# **Exploring Sucrose Alternatives for Bakery: A Comprehensive Analysis**

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Sweeteners are bounteously available in nature as constituents of organic matter and can also be fetched from plant-origin sources that are abundant in starch molecules. They can be endowed in fair amounts in cereals and grains as well as in fruits; leaves containing glycosides of steviol; milk and its products; sugarcane and its derivatives; honey; and maple syrup (Xu et al. 2019). Sweeteners are polysaccharides characterized for their sweet taste, are absolutely necessary components of baked goods and are added to products leavened either by yeasts or by chemicals like in the case of cake batter and cookies. The handed-down sweetening substance used is sucrose. Sucrose is notoriously known for its deleterious effects on human health like diabetes.

#### Alternatives of sucrose

Given its universality, sucrose has become easily contingent and is increasingly being replaced by sweeteners, natural and synthetic in nature (Struck et al. 2014). Along with sucrose, there are several other sweeteners that are taken liberty with such as crystal form of glucose, unrefined or partially refined sugar, cane or sugar beet molasses, liquid sugar, Invert sugar syrup, Honey, sugar derived from maple, Glucose or corn syrup, High fructose corn syrup, High-intensity sweeteners, Sugar alcohols or polyols. They can be categorized (Fig.1) conforming to their content of calories as follows.

- Nutritive or caloric sweeteners that can be either mono or disaccharides, or a mixture of both.
- Non-nutritive or high-intensity sweeteners are zero or low-calorie sweeteners.

They can also be divided according to their origin, either as natural or artificial sweeteners. Their functions are sweetening, tenderizing, fermentation control through osmotic pressure, batter aeration (crystallized sugars), yeast food or nutrient, bulking agents (body), crust colouring or browning agents, flavouring agents (molasses, honey, malt, maple sugar), hygroscopic moisturizing agents, texture givers and shelf-life extending by minimizing water activity.



#### Fig. 1: Classification of sweeteners used in bakery

According to how much a particular sweetener contributes to doughs, batters, or finished products, they are selected on the following basis namely sweetness level or relative sweetness. Fermentability is also an essential variable that can be studied along with the total solids and moisture content of the liquid sweeteners (maple syrup or honey) or dry sweeteners. All these factors are hypercritical for batter-based products like cakes.

The food industry is becoming more interested in sucrose alternatives to use in low-sugar products. One of the key ingredients in sweet baked goods is sucrose, which greatly increases their energy content. A reduction in the consumption of sugars in the human diet has been advised due to the association between dental caries and excessive consumption of low molecular mass carbohydrates and other dietrelated health problems (WHO, 2004).

### Impact of using alternative sweeteners

Altering the sugar content may have a deleterious impact on the rheology and texture of food. When making low-sugar baked goods, reducing the amount of sucrose can result in noticeable changes the final product's rheological and textural to properties, as well as appearance, texture, flavour, and mouthfeel. Although frequently overlooked and consequently understudied, these aspects are rudimentary since a novel cuisine that is properly prepared from a nutritional and healthy point of view should also be enjoyable and satisfying to consume. Aspects like texture, volume, colour, taste, and shelf



life of the product all significantly vary when the sucrose concentration decreases, though. Both the acceptability of the product and the processing characteristics of batters or doughs may be negatively impacted by these alterations. The thermal stability of sweeteners is one of the key criteria for their usage in bread goods for example Aspartame begins to thermally decompose at temperatures reached during baking. Additionally, sweeteners vary in terms of sweetness intensity, sweetness profile, sweetness persistence, aftertaste, mouthfeel, solubility, and stability (Ding and Yang 2021).

## **Future prospects**

Finding a substitute for sucrose that matches its sensory and bulk qualities is therefore the key issue in replacing it, leading to the production of products that are comparable to their full sugar counterparts. Replacing sucrose with a combination of a heat-stable high-intensity sweetener and a bulking component can preserve the viscous nature of the batter and the finished product's texture. Finding a replacer or replacer combination that offers outstanding product features, is simple and beneficial to the fundamental structure consequently the intrinsic value of cerealbased foods is a crucial problem for large-scale commercial applications. In order to produce bakery items with decreased sugar that consumers will accept, it is crucial to make sure that the alternative sweeteners have an impact on the product quality that is equivalent to that of sucrose and that they have similar machinability. The natural and highintensity artificial sweeteners both have the benefit of imitating a flavour and sweetness similar to that of sucrose, but they do not contribute as much to the viscosity and body of batter or dough, which may have a negative impact on a number of characteristics that are derived from the microstructure of the product, e.g., inulin and polydextrose have been particularly utilized again and again in those circumstances, even though an amalgamation of a bulking agent with a high-intensity sweetener or an appropriate dietary fibres may be applied to address these issues. Tagatose is a prospective natural sweetener considering it has attributes that are comparable to those of sucrose in terms of volume and sweetness, but only about half as much caloric value. Given that polyols make available good bulking traits for utilization in baking products, they can occasionally possess or exhibit a low relative sweetness, which confines their potential for use from a sensory perspective. Utilizing one or a combination of specific sweetening agents depends largely on the food type and its role played in the matrix and as of now, not surprisingly, there is currently a lack of a perfecting sweetener for replacing sucrose.

## Conclusion

So, to conclude, exploring a total replacement to sucrose for use in bakery products is yet to be achieved. Considering the negative impact it bestows on human well-being, consumption in moderation can be an answer to the problem.

## References

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