

TAL 797 – Seminário

Data: 16/09/2026

Ultrasonic Processing as a Strategy for the Modification of Plant Proteins

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The global demand for plant proteins has increased due to growing environmental, ethical, and health concerns. However, the broader use of these proteins as alternatives to animal-derived proteins in food systems depends on their structural and physicochemical characteristics, which directly influence their technological functionality and behavior during processing. To overcome these limitations, several protein modification strategies have been investigated. Although chemical modifications can effectively alter protein functionality, their application may be limited by the use of chemical reagents and the potential generation of undesirable by-products. Biological approaches, such as fermentation and enzymatic hydrolysis, can improve the nutritional and functional properties of plant proteins, but they may require controlled processing conditions, prolonged processing times, and careful monitoring of temperature and other critical parameters. In this context, non-conventional technologies have gained increasing attention as alternative approaches for protein modification. Among these technologies, ultrasound (US) processing has emerged as a promising strategy for tailoring the structural and functional properties of plant proteins. Ultrasound promotes acoustic cavitation, generating localized shear forces, microjets, and transient changes in pressure and temperature that can alter protein structure and protein–protein interactions. These effects may reduce particle size and expose hydrophobic and sulfhydryl groups that are initially buried within the protein structure. Such structural modifications can consequently improve the techno-functional properties of plant proteins, including their solubility, emulsifying, foaming, and water-holding properties. This seminar will discuss studies demonstrating the potential of ultrasound for modifying plant proteins, with emphasis on the mechanisms underlying these changes, their effects on protein techno-functionality, and the main challenges and perspectives for their application. Overall, ultrasound represents a versatile and potentially sustainable technological tool for tailoring plant proteins and expanding their functionality and applicability in food systems.

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