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Published at http://www.ijate.net http://dergipark.gov.tr/ijsm **Research Article**

Evaluation of Fatty Acid Compositions of Some Important Wild and Domestic Turkish Mustard Genotypes (*Brassica* spp.)

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Abstract: The seed oil samples of 57 mustard genotypes belonging to six species of mustard (*Brassica* spp.) *Brassica juncea* (31 genotypes), *B. rapa* (6 genotypes), *B. napus* (2 genotypes), *B. nigra* (6 genotypes), *B. arvensis* (10 genotypes) and *B. alba* (2 genotypes) collected from USA gene bank and diverse ecologies of Turkey were used as research material and evaluated for their fatty acid composition by gas-liquid chromatography (GLC). The aim of this study was to evaluation of fatty acid compositions of some important wild and domestic Turkish mustard genotypes (*Brassica* spp.). The results showed significant variability among all genotypes for fatty acid composition. Erusic acid (C22:1; 20.63-47.87%), oleic acid (C18:1; 7.42-24.54%) and linoleic acid (C18:2; 9.61-25.11%) were determined to be the dominant fatty acids among all genotypes. It has been observed that the results in wild mustards have too many resemblances with the composition of fatty acid of mustard which is used by people in alternative medical science, paint, food industry and biodisel production. The great variability in seed oil contents in *Brassica* genotypes showed their potential for use in future breeding programs.

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1. INTRODUCTION

Brassicas are members of the *Brassicaceae (Cruciferae)* family. *Brassicaeae* comprise a diverse family of plants and provide one of the most extensive and varied range of end products used by man from a single plant genus [1]. *Brassica rapa* (rapeseed or rape mustard), *B. juncea* (Asian mustard or brown mustard), *B. arvensis* (charlock), *B. nigra* (black mustard) and *B. alba* (white or yellow mustard) are some of the important species of *Brassicaceae* family. Turkey has a rich flora; more than 9000 flowering plant species. The family *Brassicaceae* contains 84 genera with 441 species [2]. *Brassica alba* L., *B. arvensis* L., *B. nigra* L. and *B. juncea* L. family *Cruciferae*, grow in Turkey under natural conditions as weed (3, 4).

Brassica species are cultivated extensively to produce edible and industrial oils throughout the world. They occupy a unique position in world agriculture as a source of

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vegetables, oilseed, forage and fodder, green manure and condiments [5-7]. *Brassica* seed oil is used for the edible purpose, as industrial lubricants and as a base for polymer synthesis. Oilseed brassica cake is used as a source of protein in animal feeds [8, 9]. The oil is commonly used for cooking and to add a hot and spicy flavor to food [10]. As a crop, they are also one of the maximum oil yielding and high protein containing oilseed species [1, 11].

Mustard oil contains the major saturated fatty acids like palmitic and stearic acids along with mono and polyunsaturated fatty acids like oleic, eicosenoic, erucic, linoleic and linolenic acids. The fatty acid composition of the seed oil depends on the genetic, ecological, morphological, physiological and cultural factors. There may be big or small differences among *Brassica* species in terms of fatty acid composition and it may be changeable to a small and large scale depending on this factors [12, 13, 14, 15]. To know the fatty acid composition of *Brassica* species oil makes oil production possible for special using purposes. Thus, it would be possible to produce suitable oils by cultivating the desired genotypes.

The purpose of the study was to evaluate seed fatty compositions of 57 mustard genotypes *Brassica* belong to six species which selected from different mustard genotypes as a potential material for starting mustard breeding programs in Turkey.

2. MATERIALS and METHODS

The study made use of 57 mustard genotypes as research material including six *Brassica* species which were selected from different mustard genotypes obtained from the USA gene bank and collected locally from diverse ecologies in Turkey. All genotypes were planted during the growing seasons of 2016-17 at the experimental fields located at Yenimahalle (fall sowing) 39°12′ - 43°6′ N, 35°58′ - 37°44′ E, and 925 m altitude, with semiarid climatic characteristics ecological dry conditions. The station belongs to the Central Research Institute for Field Crops, Ankara, Turkey. Table 1 shows long term and monthly meteorological data of experimantal station where *Brassica* field experiment was carried out. There was a total of 400.2 and 393.6 mm precipitation, 12.2 and 12.1 °C average temperature, and 56.5% and 60.3% average humidity, respectively at Yenimahalle. It was determined that more arid conditions persisted during 2016-2017 growing season compaired to the averages of long years.

