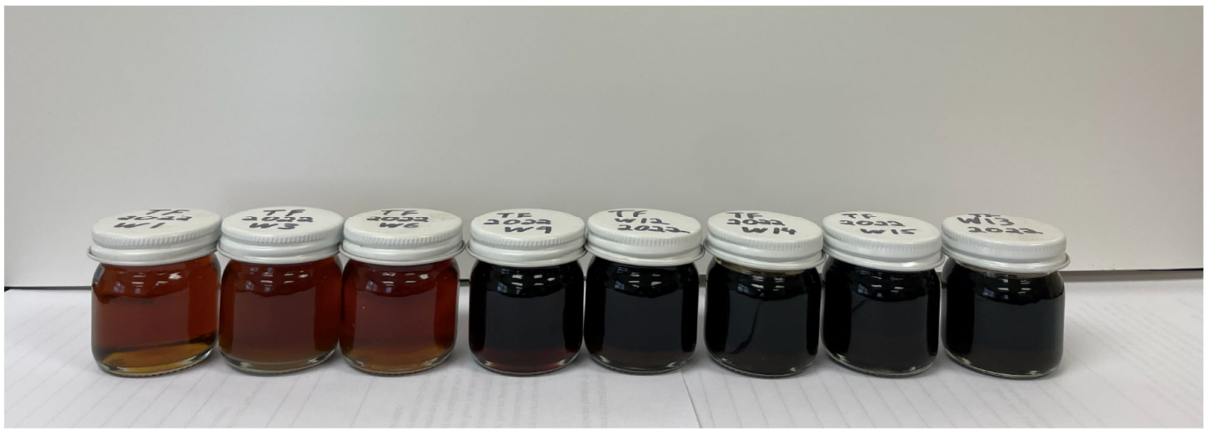
USDA SARE ON-FARM RESEARCH

BLACK WALNUT SYRUP SENSORY PANEL

Black Walnut Syrup Sensory Panel Report for

"Tapping new forest farming opportunities in Central Appalachia

through Black Walnut syrup production"



Black walnut syrup samples ready for tasting by the sensory panel (photo by Christoph Herby)

Compiled by: Christoph Herby and Will Shepherd of Tonoloway Farm,

and Tom Hammett at Virginia Tech, Department of Sustainable Biomaterials

Report compiled during October 2023 – May 2024

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SUMMARY

The purpose of this portion of the project is to develop a framework for grading walnut syrup in order to distinguish various flavor profiles so that producers can effectively communicate about the product they offer. Just as maple syrup can be described and labeled within a grading system, black walnut syrup should have a universally recognized grading system so that producers can promote their product and consumers are able to make informed choices based on personal preferences. This project intends to begin the process of identifying nuances among a range of black walnut syrup samples and determine a predictable pattern so that distinct flavor profiles can be graded and correlated to variables such as time of year and range of color. This project is also intended to determine correlations between flavor profiles and the time of year walnut syrup is produced. Producers who understand predictable flavor patterns are able to make more informed decisions about how to market their product.

The work consisted of organizing and conducting two separate tasting events; one with members of the culinary industry (listed as "Chefs" in the results below) and one with members of the maple syrup production industry (listed as "maple industry" in the results below). Participants sampled 16 different samples of pure walnut syrup and ranked the intensity of 9 flavor profiles. The samples were comprised of distinct walnut syrup batches from sap collected during different times of the season and walnut syrup from different producers. The panel members were also encouraged to add additional tasting notes that were not represented on the tasting chart.

This qualitative analysis of walnut syrup yielded results that begin to establish a framework for characterizing the nuances of walnut syrup flavors. Using maple syrup flavors as a point of reference, tasters were able to identify flavor profiles that are a departure from this more traditional, recognizable taste, which is important when leading customers to a new product. Culinary professionals were able to identify flavor notes from a chef's perspective, which enables syrup producers to speak their language when offering walnut syrup for use in that industry. In addition to the general distinguishing flavors of walnut syrup to maple syrup, the tasting panels help to chart the change of flavors within a single season, which can help inform decisions about production schedule and uses for varying batches, and also equip producers with ability to describe the change in flavors to customers.

