Maple Syrup Digest

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Maple Syrup Digest
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COVER: 2006 Hall of Fame Inductees: Roger Sage and Ralph K. Curtis.

GREETINGS FROM YOUR PRESIDENT

I hope all of you had a very good, long and sweet season. I know from talking to some folks the run started very early in some areas but was more normal in other areas. I had a so-so season. It is hard to make much syrup when, after filling the evaporator with sap, you hear it running into the fire box. Several tries later (I am not very good at soldering), it worked but the season was well advanced at that point. As they say, there is always next year. And I have the summer to get the pan fixed.

While you were busy filling all the jugs, tins and bottles, I hope you kept count so that you can send the penny per container to the Research Fund. At the meeting in Quebec, it was decided to appoint a new Research Fund Committee. I have sent the letters to the new members along with their charge for the rest of this year. Members are: Bob Dubos, Connecticut; Luc Lussier, Quebec; Jeremy Steeves, Maine; Randy Heiligmann, Ohio; Eric Randall, Pennsylvania and New York, Warren Wells, New York and Kay Carroll, Connecticut. Kay is the treasurer of the Research Fund. I have asked this group to do a couple of things before our meeting in Green Bay. First, make recommendations of proposals to fund this year; second, look at fund allocation for the future and third, start looking at how to increase the fund. Part of the second charge relates to the fact that the fund was set up to provide seed money, to help researchers obtain further funding. Should it remain that way or should there be some change such as funding a greater percent of a project? At this time it is funded based on each producer donating a penny for each container filled. Should we change that? Increase the amount? Look at a different funding source? Any suggestions or ideas you might have on the Research Fund should be directed to a committee member.

Spring is here — I had my first wood tick this week. The grass is green and I am ready to put in my garden.

I hope all of you have made your reservations for the meeting in Green Bay. Have a great spring.

Beth

FROM THE EDITOR

Here we go again! By the time you read this I will be on my way to Alaska again. Soooo, please don't call, write or e-mail me before the last week in August, as I won't be home to answer you.

The price of gas keeps going up and making the trip more expensive every day, but I say "Money is only good when you spend it." So, I am going to spend some. This will be may last trip as age is catching up with me.

See you in the fall.

Roy

IMSI NEWS

By Larry Myott
Executive Secretary

When you get this issue of the Digest, maple sugaring 2006 has begun in some areas of the maple world. Once again, like the new year, we are optimistic and expecting the best of crops. Producers have been preparing since last fall in anticipation of that first sap run. The downed trees and branches have been cut up, the tubing repaired and, yes, now the taps have been tapped. The decisions that we make in the sugarbush will determine the crop for 2006.

We know how to do it, but sometimes we don't follow those general rules of maple production. You have attended maple tours, maple schools and seminars and read everything there is to read on how to–in the maple business. Now is the time to put all that knowledge to work to ensure a good maple crop with peak quality. I am reminded of the favorite saying of one of my old timer friends, "We are the sum of our decisions."

The 2005 crop is pretty much gone, there is very little syrup in the field. The darker grades have disappeared and of the dark syrup still in storage, the price has risen considerably. There is definite need for an increase in production on the U.S. side of the border. Although there is still a large inventory of surplus syrup in Quebec warehouses, the report is that it has been in demand and the supply is going down.

GETTING READY
MEANS BEING SAFE TOO!

Many copies of the new maple publication titled, "Chemical Safety in Maple Sugaring Operations," were distributed at the international meetings last fall in Quebec. This is a valuable little publication to help sugarmakers be safe and use chemicals in a way that will not harm your business, the environment, or perhaps most importantly the entire maple industry. Prepared by University of Vermont maple researchers Dr. Tim Perkins and Abby van den Berg at the Proctor Maple Research Center, this should be in every sugarhouse just as a reminder that not all chemicals can be used in the food industry.

In years past, we have had some very near disasters with the use of chemicals for cleaning or other purposes that were not intended, or registered, for use in the food industry–in particular the maple industry. On both sides of the border, agricultural and food chemicals must be registered for the intended use. If they are registered, it is illegal to use them. If you are using acids or other cleaners in your maple business, make sure you know how to use them and take all the required precautions. If the label is in French and you read only English, that does not count as understanding all the precautions. You'll need an interpreter, or call your supplier for the English translation.

For a copy of twelve publication, email the Proctor Maple Research Center at pmrc@uvm.edu. You can also get a copy by calling the center at 802.899.9926 or writing to PMRC, P O Box 233, Underhill Center, VT 05490.

IMSI DUES ARE DUE

Members of the IMSI have been sent dues notices for 2006. All dues are due not later than March 1. Members are asked to fill out the form that comes with the notice and mail it back with their check to Treasurer Gary Gaudette, 919 Bronson Road, St. Albans, VT 05478 USA.

Questions about the IMSI and its dues structure? Contact Executive Secretary Larry Myott, see below for contact information.

(***For information on the IMSI, call or write Larry Myott, IMSI Executive Secretary, 5014 Route Seven, Ferrisburgh, VT 05456. Email: Larry.Myott@uvm.edu visit the IMSI at: www.internationalmaplesyrupinstitute.com***

MAPLE FALL FESTIVAL SEPTEMBER 16-17 IN MARSHFIELD, WISCONSIN

Maple Fall Festival is a celebration of Fall. Fall Fest has about 200 arts and craft booths. Enjoy a potato and regular pancake breakfast with fresh Maple Syrup and Wenzel Farm maple sausage. Visit the new and enlarged Maple Village and see how syrup is made, taste maple syrup products, enter maple recipe contest and enter your syrup to win the best of the best of the Maple Fest.

Children will make maple ice cream and judge pure maple products. Taste sugar on snow, maple rootbeer and maple candies. Great food, entertainment and a children's area.

WISCONSIN TO HOST INTERNATIONAL/ NATIONAL MEETING OCTOBER 18-21, 2006 IN GREEN BAY WISCONSIN

Wisconsin would once again like to extend a hearty welcome to everyone in the maple industry to come and join us for the convention at the Regency Suites Hotel and KI Convention Center in Green Bay, Wisconsin.

If you are flying in be sure to let the hotel know, as they do have a courtesy shuttle for you.

The room rates are locked in at $109.00 plus tax for a standard suite and $119.00 plus tax for a king suite per night. Children under 12 stay free. There is a limit to six (6) people per room. The phone number for reservations is 1-800-236-3330 and be sure to tell them that you are with the maple syrup convention.

