

Maple Syrup Digest

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September 2024



2024 NAMSC Conference in Maine
Mold in Maple Syrup
Maple Syrup Price Analysis



The Newsletter of the North American Maple Syrup Council



MAPLE SYRUP DIGEST

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NAMSC's **Mission** is to be a leading advocate and resource for maple associations and their members, working to ensure that sugarmakers have the tools and support needed to sustainably produce high quality products.

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President's message

With fall comes cooler weather and fewer bugs — and renewed energy forgetting back into the bush to increase the efficiency of your production. The old saying 'you make your money in the bush' is so true. While market demand for Pure Maple Syrup and value added products continues to grow, the most efficient way to build your business is to increase the amount of sap being produced in the bush itself. Spending a few hours in the bush this fall will save you double the time or more than waiting until there is a foot of snow on the ground.

Maine will be hosting the annual conference in Portland, Maine October 21-24 and registration is now open. Please take advantage of this opportunity to share knowledge with other producers and benefit from the technical presentations. I can guarantee there will be something you will take away that will help you to improve your operation.

The search for a permanent NAMSC Executive Director (ED) search is well underway. By the time you read this column, final interviews will have been conducted, and a recommend

the search committee will be in place before the convention in Maine. With the announcement of Jean Lamontagne retiring from IMSI, NAMSC reached out to IMSI to see if there was interest in combining the responsibilities of both groups into one role. Since NAMSC was already in the process of conducting a search for an ED, a special meeting of the delegates was held in July. They approved the concept of a joint search being conducted with IMSI. This search does not presuppose that the organizations will necessarily share a common ED — just that all options are being explored. Going forward, both organizations may well continue to have their separate EDs.

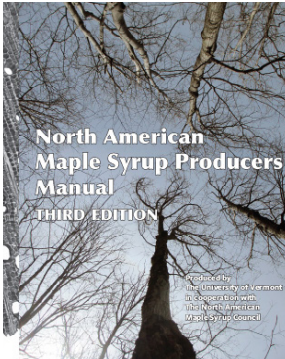
For purposes of the search, the candidates who had applied for the NAMSC position were contacted to determine their interest in an expanded joint role. Three of the five applicants indicated interest in the combined position while two others confirmed interest in only the NAMSC role. The new permanent ED position does not intend to suggest a merger of the two associations. This initiative is instead an example of both associations working to create an effective collaborative relationship, with the goal of benefiting both groups from the combined synergies of the organizations. The Research Committee has received initial proposals. Four of these were asked to supply detailed proposals for funding consideration. These proposals will be reviewed in detail before the conference and the successful proposals will be announced at the conference in October.

The International Grading school is to

be held right after the Maine conference. This initiative is partially funded by NASMC. If you haven't had the opportunity to attend the school, I highly recommend that you do, as it truly expands your maple tastebuds.

Hope to see you in Maine.

Brian



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In this issue...

2024 65th NAMSC Maple Conference in Portland, Maine	6-9
Mold in Maple Syrup Crop Failure in the U.S	10-12
Yale Forest: New Online Resources for Maple Producers	14
Maple Syrup Price Analysis	16-21
Maple Hazelnut Spread	22-29
Maple Syrup Production at Mount Wachusett Community College	32

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"Be Sure It's Maine Pure"

2024 North American Maple Syrup Conference

65th Annual Conference of the North American Maple Syrup Council (NAMSC)

Hosted by the Maine Maple Producers Association

Portland, Maine

Oct. 21st thru Oct. 24th, 2024



MMPA is hosting the 65 Annual Conference of the North American Maple Syrup Conference (NAMSC).

The Annual Meeting will be held at the Double Tree by the Hilton, Portland, Maine. This 4-day program includes technical sessions on the latest research and technology relevant to the industry, sugarhouse tours, networking with peers, a trades show, and more. Plus, the event will be located just inland from the beautiful coast of Portland, Maine.

In addition to the business meetings, there will be an all-day tour on Wednesday with 2 sugarhouse stops, Lone Pine Brewery, Pineland Farm, and Cumberland Fairgrounds where you will see sawmill, museum, sugarhouse, blacksmith shop, cash bar/social and a lobster bake, Tuesday & Thursday workshops, and technical sessions, music and more.

Tuesday's Companion Tour will take participants to the heart of down

town Portland, Maine's largest city. Portland is one of the few working waterfronts left in the United States. We will start our tour in the "Old Port", then board the Narrow-Gauge Train and relax on their beautiful historic train cars while we take in beautiful views of Casco Bay all while hearing about fascinating history about the Maine's railroading history as well as the sights along the route.

Then visit the most photographed lighthouse in the world! Portland Headlight which is located on the shores of Fort Williams Park in Cape Elizabeth. We will take in the beauty of the stunning shorefront and tour the award-winning Museum that was the former Keepers' Quarters.

All information is up online at our website, Hotel link, Schedule, Contest and more at, www.mainemapleproducers.com

"Be Sure it's Maine Pure" Preliminary Schedule

Monday Oct. 21st, 2024

9:00am-4pm Vendor Set Up

9:00am Registration Set Up

9am-4pm Antique Room Display Set Up

TBD NAMSC Committee and Delegates Meetings as necessary

Noon-6pm Registration Open, Contest Entries- Syrup/Candy/Cream/Sugar/Photo

Noon-6pm Silent Auction/ Auction Items Drop Off

4pm-6pm Informational Workshop/Round Table/Social/Cash Bar

Dinner on your own - 15 plus restaurants within 10 min.

Tuesday Oct 22nd.

