Pharmacogn J. 2025; 17(5): 542-544
A Multifaceted Journal in the field of Natural Products and Pharmacognosy
www.phcogj.com

Original Article

Peptide Production from Snakehead Fish (*Channa striata*) extract with the addition of Bay leaf (*Syzygium polyanthum*) and Basil leaf (*Ocimum basilicum*)

Ace Baehaki[1]*, Sabrina Rahmadania[1], Herpandi[1], Muhammad Hendri[2]

[1]Study Program of Fisheries Product Technology, Faculty of Agriculture, Universitas Sriwijaya, Jl Palembang-Prabumulih Km 32, Indralaya Ogan Ilir, South Sumatera, INDONESIA.

[2]Study Program of Marine, Faculty of Mathematics and Natural Sciences, Universitas Sriwijaya, Jl Palembang-Prabumulih Km 32, Indralaya Ogan Ilir, South Sumatera, INDONESIA.

Correspondence

B. Ace

Study Program of Fisheries Product Technology, Faculty of Agriculture, Universitas Sriwijaya, Jl Palembang-Prabumulih Km 32, Indralaya Ogan Ilir, South Sumatera, INDONESIA.

E-mail: acebaehaki_thi@unsri.ac.id

History

- Submission Date: 16-08-2025;
- Review completed: 09-09-2025;
- Accepted Date: 01-10-2025.

DOI : 10.5530/pj.2025.17.67

Article Available online

http://www.phcogj.com/v17/i5

ABSTRACT

This study aims to determine the effect of adding bay leaves (*Syzygium polyanthum*) and basil leaves (*Ocimum basilicum*) on the peptide extract of snakehead fish (*Channa Striata*). The research utilized a Randomized Complete Block Design (RCBD) with 4 treatment factors and 3 replications. Treatments involved different leaf additions during the preparation of the fish peptide extract: control (A0), bay leaves (A1), basil leaves (A2), and both bay and basil leaves (A3). Parameters observed were protein content analysis, degree of hydrolysis, and protein profile using SDS-PAGE. The results of protein content analysis showed no significant effect on protein content, with averages of 6.25% for treatment A0, 6.09% for A1, 10.83% for A2, and 9.80% for A3. The degree of hydrolysis results indicated highly significant differences, confirmed by Tukey's Honestly Significant Difference (HSD) test at a 5% significance level: 22.21% for A0, 41.82% for A1, 52.76% for A2, and 43.66% for A3. This demonstrates very significant variation among treatments. The protein profile analysis of the snakehead fish peptide extract showed that treatments involving the addition of bay leaves and basil leaves affected the molecular weight of proteins in the range of 10-140 kDa and the number of protein bands produced.

Keywords: Degree of Hydrolysis, Peptides, Protein Content, Snakehead fish, Bay leaf, Basil leaf

INTRODUCTION

Snakehead fish is one of the fish that can be found in various habitats, such as rivers, lakes, and swamps. With the different habitats owned by snakehead fish, of course, they have different characteristics. Snakehead fish are widely used in various types of processed foods, such as salted fish, pempek and crackers. This is because snakehead fish has a high nutritional content, especially protein. The protein content in snakehead fish can reach 20.21% followed by other nutritional content such as fat, carbohydrates, calcium, phosphorus, iron[1]. Snakehead fish is also useful in the medical field as a pain reliever, anti-microbial and anti-inflammatory to accelerate wound healing due to the high albumin content in snakehead fish[2]. Albumin is the main protein that forms blood plasma. Albumin is produced by the liver which functions to maintain the balance of osmotic pressure in the body and transport useful substances such as drugs, vitamins, hormones to enzymes throughout the body[3].

