

The nutritional influence of organic maple syrup on consumer health

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Abstract

The experimental study looked at the nutritional properties of maple syrup assortments. The physico-chemical analysis determined the content of soluble dry matter, reducing sugar, PH, acidity of the types of maple syrup. The aroma of the different varieties was highlighted by comparison with the standard scale, by comparing the natural aroma, by association with fruity, floral, caramel aromas. The antioxidant potential of maple syrup, the PH, the acidity were also highlighted. Soluble dry matter varied between the limits of 42.5 - 63%, indicating a high concentration in sucrose. However, maple syrup is recommended to be consumed like bee honey, having a significant amount of polyphenols, being a good natural syrup for preserving fresh fruit, sea buckthorn or in sugar-free diets. Maple syrup contains zinc, manganese, iron, calcium and potassium. Maple syrup contains up to 15 times more calcium than honey, another favorite sweetener. Compared to the same food, maple syrup also has a lower salt content. Among vitamins, maple syrup contains decent amounts of niacin, vitamin B2, vitamin B5, folic acid, vitamin B6, biotin and vitamin A.

Keywords: the beneficial effects of maple syrup

1. Introduction

The current context of international knowledge. Maple syrup was first classified in the 1920s into five categories. In the second half of the 20th century, it gradually replaced maple sugar as the consumer's favorite and could be found on supermarket shelves in the new size more suited to an increasingly urban lifestyle [15]. Characteristics of Canned Maple Syrup. Maple sap is the raw material from which pure maple products are made, including maple syrup, maple sugar and confectionary derivatives. It is a completely natural product, which is obtained from the sapwood (light-colored outer xylem tissue) of several species of maples [4]. The sugar in maple sap is the product of photosynthesis that occurred during the previous growing season. Photosynthesis produces carbohydrates, which are stored in the tree, predominantly in the form of starch and a small part in the form of sugars. During the winter, in maples, some of this starch is converted into sucrose and dissolves in the sap. The amount of sugar in the sap will depend on many factors, including the genetics of the tree itself, the quality of the soil it grew in,

the health of the tree, the environmental conditions of the previous growing season, and the weather conditions of the harvest season [5]. The sugar content of the sap is sometimes lower at the beginning of the extraction season, followed by a rapid increase and a slow decrease as the season progresses [6].

1.1. Sensory analysis.

The determination of the sensory characteristics was done using the method of comparison with control tests, according to the aroma characteristics below.

1.2. Classification.

The syrups classified in category A, are part of the early production, are lighter in color, do not have a strong aroma, and the taste is not very sweet. The product resulting from the last harvest, called generic degrees C, has a dark brown color, and the aroma is special, intense. This type of syrup is characterized by a high concentration of minerals and has a strong aromatic taste.

Category B syrups are intermediate in terms of harvest time and intensity of taste and color [8].



The quality of maple syrup is evaluated according to US and Canadian grading charts, with specific standards for judging the price of the product. The color intensity of the product is also evaluated (light-colored products tend to be more expensive). This means that brown syrup can be used as an indicator of irregularities that might occur during processing or microbial contamination [9]. Lighter maple syrups tend to be usually sweet and contain no other prominent flavors, and darker ones have burnt caramel flavors and can be mixed with light syrups for a classic "maple flavor." Previous studies report a preference for darker maple syrups over lighter ones. Darker syrups contain beneficial bioactive compounds such as polyphenols [10]. The Canadian Food Inspection Agency (CFIA) monitors the safety and quality of Canadian maple syrup, the Agency is responsible for the federal classification of Canadian maple syrup color descriptors and grades, ensuring that they align with international systems of classification standards. Canadian regulations define two grades for maple syrup: grade A and processing grade, and four color grades (golden, amber, dark, very dark) [14].

1.3. Grade A maple syrup.

According to the definitions dictated by the product specifications, maple syrup can only be classified as grade A if it meets the following requirements: not to have an undesirable uniform fermentation color, to be without sediments, without turbidity, characteristic natural maple flavor for all four color classes, no uncharacteristic odors or aromas. All color classes are characterized by a name and accompanied by a note about taste: gold - delicate taste, amber - rich taste, dark - strong taste, very dark - strong, predominant taste [13].

