SYNARA SCOLYMUS L. – NEW OIL-YIELD PLANT FOR UZBEKISTAN

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Objective of research*: Studying the chemical composition of artichoke prickly seeds oil, grown in different soil-climatic conditions of Uzbekistan.*

Methods of research*: In determining the composition of artichoke prickly oil were used:*

Manual on research methods, techno-chemical control and registration of production in creamery industry, v.**2**, 1965, p.152

Manual on research methods, techno-chemical control and registration of production in creamery industry, v.**1**, b.2, 1967, p.887

Manual on research methods, techno-chemical control and registration of production in creamery industry, v.**1**, b.2, 1967, p.815

Results of research. *Cynara scolymus* L. (artichoke prickly) – is a perennial herbaceous plant fam. Asteraceae. Origin of this plant is Ephiopia, nowadays it is cultivated throughout the Europe, particularly, in Mediterranean countries. It is delicacy in culinary. As boiled is used fleshy receptacle and base of coat's leaflets.

From plant grown in Azerbaijan were collected seeds and determined their principal indicators and fatty-acidic composition of oil [1].

Recently the study of artichoke prickly seeds oil was not carried out in Uzbekistan. This research in Uzbekistan was carried out for the first time.

The objective of our research included the study of C. *scolymus* seeds oil grown by us in Uzbekistan.

We studied oils of 2 seeds samples:

Sample I – dark seeds

Sample II - grey seeds

Methods of research:

Extraction of oil (or free lipids) was carried out in Soxlet apparatus with extraction petrol (p. boil. 72-80^{0}C) during 15 h. [2]. After distillation of solvent the content of oil in seeds was ascertained (Table1). From data of this table it is seen that the content of oil in seeds I is slightly higher than in sample II.

The obtained oils were analyzed in thin layer of silicagel L 5/40 mc (ATLC) in the system of solvents hexan:ether (4:1). The identification of lipids was carried out comparing mobility of model compounds with such oils' components. It was revealed that the principal compounds of free lipids were triacylglycerides (TAG) that is typical for reserve lipids (lipids of seeds). Besides that, were revealed free fatty acids and esters of fatty acids and sterols, and such lipophilic (or non-saponifiable) substances, as hydrocarbons, free sterols, triterpenols and aliphatic alcohols. The content of free fatty acids was ascertained according to acidic amount of oils, which was determined on methods [2,3]. It was equal for (I) 0.38 and for (II) 0.42 mg KOH, that corresponds to the part of free fatty acids in oils as 0.18 % (I) and0.21 % (II). The content of non-saponifiable substances was determined according to the method [4] and after removing the solvent their outlet was ascertained gravimetrically (Table 1).

Results of research are presented in Tables 1 and 2.

Table 1

Description of free and bonded lipids of C. *scolymus* seeds

№ п/п	Indicator	Samples	
		I	II
	1.Oil-yield, % from seeds mass, including, % of the oil:	25.7	24.5
	a) free fatty acids	0.18	0.21
	б) non-saponifiable substances	1.96	1.80
.	2. Polar lipids, % from seeds mass, including:	1.24	1.06
	glycolipids	0.74	0.66
	phospholipids	0.50	0.40

As it is seen, their content was slightly less than 2 %, and principal components of non-saponifiable substances according to ATLC data were free sterols and triterpenols.

Then from the rest shrot were extracted polar (or bonded) lipids by mixture of chlorofom with methanol in ratio 7:3 according to Folch method. Purifying polar lipids from concomitant substances (carbohydrates, aminoacids and other hydrophilic substances) was conducted by washing the extract with water 0.04 % solution of $CaCl_2$. It is known that bonded lipids of seeds include mainly glycolipids (GL) and phospholipids (PL) and part of neutral lipids, so we separated CSL by column chromatography in silicagel L100/160 mc to separate groups. During this NL were eluated with chloroform, GL- with acetone, PL – with methanol. After distillation of solvents it was revealed that NL in composition of CSL composed only trace amounts, and the content of GL and PL is presented in Table1 and for sample I this content is slightly higher than for sample II.

