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HM Yersteniuk
 Ivano-Frankivsk National
 Medical University, Ukraine

MA Obodianskyi
 Ivano-Frankivsk National
 Medical University, Ukraine

MV Melnyk
 Ivano-Frankivsk National
 Medical University, Ukraine

VM Vodoslavskyi
 Ivano-Frankivsk National
 Medical University, Ukraine

The comparative characteristics of chemical parameters and composition of fatty acids of extracts from seeds of winter and spring rape of sort «MYKYTYNETSKYI»

HM Yersteniuk, MA Obodianskyi, MV Melnyk and VM Vodoslavskyi

Abstract

Several studies have been conducted to compare chemical parameters and fatty acids composition of extracts from seeds winter and spring rape of sort «Mykytynetskyi», obtained in a laboratory under the cold pressing method. It was found that all samples of the investigated extracts had acid and peroxide numbers were well within the standards. It has been determined the fatty acid composition and the quantitative content of the main fatty acids in the extracts from the seeds of winter and spring rape of the «Mykytynetskyi» variety, namely oleic, linoleic and linolenic acids. The study has revealed the ratio of ω -3: ω -6 fatty acids that shows the high biological value of extracts of modern varieties of rape.

Keywords: rapeseed oil, fatty acid composition, fatty acids, cold pressing

1. Introduction

Rape oil is one of the most widespread on the global scale. Growth in demand for rapeseed oil is caused by the fact that its quality has changed. Rape oil, because of its unique biological properties, is widely used not only in many branches of the national economy, but especially in medicine. The biological value of this oil is related to the content of essential fatty acids in its composition, which are not synthesized in the human body - linoleic and linolenic. Rape oil positively affects metabolism, lowers cholesterol, prevents the formation of clots in blood vessels. It moisturizes, nourishes and restores the skin, therefore it is often used in dermatology.

2. Materials and Methods. The object of the study was selected extracts from the seeds of spring and winter rape of sort «Mykytynetskyi» variety, obtained by cold pressing at the temperature of up to 50°C. Standard methods were used to determine the quality of rapeseed oil. The peroxide number was identified according to DSTU ISO 3060: 2001 ^[1], iodine number – according to DSTU ISO 3961: 2004 ^[2], acid number – DSTU 4350: 2004 ^[3]. The organoleptic properties of the oils were evaluated by appearance, colour, smell and taste according to DSTU 4536: 2006 ^[4]. Determination of fatty acid composition was carried out in accordance with DSTU ISO 5509: 2002 ^[5].

3. Results and Discussion. With the help of a laboratory screw press from seeds winter and spring rape of sort «Mykytynetskyi» extract was squeezed, with 25 – 27 % of oil and 73 – 75 % of cake. The mass fraction of protein in the cake of rape seeds was 32 – 35 %, the mass fraction of fat – 10 – 12 %, moisture content – 8 – 10 %, the resulting oil does not require additional purification.

The yield of extract from spring and winter rape seeds by cold pressing is shown in the Table 1.

Table 1: Extract from the seeds of spring and winter rapeseed of the «Mykytynetskyi»

Name of raw material	Mass fraction of dry substances %	Utilization norm per 100 kg of extract, kg	
		In nature	In dry material
Seeds of spring rape			
Cake	92,0 ± 0,5	120,5 ± 1,0	110,9 ± 0,5
Oil	99,9 ± 0,1	44,5 ± 1,0	44,4 ± 0,1
Seeds of winter rape			
Cake	90,0 ± 0,5	114,0 ± 1,0	102,6 ± 0,5
Oil	99,9 ± 0,1	38,0 ± 1,0	38,0 ± 0,1

Correspondence
Maria Melnyk
 Ivano-Frankivsk National
 Medical University, Ukraine

The cake is a homogeneous bulk material of yellow colour with the characteristic rape odour and taste. Increasing or decreasing the mass fraction of moisture in rape seeds leads to a change in the mass of the yield of seed cake, its composition and flowability. Extrusion of rape seed extracts is most effective at the moisture content of seeds of 8 – 10 %. At higher humidity, the pressure in the screw press is reduced and the zone of intensive oil separation shifts to the loading zone. At humidity less than 8 % the pressure increases above nominal and the zone of intensive extrusion of oil shifts to the

output of cake from the press, openings of the separator chamber clog, causing breakage of the press. The chemical indices of the studied samples of extracts from the seeds of spring and winter rape of sort of «Mykytynetskyi» are given in Table 2. It can be seen that the extracts of the lowest acid and peroxide numbers have an extract of spring rape seeds. The values of iodine numbers of investigated samples of extracts from spring and winter rape seeds fluctuated within 102 - 118 g I₂ / 100 g and are determined by their fatty acid composition.

