

A HISTORY OF TAPS AND TREE SIZE

*Brian Chabot
Cornell University*

The current "traditional" tap hole number guidelines involve adding a tap for each 5 inch dbh above 10 inches dbh. "Conservative" guidelines involve placing one tap in trees 12 inch dbh and a second tap in trees more than 18 inches dbh. The reasons behind the traditional guidelines are not stated in the North American Maple Syrup Producers Manual, but the conservative guidelines are suggested when there is concern for tree health. The purpose of this article is discover where these guidelines

came from and to re-establish the reasons why they exist.

The earliest publication I have found that has tapping guidelines is a 1928 publication from Cornell (Collingwood, Cope, and Rasmussen). I have not found guidelines in earlier publications, though I don't have access to all publication that may have been produced.

These guidelines read: "Trees less than 9 or 10 inches in diameter at breast height are not worth tapping. Such small trees do not have enough leaves to provide a satisfactory amount of sugar in the sap. Trees more than 12 inches in diameter at breast height may have two tap holes with as many buckets, and will yield more than twice as much sap as

New - Maple Leaf Line Bottles



Sizes : 100ml, 250ml, 500ml, 32oz, 1L.

RICHARDS PACKAGING INC.

Dartmouth
Tel. 902-468-8211

Montreal
Tel. 514-697-8690

Quebec
Tel. 418-682-5002

Toronto
Tel. 905-624-3391

dartmouth@richardspackaging.com
quebec@richardspackaging.com

mtlsales@richardspackaging.com
tosales@richardspackaging.com

Web Catalogue : www.richardspackaging.com

when only one hole is made. To put a third hole in trees ranging up to 20 inches does not materially increase the yield. Trees larger than 20 inches in diameter can usually carry three buckets, and very large trees four buckets. To hang more buckets on each tree seldom produces enough extra sap to warrant the extra expenditure. Furthermore, each tap hole increases the possibility of decay. The practice of tapping the tree in two places close together in order to collect the sap from the two in one bucket is not recommended."

Crockett and Hitchcock (1930) give the following guideline for Vermont: "Usually the rule is one bucket to the tree, but on the large vigorous trees two are sometimes hung."

The "traditional" tap hole number

guideline was introduced by Collingwood et al (1935) in a revision of their 1928 publication. The text from their publication is: "The general practice followed by many of the best sirup producers in the State is to be recommended as giving a maximum yield of sap from year to year without at the same time seriously limiting the health and vigor of the trees.

Trees 10 to 15 inches in diameter at breast height, 1 bucket.

Trees 16 to 20 inches in diameter at breast height, 2 buckets.

Trees 21 to 25 inches in diameter at breast height, 3 buckets.

Trees 26 inches and over in diameter at breast height, 4 buckets.

Additional buckets hung above the numbers indicated do not materially



Everything for the Maple Producer Large or Small

Mon.-Sat.: 8:00-5:00
Phone: 315/852-3326
FAX: 315/852-1104
www.countrysidehardware.com

- Leader-King-Grimm Evaporators
- Sugar-Hill Plastic Jugs
- Lamb Tubing & Fittings
- MARCLAND Draw offs
- Vacuum Equipment (let us help you find a solution to fit your needs)
- Open year round — Fully stocked show room
- Call us for a listing of used equipment
- We USP Daily

Call or write for our catalog

Countryside Hardware

PO Box 409, Albany St.
DeRuyter, NY 13052



Give your present evaporator
up to 70% more capacity
with a steam away.



increase the yield and at the same time the increased number of tap holes means a greater area of dead sap wood.”

There is no research cited to support these guidelines. The guidelines appear to be arbitrary and intended to achieve a balance between sap yield and limiting damage to sap wood. Note the gaps between 15-16 inches, 20-21 inches, etc.

Winch and Morrow (1978) slightly modified the Collingwood and Cope guidelines by recommending tapping intervals from 10-16.9 inch dbh for 1 tap, 17-23.9 for two, and 24-29.9 for 3. This removed the gap noted above and moved the traditional guidelines in the direction of the conservative guidelines.

Guidelines in Murphey (1937) from

Penn State are: “There is no doubt that a tree 10 inches in diameter at breast height will support one bucket, a 12-inch tree two buckets, a 14-inch tree three buckets and a 16-inch tree four buckets. A larger tree with a greater bark surface and perimeter will support more buckets, but it must be realized that these larger trees do not increase in diameter as rapidly as the smaller ones and hence do not produce a fresh layer of wood over the old tap holes nearly so soon as the smaller tree.” Earlier in that section there are statements “Tapping may be carried out directly over old holes just as soon as the tree has added two or more inches of sapwood over them. In thrifty trees this growth may be attained within 10 years.” There are no references to



Maple Producer Vacuum Systems

INCREASE YOUR PRODUCTION NOW!

