XXV Congresso de Iniciação Científica da Unicamp
October 18 to 20 Campinas | Brazil
2017

Characterization of pseudo-residues of annatto (Bixa orellana L.) and turmeric (Curcuma longa L.) focusing on industrial applications

Lucas B. Emerick, Eric Keven Silva, Milena Martelli-Tosi, Renata Vardanega, Gislaine C. Nogueira, Giovani L. Zabot, M. Angela A. Meireles

Abstract

The goal of this work was to evaluate the characteristics of the pseudo-residues generated from turmeric and annatto after the extraction processes supercritical fluid extraction (SFE) + pressurized liquid extraction (PLE) and SFE + low-pressure solvent extraction (LPSE), respectively. The purpose is to demonstrate the potentialities of these coproducts as a source of alternative carbohydrates for industrial application or as new products precursors.

Key words: *Biorefinery, process integration, process intensification.*

Introduction

The crescent seeking for products obtained from renewable sources instead of fossil sources has been motivating several studies to develop new processes for better exploring agroindustrial residues as coproducts. Integration and intensification of processes are promising strategies to obtain bioactive-rich fractions from the whole exploitation of vegetable raw materials. Integrated processes are defined as a way of obtaining interesting fractions by different unit operations in different equipment. On the other hand, intensified processes use a single multipurpose equipment to obtain such fractions by different unit operations. Both approaches have been used successfully for biofuel and pharmaceuticals productions, and for extraction of different compounds from several vegetable raw materials, among others. Regarding vegetal sources for intensified or integrated extractions, annatto seeds and turmeric are highlighted.

Annatto (*Bixa orellana* L.) seeds are widely known because of its high coloring power related to bixin (carotenoid) content, which can be applied in the food, pharmaceutical, cosmetics, and textile material industries. Another promising vegetal source is turmeric (Curcuma longa L.), which is a plant widely cultivated in tropical and subtropical weather regions with an estimated annual production of 1.1 Mton/year. Turmeric rhizomes are used since ancient times as seasoning and for folk medical therapies.

Therefore, based on this brief overview, the goal of this work was to evaluate the characteristics of the pseudo-residues generated from turmeric and annatto after the extraction processes SFE + PLE and SFE + LPSE, respectively.

Results and Discussion

The proximate analysis of pseudo-residues obtained after annatto and turmeric processing by emerging and environmentally friendly technologies is presented (Figure 1), which the results are expressed as a dry mass basis. Moisture contents in the pseudo residues were 11.23 ± 0.03 g/100 g for annatto and 19.92 ± 0.14 g/100 g for turmeric. Although none report was found regarding the proximate analysis of annatto and turmeric pseudo-residues, the composition of carbohydrates, proteins, lipids, and minerals are similar to some other agroindustrial residues. For example, residues of sugar beet pulp, walnut shells, cocoa bean husks, onion peels, and pea pods presented 70-80% carbohydrates, 7-18% proteins, and 1-3% lipids (dry mass basis)[1].

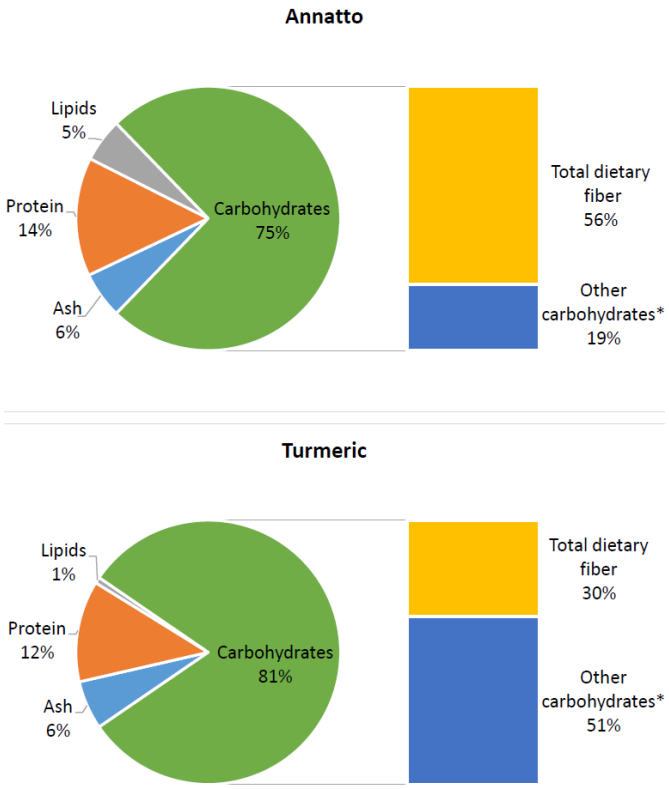

Figure 1. Results of proximate analysis of annatto and turmeric pseudo-residues; * calculated by difference and interpreted as starch content.

Conclusions

Pseudo-residues mostly composed of starchy materials and dietary fibers were isolated from annatto seeds and turmeric rhizomes based on high-pressure technologies. A high value of dietary fiber was found in both pseudo-residues, as 30% (mass basis) for turmeric and 56% (mass basis) for annatto.

Acknowledgement

Eric Keven Silva thanks FAPESP (2015/22226-6) for the postdoctoral assistantship. M. Angela A. Meireles thanks CNPq (302423/2015-0) for the productivity grant.

[1] Vojvodić, A.; Komes, D.; Vovk, I.; Belščak-Cvitanović, A.; Bušić, A., Compositional evaluation of selected agro-industrial wastes as valuable sources for the recovery of complex carbohydrates. *Food Research International* **2016,** *89, Part 1*, 565-578.