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► **To cite this version:**

Hugo Mear, P. Gillon, I. Gifuni, L. Lavenant, A. Poidevin, et al.. Extraction of soluble proteins by bead milling from Tetraselmis chui in two different physiological states. European Phycological Congress, Aug 2023, Brest, France. hal-04211525

HAL Id: hal-04211525

<https://hal.science/hal-04211525>

Submitted on 19 Sep 2023

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Extraction of soluble proteins by bead milling from *Tetraselmis chui* in two different physiological states

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Tetraselmis is an interesting microalga for food products because of its high protein content and surface productivity as well as the possibility to scale-up the culture easily. However, this specie is yet understudied compared to other algae such as *Chlorella*. Different batches of *Tetraselmis chui* were received from the same supplier, with different morphological properties, probably associated with a difference in physiology.

The batches were characterized biochemically and the rupturability was tested to characterize their behaviour to cell disruption, with one batch more fragile than the other. The bead milling of the two batches also showed striking differences in terms of cell disruption kinetic, as well as in dry matter repartition after centrifugation and in protein recovery yields within the supernatant. Nearly no differences in protein yield were observed after bead milling in comparison to freeze-thawing for the resistant batch, with a final yield of 11% of the initial proteins. However, a clear protein release was observed for the fragile batch along the milling residence time, with a final protein yield of 32%. The electrophoresis of the supernatants as a function of the milling showed very different protein profiles.

The results underlined that a difference in physiology, which may come from a different life cycle stage or a different cell cycle stage of *Tetraselmis chui* had a significant impact on the following biorefinery, affecting directly the cell disruption and the protein recovery yields. The valorization of the whole microalgae thus necessitates the finest coupling between upstream and downstream.