

FATTY ACID COMPOSITION OF *TILIA* FRUIT OILS*

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The fruit oils of three *Tilia* species growing in Turkey were analyzed by GC. The fruits of *T. argentea*, *T. platyphyllos* and *T. rubra* contained 5.6, 8.12 and 6.16% oil respectively. Palmitic, linoleic and oleic acids were determined as the main components of these oils. In addition caprylic acid was found in high amount in the oil of *T. argentea*.

Bu çalışmada Türkiye'de yetişen ihlamur türlerinin meyva yağları, yağ asitleri bakımından gaz kromatografisi ile araştırılmıştır. *T. argentea*, *T. platyphyllos* ve *T. rubra* meyvaları sırasıyla %5.6, 8.12 ve 6.16 yağ içermektedir. Yağlarda saptanan başlıca yağ asitleri palmitik, linoleik ve oleik asitlerdir. Ayrıca *T. argentea*'da fazla miktarda kaprilik asit te bulunmuştur.

Keywords : *Tilia*; Linden; Lime tree; Tiliaceae; Fruit oil; Fatty acids

Anahtar kelimeler: *Tilia*; Ihlamur; Tiliaceae; Meyva yağı; Yağ asitleri

Introduction

The flowers of Lime tree (Linden) (*Tilia platyphyllos* Scop. and *T. cordata* Mill, Tiliaceae) are widely used as sedative, diuretic, diaphoretic and expectorant in folk medicine (1-3). In some European countries, branch and stem barks of the plant are also used for their sedative and choleric effects and are ingredients of some preparations (2). In addition, it is known that the fruits are used as hemostatic and astringent (3). An investigation of the literature reveals the smooth muscle stimulant activity of aqueous extracts of lime seeds on the duodenum of rats (4,5). The hypoglycemic activity of flavonoid and polysaccharide extracts of flowers and fruits of *T. cordata* have been studied (6). Fruits contain oil, phytosterol, tannin, sugar and amino acids (7).

T. platyphyllos Scop., *T. rubra* L. and *T. argentea* Desf ex DC. (Syn. *T. tomentosa* auct.) grow wild in our country (8). There are some reports about the fruit oils of *T. argentea* and *T. platyphyllos* while none was encountered for *T. rubra* fruit oil.

The aim of this study was to investigate the fruit oil compositions of *Tilia* species growing in Turkey. The quality and quantity of the fatty acids were determined by GC.

Materials and Methods

Plant Materials: Fruits of *T. platyphyllos* Scop. (AEF.

10229) and *T. argentea* Desf. ex DC. (AEF. 10228) were collected from the garden of Faculty of Science, Ankara University; *T. rubra* DC. (AEF. 10227) from the vicinity of Kızılcahamam in August. Voucher specimens were kept at the Herbarium of the Faculty of Pharmacy, Ankara University.

Method: 20 g of fruits were powdered with 10 g of anhydrous sodium sulphate and extracted with petroleum ether in Soxhlet apparatus. Extracts were distilled to dryness under *vacuo* at low temperature. The oils were transesterified with Boron trifluorid-methanol (2%) reagent (9). 2 ml of BF₃-MeOH was added to the oils in 2 ml petroleum ether and heated at 100°C for 2 minutes. The reaction was stopped by adding 1 ml of water. The methyl esters of fatty acids were extracted with petroleum ether. The fatty acid compositions were investigated using a Hewlett Packard 5890 Gas Chromatograph. Ultra I column; cross linked methyl silicone gum phase (50 m x 0.2 mm x 0.33 µm) was used in GC equipment with FID detector and automatic integrator HP 3398-II. The flow rate of helium (carrier gas) was 0.9 ml/min and oven temperature was 180-250°C programmed at 2°C, per minute. The injector and detector temperatures were at 250°C. The fatty acids were identified by comparison with authentic standards. Split flow was adjusted to 50 ml/min.

Results and Discussion

The fruit oils of three *Tilia* species growing in Turkey have not been studied before. In this study, fruit oils were investigated with the aspect of their fatty acid compositions. The fruits of *T. argentea*, *T. platyphyllos* and *T. rubra*

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Fig.1. The gas chromatogram of the fruit oil of *T.platyphyllos*

Table 1. Retention times and percentages of the fatty acids of fruit oils(%)

Fatty acids	Rt(min).	<i>T.a</i>	<i>T.p</i>	<i>T.r</i>
Caproic	2.59	1.77	3.14	1.24
Caprylic	2.98	18.42	1.56	7.04
Capric	3.32	7.06	5.46	2.75
Lauric	5.59	5.64	7.25	1.45
Palmitic	13.54	18.23	28.03	15.59
Heptanoic	15.76	----	1.95	1.32
Linoleic	18.74	22.88	10.40	35.82
Oleic	19.03	15.05	27.02	12.70
Elaidic	19.21	1.88	2.24	2.15
Stearic	19.97	2.41	3.88	3.10

T.a: T.argentea, T.p: T.platyphyllos, T.r: T.rubra

contained 5.6, 8.12 and 6.16 % oil respectively. The fatty acids in saponifiable parts of the oils were determined by gas chromatography. The gas chromatogram of the fruit oil of *T.platyphyllos* are given in Fig.1. The content of the fatty acids of the oils, their percentages and the retention times are given in Table 1.

In a previous work (10), Cristea and Stanescu have shown that linoleic, oleic and palmitic acids were present in high concentrations in the fruits of *T.argentea*, *T.platyphyllos* and *T.cordata* while Mruk-Luczkiwicz has determined linoleic, oleic, palmitic acids and trace amounts of myristic, palmitoleic, eicosanoic and eicosenoic acids in the fruits of *T.cordata* (11). But there is no study on the fruit oil of *T.rubra*.

The major components of the oils are linoleic, oleic and palmitic acids. In addition caprylic acid is higher in *T.argentea*. Other acids found were caproic, capric, lauric, elaidic and stearic acids in the oils of the fruits.

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