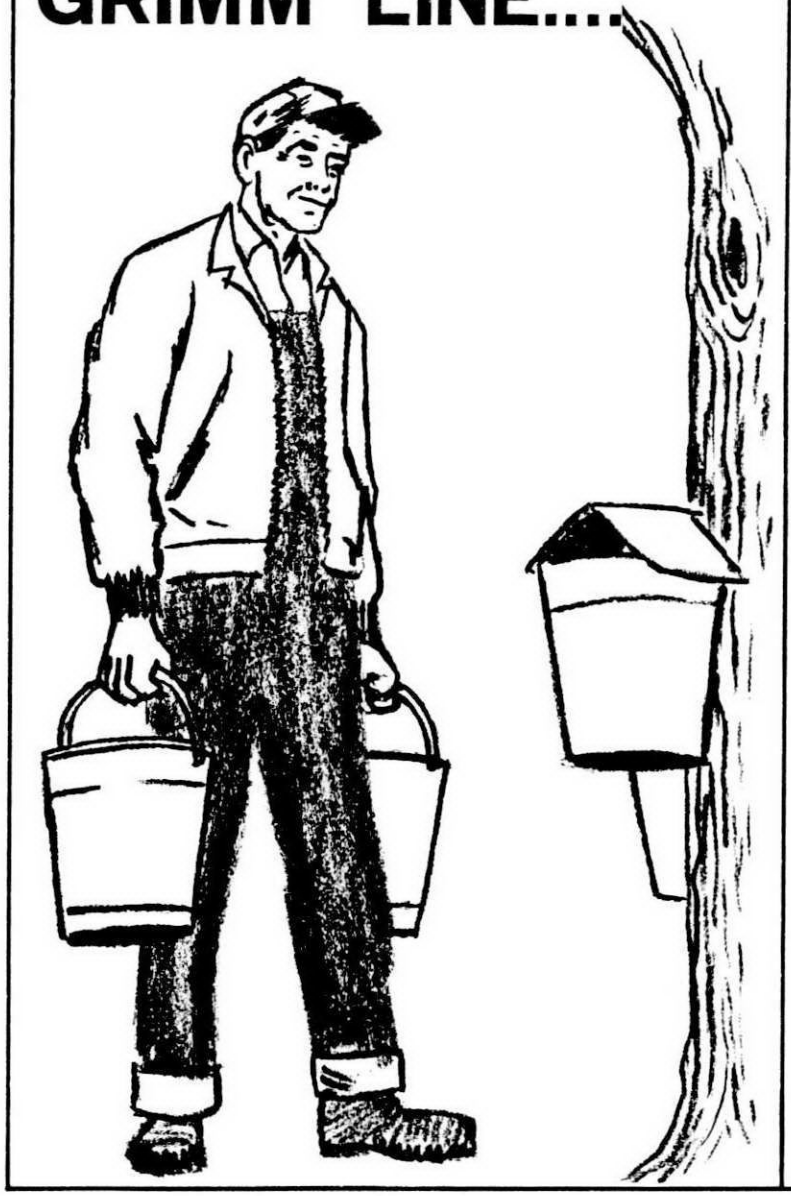
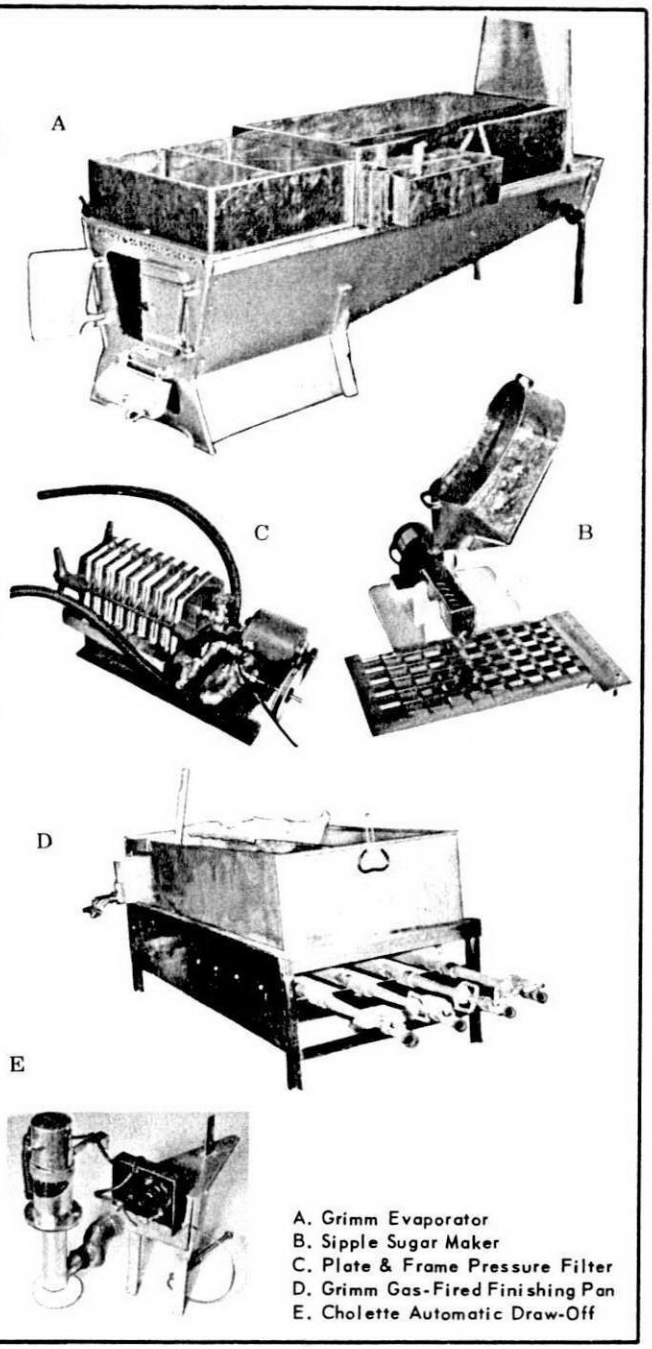
National Maple Syrup
• DIGEST •

INSTALLING
PLASTIC TUBING

Vol. 6, No. 2 BAINBRIDGE, NEW YORK FEBRUARY, 1967

TAP THE GRIMM LINE....





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NATIONAL MAPLE SYRUP DIGEST

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NOTICE
BACK ISSUES AVAILABLE

The following issues of the Digest have been printed to date:

Vol. 1, No. 1, 2, 3, 4
Vol. 2, No. 1, 2, 3
Vol. 3, No. 1, 2, 3, 4
Vol. 4, No. 1, 2, 3, 4
Vol. 5, No. 1, 2, 3, 4

We still have a supply of most of them but they are getting scarce, and they are expensive to mail. If you lack any, drop us a card stating which copies you would like and we'll send them if available.

COVER PICTURE

Photo of Donald Gibbon's sugar house at Sundridge, Ontario. We heard, via our international grapevine, that his syrup, made using Lamb's pipeline and tap hole pellets, took first prize at the Toronto Royal Winter Fair and reserve championship for Ontario and Quebec. Congratulations, Don.

--from the President--

Fellow Syrup Makers - - Here we are right up to another syrup making season in a brand New Year with a brand new set of challenges. Are you ready for them?

If you read the January issue of the Digest listing the accomplishments of the Philadelphia Laboratory during the last 16 years, it might be worth while to review **your own** accomplishments during that same period. How many technical developments of the Laboratory have you made use of? Read that list over again and if you are not making use of any of these findings, then you really need help.

Much of the data from these developments has been featured at the Maple Institutes through all the Maple States. Have you been attending these Maple Schools?

Much of this same data has been reprinted in the Maple Digest for refreshing your memory and to use for reference.

And of course many things have been developed by individual syrup makers themselves, and these people seldom ever get any credit. But whether they get credit or not, most of these producers are glad to share their experiences, their developments, their "research data" with their fellow producers and this demonstrates another wonderful characteristic of the "breed". This general exchange of ideas and methods and "tricks" is part of the reward of attending your Maple Institutes and also taking part in Maple tours wherever they are held.

In behalf of all State Maple Associations or Councils, I urge you to support your particular one. **You** are very important to your own state organization, so make sure that you are in there doing your part. Your state association will only be as good or strong or successful as people like you really make it. Don't leave it all to your officers, but get in there and work and - - Pay your dues.

In closing, if wishes can be of value, then my wish would be that 1967 will be high in "sugar solids" for all syrup makers everywhere.

Sincerely,
Adin Reynolds

MAILING LIST

This is the first issue of the Digest to be sorted entirely by Zip Codes. We're very anxious to know how it's going to work out.

We're also quite concerned over our mailing list. When we added the zip codes to the addresses, we found many mistakes. Some of the towns were not even listed in the postal directory. We don't know if these copies were ever delivered or just discarded somewhere along the line. If you hear of anyone who does not receive this issue, please let us know.

Some of the mistakes in the mailing list are our own fault, that we know. But not all of them! We have received new lists that contained many incorrect addresses. We just can't over-emphasize the importance of correct addresses. Please help us all you can.

WE GOOFED - - - We have received several complaints that some copies of the January issue of the Digest were not collated properly. If your copy is not complete, please drop us a card.

THE MAPLE SYRUP DIGEST,
BAINBRIDGE, N.Y. 13733

CHANGE OF ADDRESS

If you change your address, or want any corrections made, please send us **BOTH** the old address and the new, corrected address.

