Maple Syrup Digest

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GREETINGS FROM YOUR PRESIDENT

With the 2005 maple season just around the corner, many producers are working in the woods on upgrading their tubing and vacuum systems. The unpredictable weather patterns we are currently experiencing have left very little snow in many regions. The temperature here in western New York this weekend is sixty degrees warmer than the same weekend last year.

Maple Sunday Weekend/Open Houses are scheduled in many states in March. These are a great promotional event educating the public on the production of pure maple syrup and related products that can be made from maple syrup. If you are participating in any of these events make sure you have interesting things for your visitors to do and see i.e. hayrides, free samples, sugar on snow, etc. Some areas have developed websites to help promote these events. Contact your local association for information on the availability of a website that may be helpful in your locality for promotions, etc.

The 2005 North American Maple Syrup Council and International Institute meetings will be in Quebec. Details are available in the Maple Digest. The committee is making plans for informative and exciting meetings.

Best wishes for a productive maple season with good quality and ample quantities.

Roger C. Sage, President

IMSI NEWS

by Larry Myott
Executive Sectretary

December, 2004 didn't bring much winter to most of the maple belt. In Vermont we had a couple cold days, but mostly we had temperatures in 20's and 30's. January started out warm (40's), with lots of rain, wind and very little snow. Like I have been telling everyone who asks, "we don't need snow to make syrup in March and April."

Tent Caterpillars are the latest threat to maple trees, and they have raised havoc on 90,000 or more acres in Vermont. Barbara Burns of the Vermont Department of Forests, Parks and Recreation recently reported to producers that this insect has defoliated some commercial forests in most parts of Vermont. Summer defoliation affects maple trees health by reducing their ability to produce and store starches. Those starches are necessary to make sugar for sap production, new leaf flush in the spring and wood production too.

If you had defoliation in your maple woods last summer, you should consult with your forester about whether or not you should be tapping in 2005. Perhaps you want to really make sure you don't over tap in 2005. Although defoliation is quite common, trees usually re-foliate within a few weeks, that did not happen in 2004.

The Quebec Federation of Maple Producers Annual Meeting was held in Granby, Quebec in early November. I was invited as an observer along with my interpreter, and fellow sugarmaker, Jacques Couture, president of the Vermont Maple Sugar Maker's Association.

Nearly 500 producers from around Quebec attended the event in a large hotel ballroom. Although the meeting was all in French, it was a very informative meeting for those of us outside of the Quebec maple world. There have been rumors about the Federation quota system failing and that Quebec producers were fighting it. There was no evidence of that at this meeting. The meeting was very peaceful and producers appeared to be happy. Those producers that I talked with indicated that they are happy to get paid for their syrup, even if they have to pay a small percentage for grading, testing and marketing. Many of the producers had fought against the implementation of the quota system, but when it was adopted they have adopted the plan and appear to be happy to go with it. About 7,400 producers are involved in the province with the quota system and all market their syrup through the Federation.

The Federation aims to restrict production and keep prices at a stable level, therefore avoiding surpluses and price depression. Currently the price paid to Quebec producers is about $2.00CN per pound.

This annual meeting group consisted of 100 delegates elected at 11 regional meetings, with more than 3000 producers attending, around Quebec during the fall. Some of those meetings were reported to be contentious and rather ugly, there was no evidence of that in Granby. Open to all Federation members, There were about 400 non-delegates attending. Charles Felix Ross,

Federation Secretary General reported that they are not rethinking the quota system, but they are fine tuning it. After one years experience they are re-examining the way the quota is determined, perhaps adjusting the numbers before the 2005 crop is purchased.

The quota system has actually created a black market for Quebec maple syrup, with it being sold into the U.S. through ports outside of Quebec. Several producers have been fined large sums because of this. Ross said, "(The black market) is an important issue. . . . When someone sells syrup under the table, it's not fair to the other producers." The annual meeting was very educational, open and relaxed for those members in attendance.

A new USDA Grading Kit has become available, but the company making it, has not marketed it yet. This kit was first unveiled to maple graders at the New Hampshire based international maple grading school in December. I'm on the track of this and will provide details as they become available. It is reported that the kit, which sells for $125 US, has some problems matching the old USDA colors. It also has problems with scratching easily and the quality of the glass bottles being used.

(For information on the IMSI, call or write Larry Myott, IMSI Executive Secretary, 5014 Route Seven, Ferrisburgh, VT 05456. Email: Larry.Myott@uvm.edu)

*Gary Graham, Ohio State University Extension maple specialists, is shown here learning the latest in grading maple syrup at the December grading school in New Hampshire. The school was developed by Henry Marckres of the Vermont Agency of Agriculture, Kathy Hopkins of UMaine Extension and Sumner Dole of the University of New Hampshire Extension. More than 30 attended the three day program from around the maple world in North America. (*Photo by George Cook, UVM Extension)

INDIANA MAPLE SYRUP ASSOCIATION ANNUAL MEETING

By Steve Deatline

"How Big is your Footprint?", referring to the impact that roads and trails make in a sugar woods; both as compaction and as erosion, was the subject of one of two talks given by Gary Graham, Resource Specialist from Ohio State University at the annual meeting of the Indiana Maple Syrup Association. Members were made aware of just how much damage can be made by the simple process of collecting sap; using tractors, sleds, skids and even horses. Graham showed slides of trees damaged by their proximity to collection trails. He explained that these trees grew slower and produced less because sugar maples have most of their roots within 5-8 inches of the surface and that they go out to 3 to 5 times the distance to the drip line. Compaction or any change in that top 5-8 inches can damage the tree. The bottom line here was to use larger tires with lower psi and as few trails as possible.

