Fatty Acid Composition in Oil of Recent Rapeseed Hybrids and 00-Cultivars

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Summary

Fatty acid composition in oil of seven new hybrids ('Artus', 'Baldur', 'Exact', 'Executive', 'Extra', 'RG 9908', 'RG 9909') and eight 00-cultivars ('Aviso', 'Bristol', 'Canary', 'Dexter', 'Ella', 'Kosto', 'Navajo', 'Royal') of rapeseed was investigated in the period 2003-2005. The experiments were placed in the experimental field of the Faculty of Agriculture in Zagreb. Fatty acid composition was determined by gas chromatography of their methyl esters, and the oil iodine number was calculated as well. The studied new rapeseed hybrids and 00-cultivars contained no erucic acid or it was present far below 2%. The average content of oleic acid was 61.88±2.64% in hybrids and 62.54±3.90% in 00-cultivars, the content of linoleic acid was 20.52±1.49% and 19.57±2.51%, the content of linolenic acid was 8.39±1.50% and 7.92±2.12%, the content of palmitic acid was 5.13±0.48% and 5.50±0.51%, and the content of stearic acid was 1.48±0.16% and 1.58±0.19%, respectively. This ratio of fatty acids confirms the high nutritive quality of rapeseed oil. The iodine value was 112±2 in oil from hybrids and 110±4 in oil from 00-cultivars.

In both investigated groups there were no differences in fatty acid composition which could influence the quality and stability of rapeseed oil. The average values in oils obtained from hybrids as well as from 00-cultivars are inside the data prescribed in law regulations. Although, there were several samples in which oleic and palmitic acid contents were above and linoleic and linolenic acid contents (as well as the iodine values) below the limit values, what ought to be incorporated into the revision of present regulations on vegetable oils.

Fatty acid composition in hybrids and in 00-cultivars was greatly influenced by weather conditions. In the year with higher mean monthly air temperatures and less precipitation during May and June compared to average long-term weather conditions for these months, oil contained more oleic and less linoleic and linolenic acid.

Key words

rapeseed, hybrids, 00-cultivars, fatty acid composition

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Introduction

Rapeseed can be cultivated in the cooler agricultural regions and as a winter crop in temperate zones, producing at least 40% of oil and a meal containing 38-40% of high quality protein. It is now number three, after soybean oil and palm oil, in ranking of the 17 commodity oils and fats reported by Oil World. It has attained this position after rapid growth during the last twenty years and further increases expected in the next twenty years should allow it to maintain its market share of 13-14% (Gunstone, 2001). There is much interest in the potential of rapeseed oil in human and animal nutrition and in its industrial applications. Some nutritionists believe that it is almost ideal to replace traditional predominantly saturated fats in the ''Western'' diet. The residual high protein meal is used mainly for animal feed. Petrochemical industrialists may see much potential in rapeseed oil as a source of an environmental friendly biodiesel as well as in production of non-food products such as surfactants, plastic additives and lubricants.

Rapeseed plants have been the subject of intensive breeding projects in the last fifteen years, which include modifications in the fatty acid composition of the oil. A range of cultivars was created whose oils have a modified fatty acid profile in comparison with the conventional cultivars. The main focus was on the content of erucic acid, of oleic acid and of medium-chain fatty acids (Töpfer and Friedt, 1999; Piazza and Foglia, 2001) as well as a meal with very low levels of sulfur-containing glucosinolates. Development and introduction of new rapeseed cultivars and restaurated hybrids into exploitation, as well as the improvement of oil and meal quality influenced the extension of this crop, especially in Europe.

The results in the previous research of rapeseed cultivation in Croatia follow the European trends: instead of eruca acid, the dominating fatty acid in triglycerides is oleic acid (over 60%), and they contain the reduced content of linolenic acid (under 10%) and increased content of linoleic acid (10–20%) (Mustapić and Pospišil, 1995; Pospišil et al., 2000). Besides, the oil of new cultivars is also suitable for biodiesel production and the meal contains the low amount of glucosinolates. Rapeseed hybrids are successfully grown in many countries of western and northern Europe. In Croatia the first hybrids were investigated in 1993 (Pospišil and Mustapić, 1995), and introduced into production in 2003.

