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Market Requirements for Bulk Maple Syrup

Product specifications and manufacturing control measures

MAPLE INDUSTRY COUNCIL

CTAQ
CONSEIL DE LA TRANSFORMATION ALIMENTAIRE DU QUÉBEC

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1. Introduction

Maple syrup is part of Québec's cultural and gastronomic identity. According to 2023 statistics, Québec is the world's leading maple syrup producer (70% of global production), with **$598 million** in international exports in 2023.[1]

Québec exports most of its maple syrup to the United States (**62%**), Germany (**7%**) and France (**5%**). Canada exported to 64 other countries, representing **25.3%** of total Canadian exports.[2]

Expertise and quality

These statistics were generated through the expertise and rigorous quality controls of all of the players in the production chain (e.g., producers, processors, buyers, distributors, customers).

1 *Source:* quebec.ca/agriculture-environnement-et-ressources-naturelles/agriculture/industrie-agricole-au-quebec/productions- agricoles/production-sirop-erable-acericulture

2 *Source:* Agriculture and Agri-Food Canada

As with all food products, maple syrup is subject to several laws and regulations in Canada, such as:

Safe Food for Canadians Regulations (SFCR)[1]

Regulation respecting food (P-29, r.1) of the Ministère de l'Agriculture, des Pêcheries et de l'Alimentation (MAPAQ)[2]

The ***Règlement des producteurs acéricoles sur les normes de qualité du sirop, de l'eau et du concentré d'eau d'érable et sur le classement du sirop d'érable*** under the Act respecting the marketing of agricultural, fish and food products of the Ministère de l'Agriculture, des Pêcheries et de l'Alimentation (MAPAQ)

In addition to these laws and regulations, maple syrup must comply with the various legal food safety and quality requirements of the importing countries, mainly the United States and Europe. These legal requirements are constantly changing to meet consumer expectations, and prevent and control any emerging food danger.

Maple syrup buyers and processors are responsible for guaranteeing their customers around the world that all requirements have been met. To do so, they must ensure the maple syrup's compliance right from the first link in the production chain—the sugar bush. This guide includes:

- *the specifications for bulk maple syrup required by buyers based on legal and customer requirements;*
- *the preventive measures to put in place based on the main known risks involved in maple syrup production. When effectively implemented, these measures help prevent inconsistencies that could taint the quality and reputation of Québec maple syrup.*

The self-declaration register in the appendix must be completed by all producers who have committed to meeting the requirements set out in this guide.

2. Regulatory and market requirements

2.1 Definition and scope

The requirements set out in this guide apply exclusively to maple syrup as defined in the Canadian Standards of Identity:[4] *"Maple syrup is syrup obtained exclusively by the concentration of maple sap or by the dilution or solution of a maple product in potable water."*

Only maple syrup packaged in bulk for local or provincial trade or for export is subject to the specifications listed below.

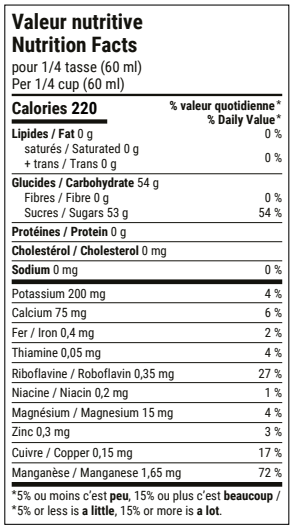
2.2 Specifications

The following table presents the specifications for maple syrup in compliance with current regulations and market requirements.

Buyers are entitled to refuse any maple syrup container that does not meet the specifications listed in this guide.

TABLE OF REQUIREMENTS

Parameters	Value/Description	Target (Limit if applicable)	Link/References
Origin	Province of Québec, Canada	–	–
Ingredient declaration	Maple syrup	–	–
Additives/ Processing aids	No food colouring or preservatives	0	–
	Antifoaming agent authorized for sugar maple cultivation	1. Food-grade, kosher, deodorized organic sunflower oil 2. Food-grade, glyceride-based, allergen-free antifoaming agent (< 10 ppm for sulphites) 3. Any other authorized kosher organic antifoaming agent Use according to industry best practices (IBP)	General principles and management standards[5] See Part 3: Risks and control measures during maple syrup production
	Filter aid	Only food-grade diatomaceous earth can be used in accordance with IBP	
Nutrients or amino acids added	No additives	0	Food and Drug Regulations (D-03-002)[6]

Parameters	Value/Description	Target (Limit if applicable)	Link/References
Nutritional value			–
Sensory criteria for bulk syrup**	Has a maple flavour characteristic of its colour class that can leave slight traces of caramel or wood flavour	5 (4)	Canadian Grade Compendium Volume 7 – Maple Syrup[7]
	No objectionable taste, aroma or odour	5 (5)	
	No defects, strange flavours or odours (e.g., ropy syrup, metal, plastic, detergent, naphthalene, byproducts of petroleum distillation or any other major defect)		
	Does not ferment		
	Appearance: clear, uniform colour, free of sediment and turbidity		
Physicochemical criteria	Brix (soluble dry extract at 20 °C)	66 to 68.9	Canadian Grade Compendium Volume 7 – Maple Syrup[7]
	pH	7 (6-8)	
Colour class based on percentage of LT (light transmission) ***	1 Golden, delicate taste	TL ≥ 75	Canadian Grade Compendium Volume 7 – Maple Syrup[7]
	2 Amber, rich taste	TL < 75 and TL ≥ 50	
	3 Dark, robust taste	TL < 50 and TL ≥ 25	
	4 Very dark, strong taste	TL < 25	

