

SUMMER 2021
ISSUE 75.2

The Nutshell

WHAT TREES GROW BEST UP NORTH?

LEARN MORE BY GORDON WILKINSON'S
EXPERIENCES IN GROWING NUTS IN
ONTARIO, CANADA

PAWPAW NUTRITIONAL INFORMATION

READ MORE FROM ROBERT BRANNON
AND EMILY ANDERSON AND THEIR NNGA
FUNDED STUDY ON PAWPAW NUTRITION

The Nutshell (ISSN1093-376X) is published quarterly by the Northern Nut Growers Association, Inc. A subscription to *The Nutshell* and a copy of the *Annual Report* are included in the annual dues paid by members.

The Northern Nut Growers Association, Inc. is a non-profit organization formed in 1910 for the promotion of interest in hardy nut bearing trees, their products, and their culture and is dedicated to advancing knowledge of nut tree culture.

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On the Cover

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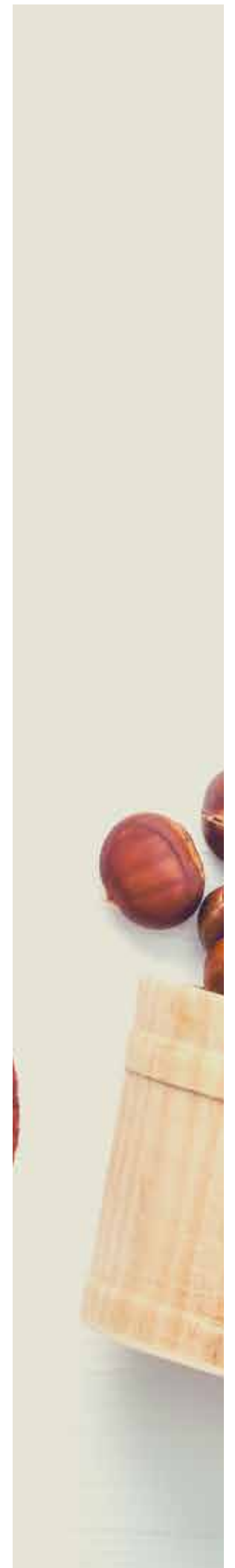
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Editor's Message

Happy Summer NNGA!

If you missed our spring *Annual Report*, you all had the chance to vote on important issues including approving the updated version of the Constitution and Bylaws, as well as voting in the board of elections. You still have time to vote!

If you're reading this on PDF, voting is simple. Please follow the following [link to vote online](#). If you would rather vote via mail, please see page 6 for a mail in voting form. You can also check out our website for a link or contact me at contact@nutgrowing.org.

Voting will end at the conclusion of the 2021 Annual Conference.

Also, registration is available for our VIRTUAL Annual Conference, to take place on Zoom August 1-3. [You can register on our website.](#)

We are also looking for future volunteers to serve as board members or to contribute their expertise to our organization. If you'd like to get involved, contact me today!

Thank you,

Gina Zimbardi

2021 Membership NNGA Vote

Please use this form to vote on important issues regarding the Northern Nut Growers Association, including approval of revised constitution and bylaws, board nominations from the floor, as well as your 2021-2022 Board of Directors. If you have any questions or concerns please contact us at contact@nutgrowing.org.

Mail to:

NNGA
C/O Gina Zimbardi
P.O Box 670187
Northfield Ohio 44067-0187

Each paying member of the NNGA have one vote.

First & Last Name: _____

Are you a current paying member of the NNGA? Yes No

Do you approve of the 2021 changes to the NNGA Constitution & Bylaws? Yes No Abstain

Do you have any edits or suggestions to the NNGA Constitution & Bylaws? _____

Who would you like to serve on the NNGA Board of Directors 2021-2025? Kris Heeter Ray Rusmisl Abstain

Do you vote for Greg Miller to continue his position as President of the NNGA? Yes No Abstain

Do you vote for Shawn Mehlenbacher to continue his position as Vice President of the NNGA? Yes No Abstain

Do you vote for Sandra Anagnostakis to continue her position as Secretary of the NNGA? Yes No Abstain

Do you vote for Debbie Milks to continue her position as Treasurer of the NNGA? Yes No Abstain

Who do you nominate for the slate of officers for the 2022 Board of Directors? Please include first and last name. _____

Would You Like to Join the NNGA?

You can become a member of our great organization by checking out our website at nutgrowing.org and purchasing a membership on our store page. Membership to our organization allows us to continue our work in the research of temperate nut trees. Membership grants you an invitation and voting opportunities at our annual conference, as well as access to our members-only portal to our website. You will also receive a digital copy of our quarterly newsletter, *The Nutshell*, or a paper copy for an additional \$10.00. Any questions or concerns can be directed at Gina Zimbardi, Membership Manager, at contact@nutgrowing.org.

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Individual Member. The Individual member shall be any person interested in the purposes of the Northern Nut Growers Association who pays annual dues. The Individual member shall be a full voting member of the Association, receive copies of the Association's publications, have access to members-only portions of the website, and be eligible for discount pricing and other privileges offered by the Association. Annual dues for the Individual member shall be determined by the Board of Directors.

Family Members. Family members shall be any two members of a household who are interested in the purposes of the Northern Nut Growers Association and who pay annual dues. Both Family members shall be full voting members of the Association, receive copies of the Association's

publications, have access to members-only portions of the website, and be eligible for discount pricing and other privileges offered by the Association. Annual dues for Family membership shall be determined by the Board of Directors, and shall be no less than \$5.00 more than the annual dues of the Individual member.

