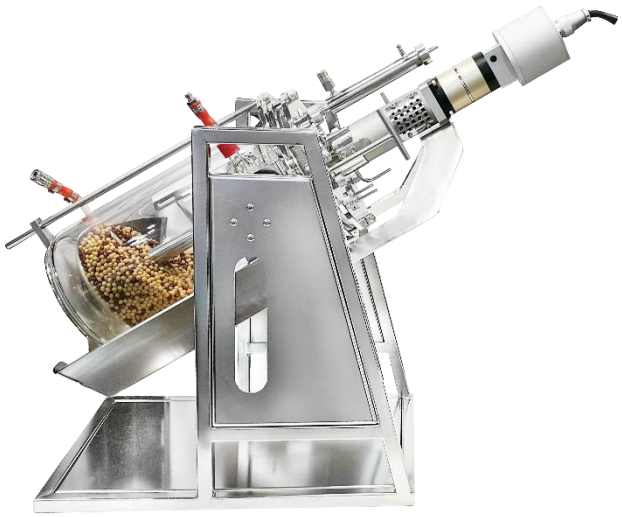
Glycine-rich peptides from fermented Chenopodium formosanum sprout as an antioxidant to modulate the oxidative stress

Chen-Che Hsieh , Shu-Han Yu , Hsing-Chun Kuo , Darin Khumsupan , Hsiao-Chu Huang , Yu-Wei Liou , Chen-Yu Kao , Szu-Chuan Shen , Kuan-Chen Cheng

Abstract

Rhizopus oligosporus was used to ferment *Chenopodium formosanum* sprouts (FCS), yielding a glycine-rich peptide (GGGGGKP) from <2 kDa proteins. This peptide showed antioxidant activity and was confirmed to be safe, non-toxic, and non-allergenic via SwissADME and other tools. In silico and in vitro studies revealed that it inhibits v-rel phosphorylation in the NF-κB pathway, reducing oxidative stress and inflammation, indicating potential biomedical applications.



Winpact Model: FS-V-SA05P

Introduction

Fermentation is known to enhance the bioactivity of plant-based proteins. *Chenopodium formosanum* sprouts are nutrient-rich and contain bioactive compounds. Prior research has highlighted their antioxidant and anti-inflammatory potential. This study focuses on isolating <2 kDa peptides, identifying glycine-rich sequences (GGGGGKP), and evaluating their biological properties and safety through both computational and experimental assays.

Materials and Methods

Fermentation Process:

1.5 kg of *Chenopodium formosanum* sprouts were inoculated with 75 mL of *Rhizopus oligosporus* spore suspension (10^6 spores/mL). Solid-state fermentation was carried out in a **bioreactor model FSeV-SA05P (Winpact FS-V-SA05P)** at 35°C, with aeration at 0.4 vvm and rotation at 5 rpm, for 4 days.

Results

- Bioreactor fermentation (BF) produced significantly higher free peptide content and enzyme activities compared to plate fermentation (PF).
- Identified peptides potentially act as DPP-IV and ACE inhibitors.
- Over twenty new metabolites, including aromatics, amines, fatty acids, and carboxylic acids, were generated specifically in BF.
- Enhanced antioxidant capacity was demonstrated in BF-derived products..

References

Glycine-rich peptides from fermented Chenopodium formosanum sprout as an antioxidant to modulate the oxidative stress

https://doi.org/10.1016/j.foodres.2023.112707