Ginkgo Biloba Polypeptide Preparation Key Technology Research

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Abstract**—** *In this study, ginkgo powder was used as the research object, and neutral protease and flavor protease were selected to study the degree of hydrolysis of ginkgo protein. Using single factor test and orthogonal test, the results show that the addition amount of neutral protease is 1.6mg/ml, pH is 7.0, enzymolysis temperature is 44°C, and the reaction time is 4h, the best hydrolysis degree is 4.68%; flavor; The added amount of protease is 7.2mg/ml, pH is 6.5, enzymolysis temperature is 55°C, and the reaction time is 6h. The best hydrolysis degree is 24.95%; finally, the ginkgo polypeptide is obtained by separation and purification by 3kDa filter membrane. The yield rate was 8.73%, and the obtained filtrate was concentrated by a rotary evaporator to prepare a polypeptide concentrate.*

Keywords— Ginkgo peptide; Enzyme hydrolysis; Membrane separation and purification.

I. INTRODUCTION

Ginkgo biloba, also known as ginkgo, is a precious medicinal and food homologous substance with high edible and medicinal value. In addition to rich nutrients, ginkgo also contains many special biologically active functional factors. It can be used as a tonic or as a food. Studies have shown that Ginkgo contains 17 kinds of amino acids. Among them, there are 8 essential amino acids, accounting for about 38% of the total amino acids. The osmotic pressure of peptides is lower than that of free amino acids, the absorption rate is high, and the characteristics of low antigen properties, etc., will not cause adverse reactions such as diarrhea and allergies. Ginkgo protein is enzymatically hydrolyzed into polypeptides, and ginkgo polypeptides have functional properties such as antioxidant, easy absorption, cholesterol-lowering properties, immune activity, and promotion of metal ion absorption[1]. The principle of enzymatic hydrolysis of protein is to break the peptide bond in the protein to turn the large long-chain protein in the protein into peptides and amino acids of different lengths. Enzymatic hydrolysis of protein has the advantages of low cost, mild reaction conditions, high reaction efficiency, and short time, no damage to amino acids, high product purity, and easy separation. The hydrolysis of proteins generally requires more than two complex proteases to be selected according to the structural and functional characteristics of the biologically active peptide. At present, a lot of research has been done on the preparation of peptides by protease hydrolysis. The peptides prepared by Wu Mengmeng used alkaline protease to hydrolyze the spirulina protein, and the optimal enzymatic conditions were pH 7.0, enzymatic hydrolysis temperature 55°C, reaction time 2.7h, and the ratio of enzyme addition to substrate concentration was 4300U/ g, the degree of hydrolysis can reach 26.8%[2]. Zhu Yanhua et al. obtained the best alkaline protease enzymatic hydrolysis of corn gluten meal through research and preparation of corn peptides: substrate concentration 4%, pH 9.5, enzyme addition amount 1000 U/g, temperature 55°C hydrolysis 4h[3]. Two types of polypeptides are separated by protease hydrolysis of casein and soybean

protein: multi-branched amino acid oligopeptides and low aromatic amino acid polypeptides. The principle of ultrafiltration is a membrane separation process with pressure difference as the driving force. The separation and purification of peptides uses ultrafiltration technology. When the enzymatically hydrolyzed liquid passes through the membrane surface under a certain pressure, the microporous structure on the membrane surface selectively separates the hydrolysate, and small molecules permeate the membrane to obtain ultrafiltrate of small molecule polypeptides[4]. Ginkgo biloba polypeptide can be prepared by separating and purifying the ginkgo protein through a filter membrane by enzymatic hydrolysis.

II. MATERIALS AND METHODS

2.1 Materials and equipment

Ginkgo biloba is analytical pure sulfuric acid, boric acid, hydrochloric acid, ethanol, sodium hydroxide, petroleum ether produced by Sinopharm Chemical Reagent Co., Ltd. Shanghai Enzyme Link Biotechnology Co., Ltd. produces chemical reagent flavor protease, neutral protease, papain, and alkaline protease. pH meter (EL20), CJ78-1 type magnetic stirrer, PRIMOR type refrigerated centrifuge, HH-S2 type digital display constant temperature water bath, DHG9101.2s type electric heating constant temperature blast drying oven, DFT-100 type 100g portable high-speed Chinese medicine Crusher, LABCONCO type freeze drying system, RE-5203 type rotary evaporator.

