
From bread to digesta: How superfine-milled purple whole wheat flour affects bread performance, human sensory evaluation and *in vitro* starch digestion

JIANG Y. (1), TANG C. (1), ZHAI J. (1), ZHOU W. (1), QI Z. (1), LI J. (1)

¹ Department of Food Science and Technology, National University of Singapore, Singapore, Singapore

Purple wheat has been well recognized for its high nutrition value, especially for the anthocyanins concentrated in its pericarp layer. To increase the intake of anthocyanins and dietary fibre while mitigating the undesirable quality deterioration caused by bran in the end product, superfine milling was employed to yield micro-size whole-purple-wheat flour (WPWF). The purpose of this work was to evaluate organoleptic qualities via instruments and human panels, as well as the glycemic potential via *in vitro* starch digestion of bread made from superfine-milled whole-purple-wheat flour (SWPWB). Results from the instrumental analysis showed the superior quality of SWPWB in specific volume (SV), hardness, chewiness, cohesiveness, and springiness. SWPWB was more porous and less hard with a significantly higher specific volume (Hardness: 3.63 N; SV: 3.21 mL/g) than bread made from commercial superfine whole wheat flour (SWB; Hardness: 10.88 N; SV: 2.30 mL/g). Temporal check-all-that-apply (TCATA) allowing for describing multi-dimensional sensory properties was applied for 8 attributes to bread texture. Similar to instrumental analysis, the obtained ratio of perception from 13 trained human assessors during TCATA evaluation, indicated that SWB was denser, while SWPWB was significantly more aerated. *In vitro* digestion was conducted according to the standardized INFOGEST protocol, including oral, gastric, and intestinal phases. The *in vitro* digestograms were fitted into the first-order kinetic equation. Comparing the obtained rate constant (k) revealed that the SWPWB significantly slowed down the digestion rate ($k = 0.0045 \text{ min}^{-1}$) as compared to the SWB ($k = 0.0068 \text{ min}^{-1}$). Furthermore, the predicted glycemic index value of SWPWB was significantly lower than that of SWB. These findings suggest that purple whole wheat bread with higher acceptability and commercial potential, is promising to be a healthier alternative to not only refined carbohydrates but also conventional wholegrain products.