

Maple Syrup *Digest*



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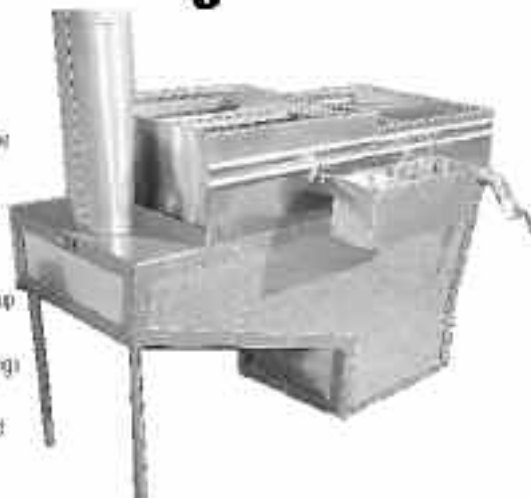


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COVER: Tim Taylor (Fred Taylor's son)
and Norman Anderson.

GREETINGS FROM YOUR PRESIDENT



I've heard positive reports from friends around the maple belt that this year's season yielded good to excellent crops, prices are up and the market demand for maple is on the rise. Record breaking syrup prices grabbed the attention of the press this spring and it was entertaining reading some of the articles. It's good to hear the media compliment us on our unique product but I did find it difficult to see the correlation between the financial return of sugaring to that of "sugarmakers striking gold" as one paper boldly reported. The increase in syrup prices along with a decent crop this season is certainly a plus for producers but we know its hard earned and a far stretch from a financial windfall. Even at today's prices we struggle with increasing production costs and some serious industry issues. The good news is that our customers continue to support us and appreciate the value of pure maple products.

The media has also been busy reporting that the food industry is subject to growing consumer concerns regarding the safety and quality of food products. Maple syrup is no exception and each and every sugarmaker should understand their responsibility to provide customers with high quality maple products. It is important that we are consistent with quality control and employ the highest standards possible when processing and packaging pure maple syrup products. Any consumer concerns

about food safety, quality and health should be addressed promptly and in a professional, courteous manner. Fact is that regardless of how much syrup we produce or pack, we equally represent the maple industry to the consumer. Our actions and practices employed as producers will be reflected in the quality of the product we produce for market.

The NAMSC Research Fund Committee is pleased to announce the Request for 2009 Maple Research Proposals. Qualified research institutions, state and provincial governmental research professionals and privately held research and development organizations are encouraged to apply for research funding. The NAMSC-RF will be considering proposals in two funding categories. The first being traditional "seed funding" which are support grants providing up to \$5,000, and the second is an expanded grant of \$10,000 to \$25,000 for significant research projects. Both categories are subject to the applicants' ability to secure supporting or matching grants from outside sources. The Committee will consider funding research proposals which focus on industry related issues such as: production efficiency, alternative energy, sustainability, energy cost reduction for maple production, product packaging, marketing and market expansion. Those interested in submitting research proposals should contact me or Joe Polak for a copy of Research Proposal Submission Guidelines.

As many of you may already know, Gary W. Graham, Ph.D., Extension Specialist, Ohio State University Extension Center, has stepped down as chairman of the Research Fund. His resignation was a result of unex-

pected changes in work responsibilities but Gary will continue with state-wide maple specialization and direct his limited maple time to Ohio issues. Gary extends his thanks to all who supported him and we extend our appreciation to Gary for the time he served as chairman.

As forest pests, like the Asian Longhorned Beetle are detected in new areas such as the large infestation in Worcester, Massachusetts, the importance of the Forest Service and related forest health programs increase. The Massachusetts infestation places the ALB on the very edge of the highly vulnerable northern hardwood forests reaching from New England into Minnesota. The NAMSC has been active along with eighteen other leading organizations in the field of conservation, forestry, and horticulture and were signatory on two letters urging Federal Government Subcommittees on Interior, Environment and related Agencies to appropriately and adequately fund the USDA Forest Service for fiscal year 2010 to help manage non-native insects and plant diseases that are threatening America's forests. The maple industry's primary concern is maintaining an adequate level of government funding for the eradication of the Asian Longhorn Beetle. Funding is vital for the control of the ALB and loss of resources could spell disaster for our industry. We will hopefully be successful in our efforts and we will continue to monitor this issue closely.

Enjoy the summer and I look forward to seeing many of you in October at our 50th Anniversary annual meeting in Bar Harbor, Maine.

Mike Girard

MAPLE HALL OF FAME

On May 16, 2009 the Maple Hall of Fame in Croghan, New York inducted two new members.

NORMAN ANDERSON

Cumberland, Wisconsin

My father, Norman Anderson and Grandfather Paul, started Anderson's Sugar Bush way before the beginning of time, about 1930! Norman Anderson was raised in rural Cumberland, Wisconsin. His parents Paul and Clara Anderson, who had moved to Minneapolis, MN for a few years in the early 1920's, moved back to rural Wisconsin just after Norman was born in 1928. Sapping was one of Paul's passions from his early days in rural Cumberland and when they returned he immediately started tapping his trees. This passion was quickly passed on to Norman. By the time Norman was old enough to be helpful they were putting out close to 500 taps. In search of more taps, Paul and Norman partnered with a cousin who had more land. This brought the tap total to around 3,000 in 1940. This growth was good, but in 1946 Paul and Norman decided it was time to expand again and purchase a commercial evaporator for \$600. The cousins were out. "Too much money," they said.

Norman and Paul were on their own. The pair continued to tap trees and sell their syrup to local stores throughout Minnesota and Wisconsin. In 1953 they suffered a small set back. A tornado destroyed 4,000 taps and forced them into another purchase, an 80 acre plot of land about 4 miles from home, this brought their total taps up to 5,000. In 1953 Paul and Norman agreed to become

equipment dealers for the Leader Evaporator Company. Up until this time they had been managing a dairy herd as well. In 1957 they sold the cattle and turned solely to the maple syrup industry to provide for their family. In 1960 more land was rented to bring the total taps up to 12,000 with two boiling locations, one 40 miles away in Minnesota and one at home in Wisconsin. In 1963 Norman married Janice Carlson and took over control of the company. Paul remained very active for many years after. In 1973 another 100 acres was purchased about 25 miles from home and that brought Norman to his peak production of almost 18,000 taps (all on buckets). Norman ran at this capacity for about 10 years until an aging uncle whom had been running the Minnesota operation was no longer able to help. Taping was then cut back to around 10,000 and Norman only cooked at the home location. Over the next 10 years production was cut more and more, as the syrup sales business grew larger and larger. In the best year Norman was only making 15 to 25% of what he was actually selling. The emphasis of the business was moving to packaging and distributing maple syrup, now all those producers that Norman and Paul had help set up over the years were relied upon to provide most of the product that was needed to fulfill the large market that Norman and Paul had created and maintained.