Table 1. Growing season and long term monthly meteorological data of the experimental area, where the *Brassica* genotypes were sown for experimantal purposes

Climatic factors	Years	Months												Total or average
		S	O	N	D	J	F	Mr	A	M	Jn	Jl	A	
Precipitation	Long years	17.5	31.8	34.2	42.0	40.2	33.0	36.7	46.7	49.9	34.2	14.3	13.1	393.6
(mm)	2016-17	11.1	4.0	23.7	47.9	28.1	7.5	46.1	19.8	96.2	102.8	0.0	13.0	400.2
Relative humidity	Long years	49.1	60.5	69.7	76.5	76.4	70.7	63.2	59.0	56.5	52.1	45.1	45.3	60.3
(%)	2016-17	45.4	53.9	53.8	74.1	76.4	66.5	59.6	49.8	55.7	58.3	38.4	45.8	56.5
Average	Long years	19.0	13.1	6.8	2.3	0.4	2.3	6.4	11.5	16.2	20.3	23.8	23.5	12.1
temperature (ºC)	2016-17	19.2	13.7	6.9	-0.3	-1.3	3.1	8.1	11.2	15.7	20.3	25.5	24.7	12.2
Maximum	Long years	32.6	27.6	19.7	13.9	11.9	14.7	21.4	25.7	29.3	33.6	36.2	35.8	36.2
Temperature(ºC)	2016-17	32.9	28.1	21.5	10.1	9.2	18.7	19.9	27.2	29.2	35.8	38.3	37.8	38.3
Minimum	Long years	6.6	1.1	-3.8	-8.2	-11.5	-9.9	-5.9	-0.8	4.1	8.1	11.4	11.5	-11.5
temperature (ºC)	2016-17	5.3	-0.1	-4.9	-9.7	-10.5	-12.0	-1.5	-1.0	5.0	9.0	14.2	13.3	-10.5

S: September,O: October,N: November, D: December, J: January, F: February, Mr: March, A: April, M: May, Jn: June, Jl: July, A: August

Data were obtained from the General Directorated of Meteorology at Ankara, Turkey

Table 2 shows soil samples features belonging to the experimental area. The soil analysis during 2016, performed out of the soil taken at a depth of 0-20 and 21-40 cm showed low organic matter (1.26%), in alkaline (pH 7.99), lime (7.3%), and clay-loamy soils at Yenimahalle.

Table 2. Soil samples features belonging to the experimental area

Location	Year	Depth (cm)	Texture	Saturation percentage (%)	Total salt (%)	pH (%)	Lime (%)	Phosphorus (P)	Potassium (K)	Organic Substance (%)
Ankara	2016	0-20	Clay loamy	56.0	0.014	8.00	7.5	8.3	174.7	1.15
		20-40	Clay loamy	62.0	0.015	7.97	7.0	9.1	187.8	1.36
		Average		59.0	0.015	7.99	7.3	8.7	181.2	1.26

Data were ontained from the Soil Fertilizer and Water Resources Institute

Each genotype was planted as two row, 3 m plots with 30 cm row spacing unreplicated. Gas chromatgraphy (GC) analysis: The fatty acid methyl esters (FAME) were performed with Shimadzu AOC-20i gas chromatgraphy equipped with a flame ionization detector. Analyses were conducted using Teknokroma capillary calumn 100 m x 0.25 mm x 0.2 µm. The column temperature was programmed to waiting 140 °C for 5 min., increase 4 °C/min and was kept at 240 °C for 20 min. The injector and detector temperature were 250 °C using helium, air and hydrogen. 15 major fatty acids palmitic (C16:0), stearic (C18:0), arachidic (C20:0), behenic (C22:0), lignoceric (C24:0), palmitoleic (C16:1), oleic (C18:1n9c), eicosenoic (C20:1), erusic (C22:1n9t), nervonic (C24:1), linoleic (C18:2n6c), linolenic (C18:3n6), Cis-11,14-eicosadienoic acid (C20:2), Cis-11, 14, 17-eicosatrienoic acid (C20:3n3) and cis-13, 16-docosadienoic acid (C22:2) were identified as percentage of total fatty acids.