Table 2: Characteristics of chemical indices of extracts from the seeds of spring and winter rape of sort «Mykytynetskyi»

Indicators	Extract from spring rape seed	Extract from winter rape seed
Color number, mg iodine	45	50
Acid number, mg KOH / g	1,06	2,96
Peroxide number, ½ O mmol / kg	1,8	6,98
Iodine number, g I ₂ / 100 g	102	118

The results of the analysis of the fatty acid composition of the investigated extracts from the seeds of spring and winter rape

varieties of the «Mykytynetskyi» are given in Figure 1, 2 and Table 3.

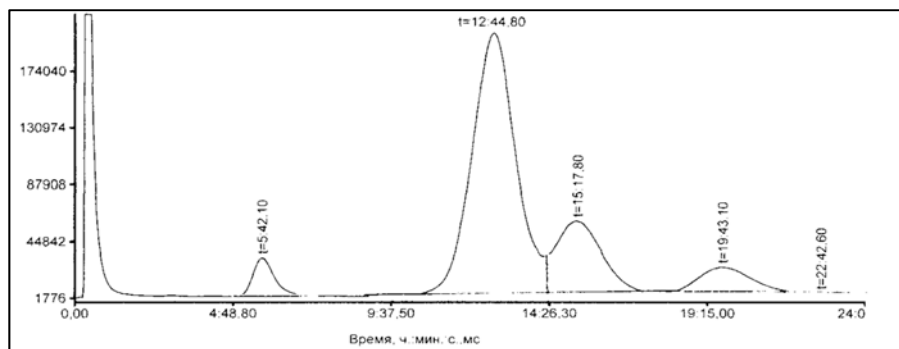


Fig 1: Chromatogram of fatty acids from the seeds of spring rape

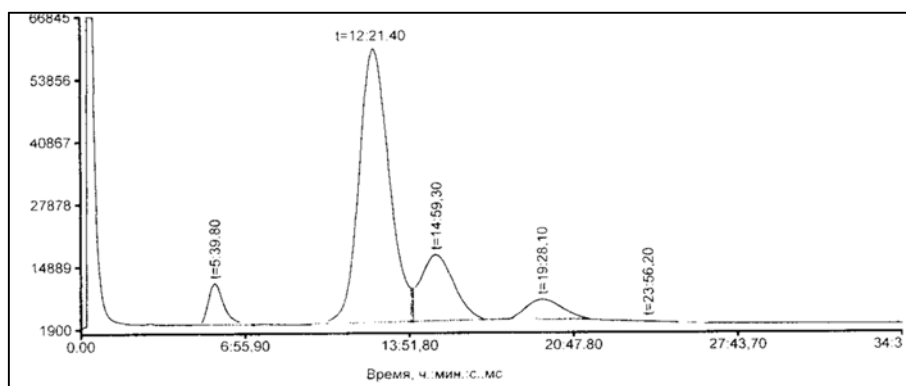


Fig 2: Chromatogram of fatty acids from the seeds of winter rape

Table 3: The content of fatty acids in extracts from the seeds of spring and winter rape of the «Mykytynetskyi» variety.

Vegetable oils	Content of fatty acids in % of the total mass						The ratio ω-3/ ω-6
	Palmitic	Oleic	Linoleic	Linolenic	Eikosanic	Erucic	
Spring rape	4,77	67,44	19,63	8,02	0,14	-	1:2,4
Winter rape	5,23	68,82	18,61	7,03	0,31	-	1:2,6
Content by PhEur.	2,5-6,0	50-67	16-30	6-14	< 5,0	< 2,0	

The research results suggest that in investigated extracts from seeds of spring and winter forms of rape of «Mykytynetskyi» variety there was not found erucic acid. The main fatty acids

in all samples were oleinic, linoleic and linolenic acids. The content of the essential fatty acids, linoleic (ω-6) and linolenic (ω-3), is 18,61 % - 19,63 % and 7,03 % - 8,02 %, respectively.

respectively. This ratio is a very valuable indicator for vegetable oil.

4. Conclusions

1. Comparative analysis of chemical parameters of extracts from seeds of spring and winter rape of sort «Mykytynetskyi», which was obtained by cold pressing method, was carried out.
2. It was established that erucic acid was not found in the studied samples, and the ratio of ω -3 / ω -6 fatty acids indicates the pharmacological value of extracts.
3. Extracts from the seed of spring and winter rape of sort of «Mykytynetskyi» variety are the source of important biologically active substances in order to use in medicine and promising in the development of cosmetics.

5. References

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