Reservations may be cancelled without penalty no later than 6 PM on the day of arrival. Reservations cancelled after this time will be subject to charges equal to one (1) nights stay and the applicable taxes of said night. **BE SURE TO CALL NOW FOR YOUR RESERVATION AT THE HOTEL!!**

For more information on this, please refer back to your February 2006 Maple Syrup Digest.

If you are a exhibitor and would like to have an exhibit at the convention, please contact Joe Polak at 715-536-7251 and he will send you an exhibitor's packet.

You will be getting a mailing on all of the activities, meetings, etc. in the near future. The committees are all getting their things together, so that we can get this information out to you. There are so many things that we would like you to be able to see/do while you are in Wisconsin, the committees are having a time fitting them in. All in all, we are sure that you will enjoy your stay!

Watch for the mailing on the 2006 Convention! If you have been to the last few conventions, your name and address will be on the list. I am not sure at this time exactly when these mailings will go out. If you are concerned that you may not or did not get this mailing, you can contact me at gretchen_grape@yahoo.com and I will let you know. It would probably be a good idea to wait until after July 4th to see if we have them out by then.

Thank You and Wisconsin is awaiting your visit!!

Gretchen Grape
Executive Director WMSPA

2006 New York State Maple Tour

To be hosted by the Maple Producers Association of St. Lawrence County, NY
July 15th & 16th

Plans are being set for the New York State Maple Tour to be held in the St. Lawrence valley and Northern Adirondack foothills this summer, in cooperation with Cornell Cooperative Extension and Clarkson University. The two-day tour, banquet, and trade show will be based in Potsdam NY, at Clarkson University's Cheel Campus Center. Maple syrup makers of any level are invited to see North Country maple production from classic log cabin style on up to probably the largest bulk syrup operation of the region. Several producers will not only showcase their syrup operation each day, but some will likely have additional features to offer such as saw-milling, or antique displays.

The largest in New York State, St. Lawrence County is extensively wooded, from large industrial forests, state lands, and farms, to smaller private woodlands. Maple production from its forests places the county as one of the major syrup producing areas of the North Country, as well as the state. Bordering Canada along the St. Lawrence Seaway, the county's broad valley and highlands also feature many other interesting points in agriculture, industry, higher education and recreation. There's even an internationally acclaimed carp fishing tournament here along the St. Lawrence River.

Clarkson's Cheel Center will offer spacious conference facilities and parking, as well as a noted banquet service. Lodging can be arranged right on campus, as well as in the Potsdam area. This tour is planned to be both enjoyable and useful for take-home information. The first day even features a BBQ along the route.

Registration must be received at tour headquarters, Clarkson University, by June 14, 2006 so please contact tour headquarters for more information or visit: http://www.clarkson.edu/projects/nymaple2006/

Clarkson contact: Christina Lesyk, University Events Coordinator, 315-268-6425 or chlesyk@clarkson.edu

P.S. Arrival registration & Trade Show open Friday afternoon, July 14, with evening social hour.

Maple News From Connecticut

By John Trumbull

The annual preseason workshop for the Maple Syrup Producers Association of Connecticut was held on January 21, 2006. The Sessions Woods Wildlife Management Area kindly donated their meeting hall for our program. Over 130 members, guests and others attended this workshop. There were four equipment dealers represented, the Agriculture Department of Connecticut, and the Producers Association table with maple signs, test kits, hats, and mugs on display. Steve Broderick from the UConn Extension Services had a table set up for testing hydrometers.

Ron Wenzel, president of MSPAC, opened the workshop at 9:00 a.m. with a brief introduction of the new Connecticut commissioner of Agriculture Phil Parelli. Commissioner Parelli spoke of his short time in office and the challenges ahead for his department. Commissioner Parelli also spoke of new state grants that are going to be available to build or expand facilities for farming. Maple syrup production is an aspect of farming, and Connecticut producers can apply for monies from this program. This information should be on the Department's web site eventually.

An Association business meeting followed Commissioner Parelli's brief remarks. Ken Sherrick read a brief treasurer's report. Ken is retiring after after 25 years as treasurer and will be looking for a replacement.

Chuck Drake read the minutes from the October annual meeting. He reported that 165 members were on the active member list as of the end of October. The motion to accept these minutes was passed unanimously. Chuck also spoke of the Steering Committee being formed to begin planning for the 2012 IMSI/NAMSC annual meeting to be held in Connecticut.

Ron Wenzel will represent the Association at Connecticut Agriculture Day March 22 in the State Capitol Building. Motion was made and passed to pay the fee for representation and to send maple candy as examples of the maple products produced in Connecticut. These samples will be given to the state legislators in attendance at this event in Hartford.

Motion was made and passed to allocate up to $500.00 to develop our Website and get it up and running. Brian Atwood will head this committee. The Board of Directors will review and allocate additional funds as needed. The sites we have are: ctmaple.com and ctmaple.org.

Rob and Jean Lamothe and daughter Jessica followed the business meeting with their presentation on candy making and other value added products. Rob and Jean are available for consulting on all aspects of candy making. They can be reached at (860) 675 - 5043

Many producers were interested in the production of maple candy. Rob and Jean gave tips and information ranging from specific note - keeping to temperature control to test kits for invert sugar content, how to extend the shelf life of the candy and how to modify your candy machine. Their presentation was loaded with tips gained from years of experience.

MAPLE HALL OF FAME

On May 20, 2006 the Maple Hall of Fame in Croghan, New York inducted two members.

RALPH K. CURTIS

Maple Syrup Making
at Journey's End Farm

It all started way back in 1934. My grandfather gave my father (Francis Curtis, Jr.) 50 buckets and spiles and two sap pans, one 3'x6' and one 2'x3', to encourage us to use some of the maple trees growing on the property purchased in Sterling Township in 1925. There were 30 acres, including a large farmhouse, blacksmith shop, a barn etc., for $2500. Maple Syrup had been produced on the Curtis farm north of Waymart where my father had grown up, and was the primary sweetener in those days. I recall staying at my grandfather's house and being sent to the summer kitchen to get soft maple sugar from a basswood tub for our early morning pancakes.

That first season on a southeast slope was good in spite of the bitter cold. In 1935, we added some taps and carried this sap to our outdoor arch made of stones laid up with salt and wood ashes for mortar. Later a sap house was built over the pans using lumber from the woods. The roof was sheet metal from old cars. It was crude, but was protection from rain and snow.