Editorial

It seems as though every time I pick up a newspaper or magazine lately, somebody is ridiculing the Postal Service. I don't think this is at all fair in as much as those stamp lickers are really doing a wonderful job.

Just the other day Fred Winch told me it took only 13 days to get a special delivery letter from New York to Ithaca informing him his car had arrived from Europe and would he please pick it up. Sure, I know it would only take a pony express rider two days to make the trip back in 1850 but after all, there wasn't nearly as much traffic then, and the riders worked 12 hours a day with no coffee breaks which gave them a distinct advantage. Why, only two years ago it took Fred a year and 11 days to get a letter from Rochester so 13 days from New York should be considered some kind of a record.

Now you take air mail - - there's where they really shine. You can mail a letter in New York on Monday and it will be delivered in California on Tuesday! Of course the planes don't fly everywhere, at least not very often, so if I mail a letter to Norwich, our county seat, on Monday it has to go to Binghamton because we have no airport, which is no fault of the Postoffice. There's no airline from Binghamton to Norwich, which isn't their fault either, so it has to wait 'til Saturday when maybe a private plane will take it along. I could walk the 20 miles in a day and the mail truck goes twice a day, but they figure somebody paid eight cents for an air mail stamp, so, by golly, it's gonna go by air mail if it takes a month.

Zip codes are really helping to speed the mail. Now a postal employee picks up a letter, looks at the zip code and can tell immediately that it goes to California. Or is it Washington? Florida, maybe? Oh well, send it on. Somebody will know where it's supposed to go. Anyway, they don't have to even look at the state, and who can remember where California is. You can't expect everyone to be an expert in geography. With a zip code, it's supposed to bypass the Chicago terminal which is a real bottleneck.

But things are much better in Chicago now. They had a big pile of mail there in October but they solved that in a hurry. They just took it out and burned it up. It was mostly third class stuff and nobody wants to get that junk anyway. Of course, the folks who mailed it and spent a lot of money on postage, printing and merchandize were probably a little concerned when the orders didn't come in, but that's not important. The important part is - the mail must be delivered (spelled d-i-s-p-o-s-e-d). If you happened to have an important first class letter wedged in between a couple of truckloads - - that's your fault. You shouldn't be so careless with your mail.

Our postoffice wants me to rent a postage meter for only $228 a year. Then I could weigh the packages, look up the zone, put the postage on and even write up the insurance, all by myself. In this way their employees wouldn't have to waste their valuable time doing all this work (that they're getting paid to do anyway) and could speed the mail on its way much faster. They consider me a genuine stinker because I'm too cheap to spend the $228.00!!

One of the girls in the conservation Office in Cornell sent a gallon of syrup to a friend in the south. The package arrived in excellent condition, only there was no can of syrup. When she complained to the postmaster about it, he asked her if she was sure the can was in the box when it was mailed. I guess it is pretty difficult to tell whether there's anything in a box or not when a gallon of syrup only weighs 12 pounds. It's her own fault anyway for marking the carton "Maple Syrup, Handle with Care". You can't expect people to resist that stuff. Charlie Hubble says you should mark all cartons "Barn Cleaner Parts" and nobody will touch them.

The postal service (service?) should be an efficient organization. The postmasters are all appointed by their congressman who is trained for the job - - or some job, anyway - - I just haven't figured out what, yet. They are very careful about their qualifications, such as - what political party do they belong to and who did they vote for in the last election. Their experience in the post office is unimportant. Any clerk can show them how to run the joint. That's what they have assistants for, anyway.

The junk mail, second and third class stuff, like the Maple Digest, is where they lose money, and I think they should be given some kind of a trophy for solving this problem. They say the rates are so low they're just going to have to raise first class and parcel post rates to make up for it. Now I think that's real good thinking – about par for the U.S. Govmint.

Indiana Maple Institutes

Indiana's forestry extension staff completed their sixth consecutive annual series of Maple Sirup Institutes during the week of December 5-8, 1966. Three meetings were conducted which were attended by over 250 producers and others interested in the maple industry.

Highlighting the program at each meeting were Dr. C.O. Willets, Head of Maple Investigations, Plant Products Laboratory, Philadelphia, and Mr. Adin Reynolds of Aniwa, Wisconsin, President of the National Maple Sirup Council. Dr. Willits gave an excellent discussion concerning sanitation in the maple woods and also told the groups about the latest developments in research at the Laboratory. Mr. Reynolds discussed marketing, the activities of the National Maple Syrup Council, and central evaporator plant operations. He emphasized the central plant idea since it is felt that the future of the maple syrup industry in Indiana lies largely in this type of operation.

Ed Lott, State Extension Forester at Purdue University, gave a brief discussion of maple promotion at each of the meetings, as well as serving as the master of ceremonies. He used colored slides to show scenes of the maple syrup exhibit which he and his staff set up at the Indiana State Fair during the past year. The exhibit was a cooperative one with Reynolds Sugar Bush which occupied the entire end of the Horticulture Building and consisted of a woods scene complete with maple logs and sugar house, a little theatre where the Indiana film entitled Collecting the Maple Bonus was shown constantly, a maple sundae stand, and a retail booth operated by the Reynolds brothers, Lynn and Juan. It was a real fine example of industry-education cooperation and resulted in favorable comments from many.

During each of the meetings the extension forester for the district gave an excellent discussion on the management of the sugar woods. These were F.T. Miller, extension forester for west central Indiana with headquarters at Greencastle, W.L. Fix, extension forester for southwestern Indiana with offices at Jasper, A.N. Liming, extension forester for southeastern Indiana located at Versailles and Larry Frye in northeastern Indiana at Columbia City. In addition these foresters served as chairman of the local committees to plan and make local arrangements for the meetings.

At the Rockville meeting in west central Indiana Austin Noblitt discussed the Maple Sirup Festival which is now held annually during the sirup season at Rockville and at least in part is a result of these institutes. The first of its kind in Indiana this festival now attracts many thousands of people to this beautiful scenic area of the state which also boasts proudly of its reputation of having the most original wooden covered bridges of any county in the nation. This activity has definitely increased production of maple products in this area of the state and has certainly raised the prices for maple products to the highest of any area of the state.

An interesting sidelight during the institutes was the fact that several producers present indicated that they had definitely started sugar camps as a result of the meetings during the past six years. This indicates that they are effective in encouraging new production as well as bringing about more efficient production through the use of newer and better technology. Indiana has a great potential for maple sirup production with extensive areas of sugar maple trees and we are confident that the State can and will take its place as one of the leading producers of maple products in the near future.

National Maple Queen Contest

The site of this year's National Maple Queen Contest will be in Ohio as it was last year. This was approved by the National Maple Syrup Council last October. It will be held on Saturday evening, April 8, 1967 at the Geauga Theatre in Chardon, Ohio.

The judging will actually start at the banquet before hand. Knee length dresses are preferred for the banquet with formal gowns for the theatre stage appearance. Judging will be based on poise, conversing, personality, speech, beauty and photogenic appeal. Special talent will not be considered. Contestants must be single but there is no age limit.

The queen committee of the Chardon Festival would like entrees from as many states as possible. For entrance, simply send contestant's name, address, and sponsor, along with a glossy picture of your queen to the **Maple Queen Committee, Geauga County Maple Festival, Chardon, Ohio.**

How To Do It...

CLEANING EVAPORATORS

About 6 years ago, a maple producer from "way back" told me how to clean an evaporator at the end of the season. I have used his system every year since then but haven't talked about it much. Since it has proved to be the best way I ever found and also endorsed unanimously by the few producers I've told about it, I guess it's time to tell everyone. It's probably "old hat" to some of you, but for those who haven't heard of it, here it is:

At the end of the season, save enough of the last sap (it isn't worth much anyway) to fill the evaporator as deep as you want it cleaned. Empty out the pans, rinse out the loose dirt, fill them with the sap and let them set. **Don't heat the sap.** Don't do anything. Just go to the house and forget it for about 4 weeks. For a while it will get awfully ropey and it won't smell too good, but by the time it's ready to come out, it will be like water again. Then check it every few days by running your hand across the bottom or side of a partition. The scale should push off with your finger.

When it does, empty out the sap and wash the scale out with a brush and water. The sap doesn't seem to have any effect on the tin if it isn't left too long. Be sure to wash it out as soon as the scale is loose. If you don't get all the scale off, it will look like a layer of light colored powder after it has dried out, but it will be loose and can be brushed off easily.

Caution! Never use this method on a galvanized pan. The acid formed by the sap souring will eat up the zinc. It doesn't seem to bother tin as much as sulfamic acid or some other pan cleaners, and your pans will look like new again. Of course, if they're burned, it won't help - - I don't think anything will.

INSERTING PELLETS

Here's a slick way to put pellets in the tap holes. It requires no pellet gun or extra help.

The man who drills the tap hole carries the pellets in his pocket. As soon as the hole is drilled, he lays a pellet on the edge of the hole and goes on to the next one. The white pellet shows up against the dark colored bark and makes it much easier for the man who is driving spiles to find the hole. This man has a 4 inch length of 5/16 tubing, one end of which has been inserted between the second and third finger of the hand in which he carries his hammer, and butted up against the handle of the hammer. The tubing looks as if it was sticking out of the back of his hand. As he comes to each hole, he pushes the pellet on into the hole with a backhand motion and goes on driving the spile. Simple, isn't it. Everyone who uses this method tells me they have no longer any need for a pellet gun, and it takes no more time than before they used pellets.

