Abstract

Title: Techno-functionality of different legume flours intended for gluten-free applications

Consumption of legumes is associated with health benefits thanks to their unique nutritional profile rich in proteins and fibre and with a good amino acid profile [1]. The inclusion of legumes in gluten-free (GF) products could be interesting to improve their nutritional and technological quality [2]. The aim of this work was to provide a general overview of the technological functionalities of different legume flours, to guide their application. Several commercial legume flours typical of the Mediterranean area differently treated were analysed: raw (C) and heat-treated (C-T) chickpea, raw (RL) and heat-treated (RL-T) red lentil, raw (GP) and heat-treated (GP-T) green pea and heat-treated green lentil (GL-T). Flours were characterized for techno-functional properties, such as colour, bulk density, particle size, water retention capacity (WRC), oil absorption capacity (OAC) and emulsifying, foaming, and pasting properties.
The legume flours somehow differed in their techno-functional properties. Flours showed a wide range of final viscosities (387-1615 Brabender Unit, BU) and of setbacks values (288 to 1262 BU), with GL-T and RL-T showing the lowest and the highest values, respectively; these behaviour can be partially explained by their particle size [3]: in fact, GL-T was characterized by the coarsest particle size (D_{90}=516±3µm) and L-T showed the finest one (D_{90}=310±2µm). Moreover, except for RL-T, all the heat-treated legume flours showed values of WRC higher than those of raw flours, with GL-T exhibiting the highest retention capacity (305±9%). The increase in WRC was expected, being mainly associated to starch damage [3]. Heat-treated flours also showed a slight increase in OAC values, even if they did not differ significantly from each other, except for GL-T which showed the highest value (1.52±0.04 mL/g); high OAC are generally associated to the improvement of mouthfeel and flavour retention in food products [4]. Emulsion activity (EA) and stability (ES) did not differ among flours, except for C-T (23±2% and 63±6%, respectively) and GL-T (43±3% of ES) which showed the lowest values. Heat-treated flours had lower value of foaming capacity and stability, possibly related to protein denaturation [5]. The results demonstrated that legume flours have unique techno-functional properties that can be exploited for targeted GF food applications.

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Keywords:

legume flour; gluten-free ingredients; techno-functional properties; heat-treatment; alternative proteins

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