2.2 Method

2.2.1 Preparation of Ginkgo Powder

To dry the water in the ginkgo, use a portable high-speed Chinese medicine grinder to crush the ginkgo into powder. Because ginkgo acid in ginkgo is a harmful component, it can cause serious allergic reactions, nerve damage, gene mutations and other harms. Ginkgo acid is easily soluble in alcohol. According to the mass-volume ratio of 1:3, take 500g of ginkgo powder and 1500ml of 85% alcohol and mix well, discard the yellow alcohol solution and soak it with alcohol until it is colorless, then use a freeze-drying system After drying, ginkgo powder with ginkgolic acid removed is obtained[5].

2.2.2 The technological process of preparing Ginkgo polypeptide concentrate

Ginkgo powder→hydrolysis→enzyme inactivation (water bath 100^{o}C, 10min)→centrifugation (8000r/min, 15min)→take supernatant→ultrafiltration(3kDa)→take filtrate→concentrate (rotary evaporator 55^{o}C)→finished product (Refrigerate for later)

2.2.3 Operation points

1) Hydrolysis Weigh ginkgo powder and 250mL Erlenmeyer flask, prepare a suspension with water according to the ratio of 1:10, and stir evenly. Put it in a constant temperature water bath at 100^{o}C for pre-denaturation for 10 minutes, adjust the required pH with 1mol/L NaOH and 1mol/L HCL[6], add enzyme to the flask, put it in a constant temperature water bath, and hydrolyze for a certain period of time , The optimal conditions for regulating enzymes.
2) Enzyme inactivation after the hydrolysis, the flask containing the sample is placed in a jacketed water bath, and the enzyme is inactivated at 100°C for 10 minutes.

3) **Centrifugation**: The hydrolysate after enzyme inactivation is rapidly cooled, the centrifuge speed is set to 8000r/min, and the working time is 15min. After the centrifugation, the supernatant is taken for later use.

4) **Ultrafiltration**: Put the supernatant into an ultrafiltration cup, adjust the air pressure to 0.1-0.2kPa, ultrafiltration for about 8 hours, and remove the filtrate.

5) **Concentration**: The lower filtrate after ultrafiltration is concentrated under reduced pressure with a rotary evaporator at 55°C. When the concentration of the solution reaches 30-40%, it is taken out and collected.

2.2.4 Neutral protease hydrolysis single factor test

1) The effect of neutral protease addition on the degree of hydrolysis of Ginkgo biloba peptides. The addition of neutral protease is 0.8mg/ml, 1.0mg/ml, 1.2mg/ml, 1.4mg/ml, 1.6mg/ml. ML, 1.8mg/ml, 2.0mg/ml were used to investigate the degree of hydrolysis of Ginkgo polypeptide by neutral protease.

2) The effect of enzymolysis temperature on the degree of hydrolysis of Ginkgo biloba peptides. The reaction temperature of enzymatic hydrolysis was 40^{o}C, 44^{o}C, 48^{o}C, 52^{o}C, 56^{o}C, 60^{o}C, 64^{o}C to investigate the effect of neutral protease on Ginkgo biloba polypeptide. Degree of hydrolysis.

3) The effect of pH of enzymatic hydrolysis on the degree of hydrolysis of Ginkgo biloba polypeptide. The pH of enzymatic hydrolysis was 5.5, 6.0, 6.5, 7.0, 7.5, 8.0, 8.5 to investigate the degree of hydrolysis of Ginkgo biloba polypeptide by neutral protease.

4) The effect of enzymolysis time on the degree of hydrolysis of Ginkgo biloba polypeptide. The enzymatic hydrolysis time was 1h, 2h, 3h, 4h, 5h, 6h, and 7h to investigate the degree of hydrolysis of Ginkgo biloba polypeptide by neutral protease.

2.2.5 Orthogonal test design of neutral protease hydrolyzing ginkgo polypeptide

Ginkgo powder was initially hydrolyzed with neutral protease, and an orthogonal experiment was designed according to the addition amount of neutral protease, enzymolysis time, pH, and enzymolysis temperature (Table 1).

TABLE 1
ORTHOGONAL TEST TABLE OF NEUTRAL PROTEASE HYDROLYSIS

NO.	Factor			
	A amount (mg/ml)	B time (h)	C pH	D temp (^{o}C)
1	1.4	3	6.5	48
2	1.6	4	7.0	52
3	1.8	5	7.5	56

2.2.6 Flavour protease hydrolysis single factor test

1) The influence of the added amount of flavor protease on the hydrolysis degree of Ginkgo biloba peptides. The added amount of flavor protease is 1.0mg/ml, 2.0mg/ml, 3.2mg/ml, 4.5mg/ml, 6.0mg/ml , 7.2mg/ml, 9.0mg/ml to investigate the degree of hydrolysis of ginkgo polypeptide by flavor protease.

