UNIVERSIDADE FEDERAL DE VIÇOSA
CENTRO DE CIÊNCIAS EXATAS E TECNOLÓGICAS
DEPARTAMENTO DE TECNOLOGIA DE ALIMENTOS
PROGRAMA DE PÓS-GRADUAÇÃO EM CIÊNCIAS E TECNOLOGIA EM ALIMENTOS

GREEN TECHNOLOGIES APPLIED TO PROTEINS FROM THE *Leguminosae* FAMILY TO IMPROVE THEIR TECHNOLOGICAL PROPERTIES

Abstract

People have been seeking a healthier and eco-friendly lifestyle and gradually modifying their dietary habits, as for instance by replacing the consumption of animal proteins with plant-based alternatives. Many plant proteins which meet human dietary demands belong to the *Leguminosae* family, with soy standing out as one of the most widely consumed worldwide. However, the extensive use of soy has led to a significant expansion of cultivation areas and the adoption of techniques to increase productivity on a global scale, resulting in environmental impacts and production overload (AVELAR et al., 2021). Consequently, there is a need to explore new plant sources for protein extraction intended for food formulation. Some emerging plant proteins, such as those from peas, chickpeas, and lentils, are well-received by consumers. However, protein extraction from these sources still needs efforts to enhance both yield and process costs (KYRIAKOPOULOU et al., 2019). Additionally, these proteins pose challenges such as low solubility, pH and ionic strength sensitivity, as well as poor digestibility and bioavailability, thus impacting essential bio- and techno-functional properties for food products formulation (LI et al., 2019). However, these limitations can be overcome through the application of "green" technologies, preferably those which avoid high temperatures. This is justified by the expensive amount of heat required and by the risk of irreversible protein denaturation which leads to the loss of both protein bio- and techno-functionalities (ESTEGHLAL et al., 2019). Unconventional and non-thermal technologies, such as high-pressure homogenizers and ultrasound may minimize this problem. These technologies can act interactively and in a controlled manner, positively influencing the conformation of supramolecular protein structures, transforming them into simpler structures, such as secondary and tertiary (CHACHA et al., 2021). These processes enhance solubility, hence improving foaming, emulsifying and gelling properties, allowing an easier use of these proteins in formulated foods. Besides, such technologies may improve digestibility and bioavailability of *Leguminosae* proteins. In summary, high-pressure and ultrasound may be helpful alternatives to allow a better exploration of *Leguminosae* proteins in the food industry nowadays in order to meet the society needs and market demands (SRIDHAR ET AL., 2022).

Documento assinado digitalmente
gov.br
EDUARDO BASILIO DE OLIVEIRA
Data: 23/11/2023 15:27:39-0300
Verifique em https://validar.iti.gov.br

Advisor

Documento assinado digitalmente
gov.br
MARQUEJON DOS SANTOS OLIVEIRA
Data: 23/11/2023 20:07:01-0300
Verifique em https://validar.iti.gov.br

M. Sc. Student

References

AVELAR, Z., VICENTE, A. A., SARAIVA, J. A., & RODRIGUES, R. M. The role of emergent processing technologies in tailoring plant protein functionality: new insights. Trends in Food Science & Technology, v. 113, p. 219–231, 2021.

CHACHA, J. S., ZHANG, L., OFOEDU, C. E., SULEIMAN, R. A., DOTTO, J. M., ROOBAB, U., AGUNBIADE, A. O., DUGUMA, H. T., MKOJERA, B. T., HOSSAINI, S. M., RASAQ, W. A., SHORSTKII, I., OKPALA, C. O. R., KORZENIOWSKA, M., GUINÉ, R. P. F. Revisiting Non-Thermal Food Processing and Preservation Methods—Action Mechanisms, Pros and Cons: A Technological Update (2016–2021). Foods, v. 10, n. 6, p. 1430, 2021.

ESTEGHLAL, S., GAHRUIE, H. H., NIAKOUSARI, M., BARBA, F. J., BEKHIT, A. E.-D., MALLIKARJUNAN, K., & ROOHINEJAD, S. Bridging the Knowledge Gap for the Impact of Non-Thermal Processing on Proteins and Amino Acids. Foods, v. 8, n. 7, p. 262, 2019.

KYRIAKOPOULOU, K.; DEKKERS, B.; VAN DER GOOT, A. J. Plant-Based Meat Analogues. Sustainable Meat Production and Processing, p. 103–126, 2019.

LIU, X., HUANG, Y., CHEN, X.-W., DENG, Z.-Y., & YANG, X.-Q. Whole cereal protein-based Pickering emulsions prepared by zein-gliadin complex particles. v. 87, p. 46–51, 2019.

SRIDHAR, K., BOUHALLAB, S., CROGUENNEC, T., RENARD, D., & LECHEVALIER, V. Application of high-pressure and ultrasound technologies for legume proteins as wall material in microencapsulation: new insights and advances. Trends in Food Science & Technology, v. 127, p. 49–62, 2022.