4-H Foundations of Maple Sugaring Enterprise: From Sap, to Syrup, to Sales
2025 Instructional Content Guide for Volunteers and Club Leaders

Unit 2: The Sugarhouse

Goals:

1. Provide educational experiences related to converting maple sap to maple syrup for storage and use.
2. Provide experiences rooted in positive youth development for Maine 4-H youth. (See PYD Planning Guide on the last page.)
3. Facilitate the learning and practice of entrepreneurial and workforce skills related to maple forest agricultural occupations in northern New England.

Learning Objectives *The items with an asterisk are assessed for the Level 1 Digital Badge	**Activities & Resources** (Instruction will be virtual or remote unless noted as an in-person activity) **Three Types of Selected Student Resources (SSR)** **Orange- Activity or Worksheet** **Black- Informational Resource** **Purple- Lesson Plan led by an Adult**	**Citations for All Sources and References**
*Recognize one data collection and record keeping method for sap flow	**SSR 2A** - Weather Patterns and Sap Flow	Cameron, J. (1995). Document file pp.25 & 44 **(SSR 2A)** Wolfe, L.M. (2019). p.63
*Recognize and explain how an evaporator processes maple sap	**SSR 2B** - Evaporator Pan Drawing and Continuous Boil Pan Diagram ***In-person activity at host site***	Perkins, et al. (2022). pp.7-2 to 7-7 Vermont Evaporator Company (2023). Document file pp.7 & 19 **(SSR B)** Wolfe, L.M. (2019). pp.46-48 ***Host Guide: Week 1-Operating a Sugarhouse, Items #1 & #2***

*Identify the different parts of an evaporator (ex. 2' X 6' size evaporator)	**SSR 2C** - Evaporator and Sugarhouse Diagrams **SSR 2D** - Evaporator and Flue Diagram with Description ***In-person activity at host site***	Berkshire-Pioneer Resource Conservation & Development (2012). pp.8-9. Massachusetts Maple Producers Association (n.d.). **(SSR 2C)** Perkins, et al. (2022). pp. 7-2 to 7-11 Wolfe, L.M. (2019). pp.46-48 **(SSR 2D)** ***Host Guide: Week 2-Operating a Sugarhouse, Items #1 & #2***
*Recognize the function of a reverse osmosis machine	**SSR 2E** - Reverse Osmosis Description and Diagram **SSR 2F** - Images of Reverse Osmosis Machines ***In-person activity at host site***	Perkins, et al. (2022). pp.7-26 to 7-29 Wolfe, L.M. (2019). pp.48-49 **(SSR 2E)** Cornell Maple Program (2020). pp.89-95 **(SSR 2F from p.92-95)** ***Host Guide: Week 2-Operating a Sugarhouse, Items #3 & #4***
*Define liquid density as it relates to maple syrup	**SSR 2G** - Sugar Concentration and Hydrometers	Cornell Maple Program (2020). pp.99-101 NH Agriculture in the Classroom (2023). *Sugar Concentration and Hydrometers* **(SSR 2G)** Perkins, et al. (2022). p.7-6, 7-20 & 7-21

		Optional from Week 1-**SSR 1E**-How Sweet is Maple Sap
*Recognize how a thermometer and hydrometer are used to measure maple syrup density	**SSR 2H** - Hydrometer and How to Use It ***In-person activity at host site***	Perkins, et al. (2022). pp.7-20 & 7-21 Wolfe, L.M. (2019). pp.51-53 **(SSR 2H)** Cornell Maple Program (2020). pp.99-101 ***Host Guide: Week 2-Operating a Sugarhouse, Items #5***
*Name essential safety practices for sugarhouse operations	**SSR 2I** – Sugarhouse Safety	Cornell Maple Program (2020). pp.116-119 **(SSR 2I)** Perkins, et al. (2022). Chapter 7 (pp.7-1 to 7-44)
*Describe how maple syrup is filtered before bottling	**SSR 2J** – Filtering, Bottling & Storing Syrup	Cornell Maple Program (2020). pp.7, 11, 102-105 **(SSR 2J)** Perkins, et al. (2022). 8-3 to 8-12 Wolfe, L.M. (2019). p.54-56
Observe an evaporator with a finishing pan create a final syrup	***In-person activity at host site***	***Host Guide: Week 2-Operating a Sugarhouse, Item #6***
*Recognize the components of clarity, color, density and flavor for grading maple syrup	**SSR 2K** - Flavour Wheel for Maple Products	Agriculture and Agri-food Canada (June 25, 2021). **(SSR 2K)** Cornell Maple Program (2020). pp.106-113

		Perkins, et al. (2022). pp. 8-2, 8-3, & G-9 U.S. Department of Agriculture (March 2, 2015) Wolfe, L.M. (2019). pp.58-62
Identify different grades of maple syrup	**SSR 2L** - Maple Syrup Taste Test ***In-person activity at host site***	Cameron, J. (1995). Document file pp.124 **(SSR 2L)** ***Host Guide: Week 2-Operating a Sugarhouse, Item #7***
Demonstrate how to record maple syrup production	**SSR 2M** - Boiling Record Sheet ***In-person activity at host site***	Wolfe, L.M. (2019). Appendix F, pp.93 **(SSR 2M)** ***Host Guide: Week 2-Operating a Sugarhouse, Item #8***
*List essential practices for bottling and storing maple syrup	**SSR 2N** - Filtering, Bottling & Storing Syrup ***In-person activity at host site***	Cornell Maple Program (2020). pp.114 **(SSR 2N)** Perkins, et al. (2022). Chapter 8 (8-1 to 8-33) & pp.14-2 to 14-4. Wolfe, L.M. (2019). pp.54-56 Vermont Evaporator Company (2023). Document file p.17