2) The effect of enzymatic hydrolysis temperature on the hydrolysis degree of Ginkgo biloba polypeptide. The enzymatic hydrolysis reaction temperature was 40°C, 45°C, 50°C, 55°C, 60°C, 65°C, 70°C to investigate the hydrolysis degree of Ginkgo biloba polypeptide by flavor protease.

3) The effect of pH of enzymatic hydrolysis on the degree of hydrolysis of Ginkgo biloba polypeptide. The pH of enzymatic hydrolysis was 5.0, 5.5, 6.0, 6.5, 7.0, 7.5, 8.0 to investigate the degree of hydrolysis of Ginkgo biloba polypeptide by flavor protease.

4) The effect of enzymolysis time on the degree of hydrolysis of Ginkgo biloba polypeptide. The enzymolysis time was 1h, 2h, 3h, 4h, 5h, 6h, and 7h to investigate the degree of hydrolysis of Ginkgo biloba polypeptide by flavour protease.

2.2.7 Orthogonal test design for hydrolyzing ginkgo polypeptide by flavor protease

The flavour protease was used to initially hydrolyze the ginkgo powder, and the orthogonal experiment was designed according to the addition amount of flavour protease, enzymolysis time, pH, and enzymolysis temperature (Table 2).

TABLE 2
FLAVOUR PROTEASE HYDROLYSIS FACTOR LEVEL TABLE OF GINKGO BILOBA POLYPEPTIDE

NO.	Factor			
	A amount (mg/ml)	B time (h)	C pH	D temp (°C)
1	5.4	4	6.0	45
2	7.2	5	6.5	50
3	9.0	6	7.0	55

1) The determination of amino nitrogen content adopts potentiometric titration (GB 5009.235-2016)

2) Protein determination method, national standard method, Kjeldahl method (GB 5009.5-2016).

3) Degree of protein hydrolysis:

$$\text{Degree of hydrolysis}\,(\%) = \frac{\text{Amino acid nitrogen content after enzymolysis} - \text{Amino acid nitrogen content before enzymolysis}}{\text{Total nitrogen content in raw materials}} \times 100\%$$

III. RESULTS AND ANALYSIS

3.1 Neutral protease hydrolysis test

3.1.1 The effect of neutral protease addition on the degree of hydrolysis of ginkgo powder

The hydrolysis degree of ginkgo protein is 1.6% when the amount of enzyme is 0.8mg/ml; the degree of hydrolysis of ginkgo protein is 2.2% when the amount of enzyme is 1.0mg/ml; the hydrolysis of ginkgo protein when the amount of enzyme is 1.2mg/ml The degree of hydrolysis of Ginkgo protein is 3.1% when the amount of enzyme is 1.4mg/ml; when the amount of enzyme is 1.6mg/ml, the degree of hydrolysis of Ginkgo protein is 3.3%; when the amount of enzyme is 1.8mg/ml The degree of hydrolysis of ginkgo protein is 1.4%; when the addition of enzyme is 2.0mg/ml, the degree of hydrolysis of ginkgo protein is 3.4% (Figure 1); the reaction curve gradually rises and tends to level, so the addition amount of neutral protease is 1.4mg/ m L, 1.6 mg/ml and 1.8 mg/ml are the horizontal factors in the orthogonal experiment.

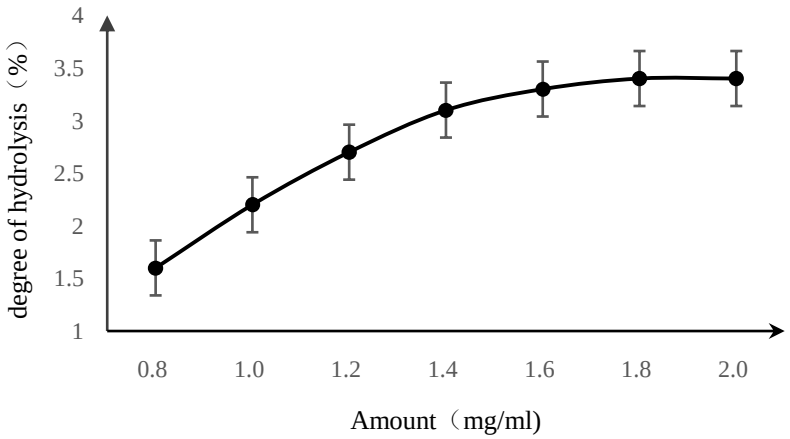

FIGURE 1: The effect of neutral protease addition on the degree of hydrolysis of ginkgo powder

