The hidden structures of the processed plant foods

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ABSTRACT

Protein-rich cereals and legumes such as, quinoa, wheat and lupin, during latest years have got a lot of attention in food sector because of their potential to substitute imported soy. Quinoa seeds originating from the Andean region are known for its superior nutritional characteristics that include attractive amino acid composition, vitamins and minerals, highly suitable for development of innovative foods. While lupin, in a form of isolates and concentrates (Muranyi et al. 2016), and wheat gluten protein gliadin, due to its ability to deliver different functionalities and structures (Kuktaite et al. 2016; Muneer et al. 2016), can be suitable ingredients in developing new food products. The study is focusing on investigating micro-/and nano-structures and properties of proteins (but also starch and fibers) in quinoa flour, lupin protein isolates and gliadins transformed into different foods/fibers using various processing methods (Kuktaite et al. 2021; Ceresino et al. 2020; 2021; unpublished results). The structures resolved using scattering techniques such as, SAXS, WAXS in combination with X-ray tomography, SEM, FTIR and HPLC, elucidated new interactions between the proteins (and other seed components) and food grade additives, not previously observed in the processed foods. From the main results, the synergistic interactions of gliadin and linoleic acid led to the formation of lamellar structures in the foams observed by SAXS (Ceresino et al. 2020). While in the lupin foams, a hexagonal arrangement 1: $\sqrt{3}$ was observed by SAXS in the presence of lecithin in the blend (Ceresino et al. 2021).

With this study we conclude, that the plant protein and other components structures in the studied cereal and legume food/fiber products can be more influenced when the additives and more refined proteins (e.g. isolates) are used compared with the whole flour.

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