

Influence of Camelina Seed Oil-Bodies Release Parameters in the Development of an Integrated Oilseed Biorefinery Scheme.

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Camelina is a seed that is still under-exploited in the world despite its clear agronomic advantages (resistance to pests, low input requirements, plant cover, co-cropping to control weeds, etc.). The most valuable fraction of these seeds is its oil, rich in polyunsaturated fatty acids. It is stored in the seed in the form of oil-bodies (OB) that naturally protect it against oxidation and could effectively vectorize it for food, cosmetic or pharmaceutical applications. Within the framework of a project aiming at developing new uses of camelina and gathering French research laboratories (Project INRAE Syalsa "Revomega"), the work presented here concerns the study and the lifting of scientific and technological barriers for the release of these OBs with a low environmental impact process. This one consists of a sequence of mechanical destructuring steps in water. A preliminary step is the mucilage removal from the seeds. For this, the synergetic use of ultrasound and hydrodynamic forces has proven to be adapted and efficient. The next step is a high shear grinding, performed with a rotor/stator type mill. Finally, a high-pressure homogenization allows to further destructuring the seeds and leads to the release of OBs in water. The recovery of the different fractions is carried out by centrifugation whose expectations are i) an emulsified concentrate rich in OBs, ii) a mineralized aqueous concentrate rich in water-soluble proteins, iii) a sedimentary pellet rich in fibers and proteins. Different parameters were studied as the pressure and number of homogenization cycles and the pH. The optimization of the number of homogenization cycles and the value of the pressure allowed to obtain a release efficiency of the OBs above 50%. We have shown that the adjustment of pH throughout the different steps of mechanical destructuration influences both the flocculation of OBs and their interactions with proteins. A basic pH and four homogenization cycles carried out with increasing pressures allow to increase the release and recovery of OBs from the seed with a lipid yield of more than 63%. These results show the key technological parameters for the release of native OBs from camelina seeds that can still be exploited to further improve OB yield.