STORING CANNED SYRUP

Are you having trouble with cans rusting? Here's a tip we ran across a few years ago that's worked wonders for us.

Most of the time, can rusting is caused by condensed moisture in the air collecting on the can. This is caused by quick changes in temperature. When it warms up quickly, the syrup in the can is colder than the air around it. This causes condensation to form on the can, sort of like dew on the grass in the morning. After a month of this the cans are rusty, and can't be sold.

When you fill the cans, put them in corrugated cartons as soon as they are cool. Never store them on open shelves even if you think the room is pretty dry. You can put them in cartons that hold a dozen or a hundred, it doesn't matter, but close them up fairly tight. The carton is enough of an insulator to allow the can to warm up slowly, preventing condensation from forming. That's all there is to it. After a year the tops are as bright and shiny as new. A word of caution: If you want to put gallon cans back in the big carton they came in, better set it where it won't have to be moved, unless you've got a fork lift. You can pile them 2 or 3 cartons high; just put a cardboard flat between each layer and close the flaps before putting another one on top of it.

QUICK TIPS

Always drill the hole straight into the tree instead of on a slant so the pellet won't roll out and be lost in the snow.

A hammer with a yellow plastic head is just the thing for driving plastic spiles.

Corn oil (cooking) oil is an excellent de-foamer for the evaporator. It is always liquid regardless of temperature and is very economical. If it is kept in a plastic squirt bottle, always ready for use, and won't break or spill if dropped on the floor. Since it is a food product, it's perfectly safe to use.

Milking machine stall cocks, the kind used on the vacuum line in a dairy barn, work fine as a no-drip faucet for filling syrup containers. They give a smooth, even stream that eliminates bubbles and they won't drip a bit after they're shut off. To insulate the handle, slip on a piece of 5/16 plastic tubing.

Would you like to see this column continued? Maybe you've got some ideas that others could make use of. If you have, send them to the Maple Syrup Digest, Bainbridge, N.Y. 13733, and we'll keep the column going.

Editor

The Future of Maple

by Gordon Brookman
South Dayton, N.Y.

I own and operate a 550 acre dairy farm in Chatauqua County, milk about 85 Holsteins, and raise my own replacements, making a total of 150 head. I keep two full time hired men, which gives me some time to work with our farm organizations.

My sugaring experience started as a boy; tapping the trees in our yard and boiling the sap in an open kettle. We had no sugar bush on our farm, so the first year after I graduated from high school, I rented our neighbors bush on halves, using a flat pan and dipping the finished syrup out with a scoop. Neither of these ventures proved profitable, but maple has always fascinated me, and has been my hobby ever since. Now I look at it as an important part of my business that must pay its own way.

When I bought my first farm, I made sure it had a hard maple woods on it. The 200 taps I started with has grown to 1200 with a potential of 3000 or more in 100 acres of woods. Having kept cost accounts several times, I never figured there was much profit in bulk syrup at the prices we offered in New York. Consequently, I plan to produce just about what I can retail myself. At present, a self service sugar kitchen on the back of our house, together with good roadside signs, takes care of 80% of our crop; the other 20% is dark syrup which is drummed. My sales have grown steadily and I plan to expand more as it continues to grow.

The future of the maple industry is bright if producers work at marketing. I have always said marketing a product is as important as producing it. Our New York State Maple Producers Association was organized in 1950 to promote Pure Maple and expand our markets. I appreciate the confidence its members have had in me by continually electing me to represent them as a director, both at a local level, and for the past eight years as state director.

We have gone a long way in promotion with beauty contests, festivals, and booths at fairs. Experience has taught us that fairs are one of the best places to promote maple. Many of our present customers had never tasted maple, or knew where to buy it, until they visited one of our booths. The booth at the New York State Exposition in Syracuse, managed by Lloyd Sipple, has been operated for thirteen years and the volume of sales has grown steadily. The other is at the Erie County Fair at Hamburg where the attendance is almost as large as at the State Exposition. This has been operated for three years, and as its manager, I'm happy to report its sales have also grown. Many of the county divisions of the association operate similar booths at their local county fairs. We have sponsored several state festivals, one of which has become an annual affair. This is located at Franklinville, in Cattaraugus Co. Through the cooperation of their Junior Chamber of Commerce it is growing steadily. Altogether we sell a surprisingly large amount of pure maple products at these various places. The educational value of these ventures is amazing; as indicated by the comments of the new and prospective customers. A quality product in an attractive package is always in demand.

In the spring of 1964 we were offered the ridiculously low price of 22¢ to 25¢ a pound for bulk syrup. Our Chatauqua County Farm Bureau forestry committee asked me to help them do something about it. We worked together, checking markets and supplies, within a week, we moved over 9000 gallons at 4¢ per pound over the offered price. In 1966, all producers in New York State received this increase plus another cent for fancy, which could be a result of our efforts in 1964.

Other county Farm Bureaus in New York asked our state board of directors to organize a Maple Division of the New York Farm Bureau Marketing Association. The state board asked me to act as chairman of a committee to study possibilities of organizing a maple division if producers showed enough interest. A survey was taken of all producers and 90% showed interest. After many meetings and much study, in February, 1966, we finally became an authorized part of the N.Y.F.B.M.A.

MARKETING ACTIVITIES

Last spring we contacted buyers to try to find out before the season closed what we could expect to receive for bulk syrup to keep our members informed as best we could to market conditions. Some of us bought drums of our own so we could hold some of our syrup for a better price and market it where we pleased. We have succeeded in marketing most of the syrup we held back last spring at a better price. We sent

syrup to the European Trade Fair and have been informed it was well accepted. Several processing plants in New York are considering blending pure maple and marketing it along with their line of canned fruits and vegetables in chain stores. One plant has done this as a pilot project and is pleased with the results. This is a new marketing development and looks promising.

As of now we are in the midst of a state wide membership campaign in conjunction with our Farm Bureau membership drive. Any maple producer wishing to join should contact his local Farm Bureau President.

Did you know it takes less hours of labor today to buy a gallon of pure maple syrup than ever before in history? Therefore it is cheaper and should be more salable. Why has maple production dropped in so many areas? According to our foresters, only a small percentage of our maple trees are tapped. Could it be that the cost of production, supplies, and labor have gone up to the point where it is no longer practical to produce bulk syrup?

I honestly believe maple producers in each state should organize a Maple Division of their Farm Bureau Marketing Association which is affiliated with the American Farm Bureau Marketing Association. By working together we can gain price increases as costs justify, therefore making it possible to stay in business and expand our maple industry. Increasing production will make it possible for our established maple buyers to stay in business, and also to develop and supply new markets, some of which I mentioned earlier.

THE FUTURE OF MAPLE IS WHAT WE MAKE IT. LET'S MAKE IT GROW!

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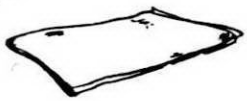
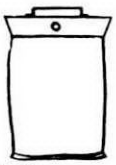


BAG



Shows hole side of cover that hangs directly on sap spout. (No special spout needed) Just without hook. Works best with Hookless cast spout. Quickly assembled (about 30 seconds). Open end of bag is slipped thru band - folded over band and set into cover.

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WE WILL BUY YOUR SYRUP

During the six years which have elapsed following the publication of the U.S. Department of Agriculture, ARS 73-35 "The Use of Plastic Tubing for the Collection and Transportation of Sap" in which we described a workable plastic tubing system for sap collection, the use of tubing for the harvest of the maple sap crop has become almost a must if the industry is to survive. The current short labor market has again focused attention on the use of tubing.

It was not our intent when we published the above that the described system for the use of the tubing had to be followed to the letter, but rather that it be accepted as a guide and that each individual maple sirup producer introduce his own variation or modification of the system.

Further, it was not implied then nor is it now that it advocated an immediate 100% conversion of whatever method of sap harvesting a producer is using to the use of plastic tubing. Rather it was to encourage its use in moderation. Then, as you become familiar with the handling and use of plastic tubing and of the advantages its use offered, to expand its use to fit your respective needs.

But the use of tubing did not expand in an orderly way, instead the use of tubing has become the most controversial subject of the maple industry. Hundreds of producers swear by it and probably just as many swear at it. We recognized this as far back as January 1962 when in the very first issue of the Digest we printed an article titled "Let's talk about tubing", which we have learned helped many producers get better results from their installations. Since then, we have learned of and experienced many new problems which have resulted in important changes in the method for installation of tubing. These have been brought about by "Yankee ingenuity," and I use the term literally because the following is based on improvements devised by maple producers - - the folks who make their living producing maple sap and syrup - - the folks who have to make tubing work, and **have** made it work. However, the basic precepts outlined in ARS 73-35 are still effective today. These are the methods of installation, take-down, washing, storing and reinstallation the next season.

This article attempts to piece together scraps of information received from producers everywhere as well as my experiences and I have pooled this and will pass it on to you for what it is worth, so - - -

Let's Talk About Tubing

by Lloyd Sipple

To understand tubing we should ask ourselves, Why does plastic tubing work? What basic law or laws of physics are responsible for its proper functioning? This can be summed up pretty well with one word - - gravity. It is not a high pressure system like a domestic water system as one-time supposed. Instead, it is a low pressure system at least most of the time and therefore should be treated as such. If you take a length of garden hose, lay it on an incline such as on a hill and pour water in the higher end, what happens? The water runs out the lower end. I don't think anyone is ready to admit they can't make water run downhill - and if it doesn't run through the hose then there is something that prevented it from doing so - some form of stoppage and that is what we will talk about.

