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# Synthesis and Fractionation of Protein Hydrolysate from *Hermetia illucens* L. pre-treated with *Lactobacillus* spp

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## Abstract

This study aimed to investigate the effects of fermentation pretreatment using *Lactobacillus* spp. on the protein content of black soldier fly larvae as well as the protein recovery, degree of hydrolysis, and amino acid composition of protein hydrolysate from these larvae. Solid state fermentation of black soldier fly larvae with *Lactobacillus* spp. carried out for 72 h at 37°C increased the protein and fat content from 32.35 to 36.75–41.99% and 36.91 to 40.03–41.99%, respectively. Protein content in the fermented samples was extracted using an alkaline extraction method, which resulted in a protein recovery of 31.41 to 35.99%. The protein extract was then hydrolyzed using bromelain enzymes for 24 h to produce protein hydrolysates with a degree of hydrolysis ranging from 47.64 to 52.61%. The protein hydrolysate was further fractionated using size-exclusion chromatography with a flow rate of 0.5 to 1.5 mL/min. The protein concentration of each fraction was determined using a UV-visible spectrophotometer, and the results varied from 0.004 to 2.03 mg/mL, with the highest protein concentration for each fermented sample observed at a chromatography flow rate of 1–1.5 mL/min. The amino acid composition of the fractionated protein hydrolysate was determined using ultra-high-performance liquid chromatography. The results show that the fractionated protein hydrolysates fermented with *Lactobacillus* spp. contained several amino acids, such as glycine and L-methionine, which were significantly different from the unfermented samples. The findings highlight that fermentation of black soldier fly larvae using *Lactobacillus* spp. positively influenced the protein and amino acid composition of protein hydrolysate from black soldier fly larvae. © The Author(s), under exclusive licence to Springer Nature B.V. 2025.

## Author keywords

Amino acid; Black soldier fly larvae; *Lactobacillus* spp.; Protein hydrolysate; Solid-state fermentation

## Indexed keywords

### Engineering controlled terms

Amino acids; Extraction; Fermentation; Hydrolysis

### Engineering uncontrolled terms

Amino acids compositions; Amino-acids; Black soldier fly larvae; Degree of hydrolysis; *Lactobacillus* spp.; *Lactobacillus* spp.; Protein contents; Protein hydrolysate; Protein recovery; Solid-state fermentation

### Engineering main heading

High performance liquid chromatography; Size exclusion chromatography

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