The second presentation by Graham had to do with liability in maple-syrup production. He explained the difference between product and property liability, stressed to attendees that they must talk to their insurance carriers to be absolutely certain that there is coverage on the activities carried on in their operations. He also stressed that the best way to go is with a commercial policy, covering just the maple business.

Stephanie Hays-Mussoni gave a brief talk about the Cope Environmental Center in Wayne County near Centerville, Indiana. She is in charge of the educational programs there so she showed members how interpreters explain the various phases of mapling; in short programs, for school groups, and in longer weekend programs for families. An auction of maple-related articles and equipment was held, with proceeds going to the Cope Center.

Dealers of various maple-related products and equipment set up displays that were available for attendees to browse. Each dealer spoke briefly about new products and their particular line of products.

Art Harris, IMSA member, talked about his and his wife, Rebecca's experiences with a reverse osmosis machine. After carefully researching the subject, they decided that RO would, in the long run, pay for itself in fuel savings and in better quality syrup. He stressed the need for careful maintenance, to avoid having to replace expensive membranes.

Two board members, Kenny Shipley and Florence Williams, were re-elected and Art Harris was elected for his first term on the board. President for 2005 will be Garry Sink, vice-president is Don Jewell, secretary is Lowell Williams and treasurer will be Dave Hamilton. Larry Yoder will continue to publish the TAPLINE quarterly and Steve Deatline will continue in the position of public relations.

The 2005 meeting is planned for Columbia City, Indiana on the first Saturday of December.

NEWS FROM CONNECTICUT

By John Trumbull

The 26th annual meeting of our association was held at the Uconn School of Agriculture in Storrs, Connecticut, on November 6, 2004. The officers and Board of Directors were elected for the upcoming year. Ron Wenzel from Hebron, Connecticut, will again be our president. All other officers will remain as they were last year. Bruce McKay will take Dave Rhinelander's place as an Eastern Region Director. All other Directors were reelected to serve for another year.

Our membership continues to hold steady as we have close to 270 members on our books. Not all of the members have paid this year's dues, however. The membership dues remain the same $20.00 that they were last year.

Our annual brochure of Sugar Houses open to the public is due to be printed by the end of December. Many of our producers chose to be represented in this brochure, with their addresses and hours of business listed. These brochures are distributed in town halls, libraries and businesses throughout the state.

Our new membership to our Association is exciting to all of us. The University of Connecticut Forestry and Wildlife Club has secured funds to purchase an evaporator and establish a sugar house on campus for the first time at UConn. The club hopes to be open to the public this season and help raise the awareness of the Maple Industry in Connecticut. The Connecticut Association has agreed to support this endeavor in any way we can. We have given the club a membership in the association, two metal Connecticut Maple Producer signs and an ad in our "Open to the Public" brochure. Members of the Connecticut Association are also on hand to lend technical and practical advice to the students and will work with them throughout the season. The contact person for this new group is Geoff Picard — Forestry and Wildlife Club, W.B. Young Bldg., Room 308, 1376 Storrs Road, Storrs, CT 06269-4087.

Connecticut and Massachusetts Maple Associations held their joint picnic again this year with about 110 people in attendance. Members Kay Carol and husband Mark Hanan hosted the event at their farm in Litchfield, Connecticut. There were antique cars and tractors and a tour of a local vineyard and winery. The day was a great success. We hope to keep this tradition going for next summer at a location in Massachusetts.

Paul Hughes, a Connecticut producer and Business Counselor for the Connecticut Small Business Development Center, spoke to our group about the availability of help for producers wanting to expand their business. There is free counseling for members of the Association. This help can include developing marketing plans, loan packaging, and preparing a business plan. More information is available from Paul Hughes at (860) 347-6924.

The speaker for the day was Brad Gillilan from Leader Evaporator Company. Brad spoke about all aspects of syrup production with

wood-fired evaporators. He had many interesting insights about the collection and production of maple syrup. There were tidbits of information for everyone, from new producers to the old timers. The presentation was easy to listen to and quite enjoyable.

Many of us in Connecticut are taking advantage of the snowless days, so far, to improve things in the woods, set new lines and get ready for another season. We are hoping Mother Nature will be kind to us again this year. We hope to have a production report and season summary for the June Digest.

1998 ICE STORM EFFECTS ON THE HEALTH AND PRODUCTIVITY OF SUGAR BUSHES OF EASTERN ONTARIO: PART 2

Thomas L. Noland[1]
Geoff McVey[2]
and Dave Chapeskie[3]

SUMMARY

In 1998, fifteen managed sugar bush blocks with 7% to 72% ice-induced crown damage were established in eastern Ontario. All blocks received dolomitic lime (calcium and magnesium) and phosphorous (P) and potassium (K) treatments in June 1999. Initial crown damage, fall root starch, sap production and sweetness were all measured. Syrup production was calculated. Trees with >50% (severe) crown damage had reduced root starch content in 1998, 2000, 2001, but not in 1999 or 2003. Sap produced per tap and sap sweetness were reduced by damage, but not consistently in all years. Syrup production per tap was consistently reduced in damaged trees in all years in trees with moderate and/or severe damage. The lime and P and K treatments did not significantly affect syrup production. Results suggest that severe ice storm damage to crowns resulted in reduced fall root starch levels and less sap production, and/or sap sweetness, and therefore lowered the syrup producing capacity of sugar maple for six years after the storm.

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[3]Ontario Ministry of Agriculture and Food, ORC Government Building, Box 2004, Kemptville, ON K0G 1J0.