Parameters	Value/Description	Target (Limit if applicable)	Link/References
Authenticity	Pure, unadulterated, not mixed with contaminated syrup, including only expected substances	5	J. BAUER and L. LAGACÉ (2022) Centre ACER[8]
	No sugar added	0	
Microbiological criteria (recognized reference methods conducted by certified laboratories in accordance with standard ISO/IEC 17025 and based on Health Canada's Compendium of Analytical Methods)	Exempt from viscous or ropy organic substances resulting from microbial activity	5 (4)	See Part 3: Risks and control measures during maple syrup production
	Mesophile aerobic bacteria (UFC/g)	0 (10^2)	
	Yeasts and moulds (UFC/g)	(0) (< 10)	
	Pathogenic bacteria (Salmonella, Listeria) (UFC/g)	Absence / 25 g	
	E. Coli (UFC/g)	0 (< 10)	
Delivery lead time and conditions	Harvesting/delivery season	The syrup must be a product of the current season, stored and delivered at room temperature.	See Part 3: Risks and control measures during maple syrup production
	Bulk containers	– Food grade – In good condition and clean inside and out - Preferably made of stainless steel (allows for better syrup conservation) - Contained only maple syrup - A single legible label specifying relevant information (e.g., producer's address, production date) affixed to the container	
Heavy metals	Lead (ppm)	0 (0.11)	Proposition 65[9, 10] Preventive controls for maple products – Lead residues - CFIA
	Cadmium (ppm)	0 (0.003)	Dumont et al. (1995), Centre ACER[11]
	Arsenic (ppm)	0 (0.01)	Health Canada (e.g., maximum concentration = 0.010 ppm for drinking water)[12]
	Mercury (mg/L)	0 (0.001)	Health Canada[12]

Parameters	Value/Description	Target (Limit if applicable)	Link/References
Other chemical compounds	Formaldehyde (ppm)	0 (2)	M-35.1, r. 18[3]
	Sodium (ppm)	< 100 (500)	
	Iodide (ppm)	< 1 (5)	
	Perfluoroalkyl substances (PFAS)	0.5 µg/L for all PFAS	Drinking Water Directive (DWD)
	Nanoplastics	NA	Avoid advanced tubing wear
	Chlorates and perchlorates (mg/Kg)	0 (0.05)	Regulation (EU) 2020/685 of 20 May 2020[13] Chlorates et perchlorates (Centre ACER)[14] Infofiche Centre ACER : contaminants du sirop d'érable[17]
	Pesticides (ppm)	0 (Limit according to the country of distribution) Ban on the use of herbicides in sugar bushes	Maximum residue limits, human health, and food safety (CFIA)[15]
	MOSH/MOAH (mg/kg)	0 (MOAH < 0.5 /MOSH < 2)	Regulation (EC) 178/2002- Standing Committee on Plants, Animals, Food and Feed – Section: "Novel Food and Toxicological Safety of the Food Chain," 21 April 2022[16] Infofiche Centre ACER : contaminants du sirop d'érable[17]

Parameters	Value/Description	Target (Limit if applicable)	Link/References
Other chemical compounds (cont.)	GMOs	0	GMO: Regulation (gouv.qc.ca)[28]
	Radionuclides (Bq/kg)	0 (< MDL: minimum detectable level < 2)	Health Canada: Concentrations (Bq/kg) of radionuclides in foods from Total Diet Study in Ottawa, 2000[18]
	Bisphenol A and phthalates	Ban on BPAs in food-grade containers and plastics	European Commission (2024). COMMISSION REGULATION (EU) on the use of bisphenol A (BPA) and other bisphenols and their derivatives with harmonised classification for specific hazardous properties in certain materials and articles intended to come into contact with food Infofiche Centre ACER : contaminants du sirop d'érable[17]
	Other contaminants and adulterating substances	0 (Limit according to Health Canada)	Health Canada[12]
Allergens	Maple syrup must not contain any priority allergens in Canada (see list below).	Absent	FDR (B.01.010.1)[6] Health Canada: The Compendium of Food Allergen Methodologies - Canada.ca[19]
	Tree nuts (almonds, Brazil nuts, cashews, hazelnuts, macadamia nuts, pecans, pine nuts, pistachio nuts and walnuts)	Absent	
	Sesame seeds	Absent	
	Wheat or triticale	Absent	
	Eggs	Absent	
	Peanuts	Absent	
	Milk	Absent	
	Soy	Absent	
	Crustaceans	Absent	
	Molluscs	Absent	

Parameters	Value/Description	Target (Limit if applicable)	Link/References
Allergens (cont.)	Fish	Absent	
	Mustard seeds	Absent	
	Gluten	Absent	
	Sulphites	Absent (≤ 10 ppm)	
	Other allergens according to the country of sale: Eggs (all other animals), soy (including highly refined oils), buckwheat, peaches, products of animal origin (chicken, beef, pork), tomatoes, coconut, conch, fruit (mangos, kiwis), celery, lupin.	Absent	According to priority allergens of countries of sale: Food Allergen Labeling and Consumer Protection Act of 2004 (FALCPA) FDA[20] Food labelling: EU general rules - YourEurope (europa.eu)[21]
Foreign substances	Free from all foreign bodies	0 (10 µm)	See Part 3: Risks and control measures during maple syrup production
	Warm filtration prior to packaging	T ≥ 185°F	

