maple syrup in select areas or all of North America. One outgrowth has been a regular marketing newsletter managed by Michael Farrell of Cornell University. The goal is to help keep supply and demand balanced to help ensure an “orderly market.”

### **Maple Water**

IMSI recently initiated a project to establish standards of identity for maple water to avoid consumer confusion (maple water can now be produced and sold in at least four different ways) and thereby support market growth of the maple water market which could reach sales of several billion dollars, similar to what may be the case already for coconut water. Consumer confusion over what constitutes real maple water could have a negative impact on the market.

---

## **2015 New York State Maple Producers Winter Conference, January 9-10**

The 2015 New York State Maple Conference will be held January 9-10 at the Vernon-Verona-Sherrill High School in Verona, New York.

Friday’s evening program will feature two great options starting at 5:30. One option is a panel discussion with industry leaders titled “What are we going to do with all this maple syrup, marketing opportunities that come with industry expansion.” At the same time, for those interested in the latest ideas for getting the public to want the most natural sweetener in their beverages, we will be having a “Maple Beverage Show and Tell” in the middle school cafeteria. Right after these sessions the

VVS FFA will host the fourth annual maple conference auction. This auction gets bigger and better each year.

Saturday’s events include a large trade show with many exhibitors displaying plenty of specialized equipment for meeting maple producer needs, and more than 40 workshops on maple production, marketing, and more. Saturday’s trade show opens at 8:00 AM and workshops start at 9:00 AM.

For additional information see <http://maple.dnr.cornell.edu/> or contact V.V.S. FFA advisor Keith Schiebel at [kschiebel@vvschools.org](mailto:kschiebel@vvschools.org).



## Producing Syrup from Black Walnut Trees in the Eastern United States

Michael Farrell, Director, The Uihlein Forest, Cornell University

Ken Mudge, Associate Professor of Horticulture, Cornell University

Though it is not well known, all species of walnut (*Juglans spp.*) produce a sweet sap that can be boiled down into valuable syrup. There is a well-established resource of black walnut (*Juglans nigra*) trees throughout eastern North America that could be utilized for syrup production to complement existing sugaring operations. However, very little information exists on the optimum tapping time for these species, the expected yields from traditional bucket or more modern vacuum-enhanced tubing systems, and the overall economic outlook for producing walnut syrup. Although many sugarmakers are interested in tapping these trees to complement existing sugaring operations, better data is needed on potential yields and market opportunities before investing in planting these trees or seeking out existing trees to tap.

Although the number of tappable black walnuts is significantly less than the number of tappable maples (Farrell 2013), there are excellent opportunities for sugarmakers to utilize the trees they currently have while also planting these trees for long-term benefits. They grow extremely fast and are relatively easy to establish in open fields and along watercourses as riparian buffers. Most people currently plant walnut trees for their timber value and nut production. If it is also economically viable to tap them for syrup production, this could result in many more trees being established throughout the Northeast.

reported in North America in the 19th century as part of a comprehensive study of sap flow in plants (Clark 1874). Sap flow in English walnut (*Juglans regia*) has also been studied in France due to the worldwide importance of nut production in this species (Ewers et al. 2001). Controlled research in an English walnut orchard and greenhouse demonstrated the capacity of autumn, winter, and spring sap flows through a combination of stem and root pressures. The researchers never investigated the potential to use this sap as a source of syrup production and there is no such data on potential sap yields and sugar content for tapping black walnut in the United States.

The only research on using the sap of black walnut trees for syrup production took place in Kansas nearly a decade ago (Naughton et al. 2006). It was limited in nature and meant as a preliminary study. Despite the promising results, no follow-up studies were conducted. Todd Leuty from the Ontario Ministry of Agriculture recently conducted research on tapping Japanese walnuts grafted onto black walnut rootstock in Ontario. His findings, as well as other practical experience, indicates that the sugar content of walnuts mirrors that of maples, yet the amount of sap flow is significantly less. Whether the amount of sap produced is so low that it limits the commercial potential of this species is not yet known. Furthermore, none of the previous studies were done with

Sap flow in walnut trees was first

*Walnut: continued on page 34*

high-vacuum tubing and there isn't yet any reliable data on what one can expect from tapping black walnuts. Since vacuum tubing can produce two to three times the amount of sap as gravity flow in maples, it is important to determine the effect of vacuum assisted sap flow on walnuts. This article will address preliminary research exploring the potential yields from black walnut trees in the eastern U.S.

