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Maple water: A first look

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Drinking tree sap is common in several areas of the world, but is far less practiced in North America. Several new maple-sap derived beverages have been introduced into the consumer market and prominently featured in news articles over the past year.

This outlet for maple sap has considerable promise for opening up new avenues for the sale and consumption of maple products, particularly if it can achieve the success of its forerunner beverage, coconut water, and may help to produce a higher demand to meet the rapidly growing production of maple.

Fresh maple sap is considered a good hydration source, with few calories than coconut water, and typically with a good crisp, slightly sweet, vaguely woody

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taste. Maple products also have a distinct advantage in the North American beverage marketplace by appealing to consumers who wish to purchase locally-sourced products that are pure, highly sustainable and possess a small carbon footprint compared to coconut water.

Maple sap contains a reasonably high quantity of microbial food (sugar) making it a highly perishable product. Any marketing scheme for maple water must ensure that the product is quickly treated after collection and packaged rapidly to retain the freshness of the sap as it comes out of the tree and remain a pleasant-tasting and refreshing beverage.

There are several ways in which maple sap can be processed and packaged in preparation for marketing. Fresh sap could be filtered, bottled (or canned), and refrigerated for sale in local markets, most likely by individual maple producers. While this has the advantage of being fresh and not requiring much in the way of equipment, shelf-life would be relatively short. Thus maple sap sold in this way would be only a seasonal beverage. Alternatively sap could be frozen fresh or as concentrate after Reverse Osmosis (or nanofiltration) processing, and be thawed, diluted (if from concentrate) and bottled later.

Shelf life

This would maintain a shelf presence in the marketplace for a far longer period of time, but could be fairly expensive due to the need for large amounts of freezer storage. Treatment via different forms of pasteurization would improve the shelf-life to allow a wider geographic distribution over a longer time period, but might result in a slight alteration of the taste of the product through a small degree of caramelization during the heat-processing stage. Various "flash" methods of pasteurization can reduce this, but not eliminate it entirely. Cold processing of sap via high pressure pasteurization (HPP) will extend the shelf-life of sap by inactivating most microbes, although spores may persist and cause spoilage after a few weeks.

The advantage of HPP is that the flavor properties of the product are largely unchanged by the process. The disadvantage, beyond the relatively short shelf-life, is that there are relatively few places that do this process and package the product, thus the cost is high. To our knowledge, only one of the current sap products is produced by HPP.

In general, most maple sap-derived drinks will likely be processed by some form of pasteurization and aseptically packaged in either Tetrapaks® (paper and plastic cartons), aluminum cans, or retort pouches (plastic and metal foil pouches). This allows a much longer shelf-life of the product, and is readily accepted by consumers for a variety of products.

Only a handful of TetraPak® packaging plants exist in North America, and typically production runs are scheduled far in advance, which is problematic with the highly variable and unpredictable nature of maple sap flow.