3.1.2 The effect of enzymatic hydrolysis temperature on the degree of hydrolysis of ginkgo powder

When the enzymolysis time is 36°C, the hydrolysis degree of Ginkgo biloba protein is 2.8%; when the enzymolysis time is 40°C, the hydrolysis degree of Ginkgo biloba protein is 3.2%; when the enzymolysis time is 44°C, the hydrolysis degree of Ginkgo protein is 3.5%; the enzymolysis time is 48. The degree of hydrolysis of Ginkgo protein at 50°C is 3.7%; the degree of hydrolysis of Ginkgo biloba protein at 52°C is 3.6%; the degree of hydrolysis of Ginkgo protein at 56°C is 3.4%; the hydrolysis time of Ginkgo biloba is at 60°C. The temperature is 3.2%; it can be seen from the figure that the temperature gradually increases from 36°C to 48°C, and the reaction is a rising curve. When the enzymolysis temperature is 48°C, it is the optimum enzymolysis temperature and the hydrolysis degree of Ginkgo protein is the largest. When the temperature rose from 48°C to 60°C, the reaction showed a decreasing curve (Figure 2). Therefore, 44°C, 48°C and 52°C are selected as the horizontal factors in the orthogonal experiment for the enzymolysis temperature of neutral protease.

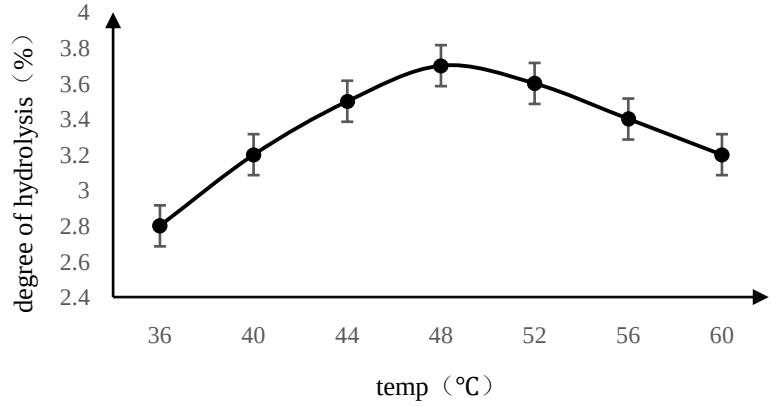

FIGURE 2: The effect of neutral protease hydrolysis temperature on the degree of hydrolysis of ginkgo powder

3.1.3 The effect of pH on the hydrolysis degree of ginkgo powder

When the pH of enzymolysis is 5.5, the degree of hydrolysis of ginkgo protein is 1.8%; when the pH of enzymatic hydrolysis is 6.0, the degree of hydrolysis of ginkgo protein is 2.5%; when the pH of

enzymatic hydrolysis is 6.5, the degree of hydrolysis of ginkgo protein is 3.1%; when the pH of enzymatic hydrolysis is 7.0. The degree of hydrolysis is 3.4%; when the pH of enzymatic hydrolysis is 7.5, the degree of hydrolysis of ginkgo protein is 3.1%; when the pH of enzymatic hydrolysis is 8.0, the degree of hydrolysis of ginkgo protein is 2.5%; when the pH of enzymatic hydrolysis is 8.5, the degree of hydrolysis of ginkgo protein is 1.7%. It can be seen that the pH of the enzymatic hydrolysis gradually increased from 5.5 to 7.0, and the reaction was a rising curve. When the enzymolysis pH is 7.0, it is the optimum pH and the hydrolysis degree of Ginkgo protein is the largest. When the pH of enzymatic hydrolysis rises from 7.0 to 8.5, the reaction becomes a decreasing curve (Figure 3). Therefore, the selection of pH 6.5, 7.0 and 7.5 for the enzymatic hydrolysis of neutral protease is the horizontal factor in the orthogonal experiment.