The nutritive value of rapeseed oils is highly relevant, especially their effect on parameters associated with the development of atherosclerosis. Diseases of the cardiovascular system are the most common cause of death in the industrial countries. The types of fatty acids consumed with the diet affect not only the cholesterol level, but also the susceptibility of low-density lipoproteins to oxidation. Special prominence has been given to the beneficial effects of olive oil in the prevention of cardiovascular disease, primarily due to the high content of monounsaturated acids (MUFA) and native antioxidants (Massaro et al., 2006). Rapeseed oil has also high content of MUFA. The ratio of linoleic acid to linolenic acid affect the risk of atherosclerosis *via* the formation of eicosanoids, thus rapeseed oil can also be effective in preventing atherosclerosis (Eder and Brandsch, 2002; Freese, 2001; Lorgeril et al., 2001). Linoleic and linolenic acids are essential polyunsaturated fatty acids. They are precursors of the other long chain ω-3 and ω-6 polyunsaturated fatty acids (PUFA) which have preventive and therapeutic effects on coronary heart disease and other diseases (Nordoy et al., 2001; Chardigny et al., 2001).

The objective of the present research was to establish the fatty acid composition in oil of rapeseed hybrids in comparison with 00-cultivars, both grown under agroecological conditions of northwestern Croatia in the course of three succesive crop seasons.

Material and methods

Samples

Seven new hybrids ('Artus', 'Baldur', 'Exact', 'Executive', 'Extra', 'RG 9908', 'RG 9909') and eight 00-cultivars ('Aviso', 'Bristol', 'Canary', 'Dexter', 'Ella', 'Kosto', 'Navajo', 'Royal') of rapeseed were grown in the experimental field of the Faculty of Agriculture in Zagreb in the period 2003-2005. Each rapeseed sample was extracted by hexane in laboratory using Soxhlet apparatus, as it is required for quantitative oil content determination (ISO 659:1998). Analyses of oil content and fatty acid composition were carried out in triplicate and the results are elaborated statistically. The mean oil contents (in absolutely dry matter of seed – % of oil in ADM) of rapeseed samples used in experiments were 42.18±3.65% for hybrids and 43,67±4.24% for 00-cultivars.

Chemicals

Standards (fatty acid methyl esters) were supplied by Sigma Chemical Co. (St. Louis, MO, USA). All other chemicals were of analytical grade, obtained from Merck KGaA (Darmstadt, Germany) and used without further purification.

Apparatus

Gas chromatography analyses were carried out on ATI Unicam 610 instrument (Cambridge, England) equipped with a split-injector and flame ionization detector (FID).

Fatty acid composition

Methyl-esters of fatty acids (FAME) were prepared using methanolic KOH, according to the standard method (ISO 5509:2000) from the oil obtained after Soxhlet extraction. The fatty acid profile was determined by gas chromatographic separation of their methyl esters (ISO 5508: 1990) on a capillary column (J&W Scientific DB-23, 30 m x 0.25 mm x 0.25 μm). The temperature of the injector and detector was set at 250 °C. The initial oven temperature was 170 °C. This temperature was maintained for 8 min, and then increased at a rate of 2 °C min^{-1} to 190 °C, which was held for 7 min. Helium was used as the carrier gas at a flow rate of 0.87 mL min^{-1} and injection volume was 0.3 μL. The FAME peaks were identified using FAME standards. The fatty acid composition is expressed as weight percentage of total (internal normalization method). Chromatography software (Unicam 4880 chromatography data system) was employed for data collection and processing.

Iodine value

Iodine value was calculated on the basis of fatty acid composition taking into account the percentage of each individual unsaturated fatty acid, as it is described in standard method (AOCS Cd 1c-85).

Statistical analysis

Statistical analysis was performed using the Statistica 7.1. Software. ANOVA was used to determine the effect of seed cultivar and climatic conditions of each investigation year on the fatty acid composition of analyzed oils. The similarity of varieties was tested by Cluster analysis using Ward's method and Euclidian distances (StatSoft, 2005).

Results and discussion

In this work, the results for fatty acid profile and iodine value of all analyzed rapeseed samples from three crop years are presented in Tables 1-6. From that data the Cluster analysis was carried out separately for hybrids and cultivars (Figures 1, 2).