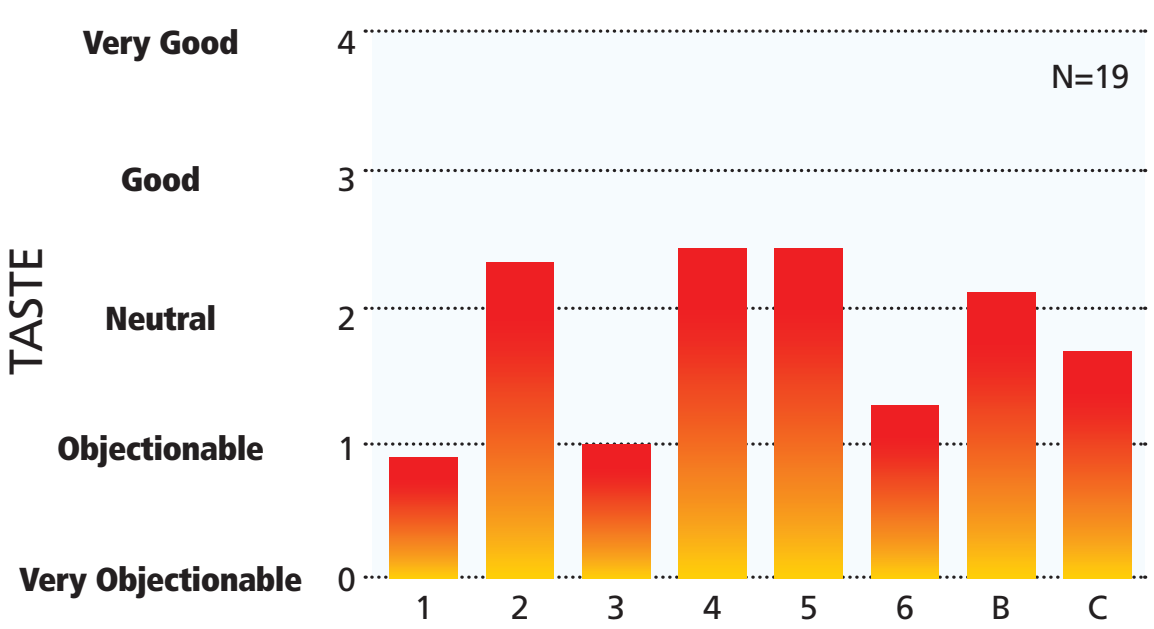
Given the relative newness of the maple sap beverage field and in order to become acquainted with the products, the University of Vermont Proctor Maple Research Center commercially acquired samples of several different offerings in the summer of 2014. Dr. Mike Farrell (Cornell University Maple Program) and Joël Boutin (CETTA, Quebec, Canada) assisted in acquiring one sample each, and Chris White (Underhill, Vermont) also obtained one sample for us.

Table 1. Maple-sourced beverages available and acquired in 2014.

Product (Package Type)	Serving Size	Calories/Serving	Total Carbs (grams/serving)	From (Co./Source of sap)
Better Sweet TetraPak® (single serve)	11.2 oz	35	9	DE/VT
Drink Maple TetraPak® (single serve)	8.45 oz	20	5	MA/Canada
Happy Tree Plastic bottle (single serve)	10 oz	30	9	NY/NY
Oviva TetraPak® (1 L)	8.45 oz	25	6	Quebec/Quebec
Vertical Water TetraPak® (2 servings)	8 oz	15	3	NY/NY
WahtaTetraPak® (single serve)	8.45 oz	20	5	Canada
TrēTap[1] Glass bottle (2 servings)	8 oz	5	2	VT/VT

[1] TrēTap is a maple water permeate beverage containing sweeteners, flavoring and preservatives. All others are maple sap based beverages.

Figure 1. Taste scores for beverages[1] tested in 2014.



[1] Beverages 1-6 are maple sap or flavored permeate, B is a birch sap beverage, C is a coconut water beverage

The beverages

The products (Table 1) included six maple sap beverages which listed only "maple sap" or "maple water" as the only ingredient. Several included the descriptor "organic" as part of their label. In addition there was one maple-permeate beverage, one birch sap beverage, and one coconut water used for comparative purposes (only the maple beverages are shown in Table 1).

The maple permeate beverage was described on the label as "water from organic maple trees" and also included maple syrup, cane sugar, preservatives and flavorings on the list of ingredients. The International Maple Syrup Institute currently has a committee discussing the standard of identity, possible naming conventions, and necessary regulations for maple sap derived beverages.

Six of the maple sap beverages were offered in TetraPaks®. Four of these were single-serving size, one contained two servings, and one contained four servings.

One of the maple sap beverages was packaged in a plastic bottle. Stated serving size ranged from 8.0 – 11.2 oz, averaging 9.1 oz. The six maple sap beverages contained 15 – 35 calories per serving, averaging 24.2 calories. Calories per oz varied from 1.88 – 3.13, reflecting differences in carbohydrate (predominantly sugar) content. The maple permeate product was packaged in a glass bottle and had the lowest number of calories and total carbohydrates per serving.

