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DIGEST



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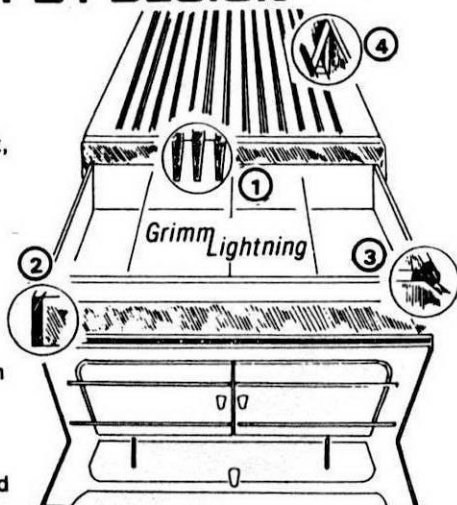
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MAPLE SYRUP DIGEST

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44th ANNUAL NEW YORK MAPLE TOUR

It doesn't seem possible but that's right. The first New York Maple Tour was held in 1946 according to Prof. Fred E. Winch who was guest speaker at the banquet. A condensation of his talk is printed in this issue under the title, "Looking Back."

I didn't get very excited about maple tours when they were first started. I wasn't making much syrup in those days and the first one I attended was in 1951. I got hooked then and have only missed one or two since. But even though I've attended so many, this is the first one I've ever helped plan. I knew someone had to do it but aside from that, I never gave it much thought. Boy, was I awakened.

When I went to the first meeting held by our county association I thought it would be easy. I guess what I did was, but some of our members had plenty to do. Planning meals and locating caterers, engaging buses, finding accommodations for both the tour and housing, deciding where to go, what route to take and figuring the cost of everything were some of the major tasks. The minor ones were too numerous to try to list. After several meetings from November through July, some of them quite lengthy, the most important thing I learned was it's not easy to put on a maple tour. I'd like to give a long overdue commendation to the folks who have had the task of doing it in years past.

With the very capable leadership of our County Agent, Gerry LeClair and our County Maple Association president, Rod Aldrich tying all the loose ends together, we finally got the show on the road on time on Monday morning, July 17th. Registration was held at the Chenango County fairgrounds where there was plenty of room for equipment exhibitors and a sugar making demonstration by Mary Jane Cook.

We then traveled by tour buses to Rod and Cindy Aldrich's Tradewinds Maple Farm and found his wood chip gasifier in operation. He burns anything from sawdust to wood chips and makes syrup at a fuel cost of about 50¢ per gallon. We also hit our first snag when the P.A. system I put in my car wouldn't operate satisfactorily, but a back up unit Jerry had brought along substituted quite adequately. The buses then took us to General Clinton Park in Bainbridge for lunch by the Presbyterian Church women.

After lunch the group split up to visit three places at once. Over 200 people is too many at one stop. One group went to Hansmann's Mills and saw how several kinds of prepared pancake, biscuit, doughnut and bread mixes are made, packaged and distributed. After all, pancakes are our biggest user of maple syrup.

The second group saw Reed Bakers brand new 36x68 foot sugarhouse with 3 - 6'x10' flue evaporators that run in series and a 4'x10' finishing evaporator,

COVER PICTURE

Sugar maples should be listed under "Endangered Species" because scenes like this are fast disappearing. This one was located on State Route 7, 2 miles west of Bainbridge, NY. Photo was taken about 1955.

Thanks to the Dept. of Transportation there's only about 6 trees left, no young trees have been planted but over 35 house trailers and a saw mill cover the 20 acres of Susquehanna valley bottom land along both sides of this 1/4 mile stretch of road.

This may be called progress and I doubt if anything can be done about it, but it wouldn't break anyone to plant a few maples along roads where they can. Maybe someday someone can enjoy them as we have enjoyed these.

all oil fired. Sap flow of about 600 gallons per hour makes 15 to 20 gallons of syrup per hour. He taps 1600 around the village, buys from another 4000, mostly roadside trees, and could use a lot more sap.

The third group went to our place, Sipple's Farm. We don't have much in the syrup production line, just a 1000 tap outfit the two of us can handle. We wanted to show how maple syrup and Christmas trees go together with no confliction for time. We also sell maple equipment and supplies making a diversified business requiring no hired help. We also hit the second snag when the batteries in the No. 2 amplifier went dead leaving only Jerry's unit and a bullhorn. As you may have guessed, I was in charge of the sound systems. Then the three groups rotated so that everyone visited all three places.

After a delicious buffet style banquet at the Canasawacta Country Club in Norwich, the feature of the evening was Fred Winch's slide show and talk on the history of the New York Maple Tour. See: "Looking Back" in this issue.

On Tuesday we visited Gerald and Debbra Parry's sugarhouse near Smyrna. They tap 5000, 2000 on a mechanical vacuum. They use a Reverse Osmosis machine and a 4x12 all flue evaporator finishing on a 2x6 oil

fired unit.

The next stop was Don and Mary Jane Cook's sugarhouse. They tap 6500, mostly on mechanical vacuum. They make 1200 - 1500 gallons of syrup with an R/O, a 5x14 evaporator, 2x6 finishing pan and a filter press. They have a sugar kitchen and sales room, make a full line of maple products for sale wholesale and retail and find time to operate a 150 cow dairy farm.

Just before noon the tour wound up at the Roger's Conservation Center where Bill Betts, Senior Forester showed a sugarbush that was thinned in 1970 and an area that was thinned for saw timber production. A Rogers Conservation program was held for those not visiting the woodlands and lunch was served to everyone by the Otselic Valley Grange.

So, after attending a good many tours, I've learned that while seeing how someone else does it is a big part of any tour, the most important thing is visiting with all the friends you make going on these tours. If you don't join in you're certainly missing a lot.

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FROM CONNECTICUT


by Darrell Russ

The 13th annual meeting of the Maple Syrup Producers Association of Connecticut will be held on November 11th at Sugar Hills Containers in Sunderland, Mass. as guests of Dick Haas. The day will include a tour of the container plant and the Tobey Hill sugarhouse. The business meeting will center around a report on the October NAMSC annual meeting to be held in Portland, Maine and the Connecticut Association election of officers for the coming year.

The Spring Workshop is scheduled for Saturday, January 20, 1990 in the Hebron - Marlborough, Connecticut area. Sheldon Wells will host a tour of his sugarhouse.

FROM OHIO

The Ohio Maple Producers Association will hold their annual meeting on November 3 & 4 at Bascom, Ohio. Dealers can set up on Thursday afternoon from 12 PM on. Call Gordon Feindel (419) 937-2675 for information.



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FROM MASSACHUSETTS

Massachusetts maple farmers are breathing a sigh of relief this summer after four short crops (1986-89) and a major insect assault. The pear thrips, which defoliated thousands of acres of sugar maples in the spring of 1988, have done very little damage in our region in 1989. Combined with abundant soil moisture and favorable temperatures for leaf development, the decreased insect damage has translated into better looking trees and cautious optimism about the 1990 maple syrup crop.

Favorable sugaring weather will still be needed to assure a maximum yield next March, but sugarhouse operators are looking forward to the first year in many when drought and insects will not be major factors.

In spite of the low 1989 yield, farmers have held prices steady at 1988 levels. Quality is excellent and demand continues strong, even in the traditionally slow summer months.

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THE ONTARIO SUMMER TOUR

BY Bill Robinson

The Simcoe local of O.M.S.P.A. hosted the Ontario summer tour. The tour was based at the Orillia Fair grounds and started with registration on the afternoon of July 20, 1989. Transportation to Penetang to catch the cruise boat was by bus. An enjoyable dinner cruise of Georgian Bay was the evening highlight.

On Friday, July 21, we had breakfast at the Orillia Fairgrounds. We then boarded buses for the day's touring and the first stop was at Ken and Rene McCutcheon. This sugar camp featured two sawdust burner evaporators, a 6 head vacuum bottler, and an in ground stainless storage tank. The McCutcheon

operation has 5-6 thousand taps on vacuum tubing and evaporators including pans and arches and other processing equipment built by Ken and Rene.

The second stop of the day was at Ritchies Sugar bush at Elmvale where we had lunch. The Ritchies sugar camp has a natural gas evaporator and finishing pan. They have 5,000 taps on vacuum tubing. The operation is looked after by Paul and Cindy who have taken over from Paul's father Ken who still helps at the sugar camp.