Norman has been a member of both the Minnesota and Wisconsin Maple Syrup Producers Associations for many years. He was also one of the early members/directors of the IMSI and Anderson's Maple Syrup still holds a director's position today. Norman served as a Director of the WMSPA for several years and currently serves on the State Fair

Committee (1995 to present). Norman has been the head maple syrup judge at the Minnesota State Fair for the past 8 years as well as serving as judge at local county fairs. Norman and his wife Janice were given the *Wisconsin Maple Syrup Producer of the Year Award* in 1993 and also hosted the WMSPA fall tour that year. Anderson's Maple Syrup, Inc. was also home to the annual first tree taping in 1992 and 2003. Norman takes every chance he can to promote maple syrup. He loves to invite groups, especially from Sweden (as he is Swedish), to feed them pure maple syrup over waffles and tell them about how maple syrup is produced. In 2008 Norman and Janice Anderson were among the first to be given the *Lifetime Membership Award* by the WMSPA for their service in the maple industry.

Norman built up Anderson's Sugar Bush and in 1994 incorporated and changed the name to Anderson's Maple Syrup, Inc. to reflect the company's true purpose: "providing the best maple syrup possible to our customers." Norman continued to run the business until 1997 when I, Steven Anderson, took over. Norman is still an important part of the business today and I rely on his experience and guidance daily. Anderson's Maple Syrup, Inc. is now one of the largest packagers of pure maple syrup in the mid-west and among the top equipment dealers in the region. This is all thanks to the hard work and determination of Norman Anderson and his father, Paul. I only hope that I can follow in this rich tradition of quality and integrity. Thank you dad!

When I think about my father and the friends and relationships he has created over his years in this industry, I know it is due to integrity and devotion to them and the industry. I don't

think you would ever find a person that my father has dealt with, that would say anything negative. He always treated everyone as a friend, with respect and fairness. I hear on the phone almost daily, "How is your dad doing?" then followed by "I sure enjoy your father, please tell him hi." This is only proof to me of his impact on our customers and the industry.

DR. FRED TAYLOR

A native of Groton, Massachusetts, where he was born in 1910, he grew up on the families market garden farm. Fred Taylor came to the University of Vermont Botany Department in 1943, after teaching for a short time at Clemson University in South Carolina. He had degrees from UMASS, and a Ph.D. from Harvard University (1938).

Dr. Taylor (who made it clear to call him Fred) and Dr. James Marvin were instrumental in the establishment of the University of Vermont's Proctor Maple Research Center in Underhill, VT. In founding the research center they rented a maple woods in Underhill. They tagged and tested the sugar content of thousands of trees, studying differences in sap sweetness from sugarbush to sugarbush. After the third year, in Fred's own words, "we began to realize we needed to do things to trees that we could not ask Sugarmakers to allow us to do, that is, radical surgery. [We needed] to find out certain things that were going on in the trees. And so the idea of having a place of our own took root. Eventually, Vermont Governor Mortimer Proctor purchased and donated a farm in Underhill that would later be named in his honor, Proctor Maple Research Center. Doctors Taylor and Marvin were at the helm.

Fred used his knowledge to bring an understanding of the maple tree to others; hundreds of university students were where he put his efforts. He taught generations of maple industry leadership from his teaching post at UVM, as a maple researcher, and as a regular presenter at two decades of Vermont Extension maple schools. He was called on regularly to present programs to community groups such as Granges, FFA classes and the community at large.

After retirement, Fred continued to be an educator. He worked diligently at the Champlain Valley Exposition's maple sugar house, some years spending all 10 days of the fair in the maple information area. He worked at the fair until he was 92 years old. Many of his former students still come in to the sugar house to visit Fred, he amazed them by remembering their names. A memorial is in place for him.

He was a fixture at the annual UVM Maple Sugar-on-Snow Party, to teach students and faculty alike about maple syrup. He offered grade samples and an explanation about the grade differences. He volunteered in elementary schools and gave presentations to groups from kindergarten through high school. He taught teacher workshops at Shelburne Farms, preparing detailed educational maple displays. His posters and displays were regularly featured at UVM's library and in the Botany department display cases during the spring sugaring season.

Bill Clark, former president of the Vermont Maple Sugarmakers' Association, recently noted that he was particularly impressed with Fred's research and displays of the types of maple trees in North America, their leaves, bark and seed. Those displays are still used today.

Fred was a member of the Vermont Maple Promotion Board, the Vermont

Maple Industry Council, and the Vermont Maple Sugarmakers' Association. He attended a number of international meetings and was a presenter at the 2000 meetings, held in Burlington, Vermont.

He was a consummate researcher for the maple industry. In his later years he researched Vermont maple history and was a founding member of the Vermont Maple History Committee, and an arm of the Vermont Maple Industry Council. His efforts were instrumental in making sure that agricultural fairs contained a segment of public education in maple, the Champlain Valley Exposition and the Vermont Maple Festival were two of the fairs that received the most attention. He also served on the board of directors of the Vermont Maple Festival and was honored by that group on several occasions, including being named Parade Marshall to lead the huge parade. He rode on a sap wagon, behind a team of horses, around the streets of St. Albans, the festivals host city.

Dr. Fred Taylor was truly a maple luminary, one of those who early on assured that research and education would perpetuate the progress and development of the maple industry. He was proud of the history of maple production, marketing and development and assured maple producers that his work would keep maple education in the forefront of agricultural news and the consciousness of consumers. He assisted in the development of *The Maple Sugaring Story: A Guide to Teaching and Learning* about the Maple Industry, by careful analysis of the botanical details; he made corrections to diagrams and botanical information insuring technical accuracy.

Aside from maple, Fred was a distinguished scholar in the broader

botanical world. He was known to be a prolific researcher and writer. His illustrative abilities were well known in Vermont and throughout the botanical world. He continued his love of plants and botany well into his nineties, growing pumpkins and gourds for large horticultural displays at fairs and many weddings, every one identified by common name and scientific name. Fred taught and carried out research at UVM for 33 years, he retired in 1975 as a full professor.

Fred passed on in 2006, at the age of 95. It would be appropriate to quote the old saying, "old Sugarmakers never die, they evaporate." Fred Taylor died, but he has not evaporated in the minds of those he so loved to serve. The maple industry will forever be benefactor of Fred Taylor's knowledge and labors. He is survived by his wife, Paula Fives-Taylor, his three children and several grandchildren.

