Identification of starchy flavour attributes and characterization of distinctive sensory profiles of corn, potato, rice and waxy rice starches

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The oral sensing of starch elicits a complex flavour that expands beyond the primary taste attribute of sweetness.[1] Maltooligosaccharides (MOS), one of the main products released during starch digestion, may play a key role in the flavour of starch.[2] However, additional sensory attributes associated with the oral sensing of starch have not been well defined to date. In addition, little is known on how differences in the molecular structure of starch may impact starchy flavour. The objective of this research was to define the most accurate descriptors of starchy flavour and stablish the relationship between the main sensory attributes and the molecular structure of starch. Purified (92.12%) MOS (Fu Run De Food (Hubei) Co., Ltd.) were used as a taste reference to characterize starchy flavour descriptors. Twenty well-defined descriptors with flavour references were provided to twelve trained panellists (20–55 years old) to identify the most accurate attributes describing the sensing of the MOS solutions. An open discussion between the expert panellists was held to determine the most common descriptors for the profile of starchy flavour. The six best-ranked descriptors identified by the panel were sweetness, cooked grain, mouthcoating, astringency, nutty and caramel. These were used to evaluate the sensory properties of four different types of starch: corn, potato, rice and waxy rice (all 10% w/v). An anchored linear scale (0–100) labelled "Not detectable" or "Very intense" at the two ends of the scale and including an anchored point for the reference MOS solution (6% m/v) intensity, was used to quantify the intensity for each attribute. A two-way ANOVA was used to analyse the statistical significance ($p < 0.05$) between different starch types. The overall flavour intensity of corn (50.9) and waxy rice (58.0) were significantly higher than that of rice (30.3) and potato (23.2). For the individual starchy flavour attributes, the sweetness of waxy rice (24.8) was significantly higher than that of potato (14.3); corn sample had significantly more intensive mouthcoating sensation (63.0) than potato (33.1); and the astringency rating of waxy rice is 44.1, which is dramatically higher than that of rice (18.3) and waxy rice sample had an obvious caramel flavour (21.6) compared to the other three types of starch. In conclusion, starchy flavour was defined as a complex oral sensing involving sweet taste and the sensory attributes defined as cooked grain, mouthcoating, astringency, nutty and caramel. Based on the identified descriptors, different types of starch elicited significantly different flavour profiles. These findings pave the way for future studies to relate molecular structure to sensory properties in starch.

References

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2. Pullicin AJ, Penner MH & Lim J (2017) *PLoS One* **12** (8), e0183008.