The amounts of most fatty acids were similar in oils from 00 cultivars and in oils from hybrids during three successive crop seasons (Table 1). Oils obtained from 00 cultivars had slightly higher content of oleic and palmitic and lower linoleic and linolenic acids than oils from hybrids. Their average values were inside the data prescribed in Croatian official law regulations (Anon., 1999). There were several samples in which oleic and palmitic acid contents were above and linoleic and linolenic acid contents below the limit values what ought to be incorporated into the earliest revision of present legislation on vegetable oils. Somewhat higher amount of erucic acid had the oils from cultivars but these amounts were far below the established limits. Oils from hybrids had higher amount of polyunsaturated fatty acids (PUFA) as well as iodine value. All samples had low amount of saturated fatty acids (SFA) which is one of the rapeseed oils benefits since SFA have

Table 1. Fatty acid composition (% of total) and iodine value of the oil from all analyzed rapeseed samples from three crop years (2003-2005)*

Fatty acids (% of total)	Hybrids		00-ultivars		Official Regulation of Croatia**
	$\bar{x} \pm \sigma$	Range	$\bar{x} \pm \sigma$	Range	
14:0 Myristic	0.06±0.01	0.05-0.09	0.07±0.02	0.05-0.14	< 0.2
16:0 Palmitic	5.13±0.48	4.11-6.07	5.50±0.51	4.53-6.67	3.3 – 6.0
16:1 Palmitoleic	0.36±0.08	0.18-0.53	0.35±0.05	0.26-0.45	0.1 - 0.6
17:0 Heptadecanic	0.05±0.03	0.00-0.09	0.05±0.02	0.00-0.09	<0.3
17:1 Heptadecenic	0.16±0.02	0.13-0.20	0.16±0.02	0.10-0.19	<0.3
18:0 Stearic	1.48±0.16	1.17-1.95	1.58±0.19	1.30-1.95	1.1 – 2.5
18:1 Oleic	61.88±2.64	57.53-68.93	62.54±3.90	55.92-72.00	52.0 – 66.6
18:2 Linoleic (ω-6)	20.52±1.49	16.01-23.94	19.57±2.51	13.82-24.57	16.1 – 24.8
18:3 Linolenic (ω-3)	8.39±1.50	5.45-11.33	7.92±2.12	4.28-10.58	6.4 – 14.1
20:0 Arachidic	0.52±0.06	0.50-0.59	0.58±0.08	0.45-0.74	0.2 – 0.8
20:1 Gadoleic	1.16±0.11	0.96-1.36	1.29±0.18	1.04-1.87	0.1 – 3.4
22:0 Behenic	0.27±0.07	0.11-0.40	0.31±0.06	0.17-0.44	< 0.5
22:1 Erucic	0.01±0.02	0.00-0.07	0.08±0.15	0.00-0.57	< 2.0
Σ SFA	7.51±0.67	5.98-8.79	8.09±0.75	6.62-9.78	-
Σ MUFA	63.58±2.53	59.48-70.40	64.42±3.89	57.76-73.72	-
Σ PUFA	28.91±2.60	21.46-33.23	27.49±4.37	18.19-34.09	-
Iodine value	112±3.67	102-118	110±6.06	99-118	110 - 126

SFA saturated fatty acids, MUFA monounsaturated fatty acids, PUFA polyunsaturated fatty acids; * mean value±standard deviation; ** Pravilnik o temeljnim zahtjevima za jestiva ulja i masti, margarine i njima slične proizvode, majoneze, umake, preljeve, salate i ostale proizvode na bazi jestivih ulja i masti

Table 2. Saturated fatty acids of the oil from rapeseed hybrids (2003-2005)*

Fatty acid (% of total)	Hybrid						
	Baldur	Artus	Extra	Executive	Exact	RG 9908	RG 9909
14:0	0.06±0.01	0.06±0.01	0.06±0.01	0.06±0.01	0.07±0.01	0.07±0.01	0.07±0.02
16:0[a]	4.98±0.20	5.52±0.13	4.06±0.24	4.49±0.23	5.07±0.16	5.53±0.12	5.71±0.25
17:0[d]	0.06±0.02	0.06±0.02	0.04±0.04	0.04±0.03	0.05±0.04	0.06±0.01	0.05±0.02
18:0[a,f]	1.74±0.12	1.54±0.07	1.35±0.05	1.28±0.06	1.47±0.06	1.51±0.12	1.49±0.09
20:0[c,e]	0.58±0.06	0.55±0.04	0.48±0.06	0.46±0.04	0.51±0.05	0.52±0.02	0.54±0.07
22:0[d]	0.28±0.03	0.30±0.07	0.27±0.05	0.23±0.07	0.26±0.12	0.28±0.06	0.28±0.04
Σ SFA	7.69±0.36	8.03±0.23	6.79±0.33	6.56±0.40	7.42±0.39	7.96±0.29	8.13±0.46