A 100th Anniversary Marks the Start of a New Conservatory for Eastern Agroforestry Species

Louise Bugbee

Beginning in 1921, Pennsylvania was at the heart of the agroforestry movement when John Hershey (no relation to Milton of chocolate fame) started a Nut and Edible Fruit Tree Nursery and Farm in Downingtown, just west of Philadelphia in Chester County. For nearly 40 years until his death in the mid-sixties, John Hershey (b.1910? d.1967) actively selected and propagated many species of trees including black walnut, English walnut, oak, hickory, northern pecan, hican, hazelnut, pawpaw, persimmon, heartnut, chestnut, honey locust, mulberry and crab apple. The Hershey Nursery provided stock of the highest caliber to professional and amateur growers. He shipped throughout the East and Midwest.

Today, more than 50% of Hershey's trees have been lost. The

genetics of the remaining trees are a critical asset that can shape the future of food security and agroforestry. They deserve protection. Several members of the NNGA are now engaged in establishing a Conservatory Collection of Eastern Agroforestry Species in Northampton County, Pennsylvania. County Administration has dedicated 20+ acres in Louise Moore Park north of Easton and provided funds for an initial planting this fall. They are invested in the project and are committed to providing a safe place for this in-situ conservation site. By design and nature this is a long-term project. Public land offers 'institutional memory', a means for secure record-keeping, data tracking and maintenance. Accessibility is a key factor that cannot be guaranteed on private land. There are plans for future



Collecting persimmon seeds -- Emelie Swackhamer

expansion as we seek partners and additional support.

J. Russell Smith's book *Tree Crops, A Permanent Agriculture* is widely considered the classic text on permaculture or agroforestry. First published in 1929, (revised 1953) it addressed growing interest in soil conservation, organic farming, and the detrimental effects of monoculture grain crop cultivation. Smith travelled the world to study cultural farming practices using perennial plants in varied ecological and geological habitats.

In the 1930's J. Russell Smith engaged John Hershey to work with the USDA and the Army Corps of Engineers to guide the revitalization of deforested lands around Tennessee Valley Authority (TVA) dam project sites as part of Franklin Roosevelt's



Group at bottom of persimmon near pond at Hershey Homestead -- Louise Bugbee

This 100 year old hican tree was grafted and planted by John Hershey. It was destroyed for an intersection expansion in October 2019.



Zach Elfers in tree collecting scion wood -- Pete Chrisbacher

New Deal Program. The work was initiated in direct response to the tragic losses associated with the Dust Bowl when 100,000,000 acres of the Great Plains were damaged, 75% of the topsoil was blown away and millions of people were displaced. The social and environmental devastation was mainly due to the rise of industrialized

farming and a lack of understanding of plains ecology.

John Hershey moved to Tennessee to manage agroforestry projects for hill farmers affected by the TVA construction. During his time there, he sought out the most highly productive specimens of many nut trees, superior varieties that were the result of breeding and selection by indigenous peoples and American farmers. Upon his return to PA, he began propagating the best of the best tree crop species collected from all along the Appalachian ridges and valleys. He revived and improved many of the crops and systems that sustainable farmers now recognize as the future of agriculture in North America.

After Hershey's death in the 1960s, the land became overgrown and sold off in piecemeal lots. Nine acres in Downingtown and the 72-acre Nut Tree Nursery in nearby Guthriesville have been largely destroyed by development. The proximity to Philadelphia and other expanding towns has placed extreme development pressure on any plot of

land seen as 'available.' The collection is fragmented. Gaining access to the remaining trees has become increasingly difficult. Since the re-discovery of Hershey's nursery map in the revised 1953 edition of *Tree Crops*, a dedicated cadre of growers has collected seeds, cross-referenced trees with old publications, grafted new trees and networked with other nut and fruit growers around the country to catalog the surviving specimens.

The USDA has developed a 5-year Agroforestry Strategic Framework for 2019-2024. Its mission is "To advance agroforestry knowledge, tools and assistance for the benefit of landowners, communities and the Nation." The Northampton County Conservatory will provide safe keeping for the germplasm needed to achieve these goals, to foster local food resilience and business development with a comprehensive collection of nuts and fruits suited to agroforestry plantings.

The structure of the nursery

trade is such that not all varieties of improved cultivars are offered to the public, researchers or even to growers in other states. Many select plants are lost when generational change occurs on farms. Pennsylvania lost an exceptional grower and award-winning nut farmer in 2020, Parker Coble. He believed that ... “The commercial nut industry is in its infancy.” (Personal Interview. August 2019. Gettysburg, PA) A new generation of growers is striving to preserve and build upon the substantial body of knowledge that survives from Parker and many, many others, living and deceased. A permanent site is required to ensure the survival of the Hershey trees and other valuable cultivars. It will guarantee that his work, and that of others like him, continues into the next millennium. It will stand as a testament to their lifelong dedication.

Northampton County is serious about land preservation and environmental stewardship. The Conservatory can provide the grafting stock that farmers will need as they transition to more sustainable and integrated farming models. As climate change brings unpredictable weather patterns and temperature extremes, the importance of the genetics in the trees increases. Native trees support a greater range of biodiversity in soil organisms, insects, birds, and mammals. The Conservatory will serve as an educational and research site for local universities, soil scientists, climate specialists and cultural resource professionals.