INTRODUCTION

One of the worst weather disasters ever recorded in Canadian history (Milton and Bourque 1999), the ice storm of January 5-10, 1998 was unprecedented in its duration, severity, and area affected (Chapeskie 1999). At its peak the ice storm covered a large portion of eastern Ontario, southern Quebec, and into Atlantic Canada along with the adjacent areas of northeastern United States. As a result of this storm, sugar maple trees suffered extensive crown damage throughout the ice storm damage region of eastern Ontario.

Critical research needs identified by Ontario maple syrup producers included the impact of crown damage on tree health as measured by fall root starch level and on the rate of recovery or mortality for damaged sugar bushes, and on tree productivity as measured by sap production and sweetness (Chapeskie and Nielsen 1998). To address those needs the objective of this project was to determine whether ice storm damage to the crowns of sugar maple trees in working sugar bushes affected their health and productivity (but not mortality). This was assessed by measuring the amount of starch stored in the roots, the volume and sweetness of the sap produced. In addition, this study examined the effect of lime and fertilizer treatments to accelerate the recovery process of

sugar bush health and productivity. The results from the first three years of this study were published previously in the maple digest. To determine the longer term affects of the ice storm on sugar maple productivity this paper reports results from the second set of measurements performed in 2003 (root starch) and 2004 (sap production and sweetness). Although data from all years measured will be presented in this paper only the results from the part 2 measurements will be featured and discussed.

METHODS

Plot Network

In 1998, 15 one-hectare blocks were established throughout the heavily ice-damaged area of eastern Ontario in privately owned sugar bushes. Each block was rated for ice damage by visually estimating the percentage of branches in each tree's crown that were removed by ice damage (Lautenschlager and Winters 2001). Each block was divided into four, 0.25-ha plots that were treated with either:

i) 2 tonnes of dolomitic lime/ha;
ii) 200 kgs of P and K/ha;
iii) lime plus P and K, or
iv) nothing (control) in June 1999.

At the time of establishment, 6 focus trees per plot (24 per block) were chosen to represent the average damage in the block and were marked for use in the study. At establishment, the following parameters were measured:

i) tree damage,
ii) focus tree diameter at breast height (DBH),

iii) basal area m2 ha-1,

iv) and root diameter of two roots sampled per tree for starch.

The experiment classified each block into one of three damage levels:

i) Light (0 - 25%),

ii) Moderate (26%-50%), and

iii) Severe (51% +).

Root Starch and Sap Sampling

Root starch samples were collected in 1998, 1999, 2000, 2001, and 2003 by taking late fall (Nov. or early Dec.) (Wargo 1979) increment cores, 2-3 (0.75-1.25") cm long, from two surface roots per tree of three focus trees per treatment plot (12 trees per block). Trees were tapped using standard 11.1 mm (7/16") diameter spiles with a taphole 6.35 cm (2.5") deep using conservative tapping guidelines: a maximum of two taps per tree (Chapeskie and Nielsen 1998). Sap was collected using a tube and bucket system. Sap collection was made from the same 3 focus trees per plot as root starch. Fifteen blocks had sap collections made in the spring of 1999, 2000, 2001, and 2004. Syrup production was calculated by multiplying seasonal sugar content average times total seasonal sap volume using the rule of 87 (Walters 1982).

Starch Analysis

Extraction of starch used 1.5 ml of methanol: chloroform: water mixture (12:5:3 by volume) (Haissig and Dickson 1979) and was done 3 times on each 25 mg DM (freeze-dried mass) root tissue sample (ground with size 20 mesh). Root starch was analyzed using a Waters' HPLC system as described in Noland et al. (1997).

RESULTS

Root Starch

Ice storm damage definitely affected root starch levels in sugar maple trees (Figure 1). In 2001, a drought year, the root starch levels of the severely damaged trees were lower than the trees with less than 51% crown damage. However, by 2003 the root starch levels were the same at all three damage levels.

Sap Volume and Sweetness

Sap volume was reduced by ice storm damage but not consistently every year (Figure 2). In 2004 the sap production was not affected by crown damage levels although it was affected in earlier years.

The impact of ice storm damage on sap sweetness was also variable (Table 1). In 2004, both moderately and severely damaged trees had less sugar in their sap, showing the same pattern as found in 2000.

Syrup Production

Potential syrup production was reduced by ice storm damage in all years measured (Figure 3). Six years after the storm in 2004, moderately damaged trees were still producing less syrup than either lightly damaged or heavily damaged trees the same result found in 2001.

Dolomitic lime and fertilizer treatments did not have a significant affect on anything measured in this project (data not shown). However, the P and K fertilizer treatments did stimulate diameter growth of ice storm dam-

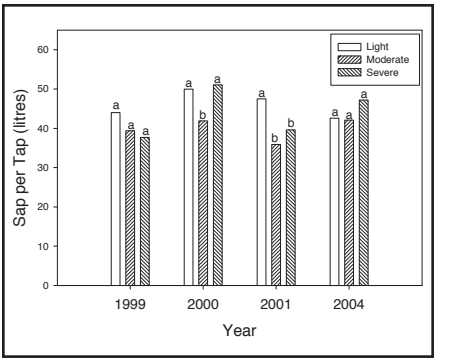

Figure 2. Ice storm damage impact on seasonal sap volume production in sugar maple trees from 15 tapped stands in Eastern Ontario (Mean). Any group of columns within a year topped by different letters are significantly different (p≤0.05).

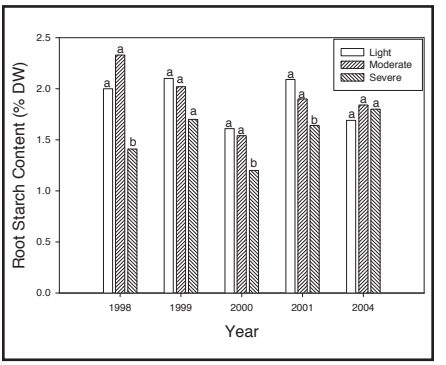

Figure 1. Effect of ice storm damage on fall root starch levels in sugar maple trees from 15 tapped and 1 non-tapped maple stands in Eastern Ontario (Mean). Any group of columns within a year topped by diffeerent letters are significantly different (p≤0.05).