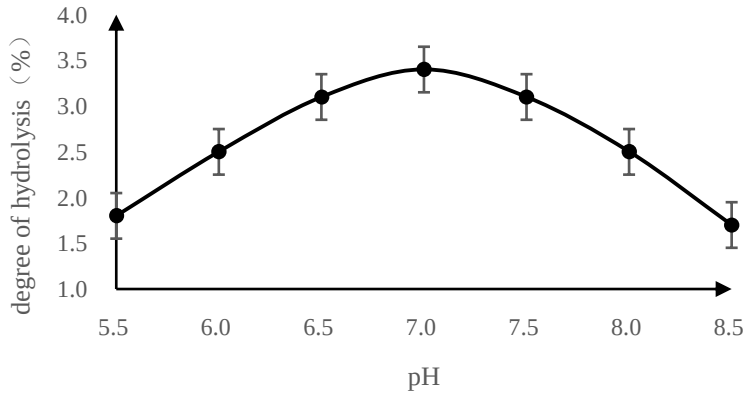

FIGURE 3: The effect of pH of neutral protease hydrolysis on the degree of hydrolysis of ginkgo powder

3.1.4 The effect of enzymolysis time on the degree of hydrolysis of ginkgo powder

When the hydrolysis time is 1h, the hydrolysis degree of ginkgo protein is 1.5%; when the hydrolysis time is 2h, the hydrolysis degree of ginkgo protein is 2.1%; when the hydrolysis time is 3h, the hydrolysis degree of ginkgo protein is 2.6%; when the hydrolysis time is 4h, the hydrolysis degree of ginkgo protein. The degree of hydrolysis is 2.9%; when the hydrolysis time is 5h, the degree of hydrolysis of ginkgo protein is 3.1%; when the hydrolysis time is 6h, the degree of hydrolysis of ginkgo protein is 3.2%; when the hydrolysis time is 6h, the degree of hydrolysis of ginkgo protein is 3.2%; reaction curve It gradually rises and tends to level (Figure 4), so 4h, 5h, and 6h are selected as the horizontal factors in the orthogonal experiment for the enzymatic hydrolysis time of neutral protease.

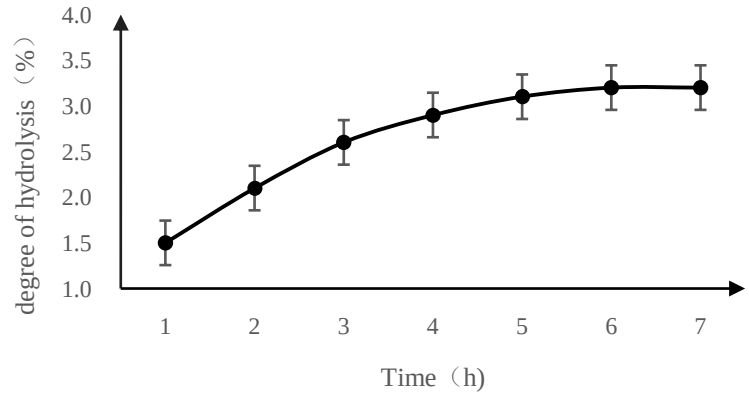

FIGURE 4: The effect of neutral protease hydrolysis time on the degree of hydrolysis of ginkgo powder

3.1.5 Orthogonal test results of neutral protease hydrolyzing Ginkgo powder

It can be seen from Table 3 that B>C>D>A; through the K value, the optimal condition for judging each factor is A2B2C2D1: the addition amount of neutral protease enzyme is 1.6 mg/ml, enzymatic hydrolysis pH7.0, enzyme. The solution temperature is 44°C and the enzymolysis time is 4h[7]. The best degree of hydrolysis is 4.68% at this time.

TABLE 3
ORTHOGONAL TEST TABLE OF NEUTRAL PROTEASE HYDROLYSIS

S. No.	Factor				DH (%)
	A amount (mg/ml)	B time (h)	C pH	D temp (°C)	
1	1.4	3	6.5	44	4.47
2	1.4	4	7.0	48	4.99
3	1.4	5	7.5	52	3.88
4	1.6	3	7.0	52	4.84
5	1.6	4	7.5	44	5.12
6	1.6	5	6.5	48	3.65
7	1.8	3	7.5	48	4.83
8	1.8	4	6.5	52	4.12
9	1.8	5	7.0	42	4.38
K1	4.45	4.71	4.08	4.66	
K2	4.54	4.74	4.74	4.49	
K3	4.44	3.97	4.61	4.28	
R	0.10	0.77	0.66	0.38	

