

Course: Maple Production

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Unit	Time Frame	Learning Target(s)/Objective(s)	Standards	Vocabulary	Assessments	Program Materials/ Resources
Tool/Equipment ID	Daily at the start of class	Identify the tools and equipment commonly used in the Maple Industry; Describe the function of each tool or piece of equipment	ESS.01.02.02.a. Identify basic environmental monitoring instruments and explain their uses.	5/16" Tubing, 3/16" Tubing, 1/2" Mainline, 3/4" Mainline, 1" Mainline, 1 1/4" Mainline, 1 1/2" Mainline, Clear 5/16th Spout, Clear Check Valve Spout, Tree Saver Spout, Sanitary Tree Saver Spout Extension, Tee with Plug, Cup Tee, Straight Connector, Hooked Connector, Quick Disconnect 5/16", 5/16" Y Fitting, Stub Spout, Stub Adaptor, Check-Valve Adapter, Dead End Tee, End Hook 5/16", Slide Fitting 5/16", End Ring, 5/16" End Y Fitting, Tubing Support, Plug, Spout Plug, 3/16" Spout, Tee w/ Plug 3/16", End Hook 3/16", Two Hand Tubing Tool, One Hand Tubing Tool, Quick Seal Mainline Entrance Fitting, Mainline Base Tee, Mainline Stars, Mainline Tee, Y Fitting, End Cap, Tubing Cutter, Sight Level, Mainline Tubing Tool, Wire Tire, Hand Tying Tool, Automatic Wire Tying Tool, Lag Bolt with Insulator, Wire Tensioning Device, Wire Tensioning Handle, Cable Grip Tubing Puller, 5/16" Tree Saver Bit, 7/16" Bit, Spout Brush, Aluminum Spout, Plastic Bucket Spout, Sap Sak Holder, Sap Sak, Sap Bucket, Plastic Sap Bucket, Dial Thermometer, Digital Thermometer, Scoop, Skimmer, Syrup Draw Off Pail, Sap Defoamer, Float, Sap Regulator Arm, King & Leader Bridge, S/S Plug, Maple Syrup Grading Kit, Square Sample Bottle, Syrup Hydrometer, Sap Hydrometer, Testing Cup, Syrup Refractometer, Sap Refractometer, Filter Press Frame, Filter Press Paper, Filter Aid Whisk, Filter Press Hose, Filter Aid, Syrup Filter, Flue Brush, Lollipop Mold, Maple Candy Mold, Drum Pump, Half Pint Container, Pint Container, Quart Container, 1/2 Gallon Container, Gallon Container, High tension wire, Pruning shears, Wool or synthetic cone filter, S/S Heavy Clamp, Teflon Gaskets, S/S Square Head Plug, S/S Ball Valve, Band Clamp, Thread Tape, RO Strainer	Quizzes after every 20 Daily Flashcards	Physical Tools, Paper, Pencil
The Maple Resource	February	Describe the maple resource in NYS, Compare the maple resource in NYS to the U.S and Canada.	NRS.01.01.01.a. Summarize and classify the different kinds of natural resources using common classification schemes (e.g., living versus non-living, renewable versus nonrenewable, native versus introduced, etc.).	Acer, Crop Trees, Roadside Trees, Sugarbush, Sugaring(Syruping), Sugaring Season, Sugarmaker(Syrup maker), Wood trees	U.S Maple Resource Graph	Statistics of different maple tree species and their location, iPad/Computer