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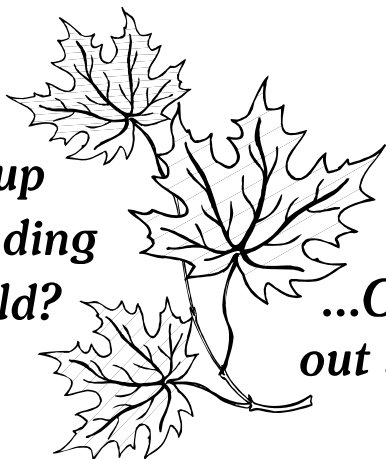
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IMSI NEWS

The International Maple Syrup Institute has been very active in recent months serving its members through activities of the Executive Secretary, Committee, and Board of Directors. This update will focus primarily on highlights from the February 2nd Board of Directors meeting, which was held in St. Hyacinthe, Quebec.

Standardized Maple Grades and Nomenclature

Following the completion of consumer research in 2009, IMSI's Maple Grades and Nomenclature committee tweaked their proposal for standardized grades and nomenclature and prepared a 10-point action plan for follow-up. The proposal was discussed at the February board meeting, and the 10-point action plan for follow-up was approved by the Board of Directors. A more full report on this item is published separately in this issue of the Maple Digest.

Air Injection Review

IMSI's Air Injection Committee chaired by Dr. Patrizia Ramacieri completed their review of air injection technology and tabled their final report at the February Board meeting. Their report and recommendations were accepted unanimously by IMSI's Board of Directors. A more detailed update is published in this issue of the Maple Digest. Planning has been initiated to follow-up on the recommendations contained in the report. Comments and questions should be provided to Dave Chapeskie, Executive Secretary or Gary Gaudette, President of IMSI.

Standing Committee's for IMSI

Dave Chapeskie prepared a proposal for six standing Committees of IMSI, including Terms of Reference for each Committee. Recognizing that functioning volunteer committees are extremely important to meeting the goals of the Institute and making progress, the Committees will provide an important and easily recognized framework for volunteer work activities and reporting accomplishments of the Institute.

The Committees are:

- Maple Grades and Nomenclature
- Strategic Planning
- Maple Processing and Products Review
- Maple Certification and Quality Assurance
- Public Affairs
- Membership

The proposal was approved by IMSI's Board of Directors in February. The intent is that Committees which are currently not active will be phased in over the next year or two. A review of IMSI goals and strategic directions is seen as an important short-term priority.

Exotic Forest Pests (Incl. Asian Longhorned Beetle)

The recent outbreak of Asian Longhorned Beetle in Worcester, Mass. demonstrates that maple industry officials must remain vigilant regarding policies and activities designed to prevent the spread of Asian Longhorned Beetle and other exotic pests which have the potential to seriously damage maple trees and/or affect the health and integrity of sugar bushes and other forest areas. IMSI strongly encourages its

members to be active in raising public awareness regarding exotic forest pests, their potential to cause serious damage to forests including sugar bushes, and what can be done to avoid spreading the pests. IMSI has recently joined the Continental Dialogue in the United States to share information with other forest stakeholders and advocates of responsible and effective avoidance, containment and control of exotic forest pests. Recently, both IMSI and NAMSC agreed to join other stakeholders in supporting enhanced appropriation(s) in the US to control these pests. Dave Chapeskie has agreed to prepare a draft Position Statement designed to encourage more proactive planning on the part of governments to safeguard the interests of commercial maple producers and encourage early detection of infestations in commercial forest areas. Dave is currently reviewing existing Legislation and Policy related to Exotic Pests as a first step in developing a position statement.

IMSI Membership Recruitment

IMSI is working to raise maple stakeholder awareness regarding the goals and mandate of the Institute as well as historical and more recent accomplishments. This included mailing a letter to about 30 potential members which provided some background on IMSI, including accomplishments and an invitation to join the organization. Those who have recently joined IMSI for the first time or re-joined the Institute are welcomed. New members as well as existing members are strongly encouraged to contact IMSI's

Executive Secretary Dave Chapeskie or President Gary Gaudette, if they have any questions or concerns. Recent recruitment efforts should be seen as a first step in working to grow the membership of the Institute as we strive to offer valuable service to members.

Promotion of NAMSC-IMSI Annual Meetings

IMSI continues to actively raise awareness of the maple community regarding the 2009 (Bar Harbour, Maine) and 2010 Annual North American Maple Syrup Council and International Maple Syrup Meetings.


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STANDARDIZED MAPLE GRADES AND NOMENCLATURE INITIATIVE

International Maple Syrup Institute

In 2005, the Maple Grades and Nomenclature Committee of the International Maple Syrup Institute tabled recommendations to standardize grades and nomenclature for the commercial maple syrup industry. The proposal included a framework that incorporated standard legal requirements, as well as standard grades and nomenclature for pure maple syrup. After extensive consultation with maple stakeholders including producers, packers, regulators and others it was proposed that there be only one grade of "table grade" syrup" and other syrup would be placed in a "processing grade" category. It was proposed that there be four classes of table grade syrup with the standardized system and that both color and intensity of flavor attributes be used to describe the syrup in the different classes.

Generally, the framework for standardized grades and nomenclature for maple was well received by industry stakeholders. There was some concern regarding the ability of consumers to utilize flavor or flavor related attributes to help describe pure maple syrup. At the same time, there was little debate that flavor of syrup is very important to the consumer. There had been little research done to help better understand this aspect. Consequently, IMSI sponsored both sensory evaluation and consumer

research projects to help determine if flavor descriptors could be utilized in a standardized grading system. The findings from this research demonstrated clearly that the consumer could not readily identify flavor classes such as vanilla, confectionary and even maple. However, consumers could detect significant differences in overall flavor intensity (ie. the taste difference between mild and stronger flavored syrups). They also provided a number of terms that they would find useful in describing flavor intensity. Consumers also indicated that describing the color was important to them.

After careful review of the research findings from both sensory evaluation and consumer research, the use of specific flavor descriptors such as vanilla, maple and confectionary was ruled out. However, intensity of flavor descriptors were seen to be useful, despite the fact that this attribute did not always correlate with color. Generally, lighter syrups of good quality are expected to have a milder intensity of flavor than darker syrups.