** : *For these parameters, the rating band is as follows: 5-complies with the criteria outlined, 4-differs slightly, 3-differs significantly, 2-unacceptable*

*** : *Measurement parameters - Method 1: Light transmission measured with a spectrophotometer using square optical cells, path of light = 10 mm, wavelength = 560 nm, % light transmission compared with AR-grade glycerol, which represents 100% transmission. Method 2: Light transmission using a glass visual comparator whose optical specifications correspond to method 1.*

2.3 Requirements associated with the production site

Approval criteria for maple syrup producers are as follows:

2.3.1 Commitment from management at the production site

Maple syrup producers agree to comply with regulatory requirements and to provide a safe, high-quality product by meeting the specifications described in the table below. The self-declaration register in Appendix B reflects this commitment.

2.3.2 Good hygiene and manufacturing practices

This guide is intended for producers, and describes recognized control measures that have proven effective in mitigating food safety risks.

Given the specific characteristics of each production site (e.g., equipment, production method, source of potable water), each producer is responsible for identifying their own risks and implementing the preventive measures needed to comply with legal and market requirements.

These measures are mainly related to:

- **Good hygiene** (e.g., handwashing, behaviour of staff at the sugar shack)
- **Pest control** (e.g., rodents, birds, insects)
- **Allergen control**
- **Sugar shack and production equipment cleanup**
- **Chemical cleaning, maintenance and antifoaming agent control**
- **Potable water / air supply**
- **Equipment, production material and sugar shack maintenance**
- **Storage / Shipping**
- **Other**

Each producer can refer to recognized repositories for more information on the implementation of necessary preventive measures, such as:

- Preventive Measures – Canadian Food Inspection Agency (canada.ca)[22]
- CXC 1-1969: General principles of food hygiene: Codes of practice | CODEX ALIMENTARIUS FAO-WHO[23]

All producers must be able to demonstrate that they have effectively implemented these best practices in the event of an inspection or audit by an authorized representative.

2.3.3 Other specific requirements

The approval criteria for maple syrup producers are as follows:

1. Production log

Each site is responsible for maintaining a production log that includes at least the following information:

- Inspection of the washing and cleanliness of each barrel
- Barrel number
- Quantity of syrup
- Instruments used for process control (e.g., refractometer, thermometer)
- Production date
- Filling date
- Filtration temperature
- Antifoaming agent used
- Filtration product(s)
- Tubing, membrane and barrel cleaning products

The production logs must be available upon the authorized representative's request.

All production logs must be kept for a period of three years following shipments of conventional syrup, and five years for organic syrup. For more information or for use as a model, refer to the maple syrup production log proposed by the Centre ACER: *Registre de production du sirop d'érable - version 2*.

2. Mixing/Reworking syrup

Reworking maple syrup (reboiling, dilution or reprocessing after final packaging) in an effort to optimize quality during packaging at the plant is prohibited. Syrup must not be the result of mixing:

- End-of-season syrup with off-flavour with good-tasting syrup
- Ropy syrup from the previous season with syrup free from defects
- Syrup with microbiological alterations (fermentation or moulds) with good-tasting syrup
- A variety of syrups with off-flavour

3. Risks and control measures during maple syrup production

Three type of risks can make a food product unsuitable for human consumption:

Chemical risks (C)

Chemical risks can be natural or introduced during any of the stages of maple syrup production. For example, allergens can be introduced if they are present in an input (e.g., adjuvant or lubricant), or through improper practices or cross-contamination during production.

Physical risks (P)

The presence of a hard, pointy or breakable foreign body in any food product can cause illness and/or serious injury among consumers.

These contaminants can include metal (from equipment, utensils, facilities, packaging materials, explosions, staples, jewelry), wood (wooden material in the production area, pallets in poor condition), paint chips, sand and stones, among others.

Biological risks (B)

Biological risks include microorganisms such as bacteria, viruses, parasites, fungi and moulds. Sources of biological risks can include poor hygiene practices, an unsanitary environment resulting from a lack of cleaning, poor syrup filling practices, the presence of insects and rodents, condensation, and air and water contamination.

Maple syrup is not considered a food at risk of developing pathogenic germs because of its composition and the heat treatment that it undergoes during the sap concentration process.

Consequently, given the high concentration of sugar, mainly osmophilic yeasts (resistant to osmotic pressure) can develop, even in the absence of oxygen. Although the risk from a food safety standpoint is not critical, deterioration in the quality of the syrup can be considerable, resulting in syrup that ferments, is cloudy or has an off-flavour.

3.1 Control measures during maple syrup manufacture

The Maple Industry Council (MIC), with the help of NSF International, the global supplier of food safety and quality solutions, carried out a risk assessment during maple syrup manufacture. Following this analysis, the control measures to be put in place during maple syrup manufacture were identified. The full analysis is provided at the end of this document. It is based on a generic production model and can be adapted to the reality of any sugar bush. Refer to it for more details.

Below are the main control measures identified, which are necessary to ensure a process that allows for quality optimization and syrup preservation, in accordance with market specifications. Refer to the *Guide des bonnes pratiques* produced by Producteurs et productrices acéricoles du Québec (PPAQ) for the control measures associated with the manufacturing process environment and to the *Cahier de transfert technologique en acériculture* (CTTA, volumes 1, 2 and 3).