Marketing of syrup will be greatly enhanced with a system that helps consumers discern between various black walnut syrups. Black Walnut syrup for sale at Tonoloway Farm during the annual Highland County Maple Syrup festival. (photo by Christoph Herby)

METHODS

As a starting point, we conducted research on tasting panels. No experience with sensory testing of black walnut syrup was found. So, we developed a methodology that sought input/participation from two groups: one made up of syrup specialists and resource persons, and the other made up of chefs or food service personnel. As it turned out, we were able to recruit specialists for two panels - one of maple syrup specialists (two of which regularly conduct syrup quality workshops for the industry) and the other panel was of restaurant owners and cooks, and those involved in cooking with maple syrup for festivals. We have attached a list of those participating in each panel (see both Appendix 2 and Appendix 3).

Each panel sat together at the same table and were provided a tasting scorecard, a stainless-steel spoon, and water to cleanse the palate between tasting samples. For every sample delivered to their spoons, panel members were asked to rank the degree of each flavor profile represented on the scorecard and offer any impressions that were not included on the scorecard that we developed. Through our background research we did not find a way to register scores for walnut syrup, so we developed a scorecard. We have included a copy of the scorecard (see Appendix 1).

Panel members chose a score within the range of 0 to 5: 0 being the absence of a respective flavor; 1 if the flavor profile was very subtle; 5 meaning that the flavor was very pronounced. Generally, sap is collected and boiled into syrup soon after the sap is collected. Few farms have the capacity to store sap in large quantities. Hence, there is notable seasonable variability and we were interested in when the sap was collected.

Samples 1-8 were from sap collected at different periods during the 2022 sap harvest season at Tonoloway Farm. Samples 9-12 are from the farm of Albert Yodder (Maryland), from 12/4/2021, 12/29/2021, 1/19/2022, and 03/09/2022, respectively. Sample 13 was from the West Virginia sugar camp of Ellie Maben and is a blend of her season's production. Sample 14 was from West Virginia producer Gary Mongol, produced on February 9th, 2022. Sample 15 is from Tonoloway Farm during the 2021 season and

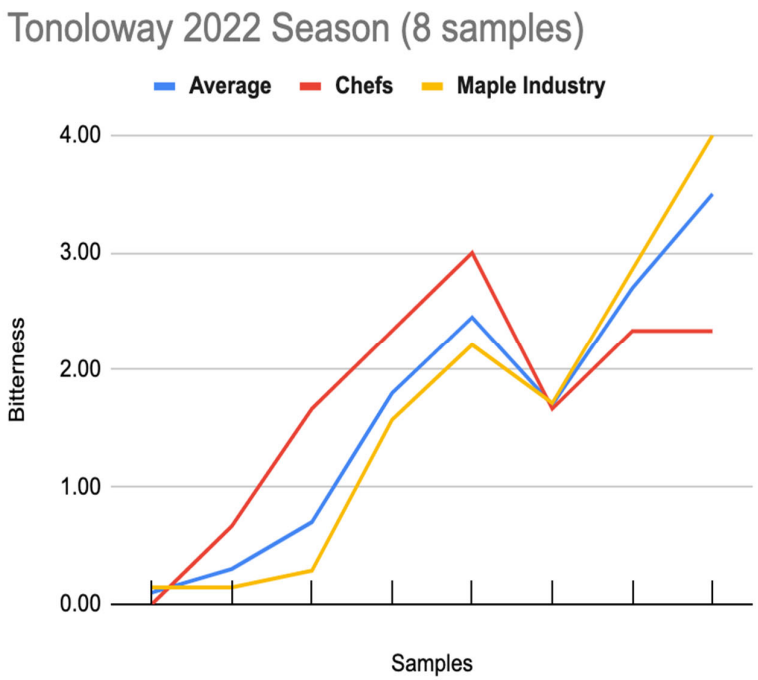
sample 16 is from a late-season April sap harvest at Tonoloway Farm. The data from these scorecards were entered into a spreadsheet and charted – the charts are included below.