3. RESULTS AND DISCUSSION

The results indicated that the major saturated fatty acids like palmitic and stearic acids along with mono and polyunsaturated fatty acids like oleic, eicosenoic, erucic, linoleic and linolenic acids were found in the oil. Number of genotypes of mustard were taken for fatty acid analysis. The fatty acid composition was variable among 57 different genotypes. Overall a total of 15 fatty acid components were detected (Table 3). The saturated fatty acids mainly include palmitic acid (C16:0; 2.11% in BNa-14-Turkey, Tekirdağ of *B. napus*-4.38 % in BA2-Turkey, Tokat of *B. arvensis*); stearic acid (C18:0; 1.17 % in BR-A48-Turkey, Tekirdağ of *B. arvensis*-2.68 % in BA7-Turkey, Şereflikoçhisar of *B. arvensis*), arachidic acid (C20:0; 0.48 % in BAI-B58-Israel of *B. alba*-1.53 % in BN-A21-Turkey, Ankara of *B. nigra*), behenic acid (C22:0; 0.00% in BAI-Russia of *B. alba*-1.65% in BN-B53-Italy of *B. nigra*) and lignoceric acid (C24:0; 0.25 in BAI-Russia of *B. alba*-1.00% in BN-A16-Turkey of *B. nigra*). Monounsaturated fatty acids included palmitoleic acid (C16:1; 0.10% in BR-A48-Turkey, Tekirdağ of *B. rapa*-0.49% in BA2-Turkey, Tokat of *B. arvensis*), oleic acid (C18:1; 7.42% in BJ-B18-United States, California of *B. juncea*-41.58% in BAI-Russia of *B. alba*), eicosenoic acid (C20:1; 5.30% in BAI-Russia of *B.alba*-17.11 % in BA7-Turkey, Şereflihoçhisar of *B. arvensis*), erusic acid (C22:1; 20.63% in BAI-Russia of *B. alba* -47.87 % in BNa-A14-Turkey, Tekirdağ of *B. napus*) and nervonic acid (C24:1; 1.06% in BN-Ucraina of *B. nigra*-2.37% in BJ-B20-Russian of *B. juncea*). Polyunsaturated fatty acids included linoleic acid (C18:2; 9.61% in BJ-C2-India of *B. juncea*-25.11% in BJ-A20-India of *B. juncea*), linoleic acid (C18:3; 4.94 % in BA7-Turkey, Şereflikoçhisar of *B. arvensis*-14.70 % in BJ-A20-India of *B. juncea*), cis-11, 14 eicosadienoic acid (C20:2; 0.31 % in BJ-C2-India of *B. juncea*-1,15 % in BN-B53-Italy of *B. nigra*), cis 11, 14, 17 eicosatrienoic acid (C20:3; 0.00 % in BJ-B18-United States, California, BJ-A20-India, BJ-A99-India of *B. juncea;* BR-A48-Turkey, Tekirdağ of *B.rapa*; BA3-Turkey, Isparta of *B.arvensis*; BAI-B58-Israel, BAI-Russian of *B.alba*; BA7-Turkey, Şereflikoçhisar of *B. arvensis*-1.68 % in BA-Turkey, Tokat of *B. arvensis*) and cis-13, 16-docosadienoic acid (C22:2;