01. Potable water

- Water quality (municipal water, well water and filtrate) should be analyzed at least once a year (twice a year for well water).
- Adhere to Health Canada's microbiological standards (recommendations for drinking water quality in Canada).

02. Sap collection

- Do not use chlorine-based cleaning products (bleach) to clean tubing during harvest season or in the off-season.
- Instead, use 70% isopropyl alcohol-based products, acetic acid, peracetic acid or hydrogen peroxide to clean the tubing (refer to the Centre ACER's guide on cleaning methods using isopropyl alcohol in maple syrup production).
- Rinse the collection system components in accordance with the recommendations in effect.
- Pay attention to the location and installation of the collection tubes. Check the age of the tubing and be sure to replace it at appropriate frequencies.
- Choose light colour tubing to limit a rise in temperature of the sap.

03. Filtration and storage of sap, concentrate and filtrate

- Choose a food-grade filter that is easy to maintain and clean and can be appropriately inspected.
- Store the sap at as cold a temperature as possible (below 10 °C), and package it as soon as possible after collection, in accordance with conditions. Depending on the situation, the tank must be equipped with a lid or be in an area that minimizes contamination. The use of silos is preferable.
- Check the turbidity. Sap that is whitish in colour, cloudy, and has a foul or acidic odour or an abnormal texture must be discarded.
- A pH less than 6 could be a sign of a high level of microorganisms.

04. Concentrate evaporation

- Using evaporation water to recalibrate the syrup is prohibited.
- Reach the recommended Brix level (66 to 68.9) to avoid microbial growth.

05. Maple syrup filtration

- Filter the syrup at 80-85 °C (176-185 °F) for optimal effectiveness.
- Comply with filtration parameters.
- If the newly filtered syrup has an off-flavour, the filter must be changed or cleaned, and the filtration system cleaned prior to the next use.

06. Filling or putting into containers and sealing

- Containers must be washed in hot water or steam cleaned (inside and out) and dried.
- Inspect the barrels prior to filling using an appropriate light source.
- Hot-fill the containers (T ≥ 185 °F or another validated time/temperature combination) in a single sequence to keep the syrup from cooling during filling (avoid placing hot syrup over cooled syrup in the barrel).
- Fill the barrel to maximum capacity to limit the presence of oxygen, which promotes the growth of some microorganisms.
- Barrelling syrup from mixtures or reworking it is prohibited.

OTHER MEASURES TO PUT IN PLACE FOR THE PROCESS ENVIRONMENT

i. Measures to avoid biological or chemical contamination resulting from improper practices and leading to an alteration in the quality of the syrup and its shelf life

- Follow good hygiene practices such as handwashing before starting work, after eating, after going to the bathroom, following breaks and after any unsanitary activity.
- Be sure that the sugar shack is kept tidy, clean, well sealed (protected doors and windows) and free of pests (rodents, birds, insects) and pets.
- Oversee or subcontract pest management inside and outside the sugar shack, in accordance with the regulations and standards in effect for organic production. For more information, see Pest control – Canadian Food Inspection Agency (canada.ca).[27]
- Prohibit drinks, food and personal belongings in maple syrup production areas to avoid introducing sources of contamination through allergens.
- Wear clean work clothes.
- All equipment and material not intended for maple syrup production must be removed.

ii. Measures to avoid the chemical contamination of syrup through the production environment (surrounding activities, condition of the sugar shack and equipment, cross-contamination, chemical mismanagement)

- Ensure the absence of activities (e.g., industries that emit heavy metals such as lead) near the sugar bush resulting in sap contamination and exceeding limits.
- Ensure maintenance of the sugar shack in order to eliminate old siding that contains lead.
- For indoor wall coverings, use paints and materials approved for use in food establishments that do not contain lead or other chemical contaminants. Do not use paint on surfaces that come into contact with sap, concentrate or syrup.
- Equipment or material in contact with sap, concentrate or syrup must be food grade and lead free.
- Barrels and tanks made of galvanized steel must be eliminated.
- Parts that were soldered using a tin and lead alloy (before 1995) or galvanized (manufactured before 1994) are prohibited.
- Eliminate any terneplate, or bronze or brass joints in the production area.
- Choose equipment made of aluminum alloy, plastic or fibreglass, and food-grade equipment that complies with standard NSF 51-2023 (contact material made of stainless or food-grade steel, with no brass). Favour stainless steel (series 200, 300 or 400 in the SAE steel grades system – chrome content greater than 16%) in maple syrup production. For plastic, reference to the type of material (PET, PVC, PP, PS) does not guarantee that it is food grade (recycled resin).