In addition to their

agricultural importance, these trees possess cultural value. Research by Kristen Gremillion, a paleo-ethnobotanist and chair of the Ohio State Anthropology Department, has established the Eastern Woodlands as an independent center of prehistoric plant domestication. Recent archeological excavations have renewed interest among Native Americans to re-create the Cuisine of the Eastern Woodlands. Native nuts were an important part of the diet. Dishes such as persimmon fry bread and hazelnut sauce were a staple. It is likely that several of the honey locusts in the Hershey nursery are derived from Cherokee stock.

In October of 2021 we will plant 50 assorted grafted trees from Hershey Nursery stock, starting with nuts, honey locust, persimmon and mulberry. Plans for 2022 include a windbreak of hazelnuts and additional varieties of nuts and persimmon. As we expand, other growers will also be invited to place specimens of interest in the park. In this way northern nut and fruit trees that may have been lost forever will be saved and made available for future propagation.

J. Russell Smith concludes Tree Crops on this note – “Whenever possible I urge private experimenters to make some provision, while still alive, for the preservation of your trees for as long as possible after your passing.” The Northampton County Conservatory of Eastern Agroforestry Species will provide a safe haven for centuries with ample room for trees to mature into the glorious creatures they can be.

2021 is the 100th Anniversary of the founding of the Hershey

Nursery in Downingtown. It is fitting that, at this time, this Conservatory be established in Pennsylvania. By finding, grafting, growing, cataloging, and sharing these trees, we ensure that the work of John Hershey, and others like him, will not end. Rather, it will help to solve the problems of the 21st century.

Please feel free to share your thoughts. Contact the author at lmsuppan@gmail.com

Thanks to Bryan Cope, Zach Elfers, Buzz Ferver, Dale Hendricks and Max Paschall



Foggy Bottom Tree Farm Hazelnuts

Donald Knezick

Foggy Bottom Tree Farm in Columbus, NJ is proud to announce we have been awarded a license to sell Rutgers University’s patented European hazelnut cultivars. Rutgers started a breeding project back in 1996 with the goal of developing hazelnuts with commercial-quality nuts that are resistant to Eastern Filbert Blight. This project, now under the direction of Dr. Thomas Molnar, recently introduced four cultivars for the eastern United States: ‘Hunterdon’, ‘Monmouth’, ‘Raritan’ and ‘Somerset’. These cultivars have performed well in test orchards and now Rutgers is partnering with Foggy Bottom Tree Farm to offer them to growers.

All four cultivars are propagated by a tissue culture lab licensed by

Rutgers. Foggy Bottom Tree Farm purchases small plugs from the lab and transplants them into 80mm x 160mm “Ellepots” (www.ellepot.com). The Ellepots are grown in the greenhouse in 10 cell “Air Trays”. This innovative system is widely used by nut growers on the West Coast. The Air Trays encourage root pruning, promoting the development of a very fibrous root system. This enables plants to grow rapidly when established in the field.

Growing plants through tissue culture is an art and a science and each of the four Rutgers cultivars has different propagation requirements. The tissue culture lab we work with is excellent, and through some trial and error, they are perfecting their propagation

techniques. In 2020, Foggy Bottom Tree Farm received a limited number of plugs in the late spring. The low numbers and a short growing season reduced the amount of plants we had to sell this past fall. The outlook is much better in 2021, as we should receive a large number of plugs ready for immediate transplant in early April. With a full growing season to develop, we anticipate our Rutgers’ cultivars will be about 24”-36” by the fall.

With minimal promotion, there is already tremendous demand for Rutgers’ hazelnut cultivars. This is wonderful since the goal of the project is to establish a hazelnut industry in the East. Large growers in the US and Canada are already placing orders and we anticipate

low availability this fall. We hope to double our production again next year and should have an abundant supply of hazelnuts available in the fall of 2022.

Foggy Bottom Tree Farm - www.foggybottom.farm - is a wholesale only company, providing hazelnuts to growers interested in establishing large orchards. We are not capable of handling small orders, but hobbyists and backyard gardeners can purchase our plants by going to our sister company's website: www.foggybottomhazelnuts.com.



Pawpaw Nutritional Information

Robert G. Brannan, Ph.D. Ohio University

Emily Anderson, MS, Ohio University

Ronald L. Powell, Ph.D., Fox Paw Farm, LLC.

Maria Coyle, Ohio University

The North American pawpaw (*Asimina triloba*), the largest edible tree fruit native to the United States, has been long-supported by the Northern Nut Growers Association. In 2019, we were awarded a generous NNGA research grant which we combined with previously-allocated funds from the Pawpaw Foundation to update the nutritional information about the pawpaw. This article describes the results, the first significant update to pawpaw nutritional information in almost 40 years.

