



7th INTERNATIONAL WORKSHOP ADVANCES IN CLEANER PRODUCTION

“CLEANER PRODUCTION FOR ACHIEVING SUSTAINABLE DEVELOPMENT GOALS”

Comparative Study Between Conventional and Clean Extraction Techniques and Characterization of the Biocomposites of Brazilian Ginseng *Pfaffia glomerata* using FT-RAMAN and FT-NIR

BALASTRERI, C. ^{a*}, SAKAI, O. A. ^b, BARROS, B. C. B. ^c, SEIXAS, F. A. V. ^c, SATO, F. ^c, OGAWA, C. Y. L. ^d, ROCHA, S. A. ^b, MELLO, J. C. P. ^e.

^a. Master student in the Postgraduate Program in Sustainability of the Federal Institute of Paraná (IFPR)

^b. Lecturer in the Graduate Program in Sustainability of the Federal Institute of Paraná (IFPR)

^c. Lecturer in the Graduate Program in Sustainability of the State University of Maringá (UEM)

^d. Doctorate degree in the Postgraduate Program in Physics, State University of Maringá (UEM)

^e. Lecturer in the Pharmacy Graduate Program, State University of Maringá (UEM)

* corresponding author, charlini.balastrieri@gmail.com

Abstract

The Brazilian ginseng *Pfaffia glomerata* (Spreng.) Pedersen is a native plant of Latin America. Its therapeutic properties had been discovered by the Japanese pharmaceutical industry, since many researches have been carried out to obtain biocomposites. The main compound of interest is β -ecdysone, a natural steroid present in the plant roots. The therapeutic properties attributed to ginseng are anti-inflammatory, antimicrobial, antioxidant, antitumor, memory enhancer and tonic. In addition to β -ecdysone, terpenes, triterpenes, nortriterpenes and phenols are also found. It's use has also been explored by the food industry as a surfactant technological agent and emulsion stabilizer. The objective of the present study was to compare conventional and clean biocomposite extraction techniques, as well to characterize the Brazilian ginseng *Pfaffia glomerata* using FT-RAMAN and FT-NIR spectrophotometers. The results showed that roots are an excellent source of carbohydrates when extracted by the clean technology via subcritical water (SWE), with a yield of 13.22% higher than the classical organic solvent methodology via Soxhlet. The use of clean supercritical fluid extraction technologies, specifically SWE, corroborate with the Sustainable Development Objectives (ODS), as they are environmentally sound technological innovations. Near-infrared spectrophotometric (NIR) and nuclear magnetic resonance (FT-RAMAN) analyzes demonstrated several chemical groups with technological potential, with emphasis on mineral selenium (Se). This mineral imparts antioxidant and anti-inflammatory activity to the human organism, which have been observed in several peaks of the spectra. When compared the β -ecdysone standard with the extract of the ginseng root in the FT-RAMAN spectrum, we observed eight identical peaks, confirming the presence of the compound in the roots of *P. glomerata*.

Keywords: ODS, supercritical fluids, clean technology, spectrophotometry.