- All production equipment design must depend on the risk associated with its use.
- Equipment that might contain lead and must be replaced includes sap spouts, buckets and pails, storage tanks, collection systems, valves, connectors, joints and level controls, preheaters, Piggy Backs and Steam Aways, syrup pumps, evaporator pans, finishers and tanks, maple sap pumps, syrup filter tanks, filtration units, and sap, concentrate and syrup tanks. For more information, refer to Centre ACER's *Guide d'amélioration des matériaux utilisés dans l'industrie acéricole*.
- Avoid cross-contamination from oils, grease or food-grade lubricants that may contain food allergens by requesting the supplier's specification sheet, allergen status and proof of the direct contact product's food-grade quality.
- Comply with the intended use of all chemicals (concentration, usage).
- Identify chemicals not approved for use with food, and avoid using them in sap collection and syrup production areas.
- Avoid syrup contamination resulting from faulty equipment (e.g., lubricant leak) by keeping production equipment in good working order (e.g., do general maintenance before the start of the season and monitor the condition of the equipment throughout the season).
- Apply best maintenance practices to avoid any contamination from maintenance products: use approved maintenance products, protect products during production, and clean and inspect after each maintenance operation that could contaminate the product or a contact surface.
- All chemicals at the sugar bush must be identified and safely stored, and kept away from production or chemical storage areas.
- Avoid contamination of syrup and production areas through the storage of agricultural chemicals (e.g., pesticides, antibiotics, fungicides) resulting from activities other than maple syrup production.
- Ensure appropriate and adapted lighting in production areas to avoid contamination resulting from handling or monitoring errors.
- Light fixtures must be protected and cleaned before the start of each season and as needed.

Appendix A
Generic HACCP plan for maple syrup production

Risk analysis for the maple syrup manufacturing process and identification of controls to put in place.

Note: *This section is not an exhaustive list of all inputs, possible production stages and related risks for maple syrup production. Each producer is responsible for conducting a risk analysis based on their production process, and ensuring that all risks are identified and controlled using effective measures.*

Input/Stage	Type of risk*	Description of risk	Source	Controls to put in place
Water	**B, C, P**	Contamination of product or surfaces in contact with a physical (e.g., particles , sand), chemical (e.g., chemical or environmental residues such as lead, pesticides or water treatment products) or microbiological (e.g., coliform bacteria, pathogens) contaminant	Use of non-potable water for cleaning equipment, barrels, materials and facilities, as well as handwashing	Comply with Health Canada's microbiological standards (recommendations regarding the quality of drinking water in Canada) according to the *Regulation respecting the quality of drinking water under the Environment Quality Act* Water quality (municipal water, well water and filtrate) should be analyzed at least once a year (twice a year for well water). Have water quality checked by an ISO 17025 certified lab.
Air	**B, C, P**	Microbial (e.g., moulds, bacteria, yeasts), chemical (non-food chemical compounds) and/or physical (presence of hazardous foreign substances) contamination of syrup resulting from contaminated air in the production area	Lack of ventilation systems in the production areas resulting in an accumulation of condensation Unclean air resulting from insufficient ventilation Ventilation system not suitable or not maintained (filters not changed) Unsafe natural ventilation (unscreened windows and doors left open, allowing particles and pests to enter)	Production areas must have natural (e.g., screened doors and windows) or mechanical ventilation allowing sufficient air exchange to evacuate the steam generated by the process, provide clean air and eliminate water condensation and odours that could have an impact on cleanliness and the quality of the syrup.

Input/Stage	Type of risk*	Description of risk	Source	Controls to put in place
Compressed air	**B, C, P**	Microbiological, chemical and/or physical contamination of the product from contaminated compressed air	Non food-grade compressor oil Contamination from water droplets, oil or particles because of a missing filter or failure to change a filter Compressors not maintained and not suitable for food use	Ensure appropriate maintenance of compressors used and change filters according to the required frequency, type of compressor and its use. Use food-grade oil for oil compressors. Check the effectiveness of preventive measures by testing the quality of the air coming into contact with the product, conducting tests in an ISO 17025 certified lab.
Containers	**B, C, P**	Microbiological, chemical and/or physical contamination of the product from contaminated non food-grade barrels or containers	Improper washing of containers Containers unsuitable for food use	Thoroughly clean containers (see syrup filling steps). Use food-grade containers.
Antifoaming agents	**C**	Presence of unreported allergens, contamination of syrup from chemical residues	Contamination of syrup from an unapproved antifoaming agent Presence of unreported allergens in antifoaming agent	Use an antifoaming agent approved for maple syrup: – Food-grade, kosher deodorized organic sunflower oil or – Food-grade, kosher, allergen-free, glyceride-based antifoaming agent or – Any other kosher antifoaming agent approved for organic syrup Ask for the supplier's specification sheet and use in accordance with the supplier's recommendations.
Tapping	**C**	Formaldehyde contamination and exceeding of legal limits in maple syrup	Sap contamination resulting from the use of formaldehyde for better flow during tapping	The use of formaldehyde is prohibited.[25]

Input/Stage	Type of risk*	Description of risk	Source	Controls to put in place
Sap collection	**C**	Sap contamination from chlorinated products (chlorates and perchlorates) and exceeding of allowable limits in maple syrup	Improper use of chlorine-based cleaning products and poor tubing sanitization practices	Avoid using chlorine-based cleaning products (bleach) at all times to clean tubing. Choose 70% isopropyl alcohol-based products, acetic acid, peracetic acid or hydrogen peroxide to sanitize tubing. Refer to the guide published by the Centre ACER: *Méthode d'assainissement à l'alcool isopropylique en acériculture.*
		Sap contamination from chemical residues (e.g., oil) in the vacuum pump	Vacuum pump not suitable for food use or in poor condition	Choose a dry vacuum pump or ensure that the oil pump is in good working order. Change the oil and filters as needed. Consider using food-grade oils if there is a risk of syrup contamination.
	B	Microbial growth in the sap	Slope too shallow or too steep Exposed tubing surface too broad, which increases the temperature Microbial flora in the tubing system	Pay attention to the location and installation of collector tubes. Check the age of the tubing. Choose light coloured tubing to limit a rise in temperature of the sap. Rinse the collection system components in accordance with the recommendations in effect.
	P	Plastic residues (nanoplastics) from degraded tubing	Advanced tubing wear	Be sure to replace the tubing after checking the appearance and the altered mechanical properties of the plastic and seals.
Sap filtration	**B, P**	Contamination or damage of the filter resulting in contamination of the sap from foreign particles (e.g., wood, bark, leaves or other detritus) and an increase in the microbial load	Poor maintenance or monitoring of filters (grills) Overly porous filter Filtration temperature that promotes the growth of microorganisms	Choose a filter that allows for easy maintenance and ensure appropriate cleaning and inspection. Choose an appropriate filter that reduces the number of microorganisms Ensure filtration at as low a temperature as possible (below 10 °C).