We visited the Greenlaw sugar camp next door to the Ritchie camp. This operation is run by Wallace and Myrt and they have 2200 taps with a wood-fired evaporator. The Greenlaws have a gas finishing pan with and R.O.

The Lalonde sugar bush is next door to the Greenlaw camp. They have a wood fired forced draft evaporator and taps on vacuum tubing. This operation also features a shingle mill behind the sugar camp. This operation is run by Tim Lalonde who has taken over for his father Herman. Tim's parents live in a house near the sugar camp and still have an interest in the operation.

We visited a sizing mill next where plantation thinnings are cut into 8 foot 4x4 and 6x6. This squared material is then shipped out to be resawed for pressure treated lumber.

After this busy afternoon we boarded the buses and returned to the Orillia Fairgrounds for a delicious banquet.

Saturday, July 22, we had brunch at Ron and Ruthanne Shaws Pancake House and toured the Shaw's Maple Operation. The Shaws have 6,000 taps on vacuum tubing with an R.O. and an oil fired evaporator and a steam finishing pan. Ron's parents live at the sugar bush and both help in the operation.

OMSPA would like to congratulate the Simcoe Local for their efforts in organizing the Summer tour. We had 235 registrations for the three day event. A job well done!

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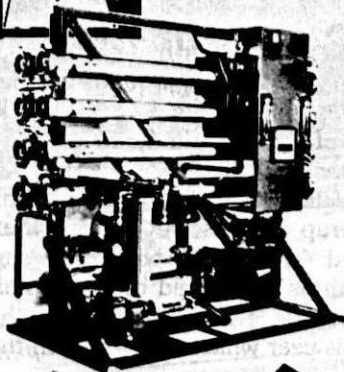


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IMSI BOARD MEETS

The Board of Directors of the International Maple Syrup Institute met Monday, July, 17, 1989, at the Airport Hilton, Montreal. The tone was set immediately, in that the general concern of the IMSI and the international maple community has shifted from environmental to marketing concerns. It would appear that the immediate concerns are not for the welfare of the tree but rather what are we going to do with the surplus the tree has provided. A combined effort between the IMSI and governmental agencies is being launched to meet this new challenge.

Membership has been a priority to the IMSI. Results of these increased member efforts is starting to show. Two major companies (Bordens and Heinz) are joining the IMSI along with equipment manufacturers, State and Provincial Associations, and more producer-packers of maple syrup. The IMSI membership is truly becoming a representation of the international maple syrup industry.

The Maple Bank was thoroughly discussed by the Minister of Agriculture at the Canadian National and Quebec levels. Approximately 4,000,000 pounds of pure maple syrup is in the maple bank. Quebec Government will not provide further funds for any additional syrup purchases even though an estimated 40,000,000 pounds of surplus syrup is being held by the producers. The Maple Bank will not sell the syrup this year which could worsen the

situation. However, Quebec may make some limited funds available to their producers for loans if those producers are in a desperate situation. These loans will be difficult to obtain and shall be required to be repaid. Further funds may be available from the Quebec Department of Agriculture for "orderly market development".

A marketing research project shall be sponsored by the IMSI jointly with the Canadian Government in the amount of \$36,000.00. The research shall provide a forum for discussion with consumers on their preferences for use of pure maple syrup in a variety of serving applications. This survey shall be conducted in 6 North American cities including New York, Chicago, and Los Angeles. The results shall set the agenda for more research which hopefully will create a whole spectrum of new maple products.

The annual meeting for the IMSI will be held in Levis (Quebec City), Quebec, October 21 and 22, 1989 at the Hotel Rond Point. The program shall be oriented towards marketing with the program including tours of Canadian sugarbushes. All persons interested in maple are urged to attend. The following week Thursday (October 26-29, 1989) is the North American Maple Syrup Council meeting in Portland, Maine. The dates were coordinated to make travel as convenient as possible and we respectfully request that you attend both meetings.

Leahey Orchards are packing maple syrup for A&P using the IMSI logo and they are not members of the IMSI. Action has been taken for the withdrawal of the entire stock of this syrup.

A nominating committee for new officers was appointed by President John Hyndaman. The nominating committee consists of Dave Scanlon, New Hampshire; Michael Herman, Quebec; and Lynn Reynolds, Wisconsin.

Meeting was adjourned. Next meeting is set for Levis at the annual convention.

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NEW YORK MAPLE QUEEN

On Saturday, May 20, at the American Maple Museum, Croghan, four New York State young ladies competed for the title of Miss New York State Maple Queen.

Miss Barbara Bray, R.D. 2, Box 377, Timian Road, Sauquoit was selected as the 1989 reigning queen. Miss Bray represented Oneida County.

Representing St. Lawrence County, Miss Angel Thompson, R.D. 1, Box 100, Gouverneur, was selected as New York State Maple Queen alternate.

The other contestants were Denise Brown, Box 523, 36 Cushman St. New Berlin - Chenango County, and Trixi Ann Tinti, R.D. 2, Box 947, Cobleskill - Schoharie County.

The girls interest was not only repre-



senting New York State as maple queen, but also in representing one of its special products, Maple Syrup.

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AMERICAN MAPLE MUSEUM HALL OF FAME

by Walter Humphreys

Archibald Roy Campbell Jones, better known to all as Arch Jones, was born in Ottawa, Ontario, on Oct. 26, 1922. He graduated from Trinity High School in Port Hope, Ont., in 1941 and attended McGill University in 1941-42 earning a one year B.Sc. degree.

After serving three years in the Canadian Navy in World War II, he entered the Faculty of Forestry, University of Toronto where he earned a B.Sc.F. degree and won the Biggs Trophy. He then worked for two years as a forester for Moskoka Wood Products, Ltd., where he made his first contact with the maple industry.

Arch started teaching in 1953 at Sedbergh School, supervising boys maple syrup operations. He then served as a Lecturer and Associate Professor of the Renewable Resources Department, Faculty of Agriculture, MacDonald Col-



lege of McGill University and Director of the Morgan Arboretum Association.

Arch was initially involved in the 3,500 tap operation on the 75 acre sugar bush in the Morgan Arboretum. He also carried out extensive work with Quebec and Ontario Maple producers and farm woodlot owners during the last thirty years. He commenced research in 1956 on maple sap collection and production methods including tubing use and taphole sanitizing pellets. Other studies included sugar maple silviculture, sugar bush management, maple collection and processing equipment.

Most recently, in the 1980's methods of protecting maple trees from the impacts of air pollution and acid rain by diagnostic fertilization in relation to adequate maple nutritional levels as shown by foliar analysis. Evaluation of different methods of assessing the health of sugar maple and its response to diagnostic fertilizers, defoliation and other stresses using electrical resistance tests, root starch levels, rate of taphole closure, presence or absence of disease and insect organisms, crown density and appearance, leaf size and colour and other common tree parameters.

From 1981-88 Arch was Director of Research, Morgan Arboretum Association, and from 1975-89 a judge in the maple section of the Royal Agricultural Winter Fair. From this background I present Arch Jones as candidate to the American Maple Museum Hall of Fame.

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HALL OF FAME MAY 20, 1989

Robert G. Coombs of Maple Lane, Jacksonville, Vermont has been involved in maple all his life. His folks started a maple products business in 1925 and in his early childhood Bob must have realized that maple had a place in the business world. He started working in the family business in 1947 and has continued to be an active participant to this date. Ultimately he became a director of Coombs Maple Products Inc. in 1961 and president in 1985 to present.

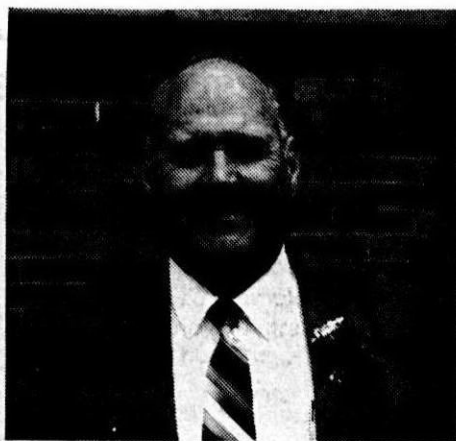
Under Bob's guidance many new and unique marketing procedures were successfully carried on for selling maple products in the New England and Northeast States. Probably one of the most successful ventures was the production of pure maple candy for which Coombs has become very well known. Other maple products include syrups, granulated sugar, creme or butter, dressings and fudge.