Members of the first sensory panel tasting samples of black walnut syrups in Weston, West Virginia (photo by Christoph Herby)

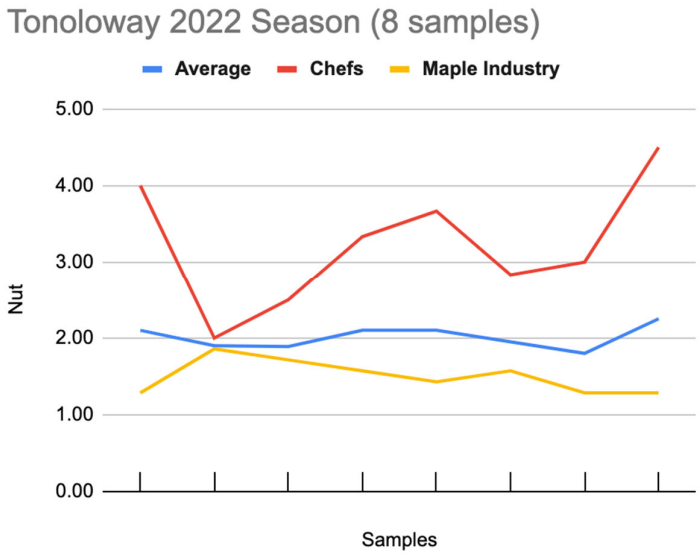
RESULTS AND INTERPRETATION

The collection of a variety of verbal descriptors to use when explaining the general flavor of walnut syrup was one of the valuable results of this tasting project. The ability to use more descriptors beyond “nutty” will help producers convey the complexity of walnut syrup.

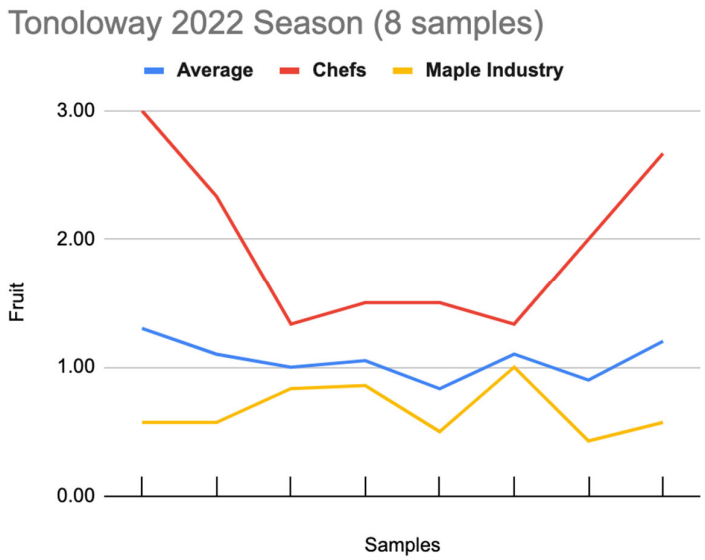
The charting of the walnut flavors through a single season offers producers the ability to anticipate changes in profile in order to effectively segregate batches, which enables versatility when blending different walnut flavors and blending with maple syrup. Following the changes in syrup flavor throughout a single season at Tonoloway shows that the level of **acidity** and **bitterness** begins very low, gradually rises and levels off, before rising towards being unpalatable at the end of the season (see chart on the following page).