When poured into a clear glass container, most of the beverages were clear or nearly so (very slight yellow tinge to some). One contained a small amount of visible (sediment) that sunk to the bottom. One beverage was visibly cloudy and somewhat milky. We communicated with the company that produced this product about the obvious poor quality and were told it was likely that we had gotten a non-representative sample resulting from a temporary shut-down in the product line at the processing and packaging factory. We made several requests for a replacement sample of the product for subsequent evaluation, but never received one.

The maple sap beverage produced by HPP (which requires refrigeration after production) was clear, but upon opening had a poor odor and was ropey (caused by a gelatinous microbial polysaccharide secretion) even though it was still within the "use by" date stamped on the bottle. This sample was not included in taste tests. Since we do not know the history of storage on this product lot, we do not have any information on where or at what stage of processing, storage, or distribution this problem may have originated.

It is important to keep in mind that our testing only examined one particular lot of each of the products tested, so it is always possible that we encountered a "bad" batch that was not truly representative of the product.

To gather preliminary consumer reactions to these products, panels of volunteer tasters were assembled on two different dates. The total sample size was small, with a total of only 19 participants, however this study was not meant to be definitive, but rather to get a first impression ourselves and from other participants on obvious quality and taste attributes of products being offered in the marketplace. Participants were both male and female (approximately equal numbers) and ranged in age from 25 to 68 years.

About half had some significant involvement in the maple industry, but all were regular users of pure maple syrup. Several drank bottled water on occasion, and a few had tried coconut water prior to this testing. Participants were given approximately 1 oz sample of each beverage, in turn, in a plastic tasting cup and asked to rate the taste on a simple 0 4 point scale, where 0 = very objectionable, 1 = objectionable, 2 = neutral, 3 = good, and 4 = very good.

After approximately 30 seconds, participants also rated the after-taste using the same scale and noted any comments they wished to make. Participants were not allowed to make comments or converse with each other during the tasting. After each sample, participants drank bottled water to cleanse the palate.

Taste results

Results of the taste tests are shown in Figure 1. The identity of each beverage is not disclosed due to the small sample size and because of the fact that the samples used may represent an isolated bad batch. Aftertaste results generally mirrored those of the taste, so those results are also not shown.

In general, scores ranged from slightly above neutral to objectionable. Two of the beverages scored an average of objectionable (score of 1) or lower. An additional beverage was only slightly better than objectionable. Three of the maple beverages achieved an average score of neutral (2) or better. The highest score was 2.4, approximately half-way between neutral and good.

The birch sap beverage scored close to the higher ranking group of sap beverages. Notably, the birch product was extremely clear, and also contained a preservative (citric acid) to maintain freshness, which probably also contributed to the crisp taste of the product.

The coconut water beverage ranked below the top three maple beverages, but was above the lowest ranking three maple beverages.

Nearly all the written comments of the test participants were not positive and were elicited by the three beverages that received low taste scores.

Appearance and attractiveness of packing was also rated. Most participants felt that the packaging was generally appealing and adequately descriptive.

Some of the packaging mentioned the presence of beneficial properties such as minerals, vitamins, antioxidants, and phenolics.

Quality control

It is fairly clear from these results that some of the maple beverages are superior to others in terms of taste, although it is disappointing that none of the products scored higher than the neutral range in our test.

Fresh, early-season sap is very tasty and appealing and it should be possible to capture these qualities if sap is treated quickly and correctly and if stringent quality control procedures are followed.

The observed quality and taste issues with some of the current offerings will no doubt be sorted out by the marketplace, or through additional quality control efforts of the companies producing these beverages.

To that end, a recent North American Maple Syrup Council funded project by the University of Maine (Kathy Hopkins) and Cornell University (Dr. Michael Farrell) aimed at developing quality standards and procedures for producing small batch, seasonal maple sap-based beverages will help maple producers market their own sap.

Efforts by both maple producers and companies offering maple sap-based beverages should focus on quality control to ensure that consumers consistently receive a pleasing product. This would go a long way towards helping to make maple sap beverages a viable long-time source of demand for sap and revenue for maple producers.