## Methods

In order to determine potential yields from black walnuts, we collected sap at four sites in New York, Pennsylvania, and Indiana during the winter of 2014. In New York, we tapped 58 trees using individual bags and 5/16 spouts on Cornell's campus in Ithaca and 96 trees using vacuum tubing at Lemoyne College in Syracuse with the assistance of Kris Dulmer and Steve Caccamo. A sap puller diaphragm vacuum pump was utilized at this site with an average reading at the pump of 18" Hg. Jacob Noonan served as a research collaborator and tapped 35 trees on buckets with 5/16 spouts in Erie, PA. Rich Hines also tapped 10 trees with 7/16 spouts and buckets in Indiana. Whereas the trees at most sites were tapped in mid-February, Hines tapped his trees on November 19 to explore the possibility of sap flow in autumn. At all locations, every time sap was collected (usually every 4-7 days), the total volume and sugar content of the sap was measured and recorded. At the end of the season, all of the data was analyzed and normalized to equate to ounces of syrup pro-

duced, following the rule of 87.1.

## Results

Figure 1 shows the running total of ounces of syrup produced per tap at the four locations. The highest yielding site (Erie PA) produced an equivalent of 11 ounces of syrup per tap whereas the lowest performer (Syracuse) yielded only 6 ounces of syrup per tap. Figure 2 displays the total sap production per tap during each collection at the four sites. These should not be considered daily totals, since sap was not collected on every day that it ran, but rather at longer intervals due to labor restrictions and the low volumes of sap flow. Figure 3 displays the average sugar content during each collection at the four locations. In a similar manner to maple sap flow, sap sugar content was very low in the fall (less than 1%) and much higher in the spring (2-3.5%). Although not shown in Figure 3 since it only displays the average sap sugar concentrations, the highest reading taken was 6.2% and there were many trees producing sap in the 4-5% sap sugar concentration range.

## Discussion

Although the sap yields observed in this study were extremely low when compared to traditional maple syrup production, it is important to realize

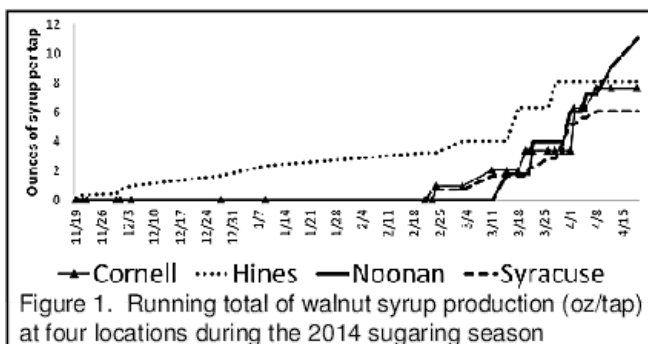


Figure 1. Running total of walnut syrup production (oz/tap) at four locations during the 2014 sugaring season

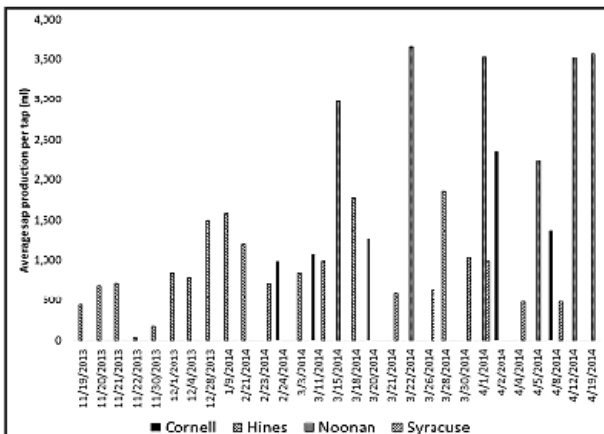


Figure 2. Average sap production from black walnut trees at four locations during 2014 sugaring season.

that this report only covers the first year of what will ultimately be a long-term study. As with maple, the differences in yields are likely to be significant between years based on local weather conditions, so it would be premature to make assumptions based on one year of data. The sample year, 2014, was also very cold throughout March and soils were deeply frozen due to a lack of snow cover, which could explain part of the low yields. Although this study suggests that it is unlikely that a walnut sugarbush will ever produce similar quantities of sap as a typical maple sugarbush, there were a few trees on some sites that did produce large quantities of sweet sap in a similar manner as maples. It is possible that there are genetic differences within black walnuts that allow some trees to produce large quantities of sap whereas others may produce very little. Further research should explore the specific qualities

of individual trees to help determine what may cause the differences in yields. Though it was surprising that the vacuum tubing system produced the lowest quantities of sap, this was only a preliminary study without any replicated trials. Thus, future research should explore sap yields under vacuum at additional sites over the course of several years before any conclusions can be made regarding the effect of artificial vacuum on walnut sap flow.

