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Improvement of the functional properties of pea and faba proteins for pastry applications

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In order to meet the nutritional needs of the increasing world population, as well as promote more sustainable food production, plant proteins are emerging as a growing market in the food sector. The several positive health effects of a plant-based diet is driving in consumers and food industry, a substantial demand for food with high contents of plant proteins (Laugesen et al., 2022). However, in addition to nutritional value, it is essential that proteins as well as ingredients have functional properties, ensuring consumer acceptance and technological viability. The formation and stabilization of foams and emulsions is crucial in many food applications, namely in the pastry industry (Amagliani et al., 2021; Mune and Sogi, 2016). Thus, in order to enable the development of a variety of vegetable protein-enriched ingredients for the pastry industry, we evaluated the technological potential of pea and faba protein ingredients. Through the experimental design methodology, the capacity of pea or faba protein to form and stabilize foams and emulsions we evaluated on the concentration range between 5 and 15 % w/v, pH values between 3 and 9, and processing temperature between 80 and 100 ^{o}C. It was concluded that the pea protein presented higher foaming capacity at a concentration of 5 % w/v, pH 8 and processed at a temperature of 90 ^{o}C and a higher emulsifying power at the same temperature but at a concentration of 11 g.L^{-1} and pH 3. The faba protein showed higher foaming capacity also at a concentration of 5 % w/v, however at pH 7 and temperature of 100 ^{o}C. Its emulsifying capacity was enhanced by processing at 80 ^{o}C, pH 3 and concentration of 13 % w/v. Taking into account the interesting foaming potential of these proteins, additional optimization was performed on the formation and stabilization of foams, by the use of additives, namely xanthan (0 – 0,04 % w/v), agar (0 – 0,2 % w/v) and starch (0 – 2 % w/v). The addition of 0.02 % xanthan gum, 0.1 % agar and 0.5 % starch showed a 32 % increase foaming capacity and a 100 %

increase of stability of the pea protein. The addition of 0.02 % xanthan gum and 0.1 % agar to the faba protein formulation demonstrated increased foam formation by 100 % and the stability of the same by 74 %. Considering the results obtained in this study, the plant protein-based formulations developed appear as an interesting alternative to animal proteins, namely egg protein, in the pastry industry.

Keywords: Emerging proteins, Functionality, Functionality optimization.

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