In February of 2009, IMSI's Maple Grades and Nomenclature tabled a proposal for standardized maple grades and nomenclature at IMSI's Board of Directors meeting taking into account research findings. While minor amendments to the original Committee proposal were made, the framework showing regulatory requirements, grades and nomenclature was similar to earlier proposals. Following the February Board of Directors Meeting, the Maple Grades Committee decided that they would present the Board with two or three options for the

classification of table grade syrup. As few as two classes of table grade syrup will be considered in this proposal. It was also proposed that syrup which did not meet legal and quality specifications for table grade syrup would need to be packed in 5 litre (5 quart) or larger containers, with an exemption for farm-gate sales.

While there is interest in what might appear in revised regulations, most maple stakeholder interest is focused on what standardized information would appear on the label. At present it is proposed that this include:

- a) "Table Grade Syrup"
- b) "Pure Maple Syrup"
- c) "Batch Number"
- d) "Color Class"
- e) "Intensity of Flavor Class"

The following action plan was tabled by IMSI's Maple Grades and Nomenclature Committee to guide future activities. This action plan was approved by IMSI's Board of Directors on February 2nd in St. Hyacinthe, Quebec. You will note that specific test markets in North American and Overseas Markets utilizing the standardized system are proposed as a step to full implementation.

IMSI's Maple Grades and Nomenclature Committee's action plan:

- 1) Continue to evaluate effectiveness of classification systems used for other food commodities;
- 2) Continue to raise awareness among maple stakeholders regarding proposal for standardized maple grades and nomenclature;
- 3) Finalize a more detailed write-up on standardized grades and nomenclature;

clature;

- 4) Assess the interest and feasibility of utilizing test markets to evaluate the proposal for standardized grades and nomenclature;

- 5) Clarify in detail what is required in regulation(s):

- a) To permit test markets in Canada and the United States;

- b) For a standardized grading system;

- 6) If determined to be needed and feasible, select and plan for test markets in North America and overseas;

- 7) Implement and evaluate test markets;

- 8) Refine standardized maple grades and nomenclature proposal based on test markets;

- 9) Finalize proposal for full implementation of a standardized maple grades and nomenclature system; and

- 10) Recommend to regulators that the system be standardized using IMSI's proposal.

IMSI's Maple Grades and Nomenclature Committee is currently working to finalize details in the standardized grades framework, including options for the classification of table grade syrup. Several maple stakeholders in Canada and the United States are actively reviewing the Committee proposal that was tabled at IMSI's board meeting in February. Input to the Committee regarding the classification and nomenclature for table grade syrup as well as other aspects should be provided to Dave Chapeskie, Chair of IMSI's Grades and Nomenclature Committee. Dave's telephone number is 613-658-2329 and his e-mail is agrofor@rip-net.com.

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NEW HAMPSHIRE'S MAPLE SEASON SATISFACTORY

By Barbara Lassonde

A survey of some of the state's producers indicates they harvested an abundant crop of sap with a lower than ideal sugar content, resulting in a good supply of the darker grades of syrup. Light amber was scarce and what little was made was quickly reserved for candy-making. A good supply of high quality medium amber was produced.

A large amount of dark amber was produced, along with plenty of grade B. Many sugar makers expressing pleasure with the dark amber flavor of some grade B syrup.

In a state that's approximately 180 miles from North to South, usually one half receives a better harvest than the other half. But this year, from the Northern tip to the Southern border, producers all around New Hampshire who use vacuum reported a better-than-average, to outstanding harvest. Those without vacuum had an average to poor season.

Muriel Blais of Bisson's Sugar House in Berlin reported that "during one stretch of seven or eight days when the temperatures did not get below freezing, the sap ran continually, day and night."

Phil Rogers of Rogers Sugar House in Warner had so much sap, he and his son boiled round the clock two nights trying to catch up.

Dave Fuller of Fuller's Sugar House in Lancaster said, "We had a great season, and during one particular run, the sap ran like I've never seen it."

Alvin Clark of Clark's Sugar House in Alstead, who had a banner year last year, said "We had a normal season this year."

Hank Peterson of Peterson Sugar House in Londonderry does not use vacuum on his tubing, and reported a below average yield.

Brian Folsom of Folsom's Sugar House in Chester, who uses only buckets, said "We had an average season and boiled every weekend."

Don Lassonde of Warner operates without vacuum and produced half of what he figures he should have. Other producers without vacuum experienced an average to poor harvest.

Many of those in Southern NH who were hard hit by the December ice storm were unable to tap their entire orchards due to debris and downed tubing. Some did not tap at all.

Over 65 sugar houses participated in New Hampshire Maple Weekend this year, and brought an estimated 25,000 - 50,000 visitors to the state's sugar houses. The overall production for NH's 2009 season is expected to be above average, probably 80,000 - 85,000 gallons.

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TECHNICAL POSITION PAPER ON AIR INJECTION

January 29, 2009

*Nathalie Martin¹, Timothy Perkins²,
Patrizia Ramacieri¹, and Abby van den Berg²*

DEFINITION

The use of air injection technology in the maple industry can be defined as: the forced introduction of air through a series of perforated pipes submerged in the boiling sap in the front and /or back pan of a maple syrup evaporator.

Several studies conducted in recent years have investigated aspects of the use of air injection technology in the process of maple syrup production. This technology was designed primarily to produce lighter-colored syrup which procured a higher market price for producers. No single study can encompass the wide range of conditions found among maple producers (different evaporators, size and design of equipment and maple operation, varying sap composition, varying air injector design and air flow rate, etc.), and it is not practical to scientifically replicate each of these different sets of conditions. Each of the studies had different objectives and was designed to answer a limited number of questions under certain conditions and constraints, and thus cannot be extrapolated beyond certain limits. In some instances, results of these different studies may appear to be contradictory; however each simply reflects the particular set of experimental conditions and emphasis on a specific question of interest. In most cases the perceived discrepancies can be explained. This document is an attempt to provide an overview of the key results that have been found to this point and to point out where the results are similar, and where they are not. Questions which require further research to answer are also identified.

COMPARISON OF SYRUP ATTRIBUTES PRODUCED WITH AND WITHOUT AIR INJECTION

Light Transmittance (Color)

All studies indicate that there is a strong effect of air injection on the color of maple syrup. Air injected syrup is generally significantly lighter in color (it has a higher light transmittance) than syrup produced without air injection. The increase in light transmittance appears to be influenced by a large number of factors. The effect is generally greatest in the early and mid-season, but may be reduced or absent in the late-season.

Light Transmittance Changes in Storage

Air injected syrup that is packed in retail containers behaves similarly to syrup produced without air injection over a storage period of one year. Color deterioration of both air injected and non air injected syrups proceed at the same rate in a given container type.