Another aspect of walnut syrup production that requires further attention is the large quantities of pectin often found naturally occurring in the sap. Pectin can make filtering the sap and syrup extremely difficult and time consuming, clogging filters much more rapidly than the sugar sand often found in maple syrup. There seems to be tremendous variation in the amount

*Walnut: continued on page 37*

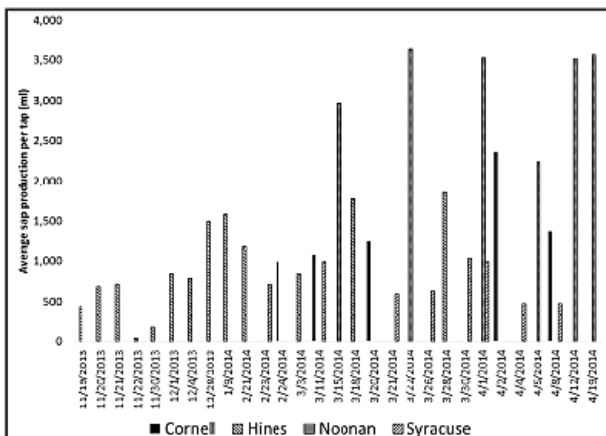


Figure 3. Avg. sap sugar concentration from black walnut trees at four locations during 2014 sugaring season

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### **Walnut: continued from page 35**

of pectin produced between individual trees and sites as well as the time of the year that the sap was collected. We did some initial experimentation with using pectinase, an enzyme that is designed to break down the pectin, obtained from Carolina Biological. Our initial trials were not extensive enough to come to any conclusions on the efficacy of pectinase, but given the problems associated with filtering and the prevalence of pectinase in so many other food processing industries, this idea deserves further attention.

Finally, additional research is necessary to explore the economics of producing walnut syrup for existing sugarmakers. Although yields from walnuts are likely to be much less than from maples, it may still be a viable enterprise if the syrup can sell at a high enough price. Black walnut syrup is a unique, novelty item that can potentially sell at much higher prices than maple syrup, especially when packaged in small decorative bottles for the gift market. A following report will outline the economic feasibility of producing walnut syrup based on variations in yield and prices.

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Farrell, M. 2013. *The Sugarmaker's Companion: An integrated guide to producing syrup from maple, birch, and walnut trees*. Chelsea Green Publishing, White River Junction, VT. 352 p.

Naughton, G., Geyer, W., and E. Chambers. 2006. Making syrup from black walnut sap. *Transactions of the Kansas Academy of Sciences*. 109 (3/4): 214-220.



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## Maple Packers & Packer Cooperatives Commit to Stringent Lead Reduction Measures

*International Maple Syrup Institute*

The North American Maple Syrup industry is committed to producing the highest quality, wholesome maple syrup and the quality and safety of our products are the industry's top priority. Pure maple syrup products are produced in accordance with very high quality standards and must meet or exceed US Food and Drug Administration and Health Canada requirements.

As part of the industry's continuous improvement efforts, since 1995, we have made considerable progress in removing lead-containing production and packing equipment from maple syrup operations. In order to address the requirements under California law (California Proposition 65) for maximum levels of lead, nine packers and packer Cooperatives in Canada and the United States have signed a legally binding agreement, committing to work toward meeting California's very stringent lead requirements over the next five years. These lead abatement measures are a continuation of the very substantial progress already made by the maple syrup industry in eliminating lead from production and packing operations.

Under the agreement, suppliers of maple syrup to the packers and packer cooperatives will further accelerate lead reduction measures on a pre-determined schedule over the next five years. While the lead reduction requirements are the same for all suppliers, the specific schedule of time to initiate and complete the changes (e.g. replacing

barrels or equipment) will vary, depending on the size of producer or supplier of maple syrup. The packers and packer cooperatives will be advising their suppliers of maple syrup regarding the specifics of the lead reduction requirements.

This agreement should be viewed as part of a larger and ongoing effort and commitment of the North American maple syrup industry to produce the highest quality pure maple syrup products and completely eliminate lead-containing equipment from maple syrup production and packing operations. It is of the utmost importance to the industry that all producers and packers of maple syrup embrace very high standards to ensure that the reputation of maple syrup be upheld. Maple syrup is a very safe food but, as with many agricultural products, there may sometimes be trace levels of lead in some syrups.

Consumers should continue to be assured that maple syrup is nutritious and wholesome and this, in turn, will help ensure a strong future for the maple industry.

