ANALYSIS OF THE FATTY ACID COMPOSITION OF FLAXSEED OIL TREATED WITH AN ELECTRIC PULSE FIELD

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Abstract. Flax seed is a brown seed of a year-old grass plant of flax . Flax seed (Linum usitatissimum L.) - one of the oldest agricultural crops, source ω-3 fatty acids, full protein, dietary fiber, minerals and other biologically valuable substances The use of new technologies, such as electric pulsed field treatment in the process of preparing the seeds for pressing, allows to increase the speed and efficiency of oil extraction. In this study, the IEF method was used to study the process of extraction of oil from flax seeds grown in Uzbekistan using pre-treatment with an electric field of 3.25 kV/cm - 6 kV/cm and a number of pulses 10-30. After the selected pre-treatment, the seed oil was extracted with a screw press, and the extraction efficiency, chemical composition of the oil and fatty acid content were evaluated. The results showed that the oil extraction process in FEP was facilitated, the oil extraction efficiency increased and the level of fatty acids in it did not change.. The oil content in it varies greatly depending on the variety and growing conditions, usually around 38.9 %.The pre-treatment and pressing of linseed oil determines the quality of linseed oil. The proposed scheme of evaluation of composition of flax seeds allows optimal use of seed material of individual plants for analysis: massoid, content of individual fatty acids (gas-liquid chromatography), protein content and sowing, elemental composition. Flaxseed oil is a valuable source of Omega-3. Flax seeds 30-48% of consist of oils: linolenic, linoleic, oleic, stearic,palmitic. Flax contains organic acids, enzymes, vitamin A.

The composition of fatty acids in oil was determined by gas-liquid chromatography.

Keywords: linseed, fatty acid, methyl esters, electric impulse field, gas chromatograph

Introduction. The fatty acid sum sample is extracted and prepared for a gas chromatographic analysis. To determine the fatty acid composition of well-mixed oil, placed in a round-shaped flask for 50 ml, added 20 ml 2N of KON methanol solution and put the flask on a water bath. Lipid washing was carried out with

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boiling for 1 hour. To the aqueous solution of soap was added 50% aqueous solution H_2SO_4 for saponage breakdown and fatty acid (FA) release. Sulphuric acid was added before the solution rose in color by methylarange. From the resulting acid solution, was extracted three times with diethyl ether of 20-30 ml. Combined ether extractors were washed with distilled water to a neutral medium by methylorange, dried over anhydrous sodium sulphate, then the ether was removed on a rotary evaporator in a vacuum of a water pump. Fatty acids converted to methyl esters by processing freshly prepared diazomethene [1].

The purification of the obtained methyl esters FA (MEFA) was carried out by a preparatory thin-layer chromatography (PTLCh) on plates with silica gel in a system of solvents hexane: diethyl ether (4:1) in double repetition. The (MEFA) zone on the sorbent was developed in J_2, cleaned from the plates and desorbed with silica by multiple chlorophoric elution. The chloroplast eluates were combined, and the chloroform was sprayed on a rotary evaporator. The resulting MEFA was dissolved in hexane and analysed on a gas chromatograph (GCh).

Chromatography conditions:HX analysis was performed on the Agilent 8860 GC (USA), Supelco capillary column 100m x 0.25 mm, programming temperature of the column from 100^0C to 255^0C, flame ionization detector, carrier gas - nitrogen, stationary phase SPtm-2560. MEFA identification was performed by comparing the retention times of their peaks on the chromatograms with the retention times of the peaks of the standard sample 37 MEFA mixture (Supelco® 37 component FAME mix, Sigma-Aldrich, USA).

Table1. Chlorophyll seed oil chromatogram

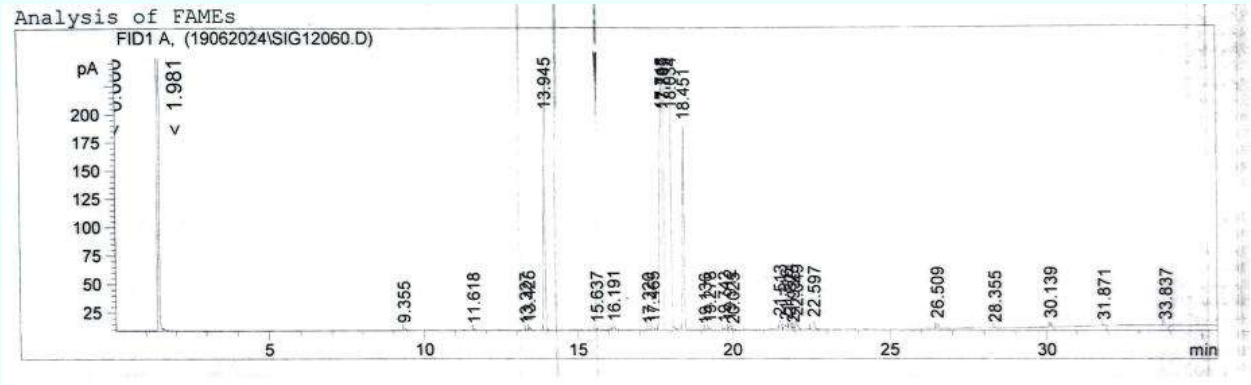


Table 2 .Area Percent
Sorted By : signal Multiplier: 1.0000Dilution : 1.0000 Use Multiplier & Dilution Factor with ISTDs Signal 1:FID1 A.