*mean value±standard deviation; SFAs saturated fatty acids; [a] Results are significantly influenced by seed variety ($p \leq 0.001$) [b] Results are significantly influenced by seed variety ($p \leq 0.01$); [c] Results are significantly influenced by seed variety ($p \leq 0.05$); [d] Results are significantly influenced by crop year ($p \leq 0.001$); [e] Results are significantly influenced by crop year ($p \leq 0.01$); [f] Results are significantly influenced by crop year ($p \leq 0.05$)

Table 3. Unsaturated fatty acids and iodine value of the oil from rapeseed hybrids (2003-2005)*

Fatty acid (% of total)	Hybrid						
	Baldur	Artus	Extra	Executive	Exact	RG 9908	RG 9909
16:1 [c]	0.36±0.06	0.42±0.07	0.36±0.10	0.28±0.07	0.37±0.08	0.37±0.11	0.37±0.07
17:1 [c,f]	0.16±0.03	0.17±0.02	0.17±0.02	0.17±0.02	0.16±0.00	0.16±0.01	0.14±0.01
18:1 [b,d]	64.86±2.86	59.31±2.24	61.47±1.98	62.65±1.68	61.19±2.61	61.84±1.67	61.84±2.36
18:2 [b,f]	18.04±1.38	20.98±0.88	21.14±0.68	20.42±0.51	22.21±1.25	20.68±0.44	20.17±1.01
18:3 [c,d]	7.74±1.77	9.90±1.23	8.85±0.99	8.69±0.80	7.52±1.34	7.86±1.24	8.15±1.77
20:1 [d]	1.15±0.09	1.18±0.11	1.20±0.12	1.19±0.10	1.12±0.13	1.12±0.09	1.19±0.11
22:1	0.00±0.00	0.02±0.03	0.01±0.02	0.03±0.03	0.01±0.01	0.01±0.01	0
ΣMUFA	66.53±2.73	61.10±2.05	63.22±1.84	64.33±1.57	62.85±2.53	63.49±1.53	63.54±2.33
ΣPUFA	25.77±3.02	30.87±2.00	30.00±1.65	29.11±1.29	29.73±2.59	28.55±1.65	28.33±2.72
Iodine value [c,d]	109±4	115±3	114±2	113±1	112±4	110.81±2.66	110.74±4.26

*mean value±standard deviation; MUFA monounsaturated fatty acids, PUFAs polyunsaturated fatty acids; [a] Results are significantly influenced by seed variety ($p \leq 0.001$); [b] Results are significantly influenced by seed variety ($p \leq 0.01$); [c] Results are significantly influenced by seed variety ($p \leq 0.05$); [d] Results are significantly influenced by crop year ($p \leq 0.001$) [e] Results are significantly influenced by crop year ($p \leq 0.01$); [f] Results are significantly influenced by crop year ($p \leq 0.05$)

Table 4. Saturated fatty acids of the oil from rapeseed 00-cultivars (2003-2005)*

Fatty acid (% of total)	00-cultivar							
	Bristol	Navajo	Dexter	Ella	Royal	Aviso	Kosto	Canary
14:0	0.08±0.02	0.09±0.03	0.08±0.01	0.07±0.01	0.07±0.01	0.06±0.01	0.06±0.01	0.06±0.01
16:0[b,e]	5.76±0.47	6.12±0.50	5.83±0.34	5.04±0.46	5.51±0.09	5.48±0.27	5.11±0.12	5.12±0.51
17:0[d]	0.05±0.01	0.05±0.01	0.04±0.04	0.05±0.02	0.06±0.02	0.05±0.01	0.06±0.02	0.04±0.01
18:0[c]	1.79±0.12	1.69±0.19	1.80±0.11	1.46±0.14	1.42±0.16	1.44±0.14	1.48±0.04	1.59±0.03
20:0[e]	0.63±0.08	0.57±0.07	0.67±0.08	0.57±0.11	0.51±0.02	0.51±0.07	0.55±0.05	0.59±0.03
22:0[e]	0.37±0.06	0.28±0.04	0.31±0.08	0.26±0.09	0.34±0.05	0.28±0.03	0.30±0.02	0.31±0.05
Σ SFA	8.68±0.75	8.80±0.83	8.74±0.53	7.46±0.67	7.91±0.13	7.82±0.48	7.57±0.13	7.71±0.48

