CLARIFICATION OF RAW BITTER ACIDS EXTRACT FROM HOT TRUB BY-PRODUCT VIA MICROFILTRATION AND MICROFILTRATION ADDED OF DIAFILTRATION

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Membrane technologies are widely used in food industry, effluent treatment and food research, concerning clarification approaches and adding value to phytochemical extracts from agro-food by-products and wastewater. Beer by-products have a high nutritional value and phytochemicals composition that still are little reused. Among these phytochemicals are bitter acids that promote bitter flavor as also colloidal and antimicrobial stability to beer, although high quantities of them are lost from hot-trub after the wort-boiled step. Because of that, this study had as goal the removal of suspended particles of bitter acids extract that could negatively interfere with the product's visual quality (promoting haze) and concentration processes. The first step was the production of an ethanolic extract of bitter acids by mixtures of hydroalcoholic solution at 30%(v/v) and hot-trub by-product with adjustment to pH 7. The bitter acids extract was submitted to microfiltration (MF), and MF added with diafiltration (MF/DF) using flat sheet membranes (MV020/NADIR) in a crossflow system (operation conditions: pressure=4 bar to MF; 4 and 5 bar to MF/DF; temperature=25°C; flow rate of recirculation=80L/h). The MF allowed ~69% of bitter acids to permeate, while the MF/DF reached 81%–92%. This improvement in permeation can be seen in MF/DF treatment at a pressure of 5bar. In addition, the MF membrane was efficient in removing the suspended particles with size of ~10µm, altering significantly the permeate fraction color parameters. However, these particles' retention contributed to the decrease of permeate flux of approx. 90% after 15 minutes of filtration to all treatments, suggesting that fouling caused by them was intense. After membrane cleaning processes and fouling characterization, it was observed that the foulant layer was strongly linked with membrane, which altered the chemical compositions, morphology, and hydrophobicity of its surface after filtrations. The foulant layer was composed of a mix of nitrogen compounds and substances with carboxyl groups, indicating the deposition of proteins, bitter acids, and sugars. Therefore, MF and MF/DF were highly efficient in promoting the clarification of raw bitter acid extract, although just MF/DF treatment showed a high permeation of bitter acids with a decrease in alcohol content from 30 to 15% (v/v).