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Fatty acid compositions of white and black mulberry fruit oils

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Abstract

In this study, fatty acid compositions of mulberry fruit oils havebeen studied. Oil contents of white and black mulberry fruits were 0.82 and 0.97%, respectively. Palmitic, oleic, linoleic and stearic acids were the major fatty acids of both mulberry fruit oils. Fatty acid contents of black mulberry fruit oil were found higher than those of white mulberry fruit oil. Palmitic and linoleic acids were determined as 12.46 %and 13.89% to 58.89% and 63.83% in white and black mulberry fruit oils, respectively. In addition, oleic acid contents of white and black mulberry fruit oils were 11.87% and 12.54%, respectively. So, higher content of linoleic acid of black and white mulberry fruit oils may be evaluated as a good source of essential fatty acid.

Keywords: white and black mulberry fruit, oil, fatty acid, palmitic, linoleic, GC

1.Introduction

Mulberry (*Morus* spp.; Moraceae family) is widely distributed in Asia, Europe, North America, South America, and Africa [1,2]. Recently, the production and consumption of mulberry fruits increased rapidly depending on their good taste, nutritional value, and biological activities [3-5]. Geographic location and soil affect to the compositions of the mulberry tree growing [5]. However, the solvent extraction of mulberry seed yielded 31.41% orange yellow colored oil, and Mulberry seed oil is very rich in linoleic acid and it may be a valuable source of dietary fat [6]. Since the composition of oil varies with the source, and depends on factors such as climatic conditions, region of cultivation, genetic and agronomic factors and by their interactions [6,7]. The aim of current study was to determine the fatty acid compositions of black and fresh mulberry fruit oils.

2.Material and methods

2.1. Materials

Black (*Morus nigra* L.) and white mulberry (*Morus alba* L.) fruits collected from Mersin (Gülnar) province in july 2016, and they were transferred to laboratory in cool bags, respectively. Fruits were washed with clear distilled water, and they were dried at 50 °C in oven. They were kept in refrigerator by using. All reagents and solvents were analytical grade and purchased from Sigma-Aldrich Co. (St. Louis, MO, USA).

2.2. Method

Oil content: About 2 g of the dried mulberry fruit was ground in a ball mill and extracted with petroleum ether in a Twisselmann apparatus for 6 h. The solvent was removed by a rotary evaporator at 40 °C and 25 Torr. The oil was dried by a stream of nitrogen and stored at – 20 °C until used.

Determination of fatty acids: Fatty acid compositions for mulberry fruit oil were determined using a fatty acid methyl ester method as described by Hışıl [8]. The oil was extracted three times for 2 g air-dried seed sample by homogenization with petroleum ether. The methyl esters of the fatty acids (1 µl) were analysed in a gas chromotography (HP 6890) equipped with a flame ionising detector (FID), a fused silica capillary column (60 m x 0.25 mm i.d.; film thickness 0.20 micrometere).

Statistical analysis: A complete randomized split plot block design was used analysis of variance (ANOVA) was performed by using JMP version 9.0 (SAS Inst. Inc., Cary, N.C.U.S.A).

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The results are mean±standard deviation (MSTAT C) of independent mulberry samples [9].

3. Results and Discussion

The fatty acid composition of black and white mulberry fruits are given in Table 1. Oil contents of white and black mulberry fruits were 0.82 and 0.97%, respectively (Table 1). Oleic acid contents of white and black mulberry fruit oils were 11.87 and 10.54%, respectively ($p<0.05$). Palmitic, oleic, linoleic and stearic acids were the major fatty acids of mulberry fruit oils (Fig 1).

Fatty acid contents of black mulberry fruits were found higher than those of white mulberry fruits. Palmitic and linoleic acids were determined as 12.46 %and 13.89% to 58.89% and 63.83% in white and black mulberry fruit oils, respectively. In addition, oleic acid contents of white and black mulberry fruit oils were 11.87% and 12.54%, respectively ($p<0.05$). Linoleic acid is one of the two essential fatty acids required for humans due to can not be produced by the human body [10].

Table 1. Oil contents and fatty acid composition of white and black mulberry fruits (%,dw)

Fatty acids	White mulberry	Black mulberry
Oil contents	0.82±0.09*b	0.97±0.11a
Myristic	0.32±0.03b**	0.26±0.05a
Palmitoleic	0.27±0.01b	0.36±0.03a
Palmitic	12.46±0.17b	13.89±0.16a
Oleic	11.87±0.21b	12.54±0.37a
Linoleic	58.89±1.67b	63.83±1.89a
Linolenic	0.46±0.11b	0.51±0.09a
Stearic	5.67±0.17b	6.49±0.21a
Behenic	1.67±0.11a	1.89±0.09a

*mean±standard deviation (n:3)
**Values within each column followed by different letters are significantly different ($p<0.05$)

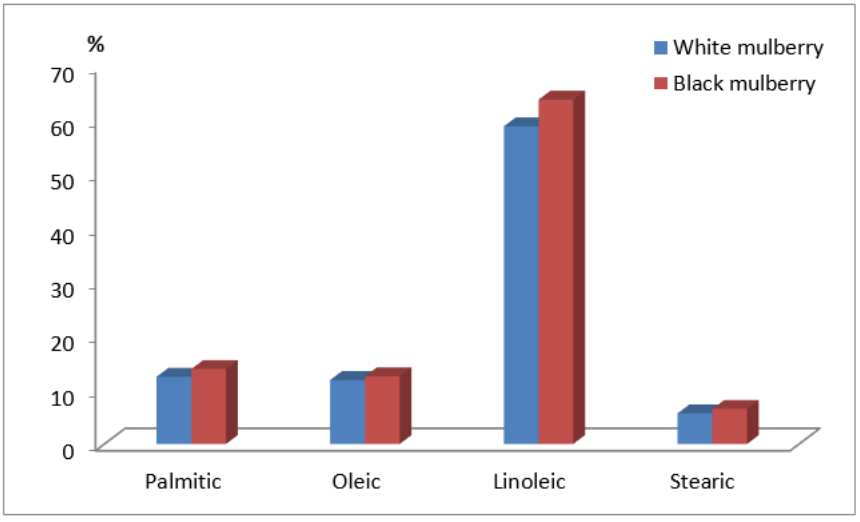

Figure 1. Dominant fatty acids of mulberry fruits

The percentage of fatty acid compositions of the mulberry seed oil were analyzed by GLC and found to contain linoleic acid (74.29%), palmitic acid (10.60%), stearic acid (5.61%) and myristic acid (0.07%). depending on soil conditions of the areas in which the plant grows [6]. The saturated fatty acids present in the black and white mulberry fruit oils are myristic 0.32 and 0.267%, palmitic 12.46 and 13.89% and stearic 5.67 and 6.49% as shown in Table 1, respectively, which are in agreement with black mulberry (*Morus nigra* L) seed oil Geçgel et al. [11] and Rahman et al. [6]. Moreover, higher content of linoleic acid of black and white mulberry fruit oils may be evaluated as a good source of essential fatty acid.

Compliance with Ethics Requirements. Authors declare that they respect the journal's ethics requirements. Authors declare that they have no conflict of interest and all procedures involving human / or animal subjects (if exist) respect the specific regulation and standards.

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