Input/Stage	Type of risk*	Description of risk	Source	Controls to put in place
Sap storage	**B, C, P**	Deterioration of the sap from improper storage	Storage at high temperature for an extended period of time Sap not properly protected from environmental contaminants	Store the sap at as cold a temperature as possible (below 10 °C) and package it as soon as possible after collection, in accordance with conditions. Depending on the situation, the tank should be equipped with a lid or in an area that minimizes contamination. The use of silos is preferable. Check the turbidity, since sap that is whitish in colour, cloudy, and has a foul or acidic odour or an abnormal texture must be discarded. A pH less than 6 could be a sign of a high rate of microorganisms. Reference: the turbidimeter reading should be less than 1 NTU and, in case of doubt, the pH or ATP[25, 26] can be measured.
Sap microfiltration and concentration through reverse osmosis or nanofiltration	**C**	Presence of unreported allergens: cross-contamination of maple syrup from sodium metabisulphite exceeding limits of 10 ppm Presence of cleaning residues from detergents used	Cross-contamination of maple syrup from nanofiltration and reverse osmosis membranes that were preserved in sodium metabisulphite to prevent the growth of microorganisms and that were improperly cleaned and rinsed before use Osmosis and membrane contamination from various cleaning products	Avoid storing membranes in the osmosis unit at the end of the season. Follow membrane and osmosis unit manufacturer's cleaning instructions (use a cleaning log). Apply the recommended sodium metabisulphite concentrations for membrane storage and for the various chemicals used for cleaning the osmosis unit. Have detailed instructions for cleaning membranes. Thoroughly rinse the membranes after storage and before their first use at the beginning of the season. Effectiveness: Verify whether the cleaning is effective by testing for the presence of cleaning products and sulphites in the rinse water and the first batch of maple syrup (at the beginning of the season). For example: – Measure the pH and conductivity of the rinse water. – Use the colorimetric method – Enzyme assay kit: detection limit > 5 ppm

Input/Stage	Type of risk*	Description of risk	Source	Controls to put in place
Sap microfiltration and concentration through reverse osmosis or nanofiltration (cont.)	**B**	Biological contamination of syrup as a result of poorly maintained filters/pre-filters	Poorly maintained or unmaintained filters	Replace filters/pre-filters at the beginning of the season and following maintenance or an extended shutdown. If used, filtrate must be stored under the right conditions (see sap storage).
Concentrate storage	**B, C, P**	Deterioration of sap concentrate from improper storage	Storage for an extended period at a high temperature Concentrate not suitably protected from environmental contaminants	Same control measures as at the "sap storage" stage
Evaporation of concentrate	**C**	Chemical contamination resulting from the use of antifoaming agents or dilution with contaminated water following concentration	Use of antifoaming agents not approved for maple syrup production or without following the manufacturer's instructions for best production practices Contamination with non-potable water	Choose antifoaming agents approved for maple syrup production. Use in accordance with the manufacturer's instructions and best production practices. Use potable water for dilution or choose filtrate.
	B	Microbiological contamination as a result of improper practices or compromised preservation (microbial proliferation once in barrels) as a result of an inappropriate Brix degree	Use of condensed water following evaporation to recalibrate the syrup Recommended Brix degree not reached	Avoid using evaporation water to recalibrate the syrup. Reach the recommended Brix degree (66-68.9) to avoid bacterial growth.
Filtration of maple syrup with diatomaceous earth	**B, C, P**	Chemical and biological contamination of syrup as a result of poorly cleaned and stored reusable filters, or inadequate or improper filtration	Improper filtration, allowing part of the nitre and lead content to pass through Improper filter maintenance and storage	Ensure that reusable filters are properly cleaned, dried and stored. Filter the syrup at 80-85 °C (176 185 °F) for optimal effectiveness. Comply with the filtration parameters. If freshly filtered syrup has an off-flavour, the filter should be changed or cleaned, and the filtration system cleaned before the next use. Use a food-grade filter.

Input/Stage	Type of risk*	Description of risk	Source	Controls to put in place
Filling maple syrup and putting it into containers	**B**	Contamination and microbial proliferation resulting from improper filling practices, leading to an alteration in the quality of the syrup and its shelf life	Poor hygiene practices during filling Unsanitary production equipment/areas Contaminated barrels Cold and improper filling of barrels Formation of water droplets (condensation), which can lower the sugar content at the surface and promote fermentation during storage Lack of contact on the inside of the barrels with the hot syrup	Follow best hygiene practices and keep the sugar shack in good condition. Steam clean containers and caps or wash with hot water (inside and out for barrels), and dry. In case of doubt, caps must be replaced. Inspect the barrels before filling. Ensure that containers are food grade, ideally made of stainless steel, and suitable for hot-filling with maple syrup. Hot-fill containers (T ≥ 185 °F or another validated time/temperature combination) in a single sequence to prevent the syrup from cooling during filling (avoid placing hot syrup over cooled syrup in the barrel). Fill the barrel to maximum capacity to limit the presence of oxygen, which promotes the growth of some microorganisms. Barrelling syrup resulting from a mixture or reworking is prohibited. Ensure the decontamination of the headspace and lid once closed (through contact with the hot syrup from tilting).[25] Following filling, store the barrels in a cool place for quick cooling.

