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Valorization of agroindustry by-products through fiber and minerals fortification of wheat bread

Statement of the Problem: By-products (BP) generated from food industry usually present, per se, insufficient biological stability, high water content, and high enzymatic activity. However, if appropriate stabilization and extraction procedures are performed they can be interesting substrates to obtain functional food ingredients. Nevertheless, the impact on those ingredients enriched in dietary fiber and minerals must be evaluated, since naturally occurring compounds may decrease mineral bioaccessibility.

Aim: The purpose of this study was to characterize the fiber rich extracts obtained from different BP and evaluate their impact on total and bioaccessible mineral composition of wheat bread.

Materials & Methodology: Extracts from orange peel (OE); pomegranate peel and interior membranes (PE); elderberry skin, pulp and seeds (EE); and spent yeast (YE) prepared as summarized in Figure 1 were used for bread fortification. Total Dietary Fiber (TDF) and Insoluble Dietary Fiber (IDF) contents were analyzed by commercial kits (K-TDFR, Megazyme, Cork, Ireland). Minerals were analyzed using an iCAP Q ICP-MS (Thermo Fisher Scientific, Bremen, Germany).

Findings: Fortified wheat breads were eligible for the nutritional claim “source of fiber” (≥ 3 g TDF/100 g bread, fresh weight). Wheat bread fortification with OE, EE, and PE improved the content of essential minerals when compared with control bread. Only bread fortified with YE presented a mineral content similar to control bread, but its mineral bioaccessibility was significantly higher than in all the other bread formulations. The opposite was observed for PE bread.

Conclusion & Significance: Fortified wheat breads claimed as “source of fiber” were produced using fiber/mineral enriched ingredients from BP. The nature of the fiber rich extract may have a strong negative impact on minerals bioaccessibility, thus it must be carefully selected. BP valorization provides new solutions for environment concerns associated with BP disposal and may contribute to indirect income generation.

Biography

Isabel M P L V O Ferreira is an associate professor at University of Porto – Faculty of Pharmacy and coordinator of Food Quality and Safety research line at LAQV/REQUIMTE. Her specialization is in: Food quality and safety, development and validation of GC and HPLC methods for analyses of nutrients and contaminants; Find new applications for brewing and agroindustry by-products and development of new functional foods. She has H-Index 30, and has published 148 indexed articles and 8 chapters. She has supervised 8 PhD thesis, 24 MsD thesis and 5 Postdoc's..

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