

NATIONAL MAPLE SYRUP DIGEST NATIONAL



Vol. 19, No. 1

February 1979

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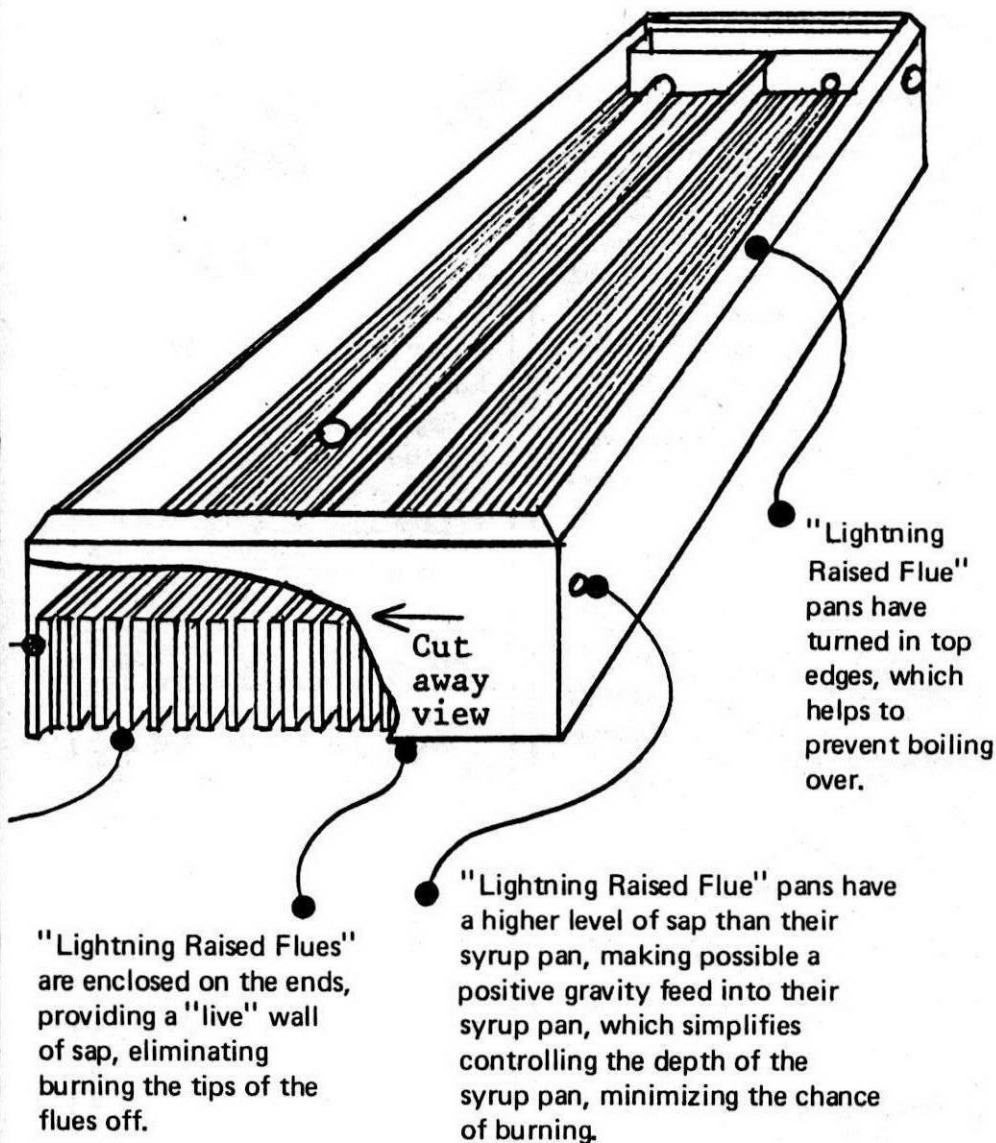
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Editorials

SUBSCRIPTIONS

When the North American Maple Syrup Council met last October, much concern was shown for the financial condition and future of the Maple Syrup Digest. We ended up with a deficit of a little over \$900.00 for the year, better than a year ago but still not good. This amount was paid by the Council but the states will not be asked to re-pay it because some of the associations have notified the Council they will not pay for any more deficits as they have in the past.

When I first heard this I was quite angry because two of those states never supported the Digest before, but led their members to believe they had. After thinking it over, I guess maybe they've got a good point.

I've always wanted to send the Digest to every maple producer with the cost paid by the advertisers and voluntary contributions from the readers. This hasn't produced enough money to pay the bills and the deficit has been pro rated and paid for by most of the state associations. But why should they? They've already paid for each of their members, why should they have to pay for some others who refuse to either join an association or send in a contribution?

To get down to the nitty gritty of the whole shebang, here's a few figures to think about. Last year we mailed out a little over 5000 copies of each issue. About 1000 more were sold to Canadian Associations who mailed them themselves. The state associations paid for their 1600 members and almost 500 producers sent in voluntary

contributions. If half of these were for more than one year, it takes care of about 2400 readers. What happened to the other 2600? If only half of these had sent in a contribution we would have been able to make ends meet, but they didn't!