Type of risk: physical (P), biological (B), chemical (C)

Appendix B
Self-declaration register

Self-declaration form - Bulk maple syrup producer

Season: 2025

Fill out this self-declaration and self-assessment form of measures put in place in accordance with IEC production specifications for the season underway.

1. General information

Company name: _____ PPAQ no.: _____

Sugar shack address: _____ Postal code: _____

City: _____

Province: _____

Contact (producer or person representing the producer)

Last name, first name: _____ Title: _____

Email: _____ Telephone: _____

2. Certifications/Declarations
(check off the appropriate box)

Is your syrup organic?

- ◉ **Yes** — If so, attach your certificate to this form.
- ○ **No**

Other claims (e.g., no GMOs, vegetarian)?

- ◉ **Yes** — If so, specify the claim in question:
- ○ **No**

3. Information about the syrup manufacturing process

Is the syrup produced exclusively from the concentration of maple sap?

☉ **Yes** ○ **No**

What is the syrup filtration temperature?
T(°F) > _____

What is the syrup filling temparature?
T(°F) > _____

Check off the appropriate box(es):
A production log specifying the following information is in place:

- ☐ **Washing and cleanliness of each barrel**
- ☐ **Barrel number**
- ☐ **Quantity of syrup**
- ☐ **Instruments used for process control** (e.g., refractometer, thermometer)
- ☐ **Production date**
- ☐ **Other** (specify):
- ☐ **Filling date**
- ☐ **Filtration temperature**
- ☐ **Antifoaming agent used**
- ☐ **Filtration product(s)**
- ☐ **Products for cleaning tubing, membranes and barrels**

Is it possible to determine traceability (e.g., sap collection, antifoaming agents used, packaging containers, shipping) using the production log in place?

- [x] **Yes**
- [ ] **No**

I commit to respecting the following statements.

The syrup is not the result of:

- [ ] **Concentrated rinse water from barrels that previously contained syrup**
- [ ] **End-of-season syrup with off-flavour**
- [ ] **Ropy syrup from the previous season**
- [ ] **A mixture of different syrups**
- [ ] **Syrup that was reworked after final packaging**

Which of the following antifoaming agents are used?

- [ ] **Food-grade, kosher, deodorized organic sunflower oil**
- [ ] **Food-grade, kosher, allergen-free, glyceride-based antifoaming agent**
- [ ] **Other kosher, food-grade antifoaming agent approved for organic syrup**
- [ ] **Other** (please explain)**:**

Check off the products used during filtration:

- [ ] **Food-grade diatomaceous earth**
- [ ] **Other** (please explain)**:**

Is formaldehyde used during collection?

- [x] **No**
- [ ] **Yes** (please explain):

Is the tubing cleaned using a base of:

- [ ] **Denatured ethyl alcohol**
- [ ] **Food-grade ethyl alcohol**
- [ ] **70% isopropyl alcohol**
- [ ] **12% sodium hypochlorite (chlorine)**
- [ ] **Other** (please explain):

The sap, concentrate and syrup tanks are cleaned with a base of:

- [ ] **Hot water**
- [ ] **Hot filtrate**
- [ ] **12% sodium hypochlorite (chlorine)**
- [ ] **Hydrogen peroxide (Oxisan)**
- [ ] **Other** (please explain):

If you use osmosis, are the membranes stored in the osmosis unit at the end of the season?

- [x] **Yes**
- [ ] **No**

If so, specify the solution in which the membranes are stored:

4. Good hygiene and manufacturing practices

Is the water used for handwashing and cleaning potable?

- [x] **Yes**
- [ ] **No**

Does the outside or inside of the sugar shack pose a risk of sap, concentrate or syrup contamination?

- [x] **Yes**
- [ ] **No**

Are pest control traps placed inside and outside the sugar shack?

- [x] **Yes**
- [ ] **No**

Are procedures for cleaning the sugar shack and equipment in place to ensure favourable conditions for syrup production throughout the season?

- [x] **Yes**
- [ ] **No**

Does the natural or mechanical aeration in the syrup production area allow for sufficient air exchange?

- [x] **Yes**
- [ ] **No**

Does all the equipment meet California Proposition 65 requirements with regard to lead?

- [x] **Yes**
- [ ] **No**

If not, please specify the reasons and the non-compliant equipment:

Are the compressors maintained? Are the filters and oil changed as needed?

◉ **Yes** ○ **No**

Are the equipment and material in contact with the sap and syrup, including submersible water pumps and back-flow pumps, food grade and compatible for use with potable water?

◉ **Yes** ○ **No** ○ **NA**

Is the production equipment inspected and maintained on a regular basis so that its condition does not pose a risk of sap, concentrate or syrup contamination?

◉ **Yes** ○ **No**

Is food-grade oil used for the oil compressors?