In a study conducted by Fitriyani et al.[1] snakehead fish has an albumin content of 3.3076 grams/dL, which is quite high. With these high results, snakehead fish can be used as an alternative consumption for people who are experiencing wounds. The albumin found in snakehead fish can be extracted with several types of leaves, for example bay leaves and basil leaves. The bay leaves and basil leaves used in this study are useful for reducing the fishy smell because they contain essential oils and add antioxidant compounds to the albumin produced from the extraction of snakehead fish. In this study, the manufacture of peptides was carried out using the protease enzyme in the form of papain. The papain enzyme is known to be rich in benefits, such as in the food industry, the papain enzyme is often used as an ingredientpelunak bahan pangan. Enzim papain juga digunakan sebagai bahan aktif dalam industri farmasi[4].

MATERIAL AND METHODS

Tools and Materials

The tools used in this study were elenmeyer flask, stirring rod, measuring cup, beaker glass, micropipette, analytical balance, thermometer, scissors, knife, spectrophotometer and incubator, SDS-PAGE electrophoresis equipment (Bio-Rad).

The materials used for protein hydrolysis included water, distilled water, protease enzyme (papain), electrophoresis gel, snakehead fish (Channa striata), bay leaves, basil leaves, boric acid solution, selenium, HCL, Methyl red and NaOH solution.

Research Methods: *This study will be carried out in 3 repetitions using the Randomized Block Design (RAK) model with different treatments of steamed leaves.*

A0: Extraction of snakehead fish without the addition of bay leaves and basil leaves

A1: Extraction of snakehead fish with the addition of bay leaves

A2: Extraction of snakehead fish with the addition of basil leaves

A3: Extraction of snakehead fish with the addition of bay leaves and basil leaves

Cite this article: Ace B, Sabrina R, Herpandi, Muhammad H. Peptide Production from Snakehead Fish (*Channa striata*) extract with the addition of Bay leaf (*Syzygium polyanthum*) and Basil leaf (*Ocimum basilicum*). Pharmacogn J. 2025;17(5): 542-544.

Method of Work

Preparation of Snakehead Fish Samples: *The snakehead fish is cleaned of scales, innards and gills using a knife and then washed with water. Then the snakehead fish is cut and then the extraction process is carried out.*

Snakehead Fish Extract Making Process: *The cleaned and cut snakehead fish meat is put into a beaker to undergo the extraction process for 20 minutes by steaming the snakehead fish meat in a water bath at a temperature of 75°C with the addition of bay leaves and basil leaves. The snakehead fish extract obtained is then filtered using 150 mm filter paper. Finally, the snakehead fish extract is stored at a temperature of ±4°C (stored in the refrigerator) until it is used.*

Observation Parameters: *Observation parameters in this study include analysis of protein content, degree of hydrolysis and SDS-PAGE Protein Profile.*

Data Analysis: *The analysis of the data obtained was processed statistically. Data processing was carried out quantitatively using parametric statistical analysis data processing techniques. The results of the analysis were calculated using a Randomized Block Design (RAK). If the data produced has a significant effect or shows that F count is greater than F table, it is continued with the BNJ test to determine the difference in the average in each experiment.*

RESULT AND DISSCUSION

Protein Content: The average value of protein content contained in snakehead fish extract can be seen in Figure 1. The results of ANOVA (Analysis of Variance) on the extraction of snakehead fish did not show a significant effect on each treatment. So the addition of bay leaves and basil leaves did not affect the protein content obtained in the manufacture of peptides from snakehead fish extract. In the control treatment, the protein content was 6.25%, in the treatment of adding bay leaves, the protein content was 6.09%, in the treatment of adding basil leaves, the protein content was 10.83% and in the treatment of adding bay leaves and basil leaves, the protein content was 9.80%. The lowest protein content was found in the treatment of adding bay leaves, which was 6.09%. This shows that the addition of enzymes and then hydrolyzed, the addition of bay leaves and basil leaves did not affect the peptides of the snakehead fish extract produced. According to Daeli et al[5], this is suspected by the addition of the papain enzyme, so that the protein that is degraded into amino acids will increase. This is supported by research conducted by Koessoemawardani et al[6] which states that the use of enzymes does not affect the protein value because

