FATTY ACID COMPOSITION OF SEEDS OF YELLOW, RED, AND BLACK COLORED *Prunus mahaleb* FRUITS IN TURKEY

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Mahaleb, *Prunus mahaleb* L. or *Cerasus mahaleb* Mill., belongs to the Rosaceae family, subfamily Prunoidae [1].

The medicinal use of seeds as a digestive aid and a diuretic has long been practiced in Turkey. Its grounded seeds are used in Turkey as a tonic or an antidiabetic in folk medicine and as a flavouring agent in making pies and candies. From the seeds, oil can be extracted that contains unusual conjugated fatty acids [2].

Although there is a study related to the fatty acid content of the seed of a single mahaleb type [3], a comparative study using different types of seeds obtained from yellow, red, and black colored mahaleb fruit seeds has not been carried out so far.

Here we report on the fatty acid compositions of seeds from yellow, red, and black colored fruits of mahaleb (*Prunus mahaleb* L.). The fatty acid composition of oils was analyzed by GC with a capillary column (5% phenylmethylsilicone) [4].

Fatty acid components representing about 98.43% (black colored) – 98.74% (red colored) types were characterized. The amount of saturated and unsaturated fatty acids in seed was found to be 8.72% (yellow colored) – 12.10% (black colored); 86.33% (black colored) and 88.83% (yellow colored), respectively. Unsaturated fatty acids from *Prunus mahaleb* seeds are the predominant constituents. Average of 88% of the fatty acids (Table 1) are unsaturated as previously described for *Prunus mahaleb* [3].

Fatty acid analysis has shown that the seeds from yellow, red, and black colored fruits of the mahaleb studied contained twelve major compounds, and a variation in fatty acids was found among mahaleb types (Table 1). Linoleic acid (33.33–34.13%) was the main fatty acid for seeds from yellow and red colored mahaleb, while oleic acid (33.67%) was the dominant fatty acid for seeds obtained from black colored fruits (Table 1). In a previous study conducted on mahaleb seed, the main fatty acids were found to be oleic and linoleic acid [3], in agreement with our present study. A high content of linoleic and linolenic acid (polyunsaturated fatty acids) is favorable for medicinal (profilaxis and treatment of arteriosclerosis, eczema) and nutritional application since these components, particularly linolenic acid, are responsible for cardioprotective, antidiabetic, and antimicrobial activities [5–8].

Palmitic (16:0), stearic (18:0), and palmitoleic (16:1 ω7c) acids detected in all samples were between (7.38–8.66%), (1.34–3.17%), and (0.45–0.51%), respectively. Ozgul-Yucel [3] reported that mahaleb seeds had 4.60% palmitic, 1.80% stearic, and 0.30% palmitoleic acid, which was close to our results.

Arachidic acid (20:0) was detected only in seeds of red and black colored fruits of *Prunus mahaleb* as between 0.25–0.31%. On the other hand, the eicosadienoic acid (20:2 ω6c) was detected only in the yellow type as 1.80%. Moreover, behenic (22:0) and lignoceric acids (24:0) were found in trace amounts in seeds of all mahaleb types (Table 1).

On the other hand, mahaleb seeds of all three types were found to be rich in terms of conjugated linolenic acid (CLNA) (Table 1). It was previously reported that, among seeds of different plant species, mahaleb seeds also contain CLNA [3]. α-Eleostearic (18:3 9*c*,11*t*,13*t*) acid was the dominant conjugated linolenic acid among mahaleb types, between 17.56–18.98%, followed by β-eleostearic (18:3 9*t*,11*t*,13*t*) as 4.71–5.03%, and catalpic (9*t*,11*t*,13*c*) acid as 0.55–0.70% (Table 1). α-Eleostearic (18:3 9*c*,11*t*,13*t*) accounted for 77.00% of the total CLNA. Our CLNA results are in agreement with earlier reports regarding the content, in particular, of α-eleostearic (18:3 9*c*,11*t*,13*t*) acid in mahaleb seeds [3, 9].

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TABLE 1. Fatty Acid Composition of Seeds of Mahaleb Types, %

Acid	Yellow	Red	Black	Acid	Yellow	Red	Black
16:0	7.38	7.91	8.66	20:0	-	0.31	0.25
16;1 ω7c	0.51	0.45	0.50	20:2 ω6c	1.80	-	-
18:0	1.34	2.03	3.17	22:0	Tr.	Tr.	Tr.
18:1 ω9c	29.38	30.15	33.67	24:0	Tr.	Tr.	Tr.
18:2 ω6c	34.13	33.33	29.11	Σ	98.55	98.74	98.43
18:3 9*c*,11*t*,13*t*	18.60	18.98	17.56	$\Sigma_{Sat.}$	8.72	10.25	12.10
18:3 9*t*,11*t*,13*t*	4.71	5.03	4.92	$\Sigma_{Unsat.}$	88.83	88.49	86.33
9*t*,11*t*,13*c*	0.70	0.55	0.59				

-: not determined.

CLNA potentially has beneficial health and biological effects, such as strong cytotoxic effects on human leukemia cells [10]. Igarashi and Miyazawa [11] reported that conjugated all-*trans* trienoic fatty acids have the strongest growth inhibition effect among the conjugated trienoic acids and conjugated dienoic acids produced by alkaline treatment of α-linolenic acid. The anticarcinogenic effect of purified α-eleostearic acid on human cells is known [12, 13]. The antioxidant property of α-eleostearic acid has also been reported [14]. Eleostearic acids were also observed in almond oil [15], whereas only "ordinary" acids were found in stone oils of *Cerasus erthracarpa* Nevski and *C. vulgaris* Mill. grown in Uzbekistan [16]. Deineka et al. [17] also reported that seeds of *Cerasus vulgaris* Mill., *Cerasus avium* Moench., *Prunus padus*, and *Prunus tomentosa* (Thunb.)] contained α-eleostearic acids, while the other *Prunus* species *Prunus tomentosa* (Thunb.) Wall., *Prunus domestica* L., *Armeniaca vulgaris* Lam., and *Prunus persica* (L.) Batsch did not contain α-eleostearic acid.

In conclusion, the fatty acid contents of seeds of yellow, red, and black mahaleb fruits were found to be different among mahaleb types. This may be due to their different genetic backgrounds. Detailed molecular studies are necessary to support this idea. To our knowledge, comparative studies on fatty acid contents among seeds from yellow, red, and black colored fruits of mahaleb are not available in the literature. Therefore, this study may provide new information in this area.

Plant Material. Yellow, red, and black colored mahaleb fruits harvested manually from mahaleb (*Prunus mahaleb* L.) plants found at the same age and ecological conditions in the Gumushane region were investigated in 2005. All fruits were picked at the commercially ripe stage. The fruits were selected according to uniformity of shape and color. Seeds were obtained from these fruits.

Sample Preparation and Fatty Acid Methyl Esters (FAMEs) Analysis. Sample preparation and fatty acid analysis were performed according to a previous method [3, 4].

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