3.2 Flavor protease hydrolysis test

3.2.1 The effect of flavor protease addition on the degree of hydrolysis of ginkgo powder

In the experiment, the hydrolysis degree of ginkgo protein was 19.3% when the addition amount of flavor protease was 1.0mg/ml; when the addition amount of enzyme was 2.0mg/ml, the hydrolysis degree of ginkgo protein was 22.9%; when the addition amount of enzyme was 3.2mg/ml. The degree of hydrolysis of ginkgo protein is 25.1%; the degree of hydrolysis of ginkgo protein is 26.1% when the amount of enzyme is 4.5mg/ml; the degree of hydrolysis of ginkgo protein is 26.9% when the amount of enzyme is 6.0mg/ml; the amount of enzyme is 7.2. The hydrolysis degree of ginkgo protein is 27.5% at mg/ml; the hydrolysis degree of ginkgo protein is 27.5% when the enzyme is added at 9.0 mg/ml; Figure 5 shows that the reaction curve gradually rises and tends to level, so the amount of flavor protease added Choose 4.5mg/ml, 6.0mg/ml and 7.2mg/ml as the horizontal factors in the orthogonal test.

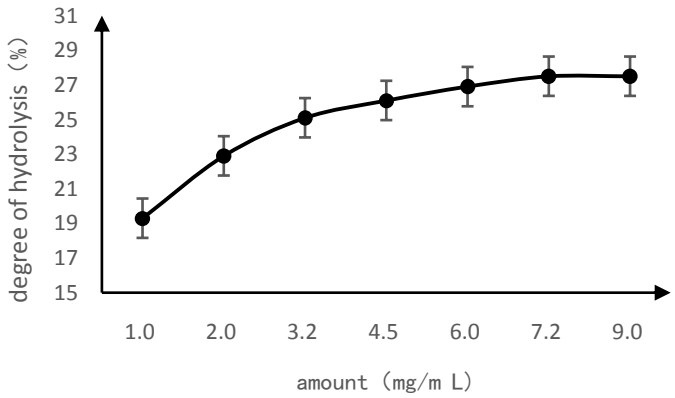

FIGURE 5: The effect of flavor protease addition on the degree of hydrolysis of ginkgo powder

3.2.2 The effect of enzymatic hydrolysis temperature on the degree of hydrolysis of ginkgo powder

In the experiment, the hydrolysis degree of ginkgo protein was 21.2% when the enzymatic hydrolysis time was 35^{o}C; the hydrolysis degree of ginkgo protein was 23.0% when the enzymolysis time was 40^{o}C; the hydrolysis degree of ginkgo protein was 24.4% when the enzymolysis time was 45^{o}C; When the time is 50^{o}C, the hydrolysis degree of Ginkgo biloba protein is 25.2%; when the enzymolysis time is 55^{o}C, the hydrolysis degree of Ginkgo biloba protein is 24.6%; when the hydrolysis time is 60^{o}C, the hydrolysis degree of Ginkgo biloba protein is 23.6%; when the enzymolysis time is 65^{o}C The degree of hydrolysis of ginkgo protein is 22.4%; it can be seen from the figure that the temperature gradually increases from 35°C to 50°C, and the reaction is a rising curve. When the enzymolysis temperature is 50^{o}C, it is the optimum enzymolysis temperature and the hydrolysis degree of Ginkgo protein is the largest. When the temperature rises from 50°C to 65°C, the reaction is a decreasing curve (Figure 6). Therefore, the enzymatic hydrolysis temperature of neutral protease is 45^{o}C, 50^{o}C and 55^{o}C as the horizontal factors in the orthogonal experiment[8].

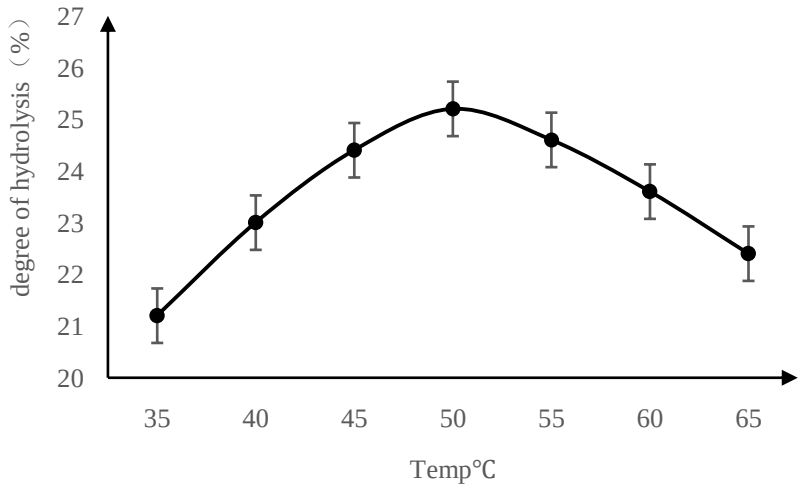

FIGURE 6: The effect of the temperature of flavour protease hydrolysis on the degree of hydrolysis of ginkgo powder

