OPTIMIZATION OF ENZYMATIC HYDROLYSIS OF DEFATTED SOY FLOUR BY CARDOSINS AND COROLASE PP

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Keywords: Soybean meal; degree of hydrolysis; antioxidant activity; Cynara cardunculus; Corolase PP.

Introduction. Soybean and their products are considered the source of vegetable protein most widely used in the world. Soybean is the second largest source of vegetable oil worldwide (after palm oil) with a global production of 271 million metric tons per year (1). Rising costs and limited supplies of animal protein have led to establish it as the most important alternative protein source for human and animal consumption (35-40%). Soybean meal is the most important co-product in the processing of this legume, with a significant content of protein, however has a low added-value. Thus, the valorisation of soybean meal by controlled hydrolysis can generate functional ingredients with high added-value, as the hydrolysate often exhibit bioactive properties such as antioxidant properties. Previous studies have shown that Corolase PP (proteolytic extract from porcine pancreas) and Cardosins (aqueous extract of *Cynara cardunculus*) are able to produce appropriate hydrolysates derived from milk proteins that have bioactive properties (2 and 3). Although there are few studies using different enzymatic systems, no study was done using these enzymes with soybean by-products.
The main objective of this work was to optimize the hydrolysis conditions by Corolase PP and an aqueous extract of *C. cardunculus* on soybean meal, considering the degree of hydrolysis (DH) and the antioxidant activity as response variables.

Methodology. Two factors of the hydrolysis process easy to handle (i.e. time of hydrolysis and enzyme/substrate ratio, E/S) following a Custom Design methodology of JMP 10 software (SAS Institute) were selected to optimize soybean protein hydrolysis. The hydrolysis was performed on a soybean meal dispersion of 4% (protein base). *C. cardunculus* hydrolysis was performed by a design of eighteen independent experiments, while hydrolysis with Corolase PP by twelve independent experiments. The degree of hydrolysis (DH) of each hydrolysate was determined using the OPA method described by Nielsen, Petersen and Dambmann (4). The total antioxidant activity was determined by the ABTS radical scavenging activity technique as described by Re et al. (5).

Results. The model was statistically appropriate to describe the DH of hydrolysates for both enzymes but not for antioxidant activity. The maximum DH obtained was 3.94% and 9.95% for *C. cardunculus* and Corolase PP, respectively. The antioxidant activity of *C. cardunculus* and Corolase PP were 0.40 and 0.50 mg Trolox/ml, respectively.

Conclusions. Although there was significant difference in the degree of hydrolysis achieved with both enzymes, being higher for Corolase PP, the antioxidant activity produced with both enzymes is similar. Other bioactive properties are under study.

Acknowledgments. Thanks to BiValBi - Biotechnologies to Valorise the regional Biodiversity in Latin America (Refª PIRSES-GA-2013-611493) for the fellowship of E. Coscueta.

References.

1. Day L. (2013). Trends in Food Science & Technology, 32(1), 25-42.
2. Pihlanto A. (2006). International Dairy Journal, 16, 1306–1314.
3. Tavares T, Contreras M, Amorim M, Martín-Álvarez P, Pintado M, Recio I. & Malcata F. X. (2011). *International Dairy Journal, 21*, 926-933.
4. Nielsen P, Petersen D & Dambmann C (2001). Food Chemistry and Toxicology, 66(5), 642-646.
5. Re R, Pellegrini N, Proteggente A, Pannala A, Yang M & Rice-Evans C (1999). Free Radical Biology and Medicine, 26(9–10), 1231-1237.