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²University of Vermont, Proctor Maple Research Center, Underhill Ctr., VT 05477

pH

Maple syrup made with air injection has a significantly lower pH compared to syrup made without air injection, although this is not consistent across all studies. When observed, differences typically occur in early to mid-season, but not in the late-season, although the tendency for a lower pH in air injected syrup is still often observed. During processing, sap pH tends to be slightly elevated in all partitions of air injected pans compared to non-air injected pans. In all cases, pH of syrup made with or without air injection was within the established range of pure maple syrup.

Conductivity

The conductivity of maple syrup produced with air injection is not significantly different from that produced without air injection.

Carbohydrate Composition

There were no significant differences in sucrose concentration between air injected and conventionally made syrup (without air injection). Some, but not all studies revealed a tendency for air injected syrup to have a slightly elevated level of invert sugars (glucose and fructose). When observed, differences in invert sugar levels did not fall outside the range documented for pure maple syrup.

Mineral & Metal Composition

In general, few differences were observed in the bulk mineral composition of maple syrup made with or without air injection. In some studies significant differences in some elements were observed, however these tended to be small and inconsistent, and in all cases the concentrations found were within the range of pure maple syrup.

Organic Acids

In a laboratory-level study, air injection resulted in reduced levels of oxalacetic acid in syrup, but did not significantly affect the concentration among the five other organic acids examined.

Phenolic Compounds

In a laboratory-level study, syrup made with air injection had significantly lower levels of syringaldehyde than syrup made without air injection. A tendency for higher level of vanillin with the use of air injection was observed, although the results were not statistically different. The coniferol content did not differ.

Qualitative monitoring during the production process showed that phenolic acid content decreased when air injection was used. This decrease seemed to be more important as the season progressed towards the end of the season.

Bioactivity

In the laboratory scale study, parameters such as the total soluble phenolic acid content, total antioxidant activity and oxydo-reduction potential were used to assess the impact of air injection on the bioactive properties of maple syrup. Preliminary results pointed to an alteration of these properties.

Production Factors (Defoamer, Niter, Temperature)

In a study using a standard type of maple evaporator, the amount of defoamer

required did not vary with or without air injection. Similarly, there was no difference in the rate of scale (niter) accumulation on pan surfaces, nor in the amount of loose scale (sugar sand) that was filtered from syrup.

In the same study, the temperature of the boiling sap was consistently and significantly lower in all partitions except the draw-off partition (where the air injection tubes were shortest). The liquid temperature averaged 7.7°C cooler (range 3.3 - 14.3°C) in air injected pans than in an evaporator without air injection.

Flavor and Volatile Compounds

The effects observed of air injection on syrup flavor varied somewhat between the different studies. This is due to the different manner by which the maple syrups were produced as well as the different sensorial analysis techniques used.

In a survey of commercial syrups made with and without air injection, the preliminary results on sensorial analysis based on the Maple Flavor Wheel, revealed a modification to the overall flavor profile with an increase in the tendency for foreign flavors due to air injection. A more complete study of the impact of air injection on sensory properties of maple syrup confirmed the previous tendencies. In the laboratory scale study, it was demonstrated, based on the Maple Flavor Wheel, that air injection modified the maple syrup flavor profile by increasing the level of the Vanilla flavour, while the level of the other flavor attributes were lower. The maple syrup samples were also evaluated by accredited inspectors from the Quebec industry in order to characterize them using the official standardized quality grading system. Out of 6 categories of off-flavors, the results indicated that air injection samples had more than twice as many unidentified origin off-flavors (R4) as compared to the non-injected syrup samples (31% R4 versus 12% R4, respectively), although these results were not statistically significant. No other category of off-flavor was detected. The inspectors also recorded 31% Good, 38% (slight taste of caramel, bud or wood) for the air injected maple syrup samples and 38% Good, 50% (slight taste of caramel, bud or wood) for the non-injected syrups. Of these, only the R4 category results in a price penalty to the producer. Similar results were observed in a parallel study with industrial evaporators. In general all the panellists of this study described air injected maple syrup global flavor using the following descriptors: honey, vanilla, acidic, chemical and oil taste. The total proportion of all off-flavors did not vary between air injected and non-air injected syrups.

In syrup produced simultaneously in paired identical evaporators boiling from a common sap source, there was no evidence of an increased frequency of total off-flavors resulting from air injection. The total concentration of volatile flavor compounds was significantly greater in syrup produced without air injection compared to syrup produced with air injection in both evaporator and laboratory studies. Several volatile compounds typical of maple syrup were significantly reduced or wholly absent in syrup produced with air injection, although this finding is not inconsistent with the fact that the syrup produced with air injection was significantly lighter in color.

Product Safety

This aspect was not directly addressed in any of these studies. However, the consensus is that to the best of our collective knowledge, there is no evidence for concern. It is understood that food safety measures and maple equipment manufacturers' operational guidelines, such as the use of an appropriate air filter, an appropriate air

uptake positioning and the use of equipment made of appropriate material for contact with food, must be respected while using the air injection technology

POTENTIAL MECHANISM(S) OF AIR INJECTION ON MAPLE SYRUP ATTRIBUTES

Overall mechanism(s)

The physical and chemical reactions involved in the production of maple syrup are very complex and not that well understood. Air injection adds yet another complicating factor in the understanding of the color and flavor development processes. The development of the characteristic amber color and flavor profile of maple syrup (composed of a mixture of a number of flavor compounds) is, to a large extent, a result of the intricate interplay of the caramelisation and Maillard processes and the polymerization of phenolic compounds. The different studies have been conducted to measure the effects of air injection during the production of maple syrup and to elucidate some of the mechanisms that may be responsible for the changes observed. It has not been clearly demonstrated that these mechanisms are causal in the changes observed in the resultant syrup color and flavor. The introduction of air injection technology as documented in these studies may affect these processes in a number of possible ways such, including:

A) Reduction in processing temperature

Air injection resulted in substantial reductions in sap and syrup processing temperatures within a commercial evaporator system. These reduced temperatures could produce a reduction or delay in caramelization and Maillard reactions, resulting in reduced color and flavor development.

B) Chemical oxidation

An increased level of oxygen introduced by air injection (ambient air contains 21% oxygen) through sap in a laboratory setting produced higher levels of oxidizing compounds *in situ*, with a concomitant decrease in color precursors and/or colored polymers. This oxidation could result in lighter-colored maple syrup, a reduced flavor profile, and a tendency for syrup to contain elevated levels of specific off-flavors (R4-undetermined origin).

C) Altering the alkaline degradation phase

Substantial color and flavour development in maple syrup can occur during the 'alkaline degradation phase' of processing maple sap into syrup. Reductions in sap and syrup pH are typically observed with air injection. The lower pH levels found during sap processing with air injection could reduce the time sap spends in the alkaline degradation phase, thereby resulting in reduced color and flavour development in finished syrup.