0.00% in BA7-Turkey-Şereflikoçhisar of *B. arvensis*; BAI-Russian of *B. alba*-1.92% in BJ-B18-United States, California *B. juncea*) (Table 3). Erusic acid (C22:1), oleic acid (C18:1) and linoleic acid (C18:2) were determined to be dominant fatty acids among all genotypes. The maximum total saturated fatty acids percent was observed in BA7-Turkey, Şereflikoçhisar of *B. arvensis* (10.18%) while the minimum oil percent was noted in BR-A48-Turkey, Tekirdağ of *B. rapa* genotype (5.25%). The maximum total monounsaturated fatty acid percent was obtained in BA7-Turkey, Şereflikoçhisar of *B. arvensis* (75.23%) while the minimum fatty oil percent was noted in BJ-A20-India of *B. juncea* (50.90%). The maximum total polyunsaturated fatty acid percent was obtained in BJ-A20-India of *B.juncea* (41.56%) while the minimum in BA7-Turkey, Şereflikoçhisar of *B. arvensis* (15.27%). Seed oil quality and utility largely depend on fatty acid composition. Fatty acids exhibit rich variety, exhibiting variable fatty acid composition and content across species (and even across varieties). Therefore, fatty acid composition and content profiles can be used as fingerprints to identify useful biological resources, in addition to their current use for oil authentication [16, 17]. The differences between fatty acids among genotypes were very obvious. Especially oleic acid (7.42 to 24.54%), linoleic acid (5.81 to 23.97%) and erusic acid (20.87 to 50.25%) were the most prominent. These differences in the fatty acid profile may be due to the variations in phenotypic or environmental conditions as well as the genetic background of the experimental material [18]. Both genotypic and phenotypic conditions (environmental parameters) determine the amount and quality of fatty acids in plant [15]. Maturation and harvest time of plants drought ere found to have significant effects on the fatty acid composition of the seeds [19- 23]. It is effective to choose the accessions with high monounsaturated fatty acid (MUFA) content as optimal germplasm resources for biodiesel production [17, 24].

The significant variability in seed oil contents among *Brassica* genotypes showed their potential for use in future breeding programs and supported the findings of [25-27] who also recorded great variations in seed oil contents among different *Brassica* species [28].

Table 3. Fatty acid composition of mustard genotypes belong to *Brassica species*