Maple Sap Production: Tapping, Collection, and Storage	February/March	Explain tapping techniques, guidelines, and skills used in the industry, Discuss advantages and disadvantages to different tapping and collection methods.	NRS.01.03.02.a. Research and summarize how climate factors influence natural resource systems.	Concentrate, Permeate, Dropline, Dual conductor/Wet-Dry Conductor, Dump Unit/Releaser/Extractor, Feed Line, Feed Tank, Feed Rate, Gathering pail, Gathering Tank, Lateral Line, Mainline, Mainline Installation Tool, Maple Sap, Natural Vacuum, Open taphole, Reaming, Retapping, Reverse Osmosis, Rule of 86 (Jones Rule of 86), Saddle fitting, Sap, Sap Bag, Sap Bucket, Sap Flow Mechanism, Sap Ladder/Star Ladder, Sap Run, Sap Season, Sap Storage Tank, Spout/Spile, Taphole, Taphole closure, Taphole drying, Tapping, Tapping guidelines, Tubing, Tubing Fittings, Tubing Manifold, Tubing System, Vacuum pump, Vacuum system, Vacuum transfer, Zone of discoloration(Stain)	PBL Lab Data Collection, Current Event	Woodlot, Sap Buckets, Spouts, Drill, Hammer, iPad/Computer
Maple Syrup Production: Chemistry, Density, Flavor	February/March	Explain production techniques in NY approved by the IMSI/NAMSC, NYSMPA and the Cornell Maple Research Team, Identify and Describe the different parts of an Evaporator/Sugarhouse and how they operate, State the correct point where syrup becomes syrup.	FPP.02.02.01.a. Examine and describe the basic chemical makeup of different types of food. FPP.03.01.01.a. Summarize characteristics of quality and yield grades of food products. FPP.03.01.01.b. Analyze factors that affect quality and yield grades of food products.	Batch Processing, Baume Scale, Blow test, Apron Test, Arch, Automatic Draw-off, Back pan (flue or sap pan), Brix Scale, Browning, Buddy, Carmelization, Maillard Reaction, Ceramic Insulation, Chasing the Sweet, Continuous flow evaporator, cross-flow pans, Defoamer, Density, Draw-off partition, Drop Flue, Evaporator, Felt-hat filter, Finished Syrup, Finishing Pan, Flat-bottom pan (syrup pan, front pan), Flavor, Flooding the rig, Flue, Gradient, Hood, Hot Test, Hydrotherm, Maple Syrup, Niter/Sugar sand/Scale, Off-flavored, Piggyback, Preheater, Raised Flue, Regulator Box, Reverse Flow Pans, Sap Preheater, Steam Hood, STEAM-AWAY, Syrup Density, Vapor Compression, Viscosity, Air Injection Devices	PBL Lab Report	Woodlot, Sap Storage Tank, Evaporator, Hydrometer, iPad/Computer
Syrup Filtration, Grading, Packaging, and Storage	February/March	Identify bottling and packaging instruments, Describe proper bottling and packaging techniques, Classify maple syrup based on the Grading Standard.	FPP.01.03.01.b. Analyze characteristics of food products and determine appropriate storage procedures. FPP.03.02.04.a. Summarize types of materials and methods used in food packaging and presentation.	Canister pressure filter(canister filter press), Plate Pressure Filter, Clarity, Diatomaceous earth (DE)/Filter Aid, Filtration System, Flat Filter, Grading Kit, Grading Standard, Gravity Filter, Hot pack, Permanent Glass Comparator, Prefilter, Settling, Small pore filter, Stack burn, Syrup Grading, Syrup Grade, Temporary Grading Kit		Evaporator, Syrup Filters, Grading Kit, Mason Jars
Safety and Sanitation in the Sugaring Operation	March/April	Discuss safety practices in the sugar bush and sap house, Identify food safe methods of sanitation in maple production.	PST.02.02.02.b. Apply safety principles and applicable regulations to operate equipment, machinery and power units used in AFNR power, structural and technical systems.	Material Safety Data Sheets (MSDS), PPE, Ultraviolet light (UV)		Sap Buckets, Spouts, Evaporator, Water, Sanitizing solution

<p>Added Value Products: Cream, Sugar, Candy, etc.</p>	<p>April</p>	<p>Develop a new maple product, Describe proper storage and packaging of different maple products, Explain the process of making different added value products, Discuss the economic advantage of added-value products.</p>	<p>FPP.02.02.01.a. Examine and describe the basic chemical makeup of different types of food. FPP.02.02.03.a. Research and summarize the application of biochemistry in the development of new food products (e.g., value added food products, genetically engineered food products, etc.). FPP.02.03.02.c. Design new food products that meet a variety of goals (e.g., consumer preferences, market, nutritional needs, regulatory requirements, etc.).</p>	<p>Crystal coating, Invert Sugar, Maple Butter/Maple Cream, Maple Candy, Maple Confection, Maple fondant/Maple nougat, Maple sugar, Maple taffy, Pig, Rock Candy, Secondary products, Seeding, Sugar-on-snow, Value added product, Additive Solution</p>	<p>Develop a New Maple Product</p>	<p>Syrup, Guest Speakers, Stovetop, Butter</p>
<p>Marketing Maple Products</p>	<p>April</p>	<p>Identify marketing management strategies, Describe the benefits/drawbacks of each management strategy, Create a Marketing plan for a new maple product.</p>	<p>FPP.02.03.02.b. Determine consumer preference and market potential for a new food product using a variety of methods (e.g., double-blind testing, etc.). FPP.03.03.03.a. Research and summarize different types of market demands for food products (e.g., local food, organic, non-GMO, etc.). FPP.03.03.03.c. Propose distribution plans for food products that meet specific market demands. ABS.05.03.01.b. Assess and select appropriate alternative marketing strategies (e.g. value-adding, branding, niche marketing, etc.). for AFNR businesses using established marketing principles. ABS.05.03.02.b. Compare and contrast the strategies of marketing for products and services used in AFNR businesses (e.g., direct marketing, commodities, etc.).</p>	<p>Market Research, Market Segment, Marketing, Niche Market, Publicity, Target Market, Advertising, Promotion, Wholesaling, Retailing</p>	<p>Create a Marketing Plan for new product</p>	<p>iPad, Computer, Pencil/Pen, Paper</p>

