

Tuning the emulsifying properties of sunflower and olive protein hydrolysates by enzymatic treatment and pH

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This work investigates the influence of the enzymatic treatment (Alcalase or trypsin, degree of hydrolysis 5%) and pH (pH 7 or 4) on the interfacial and emulsifying properties of sunflower and olive protein hydrolysates. Independently of the enzymatic treatment, short peptides (1–3 kDa) were the most abundant in sunflower protein hydrolysates, whereas olive protein hydrolysates were richer in large peptides (>10 kDa). Peptides present in all hydrolysates gained in structure when adsorbing at the oil-water interface due to their facial amphiphilicity, with sunflower peptides presenting a more marked β -sheet conformation than olive peptides. Tryptic hydrolysates of both substrates showed higher interfacial adsorption compared to hydrolysates produced with Alcalase, especially at pH 4. All hydrolysates resulted in elastic interfaces, with generally higher values of dilatational complex modulus at pH 7 compared to pH 4. These findings correlated well with the higher emulsifying activity of all hydrolysates at pH 7 than pH 4. Particularly, sunflower protein hydrolysates led to stiffer and more solid-like viscoelastic interfacial layers than olive peptides due to increased interactions between β -sheet peptides at the interface. Indeed, the use of sunflower protein hydrolysates as emulsifiers resulted in 5 wt % oil-in-water emulsions with higher physical stability at both pH 7 and 4 when compared to olive protein hydrolysates.

Keywords:

Emulsifying peptides, oil-in-water emulsions, adsorption, dilatational rheology, synchrotron radiation circular dichroism, stability

References:

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