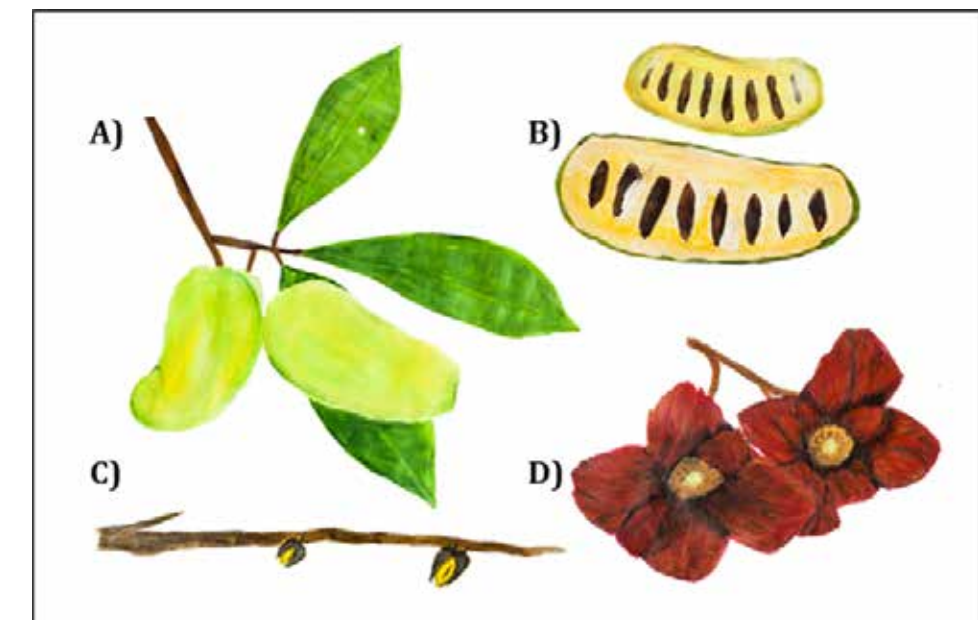
Background

The North American pawpaw (*Asimina triloba*) is the largest fruit native to North America. It has a wide growing range that corresponds to USDA plant hardiness zones 5-8. Pawpaw trees are understory trees that can grow up to 12 meters tall and produce clusters of fruit in late summer to early fall. There are many pawpaw cultivars that range in fruit size, yield and other characteristics but there is little consensus for which cultivars of pawpaw would be best for commercial purposes. Shown below are renditions of parts of the pawpaw plant: A) a mature fruit cluster; B) a mature fruit cut lengthwise to show the kidney bean-shaped seeds; C) a branch with a bud; and D) a spring-

time blossom (artwork by author M. Coyle).

Pawpaw fruit is becoming more familiar, but a major issue is its short room-temperature shelf life. Thus, marketing the fresh fruit pulp as a food ingredient has the potential

your attention to the Kentucky State University Pawpaw Resource website (<https://ksu.edu/academics/cafss/pawpaw/>). One of the deterrents inhibiting the market for pawpaw pulp is the lack of up-to-date nutritional information. Historical pawpaw nutritional in-



to increase pawpaw fruit usage. It can be added to various consumer goods for a variety of reasons, such as providing an intense, tropical-fruit-like flavor, most often identified as a combination of banana and mango, in products like sauces, salsa, ice cream, and beer or replacing fat in baked goods. For those not familiar with the North American pawpaw, we direct

formation does exist. We were able to locate pawpaw nutritional information from the 1963 USDA Food Composition Database (Handbook #8), which includes information for the proximates (water, protein, fat, carbohydrate, and ash) and calories. Apparently, pawpaw nutritional values were listed in the database until this time. The entry for pawpaws from the 1963 database is

TABLE 1.—COMPOSITION OF FOODS, 100 GRAMS, EDIBLE PORTION—Continued

Numbers in parentheses denote values imputed—usually from another form of the food or from a similar food. Zero in parentheses indicates that the amount of a constituent probably is none or is too small to measure. Dashes denote lack of reliable data for a constituent believed to be present in measurable amount. Calculated values, as those based on a recipe, are not in parentheses.

Item No.	Food and description	Water	Food energy	Protein	Fat	Carbohydrate		Ash	Calcium	Phosphorus	Iron	Sodium	Potassium	Vitamin A value	Thiamine	Riboflavin	Niacin	Ascorbic acid
						Total	Fiber											
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)	(s)
1470	Pawpaw, common, North American type, raw.....	76.6	85	5.2	.9	14.8	—	.5	—	—	—	—	—	—	—	—	—	—

shown below.

A few years ago, we obtained a copy of a personal communication (shown below) that related a request from an Australian who was seeking pawpaw nutritional information. This led to proximate analysis on pawpaw pulp from California performed at Texas A&M University. Although the communication is not dated, in all likelihood the analysis was performed in the 1980's based on the fact that Dr. Lusas' publishing career began in 1979. (*Editor's Note: See right for Nutritional Analysis of the Paw Paw*)

In 1982, the NNGA published nutritional data on the pawpaw (Peterson, R. N., Cherry, J. P., & Simmons, J. G., *Composition of pawpaw (Asimina triloba) fruit. Annual Report Northern Nut Growers Association, 73, 97-107*). This team was led by the pawpaw legend Neal Peterson and undertook a much more comprehensive nutritional analysis than the proximate analysis reported by the USDA or performed at Texas A&M. The study reported nutritional information for whole pawpaws including the

NUTRITIONAL ANALYSIS OF THE PAW PAW
 Bob Kurle 10 S. 055 Madison St. Hinsdale, IL 60521

Mark Ashton of Kuranda, Australia, had heard that *Asimina triloba*, the American paw paw had a higher protein value than any other known fruit and he determined to check this out through laboratory research and through feeding experiments. Since there is little or no paw paw in Australia, he put an ad in the *Pomona* offering to buy 300 lbs. of paw paw pulp for \$600, but as far as I know, he was only able to locate the frozen pulp of two bushels of the fruit and about a pound of dried pulp.

Mark contacted the Food Protein Research and Development Center of Texas A & M U. at College Station, TX, and Dr. E. W. Lusas ran a protein analysis on a sample of pulp sent in by John Riley of Santa Clara, CA.

