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Studies on the extraction of oil from watermelon seeds

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Abstract

In this work, the results obtained show that in order to obtain the maximum amount of oil from watermelon seeds, it is necessary to add 5% of the seed shell to the seed kernel, steam at 150 °C for 20 minutes and dry the mixture. At the same time, the fat yield is 13.59%, and the cake is 69.19%.

Introduction

At a time when the country is undergoing deep reforms in the agricultural sector, the implementation of the process of production and consumption of organic products can give the desired result. It should be noted that the processing of non-traditional oilseeds mentioned above gives not only medicinal organic oils, but also kunjara, which contains biologically active substances necessary for the human body: proteins, lipids, minerals, vitamins and very nutritious, fragrant and healing. There are substances with properties based on which the nutritional composition of the population is enriched with natural substances. The use of this type of unconventional raw materials in the production of new types of vegetable oils, raw materials for pharmaceuticals, as well as in the production of spreads, mayonnaise and bread, pastries, confectionery is highly effective [1].

It requires the study and analysis of production technology. Based on the above, in our study, along with the study of local types of fatty raw materials grown in the Republic. At the same time, we strive to study and improve oil extraction technologies or technological processes, processing them in accordance with the structure of non-traditional oilseeds, thereby producing functional types of oilseeds. The main goal of our economy in the future is to get the maximum.

Currently, due to the lack of fresh water and the reduction of acreage, the problem of providing the population with food is sharply aggravated. In this regard, the intensification of technological processes, increasing the yield of products and improving quality, including the processing of raw materials for medical purposes and healthy nutrition, the production of oils rich in polyunsaturated fatty acids is becoming relevant [2-3].

In the world, special attention is paid to obtaining oil from seeds of stone fruits, crushed melon seeds, wheat germ, pine nuts. At the same time, research work to determine the impact of the use of trace elements and vitamins, the production of essential polyunsaturated fatty acids, increasing thermal stability using ultrahigh frequencies and electromagnetic fields on human health are important [4-5].

Material and methods

The research was carried out on the seeds of the Dakar watermelon variety with an oil content of 20.10%. Chemical analysis of the initial, intermediate and final products was carried out by known methods [7-12].

The oil content of seeds is understood as the content of raw fat in them and the fat-like substances accompanying it, which pass together with the fat into the ether extract from the seeds under study.

The method for determining moisture and volatile substances applies to oilseeds, cake, meal and establishes a near-infrared spectroscopy method for simultaneous determination of the following quality indicators:

- the mass fraction of fat (in the measurement range from 1% to 60%);
- the mass fraction of moisture and volatile substances (in the measurement range from 1% to 18%);
- protein mass fraction (in the measurement range from 5% to 80%);
- the mass fraction of fiber (in the measurement range from 2% to 50%).

Results and Discussion

Due to the fact that studies on the production of oil have not been carried out before, the process of direct cold pressing of watermelon seeds, with preliminary heat treatment of seeds and cold pressing of the core of watermelon seeds after crushing and separating the peel, was studied. Under these conditions, it is not possible to extract oil from watermelon seeds. An insignificant amount of 9.07% oil was isolated during cold pressing of crushed seeds without separating the peel.

Therefore, the effect of the amount of watermelon seed peel on the yield of oil and cake after steam treatment was further investigated. To do this, 200 g of watermelon seeds were divided into a core and a peel, 5, 20 and 100% of the peel were added to the selected amount of seed kernels, steamed at 150 ° C for 20 minutes, dried at 80, 90 and 100 ° C for 25 minutes and subjected to cold pressing. The results obtained are shown in Table 1.

Table 1. The effect of pre-heat treatment on oil extraction and the yield of cake from the core of watermelon seeds

№	Introduced peel (%)	Steam treatment time (min)	Weight gain after heat treatment (%)	Drying time (min)	Drying temperature (°C)	Cake output (%)	Oil output (%)
1	5	20	6	25	80	69,19	13,59
2	20	20	6	25	90	78,14	12,72
3	100	20	6	25	100	94,9	11,10

From the data obtained, it can be seen that after steam treatment of a mixture of the kernel and the peel of watermelon seeds, regardless of the amount of peel added to the kernels, the mass of the mixture increases by 6%. At the same time, the oil yield with an increase in the amount of the introduced peel from 5% to 20% and 100% decreases from 13.59% to 12.72% and to 11.10%, respectively. The yield of cake under these conditions increases from 69.19% to 78.14% and to 94.90%.

The obtained results indicate that in order to obtain the maximum amount of oil from watermelon seeds, it is necessary to add 5% of the seed peel to the seed kernel, steam it at a temperature of 150 ° C for 20 minutes, dry the mixture at a temperature of 80 ° C for 25 minutes and subject to cold pressing. At the same time, the oil yield will be 13.59% and the cake 69.19% of the available amount.

Increasing the duration of the sesame seed treatment process increases the oil yield from the first minutes. So, when processed for 3 minutes, the oil yield increases by 8.49% and increases from 18.61% to 27.10%. The maximum degree of oil extraction is observed during processing for 10-15 minutes and is 31.55-32.79%. A further increase in the processing time to 20 minutes leads to a decrease in oil yield up to 24.08%.

Under optimal conditions of processing duration of 10-15 minutes, the yield of cake is the smallest and amounts to 68.20-66.71%.

Conclusion

Thus, the maximum amount of watermelon seed oil must be added to the seed kernel 5% of the seed peel, steamed at 150 °C for 20 minutes, the mixture dried at 80 ° C for 25 minutes and subjected to cold pressing. At the same time, the oil yield will be 13.59% and the cake 69.19% of the available amount.

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