6:30am- 8:30am Breakfast Buffet

8am-6pm Registration Table Open

Contest Entries- Syrup/Candy/Cream/Sugar/Photo

8am-6pm Trade Show

10am-4pm Antique Exhibit Room Open

Silent Auction Room Open/ Auction Items Drop Off

9am-3pm Companion Tour, Maine Narrow Gauge Railroad, Kens Seafood for lunch on own,

Portland Headlight and Museum

9am-Noon Workshops- TBD

Noon-1pm Lunch 1pm-3pm NAMSC Annual Meeting - Open to All

1pm-3pm Workshop-TBA

5pm-6pm Social/Tradeshow

6pm-9:30pm "Be Sure it's Maine Pure" Buffet, Music/Dance

Wednesday Oct. 23rd All Day Tours

6:30am- 8am Breakfast

7am - 8am Registration table/Syrup/Sugar/Candy/Cream

8am-Noon Morning Tours-Dunn Family Maple/Lone Pine Brewery/Merrifield Farm

1:30pm Afternoon Tours-Pineland Farms-Morgan Horse Farm / Sugarhouse/ Dairy barn

3:30pm Cumberland Fair Grounds- Farm Museum, Sawmill, Sugarhouse, Blacksmith Shop

3:30pm-8pm Social/Cash Bar, Lobster Bake, Music, Head back to Hotel

Thursday Oct. 24th

6:30am- 8:30am Breakfast

8:00am- 3pm Trade Show

8am - 8:30am Entries last call Syrup/Sugar/Candy/Cream

9am-3pm Antique display

9am - 3pm Silent Auction Ends

9am - 4pm Technical Session-TBA

Noon-1pm Lunch
3pm Trade Show Break Down
5pm-8pm Social, Banquet Buffet, Award, Auction items

Friday Oct 25th Grading School
Saturday Oct 26th Grading School



“Be Sure It’s Maine Pure”

North American Maple Syrup Council 65th Annual Conference
October 21st thru October 24th, 2024
Double Tree by Hilton, Portland Maine



Registration Form

Full Registration (Oct. 21st thru 24th, 2024) Includes: admission to all workshops, Wednesday all-day tour, trade show, program book, and the following meals: Tuesday breakfast, lunch and “Be Sure Its Maine Pure” dinner, Wednesday breakfast, lunch, and Lobster Bake or (steak or chicken), Thursday breakfast, lunch and banquet. Does not include Companion tour	\$ 590.00	# _____	Lobster _____ Steak _____ Chicken _____
Late Full Registration (if received <u>after Sept. 15th, 2024</u>)	\$ 685.00	# _____	
Tuesday Oct. 22nd Companion Tour: (34-person limit) Maine Narrow Gauge Railroad, Kens Seafood Place for lunch (lunch on own), Portland Head Light /Museum.	\$ 75.00	# _____	
Late Tuesday Companion Tour (if received <u>after Sept. 15th, 2024</u>)	\$ 100.00	# _____	
Tuesday Oct. 22nd - One Day Only Registration Includes lunch, trade show, admission to all Tuesday tech sessions, and program book.	\$ 125.00	# _____	
Thursday Oct. 24th - One Day Only Registration Includes lunch, trade show, admission to all Thursday tech sessions, and program book.	\$125.00	# _____	
Late One Day Only Registration (if received <u>after Sept. 15th, 2024</u>)	\$150.00	# _____	

TOTAL DUE

\$

Name(s) of attendee(s) _____

Sugarhouse name _____

Address _____

City/State _____

Zip/Country _____

Phone _____ Email _____

Payment to be US dollars and must be accompany this form. No cancelation refunds aster Sept.1st,2024.
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Tour stops in Maine: Dunn Family Maple and Museum at Merrifield
Maple



Mold in Maple Syrup

Catherine Monserrate Ph.D. and Aaron Wightman, 2024

Mold is a serious concern in maple syrup production. Any attempt to sell maple syrup contaminated with mold is prohibited in the U.S. Fortunately, mold growth can be prevented through proper production and packaging practices.

What is it?

Molds are fungi that can grow on a wide variety of foods and beverages, including maple syrup. They exist in and on food products as spores until conditions are favorable for growth. One study identified twenty-three genera of fungi in maple syrup samples including the mold genera *Eurotium*, *Penicillium*, *Aspergillus*, *Wallemia*, and *Cladosporium* (Frasz and Miller, 2015). In another report, *Penicillium* and *Aspergillus* were reported as the predominate fungal genera in maple syrups (Whalen and Morselli, 1984).

Some molds can cause product discoloration or off-flavors, while others can impact human health by causing allergic reactions or by releasing mycotoxins, which can cause a variety of serious adverse health effects. While no recalls or reports of illness have been reported for mold in maple syrup, some of the genera of mold found in maple syrup are known to produce mycotoxins (Bhunja, 2018). With the ever-evolving nature of microorganisms, it is essential

that mold growth be controlled to protect the quality and safety of maple syrup.

Why does it develop?

Mold spores exist in both properly and improperly packaged maple syrups (Fiore, 2020). However, the spores will not germinate and grow until they are exposed to oxygen and sufficient moisture. A combination of factors contribute to mold growth. In general, mold spores can germinate and grow when:

- ☉ Water is available for microbial growth, which correlates with syrup density being below 66 °Brix
- ☉ Food grade containers are unclean or improperly sealed
- ☉ Syrup is hot-packed below 180 °F

Maple syrup must contain a minimum of 66 % soluble solids (66 °Brix) according to the Food and Drug Administration (FDA; Maple sirup, 1993). At 66 °Brix, the water available for microorganisms, referred to as water activity, is low enough (≤ 0.85 ; Frasz and Miller, 2015) to inhibit growth of all pathogenic bacteria (Sperber and Doyle, 2009). However, yeasts and molds can still grow at this water activity (Beuchat, 1983) unless the syrup is properly packaged and pasteurized.

If the syrup density is below 66 °Brix, syrup will ferment or mold irrespective of pasteurization. Ensuring a minimum density of 66 °Brix will both prevent mold growth in unopened syrup and meet the requirements of the law.

Current Good Manufacturing Practices require that all foods be packaged in clean, sanitary containers (Part 117, 2015). Unclean containers can introduce biological, chemical, or physical hazards deeming the syrup unsafe for consumers. Mold spores are a biological hazard known to survive on packaging materials (Siroli et al., 2017). Cleaning and sanitizing containers can reduce the abundance of molds (Dagnas and Membré, 2013) and subsequently slow the growth of mold in opened syrup. Clean containers with a water rinse or detergent to ensure any foreign objects, such as glass, plastic, dust, or insects are removed. If using a detergent, rinse the containers with water to prevent a detergent residue. Sanitize with a disinfectant to eliminate or reduce biological hazards that may produce mycotoxins or deteriorate syrup quality. Allow containers to air dry fully before hot-filling with maple syrup.