The Council discussed this situation for some time. They seriously considered going on a strict subscription basis but decided to wait another year. They did agree to raise the advertising rates 20% to increase the amount paid by the state associations for their members from \$1.00 to \$2.00 and to promote more interest in both the associations and the Digest.

Now I'll lay my cards on the table.

I will receive a membership list from each association when they send in their apportionment. I also record all contributions. To be sure your name is on at least one of these lists use the return envelope in this issue. Enclose your contribution (and since the associations have agreed on it I'll have to ask you for at least \$2.00 a year or 3 years for \$5.00) fold it up as directed, seal, stamp and mail it. It will only take you two minutes but I'll be able to keep the Digest going all year. Or, if you would rather, please ask to have your name removed from our list.

Thank you for your cooperation.

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Editorials Continued —

VACUUM AND SUGAR CONTENT

Last year I printed a request for producers to be watching for a drop in sugar content of sap when vacuum, either natural or pumped, was used. I realize this is going to be very difficult to detect because it will be almost impossible to establish a control; for example: if you use a vacuum on one line or installation and a vented tubing system or buckets on a similar group of trees it won't mean a thing. The sugar content will probably vary any way.

However, I received a couple of reports that make me believe there is something to it and it could become a serious problem. One was from Linwood Lesure of Ashfield, Mass. Lin is a past president of the N.A.M.S.C., a long time producer and supporter of the Massachusetts Maple producers assoc. His letter is as follows:

August 6, 1978

Dear Lloyd:

I have known for at least 4 years that we do have a drop in sugar content from vacuum.

Our 1200 to 2200 taps end up at a tank in the sugarhouse. When they were coming on gravity flow, we often checked the test (sugar content) as the tank was beside our finishing evapora-

tor. The sap had to be pumped up into the storage tanks but we wanted the gravity system to be as low as possible where it came in. Also, the public could see it running.

When we put vacuum on the lines we were in a good position to continue to test at regular intervals for sugar content. The drop in sugar content was sometimes as high as 4 points. 2.3 sap became 1.9. Very seldom was it less than 3 points. We have tested it many times and are sure of our findings.

Of course we got a great deal more sap so our average sugar content was helped by the fact more sap was there. It does take a lot more fuel, of course. We even took the vacuum off and let the sap come by gravity at night. It ran only until it froze, but the next morning it would be back to 2.3 and drop to 1.9 or 2.0 as soon as we switched on the vacuum. All checking was done with the large, accurate sap hydrometers.

Sincerely,
Lin Lesure

In the above letter we must realize that Lin was getting some vacuum even when his pump was turned off. It had to be a sealed system. There is a possibility that a greater difference might have occurred had he been able to vent the system part of the time. It does indicate that the higher vacuum may cause more drop in sugar than a low vacuum.

This is an excellent way to run an experiment. If you have a sealed system that will work without a pump but are using a pump to increase production, it would be well to check the

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sugar content both when the pump is running and when it isn't. The increase received could be mostly water and might cost more than it's worth. However, you've got to check it many times to get an average. The results you get from one check may just be a mistake.

A little simple arithmetic shows that if it costs \$1.90 for fuel to make a gallon of syrup from 2.3 percent sap, it will cost about 40 cents more using 1.9 percent sap! It could be worse. Please read on.

Another report was received verbally from a producer who lives near here. He reported that one bush on a steep hillside using natural vacuum was found to be running one day late in the season when no other lines were running. The sugar content was less than 1/2 of 1 percent - almost pure water.

A complete inspection found nothing out of place and when a tube was pulled off the top spile breaking the vacuum everything stopped running. He concluded the vacuum was pulling ground water up through the trees. Since there was almost no sugar at all it couldn't have been sap as we normally know it. This could be expensive if you unknowingly pumped a quantity of this "water" in your storage tank.

I hope as many of you as possible will check your systems. If you can conduct a good, honest experiment, please send me your results. With the high cost of both labor and fuel, it could be well worth your while. The government agencies who are paid to run tests like this don't seem to want anything to do with it so I guess maybe yankee ingenuity will have to prevail.

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SAP PRICES

Each year, in the February issue, we publish a chart of the sap prices paid by one New York Producer for the past year and the proposed price to be paid in the coming season along with the respective retail and wholesale price of syrup in consumer packages.

Please remember, this chart is published to be used only as a guide and the Digest in no way intends that it should dictate the price paid for sap by any producer.

Year	1978	1979
Retail	15.00	16.00
Wholesale	11.40	12.20
Sap Brix	per gal.	per gal.
1.5	.028	.03
1.6	.041	.043
1.7	.054	.056
1.8	.065	.068
1.9	.076	.08
2.0	.085	.089
2.1	.093	.098
2.2	.101	.106
2.3	.108	.113
2.4	.114	.12
2.5	.121	.127
2.6	.128	.134
2.7	.135	.141
2.8	.141	.148
2.9	.147	.154
3.0	.153	.161
3.1	.159	.168
3.2	.165	.174
3.3	.171	.18
3.4	.177	.187
3.5	.183	.193
3.6	.189	.20
3.7	.195	.207
3.8	.201	.213
3.9	.207	.219
4.0	.212	.226

BOB LAMB'S CORNER

Let's talk about some new items for this season.

