



Research on the process of obtaining pure black cumin oil

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Keywords

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Drying
Oil content
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Abstract

The results of studies of the effect of microwave treatment of black cumin seeds on the yield of oil, cake is presented. The significant influence of the power and duration of the radiation process on the oil production indicators is shown. Optimal technological parameters have been established, at which the degree of oil extraction is 29.60%, the cake is 70.40%. The main parameters affecting the degree of oil release are the oil content of seeds, the power of microwave radiation and the duration of the process.

Introduction

Vegetable oils have high biological value and are a source of essential polyunsaturated fatty acids, vitamins and trace elements. They are a structural part of all body tissues, favorably affect many of its systems and functions and promote proper metabolism. In this regard, vegetable oils are widely used in medicine, cosmetology, perfumery, food industry and dietary nutrition. Such a wide use of them leads to the need to obtain especially pure oils with a maximum content of biologically active substances [1-4].

In this regard, an urgent task is to develop methods for deep processing of oil-containing raw materials of the Republic to obtain environmentally friendly fat products. Deep processing implies the creation and application of new technologies that allow waste-free use of all components of raw materials and obtain environmentally friendly products [5-8].

Scientific research is being carried out to develop the oil's resistance to oxidation, study the dependence of the acid number on the duration of heat treatment, the use of ultra-high frequency electromagnetic field energy, thermal stability, the effect of essential polyunsaturated fatty acids, vitamins and trace elements on human health and the environment when used in medicine and nanotechnology [9-12].

Methods

The research was carried out using Central Asian organic Black cumin with an oil content of 35.46%. Chemical analysis of the initial, intermediate and final products was carried out by known methods [13-17].

Results and discussion

Studies of the effect of microwave radiation on weight loss, the yield of oil and cake from black cumin seeds were studied on an installation, the main node of which is a microwave oven. The radiation power varied from 100 to 300 watts at a frequency of 2450 MHz and the duration of the treatment process was 15 minutes. Studies have shown that at a radiation power of 120 watts and above, the seeds are roasted.

To establish the effect of the duration of the microwave radiation process on the yield of black cumin oil, the seeds were kept in a microwave oven at a study power of 105 watts, a frequency of 2450 MHz and a study duration of 1 to 20 minutes. The results obtained are shown in Table 1.

The table shows that with an increase in the duration of the processing of black cumin seeds for 1-5 minutes, weight loss is not observed. With an increase in the duration of the microwave radiation treatment process from 10 minutes to 20 minutes, the mass loss increases from 0.5% to 1.5%. Increasing the duration of the processing of black cumin seeds increases the oil yield from the first minutes. So, when processed for 3 minutes, the oil yield increases by 6.15% and increases from 20.97% to 27.12%. The maximum degree of oil extraction is observed

during processing for 3-5 minutes and is 27.12-29.60%. A further increase in the processing time to 20 minutes leads to a decrease in oil yield to 23.96%.

Table 1. Effect of microwave radiation on oil extraction and cake yield during pre-microwave treatment of black cumin seeds

No	Time, min	Mass Loss, %	Cake output, %	Oil output, %
1	-	-	79,03	20,97
2	1	-	73,06	26,94
3	3	-	72,88	27,12
4	5	-	70,40	29,60
5	10	0,5	73,05	26,45
6	15	1,0	73,90	25,10
7	20	1,5	74,54	23,96

Under optimal conditions of processing duration of 3-5 minutes, the yield of cake is the lowest and is 72.88-70.40%.

Conclusion

Thus, the maximum degree of oil extraction is observed during processing for 3-5 minutes and is 27.12-29.60%. A further increase in the processing time to 20 minutes leads to a decrease in oil yield to 23.96%.

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