

Enzymatic Liquefaction of Oilseeds: Are Mono and Disaccharides Release from Cell Walls a Good Witness of Oil Recovery?

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The liquefaction of plant biomass in general and lignocellulosic extracts in particular is a key stage of enzymatic processes used for fruit juice and oil production. In this purpose, we formulated, with experimental designs, efficient enzymatic mixtures for oil extraction from canola and sunflower seeds. Lignocellulosic hydrolysis of cell walls results in the polysaccharides, pectins and proteins partial solubilization in aqueous phase.

The aim of this study is to demonstrate if there is a correlation between the concentration of reducing sugars and the oil recovery. In this way, it is essential to have a reliable sugars analysis method. Thus, we developed a fast and robustness LC-MS method for the quantitative and qualitative analysis of mono and disaccharides. Next, we studied, through an enzymatic hydrolysis kinetics on sunflower and canola seeds, the links between the release of small sugars and the oil and proteins recovery. The objective is to determine optimum time of hydrolysis treatment according to objectives of the study.

Is the total cell walls hydrolysis required, or is a partial hydrolysis enough for a good extraction yield of oil? To answer this question, we followed, hour per hour, oil, proteins and glucuronic acids concentrations, and qualities and quantities of mono and disaccharides released. Thus, we should be able to establish if there is a link between these parameters resulting in the control of the hydrolysis degree.

This work provides a highly efficient tool for the study of oil extraction processes without solvent with possible on-line monitoring. In a large extend, this knowledge contributes to the development of the biorefinery of oilseeds, including production of bio-ethyl alcohol or extraction of proteins or peptides with biological activities.