### **For further information contact:**

Dave Chapeskie:  
agrofor@ripnet.com

David Marvin:  
david@butternutmountainfarm.com

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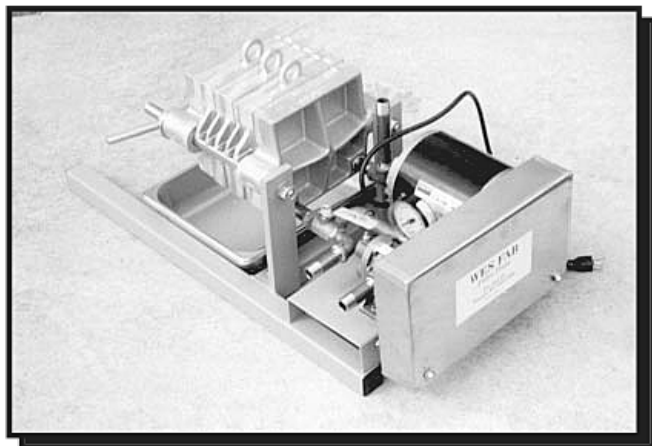
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## Roy and Mary Ellen Hutchinson Honored for Years of Dedication to *Maple Syrup Digest*



From L to R: NAMSC Executive Director Michael Girard, Past President Cécile Brassard Pichette, Roy Hutchinson, Mary Ellen Hutchinson, NAMSC President David Hamilton, and NAMSC Secretary/Treasurer Joe Polak.

At the annual banquet on October 23, the North American Maple Syrup Council recognized Roy and Mary Ellen Hutchinson for their work as editors of the *Maple Syrup Digest*.

"They worked together for 24 years to publish this informative and important maple publication for us," said NAMSC Executive Director Mike Girard.

"Our bylaws describe the *Digest* as our quarterly association newsletter and it's how the Council communicates information on maple research and happenings within our membership in a timely fashion. However, to them it was more, and the best way to describe Roy and Mary Ellen's commitment and many years as editors of the *Digest* is

that they treated and cared for the *Digest* as if it were their own."

Roy and Mary Ellen were presented with a New Hampshire-shaped, hand-whittled bowl made by Indiana delegate Keith Ruble from a piece of maple from NAMSC President Dave Hamilton's sugarbush in Indiana, complete with tap hole and stained sapwood.

Secondly, they were presented with Special Recognition Award plaque that reads: "Presented to Roy and Mary Ellen Hutchinson of Canterbury New Hampshire, in appreciation for many years of service as editors of the *Maple Syrup Digest*, and with sincere gratitude for your support of the North American Maple Syrup Council."

# Dr. Gary Graham Receives 2014 Haas Award

Dr. Gary Graham is the recipient of NAMSC's Richard G. Haas Award for 2014, an award given each year to a leading research professional and state maple specialist in recognition and gratitude for outstanding contributions to the maple industry.

Dr. Graham is a faculty member serving as an Extension Specialist in Natural Resources for The Ohio State University Extension system, within the School of Environment and Natural Resources located at the Ohio Agricultural Research and Development Center in Wooster, Ohio.

For the past 25 years his research and teaching efforts in the fields of conservation and land management have emphasized the importance of utilizing



best management practices in all land use situations. In 2001 Gary signed on to become the Extension maple specialist working with the Ohio maple syrup industry.

He works with the Ohio Maple Syrup industry by organizing annual meetings and field days to provide educational programming for producers. He serves as an Ex Officio on the Ohio Maple Producers Association (OMPA) board of directors and as past editor and publisher of their quarterly newsletter. Gary serves on the International Maple Extension Advisory board, has a university/advisor role with the International Maple Syrup Institute, and also serves on committees for the North American Maple Syrup Council.

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## In Memorium: George Fogle

George Ernest Fogle, age 90, died October 24, 2014. George spent 85 years with his family on a dairy and maple syrup farm in Mason, MI, nurturing the land and his business, Sugar Bush Supplies Co., a maple syrup equipment and supplies distributorship. The farm and business continue to thrive today under the care of George's offspring, thanks to his lifelong examples of integrity, hard work, thrift and land stewardship. NAMSC will miss George, and his devotion to the sugarmaking industry.

## U.S. Sugarmakers Must Register

The U.S. Food and Drug Administration (FDA) considers sugarhouses to be 'food facilities.' Section 415 of the Federal Food, Drug, and Cosmetic Act (FD&C Act) [21 U.S.C. § 350d] requires food facilities that are required to register with FDA to renew such registrations during the period beginning on October 1 and ending on December 31 of each even-numbered year. Further details are available online, at <http://goo.gl/h5aeVm>. If you have any questions contact 800-216-7331 or [FURLS@fda.gov](mailto:FURLS@fda.gov).