For many years Bob and his family operated Beaver Brook Sugar House on Route 9 in Wilmington, Vermont which was a nationally known tourist attraction.

Other businesses that Bob has been involved in are the Maple Country Can Company of St. Albans, Vt., the United Maple Products Co. of Essex Junction, Vt., and the Leader Evaporator Co. of St. Albans, Vt. in which he has been a director since 1964.

Many producers have been helped to get into the maple producing business by Bob as he is a dealer for a full line of maple equipment. His knowledge and willingness to explain the making and marketing of maple products is well known.

Anyone so involved in maple will be involved in their local association and Bob is no exception. His participation includes the Vermont Maple Industry Council for 29 years and, it must be noted, was presented the 1988 Maple



Person of the Year by this organization. Also Bob is a longstanding member of the Vermont Maple Sugar Makers Association.

Bob became a director of the North American Maple Syrup Council in 1963, and represented Vermont in this organization for ten years, becoming its Chairman from 1971 to 1973. His leadership was appreciated by the entire maple industry.

Still very active in maple Bob finds time for many local fraternal, civic and church organizations and he enjoys hunting, fishing, photography and collecting maple memorabilia.

We would also like to acknowledge the support that Bob has received from his wife, Shirley, and the rest of their family. It is indeed fitting and proper that we induct Bob Coombs into the Maple Hall of Fame this 20th day of May 1989 in Croghan, New York. Thank you, Bob.

Russ Davenport

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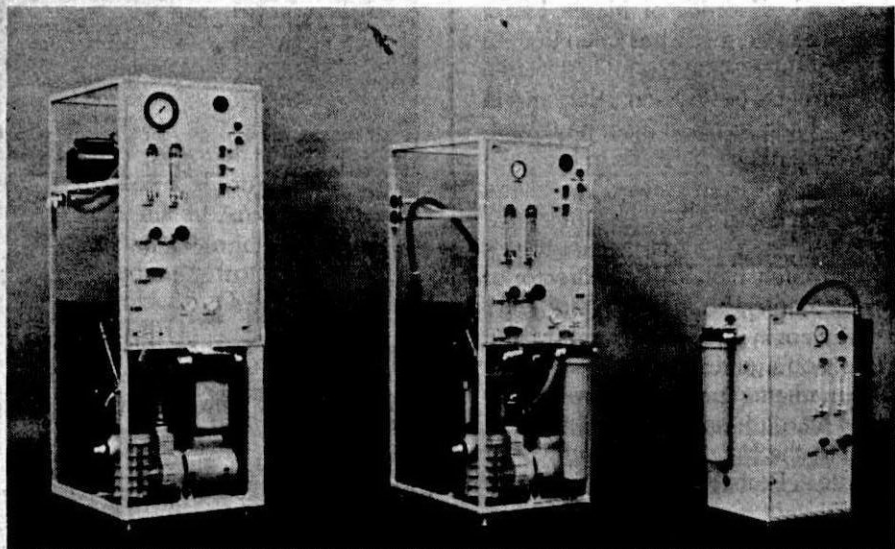
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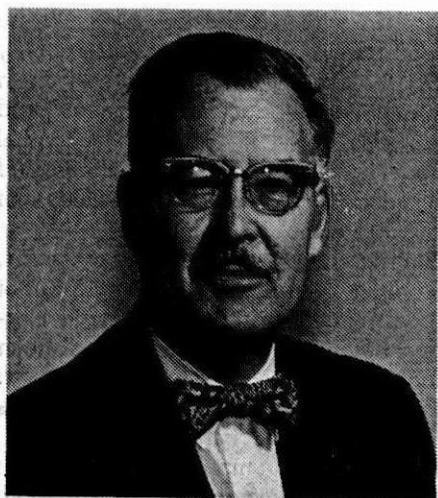
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LOOKING BACK

by Fred E. Winch

Last winter I was asked if I would review for this tour some of the history of the Maple programs carried out by Cornell University as I knew them. I have had to rely on memory, my several hundred photos from County Agents and my own collection as well as correspondence from Charlie Hubbell. We, in forestry, had daily notes on forestry activity by counties in files I left at Cornell going back to 1912 or 1914. Some 10 years ago I wished to refer to these but found they had all been discarded.

I had an early interest in maple as my grandfather, in the 1880's had planted sugar maple in his yard in Massachusetts, one for each of his five sons. My father succeeded to the home "farm" and when I was a boy we tapped them to make syrup. My first serious experience with maple was as a graduate student at Cornell with Extension Forester Joshua Cope when in 1937 we visited the sugar-bush used by the Experiment Station at Oaks Corner near Geneva. There a chemist, Dr. C.O. Willets, was concerned with lead contamination in maple syrup. The next spring, 1938,

Cope asked producers to send in a pint of syrup, and fill out a questionnaire as to the buckets used and the type of pans on the evaporator so syrup could be analyzed at Cornell and results returned to the producer. Generous maple producers sent in gallon, half gallon, quart and some pint containers. It was my job to reduce the samples to pints for analysis. More than 150 samples were tested, about 70% showed greater or lesser contamination but the grad students not discriminating, enjoyed the generous surplus as only grad students could. That was 52 years ago. In 1943 I returned to Cornell as an Extension Forester and was again involved with Cope the following spring helping to prepare data and visiting sugar bushes. Dave Trapp and Floyd Neal's were near Cornell (gasoline was rationed), both excellent syrup makers, and I scraped together \$3.12 to buy a gallon from Floyd (Office of Price Administration put ceiling prices on all commodities) and I continued with Josh to work on maple.

I am indebted to Charlie Hubbell of Jefferson who has kept diaries (75 years to date) on his daily activities. From his diaries I found that the first County Maple School was held Feb. 9, 1939 at his sugar house, organized by Cope and County Agent Ray Pollard. The speaker was C.O. Willets, topics included lead problems from terne plate and lead painted buckets and fuels for evaporators, 8 to 10 attended. This lead stydybrought out the bakelite enamel paints for buckets. From this start schools increased in number and attendance. At one time more than 25 schools were held yearly.

Cope felt a picture was worth a thousand words but seeing the setup and talking with the user was much better. Josh started the tours June 20, 1946 once gasoline became more available. Charlie noted in his diary that he, Murry Benjamin, Joe Yancey and Bill Chaffee left Ithaca with Josh at 7:00 am in a

station wagon visiting Millard Embt's processing plant, Will Tozier, Leon Wright and Bill Lincoln among others spending the night as guests of the Lincolns. The second day started at 7:30 a.m. Steam boilers, bucket washers, filters and cream stirrers were seen and discussed. The Tozier's stirred cream in a flat bottomed "dough tray" with basswood paddles by hand. He (Charlie) noted that he arrived back at Jefferson at 12:30 a.m. on the 22nd!

The second tour was June 26-27, 1947 with 12 men on the tour to Otsego and Schoharie counties where Benjamin's was visited and woodlot management was actively discussed; Clark Estate with a modern sap house visited and where Mrs. Clark was hostess for the evening meal. The next day was spent in visiting bushes in Schoharie County winding up at Hubbells discussing oil-fired evaporators, ventilation and sales ideas the roadside sap house. Hubbells put on a pancake lunch for the group which included producers from Western and Northern New York. From those beginnings tours were held annually to the three maple regions of the state growing a little yearly and covering topics of interest at the time: tapping, bucket sanitation and covers, filters, grading and oil burners of which Hubbell's use generated much interest.

On a hot, humid, thundery August afternoon in 1950 (we usually spent Saturday a.m. in the office writing up the week's work and making notes of record of field events) I got a call that Josh, who had been working his Christmas Tree Plantation had not come in to camp for an early supper and that Mrs. Cope had found him sitting under a tree where he had died from a heart attack. That year the Philadelphia Maple Conferences were scheduled to begin and Cope was to be a speaker. I filled his place discussing the New York Extension program for maple producers thus starting a cooperative association with the Federal Lab

which continued for many years. The triennial maple meetings instituted by Dr. Willets were the catalysts which stimulated producers, educators and researchers to keep in touch for mutual benefit of the national industry and through our discussions knowledge of our tours spread.