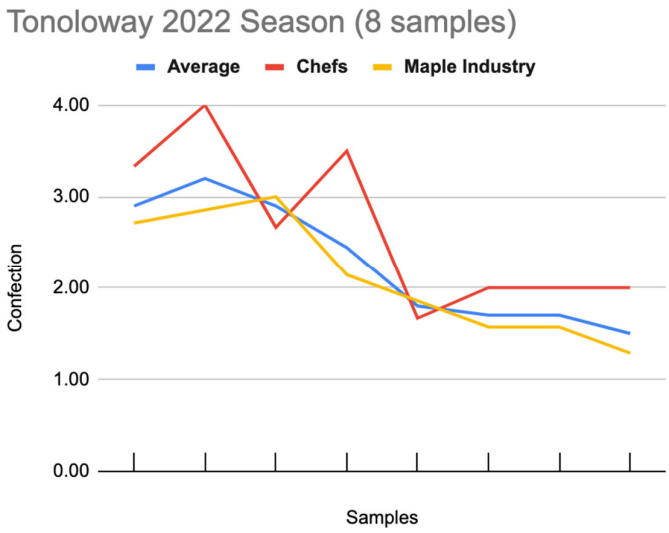


The **nut** flavor is perceived to remain constant throughout the season, on average (see chart below).

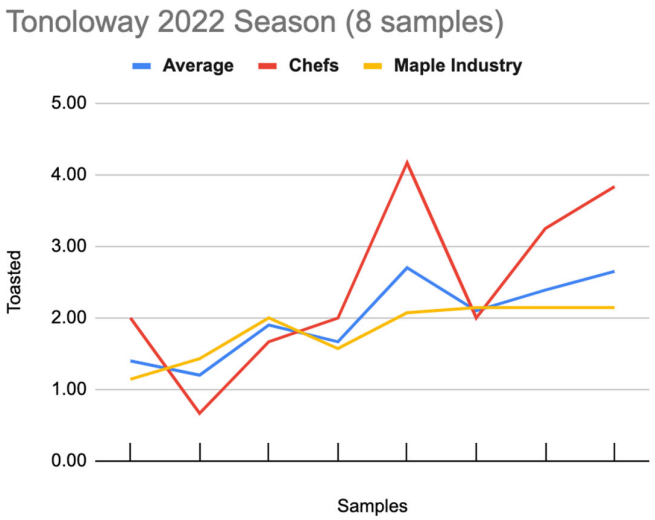


Fruit notes begin the season high, level off during the midseason, then rise again at the end of the season. **Confection** flavors start high and continue to decline through the end of the season. (see two charts below)





Tasters found that the **toasted** flavor profile started low and gradually rose, peaking at the end of the season (see chart below).



Earth and **herbal** notes fluctuated throughout the season, yielding no predictable patterns. Hence, no charts were included here.

The information about flavor profile patterns within a season offers the producer the ability to more accurately predict when batch distinction(s) might occur. Knowing that early season bitterness will likely start to mellow out as the season progresses, enables the syrup maker to segregate early season syrup to use later in the season in a blend with maple syrup. The mid-season walnut syrup is more likely to be used for sale of pure walnut syrup, as the flavors are more balanced and appealing to consumers. The producer can anticipate the likely return of bitterness and acidity at the end of the season and be poised to cap the more mellow batch in order to isolate the stronger flavor.

Regarding the samples from other producers, some were blends. But we are confident in saying that they confirmed similar patterns, insomuch as they were mostly mid-late season with stronger flavor profiles.

Reflecting on this effort to qualify walnut syrup, we include a note regarding verbal descriptors. Professor Mike Rechlin, a member of the first panel is a maple industry professional and researcher involved in both maple and walnut syrup production. He has proposed the following flavor descriptors for three categories of black walnut syrup:

Sweet Walnut - Early season walnut syrup has a smooth light flavor. It lacks any harsh tones. The syrup has a naturally caramelized flavor, with a gently earthy backdrop.

Hearty walnut – As the season progresses the syrup develops more vibrant flavors. The most prominent of which is a fruity tartness on top of a rich boldness. The earthy backdrop becomes more pronounced with a great deal of variation dependent presumably on the site the trees are grown and the unique operational characteristics of the syrup maker.