Hot-filling or hot-packing maple syrup is a required practice in the maple syrup industry. This is a process in which syrup is heated to a minimum of 180 °F to kill all pathogenic and spoilage microorganisms. The syrup is then packaged in food grade containers capable of withstanding high temperatures, such as stainless steel, glass, and high-density polyethylene (HDPE), or other food grade containers that can with-

stand fill temperatures above 180 °F. Immediately after filling, syrup containers should be capped and inverted to pasteurize the container. Pasteurization is the process of killing all pathogenic and spoilage microorganisms; it does not kill spores or eliminate toxins. To kill germinated fungi and spoilage bacteria, invert containers for several minutes (Sperber and Doyle 2009).

How can mold be prevented?

- ☉ Check that the syrup contains between 66 to 68.9 °Brix at room temperature.
- ☉ Use cleaned and sanitized food grade, hot-fill containers with an airtight, hermetically sealed lid that prevents air exchange and leaks.
- ☉ If reheating syrup, heat it to a minimum of 180 °F (ideally 185 to 200 °F) before bottling.
- ☉ Cap and invert filled syrup bottles while syrup is at or above 180 °F. Invert containers for several minutes.
- ☉ Inform consumers to refrigerate syrup after opening.

How can moldy syrup be handled?

Moldy syrup must be discarded. Attempting to fix syrup by removing the mold, boiling, and repackaging is considered adulteration (21 U.S.C 342).

According to section 402(a)(4) of the Food, Drug, and Cosmetic Act a food is adulterated if, "... (3) if it consists in

ivhole or in part of any filthy, putrid, or decomposed substance, or if it is otherwise unfit for food; or (4) if it has been prepared, packed, or held under insanitary conditions whereby it may have become contaminated with filth, or whereby it may have been rendered injurious to health.” Section 402 (b) states that a food is also considered adulterated if, “...damage or inferiority has been concealed in any manner” (21 U.S.C. 342).

Attempting to sell or introduce adulterated syrup into interstate commerce is prohibited, according to section 301(a) of the Food, Drug, and Cosmetic Act (21 U.S.C. 331). Furthermore, customers should not be advised to skim mold off the top and re-boil contaminated syrup, but rather, to throw it away, and to refrigerate new syrup after opening (Hopkins et al., 2014).

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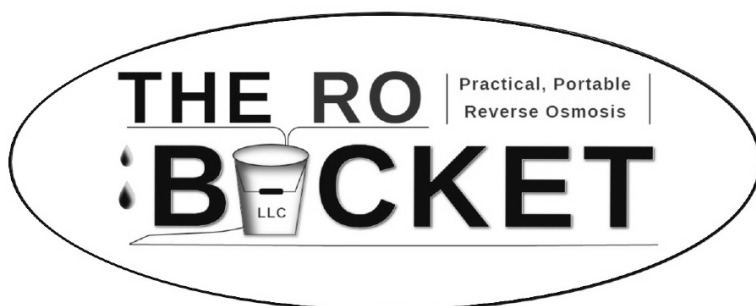


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Yale Forest:

New Online Resources For Maple Producers

Shaylyn Austin, Yale Forest Manager,

Yale Forests is excited to introduce a new online resource for maple syrup producers. With support from the USDA Acer Access and Development Program, our team has created three ArcGIS Story Maps that offer clear and simple guidance on sap collection, syrup production, and sugarbush silviculture.

ArcGIS StoryMaps is an online platform that combines text, images, videos, and maps in an interactive format that makes it easy for readers to visualize processes and understand key concepts.

What's Inside the Story Maps?

1. Maple Sap Collection from Tree to Tank

Explore the Story Map:

<https://storymaps.arcgis.com/stories/dcd028351fd24af893501a5592297df3>

This Story Map guides you through the process of tapping trees, setting up collection systems, and managing the flow of sap to your collection tank. It features maps of the Yale Forests sugarbush, illustrating the tubing layouts used in our own operation. This Story Map provides clear visuals and detailed explanations to ensure that even first-time producers can efficiently collect sap.

2. Maple Syrup Production

Explore the Story Map:

<https://storymaps.arcgis.com/stories/f2f7e4a048b145c08577981cbbddcadf>

<https://storymaps.arcgis.com/stories/f2f7e4a048b145c08577981cbbddcadf>

This guide covers the steps of converting sap to delicious maple syrup using modern, efficient equipment. It dives into the intricacies of using a reverse osmosis machine to concentrate sap and running a wood-fired evaporator. It also details the steps of filtering and bottling syrup, providing practical tips to ensure a top-quality product.

3. Silviculture for Maple Syrup Production

Explore the Story Map:

<https://storymaps.arcgis.com/stories/8cdd9855d1614395a1918c40ee895bf4>

Successful maple syrup production relies on healthy, well-managed forests. This Story Map focuses on how to manage a sugarbush for optimal sap production. Learn about crop tree selection, thinning practices, and common health issues in maple trees. Additionally, maps of Yale Forests illustrate various site types ideal for establishing a productive sugarbush.

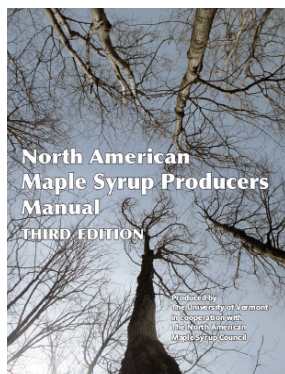
Who Can Benefit?

These Story Maps are designed to be versatile. Someone new to sugaring can count on them to answer all the questions you may have when getting started. Experienced sugar makers are likely to find information to help improve the efficiency and productivity of your operation. The Yale Forests team is proud to share these resources with

the maple sugaring community.
We encourage you to reach out to us
with questions or feedback.