Genotypes	Palmitic asit (C16:0)	Stearic asit (C18:0)	Arachidic asit (C20:0)	Behenic acid (C22:0)	Lignoceric acid (C24:0)	ΣSFA	Palmitoleic acid (C16:1)	Oleic asit (C18:1n9c)	Eicosenoic asit (C20:1)	Erusic asit (C22:1n9t)	Nervonic asit (C24:1)	ΣMUFA	Linoleic acid (C18:2n6c)	Linolenic acid (C18:3n6)	Cis-11,14-eicosadienoic acid (C20:2)	Cis-11,14,17-eicosatrienoic acid (C20:3n3)	cis-13,16-docosadienoic acid (C22:2)	ΣPUFA
Brassica juncea																		
BJ-A2-Turkey, İzmir	2.97	1.97	0.95	0.51	0.33	7.02	0.18	22.24	11.52	21.69	1.15	56.78	21.65	12.77	0.88	0.36	0.42	36.21
BJ-A3-Turkey	2.85	1.89	0.94	0.55	0.32	6.67	0.18	20.79	11.09	23.89	1.22	57.17	20.87	13.31	0.92	0.38	0.47	36.16
BJ-A4-Turkey	3.25	1.79	0.99	0.55	0.34	7.08	0.18	22.08	11.73	22.50	1.09	57.57	21.15	12.70	0.88	0.37	0.40	35.36
BJ-A5-Turkey, Tekirdağ	3.16	1.79	0.94	0.49	0.29	6.74	0.18	20.90	11.91	23.21	1.21	57.40	20.83	13.41	0.96	0.35	0.44	35.80
BJ-A6-Turkey, Kayseri	3.20	1.85	0.93	0.51	0.32	6.99	0.16	20.52	11.26	23.52	1.27	56.73	21.02	13.64	0.96	0.41	0.47	36.29
BJ-A7-Turkey, Tekirdağ	3.20	1.92	0.95	0.52	0.34	7.01	0.18	21.01	11.09	23.30	1.32	56.89	21.31	13.17	0.93	0.38	0.45	36.11
BJ-A8-Turkey	2.24	1.20	0.81	1.33	0.74	6.32	0.12	11.06	6.01	46.23	1.96	65.37	14.31	10.85	0.69	1.12	1.34	28.31
BJ-A9-Turkey, Tekirdağ	2.86	1.72	0.98	0.77	0.43	6.83	0.16	18.11	10.39	30.11	1.33	60.10	18.92	12.28	0.87	0.55	0.64	33.07
BJ-A10-Turkey, Kırklareli	3.21	1.87	1.03	0.80	0.50	7.40	0.19	17.32	10.28	29.81	1.41	59.00	19.92	11.54	0.89	0.53	0.73	33.61
BJ-A11-Turkey, Edirne	3.51	2.10	0.97	0.55	0.35	7.79	0.22	19.55	11.04	22.53	1.29	54.63	22.17	13.38	0.96	0.43	0.52	37.58
BJ-B5-Turkey, Tekirdağ	3.28	1.96	0.98	0.53	0.35	7.10	0.19	20.56	11.66	22.13	1.22	55.75	21.92	13.46	0.90	0.44	0.44	37.15
BJ-B6-India	2.69	1.32	0.92	0.99	0.58	6.49	0.16	15.41	9.36	36.21	1.54	62.68	17.72	11.38	0.84	0.00	0.89	30.83
BJ-B7-India, Rajasthan	2.68	1.42	0.96	1.19	0.64	6.88	0.17	14.27	8.13	39.19	1.62	63.36	17.81	9.30	0.81	0.79	1.07	29.77
BJ-B8-Pakistan, Punjab	2.65	1.46	0.90	1.38	0.72	7.11	0.19	12.84	6.71	41.06	1.82	62.61	17.88	9.28	0.74	1.03	1.35	30.28
BJ-B13-China	3.78	1.87	1.00	0.84	0.48	7.98	0.28	14.47	9.09	27.79	1.59	53.23	22.64	13.35	1.09	0.73	0.99	38.80
BJ-B15-Pakistan	2.65	1.63	0.91	1.32	0.69	7.18	0.17	13.56	9.91	38.64	1.73	64.01	15.41	10.96	0.83	0.69	0.91	28.80
BJ-B16-Canada	3.10	1.87	1.02	0.74	0.38	7.11	0.19	18.11	11.69	29.09	1.22	60.31	18.87	12.01	0.93	0.11	0.56	32.48
BJ-B17-Canada	3.42	1.59	0.91	1.03	0.54	7.49	0.25	13.66	8.27	33.83	1.61	57.62	20.08	11.89	0.99	0.80	1.13	34.88
BJ-B18-United States, California	3.79	1.37	0.98	1.19	0.99	8.30	0.15	7.42	5.33	42.06	2.37	57.33	18.04	13.43	0.98	0.00	1.92	34.37