When an adjacent woodlot was to be lumbered off, my Dad made known his desire to buy the property and had them leave maple saplings less than 10" in diameter. These trees are now a substantial part of our sugarbush and these 70 acres were added to our farm in 1938 for $2000. Another bordering 40 acres were acquired in 1944 and the deed states the purchase price was $1 plus "considerations". This land has another 100 taps on a north-facing slope.

My wife, Marie, and I moved back to the farm in 1954, and I began making maple syrup again. We used horses for farming and for gathering sap from 225 taps and boiled in the same old place. The next year we moved to a new location at the foot of the south sloping hill.

I went to John Gillner's store in Sterling and told him I needed $500 to buy an evaporator. John was president of the Newfoundland Bank, and I had been doing some logging for him salvaging logs from trees blown down in Hurricane Hazel. The transaction was completed on the spot and I bought a used 3'x10' evaporator. We built a structure near the present boiling place in 1956 and had 600 taps. I was able to pay off the $500 loan at the end of the season. Our first sap tubing was used in 1958 for about 200 taps. We advanced to a 4'x12' evaporator and rented neighbor's trees going to 1500 taps. In 1960 I bought my first tractor, a 10 year old Ford 8N. We used the horses until 1965.

The Wayne County extension agent in the 60's got the maple producers in northeast Pennsylvania to form an association that met annually. We created an educational exhibit for the Pennsylvania Farm Show each January. My wife, Marie, and neighbor put together the first one, and for many years it was done by someone in the Curtis family. We

started entering maple products for competition and eventually the 5 associations in PA joined together to make a sales booth, and we all took down products to sell.

We sold the cows in 1970 and I bought a 4000-gallon stainless steel storage tank for collecting sap. We built a larger sap house in 1975 and added a second 5'x14' evaporator. In the early 80s we added 114 acres and stretched to 2500 taps.

I enjoyed working with producers from other parts of Pennsylvania and seeing their operations on the annual Maple Tour. Our sap house was featured on the tour in 1989 and 2004. I served as Secretary-Treasurer for the Maple Producers in Northeastern Pennsylvania for 20 years from 1970 or so to the early 90s.

In 1994 I turned over the maple production to our son, Carl. He added a Steam-Away to the 5'x14' evaporator in 1994. Since Carl's death in November of 2002 (at 49), his wife, Kristin made the decision to keep the maple operation running. Grandsons Jason (26), Ira (23), and Andy (18) all help when they are home. I still drive tractor for some bucket gathering trips, help put out buckets, and do several hours of boiling each season.

We have from the beginning used local fuel, wood mainly from our own and nearby woods, with some slab wood from a local sawmill.

ROGER SAGE

Roger has spent his entire life devoted to the promotion and sale of maple syrup. He started early. At the age of 3 he was going to the sugar bush with his father. After high school he decided to further his maple knowledge by attending the School of Forestry in Syracuse NY. He returned home in 1961 to resume an involved role in maple sugaring. His maple interest grew and he became a Leader Evaporator distributor in 1968 and remains on the board today. He spent many hours educating Wyoming County and area maple producers in maple production.

A practical person he supplemented his maple income by dabbling in politics, taking over as town justice when his father passed away in 1967. He later served as Town of Middlebury supervisor from 1970 to 1975. 1974 to 1982 he was involved with the New York State Maple Marketing Program buying syrup for their cooperative market and doing a lot of trucking across the state.

Roger and his mother, Mabel, were a team producing maple cream and sugar for area fairs and neighbors and he has won many ribbons. He was director on his local Fair board 1972 to the present. He managed the Wyoming County fair maple booth for awhile and had a separate equipment display for Leader Evaporator.

He married Cynthia Langdon in 1976 and they spent their honeymoon driving to Michigan and the NAMSC meeting. Cynthia's first.

1977 through 1986 he was assistant manager at the New York State Maple Producers fair booth in Syracuse and has been the booth's manager from 1987 to the present. Over these 30 years he has done innovative maple marketing at this fair. They have involved all four children in every phase of the fair from sales to packaging to setting up and

breaking down the booth He remembers 4 year old Hamilton's sales pitch when asked why they should buy some maple jelly and he responded "because he was the baby of the boss". The customer bought the jelly.

Roger has held many "maple" positions: president, Wyoming County Maple Producers Assoc. for 2 years; Wyoming County Director to the Western NY Assoc., 1978 to present; Western NY director to NYS Maple Prod.'s Assoc., 1979 to present; president of NYS Maple Prod.'s Assoc., 1979 to 1982; alternate delegate to North American MSC, 1980 to 1982; delegate to NAMSC, 1991 to present; vice-president of NAMSC, 2001 to 2003; and president of NAMSC, 2003 to 2005.

He has taken his family on tours and to council meetings to learn more about maple and its producers. He assisted them when they wanted to be hosts for the first few NYS Maple Sundays on their farm. As his children grew he has taken a lesser role in production and concentrated on marketing and equipment sales. He took on a secondary job as rural mail carrier in 1994 and supports his oldest son, Philip's, hopes of resuming a larger maple production in the near future.

He has received the Hubbell award and other maple industry recognition plaques and has served as judge at the Penn. Maple Queen Contest. He has been a speaker on maple-related subjects at meetings and seminars. He is happiest talking maple to his peers. He has seen many changes in the industry, has supported them with an open mind and not hesitated to try something different.

North American Maple Syrup Council, Inc.
RESEARCH FUND

MAPLE RESEARCH

More to learn and more to fund!

This is an exciting and challenging year for Maple Research.

The excitement is that the industry has invested in funding that lays the groundwork for even better research in the future – e.g., first generation super sweet maples; getting ahead of the insect/disease issues facing maple; and supporting the building of the new research facility at the Proctor Maple Research Center.

The challenge is how to fund even more than in the past.

The NAMSC Research Fund depends solely on contributions to fund maple research – most of it coming from the "penny per container filled" program. Many of you already participate, and we thank you, but we need everyone's help. If every non-contributing person contributed., think how much more research we could do! Wouldn't that be a great investment in your maple future?

Donations can be made through your plastic, glass or metal container suppliers who participate in the "penny per container filled" program. Or send contributions to the Research Fund directly per information below.