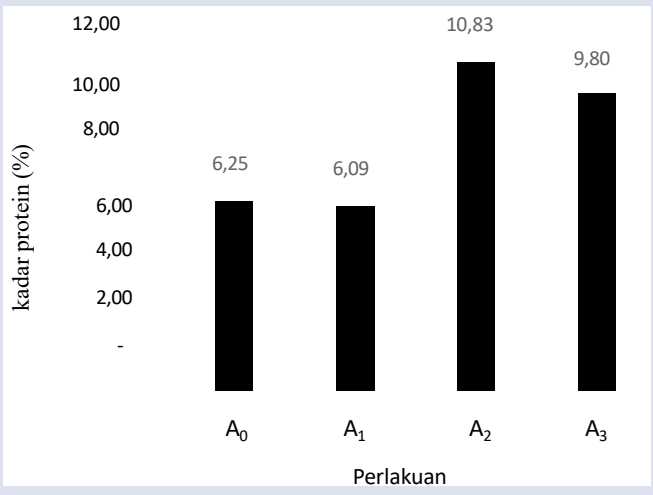

Figure 1. Average protein content in snakehead fish extract

during the process there is no addition of substrate, and the available substrate has been used up during the hydrolysis process.

The lowest protein content is in the treatment of adding bay leaves. This can happen because bay leaves contain flavonoids that inhibit bacterial growth by denaturation and coagulation[7]. Thus, the low protein content in the treatment of adding bay leaves can occur due to protein denaturation caused by the flavonoid content in bay leaves. This is also proven by research conducted by Susilowati and Harningsih[8] where there was a decrease in protein levels in soaking ribbonfish in bay leaf extract. The decrease in protein levels in the manufacture of peptides from snakehead fish extract can also be influenced by the process of making snakehead fish extract, namely steaming. According to Sumiati[9] and Almatsier[10], processing processes such as boiling, steaming or frying can affect the nutritional value contained in food ingredients including protein. The highest protein content is found in the treatment of adding basil leaves, which is 10.83%. This happens because basil leaves have a fairly high tannin compound content. According to Preston and Leng[11], tannins bind to proteins so that tannins will form complex bonds with proteins that are difficult to degrade. Basil can maintain protein levels in snakehead fish extract. Because during the steaming process, the phytochemical content in basil will be absorbed which then increases tannin levels so that proteins are not easily degraded.

Degree of Hydrolysus

The average value of the degree of hydrolysis of the snakehead fish extract peptides can be seen in Figure 2. The results of ANOVA on the degree of hydrolysis of snakehead fish extract with the addition of leaves significantly affected the degree of hydrolysis of the snakehead fish extract peptide produced. Further BNJ test with a level of 5% showed that there was a significant difference in the treatments between A0, A1, A2 and A3. However, there was no significant difference in treatments A1 and A3. This shows that the addition of bay leaves and basil leaves in the manufacture of snakehead fish extract peptides affects the results of the degree of hydrolysis. The results of the degree of hydrolysis of snakehead fish extract showed the highest degree of hydrolysis in the treatment of adding basil leaves (A2) which was 52.76% and the lowest value in the treatment without adding leaves (A0) which was 22.21%. In treatments A0 to A2, the degree of hydrolysis increased. The increase in the degree of hydrolysis can be caused by an increase in peptides and amino acids dissolved in TCA due to the breaking of peptide bonds during the hydrolysis process[12]. In this study, the temperature used was 55o C for 6 hours. The degree of hydrolysis decreased in A3 (addition of bay leaves and basil leaves). This is because the addition of bay leaves has flavonoid compounds that have a tendency to bind proteins so that they can inhibit enzyme activity[13]. The decrease in the degree of hydrolysis can be caused by the inhibition of the substrate hydrolysis process by the products produced during the hydrolysis process[12].