Here is the analysis:

Proximate analysis	(as is)	(moisture free basis)
Moisture	81.16%	
Total Solids	18.84%	
Ash	2.86%	15.18%
Oil		2.35%
Nitrogen	0.38%	2.02%
Crude Fiber	0.87%	4.62%
Protein (Nx6.25)	2.38%	12.63%

"Please note that protein content of pulp was found to be 2.38% on an as-is basis. This compares with the conflicting values of 0.6 and 5.2% protein for paw paw in the USDA Handbook No. 8."

pawpaw skin. We don't question the accuracy of the analysis, however, the skin is rarely consumed and we often witness these values used to represent the pulp with no disclaimer about the inclusion of the skin.

Editor's Note:

Pictures on the right credited to Peter Namuj, from our Facebook page. The bottom picture shows his cultivated pawpaws, while the top is a picture of wild pawpaws. New Jersey, USA.

Nutrition Information of Pawpaw
 We used the funding provided by the NNGA and the Pawpaw Foundation to generate nutritional information (subcontracted to a commercial analytical laboratory) for a pooled sample of 16 different varieties of pawpaw harvested at Dr. Powell's Fox Paw Ridge Farm in Adams county, Ohio in September 2019. The sixteen varieties were Estill, Green River Belle, IXL, KSU Atwood™, Lynn's Favorite, Mango, Mitchell, NC-1, Overleese, Pickle, Potomac™, Quakers Delight, SAA-Zimmerman, SAB Overleese, Shenandoah™, and Wabash™. The USDA Nutrient Data Laboratory pre-approved this approach and the pawpaw will be included in the USDA Food Composition Database at some point in the future.

The table below shows the nutritional information for pawpaw pulp without skin and pulp with skin from the 1982 data. We feel that this is the best way to present pawpaw nutritional data because it offers the user a choice to include the skin.

Table 1: Pawpaw (*Asimina triloba*) nutritional information for 100 g of pulp, one serving of pulp (1/2 cup, 120 g), and 100 g of pulp with skin. "N/A" indicates that the nutrient was not included in the analysis. The "<" symbol indicates the nutrient was analyzed but could not be detected at or above the threshold level.



Nutrient	Unit	Pulp (without skin)		Pulp and Skin
		100 g	1 serving	100 g
Proximates				
Calories	KCal	85	102	80
Calories	KJ	357	428	335
Moisture	g	74.5	89.4	73.2
Protein	g	0.7	0.9	1.2
Total Lipid (Fat)	g	0.6	0.7	1.2
Monounsaturated Fatty Acids	g	0.05	0.06	N/A
Polyunsaturated Fatty Acids	g	<	<	N/A
Saturated Fatty Acids	g	<	<	N/A
Trans Fatty Acids	g	<	<	N/A
Cholesterol	mg	<	<	N/A
Ash	g	0.4	0.5	0.6
Carbohydrates (by difference)	g	23.8	28.6	18.8
Total Dietary Fiber	g	4.5	5.4	2.6
Total Sugars (calculated)	g	16.3	19.5	N/A
Sucrose	g	11.4	13.7	N/A
Glucose	g	2.7	3.2	N/A
Fructose	g	2.2	2.6	N/A
Lactose	g	<	<	N/A
Maltose	g	<	<	N/A
Vitamins				
Vitamin A	IU	N/A	N/A	87
Vitamin C	mg	4.9	5.9	18.3
Vitamin D	IU	<	<	N/A
Thiamin	mg	N/A	N/A	0.01
Riboflavin	mg	N/A	N/A	0.09
Niacin	mg	N/A	N/A	1.1
Minerals				
Calcium	mg	13	16	63
Copper	mg	N/A	N/A	0.5
Iron	mg	0.2	0.2	7
Magnesium	mg	N/A	N/A	113
Manganese	mg	N/A	N/A	2.6
Phosphorus	mg	N/A	N/A	47
Potassium	mg	201	241	345
Sodium	mg	1.0	1.2	N/A

Sulfur	mg	N/A	N/A	70
Zinc	mg	N/A	N/A	0.9
Essential Amino Acids				
Cystine	mg	N/A	N/A	4
Histidine	mg	N/A	N/A	21
Isoleucine	mg	N/A	N/A	70
Leucine	mg	N/A	N/A	81
Lysine	mg	N/A	N/A	60
Methionine	mg	N/A	N/A	15
Phenylalanine	mg	N/A	N/A	51
Threonine	mg	N/A	N/A	46
Tryptophan	mg	N/A	N/A	9
Tyrosine	mg	N/A	N/A	25
Valine	mg	N/A	N/A	58

Pawpaw pulp is predominantly moisture (74%) and carbohydrates (24%). Of the carbohydrates, about half is sucrose and 4.5% was dietary fiber. The pulp contains less than 1% fat of which the most predominant was monounsaturated. The pulp contains less than 1% protein. A serving of pawpaw pulp contains less than 10% of adequate intake

recommendation of potassium and less than 5% of the recommendation for iron, calcium, and sodium. Pawpaw Compared to Common Fruits We feel it is useful to compare pawpaw nutrition to seven common fruits. We have chosen to do this in two ways. Table 2 compares the

nutrition of pawpaw pulp to 100g of each of the fruits, in other words a weight-to-weight comparison. Table 3 compares one serving of pawpaw pulp to one serving of the seven other fruits. In this comparison, one serving can range from 118 g (banana) to 182 g (medium apple). In each case, nutritional data for the seven fruits comes from the USDA Standard Reference database.

Table 2: Comparison of pawpaw pulp nutritional information to existing nutritional information for seven common fruits on a 100-gram basis.

