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Advancing green biorefining from the bottom-up: From grass to food protein and ingredients aided by proteomics and bioinformatics

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Abstract {Max words limit 250}

Grasses are generally not suitable for consumption by humans and monogastric animals due to digestive aspects, but green biorefining is proving game-changing for exploiting this abundant source of protein. While early attempts have indeed yielded protein rich products (green protein), these are not suitable for foods due to quality concerns. For the most part, Ribulose-1,5-bisphosphate carboxylase/oxygenase (RuBisCO) has been the primary protein of interest based on high abundance, but also its functional properties for e.g. food applications. Nevertheless, the grass proteome is complex and may include other proteins with desirable properties, yet to be explored. Here, we show how mass spectrometry (MS)-based proteomics can provide novel and quantitative insight on the grass proteome and how proteomics can be applied for process evaluation, development, and optimization. We also show how application of advanced membrane processes (MPs) can transform grass into a high-quality extract (white protein) with improved quality and perspectives for food applications. Compared to white protein obtained using conventional extraction methods (heat/acid), we showcase how MPs can produce superior extracts, as proteins are retained in their native and functional form. Furthermore, we illustrate how *in silico* protein analysis can aid in identifying functional/bioactive peptides embedded in abundant proteins, potentially improving functionality and value of extracts further. With this work, we both illustrate how grasses can play a major role in the green transition, but also how MS-based proteomics, bioinformatics, and application of advanced MPs can accelerate the development of not only green biorefining but food protein technology altogether.

Biography: {Max words limit 100}

Dr. Simon Gregersen Echers is an Assistant Professor in protein and peptide science at the Department of Chemistry and Bioscience, Aalborg University. He has a background in nanobiotechnology and broad experience in functional analysis and analytical chemistry with particular focus on peptides/proteins and mass spectrometry. With a molecular background, he brings new perspectives to the field of food protein science. In his work, he demonstrates how advanced analytical and computational methodologies can help drive forward both basic and applied aspects of food protein research all the way from molecular to industrial scale.