In the early '50's filters were problems, wool felts were difficult to sanitize, boot types slow and hard to wash; in Northern New York flat felts caused much interest and locally were important. Power tappers to hasten the process were new ideas. Buckets - aluminum, plastic and galvanized were used, even 10 gallon buckets were used in remote bushes. Willets pointed out galvanized coatings were bacteriacides. Labor was a big problem. At this time I felt that the successful maple producer had to utilize family labor, involve wives and children in the manufacture and sale and make the "factory" accessible and attractive to the consumer and thus began to have facets of the tour attractive to the distaff side, especially farmstead saphouses.

In 1954 Leon Wright in Cattaraugus County who was using 10 gallon buckets, gathering from them when his other bushes were caught up, turned to the available hard plastic tubing as a way to save labor. Dick Howard, a forester and chain saw agent for Lamb's of Liverpool in the area got interested and brought Leon's problem with plastics to Bob Lamb to see if there was better tubing available. I went on Sabbatical leave in June 1955 and Dick Howard took on the maple work in '55-'56 and the tubing system was born for the '56 tour. Some of the really lively discussions the next few years were on tubing installation, sanitation, flavor and quality generally. Tours in that period were to Art Merle's, Sipple's, Gerry Lyndaker's for large crowds.

In that period the Triennial Conferences generated interest in a National Council which in turn generated a national publication and research was



I found this picture in the Digest files and thought it would fit in with Fred's article. It has never been used in the Digest because it was taken on the 1955 tour at Marvin & Laura Truax's Woodview Farms, Altamont, NY.

Kneeling, in the front row, are some of the old timers. From left to right, starting with the guy in the hat is me, Lloyd Sipple, then Marvin Truax, Xura Smith, Charlie Hubbell, Leon Wright and Will Tozler. Directly in back of me is my son, John, 11, and on his left is his mother, Mary Lou. How many more can you identify? Ed.

stimulated. Field trials of new ideas were needed and we in N.Y. were fortunate to have early adopters and a modern road system from Philadelphia. An early adopter and a good publicist as well as a good mechanic was the Sipple family and many new ideas were generated in Philadelphia and Bainbridge relative to the processing and manufacture of maple products. Maple sugar and cream stirrers, series evaporators, flat filters, gas fired finishing pans, steam finishing pans as well as crystal coating equipment and processing on a producer level were generated from this symbiotic arrangement through the 60's. The transfer of this research was

aided by the tours.

One of the radical forward steps that revolutionized sirup processing was proposed by Willets, a covered evaporator. He, Charles Hager and Lloyd Sipple built an aluminum cover and tested it in Hager's new sugar house before season with positive results - the next summer this was the attraction on the tour. By this time our tour attracted New England, Pennsylvania, Ohio and Ontario producers and ideas spread rapidly.

Another spectacular tour was to Lewis County where the Forest Tent catapillar generated a spray program on designated high valued sugar bushes jointly financed by producers and the State

and then the County Maple Association. The theme of bush management was timely and demonstratable. Another tour highlighting the essential bush management was to Allegany County and Merritt Vossler's thinned bush of several acres and his planted bush behind the farmstead saphouse. Those planted trees now in 1989 are reaching 15 inches in diameter. As always one of the goals of the tours has been to look toward new tie-ins of maple with other country oriented enterprises. We have visited maple and orchard enterprises, maple and Christmas trees, maple and PYO blueberry farms, maple and pancake houses as at Cartwrights in Short Tract, Allegany county. We have also been fortunate to have had available C.O. Willets or Clyde Underwood during the years that the Philadelphia Lab was

working on maple. I doubt if one or the other was not present at most tours.

But the most dramatic revolution, surpassing the acceptance of thermister controlled automatic draw off, the steam finishing pan, excellent mercury thermometers (let's hope for accuracy we stay with Fahrenheit scale!), reverse osmosis and pressure filters, all shown on many tours, was the tour to Walter Hoyt's at Walton where Walt built from diagrams and crude sketches the preheater in his covered evaporator which generated fuel efficiency and distilled hot water for cleaning equipment, a real revolution in sanitation! Within a year eleven or more homemade units were in service and commercially made outfits started to be available!

Among the tours was one I called the "Route 100 Tour" leaving New York for Vermont and Bob Coombs, to Mass. and Lin Lesure's and Edgar Gould. One starting in Franklin County N.Y. then to Quebec with the guidance of Arch Jones of McGill to Blairs, Stephenson's and others and the hospitality we enjoyed. This tour I saw in its entirety as I was "along for the ride" as Arch Jones did the work. Another to Heaven Hill Farm showcasing Lew Staats' work in the bush and sugar house at Cornell outpost in the North Country and the hospitality of the Uihlein's who gave it to the University.

My involvement lasted through 1975 and in the 14 years since probably more technology has been added than I saw in my twenty-five years of active work with our State Tree. The family involvement is still an important facet of successful maple enterprises, the tie-in with other "minor" rural enterprises lends more nearly year round sales which induce better marketing and has enabled many families to maintain tenure of their holdings throughout the Northeast. (I am happy to be on this 44th Maple Tour, as a spectator, with you today.)

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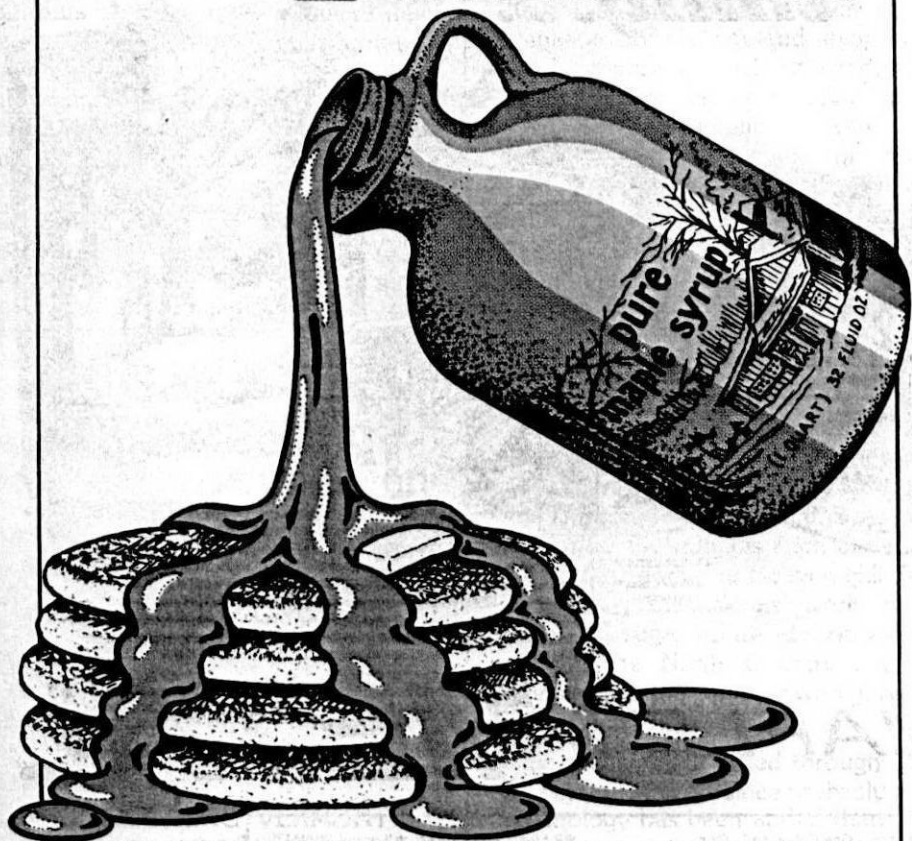
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Gary Gaudette, President of Leader Evaporator Co., Inc. announced the purchase of the G.H. Grimm Company of Rutland, Vt. The Leader Evaporator Co. has been supplying maple equipment for over 100 years since its founding in 1888. In 1964 its operations were moved to its present location in St. Albans, Vt. with the merging of the George H. Soule Co., the original producer of the King evaporator. Later in the early 1970s the Vermont Evaporator Co. of Ogdensburg, N.Y. was merged with Leader. The G.H. Grimm Co., with a 100 year old history beginning in Hudson, Ohio became the newest and fourth member of the Leader family.