	Pawpaw	Apple	Banana	Blueberry	Mango	Papaya	Pineapple	Strawberry
	100 g	100 g	100 g	100 g	100 g	100 g	100 g	100 g
Calories (kcal)	85	52	89	57	60	43	50	32
Protein (g)	0.7	0.3	1.1	0.7	0.8	0.5	0.5	0.7
Total fat (g)	0.6	0.2	0.3	0.3	0.4	0.3	0.1	0.3
Carbohydrate (g)	23.8	13.8	22.8	14.5	15.0	10.8	13.1	7.7
Dietary Fiber (g)	4.5	2.4	2.6	2.4	1.6	1.7	1.4	2.0
Total Sugar (g)	16.3	10.4	12.2	10.0	13.7	7.8	9.8	4.9
Vitamin C (mg)	4.9	4.6	8.7	9.7	36.4	60.9	47.8	58.8
Calcium (mg)	13	6	5	6	11	20	13	16
Iron (mg)	0.2	0.1	0.3	0.3	0.2	0.3	0.3	0.4
Potassium (mg)	201	107	358	77	168	182	109	153
Sodium (mg)	1	1	1	1	1	8	1	1

On a weight-to-weight basis, the pawpaw contains more fiber and sugar than the other fruits. Overall, the pawpaw is most comparable to a banana.

Table 2: Comparison of pawpaw nutritional information from this study (except where noted) to existing nutritional information (U.S. Department of Agriculture, 2019) for seven common fruits per serving.

	Pawpaw	Apple	Banana	Blueberry	Mango	Papaya	Pineapple	Strawberry
	1/2 cup pulp (120 g)	1 medium fruit (182 g)	1 medium fruit (118 g)	1 cup fruit (148 g)	1 cup pieces (165 g)	1 cup, pieces (145 g)	1 cup, chunks (165 g)	1 cup, halves (152 g)
Calories (kcal)	102	95	105	84	99	62	83	49
Protein (g)	0.8	0.5	1.3	1.0	1.3	0.7	0.8	1.1
Total fat (g)	0.7	0.4	0.4	0.4	0.7	0.4	0.2	0.5
Carbohydrate (g)	28.6	25.1	26.9	21.5	24.8	15.7	21.6	11.7
Dietary Fiber (g)	5.4	4.4	3.1	3.6	2.6	2.5	2.3	3.0
Total Sugar (g)	19.6	18.9	14.4	14.8	22.6	11.3	16.2	7.4
Vitamin C (mg)	5.9	8.4	10.3	14.4	60.1	88.3	78.9	89.4
Calcium (mg)	16	11	6	9	18	29	21	24
Iron (mg)	0.2	0.2	0.4	0.4	0.3	0.4	0.5	0.6
Potassium (mg)	241	195	422	114	277	264	180	233
Sodium (mg)	1	2	1	1	2	12	2	2

Benefits
Up-to-date nutritional data that reflects the edible portion of the fruit will help many pawpaw stakeholders. Raw fruits and certain low volume small businesses are exempt from having the ubiquitous NUTRITION FACTS labels. However, other small businesses and/or foods for sale that make nutrient claims (e.g. “Gluten free”, “Low fat”, etc.) are required to have NUTRITION FACTS labeling, even if they are exempt from the label for other reasons. Most food companies provide nutrition facts on their labels whether they are required to or not because it provides a layer of transparency for customers. As the popularity of the fruit grows, demand for up-to-date

nutritional information likely will increase. This information will be beneficial for clinicians to use for patients and could lead to pawpaw as a recommendation to increase their fiber intake. Past nutritional analysis on the pawpaw unintentionally overestimated some nutrients found in the fruit, due to the inclusion of the inedible skin in the analysis. This study found that the pawpaw contains some protein and fat and contains more calories, carbohydrates, and fiber than was previously reported.

Nut Trees that Can Survive in Eastern Ontario

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This is a summary of a presentation I gave at a re-scheduled Winter Meeting of the Eastern Chapter of the Society of Ontario Nut Growers (ECSONG) on March 14th, 2020. An earlier, more abbreviated version of this presentation was given during the Show and Tell session at the NNGA annual meeting in Iowa in July 2019. The presentation described what nut tree species can tolerate the low winter temperatures of Eastern Ontario.

Low temperatures are one of the most important environmental constraints limiting the distribution of plants on the earth (Sakai & Larcher, 1987). The fact that banana, orange, and palm trees cannot be grown in the open in Ontario is illustrative of the primary importance of low temperatures on the survival of trees generally.

There is an extensive scientific literature that estimates the low temperatures at which nut trees are likely to be killed. Nut trees recommended for planting in Eastern Ontario were based upon these estimated low temperature thresholds as well as maps showing the natural range of native nut trees published in handbooks written by tree authorities.

Chart 1: Plant Hardiness Zones Based on USDA Extreme Minimum Temperature Approach



SOURCE: Natural Resources Canada <http://www.planthardiness.gc.ca/?m=1>

hardiness or not hardy at all in Eastern Ontario? Chart 1 shows that minimum temperatures vary by latitude and proximity to large bodies of water, specifically, Lake Ontario. The more northerly parts of Eastern Ontario, which, unfortunately, happens to be where my nut orchard is located (red circle on map), are largely in USDA Hardiness Zone 4a, which is defined as having winter temperature lows averaging from -31.7 OC. to -34.4 OC. The City of Ottawa, which is slightly more than 30 kilometres west of my site is in USDA Zone 4b. The more southerly parts of Eastern Ontario such as Prince Edward County and the Kingston area, are in more temperate hardiness zones where the lowest winter temperatures do not fall below -28.9 OC. on average. Clearly, nut trees with borderline

USDA Zone 4a would have a higher probability of surviving in those parts of Eastern Ontario in USDA Zones 5a and 5b where winter low temperatures are on average less severe.