*mean value±standard deviation; SFAs saturated fatty acids; [a] Results are significantly influenced by seed variety ($p \leq 0.001$); [b] Results are significantly influenced by seed variety ($p \leq 0.01$); [c] Results are significantly influenced by seed variety ($p \leq 0.05$); [d] Results are significantly influenced by crop year ($p \leq 0.001$) [e] Results are significantly influenced by crop year ($p \leq 0.01$); [f] Results are significantly influenced by crop year ($p \leq 0.05$)

unfavorable effects on promoting diseases, *e.g.* cardiovascular diseases and atherosclerosis.

With the aim to establish the differences between the samples and influence of crop season the results of three years of investigation are presented as saturated and unsaturated fatty acids, classified in monounsaturated (MUFA) and polyunsaturated (PUFA) fatty acids separately for hybrids (Tables 2 and 3) and 00-cultivars (Tables 4 and 5).

Table 5. Unsaturated fatty acids of the oil from rapeseed 00-cultivars (2003-2005)*

Fatty acid (% of total)	00-cultivar							
	Bristol	Navajo	Dexter	Ella	Royal	Aviso	Kosto	Canary
16:1 [d]	0.35±0.02	0.37±0.07	0.37±0.05	0.32±0.04	0.38±0.07	0.34±0.03	0.36±0.05	0.30±0.03
17:1 [e]	0.15±0.02	0.14±0.01	0.16±0.02	0.15±0.03	0.17±0.02	0.16±0.02	0.17±0.01	0.17±0.01
18:1 [b,d]	65.53±3.18	62.36±3.98	65.10±3.47	66.48±3.99	58.05±2.55	60.19±2.03	61.45±0.86	61.15±1.57
18:2 [a,f]	17.42±1.90	19.48±1.99	17.63±1.61	16.90±2.22	23.33±1.17	21.09±0.77	20.78±0.43	19.94±0.86
18:3 [c,d]	6.56±2.15	7.11±2.38	6.28±2.18	7.33±2.41	8.95±1.20	9.24±1.70	8.43±1.02	9.49±1.14
20:1 [e]	1.29±0.18	1.41±0.18	1.49±0.28	1.34±0.10	1.21±0.11	1.14±0.05	1.23±0.05	1.23±0.11
22:1[b]	0.03±0.03	0.33±0.19	0.23±0.15	0.02±0.02	0.00±0.01	0.02±0.02	0.02±0.03	0.00±0.01
ΣMUFA	67.34±3.31	64.61±3.62	67.35±3.31	68.31±3.95	59.81±2.36	61.85±1.94	63.23±0.77	62.86±1.44
ΣPUFA	23.98±4.03	26.59±4.37	23.91±3.78	24.23±4.58	32.28±2.28	30.33±2.41	29.20±0.72	29.43±1.86
Iodine value [c,d]	105±6	108±7	105±6	107±7	115±3	114±4	112±1	113±3

*mean value±standard deviation; MUFA monounsaturated fatty acids, PUFAs polyunsaturated fatty acids; [a] Results are significantly influenced by seed variety ($p \leq 0.001$) [b] Results are significantly influenced by seed variety ($p \leq 0.01$); [c] Results are significantly influenced by seed variety ($p \leq 0.05$); [d] Results are significantly influenced by crop year ($p \leq 0.001$) [e] Results are significantly influenced by crop year ($p \leq 0.01$); [f] Results are significantly influenced by crop year ($p \leq 0.05$)

Table 6. The most represented fatty acids in hybrids during three years*

Year	Fatty acid (% of total)					
	16:0[a]	18:0[a]	18:1[a]	18:2[a]	18:3[a]	22:1[b]
2003	5.01±0.57	1.50±0.22	64.30±2.06	19.77±1.62	7.27±0.98	0.01±0.03
2004	5.27±0.55	1.53±0.13	61.88±1.82	20.53±1.05	7.90±1.24	0.00±0.00
2005	5.10±0.37	1.41±0.12	59.58±1.92	21.28±1.57	9.99±0.70	0.02±0.02

* mean value±standard deviation; [a] Results are significantly influenced by crop year ($p \leq 0.001$) b Results are significantly influenced by crop year ($p \leq 0.01$); [c] Results are significantly influenced by crop year ($p \leq 0.05$)