For more information regarding the Research Fund contact:

Richard P. Norman, Chairman, 387 County Road, Woodstock, CT 06281
Phone 860 974-1235, Email: r.norman@snet.net

Kay Carroll, Treasurer, 79 East Chestnut Hill Road, Litchfield, CT 06759
Phone 860 567-3890, Email: kaycarroll@aol.com

The NAMSC-Research Fund is a non-profit, volunteer managed committee of the North American Maple Syrup Council, Inc. (6-06)

New York Holds Its First Maple Syrup Grading Workshop

Stephen Childs
NYS Maple Specialist

On April 22 New York held its first in a series of Maple Syrup Grading Workshops at the Arnot Forest of Cornell University. Fourteen maple producers attended and each brought along a quart of syrup and their own grading equipment. Training sessions were broken down into the main categories of density, clarity and filtering, color grading and syrup flavor. Each category included instruction followed by hands on exercises. In all, over 60 samples of syrup were examined and classified in these various ways. The big eye opener of the day was when a number of the hydrometers, refractometers and digital refractometers brought in by the producers and extension personnel were compared against a single standard. The readings varied over 5º Brix from the various pieces of equipment. This exercise shows that many of the errors in syrup density are related to producers using testing equipment that has not been standardized in a number of years. How to standardize this equipment will become a significant part of future workshops. Some of the comments from maple producers following the workshop include: In the future we will calibrate our equipment better. We will now pay more attention to both density and flavor and we must improve and change our filtering process. The exercises led to lively discussions and in all it was a great learning experience. We have changed the name of the next workshop to be more descriptive of the course content. The program takes about six hours and the next one will be held on the west side of the Adirondacks in the Lewis, Jefferson, St. Lawrence County area on August 5th, 2006.

August 5th, 2006, Maple Density, Clarity, Color and Flavor, Making and Grading Syrups for Quality Workshop. Hosted by Lewis County CCE. Contact: Michele Ledoux, Cornell Cooperative Extension Lewis County, 5274 Outer Stowe Street, P.O. Box 72, Lowville, New York 13367, Phone: 315-376-5270

A special thank you to the organizers of the New England Maple Grading School whose outstanding training lead to this workshop series in New York.

The New England Agricultural Statistics Field Office Welcomes a New Director

By Angie Considine and Sherry Deane

Aubrey Davis retired from the National Agricultural Statistics Service (NASS) on January 3rd after 39 years of federal service, including two years in the military. Aubrey was honored with a retirement dinner and celebration on January 7th in Concord, NH, attended by 87 current and former co-workers, friends, family, and members of the agricultural community.

For his many years of dedication and hard work, Aubrey was presented with a book abundantly filled with memories and sentiments written by co-workers and friends, as well as a NASS retirement plaque and clock. The New Hampshire Maple Syrup Association presented Aubrey with a beautiful handcrafted clock carved in the shape of a maple leaf. Additionally, Aubrey was presented with one year memberships to a nearby golf course and a local fitness center.

Aubrey will truly be missed. We all wish him well in his retirement. However, they do say that the dawn brings a new day and so, in this case, it has brought us a new Director. It is a great honor to introduce to you the new Director of the New England Agricultural Statistics Field Office, Gary Keough.

Gary was born in the rural community of Darlington, Wisconsin. He and his wife Donna have two daughters. Gary has been employed with the NASS for more than 25 years. He spent his first four years managing surveys and estimating commodities in Sioux Falls, SD. In February 1984, Gary accepted a position in Columbia, MO where he gained more experience as a commodity statistician and earned his Masters in statistics.

Gary moved to NASS Headquarters in Washington, DC in September 1987 to work in the Research and Applications Division. In 1990, he moved to the Statistics Division as the Statistical Methods Statistician for the Agricultural Labor Survey program and in 1993 he took over the duties as the Statistical Methods Statistician for the Corn Objective Yield Survey program.

In August 1996, Gary accepted a position in Lansing, MI as the Group Leader of the Automated Data Processing Section and in 1997 he became the Team Leader for all fruit and livestock surveys. In January 2002, Gary transferred to San Juan, Puerto Rico to work on the 2002 Census of Agriculture and as an advisor to improve the agriculture statistics program of the Puerto Rico Department of Agriculture.

Gary is pleased to be on board in the New England Field Office and looks forward to meeting many of you as he takes on his role as Director.

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BIG NEWS from Leader Evaporator Company, INC

Leader Evaporator Company has purchased a new facility in Franklin County, Vermont. The 85,000 square foot building will be the company's new home with the store and offices opening in early January, 2006 and manufacturing to follow by mid spring. The new facility will feature the maple industry's largest inventory, store, and showroom in the United States. Along with the only complete line to equipment manufactured in the United States of America. This move will allow us to better serve sugar makers with the products and services that they need. For more information as it becomes available check out our web site:
www.LeaderEvaporator.com

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Temperatures in the Sugarbush

Tim Wilmot - University of Vermont Extension Maple Specialist
Proctor Maple Research Center

Most maple producers are keenly aware of the weather during the spring, with temperature the most frequently observed parameter. One major limitation to the sap-run forecasting ability of many producers is that measurement of air temperature in one location does not capture the wide variation in air temperature throughout the sugarbush; nor does it accurately reflect the temperature of the diverse parts of trees, or of the soil. A study of the range of temperatures in the forest during sugaring time is helpful in understanding some of the influences of weather on sap flow. This article briefly summarizes a large set of data collected over the past years which includes many sugarbush temperatures, and will give a few examples of the sometimes unexpected variation in temperatures which occur during the spring.

The temperature data referenced in this article were all collected at the University of Vermont Proctor Maple Research Center in Underhill Center, Vermont, over the past decade. Temperature measurement is part of an ongoing effort to describe sap pressure and flow in sugar maple in relation to weather. Some of the data can be seen live during the spring at http://www.uvm.edu/~pmrc --- click on TREEMET. Measurements were made with copper/constant thermocouples, which provide a high degree of accuracy, and were recorded every 15 minutes around the clock by remote dataloggers.

The sap flow mechanism of sugar maple requires periods of freezing and thawing; freezing temperatures produce negative pressure in the tree and result in water uptake from the soil, while thawing results in positive pressure that causes flow from tapholes. Large limbs and tree trunks respond slowly to changes in temperature, so that when alternating cold nights and warm days lead to periods of sap flow, this is caused primarily by temperatures low and sustained enough to freeze small branches, and warm enough to thaw them. Predicting when branches will freeze is not always easy, because air temperature measured close to the ground may not be a good indication of the temperature in the tree canopy, particularly in the absence of air movement. Figure 1 shows temperatures at different heights measured on successive nights in 2006. On April 2, wind speeds averaged 7-10 mph, which provided good air mixing, and temperatures at different heights were all within 1.5 degrees F, with the coldest air above. A short period