Off flavored walnut – Both sweet walnut and hearty walnut are good tasting syrups with preference varying with the palette and intended use. Off flavored syrups are not table grade but could have other potential uses. These syrups have the qualities of Hearty syrup but have an overpowering additional flavor most likely attributable to operational problems from sap collection or evaporation.

These syrups have a bitter taste in additional to other off-flavors dependent on the production problem.

N.**B**: The late-season April batch from Tonoloway had this off-flavor, confirming that, while walnut trees can produce considerable volumes of sap late in the season, the resulting syrup is not marketable.

There were few comments from culinary professionals about their overall descriptions or walnut syrup. None of the comments were noteworthy in that they would not offer additional help in our effort to develop a grading system for walnut syrup.

CONCLUSIONS AND OBSERVATIONS

The emerging black walnut syrup industry needs to define what is good quality walnut syrup. To do so, a common set of descriptive phrases is needed. Walnut syrup produced in Virginia and West Virginia has significant variations in color (ranging from golden to dark black) and flavor (from mild to full-flavored and acidic). Much as the maple syrup industry has established a grading system, increasing walnut syrup marketability requires developing standards to describe characteristics and identify potential off-flavors and their causes. While we could not establish a grading system for black walnut syrup, we did identify and use flavor descriptive phrases that should be useful in describing the syrup. This work was especially useful as it noted changes that occur during the season. When processing sap to make black walnut syrup has a thick pectin-like material.

This was the first research focused on describing the taste and other attributes of black walnut syrup. In addition to the accomplishments described above, this project has fostered several synergistic activities. For example, the sensory course taught at Virginia Tech used maple and black walnut syrup in their lab.

In addition to addressing the project goals, we submitted black walnut syrup samples to be tested at the food science lab at Virginia Tech. We sought more information on the “pectin” contained in the sap which accumulates after boiling to make syrup. The lab did not have the proper testing equipment for some of the tests needed, so some of testing will be accomplished at another lab. The first stages of testing are summarized in a separate report (uploaded on SARE Southern website). This testing also received financial and in-kind support from the Appalachian Program at Future Generations University.

Addressing the challenges of walnut sap harvest and product standards will facilitate the growth of walnut syrup production in the Southern Appalachians, increases livelihood and income generation opportunities, diversifying crops and opening the door to further adoption of agroforestry systems. We will continue to raise awareness about walnut syrup. We plan to submit an article based on the work summarized here for consideration by journal and will share this article with Southern SARE.

Appendices

1. Score sheets (2) developed for the use of the panel members
2. Participants on Panel #1 held on May 22, 2022
3. Participants on Panel #2 held on May 25, 2022
4. Intro Bio Form created for Panel Participants

Appendix 1 – Score cards developed to collect data from the panels

Name of taster:

		Rank level of intensity for the profiles below, between 0 and 5 and add more specific descriptions within each profile category if applicable									Rank 1-5, 1=smooth 5=gritty	Additional tasting notes
		Acidity	Bitter	Spice Flavor Includes vanilla	Nut Flavor	Earthy Flavor	Herbal Flavor	Fruit Flavor	Confection Flavor	Toasted Flavor empyreumatic	Texture/ Mouthfeel	Other flavors or off-flavors
TONOLOWAY FARM	#1	—	—	—	—	—	—	—	—	—	—	
	#2	—	—	—	—	—	—	—	—	—	—	
	#3	—	—	—	—	—	—	—	—	—	—	
	#4	—	—	—	—	—	—	—	—	—	—	
	#5	—	—	—	—	—	—	—	—	—	—	
	#6	—	—	—	—	—	—	—	—	—	—	
	#7	—	—	—	—	—	—	—	—	—	—	
	#8	—	—	—	—	—	—	—	—	—	—	

Note for both sections of this chart (pages 9 and 10) the first column indicates the source farm for the syrup samples and the second column is the sample number