Basically, our intentions are never to obsolete fittings that are already in the field. Many years of use have proven these parts to be time tested and workable, and our customers have an investment we wish to protect. When we bring out new parts that allow maple people to use our tubing in different ways, we plan it out so that the changes go on all of our present materials already in the field.

Of course, it is easier, for instance, to bring out a whole new spout for a certain purpose, but then what would our customers do that already have our spouts, but wish to change their method of use?

On the back cover are sketches of some new parts that fit onto our present single spout. These are designed to help in washing the tubing and aid the producers that leave their tubing on the trees the year around. The same spout cover that aids in washing also helps keep the insects out of the spouts that plug and contaminate them. They also provide a sane way to hang the spouts on the trees above the tees and to drain the lines and hold them during the off season.

Of course, we do not condone leaving the tubing out the year around but if producers wish to, we want to help all we can. It cuts the life span of the tubing in half and there is consistently much more rodent damage during the off season than during the season.

It seems very strange to me that some think leaving the tubing out the year around is a new discovery. This

has been done, to some extent, by hundreds of maple producers for more than twenty years. Most of them have discontinued the practice. It is on these findings that we base our recommendations. But then again, it depends on how many rodents you have.

To summarize, I don't recommend leaving any more tubing out the year around than you can afford to lose until such time as the laws change and we can eliminate the tubing chewers efficiently. When a bad off season rodent problem comes along, will that be the year the producer can afford to buy a lot of new tubing? Of course in some areas rodents are almost non-existent. We feel that after a producer takes his tubing up a few times he can become real good at it, getting well paid for his time.

We also have a new line of fittings to use when entering the small sap lines into the main lines. The fitting completed so far is for either 1/4" or 1/2" main lines. (see back cover) If you use it on 1/2", just cut off the 1/4".

The other similar fitting fits 1/2", 3/4" and 1". This particular tooling may possibly not be completed for this season. We have tested hand made samples but will have to limit production this year. They will not in any way be better than our present fittings for the same purpose, perhaps not as good. They are just more adaptable for some installations.

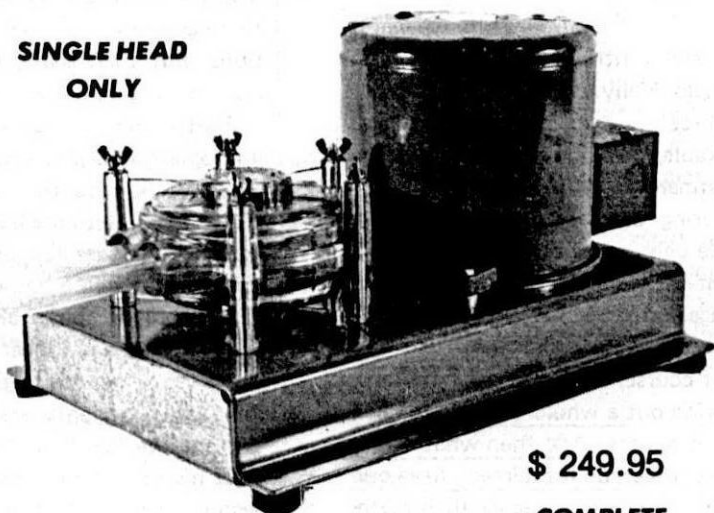
We do not claim to be the smartest people. We just work steadily towards more convenient ways to gather maple sap with tubing and we try to keep our feet on the ground. If we go off in the wild blue yonder, our customers do also.

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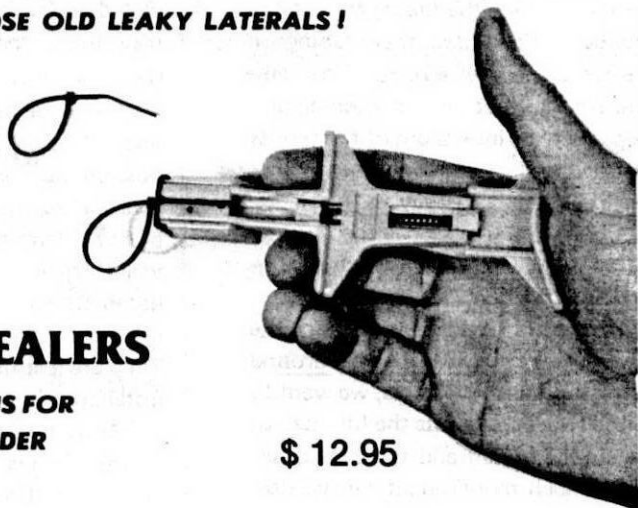
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LETTERS:

ARCHIE'S SUGARBUSH

Dear Mr. Editor,

My wife she sez, "Truthful Archie, sometimes she calls me Honest Archie because you always tell the truth. Please tell that nice Mr. Editor Man about how we invented tubing to revolutionize the maple industry. This was a couple a whiles ago.