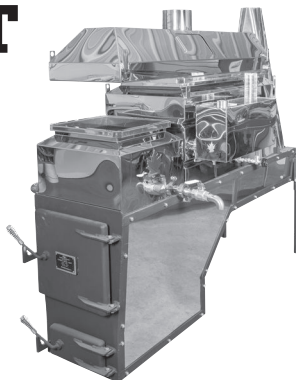
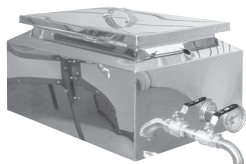
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Maple Syrup Pricing Analysis Using a Shelf Survey: Factors impacting the price of maple syrup in grocery and retail outlets

By Tom Hammett and Daniel Grizzard

Background/Context

This research was made possible by the U.S. Department of Agriculture's (USDA) Agricultural Marketing Service through grant AM200100XXXXG011 "Accessing South Atlantic Markets for US Maple Syrup: Educating consumers and enhancing distribution networks" (2020-2023) made to Future Generations University. Virginia Tech's role was to conduct marketing research, and was supported through a sub-grant from this program. The goal of this program is to support the development of markets for syrup produced in West Virginia, Virginia, and Maryland. This market development and promotion program was designed to strengthen and diversify market opportunities for the maple syrup industry in the South Atlantic United States. It sought to promote consumer awareness and access to maple syrup products through market research, consumer education, promotion of agri-tourism, and distribution support. Gaining knowledge of how maple syrup is sold (prices, on store shelves) and what information is provided to consumers (labels) to help them make buying decisions seemed a good first step. Such information had never been collected.

Summary

The majority of maple syrup marketed in the United States is available in retail outlets such as grocery stores. Although most syrup is sold in such open and public venues, there is no publicly available research discussing the pricing and other characteristics of maple syrup sold in this way. To gain a better understanding of how maple syrup is priced and sold, an analysis of maple syrup on store shelves was conducted. Data was generated from a canvas of maple syrup available on shelves in chain-operated grocery stores, locally-owned grocery stores, health food stores, and general merchandise retail stores in the mid-Atlantic region. Data was collected for each brand and type of maple syrup product that was found on the shelves of these stores. Characteristics of these products were summarized. It was found that the factor that best explained the price of maple syrup was whether or not it was part of a store brand. Store-brand syrup is typically maple syrup purchased in bulk by a commercial distributor. It is often a blend of syrups from multiple sources. The most frequently observed origin for maple syrup was "North America," accounting for 38.15% of observations. Around 25% of the syrup came from Canada or Vermont. No other source accounted for more than 5% of the syrup observed. The findings suggest that

larger outlets, such as grocery stores tend to stock syrup produced by large-scale producers and packaged by third parties. In contrast, regionally produced syrup was more commonly sold through smaller, independent outlets.

Introduction

Maple syrup producers sell their syrup in many ways, but grocery stores are still the main place where consumers purchase maple syrup (Farrell and Chabot, 2011). Although retail and grocery stores are the primary market for maple syrup in the United States, no publicly available research has been conducted on the marketing and pricing of maple syrup in this region. The purpose of this study was to catalog the type of maple syrup available in these stores, and to investigate how various features of this syrup are related to the price.

An analysis of the price of maple syrup within the Northeastern United States between 1916 and 2012 found that there is no statistically significant variation in price between any region of the United States with historical pricing data (McConnell and Graham, 2016). The lack of variation in price between states indicates that individual producers have limited control over the price of syrup in their region. This study also found that maple syrup prices increased by an average of 0.95% annually over the past century when adjusted for inflation.

Between 1975 and 2010, the average annual per capita consumption of maple syrup in the United States increased by

over 155% from 1.03 fluid ounces to 2.63 fluid ounces per person (Farrell and Chabot, 2011). This increase in demand for maple syrup has been met with an increase in production, however much of that production is in Canada which out produces the United States in maple syrup production. The province of Quebec alone produces nearly 80% of the world's supply of maple syrup (Duchesne et al., 2009). The United States is a net importer of maple syrup. In 2019, the United States imported nearly 66% percent of maple syrup that was consumed (USDA, National Agricultural Statistics Service; U.S. Department of Commerce, Bureau of the Census, 2020). The bulk production and sale of maple syrup in and from Canada has lowered prices of American maple syrup, and historically caused many American producers to cease production (McConnell and Graham, 2016). Commercially produced bulk syrup is often sold to large bottling and distribution companies, where it is then repackaged and bottled with a large grocery chain's label.

During the past two decades exchange rates and government policies have made exporting syrup from Canada more difficult (McConnell and Graham, 2016). Along with growing consumer demand, this has created an opportunity for American producers to sell more syrup. This study was first of its kind to investigate the sources of maple syrup on store shelves, how it is described (labels) and pricing information.

Objectives of this work

The ACER- funded project objectives were to raise consumer awareness of the benefits of, production history of, and buying options for US Maple Syrup, and to improve consumer access to U.S. Maple Syrup in South Atlantic markets (focusing at first on Virginia, Maryland, West Virginia, and the District of Columbia, and later stretching to other states to the Southern US).

In many instances when seeking to quantify markets and sales, price information is the easiest to collect and summarize. Hence, this case study sought to better understand how maple syrup is priced and sold. The specific research objectives are to:

- Determine how different characteristics of maple syrup are related to the price of the product;
- Investigate the difference in price between store brand and non-store brand syrup that is available in stores; and
- Identify maple syrup available in stores and where it is produced.

Methods

Overview

During the Spring of 2021 a survey form was developed and tested to help guide information collection. Since previously similar studies had not

been conducted, the survey form was developed based solely on the research team's experience with other surveys

During the Summer of 2021, a research team was trained. Virginia Tech developed and presented a series of video and Zoom-based training sessions for data collectors. Written resources were also created and distributed to all members of the surveying team. A survey form was designed in Google Forms where data collectors could enter information about various characteristics of maple syrup including the brand, size, price, packaging material, and place of origin for the syrup. No information on corn syrup or cane sugar-based "table syrup" was collected – only containers of real maple syrup were cataloged.