The Grimm acquisition includes the Lamb Natural Flow Tubing Co. which merged with the G.H. Grimm Co. four years ago. Bob Lamb is very much in favor of the merger and has agreed to advise and assist in anyway possible.

The Leader Evaporator Co., Inc. is wholly owned by its distributors and employees, providing it with a wealth of knowledge and experience in the maple business. This is a valuable asset to its customers and gives assurance of continuing availability of top quality equipment of U.S. manufacture in both raised flue and drop flue design. Leader also manufactures the Springtech line of Reverse Osmosis machines.

Leader has announced that it will be continuing the Grimm/Lamb operation in Rutland with existing staff. John Record, a twelve year veteran of the Grimm Co. has been named General Manager of the Rutland operation. Both Leader and Grimm distributors and agents will now be able to offer both lines of maple equipment to their customers enhancing better service to the maple producer.

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far as distribution and delivery are concerned — they can only be enhanced by our acquisition of Grimm."

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CORNELL COMPLETES FINAL VCE EVALUATION

By John W. Kelley and Lewis J. Staats

The New York State College of Agriculture and Life Sciences has been working with the Modern Evaporator Company since 1983 on the development of a previously unavailable vapor compression evaporator (VCE). During the 1988 maple season the operation of a prototype VCE was evaluated at Cornell's Uihlein Sugar Maple Research - Extension Field Station at Lake Placid, New York. The VCE was used to remove 32,630 gallons of water from 37,100 gallons of 1.9% sap which produced 4,470 gallons of concentrate of about 15% sugar. This level of concentration is the equivalent of removing 90% of the water from the maple sap necessary to produce standard density (66% sugar) maple syrup. Syrup made from the concentrate was equal to or

superior in quality to that produced entirely by a conventional open pan evaporator (OPE).

The VCE functioned without breakdown or difficulty of any kind during 14 operating periods for a season total of 150 hours. Throughout the season, average sap processing intake capacity was 248 gallons per hour. The average water removal rate was 218 gallons per hour. Average energy consumption (only electricity is required) was 23.5 kilowatts per hour. Energy cost for further processing concentrate to 813 gallons of syrup in a modified OPE, primarily fuel oil and a very small amount of electricity, was \$365.04. The total energy cost of producing syrup via the VCE and modified OPE method was \$.66 per gallon (\$.22 per gallon VCE and \$.44 per gallon OPE). In comparison, processing the same amount of maple sap, of equal sugar content, by conventional OPE at the Field Station, computed on the basis of 15 years of data, would have cost \$3.42 per gallon.

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and the demonstrated performance reliability of the machine, those involved in this operational evaluation feel that the prototype VCE is ready for commercial production. Producers interested in the VCE should contact Steven Dorsey, Modern Evaporator Company, P.O. Box 222, Westport, New York. Examination of the Cornell VCE can be arranged by contacting the Uihlein Sugar Maple Research - Extension Field Station, Bear Cub Road, Lake Placid, New York 12946 (518) 523-9337.

Sincere appreciation is extended to Mr. and Mrs. Henry Uihlein, II of Heaven Hill Farm, Lake Placid, for

their long-term and generous support of the Field Station; and to the Greater Adirondack Resource Conservation and Development Council, Inc. and the New York State Department of Agriculture and Markets for partial funding support for this evaluation.

A copy of the final evaluation report "Development and Evaluation of a Prototype Vapor Compression Evaporator for the New York Maple Syrup Industry", Department of Natural Resources Research and Extension Series No. 33, can be obtained at \$3.95 per copy from the Distribution Center, 7 Research Park, Cornell University, Ithaca, N.Y. 14853.

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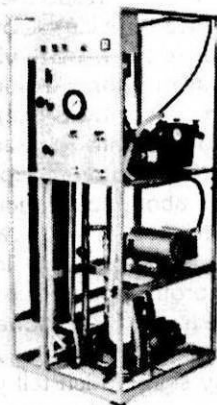
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CHARACTERISTICS OF NEW YORK STATE MAPLE PRODUCERS: SOCIO-ECONOMICS, TRADITION, AND PERSONAL EXPERTISE

PART TWO:

By: Catherine K. Tucker and
Gabriel F. Tucker

Department of Anthropology and
Department of Natural Resources
Cornell University, Ithaca, New York

This is the second of two articles which together examine the role that socio-economics, tradition, and personal expertise of sugarbush management play in decision-making by New York state maple syrup producers. The first article covered the methods used in the study and discussed the results concerning socio-economics and tradition; this article reports results dealing with the personal expertise that producers may use to manage a sugarbush, and presents some conclusions for study as a whole.

The first question asked concerning sugarbush management was, "Are there any signs which you look for in a sugar maple tree which tell you whether it will produce a high sugar sap?" While 50% of the respondents stated that they looked for a large crown, 33% said they looked for healthy vigorous growth. In addition, three respondents said they looked for trees with many limbs, and two said that stressed trees might produce a high sugar sap. In a related question about large quantities of sap 53% of the respondents said they looked for large crowns, 19% looked for healthy, vigorous growth, 5% looked for a moist site and 4% mentioned "many limbs".

The next question asked, "Are there any signs which tell you what area will make a good sugarbush?" While some

people gave answers about the accessibility for tapping, the majority gave answers related to the ecology of the woods. The largest number of respondents were concerned with the orientation of the slope. Most respondents thought southeastern slopes offered the best sugarbush areas; a few mentioned south and southwest aspects as well, and one person said a south or southeast slope should not be chosen because although the run starts earlier it also ends earlier. These answers could give rise to some interesting experiments, assuming other sources of variation could be controlled.

Soil fertility was important for 25% of the respondents to this question. Some were more specific and said what kind of soil was good for a sugarbush but there was some disagreement between answers. Some said loamy soils were good, others said heavy soils, others said soils that were *not* heavy were preferable. This is another area where it is clear that the producers have done some observation or even informal experimentation on their own lands.

Some of the most interesting answers to us were three descriptions of the other species likely to be present in a good sugarbush, such as beech, hop-hornbeam, or ash and birch. As two other respondents stated, "groundcover types are indicators of soil fertility." This is interesting because the method of judging the productivity of forest land based on the plant types growing there has been used by other farmers and foresters concerned with tree growth all over the world, but it is rare to hear of indicator species being used to help determine sugarbush production.

It is difficult to say how representative these results are for maple syrup producers as a whole or even those in New York State alone. Participants in the yearly maple tour are in many ways a very special group of people. Certain characteristics indicated by the responses, however, clearly stand out

as being critical to New York maple syrup producers in general and most likely to others in the northeastern U.S. as well. Not only did the majority of those responding say that financial profit was a major incentive, but many also said it was pleasurable. This is an important combination that is not always found in all industries.

Another critical characteristic appears to be the role that tradition and family play in syrup production. Over one quarter cited tradition as an important factor in their decision to be involved in maple production; perhaps most important was the overwhelming indication that maple syrup production is so clearly a family affair. It is also quite clear that maple producers as a group think a great deal about the ecology of their sugarbushes and generate hypotheses about what will increase production, as well as making observations about the morphology of individual trees in relation to their sap and sugar production.

For us as researchers, the most important outcome of this study is not the results themselves but the ideas or hypotheses that they generate for future work. Maple syrup producers, other farmers, and landowners in general are an important source of information. They have much to offer to researchers who are willing to work closely with them to improve maple syrup production and the industry as a whole.

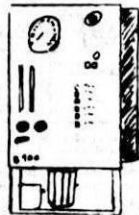
ACKNOWLEDGEMENTS: First, our sincerest thanks to all those who donated their time and effort by filling out the questionnaire. Funding came from related projects supported by McIntyre-Stennis and Kleckhefer Adirondack Fellowship research grants. We also wish to thank Lewis J. Staats who reviewed the questionnaire before distribution and James P. Lassoie who reviewed this article before publication but they are not responsible for any deficiencies that may remain.