TYPE AND SIZE OF TUBING

But we can't use garden hose for sap for many reasons. In the first place it is so expensive that all of the other reasons don't matter. However, polyvinyl plastic tubing does fill the bill. It is relatively inexpensive, does not affect the flavor of the sap or resulting syrup, is surprisingly durable, and has enough stretchability that water (sap) freezing in it won't split it.

The next important consideration is the size of the tubing. In the beginning a lot of 1/4 inch diameter tubing was tried but it was found that a drop of sap would bridge across and completely fill the tube with a solid column of sap which would not allow bubbles to pass. Why should this cause trouble? Well, before tubing was used, no one gave any thought to the fact that a tree produces about as much gas as it does sap. Using the conventional metal spiles and buckets it didn't matter that the tree gave off gas for it just passed unrestricted in to the air. Since the first tubing systems were all sealed, (no vents) this gas from the tree was confined inside the tubes. The only way it could escape was to go down the tube with the sap. But it didn't want to do this so here is where the trouble started.

VAPOR LOCK

The gas given off, being lighter than sap, wants to go up the tube, blocking or at least slowing down the flow of sap trying to go down the tube. If the tube was not perfectly graded, the gas collected in each high point where the tubing loops upward causing a vapor pocket in the high point of the loop and this was a vapor lock. This isn't anything new; anyone who ever had a spring with a pipe running over a little hump knows that if air was drawn in the pipe when the spring got low, they had a vapor lock that shut off the supply of water, or how many have had car trouble on a hot summer day due to vapor lock in the fuel line? But when this happens in sap collecting tubing

and the sap stops running, is it any reason to condemn the tubing? It merely points out that there is something wrong in its installation which permitted this to occur.

There are three ways to control vapor lock. **One** is to use a tubing of large enough size so that no place in the tubing can be completely filled with sap. A **second** way is to install the tubing on a perfectly smooth grade or slope so there will be no high spots to collect a pocket of the gases. This can be done by either stretching the tubing tightly between trees providing they are close enough together to prevent sags or on a hill that is fairly steep. If the trees are far apart, then the tubing could be supported by taut cables. Either way, the expense involved from the extra labor required to install would make the cost prohibitive. We have never experimented to any extent with this aerial system because we feel that any system that is going to be too expensive to use, isn't worth working on. And, whoever saw a piece of tubing that didn't sag after a few days, no matter how tightly it was originally stretched.

The **third** alternative would be to use a vacuum pump to suck out both the sap and the gas. This will work up to a point, but it is also expensive and can be almost unmanageable particularly if your woods are scattered over parts of three counties. Anyway, let's admit it - - that unless you have to actually pull the sap uphill, a vacuum pump is just a cover-up for a poor job of installation. After all, if the air cleaner on a gas engine becomes so plugged up with dirt that the mixture is too rich, do you close the needle valve a little to compensate for it? Of course not, you get to the root of the trouble and clean or replace the air cleaner. The same is true with tubing. If you have too many gas pockets (vapor locks) in the pipeline - - well, you can put on a vacuum pump if you want to, but I'd have to buy about 20 of them, which is a pretty fair piece of change, and since most of them would have to be gas engine driven, I'd need about 6 men to keep them running or from freezing up - or to turn them on at the right time.

VENTING VS. UNVENTING

The **fourth** alternative is to get rid of the gas. The place to start is at the gas source, as close to the tap hole as possible. The first year we used tubing, we had no vents at all, and, like everyone else, had all kinds of trouble. The second year we put a vent on about every tenth tap and had more trouble. The sap simply poured out of every vent. We were seriously considering abandoning the whole deal when we noticed that one line of 15 taps, that had for some reason a vent on every spile, was working perfectly. We decided that maybe venting was the reason it was working. So we started venting all of the taps on the other lines, and as we did, one by one, they started working much better than ever before. We told other producers about it, and they reported that venting did the same for them. Many of these producers also were ready to throw in the towel until they tried venting at the spiles.

When I say venting I mean 100% venting, not now and then a vent, or even 50%. If you put a vent on half of the spiles and leave the others sealed, the gas from the sealed ones will cause vapor lock which, in turn will push the sap out of the vents. But if they are all vented, it won't push sap out of any of them. Also, in an unvented system, the sap and gas, being forced out of the tree by internal pressure, builds up pressure in the lines which some folks believe is an aid to thawing since it forces some of the sap past the ice in the lines and thaws them faster. I can't quite buy this theory, but there is another angle that does make sense.

Occasionally, a tree will develop a pressure of 20 to 40 pounds. More likely, though, the pressure is less than 1/10 pound which, while very low, is enough to cause the sap to ooze out of the tree. It takes only the same amount of pressure to hold back this weeping flow of sap and this is easily built up in the vapor lock of an unvented system. This back pressure or plugging effect of the vapor lock is a terror, stopping the flow of sap completely. If you don't believe this, try putting air in a tire that already has 30 pounds pressure with a compresser that will develop only 29 pounds and you'll see which way the air goes. And its pretty hard to tell if you have back pressure in a sealed tubing system. In the partially vented system, you can tell because the vents will run over and you can take steps to correct the situation. Of course, there are a few other flies in the ointment, but I wanted to try to get across the importance of complete venting.

Since the 1/4 inch tubing was found to be too small to work properly, 5/16 (inside diameter) tubing was tried and found satisfactory. It was large enough to vent properly, had about twice the capacity of 1/4 inch, and was cheap, so in the rest of this article you can assume I am talking about the 5/16 inch size tubing.

TUBING LOCATION

Since I cannot afford the suspended system I will hereafter limit my remarks to the ground system of installation which is the easiest and cheapest to install. However, while I am a firm believer in 100% venting, I will admit right now, it didn't solve all the problems. There were a whole lot of little wrinkles to be ironed out.

The first problem is freezing. When the air warms up in the morning and the sap begins to run, the tubing is usually thawed out in time to carry it on down the hill. There is sometimes a lag of 15 to 30 minutes and during this time the vents will occasionally run over if the tubing is filled with unthawed ice. This isn't of great importance, at least when compared to buckets. The sap from spiles on buckets aren't running either because they are shaded and frozen at that time and so I haven't even thawed out until after the tubing has thawed and is operating. Later in the day, though, when the buckets fill up and run over, the tub-

ing is still doing its job with no loss of sap. There are times when the vents will continue to run over all day and you had better get busy and find out why. It has to be caused by some obstruction in the tubing such as overloading the line with sap, a vapor lock, or ice in the line that didn't melt. If a tube is laid close to a tree on the north or shaded side, or if laid under an evergreen, it is possible that ice in that section of the tubing that is in the shade will remain all day. This shade, if the temperature is near freezing, will keep that spot of tubing frozen, and prevent any sap from flowing past it. **Always place the ground lines on the south or sunny side of the tree,** and **Never** in the shade of evergreens or buildings.

An innovation to assist in thawing in cold areas is the new ribbed tubing. The ribs on the sides of the tubes bend more infra-red (heat) rays from the sun into the tube causing it to absorb more heat. This results in much faster thawing.

EVERGREEN TREES

If you are having trouble with tubing working properly when used near evergreen trees, there is only one solution - - cut the evergreens; get them out of the sugar bush once and for all. Any evergreen tree will shade the maples and hold the temperature even, resulting in decreased sap flow whether you use tubing or buckets. Also, when tubing is used, you will have much more rodent damage near evergreens because the squirrels seem to like the cover they provide. Evergreens and maples just don't mix when it comes to sap production, and since the sap is worth far more than timber, get rid of the evergreens.

HOW MANY TAPS?

As for overloading the lines, I seriously doubt if this is your trouble. We have found that a 5/16 tube will handle as many as 50 taps of high producing roadside trees. These were on 800 feet of tubing on perfectly level ground. This would indicate that if you have much of any grade at all, which will increase the rate of sap flow through the tubing, a 5/16 line may handle as many as 100 taps. This increased capacity of the tubing reduces the amount of the larger main lines required and therefore lowers the cost of both material and labor.

CHANGES IN VELOCITY

This is a situation which is not serious in that it will not stop the flow through the tubing but sometimes results in a considerable loss of sap. If the grade in a bush is uneven, quite steep in some places and relatively flat in others, the sap will come down the steep slopes at such a high velocity that when it comes to a flat area it slows down, causing the sap to be forced up out of the vents at the foot of the steep slope.

This can be easily remedied by running the lines down the steep slope at a more oblique angle (slantwise of the hill) reducing the grade and the velocity. At the same time, the lines running across the flat areas should be run as straight downhill as possible to increase their grade. The object is to keep the lines running at as even a grade as possible over the entire bush.