Well, we herd about those bug spiders in the tropics and how thier webs was stronger than steel, well, we got us one of those spiders from a zoo going out of business, then we got him to spin a web across Narrowfoot gorge, Those webs is hollow, but too small to allow all our sap to flow through, so I took some grain and put it in the top horizontal part of the web, tipped it up so the grain would roll to the other end, then I took a hungry mouse, (He

had to be hungry for what I wanted him to do) let him smell where I put the grain and started him through the web. As he went through the web he stretched the top of the web to exactly 1 inch inside diameter which was large enough to carry my sap across the gorge.

When others discovered what I had did they got the idea of buying tubing to move sap from the tree to the sugar house. This was actually the beginning of tubing.

Now this is the truth because if I wanted to stretch a point or two I would have said that mouse expanded the web to 1 1/2 inches. We played a dirty trick on the mouse. We never gave him any of the grain.

Your truthful servant,

Archie

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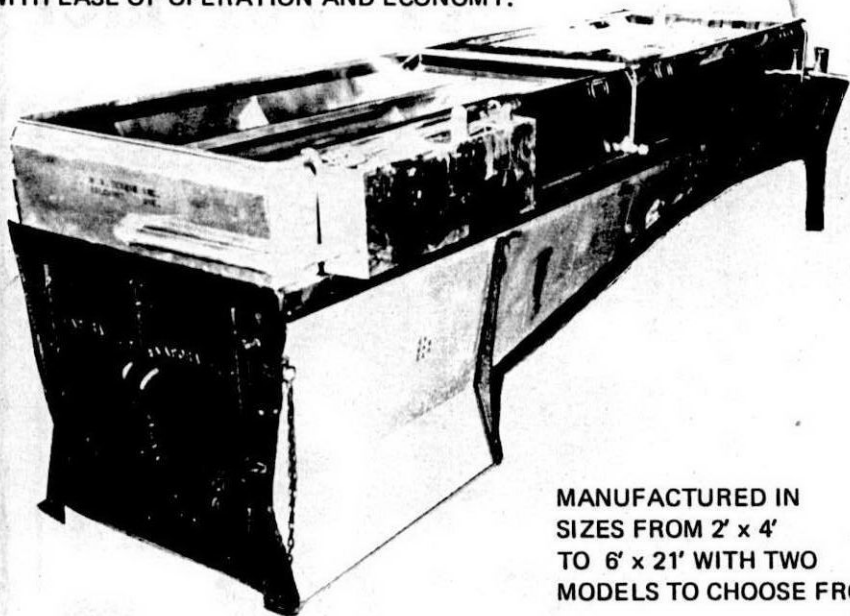
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MORE VACUUM IMPROVES YIELD

Russell S. Walters

George D. Aiken Sugar Maple Lab.

Northeastern Forest Exp. Station

Burlington, Vermont 05402

More sap can be collected from a sugarbush by using a plastic pipeline with a vacuum pump than can be collected by either buckets or tubing alone (Blum 1967, Blum and Koelling 1968). Although this is well documented, we did not know what level of vacuum is best, or how much is needed.

Maple sap cannot be pulled or sucked from a taphole. Rather, it is forced out by positive pressure differential when the pressure inside the tree is greater than the atmospheric pressure outside. Applying vacuum to a taphole, through a tubing system, has the effect of artificially reducing the external pressure, thus creating the pressure differential necessary to allow sap to flow from the tree.

For this study, 3 tapholes were

drilled in each of 15 trees in a Jericho, Vermont, sugarbush in late February 1971. One of three different levels of vacuum — 5, 10, or 15, inches of mercury — was assigned to each taphole (Fig. 1). Each taphole was connected by plastic tubing to a separate 55 - gallon steel drum, where the sap was collected.

The sap-collection drums for each vacuum level were connected by plastic tubing to form a separate system. Vacuum was developed in a central tank by a vacuum pump and transferred through the tubing. The desired vacuum levels were maintained by pressure-control valves and were monitored by gauges attached to the tubing systems at the point farthest from the pump.

Vacuum was applied for approximately 130 hours during the sugaring season from March 19 to April 18. The sap in each drum was then mea-

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I found that the higher the vacuum level, the greater the average sap yield. The average sap volumes per taphole were 40.0, 81.2, and 87.4 quarts for the 5 -, 10 -, and 15 - inch vacuum levels respectively. The sap volumes collected at the 10 - and 15 - inch levels were significantly greater than the amount of sap collected at the 5-inch level. The difference in sap volume between the 10 - and 15 - inch vacuum levels was not statistically significant. (Differences were significant at the 1-percent level.)

Therefore, I conclude that a vacuum level of at least 10 inches of mercury should be maintained at the taphole to achieve good results from a

Figure 1. Sap from each taphole was collected in individually sealed 55-gallon steel drums.

vacuum pump system. Striving to develop a higher vacuum level (15 inches or more) at the taphole will not result in a sufficient volume increase to justify the expense. These results are illustrated in Figure 1. This means that a vacuum level higher than 10 to 15 inches of mercury should be maintained at the pump—perhaps as high as 20 to 25 inches—in order to achieve the desired level at the taphole. Maintaining high vacuum requires constant inspection and maintenance of the tubing system.