◉ **Yes** ○ **No**

Are all measurement instruments (e.g., thermometers, refractometers, scales) calibrated?

◉ **Yes** ○ **No**

Are cleaning and maintenance products appropriate for food production and does their use meet the supplier's recommendations?

◉ **Yes** ○ **No**

Are only chemicals used for syrup production stored inside the sugar shack?

◉ **Yes** ○ **No**

Are the syrup containers (e.g., barrels) inspected before use?

◉ **Yes** ○ **No**

If necessary, are non-compliant syrup containers thoroughly cleaned with hot water or steam cleaned, and then dried and inspected?

◉ **Yes** ○ **No**

Were reused containers used only for maple syrup and did they serve no other purpose?

◉ **Yes** ○ **No**

Are syrup containers stored away from sources of contamination and in such a way as to prevent them from being damaged?

- [x] **Yes**
- [ ] **No**

Are all products stored in such a way as to prevent their contamination?

- [x] **Yes**
- [ ] **No**

Are inputs, sap, concentrate and syrup stored under conditions (e.g., temperature, humidity, duration) that prevent contamination and microbial proliferation?

- [x] **Yes**
- [ ] **No**

When used, are the osmosis membranes stored and cleaned in accordance with the manufacturer's instructions?

- [ ] **Yes**
- [ ] **No** (please explain):

5. Declaration of food allergens

Allergen	Present in the syrup or sap	Present in another food product at the production site	Present at the production site
Nuts (almonds, Brazil nuts, cashews, hazelnuts, macadamia nuts, pecans, pine nuts, pistachio nuts and walnuts)	☐	☐	☐
Peanuts	☐	☐	☐
Sesame seeds	☐	☐	☐
Eggs and egg-based products	☐	☐	☐
Soy	☐	☐	☐
Wheat or other sources of gluten, such as barley, oats, rye and triticale	☐	☐	☐
Fish, crustaceans and molluscs (e.g., crab, shrimp, mussels)	☐	☐	☐
Mustard	☐	☐	☐
Sulphites (> 10 ppm)	☐	☐	☐
Other allergens according to country of sale: Eggs (all other animals), soy (including highly refined oils), buckwheat, peaches, products of animal origin (chicken, beef, pork), tomatoes, coconut, conch, fruit (mangoes, kiwis), celery, lupin	☐	☐	☐

6. Producer's declaration of commitment

- By completing this form, I declare having read the specifications, and I undertake to implement all the measures needed to meet the specified requirements.
- I agree to comply with all the regulations and laws that apply to maple syrup production.
- To ensure food safety and the quality of the syrup, I agree to implement the best hygiene and manufacturing practices set out in this guide.
- I certify that I have implemented the preventive measures needed to ensure compliance with the California Agreement on Lead: no paint containing lead in the processing area, no galvanized barrels used, all equipment listed in the table below is food grade, made of stainless steel or meets standard NSF 51-2023 (section 4.1.2) requirements.

– Sap spouts – Pails and buckets – Sap or concentrate collection and storage tanks – Collection tubes	– Valves, joints, connectors and controls – Preheaters, Piggy Backs and Steam-Aways – Syrup pumps – Evaporation pans – Tanks	– Sap pumps – Filling units – Filtration tanks – Filtration units – All other utensils (e.g., ladle, plunger)

- I confirm that the syrup is filtered and packaged at a temperature equal to or greater than 185 °F (85 °C), and that only authorized antifoaming agents are used.
- I agree to immediately notify the buyer of any change or incident that could affect the cleanliness, quality, legality or authenticity of the syrup.
- I accept that my site be audited by a representative as part of continuous monitoring and improvement.
- I agree to keep the production logs and all necessary documentation up to date and accessible, as needed.
- I confirm that all the information provided is true.

Signatory's name: _____ **Signature:** _____

Date of signature: _____

Appendix C
Glossary

Additive or processing aid: A product used to create a technical effect during food transformation or manufacture and, when used, does not change the item's inherent characteristics and does not result in any residues or only negligible residues of the substance or its by-products in the finished food.

Adulterant: A substance added to or fraudulently used in a product, which is then sold as something it is not.

Allergen: An allergen induces food sensitivity caused by a reaction of the body's immune system to particular proteins in a food. In people with allergies, the immune system incorrectly identifies a food protein as a harmful substance.

ATP: Adenosine triphosphate

Bq: The becquerel is a unit of radioactivity of a given sample of material equal to one atomic decay per second.

CFIA: Canadian Food Inspection Agency

CFU: Colony-forming unit

Control measure: Any means taken to prevent or eliminate a biological, chemical or physical hazard that poses a risk of food contamination, or reduce it to an acceptable level.

Cross-contamination: The process by which a biological, chemical or physical risk is unintentionally transferred from one person, object or place to another.

GMO: Genetically modified organism

Hazard: Refers to a biological, chemical or physical agent in a food, which, when not properly controlled, can lead to diseases or injuries for the person consuming the food.

IBP: Industry best practices

LT: Light transmission

MAPAQ: Ministère de l'Agriculture, des Pêcheries et de l'Alimentation du Québec

MDC: Minimal detected concentration

MOAH: Mineral oil aromatic hydrocarbons

MOSH: Mineral oil saturated hydrocarbons

pH: The abbreviation for potential of hydrogen is a measure of the degree of acidity or alkalinity of a solution.

ppm: Parts per million

Radionuclide: A substance that releases energy in the form of radiation.

Appendix D
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