Protein Profile of Peptide Molecular Weight of Snakehead Fish Extract

The Sodium Dodecyl Sulfate-Polyacrylamide (SDS-PAGE) method is an electrophoresis method using polyacrylamide which is useful as a separator. This method is the most common method used to separate proteins. SDS-PAGE has a working principle that denatures component proteins with anionic detergents that bind proteins[14]. This SDS-PAGE method does not affect the structure of biopolymers, and is very sensitive to differences in charge and molecular

The results obtained in Figure 3 show that treatments 5 (control) and 6 (addition of bay leaves) produced a greater number of bands and were thicker than other treatments. Based on table 3.1. in the control treatment there were 3 bands with molecular weights of 10 kDa, 11 kDa and 24 kDa respectively. In the treatment of adding bay leaves, there were 3 bands with molecular weights obtained of 10 kDa, 12 kDa

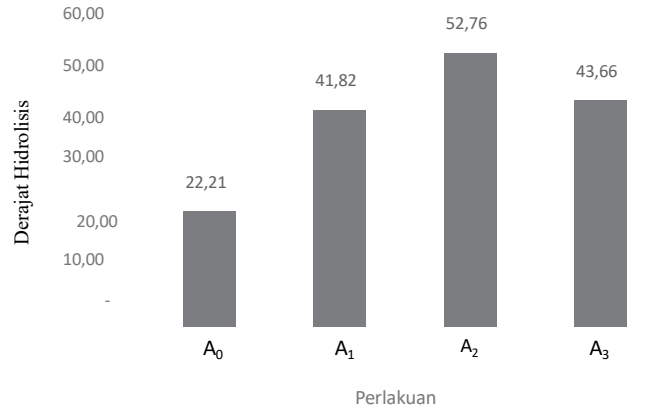

Figure 2. Average degree of hydrolysis of snakehead fish extract

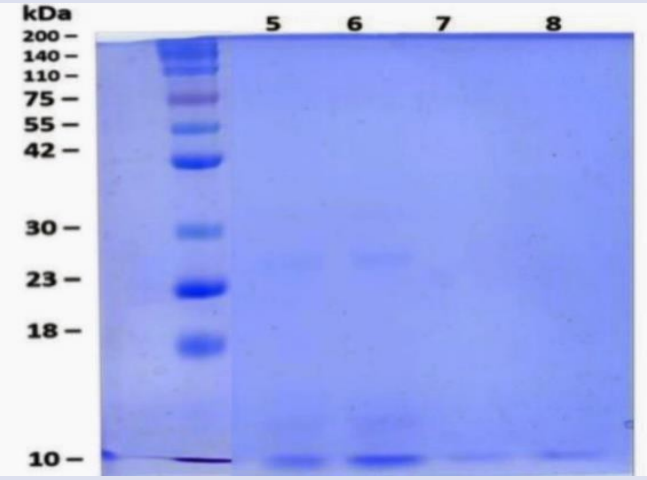

Figure 3. SDS-PAGE results of snakehead fish extract peptides

Description: Marker (M), without added leaves (5), bay leaves (6), basil leaves (7), and bay & basil (8)

and 25 kDa respectively. While treatments 7 (addition of basil leaves) and 8 (addition of bay leaves & basil) only had 1 band with a molecular weight of 10 kDa each. This can show that the results of hydrolysis with the papain enzyme are effective in breaking the peptide bonds of proteins into peptides and amino acids with low molecular weights. Gunanti[15] stated that the thickness and thinness of protein bands in the results of SDS-PAGE can be caused by genetic differences between the proteins. According to Masyitoh et al[16], the difference in the number of protein bands produced is thought to be influenced by the solubility properties of the solvent towards the protein.