3.2.3 The effect of pH on hydrolysis of ginkgo powder

In the test, the hydrolysis degree of ginkgo protein was 20.4% when the enzymatic pH was 5.0; the hydrolysis degree of ginkgo protein was 21.9% when the hydrolysis pH was 5.5; the hydrolysis degree of ginkgo protein was 23.0% when the hydrolysis pH was 6.0; the hydrolysis pH was 6.5; when the hydrolysis of ginkgo protein is 23.6%; when the hydrolysis pH is 7.0, the hydrolysis degree of ginkgo protein is 23.1%; when the hydrolysis pH is 7.5, the hydrolysis degree of ginkgo protein is 22.1%; when the hydrolysis pH is 8.0, the hydrolysis degree of ginkgo protein is 21.1%. It can be seen from the figure 7 that the pH of enzymatic hydrolysis gradually increases from 5.0 to 6.5, and the reaction is a rising curve. The optimum pH for enzymatic hydrolysis is at pH 6.5, and the degree of hydrolysis for ginkgo protein is the greatest. When the pH of enzymatic hydrolysis rises from 6.5 to 8.0, the reaction is a decreasing curve. Therefore, the selection of pH 6.0, 6.5 and 7.0 for the enzymatic hydrolysis of neutral protease is the horizontal factor in the orthogonal experiment.

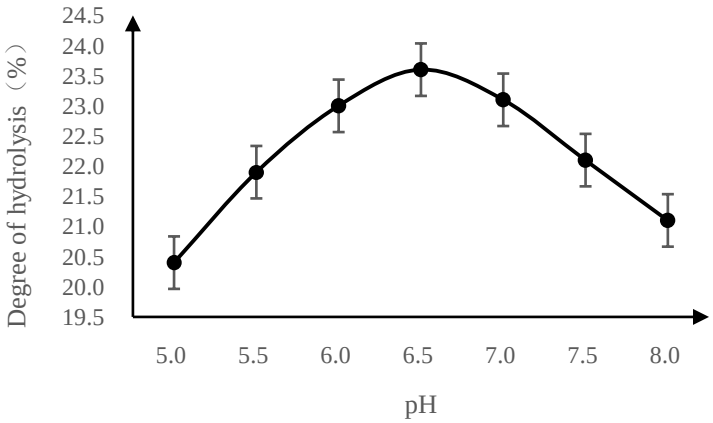

FIGURE 7: The effect of pH of flavour protease hydrolysis on the degree of hydrolysis of ginkgo powder

3.2.4 The effect of enzymolysis time on the degree of hydrolysis of ginkgo powder

In the experiment, the hydrolysis degree of ginkgo protein was 17.9% when the enzymolysis time was 1h; the hydrolysis degree of ginkgo protein was 19.8% when the enzymolysis time was 2h; the hydrolysis degree of ginkgo protein was 21.4% when the enzymolysis time was 3h; the hydrolysis time was 4h when the hydrolysis time is 5h, the hydrolysis degree of ginkgo protein is 23.0%; when the hydrolysis time is 6h, the hydrolysis degree of ginkgo protein is 23.1%; when the hydrolysis time is 6h, the hydrolysis degree of ginkgo protein is 23.1%. Figure 8 shows that the reaction curve gradually rises and tends to level, so 4h, 5h and 6h are selected as the horizontal factors in the orthogonal experiment for the enzymolysis time of neutral protease.