Table 7. The most represented fatty acids in 00-cultivars during three years*

Year	Fatty acid (% of total)					
	16:0[a]	18:0[c]	18:1[a]	18:2[a]	18:3[a]	22:1[b]
2003	5.73±0.38	1.63±0.17	65.34±3.59	18.47±2.68	6.20±1.40	0.04±0.05
2004	5.62±0.63	1.60±0.25	62.47±3.69	19.51±2.90	7.65±2.21	0.09±0.16
2005	5.15±0.36	1.52±0.13	59.81±2.27	20.73±1.63	9.93±0.53	0.13±0.19

* mean value±standard deviation; [a] Results are significantly influenced by crop year ($p \leq 0.001$) [b] Results are significantly influenced by crop year ($p \leq 0.01$); [c] Results are significantly influenced by crop year ($p \leq 0.05$)

Analysis of variance showed significant influence of cultivars (hybrids) and crop season on fatty acids composition. The amount of oleic acid (and total MUFA) was the highest in hybrid Baldur and cultivar Ella and of essential fatty acids (expressed as PUFA) in hybrid Artus and cultivar Royal. Influence of sample and climatic conditions on fatty acids was statistically significant.

The influence of each crop season on particular fatty acids that could influence the quality and stability of rapeseed oil is shown in Tables 6 and 7. The percentages of oleic acid were the highest and linoleic and linolenic acids were the lowest in the oils from the 2003 crop season which was characterized by higher monthly temperatures and lower rainfall during May and June (Republic of Croatia – Meteorological and Hydrological Service) while lipid biosynthesis is carried out. Enviromental factors, such as light, temperature and water stress affect lipid levels and metabolism in the olive fruit (Harwood, 1984) and rapeseed seeds (Gororo et al., 2003).

Results of Cluster analysis according to fatty acid composition are presented in Figure 1 and in Figure 2. Hybrid RG 9908 in crop years 2003 and 2004 (Figure1) as well as cultivars 'Aviso' and 'Royal' in crop years 2004 and 2005 (Figure 2) created homogenous and separated groups. Hybrid RG 9909 in 2003 had similar fatty acid composition as hybrid RG 9908 (2003, 2004). Fatty acid composition of 00 cultivars 'Executive' and 'Extra' was similar through first and second year of investigation. The results