For additional details of this study, see "Sugar maple sap volume increases

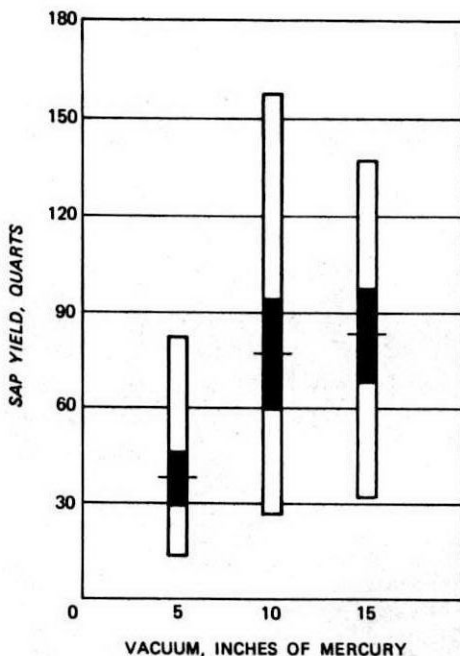


Figure 2. Average sap yield per tap for each vacuum level is indicated by the crossbar. The shaded areas indicate ± 2 standard errors of the means. The total length of the unshaded boxes represents the total range of individual tap-hole yields.

as vacuum level is increased" by Russell S. Walters and H. Clay Smith, U. S. Department of Agriculture Forest Service Research Note NE-213, 1975, Northeastern Forest Experiment Station, Broomall, Pa. 19008.

Literature Cited: Blum, Barton M. 1967. Plastic tubing for collecting maple sap: Comparison of suspended vented and unvented installations. U. S. Dep. Agric, For. Serv. Res. Pap. NE-90

Blum, Barton M., and Melvin R. Koelling. 1968. Vacuum pumping increases sap yields from sugar maple trees. U. S. Dep Agric, For. Serv. Res. Pap. NE-106.

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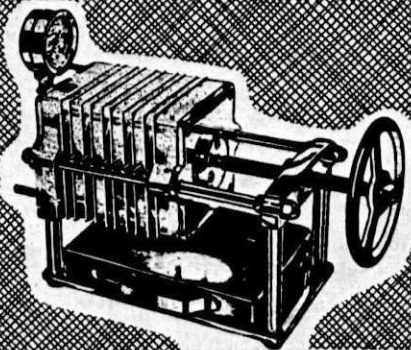
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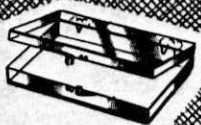


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paper to keep them for another year. All are boxed, wrapped and taped tight and placed in storage in the spare room.

She has been dreading taking down that Christmas tree the grandchildren loved so much, such memories. It is already two weeks into the new year and the warm sun is melting tiny protected spots and it stirs her thoughts. It is something that happens to people who collect sap each spring from the mighty Sugar Maple. She knows it is time to check the spouts, plastic, alu-



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NOW WAREHOUSING
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N. H. and VT.
English Speaking

Don't be caught short
next Spring. Call Now!

minum and cast. They were all cleaned, sterilized, counted and packed away last April. Tubing?, well some needs a bit of cleaning and sterilizing. These are good jobs to do on cold, bone chilling days, especially if Dad and the school kids get "snowed in" at home. Some of the buckets were washed last spring after they were taken down. Oh! well, some of the rest of the family will be ready to "tap" the maples, too.

The children will have a day off from school and a good way to keep them busy and to keep them interested in the family farm is to make a job like "bucket washing" a fun day. Build up the wood fires in the Sugar House, put the water on to heat and can Spring be far off, when it is bucket washing day?

By lunch time no meal at the finest restaurant could taste better than Moms chili that has been slowly cooking in the big pot on the wood range. There could be crisp salad, garlic bread.

and Oh! Look! chocolate chip cookies for desert. The crew usually includes a neighborhood teenager or two who wouldn't miss the fun. Mother says she is quality control and inspects each vessel as it completes its spring bath with a chlorine rinse. Sure-enough she finds a spot that needs that special scrub or scratcher. All are stacked in columns of twenty five, a fine job for the youngest member of the crew who is sure Gramps can't do without her. In a day or two the "spankin clean" containers will be placed on the flat rack wagon, covered well, and parked in the big barn to await for "tapping time."

My Goodness, where did the winter go? It seems like only yesterday we were Christmas shopping and now it is Maple Syrup Making time already. When the Maples are tapped, can Spring be far behind?

Mrs. Amos Haigh
Charlotte, Michigan

NOTICE !!!

NORTH AMERICAN MAPLE SYRUP COUNCIL ANNUAL MEETING WILL BE OCTOBER 22 and 23 1979, in DEERFIELD, MASS. WATCH JULY ISSUE FOR MORE INFORMATION.