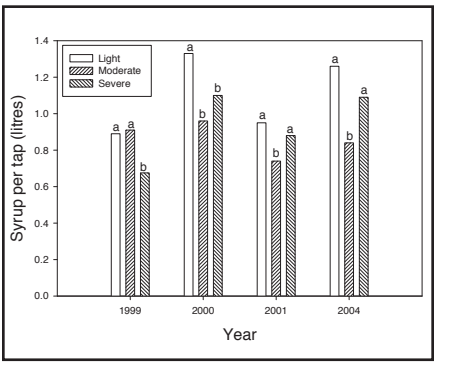

Figure 3. Ice storm damage impace on calculated syrup production in sugar maple trees from 15 tapped stands in Eastern Ontario (Mean). Any group of columns within a year topped by different letters are significantly different (p≤0.05).

Table 1. Ice storm damage impact on seasonal average sap total sugar content in sugar maple trees in Eastern Ontario (mean). Any mean in a column followed by the same letter is not significantly different (p≤0.05).

Damage Level	1999 Sap Sugar Content (%)	2000 Sap Sugar Content (%)	2001 Sap Sugar Content (%)	2004 Sap Sugar Content (%)
Light	1.74 ab	2.25 a	1.73 b	2.76 a
Moderate	2.00 a	1.97 b	1.73 b	2.50 b
Severe	1.57 b	1.94 b	1.93 a	2.52 b

aged maple trees (Lautenschlager et al. 2003; Timmer et al. 2003).

DISCUSSION

The crown of a sugar maple tree is its photosynthetic factory for producing sugar. By removing a significant portion of this crown, the ice storm of 1998 reduced the capacity of the tree to produce energy (sugar) needed for growth and development. Storm damage was assessed as the percentage of live crown removed. Although this provides a rough assessment of the ice storm impact on the tree's ability to produce energy, it does not account for differences in initial crown size between trees and the differing ability with age (Kramer and Kozlowski 1979) and crown classification (Meating et al. 2000) to sprout new epicormic branches to replace lost ones. Therefore, the impact of 50% damage on one tree that initially had 50 tertiary branches may not have been as great as on a second tree that had 20 such branches before the storm. This led to the effort to quantify the number of live and epicormic branches on the focus trees used for this experiment (Lautenschlager and Winters 2001). In addition, the age of the tree and its condition prior to the storm (Proulx and Greene 2001) also will influence the degree to which it will be affected by ice storm damage. The combination of these factors and weather patterns in the eastern Ontario region during the growing seasons (Parker 2003) after the storm are likely reasons why response to the ice storm was variable from stand to stand; these factors have been considered when interpreting the results.

The severe level of damage (>50 %) reduced fall root starch in 3 of the 5 years it was measured including the drought year of 2001. Reductions in autumn root starch levels have been reported for sugar maple trees where crown dieback equaled or exceeded 50% (Renaud and Mauffette 1991). Death of sugar maple has been associated with shoot and root starch depletion in artificially defoliated trees (Gregory and Wargo 1986). Severe insect defoliation reduced fall root starch levels in sugar maple (Kolb et al. 1992). Other ice storm studies estimated that, for hardwoods, a 40-50% crown loss was the critical level above which tree death tended to increase rapidly with increased damage (Proulx and Greene 2001, Boulet et al. 2000). The 50% crown damage threshold for root starch depletion found in this study tends to support this critical crown damage threshold for mortality.

Root starch levels of severely damaged trees were not significantly affected by crown damage in 1999 or

2003. This suggests that variable growing conditions during the different years (Parker 2003) also may affect the fall root starch levels. Other factors correlated with and possibly influencing autumn root starch content appear to be of little or no importance.

Ice storm damage tended to reduce sap production, sap sweetness, and syrup production; but results varied with the year. Sap sugar content was significantly reduced by crown damage in three of the four years measured including 2004. However, damage effects on sap volume were more variable (only affected in 2 of 4 years) and that variability may have been because of the strong dependence of sap volume production on weather during the sap run and the inherent natural variability of weather from year to year. Syrup production was significantly reduced by damage in all four years, but only in moderately damaged trees in 2001 and 2004. In his review, Coons (1999) could not find any previous literature documenting the effect of ice storms on sugar maple sap and syrup production. This study and that of Campbell et al. (2001) are, to my knowledge, the first evidence that ice storm induced damage to sugar maple crowns reduces sap sweetness, sap volume, and syrup production. Insect defoliation has been shown to lower sap production and sweetness in Pennsylvania (Kolb et al. 1992). The higher sap sugar content in the severely damaged trees in 2001 is similar to Kolb et al.'s (1992) finding that the second year after insect defoliation, sap sweetness was highest in the heavily (60-90% foliage damage) damaged maples.

Lime and fertilizer treatments did

not have a significant effect on anything measured in this study. The P and K treatments were found to enhance the recovery of sugar maple from crown damage by stimulating diameter growth (Lautenschlager et al. 2003; Timmer et al. 2003). It is possible that such treatments could be used in the future to speed recovery of trees from crown damage. However, sugar maple response to liming treatments is a long term process (Long et al. 1997) and it is too early to make any definitive conclusions on liming treatment effects.

In conclusion, ice storm damaged sugar maple trees tended to have less syrup productive capacity (20 to 33% less syrup) and lower root starch levels in moderately and/or severely damaged trees. The ice storm damage effect has proven to be significant for maple syrup producers since it has persisted for seven sap runs after the ice storm.

