



Isomalto/Malto-polysaccharides from starch: a structural analysis.

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Introduction

- Starch consists of α -1,4 and α -1,6 linked glucose units.

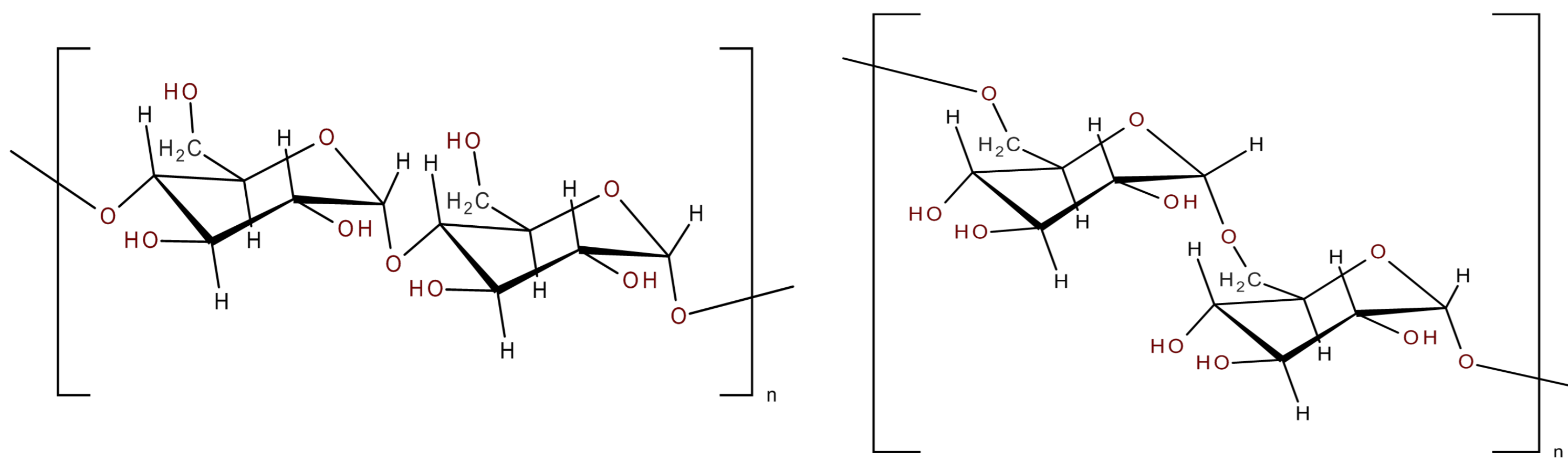


Figure 1. Molecular structure of an α -1,4 linked glucose backbone (left) and an α -1,6 linked glucose backbone (right).

- 4,6- α -Glucanotransferase (Δ N-GtfB) is an enzyme that cleaves the α -1,4 glycosidic linkages and introduces α -1,6 glycosidic linkages.

