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IMPROVING TECHNOLOGY FOR PRODUCING OILS FROM MEDICINAL PLANTS

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ABSTRACT

Chemical composition of various types of amaranth seeds. In order to identify the possibility of industrial processing and develop technological requirements as a raw material, the chemical composition of amaranth seeds was studied. The results are shown in Table 1.

Table 1

Seed type	Mass fraction, %						
	moisture	Antinutrients	Lipids	Protein	fiber	ash	starch
White-seeded	9,9	0,043	7,50	15,7	5,3	3,2	61,6
Rose-seeded	10,1	0,049	6,10	16,3	6,9	6,9	60,6
Black seed	10,3	0,058	5,30	13,9	9,8	3,4	61,7

The research results showed that in the amaranth seeds of the studied types, the starch content exceeded 60%, the level of ant nutrients, incl. tannin did not exceed 0.06%, and in light-colored seeds the amount was lower compared to dark-colored ones. Light-colored seeds had a high oil content, which, however, in some

of the samples we studied, provided by the botanical garden of Koru, did not exceed 8.37%.

Amaranth seeds are characterized by a higher acid number of the oil they contain, which approaches the value of this indicator in grain oils. In individual analyzed samples of breeding material, freshly harvested from the variety plot, the indicator varied from 14.5 to 16.0 mg KOH and even 20-21.5 mg KOH, which is apparently due to the specifics of the oil and the biochemical processes occurring in this culture. One of the possible reasons for the increased acid number may be the high enzymatic activity of lipase contained in the germinal part of the seeds, the optimum of which for amaranth seeds with a moisture content of 9.5% is at a pH of approximately 8 and a temperature of 50-600 C (Fig. 1)

Enzyme activity, 100 %

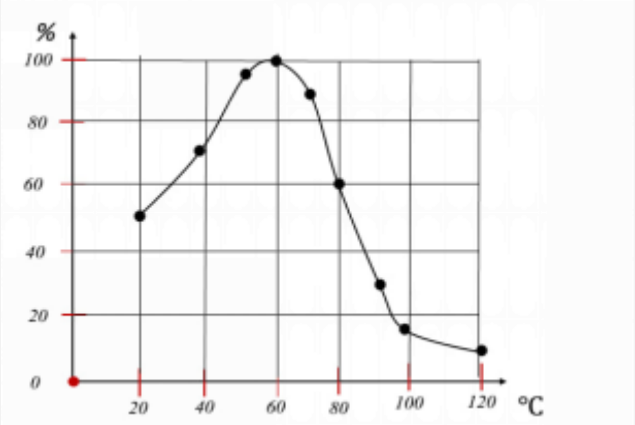

Fig. 1

Temperature optimum for the action of the enzyme complex of amaranth seeds.

Research has established that the content of unsaponifiable substances in the lipids of freshly harvested amaranth seeds is in the range of 7.86-10.2%, which significantly exceeds the proportion of these substances in the lipids of traditional oilseeds (sunflower, soybean, it does not exceed 1%) and is typical for lipids isolated from oil-containing grain tissues (Table 2).

table 2

Lipidi from seeds: amaranth	Mass fraction,%			
	Unsaponifiable substances	Squalene	Sterol catcher	Tocopherols
White-seeded	11,8	8,50	4,6	0,18
Rosesperms	9,1	6,37	3,7	0,15
Black seed	10,2	6,94	6,94	0,18

According to the data in Table 2, the lipids of amaranth of domestic selection contain the most important biologically active components - tocopherols and sterols. Our preparative analysis showed that mainly tocopherols isolated from amaranth lipids are represented by β- and ɣ-tocopherols (70-80% of the total content), characterized by high antioxidant activity.

Separation of the unsaponifiable fraction in a thin layer of sorbent in a solvent system of hexane: diethyl ether in a 1:1 ratio and development components with a 5% alcohol solution of phosphomolybdic acid showed that the unsaponifiable fraction contains a significant amount of hydrocarbons with unsaturated bonds (R^f=0.55-0.75), which corresponds to squalene (C30H50). To prove this, we preoperatively isolated a fraction with the above R^f and recorded infrared spectra in the region of 3800-1400 cm-1. Quantitative determination showed that the squalene content in amaranth lipids averages 70.3% of the mass fraction of unsaponifiable substances. The bulk of lipids are triglycerides (in the studied samples the content ranged from 77.1 to 83.2%). Amaranth seeds are characterized by an increased content of free fatty acids (9.5-12.3%) and hydrocarbons (7.5-8.3% of the sum of all fractions). The type of seed affects the content of polar lipids (phospholipids, sterols, free fatty acids) and triglycerides. Dark-colored seeds are characterized by a higher content of phospholipids and free fatty acids. Pink-seeded types occupy an intermediate position between light- and dark-colored seeds. The amino acid composition of lipids in amaranth seeds of different types does not differ so noticeably (Table 3), however, all types of seeds are characterized by a higher content of saturated fatty acids compared to sunflower oil.

Table 3

Fatty acid	Content, % of the amount of lipids in seeds

	Light seed	Rosesperms	Black seed	sunflower
Palmitic $C_{16:0}$	19,2	20,0	21,2	6,5
Stearic$C_{18:0}$	3,6	4,1	3,2	4,4
Oleic $C_{18:1}$	24,7	25,4	25,4	26,5
Linodevaya $C_{18:2}$	50,5	48,4	48,4	62,1
Linolenic$C_{18:3}$	1,2	1,0	0,8	Oleds
Arachinovaya$C_{20:8}$	0,8	0,9	1,0	0,5
Amount of unsaturated acid	76,4	75,0	74,6	88,6

Despite some differences in the fatty acid composition from that recommended by the Institute of Nutrition, yesterday's oil due to the increased The content of biologically active substances such as slalov, tocopherols and sterol in it has a high physiological value.

The protein complex of amaranth xenon of domestic selection was studied. It was found that in light-colored seeds the amount of proten was 20.1%, in pink-seeded seeds it was 17.3%, in black-seeded seeds it was 16.9%. A study of the fractional composition of proteins in amaranth seeds showed that water- and salt-soluble compounds, which are easily absorbed by the animal body, predominate in the seeds of all types of amaranth. Light-colored seeds are characterized by a higher content of these fractions than dark-colored ones. Thus, the results of a study of the chemical composition and biochemical characteristics of amaranth seeds showed the influence of seed varietal characteristics on a number of indicators that should be taken into account when choosing the intended use of seeds of this crop. It was found that light-colored seeds have higher biochemical and technological properties, so this type of amaranth seeds was used in further studies.

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