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A deed that I rate fair;
When you consider all we had
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But now I need some help to keep
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So please, just read the editorial
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You'll find on page sixteen,
And mail it when it's folded up
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TEMPERATURE EFFECT ON SAP STORAGE

Mariafranca Morselli and Lynn Whalen
 Botany Dept., Vt. Agr. Exp. Sta.,
 Univ. of Vt. Burlington, Vt. 05405

We all know that sugar maple sap held for a period of time in storage tanks usually produces a darker grade syrup. The length of storage may become critical as the air temperature rises and the sap entering the storage area warms. Similarly chemical changes in the sap caused by accelerated growth of microorganisms produce darker caramel-flavored syrup that has lost the characteristic "maple bouquet" flavor of the Fancy grade (1,2). So how long can you store sap collected at different times during a season before drastic changes occur in the quality of the syrup produced? We decided to find out what happens at controlled temperature.

We collected sap four times during the 1978 season directly from the white-painted black waterpipe that is connected to the tubing-vacuum system of the Proctor Maple Research Farm sugarbush in Underhill, Vt. Air and sap temperatures were recorded continuously.

Table 2. Sap appearance and total number of microorganisms found in the sap.

TEST 1		
5° C (41° F)		
Hours	Number	Appearance
0	670	Clear
24	9,650	Clear
48	10,000	Clear
72	290,000	Sl. turbid
15° C (59° F)		
0	670	Clear
24	60,000	Sl. turbid
48	2,000,000	Turbid
72	52,000,000	Turbid
22		

Table 1 shows that during the 1978 season, sap temperature was always warmer than air temperature, and that sap flowing in white-painted black water pipes was cooler than the sap in black pipes, which absorb heat. For each test we divided a large amount of sap equally into glass beakers, which were then stored in chambers at the controlled temperatures of 5° C (41° F) and 15° C (59° F), simulating cool and warmer sap storage.

We removed new beakers every 24 hours for 3 days from the (two storage chambers. The original sap, considered the control, and the stored sap samples were analyzed for chemical, physical and microbiological changes. We report here only microorganism number, syrup color by percent light transmittance, and grade by USDA glass comparator. One gallon of each sap was boiled to syrup, which in turn was analyzed and tasted. The results of the four tests, performed during the 1978 sap season, have confirmed the results of similar tests from the 1976 and 1977 seasons: the quality and temperature of the sap before storage influ-

Table 2. Sap appearance and total number of microorganisms found in the sap.

TEST 2		
5° C (41° F)		
Hours	Number	Appearance
0	8,900	Clear
24	28,200	Sl. turbid
48	360,000	Sl. turbid
72	6,000,000	Turbid
15° C (59° F)		
0	8,900	Clear
24	50,000	Sl. turbid
48	4,550,000	Turbid
72	19,000,000	Very turbid

ence the length of time the sap can be stored, and cool storage hinders sap fermentation.

The number of microorganisms (Table 2) increased slowly in the sap stored at 5° C (41° F), quite rapidly in the sap stored at 15° C (59° F) in tests 1, 2, and 3, and reached very high levels at both temperatures in rapidly fermenting sap later in the season (Test 4). Microorganism growth and increased enzymatic activity are correlated with just enough increase in invert sugars in the sap to raise the chances for the darkening (browning reaction) to occur during sap processing (1). The range of invert sugars was 0.00 - 0.03 percent in analyzed saps producing Fancy and Grade A syrups, and 0.04 - 0.13 percent in saps producing Grade B and C syrups.

Table 2 clearly shows that heavily contaminated, slightly turbid sap which originally produced Grade B syrup, produced Grade C syrup at both controlled temperatures after only 24 hours of storage. Clear, lightly contaminated saps in the three earlier tests still produced Fancy or Grade A syrups after 24 hours of storage. Table 2 also shows that when cool temperature storage controls microorganism growth chemi-

Table 2. Sap appearance and total number of microorganisms found in the sap.

TEST 3		
5° C (41° F)		
Hours	Number	Appearance
0	49,000	Clear
24	140,000	SL turbid
48	3,050,000	SL turbid
72	8,000,000	Turbid
15° C (59° F)		
0	49,000	Clear
24	1,700,000	Turbid
48	24,000,000	Very turbid
72	51,000,000	Very turbid

cal changes in the sap occur less rapidly, and the grade of the syrup produced is maintained longer in the lighter color range.

In conclusion: unfermented and cooler sap will produce lighter grades of syrup if kept cool; fermenting and warmer sap will produce darker syrup grades even if processed immediately.

1. Naghski, J. and C.O. Willits. 1957. Food Res. 22:567-571.

2. Morselli, M.F. 1977. Nat. Maple Syrup Digest 16 (4):16-17.

Table 1. Highest Temperatures of the day when sap was collected.