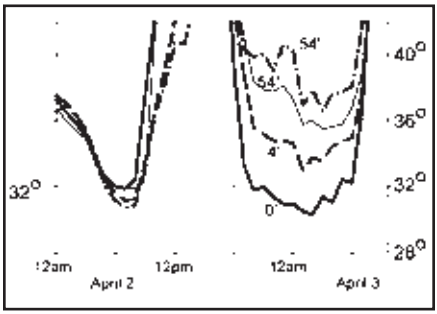

Figure 1: Air temperature at different heights (heavy lines) and branch temperature (thin line) on successive nights in April, 2006.

below 32 degrees caused small branches to freeze, providing a "recharge" through the sap flow mechanism, and consequent sap flow by the following mid-day. On April 3, wind speeds had diminished to less than 2 mph, and a temperature gradient of about 8 degrees from the ground surface to mid-canopy at 54' was present, as the heavier cold air sank to the lowest point. Puddles on the ground froze, but the temperatures above this were too warm to freeze the branches. Still nights during the spring were more common than windy nights; for example, during the sugaring seasons of 2005 and 2006, about 60% of the nights were calm enough to establish a vertical temperature gradient similar to April 3. Additionally, still nights allow cold air to move downslope and pool in low spots, so that higher parts of the sugarbush might not receive frosts that occur in hollows.

Another sugarbush incongruity is the temperature of small branches and twigs: they are rarely the same as the air surrounding them, as can be seen in Figure 2. In sunlight, the

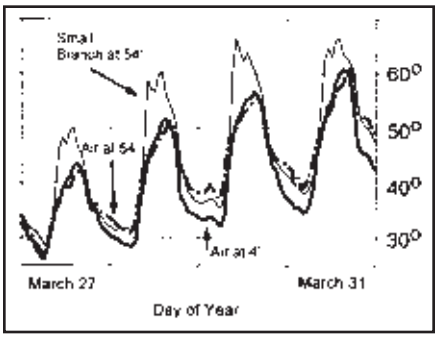

Figure 2: Air temperature at two heights and branch temperature on four days in March, 2006.

dark bark absorbs much of the sun's radiation, so that during a cloudless period, the branch is commonly 8-10 F degrees warmer than the air. When the branch is already thawed, this heating of the wood causes a temporary increase in sap pressure, in part from evolution and expansion of gas bubbles, as well from osmotic forces, leading to a greater rate of sap flow from a taphole. Often during a sap run, the sap pressure, and consequent sap flow rate, oscillates from night to day (i.e. it is higher during the day and lower at night) without any frost due to the changing temperature of the branches. Please note, however, that gas bubble expansion is a secondary mechanism of sap pressurization in maple; the principal cause of pressurization is water uptake into wood cells during freezing, followed by a thaw. While the heating of the branches temporarily increases the rate of sap flow, it also diminishes sap pressure over the course of the sap run because water is constantly evaporating through the thin bark of the branches. Thus the strength of a sap run that continues for several days without a frost may vary with the rising and falling temperature, but it will eventually diminish to a slow trickle due to evaporative losses from branches, which will eliminate all of the pressure in the system over time. So, warm and sunny days during the sugaring season are both a blessing and a curse to syrup producers.

Another anomaly, which can occur any time of the year, is a phenomenon known as black-body radiation. This often occurs on calm nights, where branches (and other solid

objects) lose heat into the atmosphere when the sky is clear; in branches this results in a temperature about 1 degree F lower than the surrounding air, which can been seen on the still night of April 2-3 in Figure 1.

Data from thermocouples located at different depths in tree trunks show that the wood is almost never at a uniform temperature, and during the sugaring season this non-uniformity can affect sap flow, particularly when part of the tree is frozen. Deeper into the tree, the wood is buffered from air temperature, so that freezing and thawing occur much more gradually than in small branches. During the summer, the center of the trunk is usually the coolest portion of the tree during the day, with the wood temperature closer to air temperature nearer the surface. Because the trunk is often shaded in the forest, a strong temperature gradient from the north to south side is rarely present. In the winter, the whole trunk eventually freezes; with warmer days in the spring it slowly thaws from the outside toward the center, with the south side thawing sooner. At shallow depths the wood is constantly warming and cooling in response to the air temperature, in a complex manner, but it may take many days or weeks for the center of a large tree to thaw. Data from the past 3 years show that large trees may be partially frozen during a portion of the sugaring season: complete thawing of two 24"+ diameter trees at the Proctor Center occurred on March 1 in 2004, March 28 in 2005 and March 30 in 2006. Figure 3, from 2006, shows a period when the air temperature was ideal for sap flow, with daytime highs in the

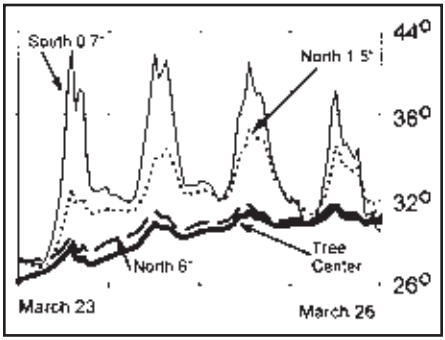

Figure 3: Variation in tree trunk temperature at different depths and aspects on four days in March, 2006.

mid 40's after a week of below-freezing temperatures. While the outer portion of both the north and south sides of the trunk was warm enough for sap to flow, a significant portion of the trunk was frozen. With this large reservoir unavailable, sap flow during the period March 23-26 was minimal.

Thawing of the trunk may make more sap and sugar available in the early spring, but as the season progresses, heating speeds microbial growth which leads a reduction in flow from a taphole. Data from a depth of 2-3" at taphole height indicate that when the wood reaches about 50 degrees for more than a day or two, the flow from a nearby hole begins to diminish. This is evident when comparing flow and wood temperatures from the south side vs. the north side of the trunk.

Finally, soil temperature is unlike air temperature at most times. Like tree trunks, soils are buffered from the extremes of air temperature, with the deeper layers cooler in the summer and warmer in the winter. Over the course of a typical year, at a depth of 12 inches, the temperature varies from about 35-65 degrees.

The largest fluctuations occur after the snow has melted and before the leaves shade the ground; during the summer soil temperature is quite stable. In 10 years of measurements at different depths, soils in the forest at the Proctor Maple Research Center have almost never been observed to freeze. In the forest, a layer of fresh leaves, as well as decomposing leaf litter, contains many air spaces which act as insulation for the soil beneath it. In addition, uncompacted snow is a superb insulator; at 1400' on the side of a mountain, our research site usually has snow cover between November and late March. Without snow, soils would freeze with possible negative consequences to sap flow and tree vigor, as demonstrated by an experiment from New Brunswick[1]. In the 1990's, researchers kept snow from forest plots and compared the soil temperature and sap flow to control plots with normal snow accumulation. With no snow cover, soil temperatures at 8" depth were as low as 21 degrees F in February, and sap yield for the following spring was less than 50% of control trees. Deep soil freezing was also implicated as a contributing cause to maple dieback in Quebec during the 1980's. Although producers have no influence over snowfall, soil compaction by logging equipment, or other traffic, and snow removal for roads could result in a loss of the natural insulation that protects the shallow roots of maple, and impact the sap season for nearby trees.