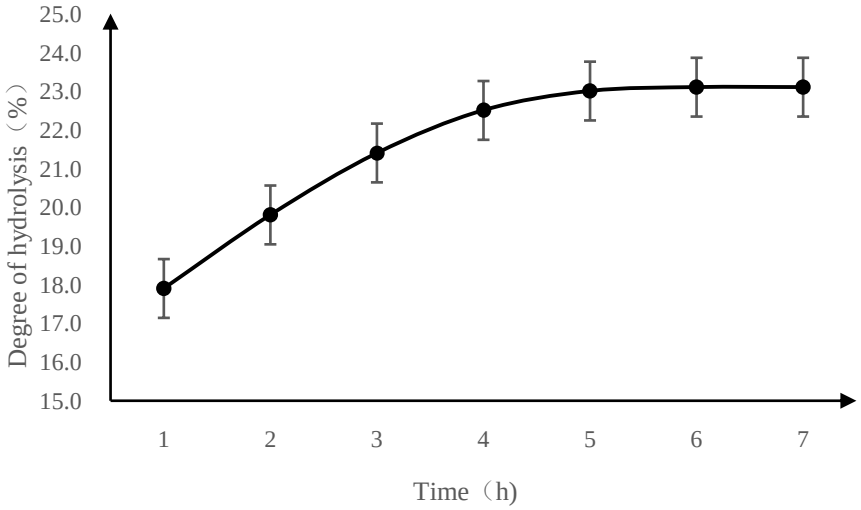

FIGURE 8: The effect of the time of flavour protease hydrolysis on the degree of hydrolysis of ginkgo powder

3.2.5 Orthogonal test design for hydrolyzing ginkgo powder by flavor protease

It can be seen from Table 4 that A>C>B>D, it can be seen from the k value that A3B3C2D3 is better, therefore, the flavor enzyme addition amount 7.2mg/ml, enzymatic hydrolysis pH6.5, reaction temperature 55^{o}C and Enzymolysis time is 6h. As the optimal flavour protease enzymolysis conditions. The best degree of hydrolysis at this time is 24.95%.

TABLE 4
ORTHOGONAL TEST RESULTS OF FLAVOUR PROTEASE HYDROLYSIS

S. No.	Factor				DH (%)
	A amount (mg/ml)	B time (h)	C pH	D temp (^{o}C)	
1	4.5	4	6.0	45	18.94
2	4.5	5	6.5	50	22.23
3	4.5	6	7.0	55	20.89
4	6.0	4	6.5	55	23.51
5	6.0	5	7.0	45	22.04
6	6.0	6	6.0	50	23.12
7	7.2	4	7.0	50	22.75
8	7.2	5	6.0	55	23.87
9	7.2	6	6.5	45	24.98
K1	20.69	21.73	21.98	21.99	
K2	22.89	22.71	23.57	22.70	
K3	23.87	23.00	21.89	22.76	
R	3.18	1.27	1.68	0.77	

IV. CONCLUSIONS AND PROSPECTS

In this study, neutral protease and flavor protease were selected to study the degree of hydrolysis of Ginkgo protein. Firstly, neutral protease is selected for single factor test and orthogonal test. The results show that the degree of hydrolysis is the best when the addition amount of neutral protease is 1.6mg/ml, pH is 7.0, enzymolysis temperature is 44^{o}C, and reaction time is 4h. It was 4.68%; the single factor test and orthogonal test were performed with flavor protease. The results showed that the addition amount of flavor protease was 7.2mg/ml, pH was 6.5, enzymatic hydrolysis temperature was 55^{o}C, and the reaction time was 6h. The best is 24.95%; finally, the Ginkgo biloba polypeptide is separated and purified by a 3kDa filter membrane, and the yield of Ginkgo biloba polypeptide is 8.73%.

Taizhou City, Jiangsu Province, China is known as the hometown of ginkgo. Its ginkgo production is abundant but the deep processing is insufficient, and the resource advantages of ginkgo cannot be fully utilized[9]. This study uses local resource advantages to clarify the mechanism of extraction and separation of Ginkgo biloba polypeptides, and screen the best extraction process for preparing polypeptides by enzymatic hydrolysis of proteins, provide theoretical and scientific basis for the comprehensive utilization of ginkgo, speed up the deep processing of ginkgo, and promote the structure of the ginkgo industry Adjustment and sustainable development[10]. This research aims to lay the foundation for the research of ginkgo polypeptide health products, and at the same time open up a new way for the comprehensive utilization of ginkgo.

ACKNOWLEDGEMENTS

This work is supported by “Taizhou Science and Technology Supporting Plan Agriculture Project (TS201815); Taizhou Science and Technology Supporting Plan Social Development Project (TS201923) ; General Guidance Project of Jiangsu University Students’ Practice and Innovation in 2019 (201912806012y)”. We are very grateful to Jinshuang Q, Ning Zhang, Xia Li, Fangyue Rong, Jinyong Zhang, Guorui Zhang, Si Chen, Yaxing Guo, Siyu Liu, Chen Liang, Guoai Lu for his technical support and help.

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