Review paper **IL 7**

FOOD SAFETY IN CIRCULAR BIOECONOMY: BIOTECHNOLOGICAL INNOVATIONS FOR FUNCTIONAL AND SUSTAINABLE FOODS

J. Klopchevska

Department of Food Technology and Biotechnology, Faculty of Technology and Metallurgy, Ss. Cyril and Methodius University in Skopje, Rugjer Boshkovikj 16, 1000 Skopje, North Macedonia (jana@tmf.ukim.edu.mk)

DOI: 10.68725/FDSQ_WORKSHOP.2026.9.9

ABSTRACT

The circular bioeconomy can transform food-chain side streams into functional and sustainable foods. This presentation examines fermentation, enzyme-assisted extraction, and cascading biomass valorization as strategies for recovering proteins, dietary fiber, phenolics, pigments, and other valuable compounds. Attention is given to food-safety-by-design, from feedstock selection and traceability through processing, formulation, and regulatory assessment. Circular systems may introduce or redistribute microbiological, chemical, physical, and allergen hazards. A practical framework is proposed to map material flows, prioritize hazards according to their occurrence, persistence, transfer, and health relevance, and implement validated controls, monitoring, and final-product verification. The presentation also distinguishes technological functionality and compositional improvement from demonstrated human health benefits. Circular biotechnology can support resource efficiency and food innovation, but safety, sustainability, and health claims must be substantiated for each product and process.

Keywords: Circular bioeconomy; food safety; food-safety-by-design; biotechnological innovation; functional foods; sustainable food systems; fermentation; biomass valorization.