



Section 3. Food processing

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FEATURES OF PROCESSING OF OILS OBTAINED FROM LOW GRADE COTTON SEEDS

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Abstract

This paper presents a technology for refining low-grade cottonseed oil, in which refined high-grade cottonseed oil has a yield of 85% and 12 colors and 35 yellow units in a 13.5 cm layer of Lovibond with 35 yellow units. k units, and the yield of refined oil obtained from low-grade cottonseed is 81.5%, the color is 18 red and 4 blue units, 35 yellow, the refined oil obtained from non-standard cottonseed has a yield of 78.3% and 13 It was found that 35 yellow, 19 red and 5 blue units were found in the 5 cm layer.

Keywords: *Low-grade cotton seeds, cottonseed oil, urea, gossypol, acid value, alkali, refining, pre-clarification, pressing*

Introduction

Along with high-grade cotton seeds, oil and fat enterprises in Uzbekistan annually receive low-grade ones, the amount of which varies between 25–35% (depending on the climatic conditions of the year, etc.) (Akhmedov A. N., Ishankulova G. N., 2024. 44; Akhmedov A. N., Ishankulova G. N., 2023. 44).

When processing such seeds at enterprises, oils with a high content of free fatty acids, gossypol, chlorophyll and their derivatives are ob-

tained, which negatively affects the quantity of refined oils obtained and their quality. Known technological schemes (Beloborodov V. V., 1960. 164; Abdullaev N. Sh., 1989. 7). Refining of oils obtained from low-grade cotton seeds is not effective enough and requires improvement. To develop new technological methods, first of all, it is necessary to study the distinctive features of the qualitative composition of oils obtained from low-grade and non-standard cotton seeds (Akhmedov A. N., 2019. 23).

We conducted a comparative study of the qualitative composition of black oils obtained from high-grade, low-grade and non-standard cotton seeds under the production conditions of Limited liability company “Asiangolden”. Sampling of black oil was carried out after the filter presses during the normal functioning of the pre-press shop, established in the technological regulations (Zaremba G. V., 1967. 471).

Materials and methods

The acid number of oils was determined by potentiometric and indicator methods using a 1% alcohol solution of thymolphthalein as an indicator.

– the color of cottonseed oil was determined using a Lovibond color meter.

Results

The analysis of black (crude) cottonseed oils obtained by prepressing was carried out according to the methods described in the “Guide to Research Methods...” (Zaremba G.V. et al. 1967. 502). The results of the analyzes are presented in table 1.

From Table 1. It can be seen that oils obtained from low-grade and non-standard cotton seeds contain significantly more free fatty acids, phosphatides, gossypol and its derivatives. These oils also contain more Lovibond red and blue coloring components. Very low quality oil is obtained from non-standard cotton seeds, which should also be taken into account when refining it.

Table 1. Indicators of crude forex oils obtained from high-grade, low-grade and non-standard cotton seeds

Oil sample	Indicators of crude cottonseed oils				
	Acid number, mg KOH/g	Color in 1 cm layer		Phosphatides, %	Gossypol and its derivatives, %
		red units	blue units		
High grade seed oil (I–II grades)	4.35	63.8	4	1.12	0.18
Low grade seed oil (III–IV varieties)	7.19	74.5	6	1.38	0.28
Non-standard seed oil	8.44	82.7	9	1.55	0.31

It is known that increasing the content of phosphatides in crude cottonseed oil increases its emulsifying properties during alkaline

refining. This increases the loss of neutral oil in the soap stock, which negatively affects the yield of refined oil.

