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Comparison of Quality and Safety Analysis of Market Cold Pressed and Refined Rapeseed Oils

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Introduction

The consumer in Poland has a wide selection of rapeseed oil from many producers and from different regions of the country. This proves the great popularity of this product on the Polish market. There are two types of oil to choose from: cold-pressed, so-called special oil, intended for cold use, and refined oil, which is neutral in taste and scent of universal fat that we can use for cooking, baking or frying. Rapeseed oil has many advantages. Among them, we can mention the pro-health effect on the human body or the use of native, domestic rapeseed crops for the production of oil.

Objective

The aim of the study was to compare the quality and safety analysis of cold-pressed and refined rapeseed oils available on the Polish market, based on selected quality indicators.

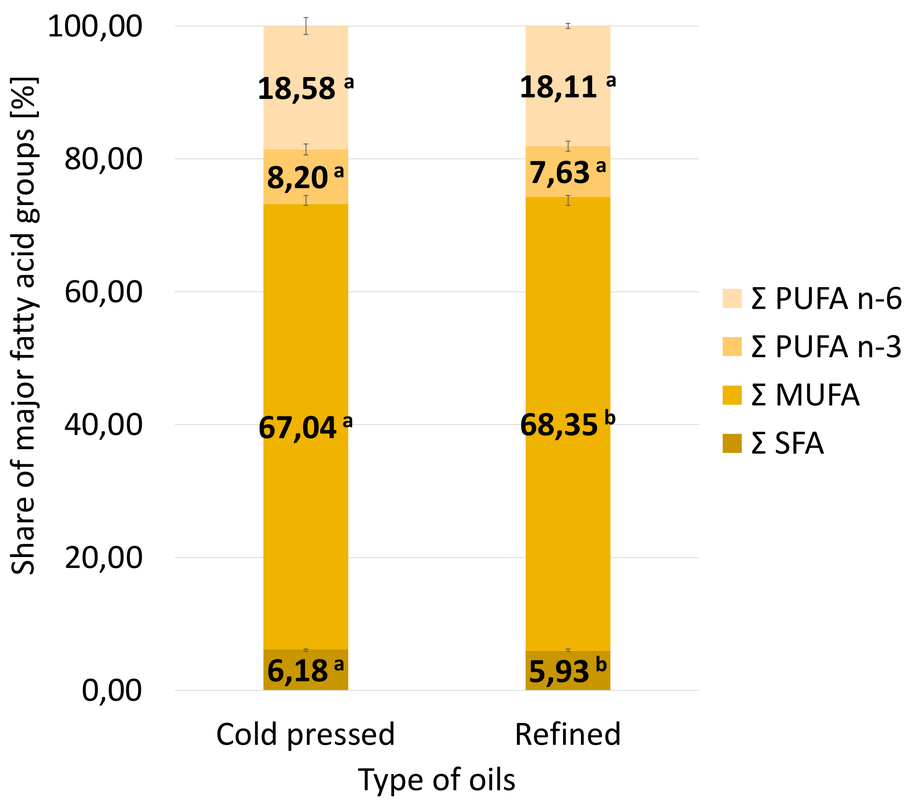

Figure 1. Share of SFA, MUFA and PUFA n – 3 and n – 6 in the rapeseed oils tested
Explanations: a, b – mean values marked with the same letters do not differ statistically significantly for a given parameter at $p \leq 0.05$.

Material & Methods

The study material consisted of 11 cold-pressed and 11 refined rapeseed oils obtained from the Polish market. The following oil quality and safety parameters were determined: acid value (ISO 660:2021 - 03), peroxide value (ISO 3960:2017 - 03), anisidine number (ISO 6885:2016 - 04), specific extinction under UV light (ISO 3656: 2011), pigment content (Borello and Domenici [2019]), CIEL*a*b* colour (Konica Minolta CR - 5 Chroma Meter), fatty acid profile (ISO 12966 - 1: 2015 - 01 and ISO 12966 - 2:2017 - 05), nutritional quality indices (Ulbricht and Southgate [1991]), polar compound content using Testo 270 (Germany), smoke point (AOCS Cc 9a - 48. 2017), oxidative stability by Rancimat test (ISO 6886:2016 - 04) and COX index (Fatemi and Hammond [1980]). Statistical analysis of the results obtained was performed using Statistica™ 13.3 (StatSoft®) with a significance level of $\alpha = 0.05$. The Student's t-test for independent samples was used to compare the two quality factor averages of the main oil groups, which allowed them to be classified into their respective homogeneous groups

Conclusions

Rapeseed oils have been shown to be of good quality and to meet the safety requirements imposed on them. Cold-pressed and refined rapeseed oils differ with regard to the degree of hydrolysis, content of primary and secondary oxidation products, pigment content (and thus colour) and smoke point. In contrast, no statistically significant differences were found, e.g. in the proportion of PUFA fatty acids, nutritional quality indicators, content of polar compounds or oxidative stability.
Cold-pressed rapeseed oils and refined rapeseed oils on the Polish market are characterised by good quality, high nutritional value and meet safety requirements. Their selection can therefore be confidently recommended to Polish consumers. However, these oils differ in terms of basic quality parameters and chemical composition, which is due to the different technologies used to obtain them. Thus, they have different purposes: for pastes and salads - cold-pressed oils, and for universal use, including cooking and frying - refined oils. The choice between cold-pressed oil and refined oil should be based on the consumer's potential use of the product in the diet.

Table 1. Quality parameters of the tested rapeseed oils
Explanations: a, b – mean values marked with the same letters do not differ statistically significantly for a given parameter at $p \leq 0.05$.

Rapeseed oils	AV [mg KOH/g]	PV [meq/kg]	AN [-]	K_{232}	K_{268}	Dyes [mg/kg]		Colour parameters			TPM [%]	Smoke point [°C]	COX [-]	OSI [h]
						Chlorophyll	Carotenoids	L*	a*	b*				
Cold presssed	1,32^{a} ±1,01	6,89^{a} ±2,96	0,47^{a} ±0,38	1,189^{a} ±0,314	0,094^{a} ±0,069	0,804^{a} ±0,691	4,938^{a} ±1,968	87,56^{a} ±2,61	6,91^{a} ±3,43	131,13^{a} ±6,83	5,57^{a} ±0,22	170^{a} ±2	4,33^{a} ±0,21	4,68^{a} ±1,16
Refined	0,31^{b} ±0,12	2,68^{b} ±1,29	1,7^{b} ±0,49	1,644^{b} ±0,290	0,336^{b} ±0,042	0,031^{b} ±0,065	0,036^{b} ±0,038	99,24^{b} ±0,48	-3,94^{b} ±1,19	13,49^{b} ±4,42	5,24^{a} ±0,13	214^{b} ±1	4,18^{a} ±0,17	5,43^{a} ±0,07