[1]Robitalle, G., Boutin, R. and D. Lachance. 1995. Effects of soil freezing stress on sap flow and sugar content of mature sugar maples. Can. J. For. Res. 25: 577-587.

Maple Industry Starts New Q&A Forum

The beginning of another maple season usually brings about many questions. Should I tap now, or later? Is my yield above average or below? The questions go on and on. Usually getting an answer to your questions means a visit to your local supplier, or clumsily searching the internet for information. Wouldn't it be great if there was a place where the hobbyist, beginner and expert alike could meet and share information?

Enter the Atkinson Maple Forum. For those of us still not quite caught up with the internet generation, a forum is an online meeting place where people can share information. In this case, information about the maple industry.

The forum was launched in early February by Atkinson Maple Syrup Supplies, an Ontario Canada supplier of maple syrup equipment, supplies, and packaging. "This is a big step for the maple industry," said Adam Smith, Webmaster for A.M.S.S., "there's never been an online forum dedicated strictly to maple before." Acting as an online venue, the forum was designed to provide a medium for beginners, hobbyists, and professional producers alike to meet and share knowledge, experience, and ideas.

With sections dedicated to a long list of FAQ's (frequently asked questions), a 2006 Crop Report, and a section to ask general questions, using the forum is pretty straight forward. If you have a question, post it in the appropriate section. If you can answer a question, then post a response. If you have any recipes, gift ideas, or anything else to do with maple, you can post that too. And best of all, it's free.

Visitors to the forum should visit regularly to stay on top of tapping dates, crop reports and other contributions. For more information visit the Atkinson Maple Syrup Supplies website at www.atkinsonmaple.com.

NEW YORK CALENDAR
OF UPCOMING SCHOOLS AND WORKSHOPS

July 14-16 2006 NYS Maple Tour, St. Lawrence County New York, hosted at Clarkson University, Potsdam NY

August 5 Maple Density, Clarity, Color and Flavor, Making and Grading Syrups for Quality. Hosted by Lewis County CCE. Contact: Michele Ledoux, Cornell Cooperative Extension Lewis County, 5274 Outer Stowe Street, P.O. Box 72, Lowville, New York 13367, Phone: 315-376-5270

September 8-9 Making Quality Maple Confections and Value Added Workshop, Chautauqua County, Contact: David L. Munsee, Farm Business Management Educator, CCE of Chautauqua County, 3542 Turner Road, Jamestown, NY 14701, (716) 664-9502 X. 202

September 22-23 Making Quality Maple Confections and Value Added Workshop, Arnot Forest. Contact: Stephen Childs, 110 Fernow Hall, Cornell University, Ithaca NY 14853, Phone: 607-255-1658

September 23 Sugarbush Thinning for Health and Productivity Workshop, Chautauqua County, Contact: David L. Munsee, Farm Business Management Educator, CCE of Chautauqua County, 3542 Turner Road, Jamestown, NY 14701, (716) 664-9502 X. 202

September 29-30 Making Quality Maple Confections and Value Added Workshop, Warren County. Contact: Contact: Laurel R. Gailor, Natural Resource Educator, lrg6@cornell.edu, Cornell Cooperative Extension, Warren County, 377 Schroon River Road, Warrensburg, NY 12885, Phone: 518-623-3291, 518-668-4881.

October 14 Twin Tiers Maple School, Arnot Forest, Contact: Contact: Jim Ochterski, Cornell Cooperative Extension of Schuyler County, 208 Broadway, Montour Falls, NY 14865, (607) 535-7161

October 27-28 Making Quality Maple Confections and Value Added Workshop, Western NY, Wyomoco 4-H Camp. Contact: Lutie Batt, Cornell Cooperative Extension of Wyoming County, 401 North Main Street, Warsaw NY 14569, Phone: 585-786-2251

November 3-4 Making Quality Maple Confections and Value Added Workshop, Catskills Area, Shaver-Hill Farm. Contact: Stephen Childs, 110 Fernow Hall, Cornell University, Ithaca NY 14853, Phone: 607-255-1658

November 17-18 Making Quality Maple Confections and Value Added Workshop, Hosted by Lewis County CCE. Contact: Michele Ledoux , Cornell Cooperative Extension Lewis County, 5274 Outer Stowe Street, P.O. Box 72, Lowville, New York 13367, Phone: 315-376-5270

January 5-6, 2007 2007 New York State Maple Conference, Verona NY Contact: Keith Schiebel KSCHIEBEL@vvs-csd-high.moric.org

January 13 Lewis County Maple School, Michele Ledoux , Cornell Cooperative Extension Lewis County, 5274 Outer Stowe Street, P.O. Box 72, Lowville, New York 13367, Phone: 315-376-5270

January 20 Western NY Maple School, Letchworth Central School, Contact: Lutie Batt, Cornell Cooperative Extension of Wyoming County, 401 North Main Street, Warsaw NY 14569, Phone: 585-786-2251

January 27 St. Lawrence Maple Expo, Potsdam Central School, Contact: Steve VanderMark, 1894 State Highway 68, Canton, NY 13617-1477, sfv1@cornell.edu, Phone: 315-379-9192

February 3 Sullivan County Beginner Maple School, Contact Peter Carey (845) 292-6180 x111

February 10 Warren-Washington County Maple School, Contact: Laurel R. Gailor, Natural Resource Educator, lrg6@cornell.edu, Cornell Cooperative Extension, Warren County, 377 Schroon River Road, Warrensburg, NY 12885, Phone: 518-623-3291, 518-668-4881,

February 17 Schoharie County Maple School, Contact: JJ Schell, jjs69@cornell.edu, Cornell Cooperative Extension of Schoharie County, 173 South Grand Street, Cobleskill NY 12839, Phone: 518-234-4303

ANNOUNCING THE THIRD ANNUAL . . .

