



EXTRACTION OF ESSENTIAL OILS OF DIFFERENT CITRUS BY ENZYMATIC HYDROLYSIS

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Introduction. Citrus are the most abundant crop in the world. The quantity of residue obtained from citrus fruits is around 50% of the weight of the whole fruit (1). Tons per day produced in the citrus waste is a problem of managing pollution, and environmental issues. These residues can be used to obtain oils which are of high interest in the food and pharmaceutical industries. Studies have been conducted on the extraction of citrus essential oils in general, oil is present in sacks oil or oil glands located at different depths of the shell. The propose for this work is to increase the recovery of essential oils by a cellulase enzyme pretreatment with the three different citrus peels, orange, lemon and grapefruit.

Methods. Citrus peel (orange (*Citrus sinensis* var. valencia), lemon (*Citrus limonium* var. colima) and grapefruit (*Citrus paradisi* var. doble rojo) were subjected to inactivation of endogenous enzymes by boiling/10 minutes, then were cooled and subjected to a treatment with cellulase enzyme (Powercell®) (1 mg / g sample) was heating to 50 ° C with constant agitation, were evaluated three times hydrolysis, 3, 6,12h and addition control (without enzyme). Reducing sugars were quantified. Each of the treatments were subjected to a hydrodistillation and quantified the amount of essential oil was recovered. Characterization of the compounds present in the oils by gas chromatography was carried out. An experimental design with factorial fix was used.

Results.

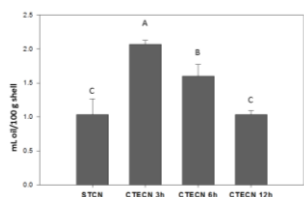


Figure 1. Extraction of essential oil of orange peels under conventional conditions (STCN) and enzymatic pretreatment (CTECN) at three exposure times (3, 6 and 12 h).

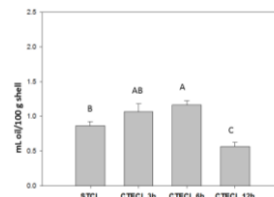


Figure 2. Extraction of essential oil of lemon peels under conventional conditions (STCN) and enzymatic pretreatment (CTECN) at three exposure times (3, 6 and 12 h).

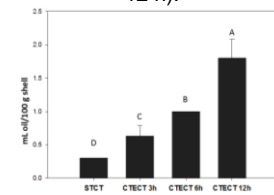


Figure 3. Extraction of essential oil of grapefruit peels under conventional conditions (STCN) and enzymatic pretreatment (CTECN) at three exposure times (3, 6 and 12 h).

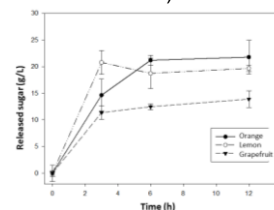


Figure 4. Release of sugars orange peel, lemon and grapefruit using a commercial cellulase.

Conclusions. Pretreatment with cellulase enzyme applied to three different types of citrus peels to allowed to improve considerably the recovery of essential oils in two sources, increasing two (orange) to six times (grapefruit) more performance over than the conventional method of hydrodistillation. Oils extracted presented as major components to limonene and α -terpineol. Besides enzymatic pretreatment allowed the release of a significant amount of sugar (22 g/L) that could be used in fermentation processes.

References. 1. Bousbia, N., Abert-Vian, M., Ferhat, M.A., Meklati, B.Y. and Chemat, F. (2009). J. Food Eng. (90) 409-413.