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Leaf Biomass-Derived Bioactive Peptides: Potential Roles in Metabolic Syndrome

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Abstract: *This investigation discusses the potential of leaf-derived bioactive peptides as functional food ingredients, with emphasis on their relevance to metabolic dysfunction.*

• Introduction

The growing prevalence of metabolic syndrome has increased interest in naturally derived compounds with antioxidant, anti-inflammatory and metabolic regulatory properties.

Agricultural by-products, particularly green leaf biomass, represent a promising and underutilized source of proteins that can be converted into biologically active peptides.

• Material and method

Leaf residues from pumpkin, pea, cauliflower and horseradish are considered as alternative protein sources, with special attention to enzymatic extraction and hydrolysis of leaf proteins, primarily ribulose-1,5-bisphosphate carboxylase/oxygenase (RuBisCO).

Current approaches to evaluating peptide bioactivity, including in vitro assays and experimental models of metabolic syndrome, are also addressed.

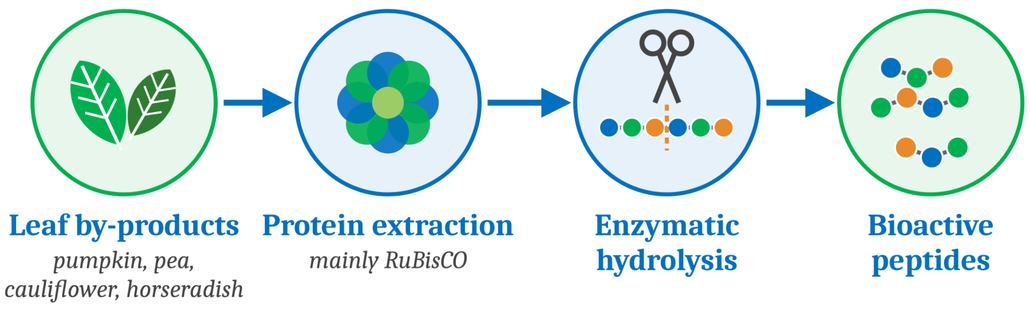


Figure 1. From green leaf biomass to bioactive peptides

• Results and discussions

The potential biological activities of the resulting peptides are discussed in relation to oxidative stress, inflammatory signaling and mechanisms involved in glucose and lipid metabolism.

The incorporation of leaf-derived peptides into bakery products and food dressings represents a promising route toward sustainable functional foods; however, further experimental validation is required to establish their efficacy, safety, bioavailability and technological suitability.

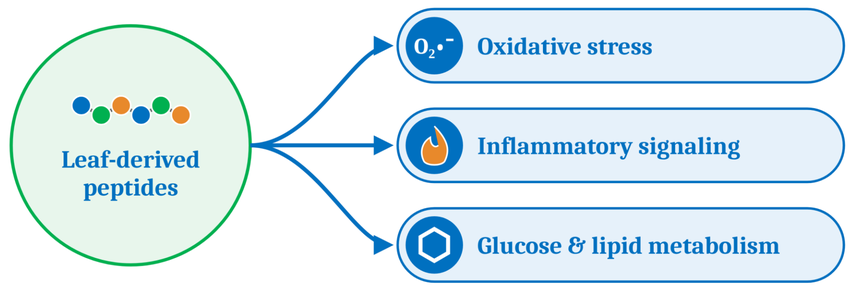


Figure 2. Potential targets of leaf-derived peptides in metabolic syndrome

• Conclusions

Overall, the valorization of green leaf biomass through bioactive peptide production may support innovative nutritional strategies and sustainable food development within a circular bioeconomy framework.

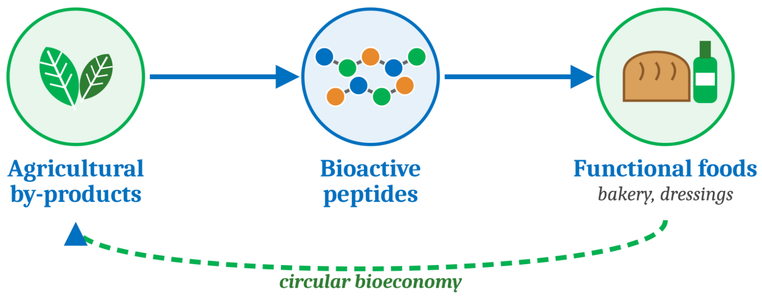


Figure 3. Valorization of leaf biomass within a circular bioeconomy

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