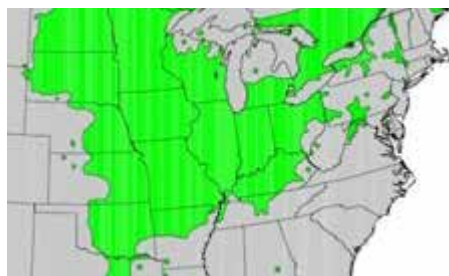
Range maps show that butternut, shagbark hickory and bur oak trees are native to much of Eastern Ontario (Charts 2, 3 and 4). Given that they are “native”, these nut tree species will not likely be harmed by the lower winter temperatures of Eastern Ontario. Possible exceptions might be some shagbark hickory cultivars originating from more southerly locations. It is most unfortunate that the lifespan of the extremely hardy native butternut is now greatly shortened by the presence of the butternut canker, *Ophiognomonia clavignenti-juglandacearum*. Orchard plantings of this nut species will



Chart 2: Range Map - Butternut
Chart 3: Range Map - Shagbark Hickory



Chart 4: Bur Oak



likely end in heartbreak. Of course, experimentation to discover resistant individuals is to be commended and the Ontario

Butternut Recovery Program provides free DNA tested butternut seedlings that are considered to be potentially tolerant to the canker (<https://www.rvca.ca/stewardship-grants/butternut-recovery>).

Black walnut has been planted so extensively in Eastern Ontario and has been self-generating for such a long time that many people consider it native. Range maps suggest that it is native to just a

small patch around Morrisburg along the St; Lawrence River. Its success in Eastern Ontario shows that it is unaffected by the region's low winter temperatures.

The scientific literature on the cold hardiness of trees is a helpful guide for determining which non-native nut trees can possibly survive the low winter temperatures of Eastern Ontario. The results of these studies are summarized in Table 1. The second column shows the estimated temperature at which severe damage or mortality is likely to occur in a specific nut tree species. The third column cites the research paper where this estimate is published. Readers are encouraged to read the research papers to find out more about the methodology used to generate the estimates. Cold hardiness can vary by latitude of origin within a nut tree species. As well, nut tree cultivars may not have the same cold temperature hardiness as that of the species. The estimated low temperature threshold values in Table 1 show why butternut, shagbark hickory and black walnut survive the low temperatures of Eastern Ontario year after year. For each of these nut tree species the low temperature threshold at which tree mortality is likely to occur is -43 degrees celcius or lower and the available historical temperature record shows that winter temperatures in Eastern Ontario have never dropped this low.

These estimated low temperature thresholds also suggest that non-

native nut trees such as Japanese walnut, some northern pecans such as Carlson #3, and Korean and Swiss Stone pine are genetically capable of withstanding the severest of winter temperatures in Eastern Ontario. It is important to mention that although heartnut is a sport of Japanese walnut, its various cultivars may not have the same cold hardiness as the species. The Carpathian walnut is a more cold hardy strain of Persian walnut (*Juglans Regia*). Unfortunately, I could not locate any temperature hardiness estimates for the Carpathian strain of Persian walnut. The hardiness estimate for more usual strains of Persian walnut shows what we all know - they would not survive winters anywhere in Eastern Ontario. The University of Idaho Extension claims that the Carpathian strain of Persian walnut could survive USDA Zone 4, but observations locally, such as in the Dominion Arboretum in Ottawa and at the Long Sault plantation along the St. Lawrence River, suggest that Zone 4 winters in Eastern Ontario are taxing for Carpathian walnuts and cause considerable winter kill to limbs.

I could not find any low temperature estimates for hazelnut hybrids nor American chestnut but northern hazelnut hybrids growing successfully in parts of Quebec and Eastern Ontario and a small grove of healthy America Chestnut trees growing in Eganville (lat. 45.54° N) suggests these nut tree species can successfully withstand the lowest

Nut Tree Species or Cultivar	Estimated Low Tolerance Temperature (C.)	Source
Butternut	-51	George et al. (1974)
Black Walnut – Northern Origins	-43	George et al. (1974) George et al. (1977)
Japanese Walnut	-40	Sakai (1978)
Shagbark Hickory	-46	George et al. (1974)
Northern Pecan - Average	-35.4	Volk et al. (2009)
Northern Pecan – Carlson #3	-39	Volk et al. (2009)
Persian Walnut	-21	Charrier et al.. (2013)
Carpathian Walnut	ZONE 4 (?)	Barkley (2007)
Bur Oak	-46	George et al. (1974)
American Hazel	-54	George et al. (1974)
Korean Pine	-70	Sakai (1983)
Swiss Stone Pine	-70	Sakai (1983)

Table 1: Estimated Low Temperature Tolerance of Selected Nut Trees (in degrees Celcius)

winter temperatures in Eastern Ontario.