The team began canvassing outlets for maple syrup including major grocery chains, independent grocery stores, health food stores, and gift shops to determine the prevalence and pricing of real maple syrup. Data was collected for every unique container of syrup stocked in each store. If there were multiple containers of the same brand, size, and packaging material, then only one observation was made for that syrup. In total, 382 unique containers of maple syrup were observed. Due to a data collection error, data on the place of origin for maple syrup was only collected for 173 of the 382 observations, so analysis of this variable was conducted on a smaller sample size. This type of study had not previously been conducted, and this sample size was ample for our purposes.

The primary focus of this study was in Virginia and neighboring areas. Stores surveyed were in areas where local syrup was not expected to be available, and most were some distance from regional producers.

For example, stores were surveyed in Richmond, the greater Washington, DC area, and northeastern Tennessee. Sixty-two stores were surveyed. Forty-eight stores in Virginia, four in Maryland, three in both Tennessee and Washington, DC, and one each in West Virginia, Connecticut, Ohio, and North Carolina were surveyed. Stores to be surveyed were selected via a convenience sample based on the proximity locations of the survey team members.

Surveys were conducted at five different types of stores/outlets: chain grocery stores, independent grocery stores, health food stores, artisan arts and crafts stores (gift shops), and retail stores. Forty-one (41) chain grocery stores, eight (8) health food stores, five (5) independent grocery stores, four (4) retail stores, and four (4) crafts stores (gift shops) were surveyed.

Once this data was collected, analysis was conducted to understand the relationship between the price of syrup and other variables. This report presents an analysis of the pricing of maple syrup, and how price is related to variables including the type of store the syrup is sold in, the quantity of syrup, packaging material, syrup place of origin, and if the syrup is sold as part of a store-brand or from an independent company. Maple syrup is sold in many differ

ent quantities. To create a comparative unit for analysis, all pricing analysis was done on a dollars-per-ounce basis.

Identifying Store Brand Syrup

A key variable in this analysis is whether or not maple syrup is being sold as part of a store-brand or not. Store-brand syrup is syrup that is purchased in bulk from producers and then resold by a commercial distributor to retail and grocery stores who package the syrup under their own brands. The purpose of comparing store-brand and non-store brand syrup was to isolate syrup that was clearly purchased in bulk by a national or international distributor. To identify what syrup was part of a store-brand, the research team investigated all sixty-three brands of syrup identified in this study, and found which brands were owned by the same organization that owns the store the syrup was found in. Store-brand syrup is not the only commercially distributed syrup that was observed in this study. There are generic brands such as Food Club and Field Day that purchase syrup in bulk from a variety of producers. However, it was outside of the scope of this project to investigate the supply chain of all sixty-three brands of syrup identified. Isolating the store-brand syrup provided a simple way to begin an investigation into the differences between syrup purchased in bulk and syrup that is packaged and branded by maple syrup producers. When reading this report, it is important to remember that even the non-store-brand classified syrup does have many containers of syrup that are being sold by commer

cial distributors.

Discussion and Conclusions

Limitations

This study was limited by the availability of the research team to visit stores, and the time required to visit stores and record data. A follow-up study could be strengthened by analyzing a data set with more observations collected from other regions of the United States. Analysis was also only conducted on maple syrup present on shelves, and no data on the actual sales of maple syrup was conducted.

Conclusions

Based on the 382 observations (unique bottles or package units) collected from 64 different stores, it appears the most influential factor on the price of maple syrup is whether it is sold as a store-brand or as a non-store-brand. Store-brand syrup was sold for an average price-per-ounce of \$0.64 while non-store-brand syrup was sold for an average price-per-ounce of \$0.95. Syrup sold in plastic containers tended to be cheaper than syrup in glass or metal containers, and “North American” syrup was cheaper than syrup produced in any more specific region. In this study, store-brand syrup serves as a proxy for bulk syrup that is distributed by a large company. In grocery and retail stores, which are believed to be the primary markets for maple syrup purchasing in the United States, nearly half of all maple syrup observed was part of a generic store brand. The findings in this study highlight the difference in price of syrup purchased in bulk by commercial distributors and syrup sold by farmers

or smaller businesses.

This study also found that 87.86% of the different bottles of syrup observed came from either “North America”, Canada, or Vermont. This finding highlights the difference in how producers in Central Appalachia market and sell their syrup compared to producers from the Northeast. Only one of the 173 bottle labels gave place of origin as Virginia. No syrup observed on the shelves came from Maryland or West Virginia.

The lack of local syrup (from Maryland, Virginia, and West Virginia) and the lower cost of bulk (often blended syrup brought in from other regions) syrup indicates that grocery and retail stores may not be an appropriate outlet in which producers from Central Appalachia can be competitive. The exception would be if these venues had a “locally produced” section. Further investigation is needed to see if even with such a location available to local producers, would they be competitive on a price basis? A future shift in market conditions, such as if consumers were more willing to pay a premium for locally branded products, could allow Central Appalachian producers to be more competitive in this space. In the current situation, sales mediums like farmer’s markets, festivals, and websites afford a more realistic platform for Appalachian producers.

We believe this study is interesting to readers of the Maple Digest because (a) it provided locally-relevant market data to maple syrup producers in Central Appalachia, and (b) it is easily rep

licable. We have no reason to assume that supermarket price points are the same in all regions of the country but we do have reason to believe that the average maple syrup producer is producing at around the same scale as producers in Central Appalachia: as Mark Isselhardt writes, “the average size of U.S. maple operations is 1,410 taps/farm.” Therefore, with the help of a dozen or so volunteers, maple syrup producers, or undergraduate or high-school students, producers in many regions could gain locally-relevant market data similar to that gained by Central Appalachian producers in this study.

