Alternative Quality and Authenticity Methods for Sugar and Confectionery Industry

Reporting

Project Information

SuChAQuality

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Periodic Reporting for period 1 - SuChAQuality (Alternative Quality and Authenticity Methods for Sugar and Confectionery Industry)

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Summary of the context and overall objectives of the project

Sugar was the only agricultural sector in the European Union where production was subjected to a quota system. It was introduced with the first rules on the sugar common market organization (CMO) in 1968, along with a support price for producers at a level significantly above the world market price. This agricultural quota ended on September 30th, 2017. The abolition brought an end to the production caps on sugar beet and guaranteed minimum prices to farmers. Following the change, the EU had the chance to export around the world rather than import to meet its needs. Many controversial discussions have been around following the ending of sugar production quotes. For some, this strategy was not proper since this will push a rise in EU sugar production at a time when the appetite for sugar is declining in the increasingly health-conscious trading bloc, throwing supplies onto a world market already awash with non-nutritive6 sweeteners. For cane refineries, this implementation was not the ideal case as well since the freedom on the production quotes was mostly in the interest of beet manufacturers as there are more beet sugar producers than cane refiners and regulations mostly concentrate on producers but not on the import tariffs.

Through the 'Sugar' value chain another important actor is the confectionary sector. Confectionery defines foods with relatively high sugar content. It represents one of the strongest sales segments in the food market. It accounted for 11% of the food revenue and 5% of volume sales in 2018 in the world. In 2018, confectionery sales increased by 5.2% in comparison to 2017 and reached €350bn and 59,89 billion kg. In terms of total revenue in the market; Europe is the 2nd in market share followed by South America with a total market share of ~11% in 20194. Chocolate and chocolate products, sugar confectionery (such as chewing gum, sweets (hard and soft candies), and pastries or biscuits), and ice cream are the main product segments of this industry. According to the annual report of CAOBISCO (Chocolate, Biscuits & Confectionery of Europe)5, 8.7% of the total European food innovation came from this sector in 2016. In addition, SMEs were supplying 99% of the employment in the sector. In this project, our focus will be the chocolate and sugar confectionery products which had ~60% of the total confectionery revenue in 2019.
SuChAQuality focuses on the quality and authenticity problems of these two sectors which are closely related and feed each other. Beet sugar and confectionery industries will be the main stakeholders.
Overall Objectives are listed as;
o To set up a network consisting of partners having expertise in different analytical techniques; data analysis and hardware design;
o To explore the potential of reliable and affordable analytical methods for predicting the authenticity of sugar and to develop methods for measuring the quality parameters of sugar and chocolate confectionery products while transferring the expertise of different partners within the consortium and contributing to the 'Sugar' value chain.

Work performed from the beginning of the project to the end of the period covered by the report and main results achieved so far

Throughout the secondments that have been performed in the last 2 years, the following have been done ;
TD-NMR has been tested on identifying beet, cane sugar, and also brown sugar; quality of hard and

soft candies; crystallinity of soft/hard candies; hydration behavior of different sugar types; interaction of sugar beet pectin and water; characterizing the behavior of candies made from the pectin produced and brown sugar obtained from Pakistan
Portable NMR systems have been designed to determine the moisture content of soft candy. A mini-NMR system has been designed to monitor the sugar inversion process a mini MR system is being designed to determine the tempering degree of chocolate
FFC-NMR experiments have been carried out to see the differences between white and brown beet and cane sugar obtained from different parts of the world; to see the differences in sugar beet pectin obtained by different methods
NIR experiments have been carried out to see the differences between white and brown beet and cane sugar obtained from different parts of the world.
Visible spectroscopy experiments were also performed for the sugar samples.
Experiments were performed using a portable NIR scanner on soft candy samples to determine the moisture content.
ESRs initiated a chemometric analysis protocol to integrate into the TD-NMR software produced by one of the partners.
TD-NMR data of sugar data which did not yield a reasonable differentiation; became more meaningful following the applications of the chemometric methods.
TD-NMR data of molasses samples were analyzed by chemometric methods.

Progress beyond the state of the art and expected potential impact (including the socio-economic impact and the wider societal implications of the project so far)

In SuChAQuality, almost 80% of the secondments have been completed so far with great productivity. Although COVID-19 slowed down the project in 2021, the secondments in 2022 were very productive. The sugar and confectionery sector does not have a lot of scientific publications in food science & technology research. In the 1st year, just 4 publications are ours and we see that 25 more are in the queue. This is a huge milestone for confectionary research. So we can say that SuChAQuality will have a significant effect on sugar/confectionery research in the next 2 years. What is more important is to see that companies were able to engage in research activities.SuChAQuality has well-defined objectives and significant progress took place in most of them during the 1st reporting period. As being a research project as well; new research questions always came out.
SuChAQuality also touches on climate change to an extent.SuChAQuality uses nondestructive/chemical-free tools for quality analysis. So chemical use in quality experiments is expected to be decreased.
SuChAQuality also contributes towards European policy objectives and strategies that have an impact on policy-making. The Ministry of Agriculture and Forestry is a policy maker in Turkey and they prepare the Food Codex of Turkey. They revised the Honey Codex regularly. But now they realized that the honey samples they thought as authentic could also be adulterated. The chemometric model developed by the UdeC researchers let them rethink whether the honey standards should change or not. That policymaking is at the regional level but such examples are also likely to be developed at EU level as well. Another example could be the EIM method. SGI uses the EIM method to determine the

invert sugar addition to fruit juices; water addition to wine. EIM is at the stage of being accredited. The new regulations in the EU may need to check the samples also by the EIM method. Such an impact is likely to be observed.

Logo of our project

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