Fish Processing Waste as a Source of Enzymes for use in Commercial Detergents

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The first application of enzymes in the detergent industry was in 1913 by Röhm and Haas who used swine pancreas extracts. However, these mammalian enzymes did not work well, since they are prone to autolysis, and are usually not stable at broad temperature and pH range, as well as in the presence surfactants, oxidants chelating. Later, with the introduction of microorganisms' enzymes, this segment grew to become the largest industrial applications of proteases, both in terms of volume and value. More recently, fish enzymes have also been researched as a new source of enzymes for detergents. It has been observed that fish enzymes are more robust than their mammalian counterparts, making them more viable for such applications. Enzymes are obtained from the inedible and discarded portions of fish processing (viscera, skin, scales, bones and carcass), mainly viscera. We calculated that in tilapia and tambaqui, the two main fish cultivated in Brazil, viscera corresponds to about 12% of wet weight; and the total processing waste of these two species in 2011 could be used to obtain around 25 kg of pure trypsin, for example. Moreover, experiments performed in our laboratory with fish proteases and amylases have shown that these enzymes are stable in the presence of ionic (SDS and sodium choleate) and nonionic (Tween 20 and Tween 80) surfactants, oxidants, like H_2O_2 (15%) and several brands of commercial laundry detergents. Furthermore, fish peptidases were as efficient as subtilisin (a commercial detergent enzyme) in removing bloodstain. Ultimately, these results indicate the feasibility of fish enzymes use as pre-wash additives due to their high stability in alkaline, denaturing and oxidative environments.