Note: Results and further analysis, the data collection survey form and other materials may be available on request to Future Generations or through the website: [Future.edu/maple](https://future.edu/maple)

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Maple Hazelnut Spread

Catherine Monserrate Ph.D., 2024

Overview

Maple and chocolate maple hazelnut spread recipes were developed using maple sugar and hazelnuts as the primary ingredients. The recipes were designed with ingredients known for their antioxidant, mineral, vitamin, and protein contents. With a market for nut-based spreads expected to grow at a compound annual growth rate of 7% between 2024 and 2029 (Market Data Forecast, 2024), this sweet treat is ideal for maple and chocolate consumers. Nut spreads have various uses, including spread on fresh fruit, pancakes, crepes, toast, pretzels, or other snack products. An overview of ingredients, recipes, regulation requirements for commercial production, packaging information, and pricing information are presented below.

The Science of Maple Hazelnut Spreads

Multiple ingredients are necessary to produce shelf-stable maple hazelnut spreads. Each ingredient presented below was selected and balanced for flavor, texture, mouthfeel, and shelf-stability. The ingredients are multi-functional and thus categorized by their lipid, carbohydrate, and protein content for simplicity.

Roasted Hazelnuts



Roasted hazelnuts are the second most common ingredient in the hazelnut spread recipes. In raw form, they contain antioxidants, vitamins, and minerals (Steutz et al., 2017) and an average of 56% fat, 15% protein, 16% dietary fiber, and 4% moisture (Müller et al., 2020). Roasted hazelnuts maintain a similar nutritional profile (Schlörmann et al., 2015), with approximately 2% moisture (Hartel et al., 2018a). Roasted hazelnuts are used in these recipes due to the flavor profile developed during roasting. According to consumer testing, an acceptable roasted hazelnut profile develops when unshelled, raw hazelnuts are roasted at 300 °F for 20 to 28 minutes (Saklar et al., 2001).

Lipids (Fats)

A combination of solid and liquid fats aid in the appearance, spreadability, stability, and texture of hazelnut spreads. Palm oil is commonly used in commercial hazelnut spreads as it

contains liquid and solid fats at room temperature. Due to health and environmental concerns with palm oil, multiple studies have explored alternative fats. The recipes presented below contain fat from cacao butter, hazelnuts, hazelnut oil, sunflower oil, and ghee. The fats contain vitamins, minerals, and fatty acids, such as linoleic acid, with multiple reported health benefits (Kim et al., 2016).

Carbohydrates (Sugars)

In general, sugars increase sweetness and viscosity or thickness, and act as a preservative by reducing water activity, the water available for microbial growth (Vaclavik et al., 2021). Maple sugar, whole milk powder, and whey protein concentrate are the primary sugar sources in this product, and each provide a distinct flavor and sweetness.

Proteins

Proteins have multiple functions in food products. Whey protein, the primary protein source in these recipes,

can aid in emulsifying or stabilizing, thickening, and water-binding. While whole milk powder and cocoa powder increase viscosity and contribute to flavor (Liang and Hartel, 2004).

Stabilizer
Lecithin is a phospholipid, a type of lipid commonly used as a stabilizer or emulsifier. It can help to stabilize and reduce spoilage of fats (Judde et al., 2003) and reduce product stickiness (Hartel et al., 2018b). An addition of

0.25 to 0.5% lecithin is common in confectionary products (Hartel et al., 2018b). The recipes below use 0.5% lecithin.

Equipment

When making a nut spread, a food processor or a stone grinder, also called a melanger, can be used. A food processor uses metal blades to chop and mix ingredients quickly, resulting in a coarse textured product. A melanger uses granite stones to grind ingredients into a smooth, homogenous paste.



Recipes

Maple Hazelnut Spread¹

Ingredients

200 g Roasted hazelnuts
85 g Ghee
50 g Hazelnut oil
40 g Sunflower oil
20 g Cacao butter
5 g Granule lecithin
435 g Maple sugar
120 g Whole milk powder
45 g Whey protein concentrate

Chocolate Maple Hazelnut Spread

Ingredients

163 g Roasted hazelnuts
85 g Ghee
110 g Hazelnut oil
15 g Cacao butter
5 g Granule lecithin
437 g Maple sugar
55 g Whole milk powder
65 g Whey protein concentrate
65 g Cocoa powder

1 To increase maple flavor, the maple hazelnut spread recipe can be adapted to contain 475 g maple sugar, 75 g whole milk powder, and 50 g whey protein concentrate. No other changes in ingredients or preparation directions. For more information, please see the Consumer Evaluation section below.

Directions

1. Roast hazelnuts at 300 °F for 20 to 28 minutes or reheat roasted hazelnuts for 10 to 15 minutes at 300 °F.
2. Add hazelnuts to a food processor or melanger. If a melanger is used, roughly chop the hazelnuts prior to grinding using a mortar and pestle. Blend or grind hazelnuts to a paste (3 to 5 minutes).
3. Add ghee, hazelnut oil, sunflower oil, cacao butter, and granule lecithin to the hazelnut paste. Continue to process in the food processor or melanger.
4. Add the maple sugar, whole milk powder, whey protein, and cocoa powder.
5. Continue to blend or grind to a desired consistency. If grinding with a melanger, a smooth texture is formed after approximately 4 hours.
6. Transfer the spread into food grade containers. Store the finished product at ambient temperature. Refrigerating or freezing containers result in a temporarily thicker product that is difficult to spread. Ideal packaging options include glass, polypropylene (PP) lined with polyvinylidene chloride, and polyethylene terephthalate (PET).

Recipe yield is approximately 1000 g (35.3 oz).

Regulations

Regulation Requirements

Commercial production of a hazelnut spread requires a scheduled process from a Process Authority. Scheduled processes are required for any food or beverage product manufactured for sale in which refrigeration or additional steps are necessary to ensure a safe product. The Cornell Food Venture Center offers scheduled process services which provide information on procedures to produce a safe product, record keeping requirements, and information on licenses and registrations required to produce said product. The guidelines presented below are for informational purposes only; it is the responsibility of each maple producer or food facility to ensure compliance and adhere to regulatory requirements.