Tests	Col. Date	Air 6'	Tree	White	Painted
				Black Water Pipe	Black Water Pipe
		°F	°F	°F	°F
1	3-12-78	32	29	34	32
2	3-21-78	51	44	58	54
3	4-10-78	44	55	61	51
4	4-24-78	53	61	62	59

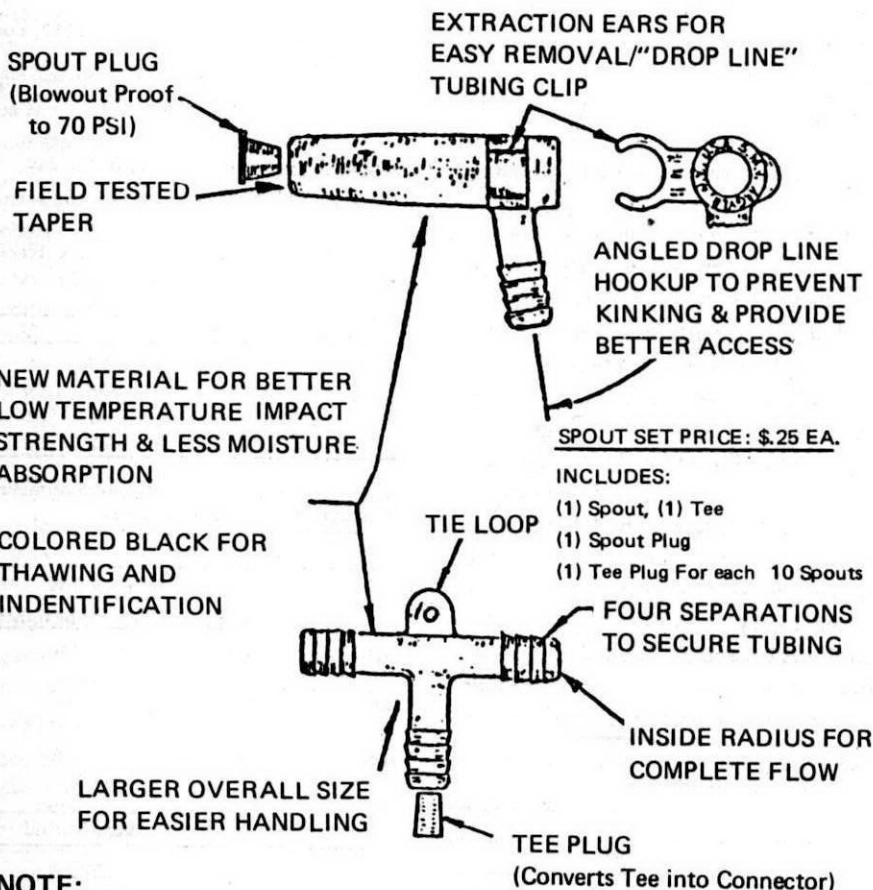
Table 2. Sap appearance and total number of microorganisms found in the sap.

TEST 4		
5° C (41° F)		
Hours	Number	Appearance
0	1,000,000	SL yellow SL turbid
24	6,000,000	SL Yellow; Very turbid
48	400,000,000	SL yellow turbid
72	9,000,000*	SL Yellow; Very Turbid
15° C (59° F)		
0	1,000,000	SL yellow SL turbid
24	5,200,000	SL yellow Very turbid
48	9,000,000	SL Yellow; Very turbid
72	22,000,000	Slimy; very turbid; yellow

* Decrease due to competition among microorganisms.



SPOUT SET COMPONENTS



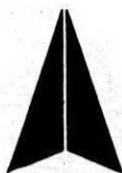
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Thanks to all exhibitors and producers (over 200 total) who made the day a success for all attending the 3rd annual Tubing School. Next years will be bigger and better than ever with more exhibitors and tubing demonstrations during the day. The tubing school's food booth was manned by the members of the Hadley-Luzerne, N. Y. Lions Club, who wish to thank all producers/exhibitors for a successful day. Support your local Lions Club on its sight, hearing, Community Projects.

