

## Summary for the final report

### Yacon syrup as novel source for prebiotic-based sugar alternative (YARUP)

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#### **Background:**

Due to the increasing prevalence of chronic diseases such as obesity and diabetes, as well as the growing demand for natural, healthy, and sustainable food products, the food industry is seeking solutions to meet consumers' needs. The food industry faces the challenge of developing products with improved nutrient content, free from additives, and with exceptional taste.

While there are currently many sugar substitutes on the market, primarily used as alternatives to sugar for individuals with specific dietary needs, an increasing number of people are also switching to these products because they are looking for something healthier. They want food with lower calorie content and less impact on the glycemic index. Despite the wide variety of sweeteners and other sugar substitutes available, many of them are controversial. This is primarily due to their potential influence on human health, sensory quality, and price.

Yacon (*Smallanthus sonchifolius*) is a root tuber from the Andes that is gaining popularity in Europe. Yacon tubers contain interesting compounds such as fructooligosaccharides. Therefore, they could be a good alternative for people who need or want to change their diet, as they serve as a source of prebiotics and are expected to have a low calorie content and good sensory properties.

#### **Objective:**

The objective of this project was to explore the potential of Yacon and its syrup as a healthy sugar alternative with appealing sensory qualities. The project encompassed various activities:

- the evaluation of the impact of storage conditions and duration on the quality of the Yacon tuber,
- the optimization of processing methods,
- the evaluation of the nutritional and sensory properties of the Yacon syrup and the testing of its suitability as a sugar substitute and
- the demonstration of its functionality in food preparations such as cereal bars and chocolate fillings.

#### **Results:**

This study confirmed that Yacon tubers contain significant amounts of fructooligosaccharides (FOS), which are sweet-tasting compounds that resist digestion and have a low glycemic index. This makes Yacon syrup a potential alternative to conventional sweeteners. In terms of sensory properties, Yacon syrups were found to be green, carrot-like, bitter and slightly acidic. Despite these characteristics, all Yacon syrups were found to be sweet, although the perceived intensity of sweetness was less compared to other alternatives such as honey and agave syrup.

The individual varieties of Yacon tubers were evaluated for their sensory characteristics. Morado was perceived as the sweetest variety, while no significant differences were found between Rojo and Neuseeland varieties. Aroma compounds affecting the sensory properties of Yacon syrup were identified, including alpha-pinene (carrot-like), methional (potato-like), 2-phenylethanol (floral), eugenol (clove-like), vanillin (vanilla-like), lactones (fruity, peach-like,

coconut-like), myrcene (geranium leaf-like), geosmin (earthy/musty), 4,5-epoxy-(E)-2-decenal (metallic), and sotolone (spicy).

In addition, the effects of replacing glucose with Yacon syrup on the quality and sensory properties of foods were investigated. For cereal bars, the addition of Yacon syrup did not significantly affect the texture profile compared to standard bars made with glucose and sugar syrup. Sensory evaluation revealed that cereal bars with Yacon syrup exhibited the characteristic properties of sweetness, crunchiness and nuttiness, which were similar to standard bars. The intensity of sweetness of cereal bars with Yacon syrup was comparable to that of rice syrup, which was perceived as less sweet than in products made with maple syrup.

In caramel fillings, the caramel fillings made with Yacon syrup showed a flavor profile that was distinct and unique from conventional caramel. The different Yacon caramels exhibited differences in color, aroma and flavor components. Distinct malt/roasted aromas, as well as impressions reminiscent of forest honey and fruity notes, gave the caramel fillings made with Yacon syrup a more complex sensory profile.

A consumer study involving 65 participants examined four caramel fillings (including three Yacon varieties and a standard glucose syrup sample) for acceptability and ratings of perceived sweetness intensity. Results showed no significant differences in overall preference ratings among the four samples. All samples were generally rated as too sweet.

**Conclusion:**

Yacon syrup has great potential as a natural alternative to sugar substitutes, due to its lower glycemic index and prebiotic benefits. The study of Yacon tubers and syrups provided valuable insights into their physicochemical properties and potential applications in foods. The use of Yacon in various foods demonstrated its potential to provide healthier and more appealing options and its versatility. However, the high costs of Yacon tubers pose questions about its economic viability. Effective marketing strategies, utilization of by-products, and standardization of Yacon products are possible solutions to address this concern and improve the sustainability of Yacon processing. Overall, Yacon syrup represents a promising solution for the food industry to meet consumer demand for healthier alternatives to sugar substitute.

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