Effect of Concentration and Extraction Conditions on Wheat Water Extracts Viscosity

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SUMMARY

In wheat grain, arabinoxylans are the major polymers of cell walls, approximately 88\% of wheat endosperm cell wall polysaccharides, of which one third to one half is soluble in water (Lineback and Rasper, 1988). They are formed of a linear backbone of (1-4)-linked $\beta$-D-xylopyranosyl units. The xylose generally represents more than 50\% of the constitutive sugars and a great diversity of side chains are present on the main chain on the O-2 or O-3 positions or both. In addition, acetic acid, ferulic acid and hydroxycinnamic acids, are found as esters (Saulnier et al., 2007). Arabinoxylans exhibit different physico-chemical characteristics such as water solubility, viscosity, gelling and hydration properties, which are the basis of their functional properties in different processes and food systems. Since the viscosity of a polymer solution is directly related to the fundamental molecular properties (molecular conformation, molecular weight, and molecular weight distribution) and concentration of the polymer, the study had in view the effect of the extraction conditions and the soluble arabinoxylans concentration of wheat water extracts on the specific viscosity ($\eta_{sp}$), The water-soluble fraction was obtained using a single extraction at a ratio 1:2 (w/v), with (WE1) and without (WE2) endogenous enzyme inactivation. Dynamic viscosity measurements were made using a cone/plate viscometer (Brookfield Model DvIII Cone CP-40) at 100 rpm and 25°C. Relative viscosity ($\eta_{rel}$) and specific viscosity ($\eta_{sp} = \eta_{rel}–1$) were calculated.

The $\eta_{sp}$ increased with wheat concentration: from 1.08 (0\% wheat) to 1.78 (20\% wheat) for WE1 and from 0.42 (0\% wheat) to 0.63 (20\% wheat) for WE2. The lower values suggest that soluble arabinoxylans were hydrolyzed and consequently their molecular mass reduced. The specific viscosity increased with the time the flour and water remained in contact prior to centrifugation on average with 0.435±0.023 for WE1 and with 0.342±0.018 for WE2 when time increased from 60 to 120 minutes.

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REFERENCES