		Rank level of intensity for the profiles below, between 1 and 5 and add more specific descriptions within each profile category if applicable									Rank 1-5, 1=smooth 5=gritty	Additional tasting notes
		Acidity/ ferment	Bitter	Spice Flavor	Nut Flavor	Plant Flavor	Herbal Flavor	Fruit Flavor	Confection Flavor	Toasted Flavor	Texture/ Mouthfeel	Other flavors or off-flavors
YODDER	#9	—	—	—	—	—	—	—	—	—	—	
	#10	—	—	—	—	—	—	—	—	—	—	
	#11	—	—	—	—	—	—	—	—	—	—	
	#12	—	—	—	—	—	—	—	—	—	—	
EM	#13	—	—	—	—	—	—	—	—	—	—	
GM	#14	—	—	—	—	—	—	—	—	—	—	
TF '21	#15	—	—	—	—	—	—	—	—	—	—	
TF Apr	#16	—	—	—	—	—	—	—	—	—	—	

Notes: GM is Gary Mongol; EM is Ellie Maben; TF is Tonoloway Farm (sample #15); and APR is the sample from late season sap - April

Appendix 2

Black Walnut Syrup Tasting Panel Members
Tasting Panel #1
Held May 20, 2022 in Weston, West Virginia
Conducted by Christoph Herby, Owner, Tonoloway Farm

Panel members:

Kate Fotos
Appalachian Field Coordinator
Maple Program, Future Generations University
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Les Ober
Maple Syrup Program Coordinator
Ohio State University Extension
Geauga County, Ohio
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Mike Rechlin
Professor and Maple Syrup Specialist
Future Generations University
Franklin, West Virginia
304.358.3811
mike@future.edu

Will Shepherd
Tonoloway Farm
McDowell, Virginia
828.778.0857
forestfood@tonolowayfarm.com

Tom Hammett
Professor and Director, Non-timber Forest Products Program
Virginia Tech
Blacksburg, Virginia
540.231.2716 or 540.250.6741

Appendix 3

Black Walnut Syrup Tasting Panel Members
Tasting Panel #2
Held on May 25, 2022 at the Shack Restaurant in Staunton, Virginia
Conducted by Christoph Herby, Owner, Tonoloway Farm

Panel members:

Joe Jarrells and Missy Moyers-Jarrells
Owners, Laurel Fork Sapsuckers Maple Syrup Camp in Highland County; an active maple syrup and agritourism site, and residents of Staunton, VA
540.622.3907
joeandmissyjarrells@yahoo.com

Ian Boden (chef/owner)
The Shack
105 S. Coalter St.
Staunton, VA 24401
chefiaboden@gmail.com

David Heins (chef)
320 7 ½ Street SW
Charlottesville, VA 22903
434.882.1328
cpotkitchen@gmail.com

Andrew Partridge (chef)
1139 Spencer Rd.
Dillwyn, VA 23936

Also, participating in the session were:

Tom Hammett, Professor and Project Head, Virginia Tech

Will Shepherd, Manager, Tonoloway Farm

Appendix 4

Intro Bio

Thank you for being on the advisory board of this SARE/Virginia Tech research project entitled "**Tapping New Forest Farming Opportunities in Central Appalachia Through Black Walnut Syrup Production"**.

The purpose of this portion of the project is to provide answers about the flavor profiles of walnut syrup. The maple syrup industry grades products based on color and depth of flavor: golden delicate, amber full-flavor, and dark robust flavor. These are generally correlated with the period in the season when sap was harvested, with early sap producing the lightest mild tasting syrup, and later sap runs producing darker syrup with more intense flavors. It has been observed that walnut syrup also varies in flavor and color, but correlations are not well-established. What is needed is a system to grade the quality of walnut syrup. Farmers and landowners would benefit through guidance on controlling variables to determine specific flavors of walnut syrup. Quality standards also contribute to consumer awareness and marketability of this new product.

Your name: _____

Contact information:

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In the space below, please provide us with your biographical information as it pertains to the syrup industry so that we may include it in our report:

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