ACKNOWLEDGEMENTS

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THE SUGARERS' MOON

The sugarers'moon shines down on the meadow
where spirits of old sugar makers tend to a kettle.
The ghost of a flame that boils off steam,
a smile cracks a face as old sugarers' dream.

He knows they've come back to see the first run,
the sugarers' moon means the seasons begun.
They speak of old friends and the stories they made,
Bert looks at the color and argues the grade.

He speaks of deep snow and the snowshoes they used
and how some of the best seasons they worked in low shoes.
Some speak of their families who still carry on
a tradition they felt would no longer go on.
Others look sad and struggle to say,
that their treasured groves had since died away.

Another log on to quicken the flame.
To taste the first run, is the reason they came.
The tapping is all done, the sap will run soon.
And we'll meet with old friends under a sugarers' moon.

Michael Benton 3/7/01

FUNDS SOUGHT FOR NEW BUILDING

Dear Friend of Maple Research:

For over fifty-five years, the University of Vermont Proctor Maple Research Center (PMRC) has conducted research that has benefitted the maple industry in a number of ways. From experiments that focus on the efficient use of plastic tubing for sap collection, to research on how to keep maple free from adulterants and contamination, to assessing the impacts of acid rain and climate change on forests, the work of PMRC scientists and staff has been instrumental in supporting maple producers, equipment suppliers, and maple syrup packers/processors.

In the past few years, we have embarked on a new course of projects that we hope will reap further gains. As part of this initiative, we installed new tubing in the majority of our sugarbush as part of an experiment to compare sap collecting equipment and tubing layout from several major equipment manufacturers. This work has already proved to be quite interesting, as the first year's results yielded an average of 0.6 gallons of maple syrup per tap in the 2004 season. We are now ready to take the next step, but in doing so, we find that we need the help of the maple industry.

Many questions have arisen over the past few years pertaining to sap processing and syrup-making technologies. New rigid/semi-rigid tubing and associated fittings, reverse osmosis, and more recently, air-injection kits are becoming more commonplace. Many sugarmakers have asked us how these new technologies affect the chemistry and quality (flavor) of maple syrup?

There are many questions, but unfortunately, relatively few answers. We would like to change this.

We are hoping to begin a new series of projects at the PMRC focusing on sap and syrup processing. We envision processing sap with a variety of equipment types and intensities. Most importantly, we will be doing side-by-side comparisons of this equipment. At the recent annual meeting of the North American Maple Syrup Council in Lake Placid, NY, a resolution in support of this project was unanimously passed. We anticipate applying for funds from the NAMSC Research Fund next year for consideration during the October 2005 meetings. The Vermont Maple Sugar Makers Association and the Vermont Maple Industry Council have also indicated they support this project. All producers that we have spoken with think that this area of research will be quite valuable.

We anticipate receiving a grant that will fund the bulk of this project, including purchasing several evaporators, tanks, an R/O, paying for scientist and technician time, and for extensive chemical analysis of the syrup produced. The funds we think will be available for this work total nearly $375,000 U.S. over a three year period. However one problem stands in our way, namely, the lack of a proper building in which we can conduct this research. We do not presently have an adequate facility to place and operate four evaporators and ancillary equipment at one time. The grant funds described above are restricted. They cannot be used to erect a building. There is a way for us to move ahead, however. A few years

ago, the University of Vermont, with the help of many individuals, companies, and organizations in the maple industry, completed an Endowment for Maple Research. The interest earned on this account has accumulated over the past several years so that nearly $35,000 will be available to spend on a new building. We estimate that it will cost $60,000 to construct an adequate facility. We need your help in making up the difference. We are asking for donations to support this project. It was suggested at the NAMSC Annual Meeting that 200 producers donating $100 each could get us most of the way there. We have already received some donations in this way. We are hopeful that individuals, county and state maple associations, equipment manufacturers and dealers, and maple syrup packers will elect to support us in this effort to make this new facility, and this new research direction possible by making a tax-deductible contribution to the PMRC before the next sugaring season. Our hope is to break ground this coming summer, so that we may begin this new line of valuable maple research in the maple season of 2006.

If you or you maple association choose to make a donation to this project, please make a check payable to the University of Vermont and mail it to:

Proctor Maple Research Center
Attn: Syrup Facility
P.O. Box 233
Underhill Ctr., VT 05490

We would appreciate your bringing this request to the attention of your local maple associations and sugarmakers in your area.

All donations will be acknowledged, in the order they are received, on an engraved plaque within the new facility. To date we have received over $8,500 in donations and pledges in only a few short weeks, but there is still a long way to go. If you have any questions about this effort, or any other project we are working on, please don't hesitate to contact me. Thank you in advance for your continued support and generosity, and we look forward to continuing to serve this wonderful industry. All of us here at the UVM Proctor Maple Research Center wish you a terrific upcoming sugaring season.

Sincerely,

Timothy D. Perkins, Ph.D.
Director, UVM Proctor Maple
Research Center
(802)899-9926/(802)899-5007 Fax

REMINDERS:

Don't forget to register for the NAMSC/IMSI meeting in October
and
Deadline for the next Digest is May 1, 2005

SOME BACKGROUND ON THE ASIAN LONGHORNED BEETLE

The beetles were first discovered in Brooklyn, New York in 1996 and spread to neighboring Queens, infesting areas in Sunnyside, Woodside, Astoria, Long Island City, Maspeth, Ridgewood and later in Bayside and Flushing. Small infestations were also found in Flushing Meadows Park, Forest Park in Woodhaven and Kew Gardens Hills. New York city has lost over 4,000 trees because infested ones have to be cut down, chipped and burned. There is no natural predator for the alien beetle, which it is believed were brought to this country inadvertently in wood-packing material from Asia about 15 years ago. The federal government fears spread of these insects because if left unchecked, their reproductive cycle eventually kills the host tree. In New York State, officials are concerned that the beetles will be transported upstate in cut wood, devastating the forests and maple syrup industry.