REFERENCES

1. Fitriyani, E., Nuraenah, N., Meidy, D.I. 2020. Perbandingan Komposisi Kimia, Asam Lemak, Asam Amino Ikan Toman (Channa micropeltes) dan Ikan Gabus (Channa 1Striata) Dari Perairan Kalimantan Barat. Manfish Journal 1(02):71-82.
2. Shafri MAM, Manan MJA. 2012. Therapeuticpotential of the haruan (Channa striatus): from food to medicinal uses. Malaysian Journal of Nutrition. 18(1):125–136.
3. Santoso, A. H. 2009. Uji potensi ekstrak ikan gabus (Channa striata) sebagai hepatoprotector pada tikus yang diinduksi dengan parasetamol. Institut Pertanian Bogor: Bogor.
4. Anggraini, A., & Yunianta. 2015. Pengaruh Suhu Dan Lama Hidrolisis Enzim Papain Terhadap Sifat Kimia , Fisik Dan Organoleptik Sari Edamame. Jurnal Pangan Dan Agroindustri, 3(3), 1015–1025.
5. Daeli, J., Laksono, T., dan Sari, N. I. 2018. Pengaruh Penambahan Enzim Papain terhadap KArakteristik Mutu Kecap Kijing Tawar (Pilsbryconcha exilis). Jurnal Fakultas Perikanan dan Kelautan Universitas Riau: 1-6.
6. Koesoemawardani D, Nurainy D, Hidayati S. 2011. Proses Pembuatan Hidrolisis Protein Ikan Rucah. Jurnal Natur Indonesia,13(3): 256-2561.
7. Salisbury, F.B. dan C.W. Ross. 1995. Fisiologi Tumbuhan, Biokimia Tumbuhan. Jilid 3. Penerjemah: Lukman, D.R. dan Sumaryono. Bandung: Penerbit ITB.
8. Susilowati I.T dan Harningsih T. 2017. Potensi Ekstrak Daun Salam (Syzygium polyanthum) Sebagai Pengawet Pada Ikan Layur (Trichiurus sp.). Jurnal Kesehatan Kusuma Husada:116-112.
9. Sumiati T. 2008. Pengaruh pengolahan terhadap mutu cerna protein ikan mujair (Tilapia mossambica). Program Studi Gizi Masyarakat dan Sumberdaya Keluarga, Fakultas Pertanian Institut Pertanian Bogor: Bogor.
10. Almatsier S. 2010. Prinsip Dasar Ilmu Gizi Cetakan Ke 9. PT. Gramedia Pustaka Utama: Jakarta.
11. Preston, T.R. and Leng, R.A. 1987. Matching Ruminant Production Systems with Available Resources in the Tropics and Subtropics. Penambul Books, New South Wales.
12. Nurhayati T, Nurjanah, Sanapi C.H. 2013. Karakterisasi Hidrolisat Protein Ikan Lele Dumbo (Clarias gariepinus). Jurnal Pengolahan Hasil Perikanan Indonesia, 16(3):208-214.
13. Robinson, T. 1995. Kandungan Organik Tumbuhan Tinggi. Edisi ke-6. Terjemahan: K. Padmawinata. ITB-Press, Bandung.
14. Nowakowski A.B., J. W. William, and H. P. David. 2014. Native SDS-PAGE: High Resolution Electrophoretic Separation of Proteins With Retention of Native Properties Including Bound Metal Ions.," Metallomisc, 6 (5):1068–1078.
15. Gunanti, M., Ulia, F., Sri, D. 2010. Karakterisasi protein Larnea cyprinacea dengan metode elektroforesis SDSPAGE. Jurnal Ilmiah Perikanan dan Kelautan, 2(1):61-66.
16. Masyitoh M, Ratna Dewanti I.D.A, Setyorini D.D 2016. Analisis Profil Protein Ekstrak Aquades dan Etanol Daun Mimba (Azadirachta Indica A. Juss) Dengan Metode SDS-PAGE. E-Jurnal Pustaka Kesehatan. 4(3): 533-539.

Cite this article: Ace B, Sabrina R, Herpandi, Muhammad H. Peptide Production from Snakehead Fish (Channa striata) extract with the addition of Bay leaf (Syzygium polyanthum) and Basil leaf (Ocimum basilicum). Pharmacogn J. 2025;17(5): 542-544.