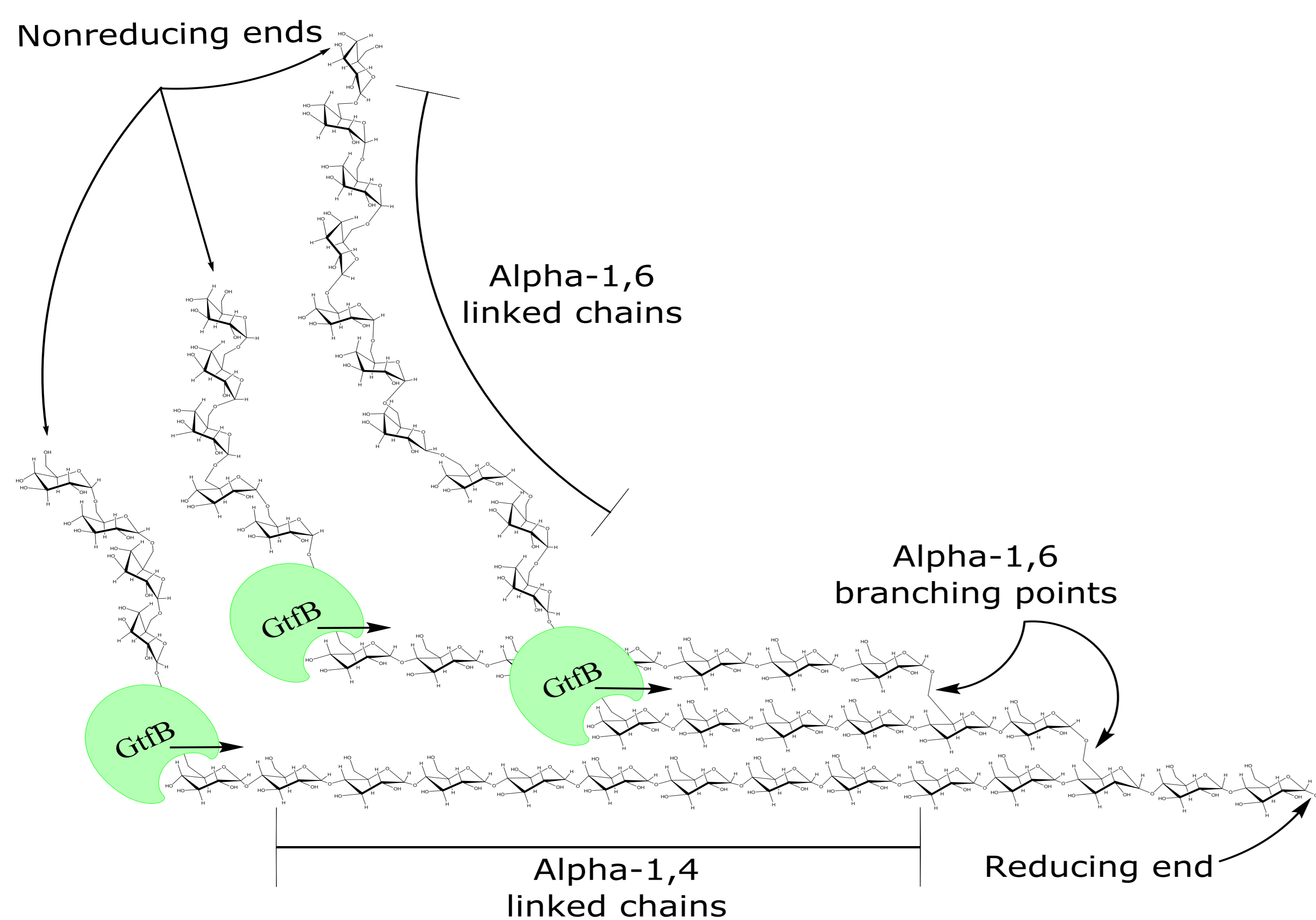
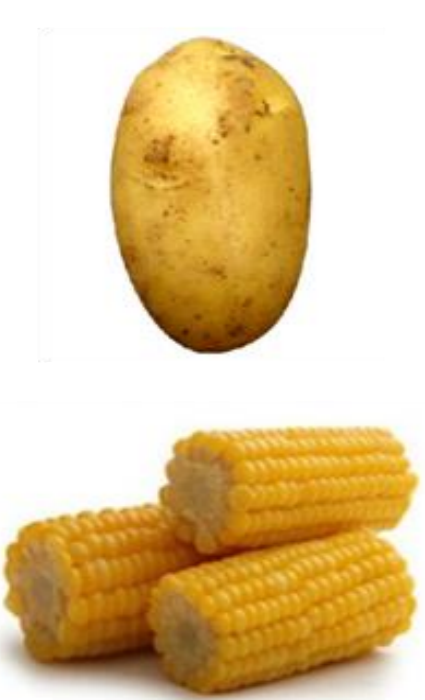


Figure 2. An impression of the action of the Δ N-GtfB enzyme on starch amylopectin.

- This change in the molecular building blocks of starch results in the formation of Isomalto/Malto-Polysaccharides (IMMPs); a group of α -glucans with a new combination of physico-chemical properties.



Starch

Conversion

Novel Polysaccharides

Objective

“The synthesis and characterization of Isomalto/Malto-Polysaccharides derived from starch.”

Approach

- IMMPs are fractionated with SEC-RI. The linkage types are monitored with ^1H NMR and methylation analysis and the molecular size is measured with dynamic and static laser light scattering (DLS/SLS).
- The IMMPs are analysed to enable custom modification towards specific functionalities in the future.
- Such as using the Δ N-GtfB enzyme in combination with debranching enzymes such as Pullulanase, as demonstrated in Figure 3.

Results

- Multiple starch types were incubated with Δ N-GtfB, with a substrate concentration of 2.5% (w/v), $T=37^\circ\text{C}$, $t=24\text{h}$ and $\text{pH}=5$.
- A high molecular weight fraction was observed after Δ N-GtfB modification, which indicates an inhibiting effect of branching points on Δ N-GtfB activity.

