

Influence of the Germination Stage on Processability in Aqueous Phase of Chia Seeds for the Release of Oil Bodies

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An aqueous integrated process has been developed for several years for high robustness and versatility in the release of oilbodies from oil seeds. It is designed as an eco-compatible biorefinery within the framework of the circular economy for the release in emulsified form of oilbodies (OB) from different oilseeds. Developed on rapeseed as a model, this process has evolved to adapt to the diversity of oilseeds and particularly to mucilage rich seeds such as flax, camelina or chia.

The presented work, carried out during projects gathering several French laboratories (AIC Coligrai and InterCarnot 3BCAR/Qualiment Obeinn Projects), aims at observing the influence of the demucilagination on the germination of chia seeds and conversely the effect of this germination on the processability of the seeds in order to release their oilbodies. For that we made the choice of a simplified and reproducible germination procedure and studied various stages of germination (0h, 1h, 24h, and 48h).

The results confirm that the degumming, if it remains essential for the processability of seeds in water, does not have influence on the germination of seeds and can be applied before or after this one without having consequence on the fractionation of seeds (destruction in water followed by obtaining concentrates by centrifugal separation).

The more advanced the germination stage, the more the reserve lipids are mobilized and used for the development of the future plant: the total lipid content of the seeds at the different stages decreases, the proportion of triglycerides decreases in favor of the appearance of greater proportions of partial glycerides and free fatty acids. The release of OBs remains conclusive whatever the germination stage, demonstrating the robustness of the process. However, lipids, especially saturated chains, become more distributed in the pellet, decreasing the yield of released OBs in the upper emulsified phase. Within the project, it is important to note that the objective is also to couple this work with metabolomic, lipidomic and proteomic studies on each concentrate obtained in order to be able to determine the mechanisms that take place in the oil seed during its germination. The interest is to be able to discover stages of germination allowing with such a process to obtain concentrates enriched in certain molecules of interest.