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VERMONT MAPLE FESTIVAL HELD

By Ray Foulds

Approximately 200 maple sugar makers and friends met in St. Albans on April 8 for the Annual Maple Banquet as part of the 22nd Annual Vermont Maple Festival on April 7, 8, and 9. The event featured a recognition and awards ceremony led by Larry Myott, Area Extension Maple Specialist. It was sponsored by the St. Albans Area Chamber of Commerce.

As the banquet opened Everett Willard, Market Development Specialist from the Vt. Dept. of Agriculture, gave the invocation. The Chairman of the Festival, Samuel Hudson of Fairfax, was introduced, as were other members of the Council.

The Awards Committee was made up of Sally Sweet, Festival Treasurer; Everett and Sally Willard; Nellie and

Doug Webb; and Mr. and Mrs. Carolyn Branagan. Over 400 posters were prepared. Honorable Mention in the 5th and 6th Grades was to Matthew Lavigne of the Canaan Elementary School, Essex County; Third Place winner was Ben Couture of Brattleboro. Second Place winner was Caitlan Kennedy of Westford. First Place winner was Brent Irish of Barre.

In the 7th and 8th Grades Poster winners were Heather Bushey of Fairfax, Honorable Mention; John Lockwood of Irasburg, Third Place; Eric Elezovic of Brattleboro, Second Place; and Jennifer Rousseau of Rutland Jr. High School, First Place.

In a Coloring Contest children colored in outlines of maple scenes. There were 65 entrants, with Donna Corrigan acting as coordinator. The two winners were Jason Friedman and Angela Magnon (from Franklin County, Vt.).

Mary Schreindorfer of Fairfield was Coordinator of the Essay Contest. The essay was to be 500 to 1,000 words and on the topic, "Maple: The Flavor of Vt." 125 students took part, with awards presented to both students and teachers. Fourth Place went to Amy Fournier of Newport Sacred Heart School (\$25 plus gift). Third place was earned by Brendan Schreindorfer of Fairfield (\$50 plus gift). Second place was awarded to Tegan Scott of Fairfield (\$75 plus gift). First place was presented to Jennifer Matthews of Vergennes (\$100 plus gift). Jennifer's teacher received a gallon of syrup.

In the competition for educational exhibits, shown in the American Legion Hall, Brian Rainville of the Mississquoi Valley Union High School, Franklin, Vt. received the first place award.

There were awards for the Junior Cooking Contest. These included, Category 1: Breads, top award to Lydia Bell of Fairfax for "Sticky Buns". In Cat. 2: Cakes & Pies, an award went to Bobbie McAbe for Hot Melinda. In Cat. 3: Cookies and Buns, an award went to



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Trish Vincelle. In Cat. 4: Other Desserts, Heather Rock of Highgate earned an award for Maple Kisses. In Cat. 5 Kait Marcus of Enosburg received an award for maple pizza. The "Over-All Winner" was Trish Vincelle (\$100 plus silver cup).

Henry Markres of the Vt. Dept. of Agriculture acted as Head Judge for Syrup and Maple Products, assisted by Ken Atwood. Awards were as follows: Cecile LaRoche of Swanton - Maple novelties; Jean-Marie LaRoche of Swanton - Indian Sugar; Clark Bros. of Wells, Vt. (Sue Clark) - Hard brick sugar; Glen and Ruth Goodrich of W. Danville - Maple fudge with nuts; Clark Bros. of Wells (Bill Clark) - Pure sugar, bulk container; Glen and Ruth Goodrich of W. Danville - Maple cream and a display of small sugar cakes.

In the Senior Cooking Contest Alan Vincelle helped with judging. Winifred Pierce of Franklin received a ribbon for breads. Joselyn Tedford of Pittsford received top award for Cakes and Pies. Donna Blotschley received best award for cookies and bars. Kelly Couture of Enosburg was awarded top prize for Other Desserts. Steve Cain of St. Albans received an award for "Misc. Dishes". The new "Mr. Maple for 1989" is Steve Cain. He is manager of the "Wagon Wheel" restaurant.

Ardis Wilcox of the UVM Extension Service office in St. Albans helped with the Maple Syrup Contest. Those receiv-

ing the top award for Dark Amber syrup were F.R. and D.E. Brown of Lincoln, Vt. For the best Medium Amber syrup Don and Rita Connor of Fairfield. Everett and Catherine Palmer of Waitsfield - the best Fancy (Light Amber) syrup.

The Blake Roy Award (for the best syrup in the 1989 Festival) went to Donald and Rita Connor of Fairfield.

Carolyn Branagan helped especially with the Maple Queen and King Contest. Selected as the Maple Queen for 1989 was Christy Perry, daughter of Ralph Perry of Ira. Maple King for 1989 was Tony Rainville of Franklin.

As the ceremonies concluded Festival Chairman Hudson presented the award of 1989 Parade Marshall to Sally Sweet. He cited her for many years of faithful service to the Festival.

The Festival included many activities and events. These included and Arts and Crafts Show and Sale, an Antique Show, Amusements (rides, etc.), Maple Pancake Breakfast, Fiddlers' Variety Show, Maple Store, Annual Maple Parade, Maple Exhibit Hall, syrup tasting, Sugar-on-Snow, Youth Talent Show, face painting, 11th Annual Maple Sap Run (marathon), special School Tours, and a sap boiling demonstration. The St. Albans Area Chamber of Commerce and Mayor gave good support.

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MAPLERAMA HELD

by R. T. Foulds, Jr.

Over 300 sugar makers, foresters, equipment dealers, and educators took part in the 24th Annual Vermont Maplerama on July 28 and 29. With registration at the Jay Peak Lodge in Jay, Vt. the participants proceeded by school bus on the 28th to stops at the Gerard and Roseanne Beaudry sugar house and bush in Jay; the Dan and Cedar Backus sugar bush at Westfield; the Jacques and Pauline Couture sugar bush and sales outlet at Westfield; the American Maple Products Corp. sugar house and packing plant at Newport; and the Paul Letourneau sugar house at Derby. During the stop at Derby lunch was enjoyed. Bus arrivals were so organized that presentations could be made to approx. 60 persons at a time.

At the Beaudry sugar bush emphasis was placed on maple decline and its treatment. Here soils were poor (shallow and excessively drained, with acid bedrock), trees were crowded (not enough thinning done), tree tapping crowded tapholes in a small area, the road system caused root damage and soil compaction, and frost damage had occurred. There was also damage from a root rot fungus (*Armillaria mellea*). County Forester George Buzzell led the discussion.

At the Backus sugar bush emphasis

was placed on restoring an old sugar bush and improving tree health. County Forester Paul Frederick of Lamoille County gave an illustrated talk on the effects of tapping on the tree bole. Improvement work in the sugar bush included the removal of spruce and fir, thinning of maples, building of a new sugar house (softwoods custom-sawed into lumber), and the hanging of tubing (1,600 taps). More improvement work is planned for the future (more thinning and tubing).

At the Couture sugaring operation Pauline Couture described marketing methods at their Maple Shop on Route 100. The entire family helps here (6 children) including operation of the dairy herd (50 cows + 35 heifers) (250 acre farm). The Maple Shop is attached to their house. Products sold include syrup, sugar, candies, maple cream, and lollipops. They have a mobile sugar house which they take to fairs. From it they sell maple cotton candy and sugar-on-snow. They have 4,000 taps, a "Mitchell" vacuum system, a pre-heater, and a "piggy-back" unit on their flue pan. The pre-heater heats the sap which goes into the "piggy-back."

At the American Maple Products stop the plant's various operations were observed (blending syrups, candy manufacture, gift packaging, use of ceramic and stoneware packages, etc.). The company buys syrup from local and Canadian sugar makers, but also buys sap from 40-50 persons and makes its own syrup (a 6'x18' evaporator with reverse osmosis). They can pack from 1,000 to 1,500 gallons per day. They make a blended maple candy as well as pure candy. They sell maple products all over the world. Roger Ames is Plant Manager.

At the end of the first day's tour a banquet was enjoyed at the Jay Peak Lodge. Following the dinner introductions of Committee persons and the Maple King and Queen were made (Anthony Rainville of Franklin, Maple King;

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and Cristy Perry of West Rutland, Maple Queen). The Ray Foulds Award was presented to Norman and Michael Auger of Barton (Sugar Mill Farm). They are "Outstanding Young Sugar-Makers for 1989" - have 1,400 taps, a 6'x18' wood-fired evaporator, a gift shop, a Maple Museum, a campground, and a trout pond. They produce about 700 gallons of syrup each year. The banquet speaker was a comedian - Mac Parker of Ferrisburg, Vt. He related several stories about "Life on the Farm."