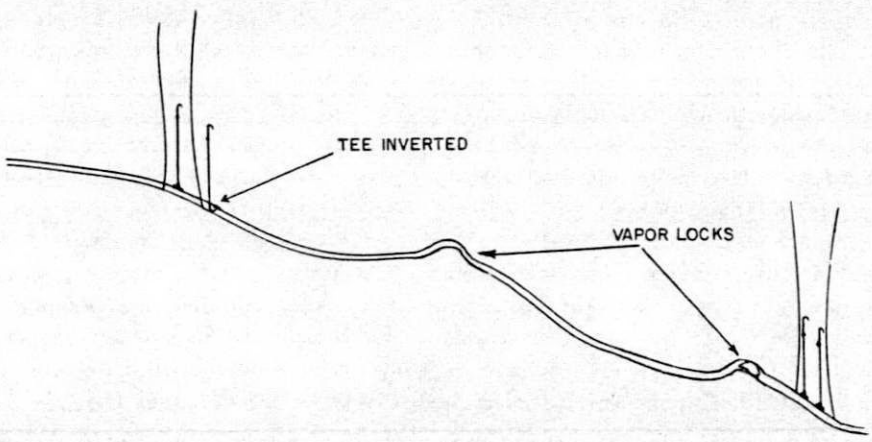
An alternative which frequently gives good results is to connect the 5/16 lines with a main line at the foot of the steep slope and start new 5/16 lines on the flat areas.

ELIMINATING VAPOR LOCK

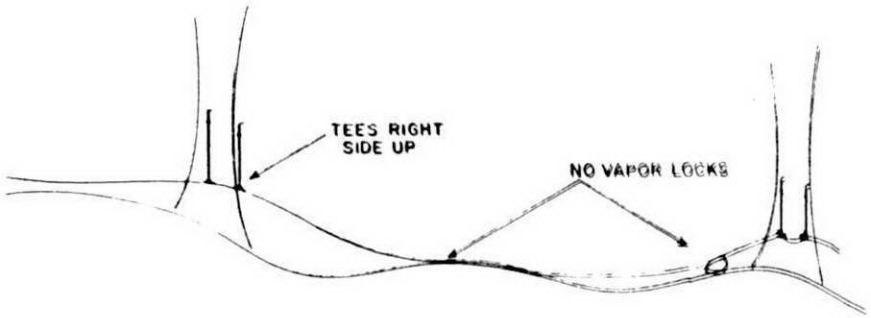
This narrows the field down to vapor lock, which, I believe, is the cause of tubing failure at least 90% of the time. If we vent every tap we will get rid of practically all the gas at the source. However, due to uneven terrain, the sap will flow faster on steep places than it will where it is more level and this surge will pull air in some of the vents which will eventually collect in high spots. What do we do about it?

The system we have found which comes closest to solving the problem is a modification of the ground system we originally outlined 6 years ago in ARS 73-35. We have found that this modification is absolutely necessary to make the ground type installation work on level land and is a distinct aid for all types of installations regardless of the grade on which it is installed.

Originally we recommended that the drop lines (from the spile to the tee) be cut long enough for the tee to reach the ground (see sketch #1). Now, we're going to change that because the **drop lines should not reach the ground,** but should end 1-1/2 to 2 feet above the ground. If the trees are tapped at 3-1/2 to 4 feet height, a 2-1/2 foot drop is about right. If they are tapped 5 feet high, as many producers are now doing, a 3-1/2 foot drop should be used. The length of the drop is not important, it is the distance it ends



Sketch #1



Sketch #2

above the ground level. We therefore don't recommend an 18 inch drop or 24 inch or 3 feet or any other exact length. The important thing is, the tee should be held up off the ground at least 1-1 2 feet. The reason is this: The side opening of the tee should always be held in an upright position so that it will allow any gas coming through the ground line to pass up the drop line to the vent. Then, if the tubing from one tree to the next is cut the exact length (no excess), the short drop will hold the ends up off the ground lines and the high spots are always located at a tee so that the gas, as it collects at these high spots, goes up the drop-line to the spile vent and is immediately vented off (see sketch # 2).

While this system may appear similar to a suspended system there is quite some difference. Remember that the major part of the ground line is **ground supported and it is vented.** In the modified method of installation ground tubes fit, but are not made taut, between trees.

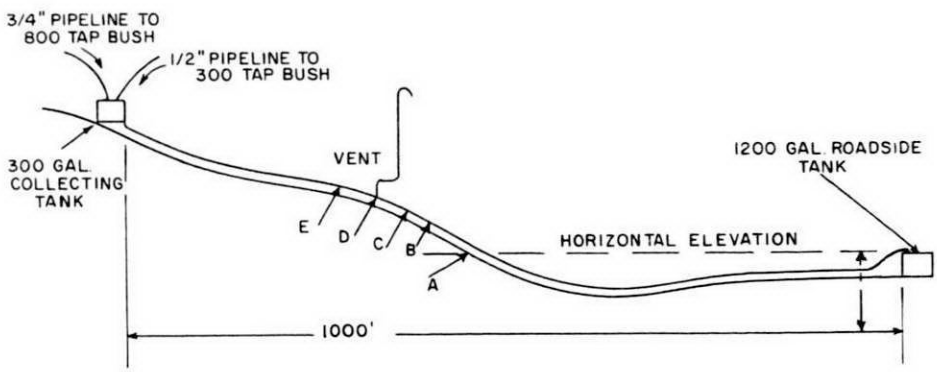
I am discussing in general large installations, 300 to several thousand taps, where the ground lines are long and carry 50 to 100 taps each. While these new recommendations can be used to great advantage on short lines, the short lines are not as vulnerable to the resistance of liquid flow and to vapor lock that affect the larger installations. On lines that carry only 15, 20, or 25 taps, and no large pipelines are used, the problems are minimized to such an extent that we felt we should limit these observations and reports to the larger installations since greater production and economy was our objective as it is with all commercial producers.

MAIN LINES

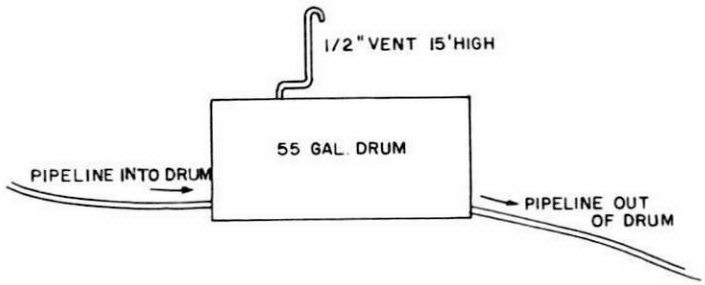
This is where we really have fun. If you think you have problems with short lines, and have never used any 1/2 inch or larger main line, you haven't seen anything yet.

Since there are no two main line installations that are identical, it would be impossible to set up any directions for installing these lines that would work everywhere. Bob Lamb has said that a good main line is an empty main line. By that he means that main lines should be laid and graded so well that they drain completely by gravity, whether by grading the ground on which they are laid or by suspending them with hangers from cables. I'll agree this is a good idea but not always possible. Sketch #3 shows a set-up which has given us more than one headache. If I tell you about our experience here, it might help you to solve some of your problems as it has already helped others. At one of our operations it was necessary to install a 3/4 inch main line, 1,000 feet long. This connected a collecting tank and a road side tank and it had to go down through a gulley and cross a creek (see sketch #3). It would have been both difficult and expensive to install a 1000 foot cable to hold the tube on grade since it would have to be set up and removed every year. The 300 gallon collecting tank was about 50 ft. higher than the roadside tank on the other side of the gulley giving us, we thought, plenty of drop and plenty of hydrostatic pressure to carry the sap down through the gulley and the creek bed and back up to the roadside tank. Since there was a sharp dip in the main line where it goes through the creek it was always full of sap and frozen when cold. The 300 gallon collecting tank provided adequate capacity to hold new runs of sap while the ice in the main line portion A to roadside tank was being thawed out by the morning sun. We found out to our surprise that the collecting tank would run over before sap would run into the roadside tank even when the main line was completely thawed. Why? The reason was a vapor lock between point E and A providing enough stoppage to prevent the sap from flowing across the gulley to the roadside tank.

To correct the situation, we installed a vent about 12 ft. high at a



Sketch #3



Sketch #4

convenient place (about point D). This provided a very nice fountain. The sap from the collecting tank ran down the pipeline to point C and gushed out of the vent but did not eliminate the vapor lock between points C and A, and the sap still didn't run into the roadside tank.

We next installed a 55 gallon venting drum at point B (see sketch #4). This worked fine the day it was installed. After a 2 day cold spell, we found the drum had filled up, frozen solid, and it took about a week to thaw out. We then fussed around, unsuccessfully, till the season was over and collected about 2 gallons of sap per tap.

What would we do now? Give up entirely on a perfectly good sugar bush? Install a vacuum pump and have to start the engine every time the sap started running and then shut it off. We did not elect to do that for the reasons already given.

We took another long, hard look at the whole situation and here's what we came up with.

We replaced the collecting tank with a 55 gallon collecting drum and moved the collecting tank down to a point about 4 feet above point A which is level with the top of the roadside tank (see sketch #5). We removed all the vents between the drum and the tank since there were no high spots. Since there was nothing to stop the sap and gas from running out of the pipeline from the drum into the collecting tank, no vapor lock could form. It also eliminated vapor lock from the tank to point A because the distance was so short the gas could escape up through the tank. The collecting tank was large enough to absorb the sap during the height of the run and could empty out as the run subsided. Everything worked fine, production was excellent and no daily inspection was required. The solution was really quite simple when we took the time to think about it and use a little common sense.