		Host Guide: Week 2-Operating a Sugarhouse, Item #9
*Recognize the steps to shut down and close an evaporator at the end of a boiling session	***In-person activity at host site***	Wolfe, L.M. (2019). pp.56-57 Perkins, et al. (2022). pp.7-24 to 7-26 ***Host Guide: Week 2-Operating a Sugarhouse, Item #10***
*Identify the best practices to close a small sugarhouse operation with bucket and tube sap collection at the end of the season	**SSR 2O** – Closing Sap Collection System at End of Season	Cornell Maple Program (2020) p.6, 7, 10, 11, 31, 32, 72, 79-81 **(SSR 2O)** Wolfe, L.M. (2019). p.32, 43, 45
*Identify maple related workplace traits and skills that are transferable from maple sugarhouse operations to other industries[1]	***In-person activity at host site***	***Host Guide: Week 2-Operating a Sugarhouse, Item #11*** National Council for Agricultural Education (2024).
*Recognize four or more occupational activities that are connected to maple sugarhouses and processing maple syrup.	Activity by UMaine Extension Staff	National Center for O*NET Development (2024). U.S. Bureau of Labor Statistics (July 25, 2023).

Sources and Text Resources:

[1] This learning objective can lead to instructional alignment with *AFNR Standards:* CRP.09.02. Implement personal management skills to function effectively and efficiently in the workplace (e.g., time management, planning, prioritizing, etc.).

- Agriculture and Agri-food Canada (June 25, 2021). Maple syrup flavour research: Flavour wheel for maple products. https://agriculture.canada.ca/en/science/story-agricultural-science/scientific-achievements-agriculture/maple-syrup-flavour-research#b
- Berkshire-Pioneer Resource Conservation & Development (2012). *Massachusetts Farm Energy: Best Management Practices Guide for Maple Sugaring*. Massachusetts Department of Agricultural Resources. Amherst, MA. https://massfarmenergy.com/wp-content/uploads/2014/03/Maple%20Sugaring%20Best%20Practices.pdf
- Cameron, J. (1995). *Maple Syrup General Level: Guide for Leaders and Youth Leaders*, Ontario 4-H Council. https://4-hontario.ca/wp-content/uploads/2022/01/Maple-Syrup-General.pdf
- Cornell Maple Program. (2020). *Maple Syrup Production Beginner's Notebook.* Cornell University. https://bpb-us-e1.wpmucdn.com/blogs.cornell.edu/dist/7/5773/files/2020/02/beginner-notebook-1st-ed-1.pdf
- Massachusetts Maple Producers Association (n.d.). *Evaporator and Sugarhouse Diagrams*. https://www.massmaple.org/web/wp-content/uploads/2017/05/EvaporatorandSugarhouseDiagrams.pdf
- National Center for O*NET Development (2024). *My Next Move*. U.S. Department of Labor, Employment & Training Administration. https://www.mynextmove.org/
- National Council for Agricultural Education (2024). Agriculture, Food and Natural Resources Content Standards: Career Ready Practices. https://thecouncil.ffa.org/afnr/
- New Hampshire Agriculture in the Classroom. (2023). *Tapping into Maple Tradition: Lessons and Activities.* https://newhampshire.agclassroom.org/resources/maple_lessons/
- New York State Maple Producers Association. (2017). *Maple Activities-6th Grade.* https://bpb-us-e1.wpmucdn.com/blogs.cornell.edu/dist/7/5773/files/2021/02/6th-grade-worksheets-revised.pdf
- Perkins, T.D., R.B. Heiligmann, M.R. Koelling, and A.K. van den Berg (Editors). 2022. North American Maple Syrup Producers Manual. Third Edition. The University of Vermont and the North American Maple Syrup Council, Burlington, Vermont. www.mapleresearch.org/manual/
- U.S. Department of Agriculture (March 2, 2015). *United States Standards for Grades of Maple Syrup.* https://www.ams.usda.gov/sites/default/files/media/MapleSyrupStandards.pdf
- Vermont Evaporator Company (2023). *Curriculum for Little Kids, Big Kids and Biggest Kids!: For the biggest kids*. https://vermontevaporator.com/at-school/
- Wolfe, L.M. (2019). *Maple: A Sap to Syrup Guide-A Manual for Career and Technical Centers of Vermont*. University of Vermont. https://www.uvm.edu/sites/default/files/media/Maple_Mini_Manual.pdf

Positive Youth Development (PYD) Planning Guide

4-H Maple Sugaring 101

Please list the ways in which you plan to incorporate each of the PYD Objectives (below) into your learning experiences.

BELONGING *Objective: Youth will feel connected to their peers* How will you create a sense of belonging in your activities and meetings?	SPARKS *Objective: Youth have the opportunity to explore something they care about, their "sparks"* What "sparks" will you be facilitating in your activities?
HANDS-ON *Objective: Youth will "learn by doing" a hands-on experience* What hands-on experience will you be facilitating during the on-site visits or at another time?	REFLECTION *Objective: Youth have the opportunity to reflect on their learning experience* How will you facilitate youth reflection in your activities?