2. Material and methods

The flavour was determined by testing maple syrup samples at different concentrations against white or

brown sugar controls at the same concentration. The sugar syrup samples were flavored with coffee, vanilla, berry and rum flavors as well as floral honey in doses from 0.5 to 2.5 ml. Flavored syrup samples obtained as a blank tester obtained from brown sugar coincided with maple syrup samples with 32° Bx.

In the case of the yellow maple syrup, the tester blank samples matched only the sugar syrup enriched with floral honey 3 ml. A total of 21 samples of pure maple syrup received from manufacturers in Canada and the United States were analyzed for their chemical composition, pH and degrees Brix.

The main carbohydrates found in maple syrup: sucrose, glucose and fructose were determined using anion-exchange high-performance liquid chromatography (HPLC) with pulsed amperometric detection. Sucrose content was found to vary from 51.7 to 75.6%; Glucose and fructose content ranged from 0 to 9.59% and 0 to 3.95%, respectively. The main organic acid present in maple syrup was malic acid. Traces of citric, succinic and fumaric acids were also present. All organic acids were determined by ion-exchange HPLC analysis with UV detection at 210 nm. Malic acid levels ranged from 0.1 to 0.7% [11].

The citric, succinic and fumaric acids were found to be present at levels less than 0.06 ppm. Inductively coupled plasma atomic emission spectroscopy was used to analyze potassium, magnesium and calcium, the main minerals found in maple syrup. Potassium was found to be present in the highest concentration, ranging from 1005 to 2990 mg l⁻¹. Magnesium and calcium ranged from 10 to 380 mg/l and 266 to 1702 mg l⁻¹, respectively. The Karl Fischer titration method was used to determine the moisture content of maple syrup. The moisture content of the maple syrup varied between 26.5 and 39.4%. The pH and Brix values for maple syrup ranged from 5.6 to 7.9 and from 62.2 to 74.0 °, respectively [12].

The sucrose content varies from 51.7 to 75.6%, that of glucose from 5.71 to 9.59 g/100g, and that of fructose from 1.3 to 3.95g/100g. (figure 1) The confidence level reached was 0.9717, which has a good probability.

Malic acid and citric acid show an increasing evolution from sample 1 to sample 7, even if

malic acid is found in a greater weight than citric acid. (figure 2) The growth trend is linear.

Regarding the PH level of the maple samples, they recorded values from 5.6 in sample 1, to 6.7 in sample 5 and a PH of 7.6 in sample 6 with an approximately neutral environment, while sample 7 it had a PH =7.9, alkaline.

The Ph level of the samples also indicates low acidity, which shows that maple syrup is also a good digestive acid.

The dynamics of soluble dry matter indicated a variation from 62.1 to 74.3 °Bx. The confidence level of the experimental results was 0.9808, very high.