Economics of Maple Syrup Production	April/May	Determine the fixed and variable costs of a maple operation, Discuss government agencies responsible for regulation and enforcement of the NY Maple Industry.	NRS.02.01.02.c. Evaluate the impact and effectiveness of agencies associated with natural resources systems (e.g., regulation of consumption, prevention of damage to natural resources systems, management of ecological interactions, etc.). NRS.02.04.02.b. Assess the importance of the use of natural resources on local, state and national economies.	Fixed Costs, Variable Costs, Loss, Profit, Record Keeping	Current Event	iPad, Computer, Pencil/Pen, Paper
History of Maple Syrup Production	May	Describe the origins of maple syrup production, Examine the change/adoption of technology within the maple industry.	FPP.04. Explain the scope of the food industry and the historical and current developments of food product and processing. FPP.04.02.03.a. Research and describe current and emerging technologies related to food products and processing (e.g., high pressure processing of foods, automation, biotechnology, etc.). FPP.04.02.03.b. Evaluate desirable and undesirable outcomes of emerging technologies used in the food products and processing systems.	Sugar Camp		iPad, Computer, Pencil/Pen, Paper

Managing Maple Trees for Sap Production	May	Recognize sugarbush disorders caused by diseases, insects, animals, sap lines, overtapping, Describe different forest management strategies and the advantages for a maple operation.	NRS.01.05.03.a. Compare and contrast techniques associated with sustainable forestry (e.g., timber stand improvement, diversity improvement, reforestation, etc.). NRS.04.01.02.b. Assess and apply the methods used to improve a forest stand. NRS.04.02.01.a. Classify causes of diseases in plants and the correct authorities to whom some diseases should be reported. NRS.04.03.01.a. Categorize harmful and beneficial insects, as well as signs of insect damage to natural resources.	Basal Area, Crop Tree Management, Even-aged stand, Girdling, Group Selection, Individual Tree Selection, Intermediate Cut, Management Plan, Reproduction Harvest, Selection harvest, Shelterwood harvest, Sunscald, Uneven-aged stand	Current Event	iPad, Computer, Pencil/Pen, Paper
Maple Production Facilities	May/June	Recognize poorly maintained or damaged equipment, Discuss proper maintenance of equipment and facilities, Summarize different maple facilities (equipment, layout, building structure, technology, etc.).	PST.01.02.03.b. Select, maintain and demonstrate the proper use of tools, machines and equipment used in different AFNR related mechanical systems.	Cupola, Forced Draft Unit, Firebrick, Firing, Sugarhouse		Local Sugarhouses(field trip), iPad, Computer, Pencil/Pen, Paper

Planning a Maple Syrup Operation	June	Design a realistic maple operation, Estimate costs to get started and run the operation, Produce a plan to sell/market your finished product.	<p>NRS.03.02.01.b. Apply cartographic skills and tools and technologies (e.g., land surveys, geographic coordinate systems, etc.) to locate natural resources.</p> <p>PST.01.02.02.b. Calculate the maintenance and purchase cost of tools, machines and equipment used in AFNR.</p> <p>PST.01.02.02.a. Identify the tools, machines and equipment needed to construct and/or fabricate a project in AFNR.</p> <p>FPP.03.03.03.c. Propose distribution plans for food products that meet specific market demands.</p>	Stand Structure, Stand-forest, stocking, Sugarbush, Topographic Map, Wood trees	Design a Maple Operation	iPad, Computer, Pencil/Pen, Paper, Modeling supplies
Careers-Maple and Forestry	Scattered Throughout	Research careers in or directly related to the maple and forestry industries.	<p>CS.05.01.01.a. Identify and summarize the steps to pursue a career in an AFNR pathway (e.g., self-assessment, set goals, etc.).</p> <p>CS.05.01.02.a. Examine the educational, training and experiential requirements to pursue a career in an AFNR pathway (e.g., degrees, certifications, training, internships, etc.).</p>		Career Profile(s)	iPad, Computer, Pencil/Pen, Career Profile Sheet