D) Mechanical agitation of sap

The mechanical action of bubbling air may increase the surface area of sap exposed to the air. This could lead to a loss in volatile compounds that are involved in flavor development, resulting in reduced flavor/aroma in finished maple syrup produced with air injection. This mechanical action may also provide a better distribution of heat during the processing of sap.

To summarize, the effects produced by all the above processes, including the reduction of processing temperature, the chemical action of oxygen, alterations in the extent of the alkaline degradation phase, and probably to a lesser extent, the mechanical agitation as a result of air injection, are all operating simultaneously. Depending on the

specific operating conditions and the specific portion of the process, one mechanism may predominate over the others. The precise contribution of each possible mechanism to the overall effects observed is currently unknown. A survey conducted amongst producers using air injectors suggest that the full range of conditions and effects might be expected.

CONCLUSION

The overview of the results obtained from these studies demonstrates that some maple syrup attributes may differ as a result of the use of air injection during maple syrup production. Even though the occurrence of several phenomenons was observed in these studies, results have well demonstrated the reduction of color and flavor development due to lower processing temperatures, as well as the alteration of maple syrup chemical components through oxidation reactions. It is important to note that these phenomena are not well understood and, even if they occur simultaneously during processing, their relative contribution to the observed modifications in maple syrup properties were not evaluated and may greatly depend on the wide range of processing parameters.

The results from the various studies may be reconciled with the following hypothesis: When the processing conditions are such that the processing temperature is significantly lowered, then the normal color formation may be retarded due to a delay in the caramelization and Maillard reactions. The flavor profile is similarly less developed, thereby providing less masking of certain flavors. The intense air flow responsible for important temperature lowering also leads to a loss of the volatile compounds.

When the temperature lowering is not as extreme, oxidation of the color precursors which are being formed at a relatively normal rate may become more important. The oxidation of components such as the phenolic compounds is concomitant with changes in the flavor profile (namely diminished characteristic flavors and increased in off-flavors) and bioactivity.

The processing conditions may favour one mechanism over the other, although these mechanisms could all be operating simultaneously. No one mechanism can be expected to explain the full spectrum of phenomena observed, given the range of equipment set-ups and operating conditions that exist in the field.

Although the majority of syrups produced with air injection may be considered to fall within the normal range of limits of composition of maple syrup, they are decidedly skewed towards lighter colored syrup with considerably less developed taste.

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Table 1 Comparison of results of air injection studies at Centre Acer and the UVM Proctor Maple Research Center. **Legend:** + = significant increase with air injection, - = significant decrease with air injection, 0 = no significant change in syrup attribute. No symbol indicates that measurement was not taken in that study.

Parameter	Centre Acer (Lab Scale)	Centre Acer (Survey)	CARA (Evaporator)	PMRC Sap (Evaporator)	PMRC Concentrate (Evaporator)
Light Transmittance (%)	+	+	+	+	+
pH	-	-		0	0
Conductivity (µS/cm2)				0	0
Carbohydrate Composition					
Sucrose (%)	0			0	0
Glucose (%)	0			+	+
Fructose (%)	0			0	+
Galactose (%)	0				
Maltotriose	0				
Total invert sugar (%)				+	+
Mineral/Metal Composition					
Aluminum (ppm)					+
Calcium (ppm)	0			0	0
Copper (ppm)					0
Iron (ppm)				0	0
Magnesium (ppm)	0			+	+
Manganese (ppm)	0			+	+
Nitrogen (ppm)				0	+
Phosphorous (ppm)					0
Potassium (ppm)	0			+	0
Sodium (ppm)	0			-	0
Sulfur (ppm)				+	0
Zinc (ppm)	0				0
Organic Acids (%)					
Oxalacetic	-				
Gluconic	0				
Malic	0				
Succinic	0				
Fumaric	0				
Lactic	0				
Phenolics (ppm)					
Vanillin	0(tendency↑)				
Conyferol	0				
Syringaldehyde	-				
Production Factors					
Total defoamer used (g)					0
Filtered Niter (g/kg syrup)				0	0
Scale Thickness (µm)				0	0
Liquid Temperature				-(3 to14°C)	-
Evaporation Rate				-	0
Flavors / Off-Flavors					
Volatile Flavor Compounds	-			-	-
Flavor (organoleptic)	+Vanilla, -others			-	
Off-flavors (organoleptic)	0 (+R4)			0	0

Table 2 Air injection study at Centre Acer. **Legend:** + = increase with air injection, - = decrease with air injection, 0 = no change in syrup attribute. No symbol indicates that measurement was not taken in that study.

Parameter measured	Increasing the level of O2	Notes
Total antioxidant activity (%)	-	
Dissolved Oxygen (% saturation)	+	Only at early season
Oxydo-reduction potential (mV)	+	0 in late season
UV-Visible spectra (AU)	-	
Temperature (°C)	0 (gas injection)	Δ4°C gas injected-no injection
Monitoring during production of air-injected and non-injected maple syrups		
Total soluble phenolic acids content (g/L) ¹	-	
Hydrogen peroxide (mg/L)	+	0 in late season
Oxydo-reduction potential (mV)	+	0 in late season
Absorbance at 420, 342, 284, 277nm (AU)	-	

APPENDIX - ABSTRACTS/PAPERS

The following collection of abstracts and papers are not part of the technical consensus summary, but are included here for completeness.

Air injection in evaporators: impact on maple syrups quality

Adaption by N. Martin from: Boutin, J. 2005. "Injection d'air dans les évaporateurs: impact sur la qualité du sirop d'érable", Coopérative acéricole régionale des Appalaches (CARA), 163, rang du Nord, St-Pamphile, QC, G0R 3X0

In 2004, the Coopérative acéricole régionale des Appalaches (CARA), a group of organic maple producers, carried out a project aimed to evaluate the impact of air injection on maple syrup. The objectives of the project were: to verify the effects of air injection on maple syrup color, to determine the stability of these effects upon time and to evaluate the impact on maple flavor. The first experiment was done with four evaporators one equipped with air injection and three without. The second experiment was meant to evaluate the performance of a processing plant using air injection for the first time comparing it with the previous years. In both experiments, the results show that air injection has a great impact on light transmission producing lighter colored maple syrup. Maple syrup from the first experiment was packaged in small containers after conditioning and pasteurization treatments and stored for 8 months at room temperature. No difference was observed between air injected maple syrup and non-injected maple syrup. Results also showed that maple syrup flavors are greatly affected with use of air injection. From both experiments, sensory analysis showed a loss in the characteristic maple flavor and an increase in honey, vanilla and sugar flavors with the use of air injection along with a unpleasant mouth and throat sensation.