The second day of the Maplerama included bus stops at the Augers' Sugar Mill Farm in Barton; the Tree Farm of Bob and Lee Walker in Brownington; the Sugarwoods Farm of Bucky and Betsy Shelton in Glover; and the Waterloo Evaporator sales outlet in Glover. The tour ended with a chicken barbecue at the Orleans County Fairgrounds in Barton.

At the Walker Tree Farm various kinds of Christmas tree planting stock were being grown for sale, also mature Christmas Trees. These are grown on a

100-acre farm in Brownington plus a farm in East Burke; as well as on 8 lease farms. Included are balsam fir seedlings and transplants, also Niko fir from Japan. Trees are grown from seed and also pulled from the wild. Several truckloads of mature trees are sold each year. For sugaring they have 1,400 taps, 200 on the home farm and 1,200 leased. Their evaporator is a 4'x12'.

At the Shelton operation a 6'x16' wood-fired Waterloo evaporator is used. It has a pre-heater and hood. They have produced syrup for 10 years, with present production from 5,000 taps. 1,200 of these are on their own land, 2,200 on neighboring leased land, and delivered sap from 1,800 taps. 3,000 of the taps are on vacuum tubing running directly to the sugar house. Sap is processed through a Saprotech reverse osmosis machine. Shelton demonstrated his vacuum pump, also his system for washing his tubing (100-1 Clorox). He wires his plastic taps to the trees to resist the pressure. There are 15 to 20 taps to each 5/16" lateral line. He



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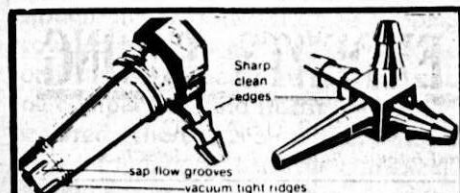
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Mrs. Bucky Shelton spoke to the group at the Waterloo sales outlet. Employees present were a sales person and a half-time secretary. In storage were evaporators, tubing, air and water tubing washers, reverse osmosis units, storage tanks, etc. Additional personnel were on hand from Waterloo Evaporators, Canada. She stated that with reverse osmosis equipment 75% of the water can be removed from the sap. One machine can process 500 gals./hr., another 1,200 gals./hr. There is a spiral-wound membrane. The fluid is gathered at the center of the machine and drawn off. Temperature affects the permeate rate - the higher the temperature, the faster the rate. Cleaning of the machine was explained. A desirable objective is to process sap so it can be boiled and will not have to be kept overnight.

There was a demonstration of a new



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sap dumping unit, which releases sap to storage after it is pulled in by vacuum pump. The newest unit will take up to 6,000 taps, compared with the older unit, which would only take up to 2,000 taps.

Because of rain the first day a scheduled aerial tram ride up Jay Peak was postponed until Saturday afternoon. Ronald Kelley, Forest Protection Specialist with the Vt. Dept. of Forests, Parks, & Rec. wrote notes concerning forest decline in the Jay Peak area. This included spruce and fir dieback at the higher elevations; beech scale-nectria disease on beech; dieback of yellow birch due to killing of small roots by hard winters; and the probable effect of injury from air pollution (ozone and other chemicals) in cloud cover.

Sandy Wilmot, Pear Thrips Project Coordinator, spoke at the Backus sugar house on recent progress in the studies to determine prevalence of the insect and ways to control it. She said that a band of infection had increased through Washington, Lamoille, and Chittenden Counties. The fact that there was little snow this year, and the ground was frozen deeply, made a difference. The fast bud break this year also made a difference - there was not much time for the thrips to damage the buds. Not much is known yet on how to control it, but a fungus disease has some promise.

There was a handout of copies of a letter from Denver Burns of the U.S.F.S. Experiment Station at Broomall, Pa. to Mollie Beattie, Forests and Parks Commissioner, about the North American Sugar Maple Decline Project. It reported on measurements taken in 1988 of 166 plots in the project, which involved 10,553 sugar maples in eleven states and provinces. It indicated that decline was much less than had been expected. 71 percent of the trees measured (dominants and codominants) had less than 5% crown dieback; and 90% of the dominants and codominants had less than 10% crown dieback.

SYRUP LAYERING AND DARKENING DURING STORAGE

by M.F. Morselli and M.L. Whalen
University of Vermont

A few months after the 1987 sugar maple season, food inspectors of the Vermont Department of Agriculture found that in some instances maple syrup was color-layering and eventually darkening color grade in bulk and retail storage. While this phenomenon has been occasionally reported over the last 20 years by maple syrup producers/packers, it has not been of major concern. However, individuals associated with the maple industry have hypothesized that the current maple decline may have affected changes in the catabolic activity of wood cells resulting in the production of high levels of phenolic substances, with a possible influence on sap phenolics and darkening of syrup due to chemical changes after storage.

However, cell catabolic activity because of the tree decline has not been documented. Syrup darkening may become a major economic issue if syrup in bulk/retail storage would change color grade from that originally identified by the producer/packer/consumer.

Researchers in the past have reported syrup darkening but never defined layering. Hayward (1) reported syrup oxidation when syrup was packed in containers with various amounts of head space. Underwood et al. (2) and Morselli and Sendak (3) reported syrup darkening in plastic containers. Morselli and Whalen (4) reported darkening of syrup produced in the laboratory after one year of cold (4°C) storage, in glass and in the dark. We noted, however, that none of the syrups processed from the sap that had been treated with in-line ultraviolet (UV) light had darkened. Willits and Hills (5) hypothesized that the same browning reaction that occurs in the evaporator during processing of contaminated sap will continue, and

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further darken packaged syrup, if stacked while it is still hot, by as much as one or two grades.

Morselli and Whalen were asked by the Vermont Maple Industry to conduct a study of color-layered syrups from the 1987 season collected by inspectors of the Vermont Department of Agriculture. We hoped that by the fall of 1987 the results of the study could give a clue to the cause(s) of the problem of syrup color layering/darkening in storage. At the very least we could develop a methodology to identify phenolic components in maple syrup. The syrup samples collected statewide would have provided a statistical sampling of syrups. Because of restrictions we could not use our federal funding. The funds to conduct the study were collected by the Vermont Maple Industry Council but did not reach us until March 1988. By that time the layering that had been seen in the previously collected syrup samples had progressed to full darkening, in spite of cold storage. During the maple season of 1988 the phenomenon

of color-layering was less prevalent. It would have been very difficult and costly to obtain again statewide random syrups that had color-layered. By June 1988, we were able to get from one packer a number of syrup samples which were representative of the phenomenon to be investigated. Some syrups (N=13) were clearly color-layered and were one grade darker than the original as identified by the packer. Others (N=31) had only a visual color-layering but not when judged by the USDA color comparator.

METHOD

We separated the top layer from the bottom layer of each syrup, placed both in glass vials, and gassed the top space with nitrogen before sealing to avoid oxidation of the syrup surface. The syrups from both top and bottom layers were then analyzed for pH, invert sugar (%), density ($^{\circ}$ Brix), color grade (USDA Berliner color comparator and percent transmittance [$\%T_{560\text{nm}}$] with a spectrophotometer), and phenolic compounds (ppm with high pressure liquid



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chromatography - HPLC). The syrup flavor was evaluated by a panel of three persons. We ran a statistical analysis to evaluate the significant differences within top and bottom layer to possibly identify the cause(s) of the color-layering. However, we wish to clearly state that this study was not a controlled one, as it did not include as controlled variables syrup processing time and method(s), storage container(s), storage temperature and time, and container air space.

RESULTS

1. The invert sugar value of the top layer of syrup was higher than that of the bottom layer (Tables 1, 2, and 3).
2. The color grade (%T) of the top layer of syrup was darker than that of the bottom layer (Tables 1 and 3). The lower the percent transmittance, the darker is the syrup.
3. The pH of the top layer of syrup was significantly lower ($P = 002$) than that of the bottom layer (Tables 1 and 3).
4. We found that 71% of the top layers of all syrups were slightly thinner than the bottom layers.
5. No significant difference between the top and the bottom syrup layers was found in the HPLC profiles that represent quantity and type of the phenolic compounds. A methodology to detect phenolic compounds in maple syrup was developed using HPLC.
6. The flavor of most syrups was considered good and characteristic of the grade.