The only other areas affected are Chicago, a small area in New Jersey and Islip, Long Island, port areas where the beetles arrived from overseas. But Joseph Gittleman, co-director of the U.S. Department of Agriculture's Asian Long-horned Beetle Program is encouraged that the insects here are being kept in check. "We have found less pockets in Queens this year," he said, "and are concentrating heavily on outlying areas of quarantine areas." His agency is focusing on inoculation for trees in these previously infested areas. They are wither injected with a pesticide into the trunk or into the dirt around the trees, where it is absorbed by the tree roots. This year, 19,358 trees were treated in the borough, mostly in Western Queens and the Bayside area. Gittleman is looking forward to improved technology that will make the inoculations easier to apply and take less time.

The USDA is currently waiting for results on testing done on Long Island trees injected by using an air pressure technique. "It gets more ingredients directly into the trees," Gittleman said. The agency is studying whether the "tree shots" do any damage. If not, Gittleman believes it will be the primary tool used for inoculations. "It's quick and on the horizon. Our workers won't have to hang around a property for four hours." The Asian long-horned beetles are known for their long antennae and spotted bodies. They bore dime-size holes into trees to lay their eggs, which is the easiest way to detect if a tree is infested. The beetles favor maple, chestnut, poplar, willow, elm, ash, birch and sycamore. The insects can only be spotted in the warm weather, when they emerge from the trees. Infested areas remain under a five-year quarantine and residents may not transport wood in these areas. Fines can run as high as $250,000. Those locations are inspected twice a year. After the five years, the area must be free of insects for three years before a quarantine is lifted. If you think a tree on your property is infested with the beetles, call the USDA hot line at 1-866-265-0301, or the Univ. of Vermont ALHB Hotline at 802-656-5434. More information about this nasty pest that threatens the maple industry can be found at www.uv.edu/albeetle.


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EVALUATION OF ALTERNATIVE SAP LADDERS SUMMARY OF 2002-2003 RESEARCH PROJECT

BACKGROUND INFORMATION

This research project was established in the spring of 2002 to study the technique of lifting sap with simple "sap ladder" tubing structures. It was conducted during the production seasons of 2002 and 2003 in an operational setting at Wheelers Maple Products in Lanark County, Ontario.

A sap ladder is a simple tubing structure designed to lift sap vertically between a lower and an upper section of mainline. It is essential that the tubing be on a vacuum system for a sap ladder to function. Sap ladders are useful in flat areas and to transfer sap over hills or other obstacles such as roadways or trails as can be seen in Figure 1. Sap ladders may benefit maple syrup producers by:

- providing an inexpensive alternative to an additional pumping station
- introducing vacuum to sections of bush separated from the source of vacuum by a hill
- increasing the yield of good quality syrup due to the introduction or improvement of vacuum into affected areas

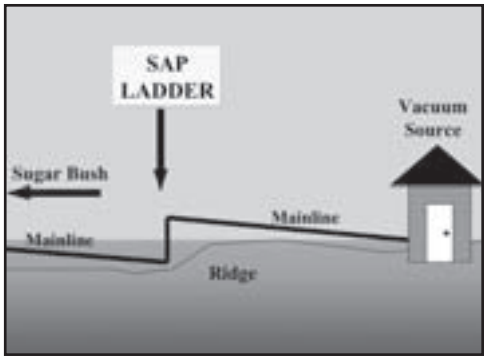

Figure 1. Example of a situation in which a sap ladder may be employed.

There are many possible sap ladder structures. Some employ 5/16" lines as the vertical lift between upper and lower portions of mainline while others use one or two sections of pipe as the vertical lift. There was still very little known at the beginning of this field investigation as to the effectiveness and limitations of the various structures.

This project was more of an operational study than a tightly controlled scientific research experiment. The evaluation of the effectiveness of each sap ladder was based on visual observations and readings of vacuum levels on either side of the ladder. Many producers have also been experimenting with sap ladders in their own sugar bushes, contributing additional practical information on the use of the sap ladder technique in sap collection. This project received financial support from the North American Maple Syrup Council and was conducted with cooperation of the Ontario Maple Syrup Producers Association, the Ontario Ministry of Agriculture and Food, and Wheelers Maple Products.

OBJECTIVES

1. To determine and compare the effectiveness of a variety of sap ladder configurations in an operational environment.
2. To determine the benefits and limitations of the sap ladders in the project.
3. To test the usefulness of practices used in conjunction with sap ladders, including a dry line, a bypass line, and venting.

METHODS

The sap ladder installation is located in a section of sugar bush that is separated from the sugar camp by a flat section of land. A vacuum level of 14" Hg was all that could be maintained at the sap ladder in 2002. A new pump house was built in 2003 closer to the installation (approximately 475 feet), providing 18" Hg to the sap ladders.

Figure 2. Sap Ladder Research Installation

All of the sap ladder systems work within the same area as can be seen in Figure 2. Two large cedar posts were installed in the ground 16 feet (5m) apart with brace wire running between them to support the ladders. Ball valves are located at the bottom and top end of each ladder so that a single sap ladder can be activated at a time, allowing each ladder to function independently. Vacuum gauges are attached to the 1 1/4 inch mainline at both ends of the sap ladders, so that the performance of each sap ladder can be monitored.