Air injectors for maple syrup production

N. Martin, S. Guay, M. Cournoyer, C. Charron, R. Gaudy, R. Desruisseaux, M. Cartier Centre ACER inc., 142, Rang Lainesse, St-Norbert d'Arthabaska, QC, G0P 1B0

In 2002, the maple syrup industry asked Centre ACER to carry out a research project allowing the documentation of the effects related to the use of this new technology. The work was done in 2003 when maple syrup samples were taken from 35 maple syrup producers half of whom were using the air injection technology. The objectives of the project

were: to determine if there was a color change in maple syrup produced with the use of the technology, when compared to the traditional process; to evaluate the differences through out the season; and to follow the color changes during storage. The study was not made for the purpose of understanding one system over another but to give an overall evaluation of the technology. Based on the results, we observed a lighter color in maple syrup samples made with the air injection technology, mostly at the beginning of the season. Stored for nine months in ideal conditions, maple syrup samples, produced at the beginning of the season, showed similar color conservation profile, when a better color conservation was observed for air injection samples produced from mid to the end of the season. However, the use of air injection seems to produce maple syrup with lower pH and flavour defects.

Study of the impact of air injection on maple syrup chemical and sensory properties

N. Martin, M. Cournoyer, A. Arzate, L. L'Hocine, É. Robert, R. Gaudy, J. Lavoie, G. Boudreau
Centre ACER inc., 142, Rang Lainesse, St-Norbert d'Arthabaska, QC, G0P 1B0

Recently, maple producers have sought to produce syrup with a lighter color for its higher commercial value. Air injection during maple sap evaporation has been introduced to achieve this. The current research was meant to investigate the effect of this technology on maple syrups physical and sensory attributes and to see if air injection contravenes Quebec's provincial regulation forbidding the use of decoloring, bleaching or refining processes. The hypothesis upon which the research was based was that oxygen introduced into maple sap during evaporation causes oxidation of color/flavor precursors and colored polymers. Maple syrup was thus produced at lab scale under controlled conditions to ensure that all effects measured were directly attributable to the air injector process. Maple sap was concentrated using different levels of oxygen injected (without injection, 0%O₂/100%N₂, 10%O₂/90%N₂ and "air" 21%O₂/79%N₂). The results showed that syrups produced with "air" injected were significantly lighter in color and lower in pH than the controls (without injection and 0%O₂/100%N₂) and that this is proportional to the level of oxygen injected. While, these effects were significant in sap acquired in early and mid tapping season, there was no significant difference observed at the end of the season suggesting a link with sap composition. The monitoring of other parameters (DO, oxydo-reduction potential, H₂O₂, HMF and furfural content) also suggests that oxidation reactions may be involved. In parallel to these observations, the study showed that there was also an unfavourable impact of air injection on maple syrup flavor. Considering all these aspects, the use of air injection during maple syrup production is to be reconsidered.

At this point, it is worth noting that some important aspects of the technology weren't covered by our work such as the evaluation of the potential risks of maple syrup contamination, related to the use of the air injection, and of the conformity level with safety and sanitary rules in food transformation, should also be addressed.

Effects of air injection on syrup chemistry and flavor.

van den Berg¹, A.K., T.D. Perkins¹, M.L. Isselhardt¹, M.A. Godshall² and S.W. Lloyd³.
Ontario Maple Syrup Producers Association Conference, Richards Landing, Ontario. July 2007.

Air injection is reported to have a variety of effects, including the production of lighter-colored syrup and reductions in the amount of sugar sand developed and deposited as nitre on pans. These effects, and whether air injection yields other effects on the chemistry and flavor of maple syrup, have not been rigorously tested. Thus, during the 2006 and 2007 production seasons we conducted experiments in the Maple Production Research Facility at the Proctor Maple Research Center to test the effects of air injection on the chemistry and flavor of maple syrup. The studies compared the chemistry, flavor,

sugar sand formation and nitre deposition of syrup produced with and without air injection simultaneously from a common sap source.

Effects of air injection combined with reverse osmosis on maple syrup chemistry and flavor.

van den Berg¹, A.K., T.D. Perkins¹, M.L. Isselhardt¹, M.A. Godshall² and S.W. Lloyd³.
Ontario Maple Syrup Producers Association Conference, Owen Sound, Ontario. July 2008.

Air injection is reported to have a variety of effects, including the production of lighter-colored syrup and reductions in the amount of sugar sand developed and deposited as nitre on pans. Experiments were conducted during the 2006 and 2007 production seasons in the Maple Production Research Facility at the Proctor Maple Research Center to test the effects of air injection on the chemistry and flavor of maple syrup. The 2006 experiment first examined the basic effects of air injection by comparing syrup produced with and without air injection simultaneously from a common sap source. The 2007 experiment sought to investigate the effects of combining the use of air injection with the use of reverse osmosis (RO), as many producers often employ both types of technology. This presentation will report results from this experiment, which compared the chemistry and flavor of syrup produced with and without air injection simultaneously from a common source of sap pre-concentrated to 8% sugar by RO.

¹Proctor Maple Research Center, The University of Vermont, P.O. Box 233, Underhill Ctr., VT 05490

²Sugar Processing Research Institute, Inc., 1100 Robert E. Lee Blvd., New Orleans, LA 70124

³United States Department of Agriculture Agricultural Research Service Southern Regional Research Center, 1100 Robert E. Lee Blvd., New Orleans, LA 70124



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INDUSTRY REVIEWS AIR INJECTION TECHNOLOGY AND ITS USE IN THE PRODUCTION OF MAPLE SYRUP

In recent years, some maple equipment manufacturers have sold air injection (AI) technology equipment for the production of maple syrup. For purposes of the recent industry review conducted by the International Maple Syrup Institute, air injection technology is defined as the forced introduction of air through a series of perforated pipes submerged in boiling sap in the front and/or back pan of a maple syrup evaporator. In recent years, several research studies have investigated aspects of the use of this technology. AI was designed primarily to produce lighter-colored syrup which generally produced a higher market price for syrup in the bulk market. Independent research findings confirm that the use of AI can significantly lighten the color of syrup. Also, some maple producers in Canada and the United States have reported that niter deposits on their evaporator pans have been reduced significantly using AI, although this has not been found to be the case in controlled research investigations.

