

Viscosifying properties of structurally diverse wheat water-extractable arabinoxylan in aqueous and gluten-starch dough systems

Dietary fibre consumption is associated with many health benefits. Unfortunately, European citizens consume only 18 g dietary fibre/day while the recommended daily intake is at least 25 g. To fill this 'fibre gap', the FIBRAXFUN project, is establishing a knowledge base for exploiting novel wheats of which the endosperm is rich in arabinoxylan (AX) dietary fibre. AX consists of a linear xylose backbone substituted with arabinose residues. AX is very heterogenous and includes subpopulations with different water extractability, arabinose over xylose ratio, degree of polymerisation, substitution pattern and molecular weight distribution. Water-extractable (WE-) AX (ca. 25% of total AX) has viscosity steering properties and a positive impact on bread dough gas cell stability. To date, a clear structure-function relationship of wheat WE-AX in bread dough systems still has to be established. The research presented here aimed to unravel the relationship between the structure of wheat WE-AX and its viscosifying properties in both aqueous and gluten-starch model dough systems. First, WE-AX was isolated from eight white flours, which were selected out of 25 novel wheats based on their very diverse WE-AX characteristics. These WE-AX isolates varied in their arabinose over xylose ratio, degree of polymerisation, substitution pattern and molecular weight distribution. Subsequently, these structural characteristics were related to their apparent viscosities in aqueous model systems. ^1H diffusion ordered nuclear magnetic resonance spectroscopy was used to relate the viscosifying properties to the self-diffusivity and the AX subpopulations of two structurally diverse WE-AX isolates. Moreover, the structural and viscosifying properties of these two WE-AX isolates were related to their impact on the extensional rheology of gluten-starch doughs. It is envisaged that these insights in the structural and viscosifying properties of wheat WE-AX will provide a knowledge base for developing high-quality fibre-enriched bakery products.

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