PHYSICO-CHEMICAL PROPERTIES OF NEW ZEALAND CHESTNUT FLOUR FROM DIFFERENT PROCESSING METHODS

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ABSTRACT

Chestnuts are relatively new nut crop to New Zealand (NZ), growing well in local conditions. Physico-chemical properties of NZ chestnut flours obtained through dry milling (DC), wet milling (WC) and freeze-drying (FC) methods were investigated to understand their potential utility in food industry. All chestnut flours showed significantly higher solubility ($S>38\%$ at $70^\circ C$) and swelling power ($SP>64\%$ at $70^\circ C$), lower moisture content (MC<4%), and higher stability against heat and mechanical treatment compared to wheat ($S=9.5\%$, $SP=43.2\%$, $MC=11.1\%$) and corn flour ($S=4.4\%$, $SP=38.4\%$, 14.1%). All chestnut flour samples showed slightly higher pH values (DC, WC=6.3; FC=6.4) compared to corn (5.9) and wheat (6.0). DC showed highest syneresis at day 4 ($90.1\%\pm0.4$) followed by WC ($86.0\%\pm0.6$), wheat flour ($85.5\%\pm0.2$), and corn flour ($83.0\%\pm1.5$), while FC showed the lowest syneresis of $81.7\%\pm0.3$). WC had highest bulk density (0.921g/ml), and FC had lowest (0.799g/ml). Paste clarity was <1% of light transmittance (650nm) for all flour types. Chestnut starch granules were oval shaped, FC were smallest in size (<2.5 µm) and DC and WC were size of 5.0-7.5 µm. All chestnut flours exhibited apparent shear thinning behaviour. DC had the lowest viscosity (peak=811cP, final=1015cP) and FC had the highest (peak=3263cP, final=1587cP). The results of this study support the potential utility of NZ chestnut flour as a thickening agent substitute to corn flour.

Keywords: Physico-chemical properties, chestnut flour

Highlights (maximum 85 characters, including spaces, per bullet point):
1. Core finding: Chestnut flour has higher solubility, swelling power, stability and lower moisture
2. Core finding: Chestnut flour has shear thinning behaviour in suspensions
3. Industrial relevance: There are many potential applications of NZ chestnut flour in food industry