BJ-B20-Russian Federation	2.70	1.57	0.90	0.84	0.42	6.42	0.15	19.46	9.57	31.56	1.40	61.73	19.58	10.23	0.91	0.47	0.69	31.86
BJ-B22-China, Xizang	2.83	1.83	0.97	1.15	0.52	7.39	0.19	14.59	8.41	36.15	1.62	60.97	19.22	9.79	0.95	0.73	0.95	31.64
BJ-B23-Pakistan	2.76	1.22	0.93	1.06	0.61	6.58	0.17	14.80	8.85	36.33	1.72	61.88	18.58	10.22	0.88	0.77	1.10	31.55
BJ-B24-Germany	3.31	1.65	0.92	1.00	0.49	7.36	0.22	15.29	8.22	31.84	1.57	57.14	21.24	11.54	0.98	0.74	1.03	35.51
BJ-B25-Germany	2.78	1.61	1.01	0.72	0.42	6.53	0.15	19.81	11.55	28.65	1.33	61.50	18.44	11.81	0.85	0.47	0.56	31.97
BJ-B27-United States, Minnesota	3.63	1.90	1.00	0.63	0.41	7.61	0.20	20.02	12.22	23.95	1.24	57.63	21.47	11.34	0.99	0.43	0.55	34.77
BJ-B28-United States, Minnesota	3.33	1.68	0.96	0.68	0.39	7.09	0.19	18.78	10.67	26.23	1.27	57.15	21.21	12.50	0.94	0.49	0.63	35.77
BJ-C1-India	2.49	1.32	0.95	1.13	0.55	6.44	0.16	11.13	6.92	44.09	1.73	64.03	15.10	11.52	0.80	0.95	1.16	29.53
BJ-C2-India	2.71	1.40	0.98	0.54	0.28	5.91	0.11	24.54	9.27	37.41	2.27	73.61	9.61	9.56	0.31	0.63	0.37	20.48
BJ-A20-India	4.07	2.24	0.92	0.47	0.33	8.03	0.22	16.16	9.78	23.00	1.74	50.90	25.11	14.70	1.08	0.00	0.67	41.56
BJ-A99-India	3.27	1.81	0.90	0.43	0.30	6.71	0.14	21.03	11.09	24.21	1.38	57.85	19.95	14.07	1.01	0.00	0.42	35.45
BJ-AK-Turkey, Konya	2.95	1.57	0.95	0.45	0.30	6.22	0.19	21.66	11.75	21.16	1.36	56.11	21.97	11.85	0.94	0.37	0.39	35.39
Maximum	4.07	2.24	1.02	1.32	0.99	8.30	0.28	24.54	12.22	44.09	2.37	73.61	25.11	14.70	1.09	0.95	1.92	41.56
Minimum	2.49	1.22	0.90	0.43	0.28	5.91	0.11	7.42	5.33	21.16	1.22	50.90	9.61	9.56	0.31	0.00	0.37	20.48
Average	3.15	1.65	0.95	0.84	0.47	7.08	0.18	16.73	9.56	31.53	1.60	59.59	19.21	11.81	0.91	0.49	0.83	33.22
Brassica rapa																		
BR-A23-Turkey	2.50	1.31	0.92	0.94	0.59	6.35	0.14	14.39	9.29	37.42	1.82	63.06	16.13	11.76	0.91	0.80	0.98	30.59
BR-A24-Turkey, Balıkesir	2.65	1.32	0.88	0.90	0.47	6.23	0.14	15.34	8.95	36.84	1.58	62.84	17.28	11.24	0.82	0.74	0.85	30.93
BR-A32-Turkey, Balikesir	2.52	1.24	0.87	1.34	0.76	6.73	0.20	11.08	5.99	44.42	2.01	63.70	16.40	9.77	0.72	1.28	1.40	29.57
BR-A47-Turkey, Bursa	3.14	2.08	1.02	0.56	0.36	7.17	0.19	21.77	11.48	21.59	1.11	56.15	21.34	13.72	0.85	0.39	0.39	36.68
BR-A48-Turkey, Tekirdağ	2.13	1.17	0.80	0.83	0.33	5.25	0.10	12.78	8.23	47.54	1.50	70.15	13.16	10.01	0.69	0.00	0.73	24.60
BR-B30-India	2.31	1.52	0.95	1.20	0.74	6.73	0.15	12.04	7.44	43.67	1.80	65.10	15.03	10.44	0.78	0.77	1.14	28.17
Maximum	3.14	2.08	1.02	1.34	0.76	7.17	0.20	21.77	11.48	47.54	2.01	70.15	21.34	13.72	0.91	1.28	1.40	36.68
Minimum	2.13	1.17	0.80	0.56	0.33	5.25	0.10	11.08	5.99	21.59	1.11	56.15	13.16	9.77	0.69	0.00	0.39	24.60
Average	2.59	1.42	0.90	0.91	0.50	6.35	0.15	15.07	8.79	37.56	1.60	63.18	16.86	11.30	0.80	0.64	0.87	30.47