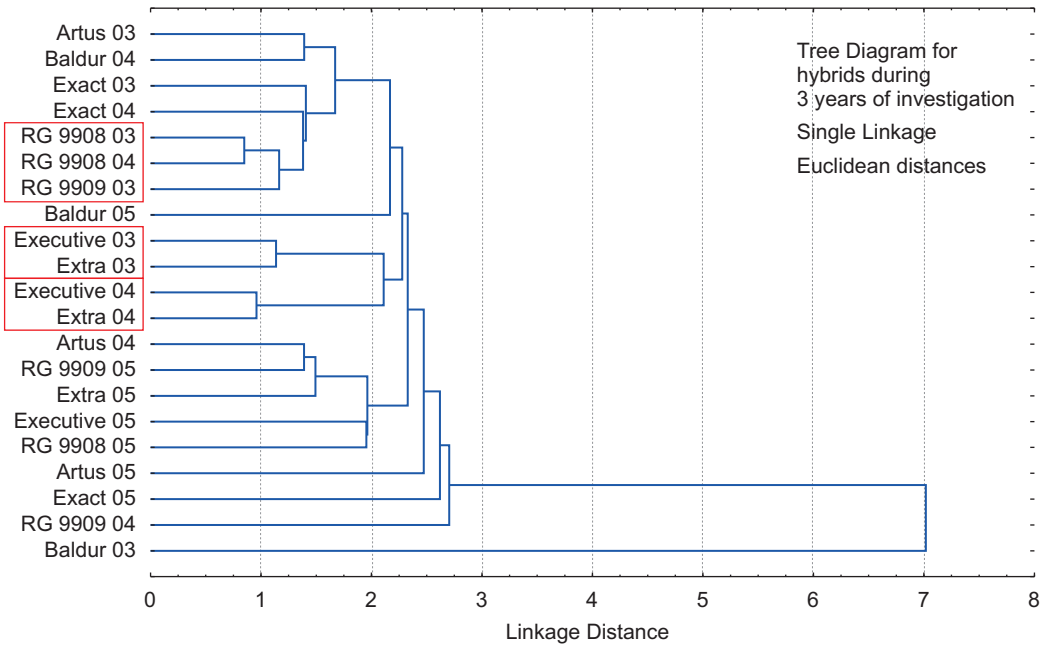

Figure 1.
Cluster analysis of rapeseed hybrids according fatty acid composition

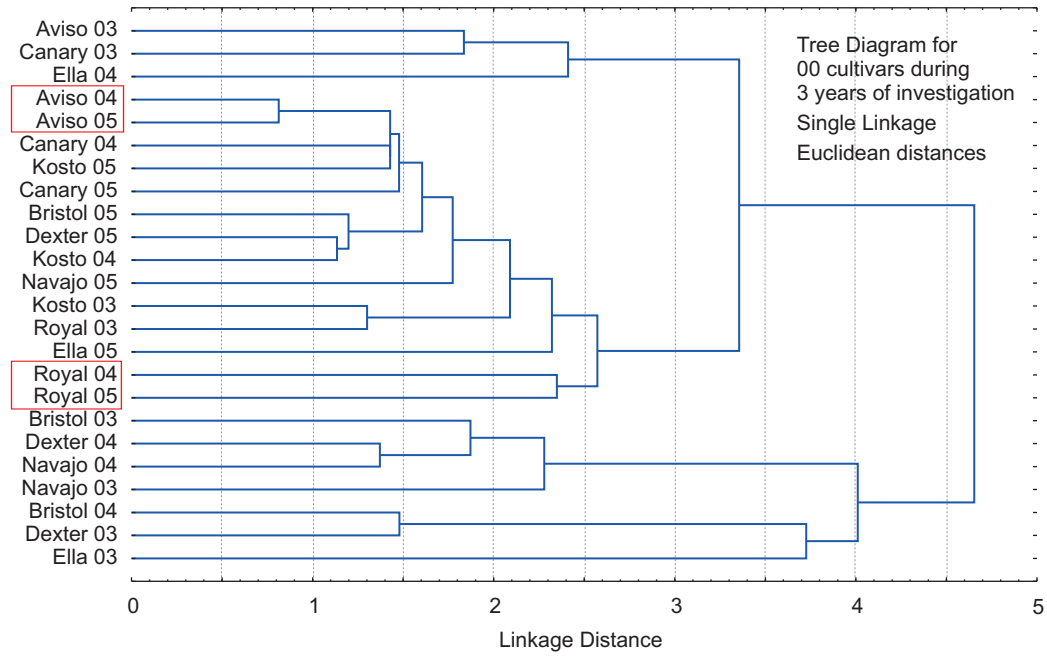

Figure 2.
Cluster analysis of rapeseed 00-cultivars according fatty acid composition

of the other samples showed wide distribution of data thus fatty acid composition by itself cannot be helpful in characterization of these oils therefore it has to be completed with other analyses.

Conclusion

In view of the performed research on seven new hybrids and eight 00-cultivars of rapeseed in the period 2003 -2005, grown in the experimental field of the Faculty of Agriculture in Zagreb, and analyzed results it could be concluded that the oil content in the seed from 00-cultivars was higher than in the seed from hybrids during three years of investigation.

In both investigated groups there were no significant differences in composition of those fatty acids which could influence the quality and stability of rapeseed oil. Neither hybrids nor 00-cultivars contained erucic acid or it was present far bellow the limit allowed in law regulations (2%). The average values of individual fatty acids in oils obtained from hybrids as well as from 00-cultivars are inside the prescribed limits, but there were several samples

in which oleic and palmitic acid contents were above and linoleic and linolenic acid contents (as well as the iodine values) below the limit values. This ought to be taken into consideration at the earliest revision of official regulations on vegetable oils.

Investigated rapeseed hybrids as well as 00-cultivars contained much the same amount of total monounsaturated (MUFA), total polyunsaturated (PUFA) and total saturated (SFA) fatty acids. The high content of oleic acid and low content of saturated fatty acids are very important characteristics of rapeseed oil, and, combined with the presence of linoleic and linolenic acid, responsible for its unique nutritive value and efficiency in preventing of cardiovascular diseases.

Weather conditions in each year greatly influenced fatty acid composition of all investigated samples what was confirmed by variance analysis.

The determination of fatty acid composition by itself cannot be helpful in characterization of rapeseed oil; therefore it has to be combined with other analyses.

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