Maple hazelnut spreads are considered low water activity foods, meaning the free water available in the product is low enough that microbial growth is not a concern, and the product is not subject to additional regulatory requirements required for acidified foods (Part 114, 2000) or thermally processed, low-acid foods (Part 113, 2011). However, the hazelnuts, whole milk powder, and whey protein concentrate ingredients are susceptible to pathogens and, if required in the Scheduled Process, must be verified as pathogen free or be evaluated for *Salmonella*, *Listeria monocytogenes*, and pathogenic *E. coli*. In New York State, hazelnut spreads must be produced in a kitchen with a 20-C Food Processing Establishment

License from New York State Department of Agriculture and Markets. Food facilities located outside of NYS, should check with their state department or state regulatory agency prior to commercial production.

Food Additives

A food additive is any substance that becomes a component of or otherwise affects the characteristics of any food. Food additives must be “generally recognized as safe” (GRAS) or approved for use by the FDA; these include preservatives, stabilizers, anti-caking agents, among others. The food additive, lecithin, is recommended to maintain quality and stability. Please refer to “The Science of Maple Hazelnut Spreads” section for information on the functionality of lecithin.

Lecithin is an emulsifier that stabilizes food products. It is a common ingredient in caramels, fudge, chocolates, salad dressings, soups, among many others (USDA-ARS, 2023). It helps maintain texture, prevent separation, and improve the shelf-life of foods. It is a GRAS substance with no limitations for use in food products (Lecithin, 2023).

Packaging and Labeling

Nut spreads require packaging that prevents moisture migration and is suitable for products with high fat content. Common packaging options include glass, polypropylene (PP) lined with polyvinylidene chloride, and polyethylene terephthalate (PET). Each is a strong material with an excellent

moisture, gas, oil, and chemical barrier.

Packaging must contain a tamper evident seal that is approved for food use. These are closures that provide visual evidence if the package has been opened or tampered with. Multiple tamper evident seals are available in the food industry, an example of seals appropriate for hazelnut spread include induction liners or seals that adhere to the product container with heat and must be peeled off for consumers to access the product. Induction seals are common in peanut butter containers and protect the product from quality spoilage from oxidation. Other tamper evident seals can be used on this product, unless specified by the Process Authority.

Cost and Pricing

Determining the cost of a product involves calculating all production expenses, including but not limited to ingredients, packaging, equipment, labor, and energy use. Additional costs may include marketing, advertising, and shipping. Due to the variation in costs from business to business, only ingredient costs are presented (Table 1). The ingredient price can be reduced by sourcing for competitively priced or bulk ingredients.

Table 1. Estimated costs of hazelnut spread ingredients per 1000 g batch.

Ingredient	Maple Hazelnut Spread ¹	Chocolate Maple Hazelnut Spread ¹
Roasted Hazelnuts	\$4.00	\$3.26
Ghee	\$0.68	\$0.68
Hazelnut oil	\$0.50	\$0.59
Sunflower oil	\$0.20	N/A ²
Cacao butter, odorized	\$0.24	\$0.26
Powdered lecithin	\$0.23	\$0.23
Maple sugar ²	\$1.74	\$1.75
Whole milk powder	\$1.92	\$0.88
Whey protein concentrate	\$0.18	\$0.26
Cocoa powder	N/A ³	\$0.59
Total cost per 1000 g batch:	\$9.79	\$9.00
Total cost per 6 oz (200g):	\$1.96	\$1.80

¹Values calculated using the maple hazelnut and chocolate maple hazelnut spread recipes in the Recipe section. ²Includes sugar with a bulk price of \$2.50 per pound. Does not include the cost of converting syrup to sugar. ³Not applicable = N/A

At the time of this publication, hazelnut spreads containing maple were not found in the online marketplace. The premium chocolate hazelnut spreads were sold for \$5.71 to 8.80 per 200 g.

Consumer Evaluations

To understand consumer insights, a consumer preference test was conducted with 200 maple consumers during Maple Weekend events in western and eastern New York. At each event, consumers evaluated a sample of either maple hazelnut spread or chocolate maple hazelnut spread, with 100 evaluations completed per spread type. Overall, maple hazelnut spread was liked by

90% of consumers, with 53% liking the product extremely. Similarly, chocolate maple hazelnut spread was liked by 95% of consumers, with 52% liking the product extremely (Figure 1).

Consumers were also asked to rate characteristics of the spreads, including maple or chocolate flavor, hazelnut flavor, sweetness, creaminess, and viscosity (Figure 2). In the maple hazelnut spread, maple flavor was rated as “just about right” by 50% of panelists, while 44% of consumers reported not quite enough or not nearly enough maple flavor. The recipe presented in the Recipe section contains 43.5% maple sugar.

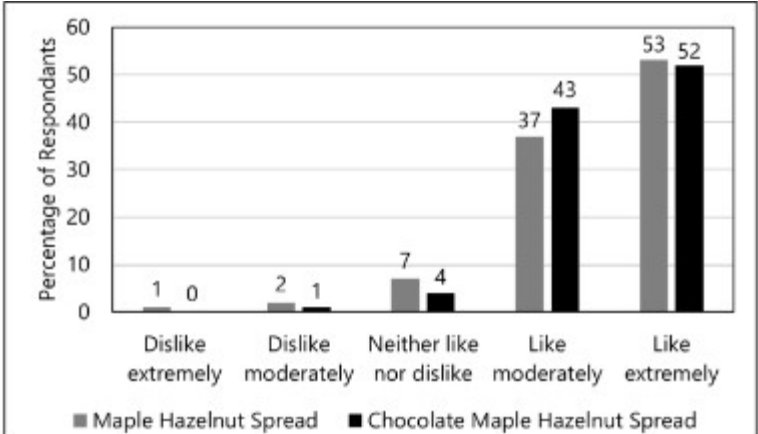


Figure 1. Overall liking of maple hazelnut spread (n=100) and chocolate maple hazelnut spread (n=100) on a 5-point scale. All participants were consumers of maple products.