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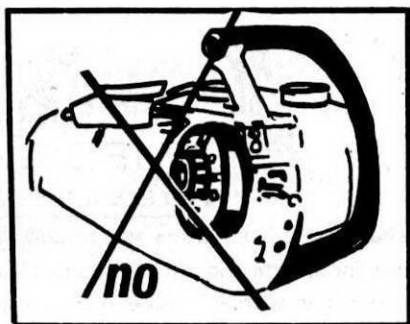
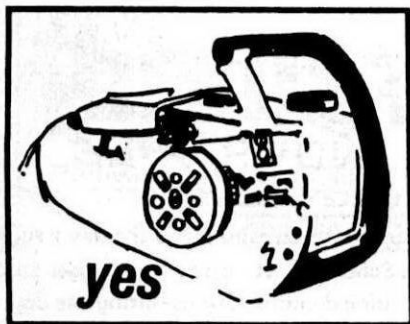
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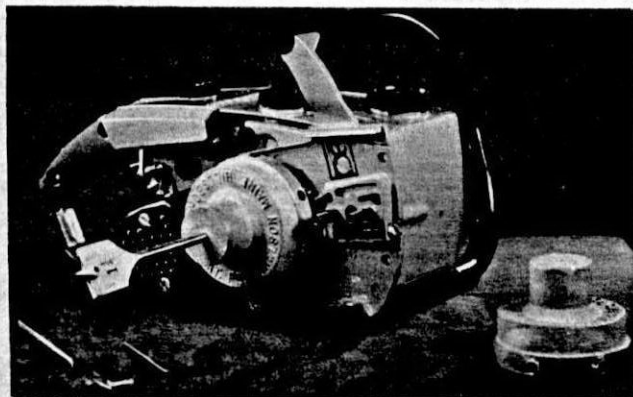
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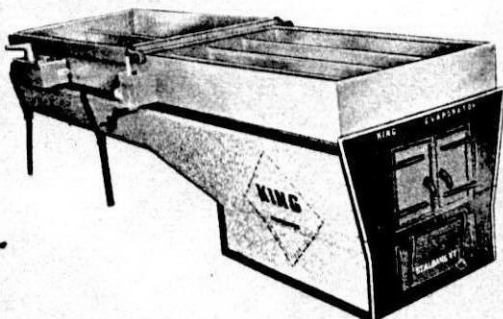
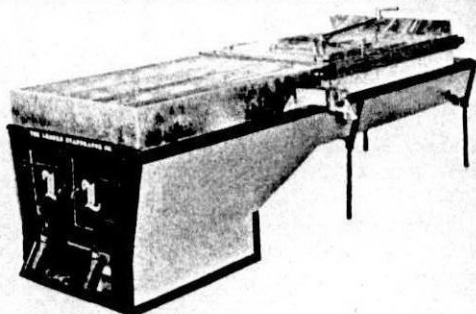
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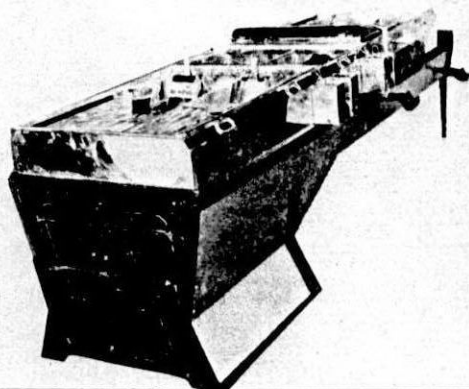
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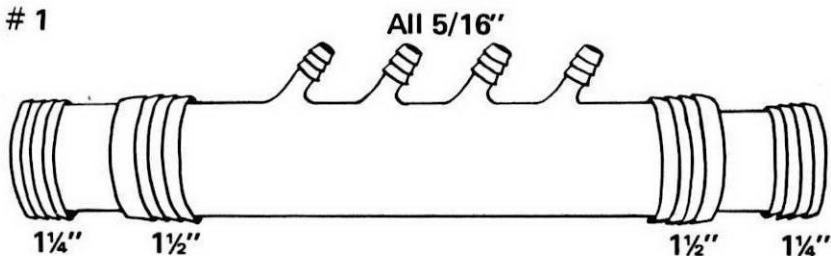
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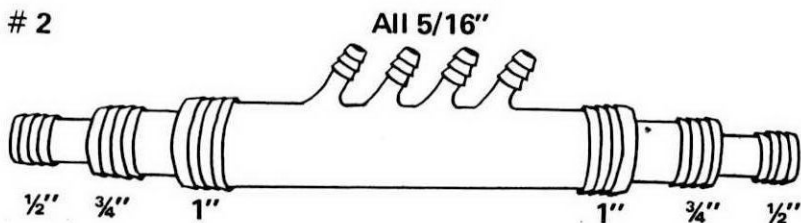
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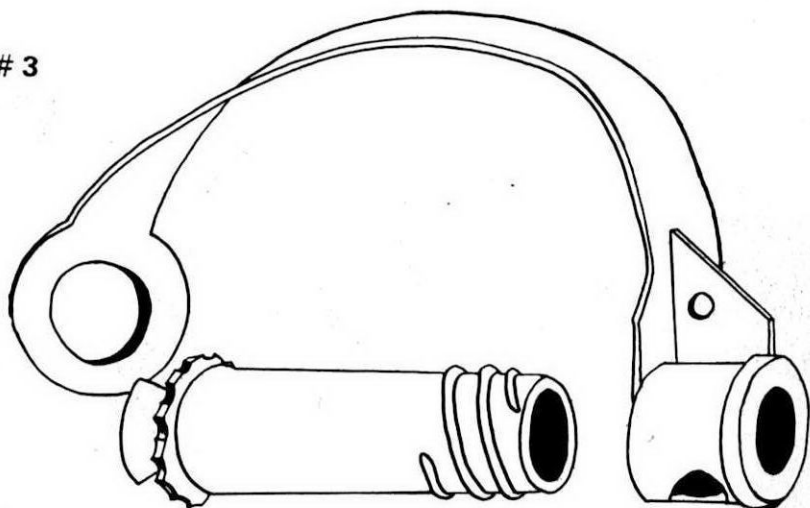


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3



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