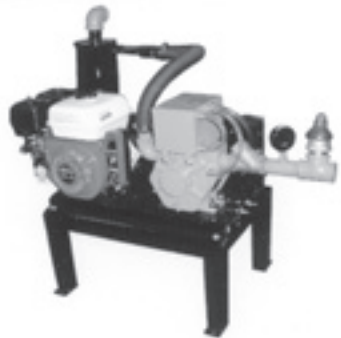
- * Electric or Gas Powered Units
- * 1/2 hp to 10 hp units
- * Ideal for small or larger producers
- * Systems for 300 to 8,000 taps
- * Automatic Oiling System
- * Oil Catch Muffler, Gauge & Vacuum Regulator are standard
- * Raised base for easy installation

Quality vacuum pumps built in the U.S.A. since 1939

800-367-0972

All Major Credit Cards Accepted

E-mail pumps@westmoorltd.com



Westmoor Ltd.

906 West Hamilton Avenue
P.O. Box 99
Sherrill, New York 13461

research that supports any of these statements.

A 1932 publication (McIntyre), also from Penn State, describes a comprehensive series of experiments dealing with sap production in maples. No tapping guidelines were described. However, they surveyed tapping in one county in PA and found one tap used on trees between 10-16 inches, two taps 17-23 inches, three taps, 24-33 inches and 4 taps on trees 34-46 inches. Data from experiments on sap yield from increasing numbers of taps on trees of different diameters were provided. Sap yield from one tap increased as tree diameter increased. Sap yield also increased as the number of taps increased. The sap yield from increasing the number of taps was significant, but not directly proportional to the number of taps. McIntyre did not make note that the yield was not directly proportional to the number of taps, but the data show this and later research by Morrow and others found this also. McIntyre provided information on the internal damage caused by tapping and calculated the number of years required to tap completely around trees of different diameters using different numbers of taps each year. With larger number of taps even reasonably large trees could be girdled with taps in as little as 10-12 years. He didn't use this information to propose guidelines, but Murphey was listed as a reviewer of McIntyre (1932) so must have considered these results in the guidelines he described.

McIntyre 1932 is listed in the bibliography of Collingwood 1935 and likely played a role in the introduction

of the revised Cornell guidelines. The Murphey paper has guidelines considerably less conservative than the 1935 Cornell guidelines, while the McIntyre paper shows that Pennsylvania producers were tapping more conservatively than any of these guidelines.

The "conservative guidelines" were introduced by Buzzell (1987). No formal research is cited to support these guidelines, though they were based on much experience and observation on the internal damage resulting from tapping (Buzzell, personal communication). Their introduction is not connected in the article to concerns for tree health. Buzzell was concerned with staining from tapping and reduction of usable surface area of the tree by previous tapping. He recommended calculating "usable circumference" by subtracting areas that had previously been tapped. He also implied that his guidelines were based on a minimum annual radial growth of 1/8 inch. If radial growth is less than 1/8 inch, he recommended using fewer taps per circumference. Buzzell's concern for usable circumference would reduce the tap number to below the current conservative guidelines.

So what started with concern about having enough trunk surface area to tap over an extended period was followed with concern about tap hole interaction and now includes concerns with tree health. I have found no research relating tapping to tree health. There also is no research supporting any particular guidelines.

With smaller spiles producing less staining, it would be useful to recalculate tapping guidelines following

McIntyre's and Buzzell's approach. Also, data on tree growth would be useful in calculating recovery periods for re-tapping the same area.

REFERENCES

Buzzell, G.L. 1987. Tapping guidelines. *Maple Syrup Digest* 27:12-18

Collingwood, G.A., J.A. Cope, and M.P. Rasumssen. 1928. The Production of Maple Sirup and Sugar in New York. *Cornell Extension Bull.* 167:1-

Collingwood, G.A. and J.A. Cope. 1935. Maple Sugar and Sirup. *Cornell Extension Bulletin* 397, Cornell University
Crockett, W.H. and J.A. Hitchcock. 1930. Vermont Maple Sugar and Syrup. *Bull Vermont Dept. of Agric.* 38, 45 pp.

Murphey, F.T. 1937. The Maple Syrup Crop. *Extension Circular* 186, The Pennsylvania State College

McIntyre, A.C. 1932. The Maple Products Industry of Pennsylvania. *Bulletin* 280, School of Agriculture and Experiment Station, The Pennsylvania State College.

Morrow, R.R. 1963. Influence of number and depth of tap holes on maple sap flow. *Bulletin* 982, Cornell University Agricultural Experiment Station.

Koelling, M.R. and R.B. Heiligmann. 1996. North American Maple Syrup Producers Manual. *Bulletin* 856, Ohio State University Extension

Winch, F.E. Jr. and R. Morrow. 1978. Production of Maple Sirup and Other Maple Products. *Cornell Univ. Info. Bull.* 95

SUGA COUNTRY PRODUCTS

VASSALBORO, MAINE

*Your one-stop
maple sugaring supply store*

**DEALER FOR:
DG/USA**

**Algier Evaporator Company
and Waterloo/Small**

**E-MAIL: suggs@psouth.net
TEL: 207-923-3355**

Serving Sugarmakers since 1934



Fully stocked warehouse.
Open year-round.

**Leader Evaporators
Lamb Tubing
Springtech R.O.s
Marcland Draw-Offs
Airablo / Bernard
Tanaka Tappers/Pumps
Bacon Jugs
New England Container
Specialty Glass, labels**

UPS shipments Daily.
Experienced Sugarmakers.

Sugar Bush Supplies Co.

2611 Okemos Rd.
Mason, MI 48854

517-349-5185

517-349-3088 fax

SBFarms@tds.net