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INFLUENCE OF AMYLASES AND PROTEINASES ON PROCESS OF EXTRACTION COTTON SEED OIL BY FOR PRESS

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Abstract
It studied the effect of amylases and proteinases on proteins and carbohydrates of cotton seed grinding. It was established that the preliminary processing of cotton seeds grinding positively influences enzymatic processes by amylases and proteinases and facilitates the process of extraction of oils.

Keywords: frying, proteinase, amylase, fermentation, cotton mint, refining

Introduction

The oil capacity and emulsifying properties of the structural components of vegetable raw materials can also be reduced by enzymatic action on the structural components of raw materials [1]. At the same time, the choice of enzymes for the fermentation of raw materials and the conditions of the process becomes important. Depending on the composition of the structural components of oilseeds, enzymes with the desired catalytic properties should be selected.

In the process of frying cotton mint, structural changes occur in the components of plant tissue, including tubules. At the same time, the protein layer is denatured, which helps to improve the oil extraction process during pressing.

Theoretical Framework

It should be noted that the seeds of many plants contain natural proteinase and amylase inhibitors of a protein nature [2], which in “in situ” conditions participate in the regulation of the activity of proteolytic and amylolytic enzymes. This also is applied to cotton seeds [3].

Proteinase and amylase inhibitors contained in cotton seeds reduce the activity of enzymes during the fermentation of cotton mint. Protein proteinase inhibitors lose their inhibitory ability during heat treatment. To reduce the inhibitory effect of the

inhibitor, we studied the effect of pre-heat treatment of cotton mint on enzymatic processes involving exogenous enzymes.

Table 1 shows the results of the action of neutral proteinases on cotton mint proteins pretreated at 95 °C.

Table 1 Formation of products of hydrolysis of cotton mint proteins by acidic and neutral proteinases

N	Time fermentation, min.	Hydrolysis products (amino acids), mmol/g of cotton mint			
		without heat treatment		with heat treatment	
		Acid proteinase	Neutral proteinase	Acid proteinase	Neutral proteinase
1	0	0	0	0	0
2	30	2,5±0,12	10,8±0,4	1,2±0,04	17,5±0,8
3	60	3,5±0,14	11,7±0,5	2,2±0,12	23,5±1,0
4	90	4,2±0,19	12,0±0,5	3,0±0,12	24,8±1,0
5	120	4,2±0,19	12,0±0,5	3,1±0,12	26,3±1,0

From the data in Table. 1 it can be seen that pre-heat treatment has a positive effect on the hydro-isolation of cotton mint proteins. At the same time, the formation of protein hydrolysis products increases by 1.7-2.0 times. So, for example, during fermentation of cotton mint for 60 minutes, 23.5 ± 1.0 mmol / g of the product is formed due to enzymatic hydrolysis against 11.7 ± 0.5 mmol /g in the control.

Heat treatment of cotton mint slightly affects the hydro-isolation of carbohydrates by amylolytic enzymes. Table 2 shows the rate of formation of reducing sugars during enzymatic processing of cotton mint. [3].

Table 1 Formation of reducing sugars during enzymatic hydrolysis of cotton mint carbohydrates

Name of the enzyme used	Reducing sugars, mg/g of cotton mint	
	without heat treatment	with heat treatment
α-amylase	22,6±1,0	12,8±,.5
α-amylase and β-amylase	34,6±1,3	31,0±1,3

From the data presented, it can be seen that the formation of reducing sugars during fermentation of cotton mint with α-amylase is 22.6 ± 1.0 mg/ g. With the combined use of α-amylase and β-amylase, the rate of hydrolysis of carbohydrates proceeds more intensively and the formation of reducing sugars is 34.6 ± 1.3 mg/g.

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The formation of reducing sugars during fermentation of heat-treated cotton mint is 12.8 ± 0.5 mg / g in the case of the use of α-amylase and 31.0 ± 1.3 mg / g in the case of the combined use of α- and β-amylases.

Thus, the moisture-heat treatment of cotton mint has a positive effect on enzymatic processes, increasing the degree of hydrolysis of protein substances. At the same time, carbohydrate hydrolysis also occurs with a slight decrease in the rate of hydrolysis.

Enzymatic processing of cotton mint with amylases and proteinases before frying has a positive effect on the oil extraction process. Table 3 shows data on the effect of enzymatic processing of cotton mint on the yield of the resulting pre-pressed cottonseed oil.

Table 3.The effect of fermentation on the process of extracting oil from cotton mint

N	Indicators	Without enzymatic treatment	With enzymatic treatment
1	Oil content of seeds, %	20,3±0,3	20,3±0,3
2	The yield of prepressed oil, in %.	12,6±0,5	13,5±0,5
3	Oil yield extraction, %.	5,4±0,2	4,5±0,2

From the data in Table 3. it can be seen that the yield of pre-pressed oil during fermentation of cotton mint increases and amounts to 13.5 ± 0.5%. The yield of pre-pressed oil without fermentation was 12.6 ± 0.5%. Due to this, the extraction oil yield decreased.

Processing of cotton mint with proteolytic and amylolytic enzymes has a positive effect on the pre-press extraction of oil, increasing its yield. These data can be used to improve the process of extracting oils from oilseeds.

Conclusion

Enzymes with proteolytic and amylolytic activities can be successfully used in the refining of cottonseed oil. Refining combines processes, the main purpose of which is to remove substances accompanying it from oils, and some foreign impurities. Concomitant substances include substances contained in seeds and passing into oil in a minimally altered state, and substances that have changed during extraction under the influence of external factors. The accompanying substances include: free fatty acids, phospholipids, waxes, hydrocarbons, vitamins, protein substances and substances formed during the moisture-heat treatment of cotton mint.

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