

Enhancement of Grape Seed Oil Extraction using Enzymatic pre-treatment of Seed - Parameters Optimization

Cláudia P. Passos¹, Sule Yilmaz¹, Carlos M. Silva¹, Manuel A. Coimbra²

¹ CICECO and ² QOPNA, Departamento de Química, Universidade de Aveiro, Aveiro, PORTUGAL

Grape seeds (*Vitis vinifera* L.) contain nearly 15% of oil being an important natural resource for the production of specialty oil as winemaking by-product. The importance of grape seed oil lies in the level of monounsaturated and polyunsaturated fatty acids (namely oleic and linoleic acids) whose relative proportions are around 22% and 64%, respectively.

Early aqueous extraction attempts have been unsuccessful due to low oil yields. However, the use of enzymes has become an interesting possibility, especially if preceding solvent or other extraction methodology, although optimum extraction conditions vary according to the oilseed composition and structure. Different studies suggest different combinations of enzymes for improving oil recovery. Anyway, to disrupt the structural components of parenchymatous cell walls, pectinase, cellulase and hemicellulase combinations should be used, and to hydrolyse the proteins present in the cell membranes surrounding the oilseed lipid bodies proteolytic enzymes are required.

Factors which influence the efficiency of extraction include: enzymatic treatment time, pH, temperature, particle size, and extraction operating conditions. At first glance the most important parameter seems to be enzyme concentration, however, due to economical restrictions, a trade off has to be assumed between what is possible and what would be desirable. Time has assumed an imperative position in achieving the best recoveries, whereas optimum pH for enzyme action seems to have also a considerable impact on yield. Temperature should be fixed below the inactivation temperatures of the enzymes whereas particle size is also crucial to facilitate their action.

This work shows that a conventional 4h soxhlet extraction of grinded seeds with a range of 0.71 to 1.0 mm can produce as much as 7% of oil. With the use of pretreated samples with optimized parameters an improvement as much as 100% to the initial oil content can be obtained.