Table 2. Indicators of alkaline refining of oils obtained from various cotton seeds

Oil sample	Alkali consumption (NaOH)			Refined cottonseed oil		
	Concentration g/l	kg/t	Excess alkali, %	Color in 13.5 cm layer		Exit, %
				red units	blue units	
High grade seed oil (I–II grades)*	250	8.6	50	12	3	85.0
Low grade seed oil (III–IV varieties)	250	8.6	100	18	4	81.5
Non-standard seed oil	310	13	200	19	5	78.3

Note: * Corresponds to the samples in Table 1

An increase in the color of oils obtained from low-grade and non-standard cotton

seeds is associated with an increase in the content of gossypol and its derivatives. For ex-

ample, if in oil obtained from I–II varieties of cotton seeds, the content of gossypol and its derivatives is 0.18%, then in oil obtained from III–IV varieties of seeds it is 0.28%, and in oil obtained from non-standard seeds – 0.31%. Consequently, when selecting alkaline refining modes, it is necessary to take into account these features in the composition of such oils. We studied the refinability of selected oils in laboratory conditions using a standard method (Sergeev, A. G., 1973. 163). The results of alkaline refining of crude oils obtained from various cotton seeds are presented in Table 2.

From Table 2 it is clear that during alkaline refining of oil obtained from high-grade seeds, an excess of alkali of 50% is used, for oils obtained from low-grade seeds – 100%, for non-standard seeds – 200%.

Discussion and Conclusion

At the same time, refined oil obtained from high-grade seeds has a yield of 85% and a color of 12 color. 3 blue units with 35 yellow units in a 13.5 cm layer according to Lovibond. Refined oil obtained from low-grade cotton seeds has a yield of 81.5% and a color of 18 red and 4 blue units with 35 yellow. Refined oil obtained from non-standard cotton seeds has a yield of 78.3% and a color

of 19 red and 5 blue units with 35 yellow in a 13.5 cm layer.

Analysis of these indicators confirms that with a decrease in the grade of cotton seeds, the quality of the resulting black oil deteriorates, and the consumption (concentration and excess quantity) of alkali (NaOH) increases. All this negatively affects the yield of refined oil and its quality indicators. For example, an increase in excess alkali by 50% leads to a decrease in the yield of refined cottonseed oil by 3.5%, and at 150% – by 6.5%. Of course, such oil losses negatively affect the technical and economic indicators of the refining shop and oil and fat production in general.

Thus, the conducted research allows us to draw the following conclusions: – to increase the yield and improve the quality indicators of crude oils obtained from low-grade and non-standard cotton seeds, it is advisable to partially remove from them phosphatides, gossypol, chlorophyll and their derivatives, as well as other components associated with triacylglycerols, which reduce the efficiency of their alkaline refining process. At the same time, the selectivity of the process of preliminary removal of these components determines the increase in the yield and quality of the resulting refined cottonseed oils.

References

- Akhmedov A. N., Ishankulova G. N. Analysis Of Oils Obtained By The Pressing Method From Fruit Grains. *Austrian Journal of Technical and Natural Sciences*, 2024. – P. 44–47.
- Akhmedov A. N., Ishankulova G. N. Technology of preliminary clarification of oils from low-quality cotton seeds. *Austrian Journal of Technical and Natural Sciences*, 2023. – P. 23–28.
- Guide to the technology of production and processing of vegetable oils and fats / [ed. V. V. Beloborodov et al.] – L.: VNIIZH, 1960-I–II. – 348 p.
- Abdullaev N. Sh. Development of a combined process of oil extraction and oil refining as applied to the processing of low-grade cotton seeds. Abstract of Candidate of Technical Sciences, Leningrad: VNIIZH, 1989. – 19 p.
- Akhmedov A. N. Investigation of indicators of cottonseed oil obtained by pre-pressing from low-grade cotton seeds // *Universum: Technical Science*. Issue: 4(61). April, 2019. – Moscow, 2019. – P. 23–26.
- Guide to research methods, technical and chemical control and production accounting in the oil and fat industry / [edited by G. V. Zarembo et al.] – L.: VNIIZH, 1967. – 1042 p.
- Guide to the technology of production and processing of vegetable oils and fats / [ed. A. G. Sergeev and others] – L.: VNIIZH, 1973-I–II, – 846 p.

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