In 2008, some maple industry representatives raised questions regarding whether or not use of AI was in full compliance with maple regulations in Canada and the United States. Further, there were also questions regarding whether or not the syrup produced with AI had char-

acteristics consistent with the norms for pure maple syrup and assured the production of a safe and high quality product. Several research studies have been conducted on the use of AI since 2002 in an attempt to answer some of these questions.

In 2008, a committee of the International Maple Syrup Institute (IMSI) was formed to review research findings for AI and make recommendations to IMSI's Board of Directors regarding its use. Representatives on the Committee included maple equipment vendors, maple packers, maple producers, maple researchers, and maple regulators. The committee mandate focused on reviewing the characteristics of air injected syrup compared to non-air injected syrup, an assessment of possible safety risks to the consumer, and a determination of legal conformance in Canada and the United States.

Representatives from University of Vermont Proctor Research Center in Vermont and Centre Acer in Quebec completed a thorough review and integration of independent research findings evaluating AI in Canada and the United States. The technical paper produced was very useful in helping document many of the characteristics of air injection syrup. This served as a backdrop to committee discussion which ensued. Legal references were consolidated by representatives from the Vermont Agency of Agriculture and the Canadian Food Inspection Agency. These also provided important background to committee discussions.

After review and discussion of research findings as well as legal references, the Air Injection Committee

forwarded the following industry position and associated recommendations for the consideration of IMSI's Board of Directors at their Board meeting on February 2, 2009, in St. Hyacinthe, Quebec.

There is no objection to the use of air injection technology since the characteristics of the syrup produced using air injection technology generally fall within the norms for pure maple syrup and there is no evidence of safety issues with the syrup produced. This statement regarding use of air injection technology together with the five recommendations listed below was unanimously supported by IMSI's Board of Directors.

1. That proper conditions of use of air injection technology be defined and provided to maple extension agents, maple stakeholders and others. This would include the use of an appropriate air filter, appropriate air uptake positioning and the use of equipment made of appropriate material for contact with food;

2. That the maple industry actively step up efforts to raise stakeholder awareness regarding technical and potential marketing implications of using air injection technology. Technical marketing implications are discussed in IMSI's Committee report;

3. That the maple industry sets payment for bulk syrup to reflect ongoing consumer demand and market forces. It is fully acknowledged in the report that many consumer prefer darker table grade syrups;

4. That industry requests that a research study be initiated to compare the bio-active properties, including antioxidant content (with associ-

ated health benefits) of syrups produced with and without air injection; and,

5. That the maple industry verbally advises maple regulators regarding the maple industry position on the use of air injectors. Such advice should help maple regulators determine if the use of air injection technology is compliant with state, provincial and federal regulations. It is suggested that maple regulators advise both IMSI and the appropriate provincial or state associations of any concerns regarding the legalities of using AI technology in the production of maple syrup.

The International Maple Syrup Institute is following up on the above referenced recommendations as required.

Please contact Dave Chapeskie, R.P.F., Executive Secretary of IMSI if you have questions or wish to receive a copy of the Position Paper on Air Injection Research and/ or the IMSI Committee Report which was endorsed by IMSI's Board of Directors in February 2009.

Prepared by:
Dave Chapeskie, R.P.F.

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MAPLE PRODUCERS' EFFORTS BACKED BY STATE FUNDS

The New York State Maple Producers Association appreciates the show of confidence from lawmakers who have continued support for the maple industry in the 2009-10 state budget. The \$131.8 billion budget passed by the Senate and Assembly on April 3 includes \$150,000 for NYSMPA programs. That is the same support given in the 2008-09 budget.

"We're delighted to get it, considering the way the budget situation is in Albany," NYSMPA President Dave Campbell said. "Legislators clearly see the potential for increased production and marketing for New York

State maple syrup." Both Campbell and NYSMPA Executive Director Mary Jeanne Packer said the state support affirms the Association's efforts to promote the industry.

"They are pleased with what we've accomplished with promotions money. They see there's still potential, and they're willing to put up the money," Campbell said. Packer also pointed to state support in the creation of the Maple Task Force, officially announced by Ag & Markets on March 25. Additionally, almost every newspaper in the state offered some type of coverage of maple season and Maple Weekend events.

"It's in people's minds now - that New York really is a maple producing state," Packer said. The Association's long-range planning committee will

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meet on April 22 to discuss uses of the new state promotions funding. Packer and Campbell said the list will most likely include expanding youth education efforts and a building on last year's successful fall promotion.

Campbell said interest from New York City schools in the Vernon Verona Sherrill Central School FFA mobile maple exhibit continues to increase. State funds could be used to help meet that demand, he said.

The fall promotion with the state's apple growers was very successful, and it's a program Packer and Campbell want to see grow. One of the program's components was recipe cards, which were a big hit at apple orchards as well as at the NYSMPA Maple Center at the NYS Fair and at members' sugarhouses and sales areas. The thousands of recipe cards

printed are all gone now, and Campbell said state money could be used to renew the effort while developing more ways to get them into the hands of consumers. Outreach to producers should continue, Packer also said, mentioning a campaign launched this winter in partnership with the Cornell Maple Program and CCE that encourage producers to talk to their neighbors about leasing trees or collecting and selling sap.

Meeting with lawmakers and answering their questions about the maple industry are key components to the Association's success in getting the state support restored. Packer recalled that participation by association members in Maple Lobby Day in February was the highest ever.

Said Campbell: "All of our trips to Albany have paid off."

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Contact: Robert Smith, E-mail: bob@beeline-online.net

or

Eric Ellis, E-mail mainemaple@beeline-online.net

Announcing the sixth annual...

IMSI - International Maple Grading School

December 3 & 4, 2009 - Skowhegan, Maine

The International Maple Grading School is for maple producers, bulk syrup buyers, state inspectors and others needing to accurately grade maple syrup or judge maple product entries at fairs and contests. This school will provide a strong scientific base combined with intensive hands-on exercises. This approach will enable participants to learn how to grade or judge maple products with confidence. It is being held in Skowhegan, Maine on December 3 and 4, 2009.

Space is limited and pre-registration is required. For further information contact Kathy Hopkins, Phone 207-474-9622, FAX 207-474-0374 or Email: khopkins@umext.maine.edu The International Maple Grading School is sponsored by the International Maple Syrup Institute, the University of Maine Cooperative Extension and the Vermont Agency of Agriculture, Food and Markets.

A fee is charged for this Extension program to cover costs. A limited number of scholarships are available to individuals unable to pay. If you are a person with a disability and will need any accommodations to participate in this program, please call Kathy Hopkins at 207-474-9622 to discuss your needs. Please contact me at least 14 days prior to this event to assure fullest possible attention to your needs.

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