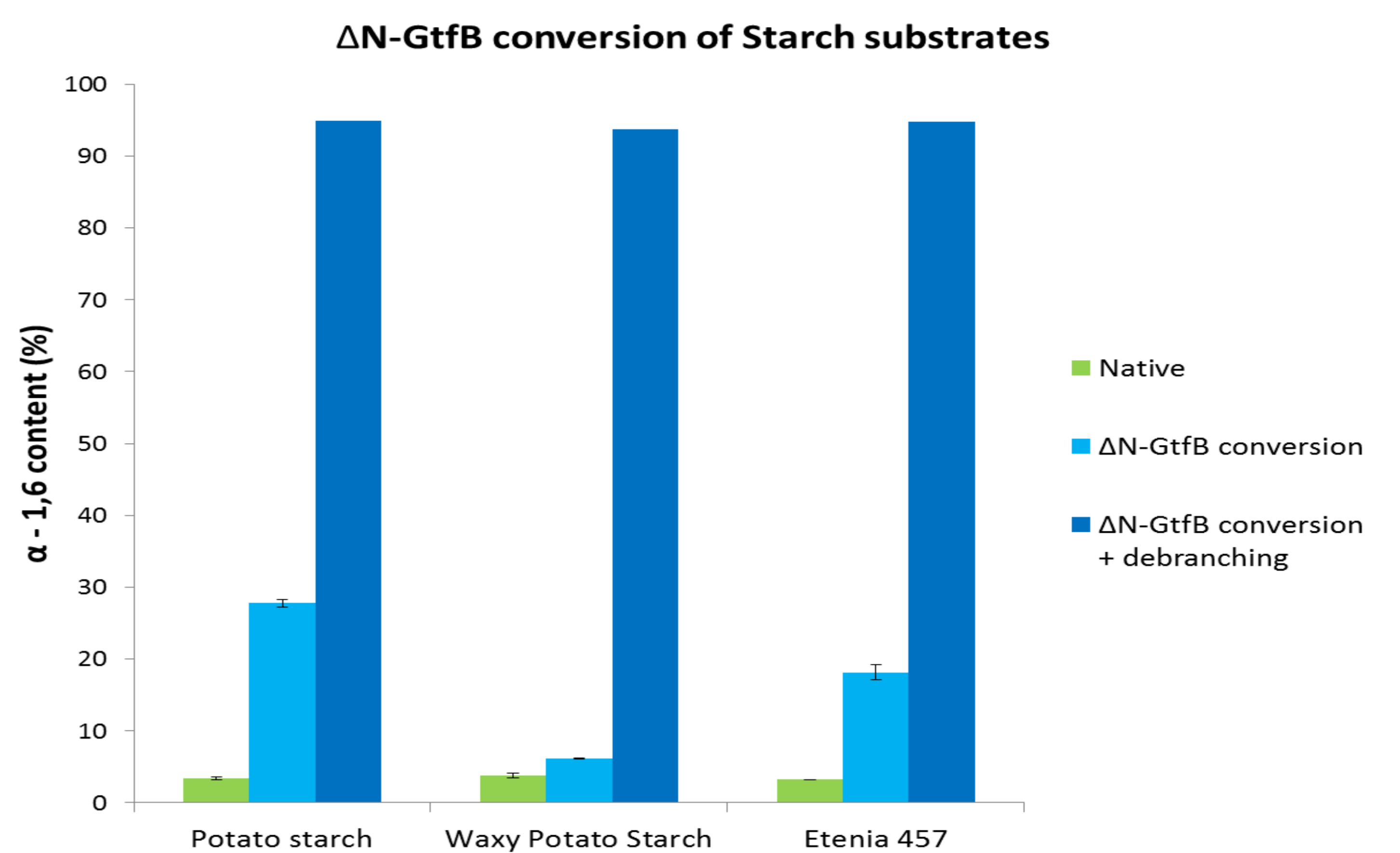


Figure 3. α -1,6 conversion in Potato Starch, Waxy Potato starch and Amylomaltase modified Potato Starch (Etenia 457) incubated with Δ N-GtfB or incubated with Δ N-GtfB + Pullulanase.

Conclusions

- Isomalto/Malto-Polysaccharides were successfully produced from a variety of starches.
- IMMP α -1,6 content increases relative to the amount of α -1,4 linear chains.
- IMMPs still contain high molecular weight fractions, this will be topic of further research.

Acknowledgements

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