

Modulation of the technological functionality of pea (*Pisum sativum*) proteins in o/w emulsions by high dynamic pressure pre-treatments

D'Alessio, G.¹, Di Mattia, C.D.¹, Flamminii, F.¹, Neri L.¹, Pittia, P.¹

¹*Faculty of Bioscience and Technology for Agriculture, Food and Environment, University of Teramo
Via Balzarini 1, 64100 Teramo, Italy*

Corresponding author: gdalessio@unite.it

In recent years, the trend of the food market to meet the consumer's demands of "healthy" food, has grown. The food industry is responding by innovative formulated products made with ingredients of plant origin, often from controlled and "organic" supply chains and/or produced by "green" processes. In this context, plant proteins obtained from by-products and waste of vegetable production are increasingly used by in promoting the sustainability of food production chains within a "circular economy" approach.

Proteins, thanks to their amphiphilicity and technological functionality, are widely used as emulsifiers, fat and foam stabilizers, plasticizers, humectants and crumb softener in many food products. Currently, the most widely used protein-based emulsifiers are dairy proteins, i.e. caseins and whey proteins. Among those of plant-origin, soy, wheat, oilseed, flaxseed, rice glutelin proteins as well as those obtained from legumes (e.g. lupine, lentils, beans, chickpeas, cowpea and peas) are being increasingly studied for their emulsifying properties and used in formulated foods.

Aim of this work was to investigate the technological functionality of pea proteins in oil-in-water model emulsions as affected by high dynamic pressures (HDP) used both as a pre-treatment to induce structural changes in the proteins and as homogenization process for emulsions formation.

The experimental plan was based on the modification of pea proteins by high dynamic pressure pre-treatments and, after that, on emulsions formulation and characterisation.

Pea protein aqueous dispersions (3.0% w/w) were subjected to HDP pre-treatments carried out at different pressures (200 and 600 bar), 5 cycles and two steps of homogenization. The obtained solutions were lyophilized and humidity %, a_w and interfacial tension, were evaluated on the protein samples after the HDP treatments.

Oil-in water model emulsions (20% v/v) were formulated with sunflower oil and pea protein either native or HDP treated, at the concentration of 3.0%w/w, by using HDP at 150 bar in the first stage and 50 bar in the second and then characterised for particle size and distribution, flocculation index, stability over time at different temperatures, adsorbed proteins (%) and interfacial protein concentration.

Results highlighted the possibility of the HDP for the enhancement of technological functionality of pea proteins and their exploitability in complex emulsified food products.