COLLECTING OR JUNCTION CANS

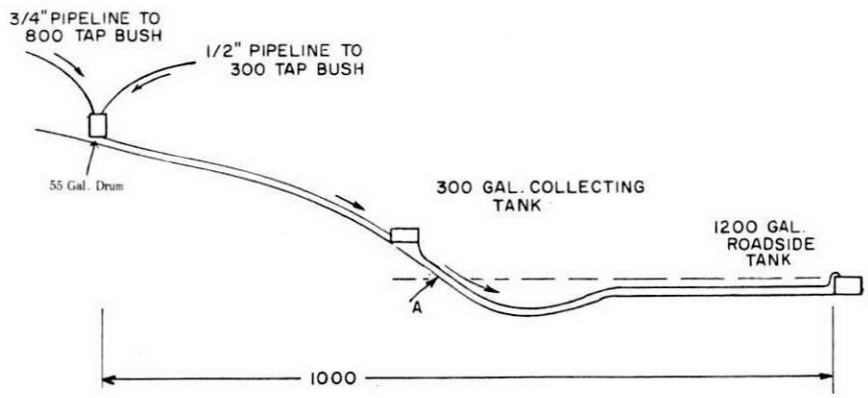
At any place in a tubing installation where two or more main lines come together, or even where several of the smaller lines merge, collecting cans can be especially beneficial. These cans can be either 20 gal. utility cans, 30 or 55 gal. drums, or even small tanks.

The outlet of these cans can be almost any type of pipe fitting to suit the need, but it should be located so that the can drains completely. If an inlet is used, it should be located 4 to 6 inches higher than the outlet, but this is not always necessary. In many installations no inlet is required since the tubes can enter the top of the tank.

The size of the tank can be varied to suit the conditions. If a large amount of sap will be handled by the tank, and the pipeline below the tank runs through a gulley or for some other reason you expect slow thawing, the tank should be large enough to provide adequate storage until the pipeline is completely thawed (see sketch #5).

In this installation, the 55 gal. drum is adequate, since the pipeline below it can drain out and not freeze. The collecting tank, being 300 gal. in size, not only serves its purpose

as a reservoir in the morning until the pipeline is thawed, but also acts as an overflow tank when a large



Sketch #5

flow of sap occurs. A float valve is installed on the pipeline in the roadside tank. When this tank is full, the float shuts off the valve, causing the sap to back up in the collecting tank, and prevents any overflow.

These tanks, in various sizes, scattered throughout the bush, will do an excellent job of venting the lines, and greatly improve the overall operation, especially in large installations.

SNOW

Deep snow can cause problems both at tapping time and later in the season. We usually have 2 to 4 ft. of snow at tapping time requiring the use of snowshoes, which are standard equipment for most producers. Power sleds (snowtravelers, snowmobiles, etc.) are a practical means of transportation since tubing is very light. The use of both power sleds and snowshoes will allow you to tap easily on any depth of snow; in fact, it is often easier than on bare ground since it is not as slippery and the blackberries are covered up.

Locate the taphole at the usual height above the ground and disregard the depth of the snow when laying out the ground lines. Before the season is very far advanced, sufficient snow will usually have melted so that the ground lines and drop lines will be in their normal positions. If, after the snow melts, the lines are found to be humped up over stones, stumps, or brush, they should be relocated.

Whenever a snow fall occurs after installing tubing, the tubing must be lifted up onto the top of the snow. The blanket of snow will act as an insulating layer and keep any frozen sap in the lines in a frozen state and prevent normal sap flow.

To use tubing successfully, you must keep watch of it; the lines must be walked occasionally to see that they have not been parted or damaged in any way. Walking the lines will not only tell you a lot about your installation, how it works, and how you can improve it, but will more than pay the cost by increasing production.

When you get right down to it, installing tubing is a mixture of about equal parts of the laws of physics and perseverence with a generous amount of good old horse sense mixed in.

When tubing was first introduced, a large percentage of it was installed in the unvented, suspended manner. Most producers soon found it didn't work that way. Some changed to another system or used vacuum pumps to correct the faults. While most simply gave up on it as a bad deal and, because it left a bad taste in their mouths, they were reluctant to try another brand or system. **I think plastic tubing is a lot like marriage – – you have to work at it to make it succeed.** But honestly isn't it a lot easier to stand with your hands in your pockets watching the sap flow a nice stream into your roadside tank than to mush through the woods carrying pails of sap from each and every tap hole? And as to cost we won't even try to compare that with the hand carrying method. But where today are you going to find the hands to carry the sap?

The profit today is measured in exactly how much labor you can eliminate.

If you don't believe what we have said try tubing on a few trees and see if you don't think it the best thing that ever happened.

Are You Tapping Deep Enough?

by Barton M. Blum and Melvin R. Koelling – Northeastern Forest Experiment Station – Forest Service, U.S. Department of Agriculture, Burlington, Vt.

The tapholes that you drill may not be deep enough to get the best flow of sap. This is one conclusion that is emerging from research on maple sap production.

For instance, Cope 1/ reported in 1949 that one-third of the yield from 4-inch tapholes comes from the innermost 2 inches. In later work Morrow 2/ observed that 3 1/2-inch tapholes had a tendency to yield more sap than tapholes only 2 inches deep (depth was exclusive of bark thickness). Morrow's results indicated an average increase in sap yield of approximately 12 percent from the deeper tapholes.

The results of more recent work by Robbins 3/ were similar. In his study total sap yields from 2-inch, 4-inch, and 6-inch tap holes were compared. Sap yields from 4-inch tapholes were found to be substantially greater than from either 2-inch or 6-inch depths.

All of which bears on this point: Are you tapping at a depth that will yield maximum sap volumes?

By local custom throughout the maple region, the majority of tapholes are drilled to a depth of 3 inches or less - - including the thickness of the bark. Since the productive portion of a taphole is the clear wood under the bark, it is the depth in this tissue that will influence sap yield.

While investigating variation in sap yield, researchers at the U.S. Forest Service sugar maple project in Burlington, Vermont, became interested in determining how taphole depth varies, particularly in a large sample of tapholes drilled to a standard depth measured from outside the bark. They studied 327 tapholes, all drilled with a bit designed to limit total depth of penetration to 2 1/2 inches (fig. 1). Obviously, use of such a drill to gage depth reduces productive depth of the tapholes by an amount equivalent to the thickness of the bark. It soon became evident that variations in bark thickwere rather large.

To determine the extent of this variation, the thickness of the bark was measured for each of the 327 tapholes studied (fig. 2). These data were then summarized and plotted (fig. 3). The bark-thickness values ranged from about 1/4 inch to 1 inch. The average was about 5/8 inch.

The sap-producing depths of these tapholes varied inversely with bark thickness. The range in productive depth was rather striking - - from 2 1/4 inches where the bark was thinnest to only 1 1/2 inches where the bark was thickest. The average value was slightly less than 2 inches.

Since maximum sap yield would be obtained only if a uniform productive depth of about 3 1/2 inches were achieved for every taphole, maple producers would find it to their advantage to know the bark thickness of every tree. However, to measure the bark of every tree would not be practical. But maple producers could feasibly determine an average value for their sugarbushes and use it as an aid in controlling taphole depth.

For instance, the data in Figure

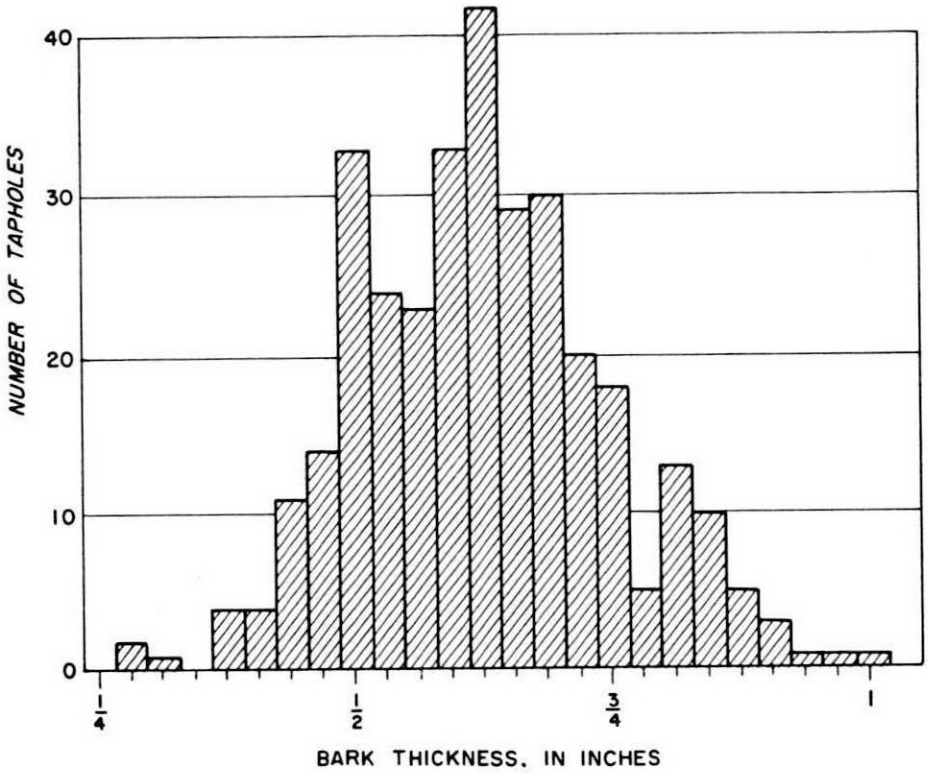


Figure 2. – Measuring bark thickness with a standard depth gage.