New England Maple Grading School
December 6, 7, & 8, 2006 - Lancaster, New Hampshire

The New England 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. Space is limited and pre-registration is required. For further information or to request a registration packet contact Sumner Dole by telephone at 603-527-5475 or email at sumner.dole@unh.edu

The New England Maple Grading School is sponsored by the IMSI, University of Maine Cooperative Extension, University of New Hampshire 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. For persons with disabilities requiring special accommodations, please contact Sumner Dole at 603-527-5475 within 30 days so proper consideration may be given to the request.

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Potsdam, New York
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Christina Lesyk, 315-268-6425 or chlesyk@clarkson.edu

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14 ANNUAL MAPLE FALL FEST
September 16-17, 2006
Marshfield, Wisconsin
For more information contact:
Sharn Kirn @1-800-422-4541 or
sharonkirn@marshfieldchamber.com or visitmarshfieldwi.com

NAMSC/IMSI ANNUAL MEETING 2006
October 18-21, 2006
Green Bay, Wisconsin
For more information contact:
Gretchen Grape at: Phone (715) 447-5758, Fax (715) 447-5745
E-mail gretchen_grape@yahoo.com

RELATING SPECTROPHOTOMETER READINGS TO VISUAL GRADING OF MAPLE SYRUP

Brian Chabot and Steve Childs - Cornell Maple Program

Color grading of maple syrup is based on placing syrup samples within four or more categories based either on visual comparison to color references or measurement of light transmission with a spectrophotometer. With a spectrophotometer, specific transmission values are used as break points to divide syrup samples into color grades. The purpose of this report is to describe the lack of agreement between existing light transmission break points and visual grading and how this problem can be addressed.

BACKGROUND

Visual color grading of maple syrup began in 1910 using a series of 20 caramel solutions based on a specific recipe (Balch 1930, Brice and Turner 1956). In 1950, colored glass references were introduced to overcome the problem that caramel solutions were difficult to standardize and changed color density with time. Colored glass references are more stable and appear not to change over long periods of time. Consequently, the USDA visual reference kit is the standard, and is written into grading regulations in the US and in several states. Glass standards were discontinued in US-manufactured kits and recently were replaced with plastic standards. The Lovibond Comparator, produced in England, uses permanent glass references that are approved by the USDA and by Canadian authorities.

Caramel solutions made with a recipe are very difficult to standardize because caramel color is sensitive to the sugar source and cooking method. In order to standardize the caramel solutions, Balch (1930) used light transmission at 560 nm as the break points between light (75%T), medium (60.5%T), and dark amber (44%T) solutions. This approach uses light transmission determined spectrophotometricly as the primary standard for preparing caramel solutions as secondary standards. At some point before 1982, Canada adopted spectrophotometric grading as the primary standard using the light transmittance break points established by Balch and added a break point of 27% to separate Canada No. 3 from No. 2.

Spectrophotometers have potential advantages. No human judgment about color is involved. Measurements are reproducible for a specific instrument and, potentially, between different instruments. The measurements quantify color density so that reasonably exact comparisons between syrups can be made and color intensity changes with manufacturing, storage, container type, etc. can be more easily documented. The spectrophotometric method is the standard in Canada. Visual grading remains the standard in the US.

In 2000 Hanna Instruments introduced a simple, low-cost analyzer for measuring transmission of maple syrup samples. Several producers in the US who used the meter felt that they were not getting accurate results. We undertook a study of this problem and to compare a variety of grading techniques and equipment.

METHOD

This study involved collecting 84 syrup samples and grading them using three different Hanna analyzers, two laboratory spectrophotometers (Hewlett-Packard 8452A Diode Array and Beckman DU640), two USDA glass kits, and a Vermont Temporary Grading Kit. We also tested the visual kits under a variety of lighting conditions eventually using specific colored lights and filters. Most of the tests were made in a laboratory with controlled

temperature conditions. Some of the visual tests were made in a sugar house where we explored background color.

DETERMINING TRANSMITTANCE BREAK POINTS

When we compared the visual and spectrophotometric grading, we found significant differences (Table 1). A significant number (45%) of Grade A and B samples were placed in darker grades when the spectrophotometric transmission standards were used. One sample was placed in a lighter grade using the transmission standards. Also, six samples graded as Commercial using the Vermont Temporary kit were graded as B (extra dark) using the 27% transmission standard. Table 1 also illustrates that different visual graders and different spectrophotometric instruments produce slightly different results.

The differences are less within methods than between methods. Garrett et al. (1983) also found that the transmission standards produced darker grades and they recommended against using what they referred to as "Canadian standards." Based on this earlier study and our results, we conclude that the current spectrophotometric breakpoints and current US visual grading systems do not produce the same results, more so than is currently understood.

Table 1. Comparison of visual and spectrophotometric grading

Number of samples placed in grades using two USDA glass kits, a Vermont Temporary kit, two Hanna analyzers, Beckman and Hewlett-Packard (H-P) spectrophotometers using the Canadian transmission standards. The USDA kit and USDA regulations do not have a commercial grade.

Grade	USDA1	USDA2	Vermont	Hanna 1	Hanna 3	Beckman	H-P
A-Light	13	12	11	3	0	2	0
A-Med.	18	20	18	9	11	12	10
A-Dark	27	23	30	33	30	30	28
B-ExDark	26	29	9	25	31	28	33
Commercial			16	12	12	12	13

Spectrophotometers themselves are not at fault and it is possible to get better agreement with the USDA visual references if a different set of breakpoints is used. Though they preferred visual grading, Garrett et al. proposed a new set of break points. However, they were based on a laboratory spectrophotometer rather than the now available Hanna analyzer and they don't describe how the breakpoints were chosen.

Using the USDA glass standards, we grouped the samples by color grades and then ranked the samples within groups by transmittance as determined by the Hanna analyzers. We used two different approaches to selecting new breakpoints, though both gave similar results. In one case, we took the average transmittance of two samples at the low end of a visual grade and two samples at the high end of the next grade.

However, the transmission values overlapped the grade boundaries. For example, one or two light syrups had transmission values that were darker than some medium syrups and one or two medium syrups had higher transmission values than some light syrups. Additionally, because of the small consistent differences between Hanna analyzers noted above, for any break point chosen different meters would place samples on different sides of the break point. This situation always would produce a small number of mis-graded syrups (meaning that visual and Hanna grading would not agree).