Peak #	Ret Time (min)	Type	Width (min)	Area (pA*s)	Height (pA)	Area %

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1.	9.355	BB	0.0431	5.75888	1.99776	0.04154
2.	11.618	BB	0.0455	2.71760	9.05498 e - 1	0.01960
3.	13.327	BV	0.0532	3.32051	8.57469 e - 1	0.02395
4.	13.425	VB	0.0492	8.15747	2.52737	0.05884
5.	13.945	BB	0.0460	710.85541	221.00352	5.12743
6.	15.637	PB	0.0581	7.64742	1.78065	0.05516
7.	16.191	BB	0.0579	13.71639	3.05339	0.09894
8.	17.320	BV	0.0571	3.33779	8.10020 e - 1	0.02408
9.	17.465	VP	0.0599	8.45430	1.83032	0.06098
10.	17.745	BV	0.0594	1112.18042	234.18265	8.02221
11.	17.797	VV	0.0330	643.92786	250.31158	4.64468
12.	17.845	VV	0.0363	734.35236	287.20868	5.29692
13.	18.034	VB	0.0907	9776.86523	1330.94373	70.52095
14.	18.451	BB	0.0486	617.69501	179.59409	4.45546
15.	19.136	PB	0.0396	1.20430	3.83931 e - 1	0.00869
16.	19.278	BB	0.0501	6.39261	1.90549	0.04611
17.	19.742	BV	0.0651	7.92050	1.61744	0.05713
18.	19.912	VV	0.0541	13.54264	3.42799	0.09768
19.	20.025	VB	0.0445	2.24031	6.96186 e - 1	0.01616
20.	21.513	BV	0.0539	27.98381	7.26893	0.20185
21.	21.716	VV	0.0816	23.11086	3.87451	0.16670
22.	21.824	VV	0.0529	28.81948	7.83881	0.20788
23.	21.935	VV	0.0476	6.10793	1.63301	0.04406
24.	22.049	VB	0.0664	35.22166	7.09585	0.25406
25.	22.597	BB	0.0560	25.17612	6.24529	0.18160
26.	26.509	BB	0.0460	16.41523	4.78600	0.11840
27.	28.355	BB	0.0449	2.39363	7.09553 e-1	0.01727
28.	30.139	BB	0.0540	12.31575	3.30585	0.8883
29.	31.871	BB	0.0432	2.41965	7.11090 e - 1	0.01745
30.	33.837	BB	0.0600	3.52288	7.20556 e - 1	0.02541

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Table3. Fatty acid content determined by gas chromatography on the Agilent 8860 GC, % of acid mass:

Name fatty acid	Sample	GOST 30623- 2018 «Oils and Vegetable Products with Mixed Fat Phase» Method of Detection of Falsification Annex B
		Group 8Lining oils with linoleic acid (18:3) - more than 20% (flaxseed oil)
14:0, myristic	Сл.	Сл.
16:0, palmetto	5,46	3,6-7,2
16:1, palmitolean	0,05	До 0,2
18:0, Stearin	4,60	2,5-5,5
18:1, oleander	16,88	11,3-24,0
18:2, linoleous	15,58	10,4-18,7
18:3, linoleum	56,97	48,5-68,5
20:0, Peanut	0,10	До 0,3
20:1, Eisenhower	0,25	До 0,3
22:0, Begen	0,11	До 0,2
Σsaturated fatty acids	10,27	
Σunsaturated fatty acids	89,73	

Conclusion: Taking into account the diversity of linens and forms, differing in lipid concentration and composition, protein content and others .The indicators of complex identification of seed composition will allow to establish their varietal affiliation, compliance with technological requirements, breeding value of individual plants for selection and hybridization. The work has used modern.The analytical methods, but the complexity of the structure and composition of flax seeds made it necessary to adapt and optimize the analytical approaches used in order to assess the reproducibility of the data obtained. According to the results of the gas chromatographic analysis, the fatty acid composition of the presented oil sample corresponds to that of linseed oil (GOST 30623-2018 «Oils and Products with mixed fat composition» Falsification detection method).

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