The composition of CSL components was ascertained also by ATLC in silicagel with the use of solvents system chloroform-acetone-methanol-acetic acid-water 65:20:10:10:3 (GL); chloroform – methanol-ammonia 13:7:1 (PL), specific displaying substances: for GL – α - naphthol, for PL –reagents of Vaskovskiy and Dragendorf, and also literature data.

In the result of conducted research it was revealed that principal components of GLwere sterylglycosides but monogalactosildiacilglycerides, ethers of sterilglycosides and cerebrosides were only in small amounts.

In composition of PL dominated phosphatidilinisites и phosphatidilincholines, and the smaller part was for phosphatidilethanolamines and phosphatide acids.

As it is known the quality and nourishing value of oils масел are determined by presence in them of those or other fatty acids, being in bonded form (ТАГ). To determine the composition of fatty acids we hydrolyzed oils and each group of polar lipids 10 % with methanol solution KOH boiling on water bath for 1 h, in ratio object : hydrolyzed solution 1:10. Acids were extracted from hydrolyzates after their acidification with extraction of diethyl ether. Then they were transferred into methyl ethers with dinitromethane [9] and analyzed by gas-liquid chromatography in Agilent 6890 N device, with flame-ionizated detector on method of «FAMES.M», using capillary column 30 m x 0.32 mm with immobile phase HP-5, gas-carrier helium, programming temperature from150^0C to 270^0C.

Obtained results are presented in table 2.

Table 2

Composition and content of fatty acids of free lipids, glycolipids and phospholipids, % of their mass

Acid	Free lipids		glycolipids		phospholipids	
	I	**II**	**I**	**II**	**I**	**II**
Lauric 12:0	-	-	0.27	0.72	-	-
Myristic 14:0	0.10	-	2.19	2.89	0.29	0.23
Pentadecanoic 15:0	-	-	0.31	0.31	-	-
Palmitic 16:0	9.88	10.98	27.24	38.20	17.47	16.07
Stearic 18:0	2.59	2.38	7.83	10.56	3.35	2.69
Arachic 20:0	0.24	0.21	0.43	0.51	0.17	0.19
Behenic 22:0	0.08	-	0.93	1.22	0.12	-
Lignoceric 24:0	0.11	-	0.54	0.51	-	-
Palmitoleic 16:1	0.12	-	-	-	-	-
Oleic 18:1	35.51	32.06	30.07	24.79	36.36	36.19
Linolic 18:2	51.37	54.37	30.19	20.29	42.24	44.63
$\sum_{\text{saturated FA}}$	13.0	13.57	39.74	54.92	21.40	19.18
$\sum_{\text{unsaturated FA}}$	87.0	86.43	60.26	45.08	78.60	80.82

From data in table 2 is seen that the total content of unsaturated components considerably dominate in oils and phospholipids of both samples unlike glycolipids, where increased both general content and composition of saturated acids.

Dominated acid in composition of oils is linolic acid or 18:2ω6, which is more than 50 %. It is an essential acid and provides high nutritious value of these oils. Linolic acid (18:3) was revealed in trace amounts. In seeds of C. *scolymus* grown in Azerbaijan the content of oleic and linolic acids is approximately the same and is 44.0 and 40.0 correspondingly, i.e. 18:1 the acid is slightly higher than 18:2 [4].

CONCLUSION:

1.In Uzbekistan for the first time was obtained oil from seeds of artichoke prickly grown in different soil-climatic conditions of Uzbekistan.

2.It was determined the percentage (%) of seeds' oil-yielding of artichoke prickly (25,7 – 24,5 %)

3.For the first time was studied the composition and content of fatty acids of free lipids, glycolipids and phospholipids in % of their mass.

4.The dominated acid in composition of oils was linolic acid (54,37) and the total amount of unsaturated fatty acids was 87 %.

5. It was ascertained high nutritious value of oil from artichoke prickly seeds.

References

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