Table 3. Continues

Brassica napus																	
BNa-A13-Turkey, Samsun	*3.29*	*1.55*	*0.97*	*0.70*	*0.40*	*7.31*	*0.17*	*17.99*	*11.09*	*28.33*	*1.35*	*58.93*	*20.16*	*11.85*	*1.01*	*0*	*0.61*	*33.76*
BNa-A14-Turkey, Tekirdağ	*2.11*	*1.36*	*0.79*	*0.82*	*0.33*	*5.40*	*0.12*	*11.65*	*7.99*	*47.87*	*1.61*	*69.24*	*12.79*	*10.43*	*0.66*	*0.67*	*0.81*	*25.36*
Maximum	*3.29*	*1.55*	*0.97*	*0.82*	*0.40*	*7.31*	*0.17*	*17.99*	*11.09*	*47.87*	*1.61*	*69.24*	*20.16*	*11.85*	*1.01*	*0.67*	*0.81*	*33.76*
Minimum	*2.11*	*1.36*	*0.79*	*0.70*	*0.33*	*5.40*	*0.12*	*11.65*	*7.99*	*28.33*	*1.35*	*58.93*	*12.79*	*10.43*	*0.66*	*0.00*	*0.61*	*25.36*
Average	*2.70*	*1.46*	*0.88*	*0.76*	*0.37*	*6.36*	*0.15*	*14.82*	*9.54*	*38.10*	*1.48*	*64.09*	*16.48*	*11.14*	*0.84*	*0.34*	*0.71*	*29.56*
Brassica nigra																		
BN-A16-Turkey	2.96	1.60	1.42	1.44	1.00	8.50	0.16	13.43	10.07	35.89	1.77	61.32	16.09	12.17	0.99	0.11	0.82	30.18
BN-A17-Turkey	3.08	1.54	1.31	1.31	0.85	8.17	0.17	11.99	9.52	36.61	1.80	60.09	15.63	13.58	1.07	0.58	0.88	31.74
BN-A18-Turkey	3.07	1.50	1.40	1.35	0.92	8.24	0.17	12.35	9.02	37.59	1.81	60.93	15.95	12.51	0.94	0.51	0.92	30.83
BN-A21-Turkey, Ankara	3.28	1.80	1.53	1.27	0.84	8.82	0.19	14.56	9.92	32.90	1.49	59.07	17.16	12.87	0.89	0.51	0.68	32.11
BN-B53-Italy	2.95	1.42	0.82	1.65	0.89	7.73	0.15	10.40	12.07	37.90	1.89	62.50	12.81	14.43	1.15	0.81	0.58	29.77
BN-Ukraine	3.44	2.01	0.58	0.45	0.30	6.78	0.14	21.03	10.61	21.13	1.06	53.97	24.99	13.27	0.65	0.00	0.34	39.25
Maximum	3.44	2.01	1.53	1.65	1.00	8.82	0.19	21.03	12.07	37.90	1.89	62.50	24.99	14.43	1.15	0.81	0.92	39.25
Minimum	2.95	1.42	0.58	0.45	0.30	6.78	0.14	10.40	9.02	21.13	1.06	53.97	12.81	12.17	0.65	0.00	0.34	29.77
Average	3.13	1.65	1.18	1.25	0.80	8.04	0.16	13.96	10.20	33.67	1.64	59.65	17.11	13.14	0.95	0.42	0.70	32.31
Brassica arvensis																		
BA1-Turkey, Ankara	3.16	1.73	0.88	1.84	0.86	8.47	0.16	13.34	12.50	35.65	1.67	63.32	14.41	11.58	0.99	0.72	0.51	28.21
BA2-Turkey, Tokat	4.38	2.54	0.89	1.34	0.70	9.86	0.49	13.67	12.62	28.68	1.71	57.16	17.28	12.36	1.11	1.68	0.54	32.98
BA3-Turkey, Isparta	2.73	1.69	0.85	1.62	0.93	7.81	0.12	11.26	13.60	38.60	1.90	65.48	12.68	12.40	1.13	0.00	0.49	26.70
BA4-Turkey, Haymana	2.79	2.34	0.99	0.45	0.27	6.95	0.15	23.48	12.95	21.56	1.23	59.37	19.44	12.75	0.87	0.31	0.30	33.68
BA5-Turkey, Kazan	3.08	2.06	0.82	1.23	0.66	8.03	0.11	15.06	15.91	31.47	1.48	64.02	14.26	12.25	1.02	0.10	0.31	27.95
BA6-Turkey, Şanlıurfa	2.25	1.45	0.86	1.23	0.71	6.51	0.17	11.79	6.61	44.83	1.99	65.38	14.51	10.63	0.72	0.99	1.26	28.11
