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High-Added Value Products Obtained from Freshwater Fish Waste Processing

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Abstract

Farmed cyprinids, carp and especially introduced species novac, cteno, phytophagous are large fish usually sold after processing, with the separation of scales, main bones and head. The lateral flows of freshwater fish processing, instead of becoming waste, can be used for obtaining protein hydrolysate (for nutraceuticals), gelatin like polypeptides (as plant biostimulants) and fish flour (nutritional supplement) (Gómez-Guillén et al., 2011). The aim of this work was to obtain high value-added products with a significant market value, through an integrated extractive biotechnology, from the side streams of freshwater fish commercialization. Protein hydrolysate was obtained by an enzymatic method using papain, from waste provided by a local freshwater fish processing factory. Peptides with a low molecular weight (LMW) <15 kDa were separated by ultrafiltration and were analyzed physico-chemically and biochemically (protein content, extraction yield, SDS-PAGE electrophoresis) and regarding their in vitro biocompatibility. The residue from the filtration was dried up, resulting fish flour. Peptides with a high molecular weight (HMW) >15 kDa were tested for their antimicrobial activity, effect on fungal phytopathogens, influence on the proton pump and alpha-amylase activity in barley endosperm. Fish hydrolysate extracted with papain has 95.2% protein content and an extraction yield of 70.94%. The hydroxyproline concentration in the fish residues analyzed sample was 4.078%, respectively the collagen concentration was 33.97%. The presence of LMW peptides in protein hydrolysates was proven by electrophoresis. Test results on normal fibroblast cells (Moldovan et al., 2009) showed that all fish peptide samples were biocompatible up to a concentration of 6000 ug/ml. Separated collagen polypeptides with biostimulant effect for plants (Oancea et al., 2017), with a peptide content with an average molecular weight >15 kDa of more than 85% had demonstrated bioactive properties: antimicrobial effect, inhibition of fungal phytopathogens, stimulating the proton pump and inducing alpha-amylase activities in the barley endosperm. Getting protein hydrolysate from freshwater fish by-products allow a higher recovery of food industry waste. We separated bioactive peptides with different

molecular weights that can be used in the nutritional supplements industry, cosmetics and agriculture.

Keywords: fish by-products, bioactive peptides, nutraceuticals, biostimulants

References

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