DISCUSSION AND RECOMMENDATIONS

Edson et al. in 1912 (6) were the first researchers to recognize that the darker grade syrups were processed from sap highly contaminated with microorganisms, and contained more invert sugar than the lighter grades. We confirmed those findings testing syrup processed from sap kept in prolonged warm stor-

age (7). The higher invert sugar value found in the top layer of most syrups (Tables 1, 2, and 3) is indicative of several possible causes of syrup color-layering and darkening.

Blending of Syrup. The syrups we analyzed may have been a mixture of syrups of different color grades and invert sugar values, either packed at successive times, or mixed to achieve a standard grade. Dark grade syrups with a high level of invert sugar may have initiated a color-layering/darkening process during storage in noncontrolled temperature.

Syrup oxidation. Color-layering/darkening may result because of possible air space in the drum/retail containers that could have initiated the chemical reaction of air, which is 21% oxygen, with other chemical substances in syrup, including invert sugar. Only

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not play a role in the color-layering phenomenon. Therefore, it seems probable that maple decline with possible wood discoloration is not affecting the normal variability of syrup phenolic substances that has other unknown cause; but more studies should be done. Past research by ARS, USDA researchers (10) has considered sap phenolics mainly to be precursors of the many and diverse syrup flavor components. In the course of this study we have tested and modified various methods using high pressure liquid chromatography (HPLC) for the analysis of syrup phenolic compounds. We recommend that the method we developed, to be published elsewhere, be used in the analysis of maple syrup phenolics.

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controlled, long term and very costly studies with state-of-the-art equipment by an organic chemist could respond to the question of maple syrup oxidation. Sendak (8) has found that penetration of air through permeable plastic containers causes darkening and lowering of pH value.

Reverse Osmosis (RO) concentrated sap. The syrups we analyzed may have been processed from sap concentrated by the RO system. In previous research (9) we found that all syrups processed from sap using RO concentration had the same or lighter color grade than syrup processed without concentrating sap with RO, but with higher invert sugar content. This is only an hypothesis that needs to be tested with a controlled experiment. Unblended syrups just processed with/without RO, stored for controlled lengths of time and in controlled temperatures, and with/without air space and different gases, should be tested for color-

layering/darkening.

We cannot rule out that syrup color-layering/darkening is a result of a combination of the above possibilities. To this end we recommend a several-year in-depth study that takes into account the variables mentioned above using several syrup batches of all grades. The recommended study should include at least 12 pure unblended table grade syrups packed in 5-gallon drums. At least 30 mixed pure syrups should be analyzed, as well.

The results of this study strongly suggest that maple syrup producers/packers should carefully consider the possibility that mixing syrups of different color grade and invert sugar level may result in syrup color-layering and darkening during bulk/retail storage.

Our quantitative and qualitative phenolic analyses do not reveal differences of phenolic profile between the different color-layers of syrup, indicating that phenolic substances may

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Table 1. Syrup analysis. Mean values.

VISUAL Color-layered by grade (N=13)	COLOR-layered but no grade difference (N=31)										
	Layers	Top	Bottom	Top	Bottom	Top	Bottom	Top	Bottom	Top	Bottom
USDA Color Comparator	MA ²	LA ³	DA ¹	MA ²	LA ²	LA ²	MA ²	MA ²	DA ¹	DA ¹	
N	13	13	13	13	12	12	13	13	6	6	
%T _{580nm}	60.5	63.4	41.7	51.8	62.8	67.2	50.2	54.9	42.2	47.6	
Invert sugar %	1.71	0.98	1.52	0.74	1.80	1.05	2.75	1.25	2.49	0.78	
Density *Brix	66.5	66.7	66.4	66.3	66.6	66.9	65.8	66.1	65.9	65.9	
pH	6.46	6.50	6.50	6.58	5.99	6.28	5.97	6.56	6.69	6.94	

¹ DA = Grade A dark amber

² MA = Grade A medium amber

³ LA = Grade A light amber

Table 2. Syrups that had no clearly defined color grade difference between layers.

Invert sugar analysis				
Grade by USDA color comparator	Number (N)	Top Layer	Bottom Layer	Significance (P)
LA ¹	11	1.80	1.05	0.04*
MA ²	13	2.75	1.25	0.007*
DA ³	6	2.49	0.78	0.06
DDA ⁴	1	3.03	1.42	--
Total	31			
\bar{X}		2.52	1.13	

*significant at the 5% level

¹LA = Grade A light amber

²MA = Grade A medium amber

³DA = Grade A dark amber

⁴DDA = Grade B darker than dark amber

Table 3. Sample analysis of two syrups clearly color-layered.

Layers	Top	Bottom	Top	Bottom
Grade by USDA Color Comparator	DA ¹	MA ²	MA ²	LA ³
Grade by %T _{580nm}	37.9	51.0	53.2	57.0
Density *Brix	68.2	68.6	65.9	66.2
pH	6.25	6.28	6.06	6.14
Invert sugar %	1.42	1.00	3.03	1.42

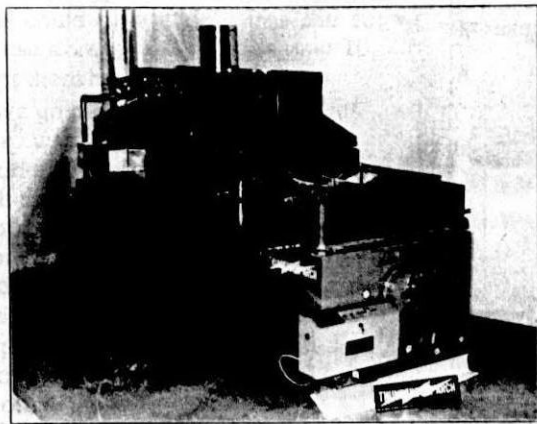
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My wife, she sez, "Honest Archie," sometimes she calls me truthful Archie, "Please tell that nice Mr. Editor man about the time the evaporator ran over." Well, it wuz like this:

The first year tubing came out we used a little, just to try it out, and it worked pretty good. The next year we thought we ought to use more but not wanting to overdo it, we decided to only tap the bush right up in back of the sugarhouse. We could pipe it right into the sugarhouse storage tank. There's only 10,000 taps there but they're good ones.

We got her all hooked up and the first run was kinda small but everything worked real good. The next one was different, a real lalalalooza. Only took 2 hours to find out the evaporators couldn't keep up with it. Storage tank was full. Guess we forgot to take in consideration that all those buckets we'd repalced with tubing represented a lot of storage space and we hadn't added any more tanks.

To top it all off we'd put in an evaporator equiator. That's a fancy gadget that keeps the sap level in the evaporators all the same. Trouble was, it had a sensor in the storage tank called a frugal schmugal. This opened up the valves when the tank got full, so it wouldn't run over and waste the sap. Nobody ever thought about the evaporators running over. They sure did.

Before we could get 'em shut off 4 of our 6 by 20's ran over, syrup pan first because they're lower. So much of that thick stuff ran down into the arch it put the fires out. Boy, what a smell.

Most of it hardened up like glass and we chipped it off the wood, packaged it up to sell like candy. Sure was a pretty color and it didn't taste too bad.

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U.S. MAPLE, Inc.

TUBING • SPOUTS • TEES • Y's • CONNECTORS



SPOUTS

- Black color aids in rapid taphole thawing.
- For removal use 1" wrench or hammer.



4 or 6-WAY MANIFOLD SET



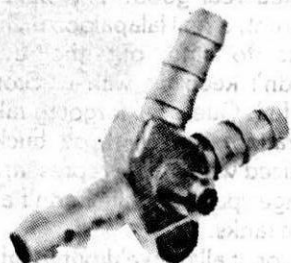
CONNECTORS

- Will not pull apart.



SPOUT-PLUG

- Tight seal with spout allows pressure or vacuum washing of tubing in place.
- Interconnection between "T" and spout.



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"RIBBED"—Heavier wall, minimizes flattening of tubing against heavy barked trees. Designed especially for year round installations.



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