As a second approach to choosing break points, we looked for values that minimized the number of mis-graded samples. In choosing these breakpoints, we also examined all the visual data to determine if the USDA visual grade was supported. The results of the second method are given on the next page:

U.S. Syrup Grade Classification	% Light transmittance (Cornell)
Light Amber	Not less than 62
Medium Amber	Not less than 50
Dark Amber	Not less than 36
Extra Dark	Less than 36

For comparison, the Balch-Canadian and Garrett et al. transmittance standards are:

Grade Classification	Balch %T	Garrett et al %T
Light Amber	75	64.5
Medium Amber	60.5	51.5
Dark Amber	44	29.0

If the proposed new break points are applied to the transmission values from the two Hanna analyzers in Table 1, the following sample classification results. These results are closer to the USDA classifications and reflect that Hanna 3 produced somewhat lower transmission values (graded darker) than Hanna 1.

Grade	Hanna 1	Hanna 3
A-Light	14	11
A-Medium	20	16
A-Dark	23	29
B-ExDark	15	16
Commercial	12	12

SOURCES OF VARIATION IN TRANSMITTANCE AND VISUAL MEASUREMENTS

As a group, the Hanna analyzers behaved consistently. At least two readings were taken on each sample with each meter; the sample was rotated 90 degrees between readings so the light beam had a different path through the sample. The average difference for repeated measurements was 0.28. 0.29, and 0.36 transmission units for each of the three meters. This is similar to differences found for laboratory spectrophotometers using a similar test. Large differences between repeat samples were infrequent (but occurred) andseemed to be due to imperfections in the cuvettes, to imperfections in the syrup that were not visible to the eye, or to something about how a particular meter was used as these differences did not always occur with the same sample on different meters.

The three Hanna analyzers were consistently different from each other. The average differences in readings between the three meters were 1.1, 1.9, and 2.6 transmission units. This amount of variation is not unusual or unexpected. The laboratory spectrophotometers also produced different readings from each other and from the Hanna analyzers, though these differences were not in a consistent direction. Larger differences between three Hanna analyzers were found by Heiligmann (personal communication). The electronics within the Hanna analyzers are sufficiently complex that it is probably difficult to bring different meters into exact agreement with each other, even though each is adjusted and calibrated at the factory.

Different visual grading methods also produced different results. These differences appear with samples close to the standards in color. Different individuals will make different grade decisions with the same kit. The same person with the same kit may make different decisions when the background light changes. Different kits can produce different results. We will provide more details on visual kit comparisons in a subsequent report.

DISCUSSION

The lack of agreement between spectrophotometric grading using the break points established by Balch and visual grading methods is a puzzle. The process of manufacturing colored glass with the appropriate hue and color density is demanding. Despite

the extensive instrumental analysis of caramel solutions and glass, it is evident in Brice and Turner that the absorbance match was not exact, especially in the longer wavelengths above 560 nm. Our eyes are very sensitive in the part of the light spectrum transmitted by maple syrup. It appears that a good match between glass and caramel, and thus between visual and spectrophotometric methods was never achieved in the beginning. There is no indication that Brice and Turner conducted the comparison performed here and by Garrett et al. The current Vermont Temporary Kit uses caramel solutions that are standardized through visual comparison with a USDA glass kit. This would avoid a mismatch between these two methods.

One source of variation between spectrophotometers relates to the choice of 560 nm as the central wavelength for measurement and the light absorption/transmission properties of maple syrup. This measuring point was chosen to correspond with the peak color sensitivity of human vision as this was understood at the time. Maple syrup absorbs strongly (transmits little) at blue wavelengths and the transmission increases smoothly into the red region. At 560 nm the transmission is changing with change in wavelength. Transmission will be significantly different at 550 or 570 nm compared to 560.

Spectrophotometers measure light with different spectral bandwidth “windows.” The laboratory spectrophotometers, which used different measurement techniques, had bandwidths of 1.5 and 1.8 nm. The Hanna meters have bandwidths of 2.0 nm. Our eyes have bandwidths of about 350 nm. This means that different instruments will see different amounts of the light spectrum and might be expected to produce different transmission results, especially where close judgments are required.

Another important source of variation between spectrophotometers and visual graders is that the color properties (hue) of syrups can vary. The change from light to dark amber involves increasing redness. Within a grade some syrups may have orange or red hues; they are not simply different densities of amber. This can be seen on a spectrophotometer as different angles to the slope of change in transmission with wavelength and different ratios of absorbance at two wavelengths. These different color properties reflect differences in syrup chemistry.

Visual grading also has sources of variation that will produce different grading results. Our eyes sense colors principally with three pigments. Our brains combine what our eyes sense to produce our color perception. There is variation among individuals that will cause each of us to sense or interpret colors slightly differently. The color of the light passing through the sample and the color standard will affect the ability to make a color density comparison, especially when samples are close to the standard in color density. Differences in hue between samples described above will produce different visual impressions about color match.

Brice and Turner used considerable effort to produce colored glass that was a close match to the caramel solutions. Their data show that the color match was not perfect, which would produce somewhat different results between visual and spectrophotometric methods when syrup chromaticity varies.

The variation inherent in both visual grading and in spectrophotometric grading will make it impossible to perfectly match these two approaches for all maple samples.

ACKNOWLEDGEMENT

This study benefited greatly from information and comments from Profs. Ellis Loew and Tom Owens.

REFERENCES

Balch, R.T. 1930. Ind Engr Chem 22:255

Brice, B.A. and A. Turner, Jr. 1956. Glass color standards for maple sirup. J. Opt. Soc. Am. 46:293-299.

IN MEMORIUM

DR. FRED TAYLOR

Dr. Fred Taylor, 95, died in Burlington on April 23. He would have been 96 on April 27. Fred, as every one knew him, was one of the founders of the Proctor Maple Research Center at the University of Vermont in 1946. Fred was an inspired teacher, who always knew the names of his students, even 40 or more years later. As a dedicated scientist he greatly advanced the study of botany, in particular the ways of the sugar maple. Since his retirement in 1975, Fred was a maple volunteer, helping out at the Vermont Maple Festival, the sugar house at the Champlain Valley Fair and many maple events. He served on the core planning committee of the 2000 International meetings in Burlington, VT.

He was born in 1910 in Massachusetts and a graduate of the University of Massachusetts. He earned his doctorate at Harvard University. His teaching career included Clemson University in South Carolina and 33 years at the University of Vermont. Many of his former students came to see Fred at the Champlain Valley Fair sugar house each August, those visits were highlights of his volunteerism.

Fred Taylor was active in the industry up until 1993, doing "taste testing" at sugar on snow parties, the Vermont Maple Festival and the Champlain Valley Fair and answering question about maple production as the resident expert.

Messages of condolences can be sent to his wife, Paula Fives Taylor, 6 Larch Road, So. Burlington, VT 05403.

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