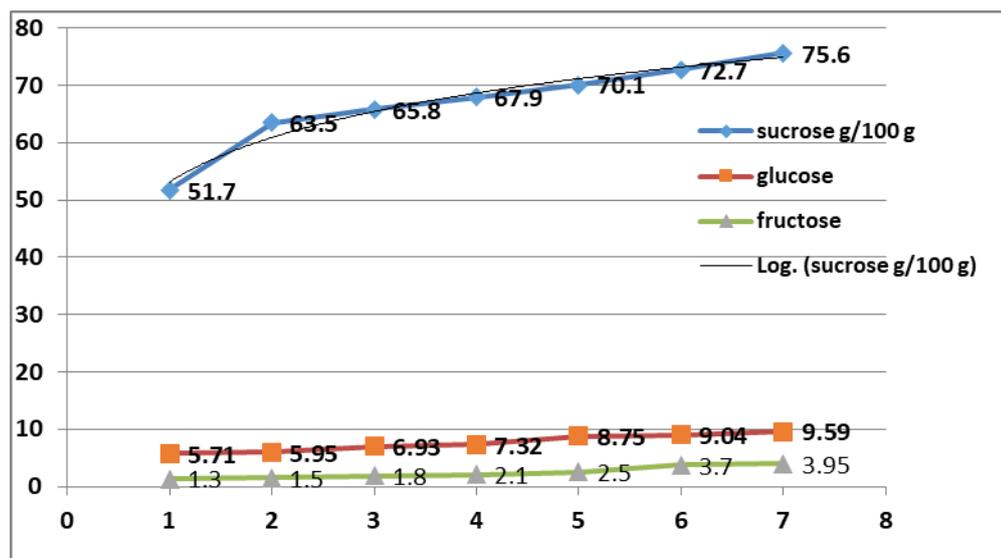


Figure 1. Sucrose, glucose and fructose content of maple syrup samples

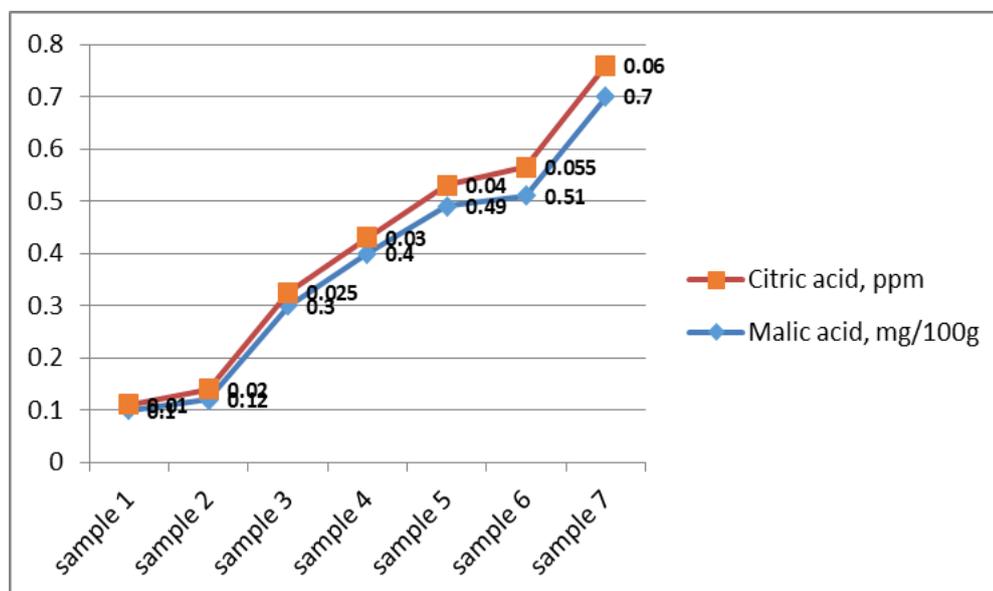


Figure 2. Dynamics of malic and citric organic acids in maple syrup samples

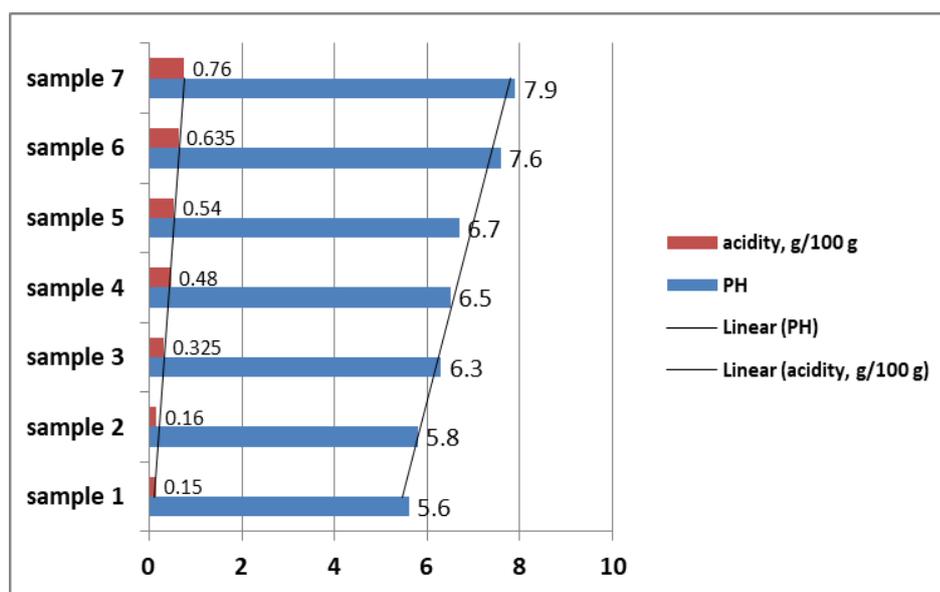


Figure 3. Variation of PH and acidity of maple syrup samples

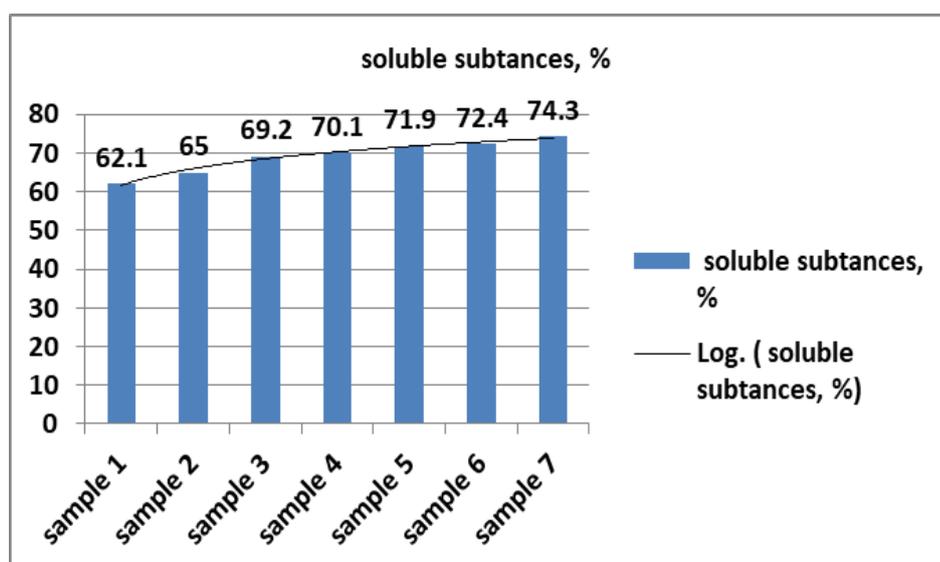


Figure 4. The dynamics of the soluble substance expressed in °Bx in the maple syrup samples.

Conclusions

1. The color classes of maple syrups are characterized by a specific taste note: gold/gold (delicate taste), amber (rich taste), dark (strong taste), very dark (strong taste). The color and taste are obtained by maturing the syrups and classifying them according to the years of age, when flavor compounds, odorous substances resulting from esterification, are formed.
2. The glucose content of maple syrups varies from 5.71 to 9.59 g/100g, and that of fructose from 1.3 to 3.95g/100g, which recommends maple syrups for consumption in low-calorie, low-sugar diets.
3. The Ph level of the samples also indicates low acidity, which shows that maple syrup is also a good digestive aid.
4. Maple syrup contains up to 15 times more calcium than honey, another favorite sweetener. Compared to the same food, maple syrup also has a lower salt content. Among the vitamins, maple syrup contains decent amounts of niacin, vitamin B2, vitamin B5, folic acid, vitamin B6, biotin and vitamin A.

Compliance with Ethics Requirements. Authors declare that they respect the journal's ethics requirements. Authors declare that they have no conflict of interest and all procedures involving human or animal subjects (if exist) respect the specific regulation and standards.

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