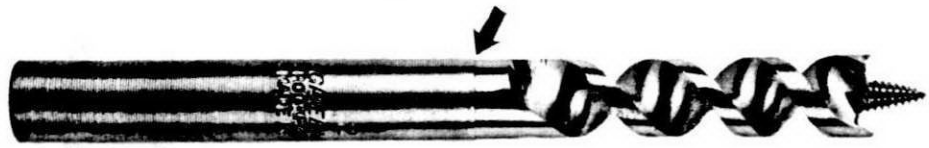


Figure 1. – An example of a commercial drill designed to limit total taphole depth to 2 1/2 inches. Note that the diameter of the shank is slightly larger to the left of the arrow.

3 indicate the average bark thickness for that sample of trees to be somewhere near the high point in the curve, approximately 5/8 of an inch. Using this as a guide, and striving for an effective taphole depth of 3 1/2 inches, a drill stop or mark on the drill would be set at 4 1/8 inches.

The number of bark-thickness measurements needed to arrive at a useful average will vary with the number of trees in the sugarbush, and with the amount of variation in bark thickness encountered. Generally speaking, the larger the sugarbush (in terms of numbers of trees) the greater the number of individual measurements that should be taken. Similarly, the greater the range in bark thickness, the more samples should be included in the average.

If your operation is on several separate sugarbushes, or if your bush has several distinctly different sections, you ought to arrive at an average for each. The average bark thickness of any particular sugarbush will depend largely on its age, vigor, and the environment under which it has grown.

Some producers tap to a shallow depth because they feel that this does less damage to the tree than deeper drilling. Actually, very little is known about the effects of tapping on maple trees, at least in terms of growth and vigor. However, taphole depth should have little effect on the length of time required for the taphole to heal, and it is doubtful that tree vigor will be greatly affected by drilling an additional inch or so into the tree.

On the other hand, there is a definite advantage to obtaining maximum yield per taphole. Suppose you can get a conservative increase of 10 percent in sap yield from tapholes averaging 3 1/2 inches(exclusive of bark) over tapholes averaging 2 inches. If the yield for 2-inch tapholes is 15 gallons of sap, then by drilling to an average depth of 3 1/2 inches into the wood, you would gain 1.5 gallons of sap per taphole. At $.05 per gallon, this would mean an increase of 7 1/2¢ a taphole for sap. On a 1,000-tap operation, the increase would amount to $75.00 for the 1 1/2-inch increase in taphole depth.

Taphole depth and bark-thickness - - consider them together when you tap your sugarbush, and you may be able to increase your sap yields and your profits.

1/ Cope, J.A. Depth of tapping in relation to yield of maple sap. J. Forestry 47: 478-480. 1949

2/ Morrow, Robert R. Influence of number and depth of tapholes on maple sap flow. Cornell Univ. Agr. Exp. Sta. Bull. 982. pp. 1963.

3/ Robbins, Putnam W. Influence of tapping techniques on maple sap yields. National Maple Syrup Digest. 4 (3): 6-7. 1965.

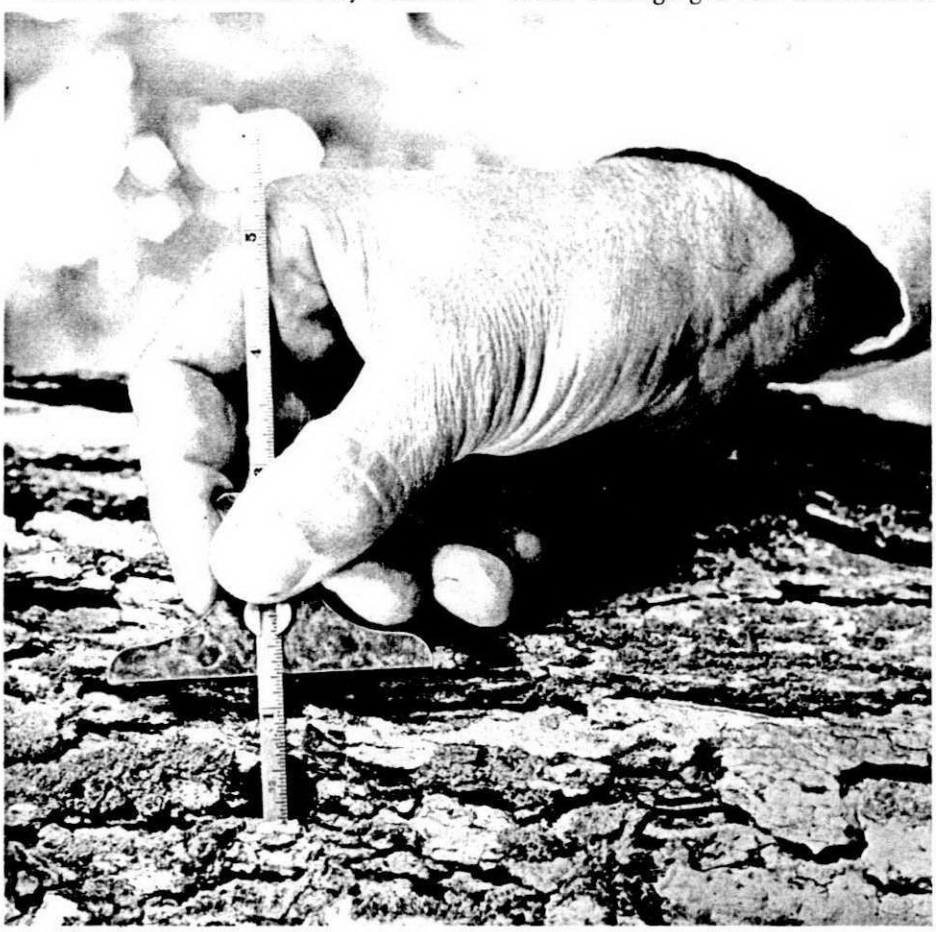


Figure 3. – Number of tapholes having different thickness of bark in a sample of 327 tapholes in three sugarbushes in northern Vermont. Unit of measurement was 1/32 inch.

The Maple Rule of Eighty-six

C.H.Jones, Un. of Vermont, Burlington, Vt. Dec. 1946

For many years, throughout its life
The maple tree so dear
Has stored, with other woody growth
A liquid sweet and clear.

When winter cold is followed by
Warm days with frost at night,
When spring is surely on the way
We know the time is right.

Again we look ahead with joy
Toward' Vermont's yearly treat,
When maple trees are tapped to get
Our share of Nature's sweet.

Get all equipment ready, for
The season soon is here,
Be ready for the early runs,
The best ones of the year.

Put all your maple trees to work
The sugar's waiting there.
Then, when the too brief season ends
You'll surely have your share.

If quality you strive to get
'Long with much syrup, too,
Then all utensils must be clean - -
You'll find this always true.

Don't let the sap stand long in pails
Or tanks of any kind.
The sooner that each run is boiled
The better grade you'll find.

Perchance the fancy grade is missed.
I'm sure we all agree
These days a ready sale is found
For grades one, two and three.

With prices also at top notch
You cannot fail to score,
Remember, though, the season lasts
At best - one month - no more.

It's quite the fashion now to know
A fact on which to bank - -
The sugar content of the sap
From trees and storage tank.

A sap hydrometer is used
Which quickly tells this tale.
It shows that trees will vary much
In sweetness in each pail.

The average figure known, you find
The syrup that it makes:
How many gallons of your sap
Each syrup gallon takes.

You ask me how the problem's solved?
It's easy; all you do,
Divide the Number Eighty-Six*
By sugar content true.

Thus two percent takes forty-three
And five but seventeen;
The average, say three percent.
Takes twenty-nine, 'tis seen.

The richer sap, without a doubt,
Will save you many a dime
In quality and fuel cost
And also boiling time.

Another maple season, boys,
Looms just around the bend.
It may be good, it may be poor;
One can't predict the trend.

For weather, you all know, still holds
A variable hand.
That's just another reason why
Our cards some tricks should land.

So get equipment ready now
For what may be your lot.
Make sure, corral all early runs - -
Be Johnny-on-the-spot.

*To use this rule in Canada
It slightly changed should be
For there the number eighty-six
Becomes one hundred three.

THIS WILL BE THE LAST ISSUE OF THE DIGEST PRINTED THIS WINTER. WE HOPE YOU'VE ENJOYED THEM ALL AND HAVE A GOOD MAPLE SYRUP CROP.

The following issues of the Digest have been printed to date:

Vol. 1, No. 1, 2, 3, 4
Vol. 2, No. 1, 2, 3
Vol. 3, No. 1, 2, 3, 4
Vol. 4, No. 1, 2, 3, 4
Vol. 5, No. 1, 2, 3, 4

We still have a supply of most of them but they are getting scarce, and they are expensive to mail. If you lack any, drop us a card stating which copies you would like and we'll send them if available.

It's Later Than You Think !!!

Winter's almost over. Spring is just around the corner. Some folks are already tapping. But there's a few things that need doing right now.

1 – Write to your congressmen urging them to support the request of the National Syrup Council pertaining to the increase in research on maple at the U.S. Department of Agriculture laboratory in Philadelphia, Pa.

