THESIS INFORMATION

INTRODUCTION

Thesis title:	**SURVEY ON BIOLOGICAL ACTIVITY OF PROTEIN HYDROLYSATE FROM EARTHWORM (*PERIONYX EXCAVATUS*)**
Major:	**FOOD TECHNOLOGY**
Major code:	**62.54.01.01**
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CONTENT

Earthworm (*Perionyx excavatus*) is an oligochaeta that can improve soil fertility and productivity and is popular in Vietnam. Earthworms have a high protein content (55-70% by dry weight), so they are used as protein ingredients to produce feed for carp (*Cyprinus carpio* L.). Earthworms are a source of potential compounds with antihypertensive, anticoagulant, and antihyperlipidemic effects. Earthworm protein and its body fluids have been shown to dissolve blood clots in the blood vessels, reducing fever and destroying tumours. Products derived from earthworms, including dried and earthworm extracts, have been used as pharmaceutical ingredients to treat allergies in China. In addition, many other countries such as Taiwan, Japan, South Africa, Brazil and the Philippines have used earthworms as food.

In recent years, bioactive peptides (BP) extraction by enzymatic hydrolysis has become a strong trend. BP has been shown to support blood sugar regulation through its effects on enzymes that convert starch into glucose, such as α-glucosidase, α-amylase or increasing insulin through inhibiting dipeptidyl peptidase IV (DPP-IV). The inhibitory activity of enzymes such as ACE or Renin in the RAS system of BP helps prevent high blood pressure in humans. In addition, a group of peptides can inhibit bacteria (AMP) through interaction with the cell's phospholipid bilayer. This study investigated hydrolysis conditions to obtain biologically active hydrolysates from earthworm protein sources such as ACE inhibition, α-amylase, α-glucosidase, DPP-IV, and antibacterial activity. In this study, the fractional filtration process using a filter column with a suitable membrane size will help obtain peptide fractions of different sizes to determine the fraction with the highest activity. From there, the most active fractions can be applied to create preparations to support the treatment of diabetes and hypertension.

The results of the project bring the following new contributions:

Scientifically:

Determine the hydrolysis conditions (enzyme type, earthworm:buffer ratio, hydrolysis temperature, hydrolysis pH, E:S ratio, hydrolysis time) to obtain the hydrolysate with the highest biological activity (ACE inhibition, *α*-amylase, *α*-glucosidase, DPP-IV, antibacterial).

Determine the fraction with the highest biological activity (ACE inhibition, *α*-amylase, *α*-glucosidase, DPP-IV, antibacterial).

Determine the stability of biological activity (ACE inhibition, *α*-amylase, *α*-glucosidase, DPP-IV, antibacterial) of the hydrolysate and the fractions through *in vitro* digestion, pH and heat treatment.

Applicationally:

The <1 kDa fraction was determined to have the highest inhibitory activity against ACE, *α*-amylase, *α*-glucosidase, and DPP-IV. In addition, the 1-3 kDa fraction had the highest antibacterial activity. Among these activities, the two inhibitory activities of α-amylase and α-glucosidase of the <1 kDa fraction were the most promising. Compared with the positive control acarbose, the inhibitory activities of α-amylase and α-glucosidase of the <1 kDa fraction were 4.05 and 0.54 folds higher, respectively.

The fractions all maintained their biological activity after *in vitro* digestion, pH, and heat treatment; the fractions with the highest biological activity showed the potential to develop these fractions into preparations to support the treatment of diabetes, hypertension, and antibacterials.

Develop a process to produce multi-active preparations from earthworm protein hydrolysate. The production process of the multi-active preparation is based on the procedure for obtaining the hydrolysate with the highest α-glucosidase inhibitory activity with a modification of obtaining the <3 kDa fraction.

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