The lift is 8 feet (2.5m) for each of the ladders. The mainline tubing on either side of the sap ladders is 1 1/4 inch food approved black polyethylene pipe. The vertical portions of the sap ladders are made of clear PVC pipe or rigid 5/16" tubing. This allows both sap and air flow to be closely monitored as it passes through the sap ladders.

A dry line from the vacuum system to the sap ladder installation and a line bypassing the installation were installed prior to the 2003 season to test their usefulness.

The five types of sap ladders evaluated in 2002 were:

1. A series of 6-way manifolds with 5/16 inch lines for a vertical lift (Star Ladder)
2. A single piece of 1 1/4" pipe as a vertical lift (Single Pipe Ladder)
3. Two pieces of 1 1/4" pipe (in the same plane) as a vertical lift, one for sap and one for vacuum, with a trap type bottom (Two Pipe Ladder)
4. A single piece of pipe with a smaller diameter pipe contained within it as a vertical lift (Diffuser Ladder)
5. A booster tank at the lowest point, with a vertical piece of 1 1/4" pipe (Booster Tank Ladder)

Three additional sap ladders were included in 2003 in addition to the sap ladders evaluated in 2002, as follows:

1. Two pieces of 1 1/4" pipe (in the same plane) as a vertical lift, one for sap

and one for vacuum, without a trap type bottom (Straight Two Pipe Ladder)

2. A two pipe sap ladder with two 1 1/4" parallel pipes on either side of the mainline separated by a tee (Side by Side Two Pipe Sap Ladder)

3. A 45 degree angle single 1 1/4" pipe sap ladder (45 Degree Angle Sap Ladder)

OBSERVATIONS AND RESULTS

The main factors of interest in this experiment were the speed, efficiency, and effectiveness of the lift as well as the vacuum transfer across the sap ladders. It is important that a sap ladder lift the sap as quickly as it comes through the line without excessive roll back or churning of the sap. Vacuum transfer is very important to enable vacuum to reach the bush on the other side of the sap ladder. If sap accumulates, blocking off the lift to a large extent, there may not be sufficient vacuum transfer.

Table 1 represents a general ranking of the sap ladders tested in this experiment, with 1 as the highest ranking and 8 as the lowest. The ranking is based on observation from the 2002 and 2003 seasons. The effectiveness of the lift, vacuum transfer, and ease of construction are taken into consideration in the ranking. All of the sap ladders work well, lifting the sap effectively, other than the 45 degree angle and booster ladders. The best sap ladder to install may be influenced by the situation and the needs and preferences of the producer.

The Two Pipe Ladder with the trap type bottom seemed to be the most promising after 2002. With greater vacuum in 2003 (16-18" Hg), it became apparent that what looked like a pumping action in the second pipe in 2002 was a struggle of vacuum between the two pipes. The second pipe would partially fill with sap, essentially blocking it off. The sap would move up and down due to the vacuum from above trying to lift it. The vacuum from the other pipe would also pull on the column of sap, occasionally lifting it up the first pipe. No sap was lifted up the second pipe in either year. Therefore, there is essentially no difference between this ladder and the single pipe ladder.

The Side by Side Ladder, as can be seen in Figure 3, was added to the experiment in 2003. It was found to be very effective, as sap was pulled quickly and efficiently up both lines. A valve in one of the pipes allows the lift to act as a single pipe lift under low sap flow conditions. The smaller area of a single pipe can lift lesser amounts of sap more effectively without roll back or churning. The greater area of two pipes allows for more sap to be lifted at once and thus greater vacuum transfer under heavier sap flow conditions.

A dry line was installed from the vacuum to the sap ladders to evaluate the effect. With the two pipe lift, the vacuum transfer improved slightly and the functioning of the lift was the same or slightly better. The dry line was not beneficial to the booster tank ladder. In this case, the vacuum from the dry line appeared to compete with the vacuum from the lift pipe, significantly decreasing the effectiveness of the lift.

A section of mainline was installed from the lower mainline (bush side), over the top of the sap ladders, to the upper mainline (vacuum side). This was to eval-

Table 1. Ranking of the Sap Ladders Studied in this Project

General Ranking	Sap Ladder	Reasons
1	Side by Side Two Pipe Ladder with Valve	Works very effectively with little to no vacuum transfer loss. Can be used as single pipe lift during low sap flow conditions or as a two pipe lift during heavier sap flow conditions by closing or opening a valve in one of the pipes (Fig. 3). Sap is lifted equally up both pipes when valve is open.
2	Star Ladder	Works very well under wide range of sap flow conditions. A little more work to construct than single and double pipe ladders. Proven to work well from use by producers.
3	Single Pipe Ladder	Works very well. May no function as well (i.e. vacuum transfer) as side by side two pipe ladder under heavy sap flow conditions because only half the lift area. Cheap and easy to construct.
4	Two Pipe Ladder (with trap type bottom)	Lifts sap effectively but second pipe appears to be usdeless, making the lift essentially a single pipe lift. Second pipe becomes partially filled by sap, essentially blocking it off.
5	Two Pipe Ladder (straight bottom)	Lifts sap effectively but second pipe appears to be useless, making the lift essentially a single pipe lift.
6	Diffuser Ladder	This sap ladder lifts the sap but does not appear to be more effective than the simple singel pipe lift.
7	Booster Tank Ladder	There did not seem to be any benefit of having the booster tank, making it an unnecessary expense.
8	45 Degree Angle Single Pipe Ladder	Poor lifting capabilities. Sap tends to roll back in the line and is not lifted as rapidly as in the straight single pipe ladder.

uate the belief that a vacuum bypass line may aid in the vacuum transfer and effectiveness of a lift. This was found to be ineffective for all of the sap ladders. Some sap would go up the bypass line and the ladder would decrease in effectiveness proportional to the amount that the valve for the bypass line was opened.