It is important to note that resistance to cold temperatures is just one aspect, although an extremely critical one, for growing nut trees successfully. Of course, there are other environmental aspects to consider. For example, insufficient late summer heat in much of Eastern Ontario would likely not enable pecan nuts to mature before the onset of winter, and plantings of American Chestnut trees would have to be sufficiently isolated to remain unaffected by chestnut blight. Thinking about the banana, orange and palm tree should make it easy to remember that the ability of a particular nut tree species to withstand winter cold needs to be

considered before it is planted at one's site. Of course, if you are like me you may well try experimenting with marginally hardy nut trees just to see whether they can survive from year to year. Realistically, the outcome of such experiments is typically not good but one can hope for pleasant surprises. For example, at my very cold orchard site of USDA Zone 4a I finally have achieved some success at raising a Carpathian walnut seedling that does not die back to the ground each winter and rebound from its roots in the spring like a garden perennial. This Carpathian walnut seedling has a trunk that has survived two winters (Chart 5). I'm crossing my fingers that this seedling will continue to perform well, especially given that it has been dressed up for winter! (Chart

6)

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Chart 5: Carpathian Seed-
 ling (Two Winters) – Septem-
 ber 28, 2020



Chart 6: Carpathian Seed-
 ling (Two Winters) Wrapped
 for Winter



Settling the age-old question: How is "pecan" pronounced?

American Pecans launches The Super Safe Pecan Debate

ORIGINALLY PUBLISHED ON OCTOBER 27, 2020 IN MISSOURI MORNING AG CLIPS

Presented by: American Pecan Council | PRNewswire

Editor's Note: At time of publication, this debate as concluded. It seems more Americans say pea-CON rather than PEA-con. [See more on the American Pecan Council Website.](#)

FORT WORTH, Texas — In a world that's a bit nutty – from socially distanced gatherings to murder hornets to a contentious election season – there is one thing we can all agree on this holiday season: pecans are a staple on the holiday table and make everything more delicious. But the country is still divided – is that delicious pie "PEA-can" or puh-CON? That's why American Pecans is launching The Super Safe Pecan Debate, the partisan issue you can passionately argue without risking your invitation to next year's family gathering.

To settle the debate once and for all, American Pecans is calling pecan fans from across the country to visit PecanDebate.com, cast your vote for "PEA-can" or "puh-CON," and share your pronunciation with pride using #pecandebate. Once you've hit the virtual pecan polls, enter for a chance to win one of 300 limited-edition pecan snacking blankets that feature the two pronunciations on opposite sides. In addition to showing off your "PEA-can" or "puh-CON" preference with pride, the pecan snacking blankets may be this holiday season's nuttiest accessory. Thanks to a pocket for holding fresh pecans, you can nosh on The Original Supernut™ throughout the holiday season – all the while getting a much-needed feeling of safety from the world's nutty chaos that only a soft and cozy blanket

can provide. The winners of the pecan snacking blankets will also receive a snack pack of fresh pecans and recipes for delicious and nutritious holiday snacks. Pecans are a holiday staple used in both traditional recipes and snacks, and demand for the nut has continued to increase this year. As consumers embrace trends like cooking at home and healthy snacking, pecans sales have increased. From September 2019 – August 2020, U.S. pecan sales rose 17 percent compared to the previous year.

"2020 has given us a lot to discuss – and even more topics to avoid at this year's Thanksgiving table – but 'puh-CON' vs. 'PEA-can' is one debate you can safely bring up with family and friends. With voting top of mind, we knew it was the

perfect time to re-ignite the age-old pecan pronunciation question,” said Alex Ott, Executive Director of the American Pecan Council. “Even across the 15 pecan-growing states from California to the Carolinas, growers and shellers themselves say it differently. So we’re asking America to help us settle it once and for all and encourage everyone to join in on this fun, light-hearted debate. But no matter how you say them, we can all agree that pecans belong on every Thanksgiving table.”

Pecans on the Holiday Table

While beloved in pie, pecans are a versatile nut that can be used throughout the season. Add a twist to holiday snacking favorites with Pecan Spinach Artichoke Dip, Pecan Stuffed Dates and Pecan Roasted Beet Dip with Sage or enjoy delicious grab-and-go options like Gingerbread Pecans, No-Bake Pumpkin Pecan Pie Bites or even a handful straight from the bag. Each one-ounce serving of pecans offers 3 grams each of plant-based protein and fiber and 12 grams of ‘good’ monounsaturated fat with just 2 grams of saturated fat. So whether you’re stress eating through election results or grazing through a holiday movie binge fest, pecans are the ideal snack to get you through the season. Find a variety of both sweet and savory recipes and inspiration at AmericanPecan.com.

To cast your pecan pronunciation vote and enter for a



chance to win one of 300 pecan snacking blankets, you can visit PecanDebate.com from Tuesday, October 27 – Friday, November 6. You can also share your personal pecan perspective by using #pecandebate and tagging @AmericanPecan on Facebook, Instagram, Twitter- and Pinterest. The poll results will be announced before Thanksgiving, and the winners of the blanket and pecan snack pack will be notified after the giveaway has closed. About the American Pecan Council The American Pecan Council (APC) is a group of passionate pecan growers and shellers whose life work is dedicated to growing, harvesting and processing

America’s native nut. Founded in 2016 through a Federal Marketing Order, the APC’s mission is to promote the many benefits of the American Pecan and help tell the story of this truly unique nut. With oversight by the USDA, APC aims to build consumer demand, develop markets and establish industry standards. APC is based in Fort Worth, Texas, and funded by pecan handlers in 15 pecan-producing states: Alabama, Arkansas, Arizona, California, Florida, Georgia, Kansas, Louisiana, Missouri, Mississippi, North Carolina, New Mexico, Oklahoma, South Carolina, and Texas. To learn more visit www.AmericanPecan.com.

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