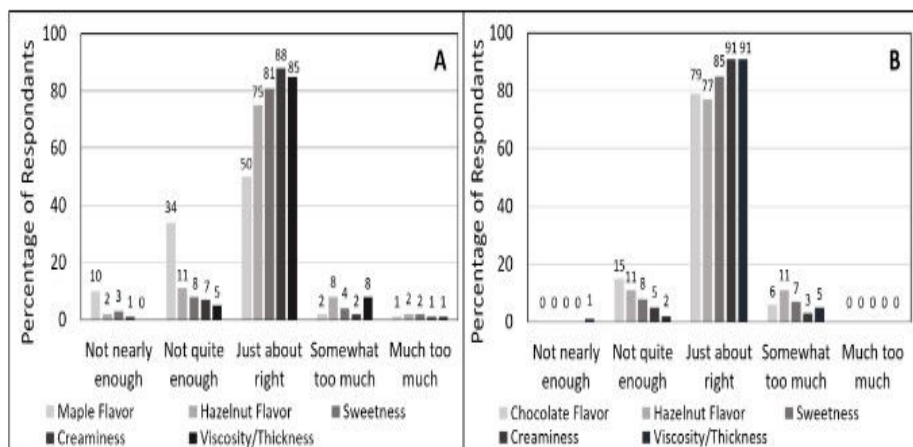


Figure 2. Acceptance of flavor and texture attributes of maple hazelnut spread (a; n=100) and chocolate maple hazelnut spread (b; n=100) on a “just about right” scale. All participants were consumers of maple products.

To increase the maple flavor in maple hazelnut spread, a post hoc test was conducted. The alternative recipe has increased maple sugar (43.5% to 47.5%) and whey protein concentrate (4.5% to 5%) and reduced whole milk powder (12% to 7.5%). No other alterations were explored, as consumer’s rated maple hazelnut spread as “just about right” for hazelnut flavor (75%), sweetness (81%), creaminess (88%), and viscosity or thickness (85%).

In the chocolate maple hazelnut spread, consumers rated “just about right” for chocolate flavor (79%), hazelnut flavor (77%), sweetness (85%), creaminess (91%), and viscosity or thickness (91%). No post hoc tests were performed to adapt the chocolate maple hazelnut spread recipe.

Acknowledgements

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Maple syrup production at Mount Wachusett Community College in Gardner, MA

The Regenerative Agriculture certificate at Mount Wachusett Community College (MWCC), comprises of labs and lectures conducted in our numerous outdoor instructional spaces. These include undeveloped plant communities and forested areas, pond ecosystems and a life studies center consisting of a greenhouse and propagation room. These diverse learning facilities give students hands-on learning opportunities that train them to be farmers and land stewards in our changing climate.

Students explore the fundamental interactions between living and non-living systems, including nutrient cycling, efficient water use, effective solar capture and synergy among plants and animals in their habitats. The program also teaches students to analyze complex food systems' cultural, ecological and economic dimensions.

As part of our hands on-learning program a student used our sugar maples for syrup and candy production. Our student Trent, wanted to see if he could scale up his small homesteading operation. So, he wrote a business plan to expand upon his current maple syrup production and went to work. With our trees Trent added an additional 30+ taps. During the spring 2024 semester he held a workshop and demonstrated

how to make maple candy with the sap collected on our campus. The event was well attended with fellow students, staff, and faculty. All of whom enjoyed seeing how the process happened with his tasty treats.

This is one example of how our program has changed in the last few years to include student centered hands on-learning. Mount Wachusett Community College looks forward to future student endeavors that support our local food systems and addresses the need to adapt to climate change.

Link to the webpage - <https://mwcc.edu/academics/certificate/regenerative-agriculture/> Link to the courses offered - <http://catalog.mwcc.edu/associateddegreesandcertificatelistandotheroptions/earthenvironmentalscience/index.html#regenerativeagriculturecertificateractext>

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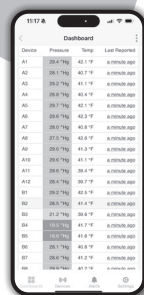
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Our Sweet Sap Silver Maple is a project going back to the 1960s. It is a special selection of *Acer saccharinum*, and these trees offer several advantages to sugarmakers. First of all, they reliably produce sap with a sugar content of 3.5 - 5%. (Compare this to the average sugar maple, which tests at 2-3%). Less hauling and less boiling for you! Another significant advantage is their extremely fast growth; if all goes well, these trees will be tappable in just 8-10 years. (Compare this to 20-25 years for a Sugar Maple). Finally, they're very tolerant of wet soils and heavy clay; areas where Sugar Maples will not grow. The importance of this variety is not as a replacement for Sugar Maples, but as an addition!

Syrup producers take note: There are suppliers promoting and selling *seedlings* of high-content parent trees. This is bad biology; seedlings are highly variable! Only cloning (tissue culture or cuttings) will reliably pass on the high sugar content trait to offspring! This selection was discovered by H. Cedric Larsson, and we propagate via tissue culture, which is cloning.

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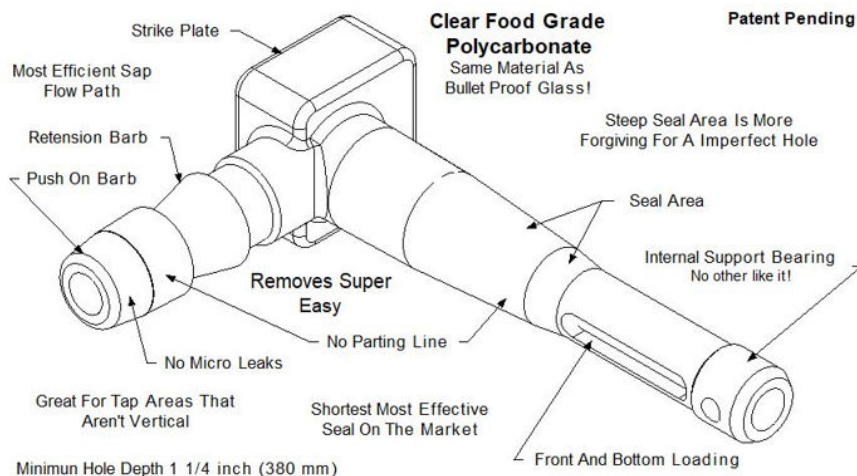


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Friday: Maple Trade Show 5-8pm

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