BA7-Turkey, Şereflikoçhisar	4.37	2.68	1.02	1.29	0.82	10.18	0.16	16.70	17.11	39.72	1.54	75.23	9.80	4.94	0.53	0.00	0.00	15.27
BA-B72-Israel	3.13	1.99	0.97	0.54	0.35	6.98	0.21	22.34	11.52	20.98	1.09	56.14	22.20	13.04	0.85	0.38	0.41	36.88
BA-B73-Israel	3.11	1.60	0.96	0.81	0.44	6.91	0.22	16.12	10.70	30.36	1.45	58.85	19.68	12.36	0.98	0.54	0.68	34.24
BA-B76-Israel	3.12	1.80	0.97	0.68	0.40	6.95	0.22	19.23	11.11	25.67	1.27	57.50	20.94	12.70	0.92	0.46	0.55	35.56
Maximum	4.38	2.68	1.02	1.84	0.93	10.18	0.49	23.48	17.11	44.83	1.99	75.23	22.20	13.04	1.13	1.68	1.26	36.88
Minimum	2.25	1.45	0.82	0.45	0.27	6.51	0.11	11.26	6.61	20.98	1.09	56.14	9.80	4.94	0.53	0.00	0.00	15.27
Average	3.22	2.00	0.92	1.11	0.61	7.95	0.22	16.48	12.36	31.94	1.53	62.82	16.43	11.08	0.90	0.57	0.53	29.31
Brassica alba																		
BAl-B58-Israel	3.23	1.67	0.98	0.51	0.35	6.90	0.16	23.15	11.99	21.84	1.18	58.31	21.29	12.24	0.88	0.00	0.38	34.79
BAl-Russia	3.45	2.02	0.48	0.00	0.25	6.20	0.16	41.58	5.30	20.63	1.30	68.97	12.89	11.96	0.00	0.00	0.00	24.85
Maximum	3.45	2.02	0.98	0.51	0.35	6.90	0.16	41.58	11.99	21.84	1.30	68.97	21.29	12.24	0.88	0.00	0.38	34.79
Minimum	3.23	1.67	0.48	0.00	0.25	6.20	0.16	23.15	5.30	20.63	1.18	58.31	12.89	11.96	0.00	0.00	0.00	24.85
Average	3.34	1.85	0.73	0.26	0.30	6.55	0.16	32.37	8.65	21.24	1.24	63.64	17.09	12.10	0.44	0.00	0.19	29.82

4. CONCLUSION

To know the fatty acid composition of *Brassica* species oil makes oil production possible for special using purposes. Genotypes belonging to six species of mustard evaluated in our study exhibited an important level of diversity for fatty acid compositions. Oleic acid (7.42 to 24.54%), linoleic acid (5.81 to 23.97%) and erusic acid (20.87 to 50.25%) were the most prominent. The result of our study showed that *Brassica* genotypes have significant potential for use in future breeding programs due to their significantly differed fatty acid compositions. While BJ-A20-India of *Brassica juncea* has maximum percent of total polyunsaturated fatty acid; BA7-Turkey, Şereflikoçhisar of *Brassica arvensis* was selected as promising genotype in terms of saturated and monounsaturated fatty acid contents. Especially the high erucic acid genotypes can be used for industrial applications. Furthermore these species are crossed to cultivated species for special using purposes and can be used as a new source. Therefore, an extensive work on these genotypes could suggest them in future breeding programs under Turkish conditions.

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