# U.S. Food Safety Regulations Still in Process

The U.S. Food and Drug Administration (FDA) is pressing ahead with its massive overhaul to the nation's food safety regulations. The Food Safety Modernization Act (FSMA) will spell out requirements for farms and food producers for implementing hazard analysis and risk-based preventive controls.

The good news for most maple producers is the exemptions: farms with less than \$1,000,000 in total annual sales of human food classified as raw agricultural commodities (food in its natural state upon harvest) are exempt, and maple syrup is considered a low-risk food and so is also exempt. In response to pushback from farmers, problematic regulations in the original draft that would have classified any farm that

brought in product from another farm – a drum of syrup, for example – as a food facility, and therefore not exempt, have been removed.

But much remains unclear. The FDA has not responded to NAMSCs request that maple cream, candy and sugar be exempt as well – if making these products is classified as food production, sugarmakers who make them could be subject to the FSMA regulations, regardless of size. There are also troubling provisions that would allow the FDA to revoke exemptions and give farmers little recourse. And the rules regarding the definition of and regulations for retail food establishments have not yet been released. NAMSC will continue to monitor the process, and keep members informed.




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# Winners of the 2014 Maple & Photo Contest at the Annual NAMSC/IMSI Meetings

## Maple Syrup and Confections

### **Light Amber US; Extra Light Can.**

- 1: Green's Sugarhouse, Poultney, VT
- 2: Paul's Sugarhouse, Haydenville, MA
- 3: Bortles Sugar Shack, Linesville, PA

### **Medium Amber US; Light Can.**

- 1: Couture's Maple Shop, Westfield, VT
- 2: Camp Aquila Pure Maple Syrup, Dent, MN
- 3: Paul's Sugarhouse, Haydenville, MA

### **Dark Amber US; Medium Can.**

- 1: Bonhomie Acres Maple Syrup, Fredericktown, OH
- 2: Couture's Maple Shop, Westfield, VT
- 3: Paul's Sugarhouse, Haydenville, MA

### **Grade B Extra Dark US; Amber Can.**

- 1: Wood's Maple Orchard, Elmwood, WI
- 2: Riordon Maple Products, Pokeshaw, NB
- 3: Brookside Farm, Bantam, CT

### **Maple Candy**

- 1: Green's Sugarhouse, Poultney, VT
- 2: Boyden Bros. Maple, Conway, MA
- 3: Gingerich Bros. Maple Syrup, Chardon, OH

### **Stirred Maple Sugar**

- 1: Bonhomie Acres Maple Syrup, Fredericktown, OH
- 2: Gingerich Bros. Maple Syrup, Chardon, OH
- 3: Riordon Maple Products, Pokeshaw, NB

### **Maple Cream; Maple Spread**

- 1: Lea Briggs, Salisbury, NB
- 2: Boyden Bros. Maple, Conway, MA
- 3: Ray Bonenberg, Pembroke, ON

### **Best In Show**

Wood's Maple Orchard, Elmwood, WI

## Maple Photos

### **Creative Maple Photography**

- 1: JoAnn Merrifield, Gorham, ME
- 2: Kevin McCormick, Rodney, NS
- 3: Frank Merriman, Chardon, OH

### **Maple People on the Job**

- 1: Frank Merriman, Chardon, OH
- 2: JoAnn Merrifield, Gorham, ME
- 3: David Kemp, Jaffrey, NH

### **Sugarbush Scenes**

- 1: Michael Girard, Simsbury, CT
- 2: George Riordon, Pokeshaw, NB
- 3: Jeanne-Mance Riordon, Bathurst, NB

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The 2015 **NAMSC/IMSI Annual Meeting**, will be held October 19 - 21 at the Seven Springs Mountain Resort in Seven Springs, Pennsylvania. For more information contact: Matthew & Stephanie Emerick at 814-324-4345 or [emerickspuremaple@yahoo.com](mailto:emerickspuremaple@yahoo.com)

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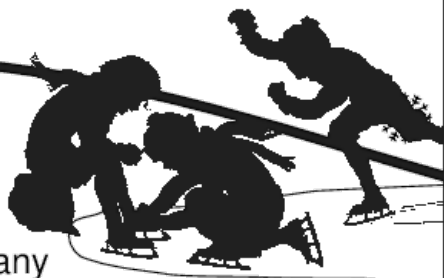
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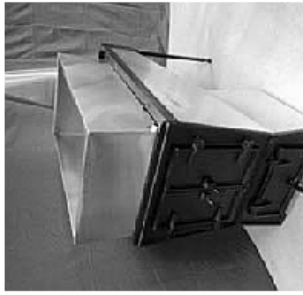


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