2 – Send your contribution to The Maple Syrup Digest, Bainbridge, N.Y. 13733

THAT'S ALL FOLKS

WE'LL BE BACK IN OCTOBER

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We will be pleased to send the MAPLE SYRUP DIGEST to our friends in Canada for the following subscription fee:

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U. S. Funds, Please.

SUMMER SPRING

WINTER FALL

MAPLE SEASON

The 5th and Busiest Season of the Year

NOW IS THE TIME TO TAKE NOTE OF WHAT YOU NEED TO BE READY AND WELL PREPARED.

We Handle a Full Line of Maple Syrup Equipment

including: power tappers, evaporators, filters and filter tanks, UV lights, cans, glass, steam hoods, automatic drawoffs, pumps, Lamb tubing, Sap Saks, buckets, thermometers, candy and cream machines.

Write for catalog.

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10 H.P. high pressure compact steam boiler. Top working condition, ideal for finishing syrup. Complete with burner, return pump and controls. $350.00 – Complete line of Lamb's tubing and supplies. Vermont Evaporators and equipment. **Harold Tyler, Westford, N.Y. Ph. 607–638–2147.**

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FOR SALE: 35 H.P. Locomotive type boiler, inspected for 100 lbs., injector, 75 lb. pop valve, extra flues. New and used sugaring equipment, containers. Grimm-Lightning, Lamb dealer. Edward Reynolds, Franklinville, N. Y. 14737 (716) 676-3094.

FOR SALE: 3000 gallon glass lined, horizontal, Storage Tanks with manhole in the end for cleaning, f.o.b. Lowville, N.Y. TINKER SALES, INC., Box 326-Eastwood Sta., Syracuse, N.Y. 13206 Phone: 315–476–6750.

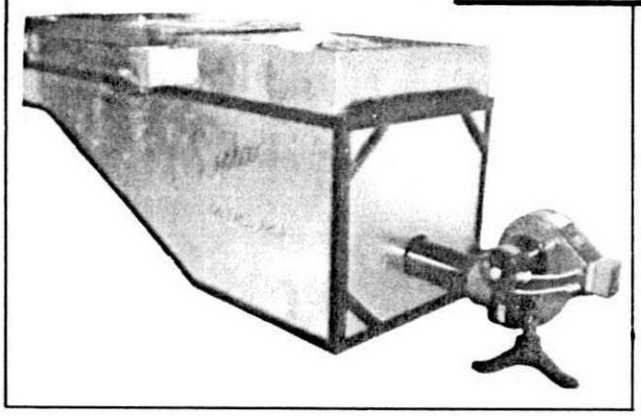
For Sale: 4'x14' King Evaporator. Used one season. Hood and vent stacks, etc., included. **Wm. T. Clark, Burton, Ohio 216-834-4166.**

Used Leader 6'x16' Evaporator and other Syrup making equipment in good used condition for sale. **Chief Industries, Inc., Rte. 4 - Hayward, Wisconsin 54843.**

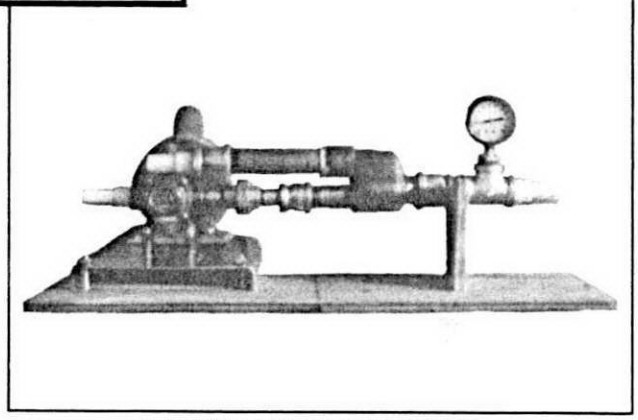
LOOK– *What's New For The '66-'67 Season!*

LEADER

THE LABOR SAVERS



LEADER OIL FIRED ARCH



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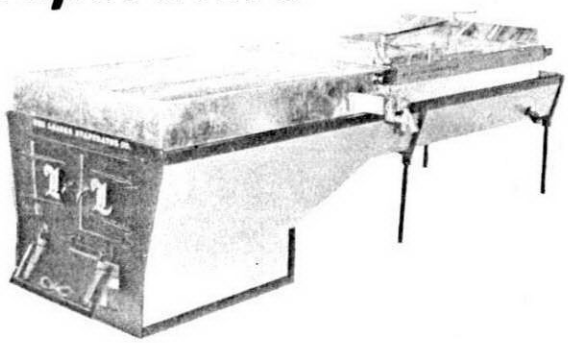
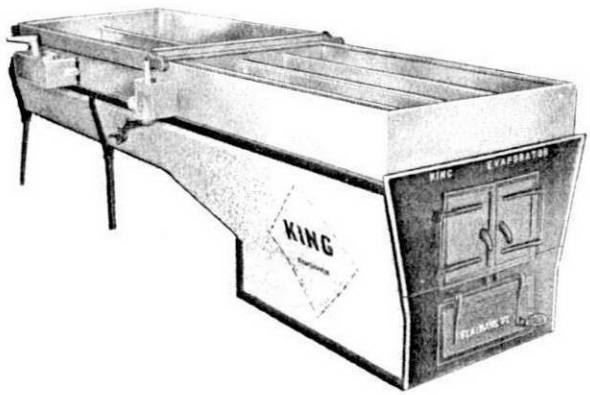


and Monitor Tanks

King Evaporators



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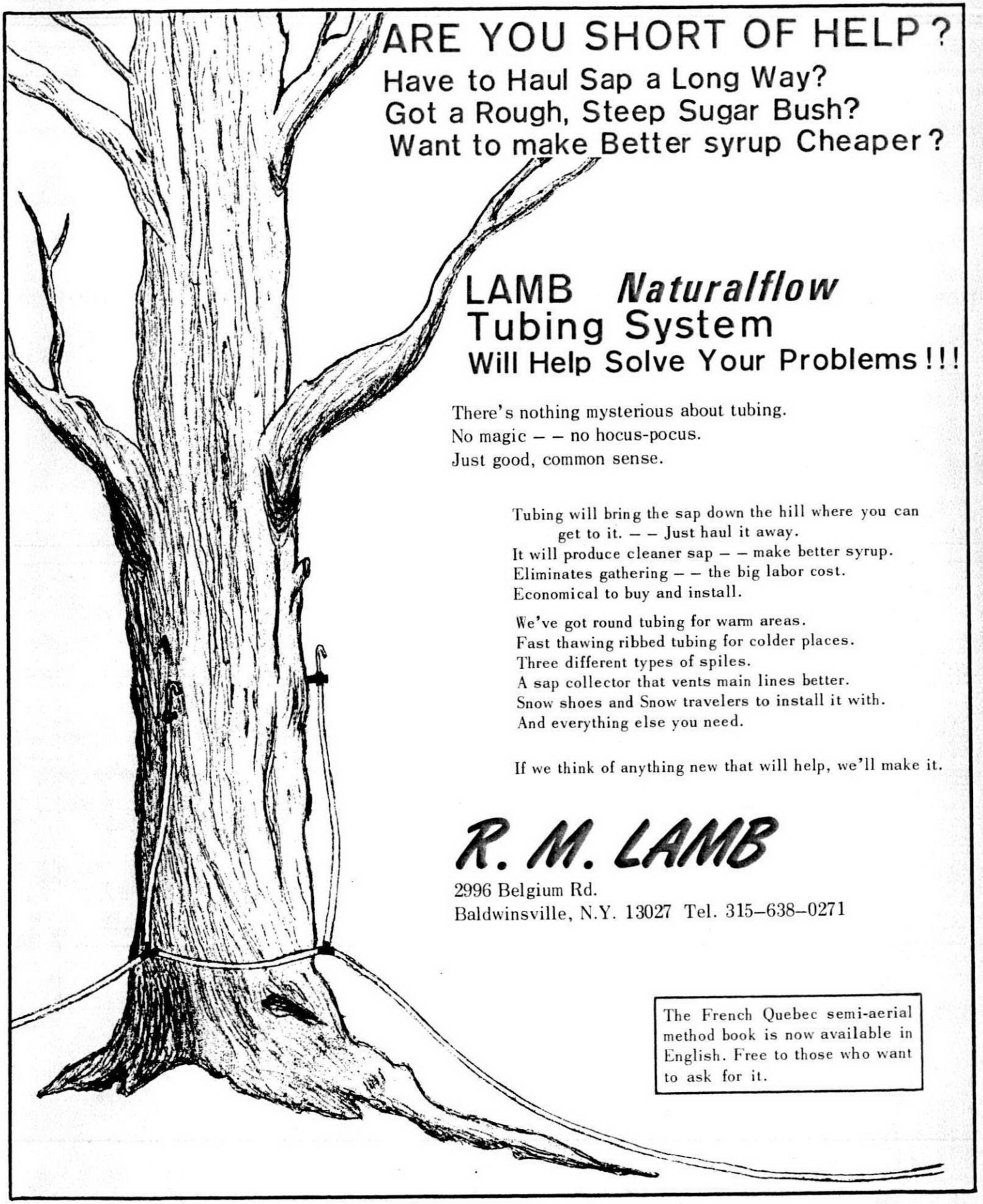

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