The theory that venting (outside air) may increase lift efficiency by preventing air locks was tested with a vent on the lower side of the sap ladders. The same effect was observed with each of the sap ladders. The sap ladder would continue to function but there would be a vacuum loss on the lower side of the ladder of at least 2" Hg. The more the valve was opened, the greater the vacuum loss.

Effectiveness of the lift decreased proportional to the increase in the amount of venting.

CONCLUSIONS

There are various sap ladder configurations that will lift sap effectively. Producers may experiment in their own bush to determine what suits their needs. It is important to have sufficient vacuum for effective lifting of the sap, preferably 16-18" Hg, as well as sufficient vacuum transfer across the ladder so that all parts of the bush receive vacuum. A valve at the bottom of each ladder would be beneficial to allow for complete drainage of sap from the ladders for cleaning and to prevent damage from freezing.

It is possible that a series of sap ladders may be used to effectively lift sap over greater heights, but this was not tested in this study. Results from other operational investigations suggest that sap ladders located in series can be effective provided that there is good vacuum transfer across the ladders. More study regarding the production of sap ladders in series may be warrented.

Relatively affordable commercial units to lift sap have also become available in the past several years. These may be considered as possible options in addition to those described in this study.

Complete information on this project, including results and lists of materials can be found in the reports from the 2002 and 2003 seasons. For further information contact:

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For more information regarding the Research Fund contact:

Richard P. Norman, Chairman, 387 County Road, Woodstock, CT 06281
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Kay Carroll, Treasurer, 79 East Chestnut Hill Road, Litchfield, CT 06759
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The NAMSC-Research Fund is a non-profit, volunteer managed committee of the North American Maple Syrup Council, Inc. (2-05)

2005
SAP PRICES

A lot of people have requested that we publish sap prices. What I have found is that sap prices vary greatly depending upon the retail price of syrup.

The retail price of syrup in the Northeast is higher than in the Midwest, hence the price paid for sap is higher in the Northeast. Listed below are sap prices being paid by SOME producers.

Remember these prices are for sap delivered to the sugarhouse.

These prices are intended to be used only as a guide for buying sap and no way intends that they dictate the price for the entire industry.

sugar	$/gal.	sugar	$/gal.
1.10	.011	3.40	.384
1.20	.044	3.50	.398
1.30	.065	3.60	.411
1.40	.086	3.70	.426
1.50	.106	3.80	.440
1.60	.124	3.90	.453
1.70	.143	4.00	.468
1.80	.160	4.10	.481
1.90	.175	4.20	.495
2.00	.190	4.30	.509
2.10	.203	4.40	.522
2.20	.218	4.50	.537
2.30	.232	4.60	.550
2.40	.245	4.70	.564
2.50	.260	4.80	.579
2.60	.273	4.90	.592
2.70	.287	5.00	.606
2.80	.301	5.10	.619
2.90	.315	5,20	.634
3.00	.329	5.30	.648
3.10	.342	5.40	.661
3.20	.356	5.50	.675
3.30	.371		

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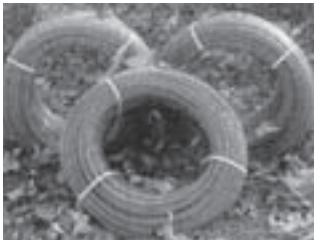

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For more information, contact the organizing committee at:
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Fax: (819) 362-2830
E-Mail: bellise@citadelle-camp.coop

REGISTRATION DETAILS WILL FOLLOW EARLY 2005

Get Ready for Sugaring Season

That time of the year we are all preparing for is just around the corner. You might want to consider a state jug or possibly an all states jug to get those shelves stocked with your unique syrup. As always our staff is eager to take the hassle out of servicing your jug requirements. We are ready to answer any questions you may have about the Bacon Jug line of products and why you would want to consider packing your syrup in the traditional style jug.

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THE BACON JUG COMPANY

CLASSIFIED

FOR SALE: Used oil burner Beckett CF 2300, 7-20 gph. very good condition. $1,095. Used stainless syrup pan, 5' x 3' Grimm-lightning. $750. ALSO: Carageenan for maple jelly, 1 1/2 lbs. or $19.95 or $25.00 shipped - recipe included. Baker's Maple, P.O. Box 23, Bainbridge, NY 13733. *(607) 967-7229.*

FOR SALE: Evaporator **NEW**, still in packing crates, 2 1/2' x 8' Grimm Lightning R.H. feed, Soldered pans. $4,850 **WILL DICKER**. 50 buckets, spouts & covers. (2) 300 gallon poly tanks, clean $100. (1) 500' roll of 1/2" black plastic (1) roll of 1" blue plastic 300' (1) single cone filter tank like new $180. (1) 300 gal. SS milk tank $225. Miscellaneous bottle & jugs. **PLEASE CALL US** *(413) 623-6021.*

FOR SALE: Two brand new Echo gas powered tappers. One has forward only for $300, the other has reverse for $350. Will sell together for $600. Full warranty, Visa and Mastercard accepted. DeLong's, Little Genesee, NY *(585) 928-2241.*

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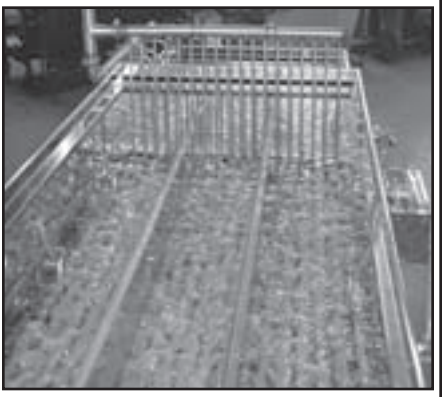

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