The biochemistry for the valorization of agri-food waste and by-products: the case of Okara for sustainable Agri-Tech Applications in Circular Economy.

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Food chains play a significant environmental and economic role for their consequences regarding the large amounts of waste and by-products produced. Recently, the monetization of matrices obtained from agri-foods wastes has been a crucial step forward for the circular economy concept. Biochemically, such by-products are very interesting because of their content in proteins, peptides, and other high-value molecules like polyphenols. Therefore, these matrices will have high biotechnological potential for different fields and applications. Okara, the by-product of soy (Glycine max) [1], has garnered agro- and biotechnological interest because of its versatility, sustainability, and abundance [2]. In the present work, we developed different approaches for the recovery and purification of Okara's peptides, which will be valorized for their agrotechnological potential (e.g. biodefense activity). Sustainable extraction methodologies and hydrolytic enzymes were used to overcome the matrix effects that hinder extraction yields. Biochemical methodologies - including sequencing and spectroscopy - were used for the molecular characterizations of the peptides purified in the different fractions. The selected fractions were tested with different in vivo systems to assess their biological activities.

[1] Belobrajdic, D.P.; James-Martin, G.; Jones, D.; Tran, C.D. Soy and Gastrointestinal Health: A Review. Nutrients 2023, 15, 1959. https://doi.org/10.3390/nu15081959

[2] De Benedetti, S.; Girlando, V.; Pasquali, M.; Scarafoni, A. Valorization of Okara by Enzymatic Production of Anti-Fungal Compounds for Plant Protection. Molecules 2021, 26, 4858. https://doi.org/10.3390/molecules26164858

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