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Short Communication

GC-MS Analysis of Fatty Acids in Thai Durian Aril

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ABSTRACT

The aril extract of a variety of Thai durian was analyzed by combined gas chromatography and mass spectrometry (GC-MS). The GC-MS data were used to identify 7 methyl esters of the durian extract after transesterification. The most prominent components found were stearic acid methyl ester (35.93%), palmitic acid methyl ester (32.91%), palmitoleic acid methyl ester (9.50%), 10-octadecenoic acid methyl ester (4.86%), oleic acid methyl ester (4.68%), myristic acid methyl ester (2.52%) and linoleic acid methyl ester (2.20%).

Keywords : durian, fatty acids, GC-MS.

1. INTRODUCTION

Durian (*Durio zibethinus* Murr.) is a highly prized fruit gastronomically, culturally, and economically in South-East Asia, so much so that it is referred to as The King of Fruits. Borneo is thought to be the center of origin and diversity of durian; however, it has spread throughout South-East Asia and is now extensively cultivated in Malaysia, Thailand, Indonesia, Brunei, Cambodia, Vietnam, and the Southern Philippines. Durian is also grown in Burma, South-East India and Sri Lanka, and there are fledging plantations in Australia located in the Northern Territory and Northern Queensland [1]. In Thailand, there are three of the most popular varieties of durian (among several to choose from): 'Cha Ni', 'Kan Yao' and the most prized of all, 'Mon Thong'. Several papers have reported their chemical content [2-6] including fatty acids [5,7-10]. However, as far as we know, no study has yet been carried out on Thai durian, especially the 'Mon Thong' variety, as illustrated in Figure 1. We report here the fatty acid analysis results of 'Mon Thong' durian by GC-MS.

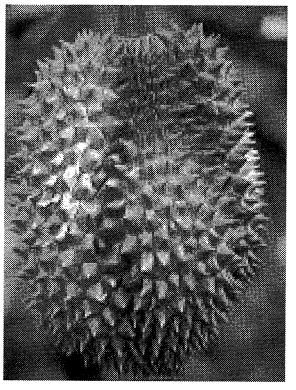

Figure 1. Photograph of the 'Mon Thong' variety of Thai durian.

2. EXPERIMENTAL

2.1 Fruits

'Mon Thong' durian fruits were obtained from a local market in Maejo, Chiang Mai, Thailand, in July 2002.

2.2 Extraction

395 g of the aril (the flesh covering the

seed) of the durian were extracted with 2×500 mL of hexane by simple extraction at room temperature. The extract was dried over anhydrous magnesium sulphate ($MgSO_4$) and evaporated to give 14.58 g of an oil.

2.3 Transesterification

To 1 g of the oil in excess methanol (20 mL) was added a small amount of sodium (~0.05 g) and left stirred overnight. The solution was extracted with 3×20 mL of dichloromethane and washed with water several times. The dichloromethane layer was evaporated to give ~ 2 mL of an oil which was a mixture of methyl esters.

2.4 GC-MS Analysis

The oil obtained from the transesterification was analyzed by GC–MS using an Agilent 6890(GC)/HP 5975(MS) GC-MS system. Separation was achieved using helium as the carrier gas (ca.1 ml/min) with a fused silica capillary column (DB-5), 30 m long, 0.25 mm i.d. and 0.25 mm film thickness. The injector and detector temperatures were 250 °C and 260 °C respectively; oven temperature programme: 1 min isothermal at 40 °C, then at 10 °C/min to 260 °C (5 min isothermal). The MS instrument was operated in full scan and in electron impact ionization mode (70 eV).

3. Results and Discussion

A typical gas chromatogram of the transesterified durian oil is shown in Figure 2. The compounds corresponding to the various peaks are listed in Table 1 by name. Their chemical structures are also shown below.

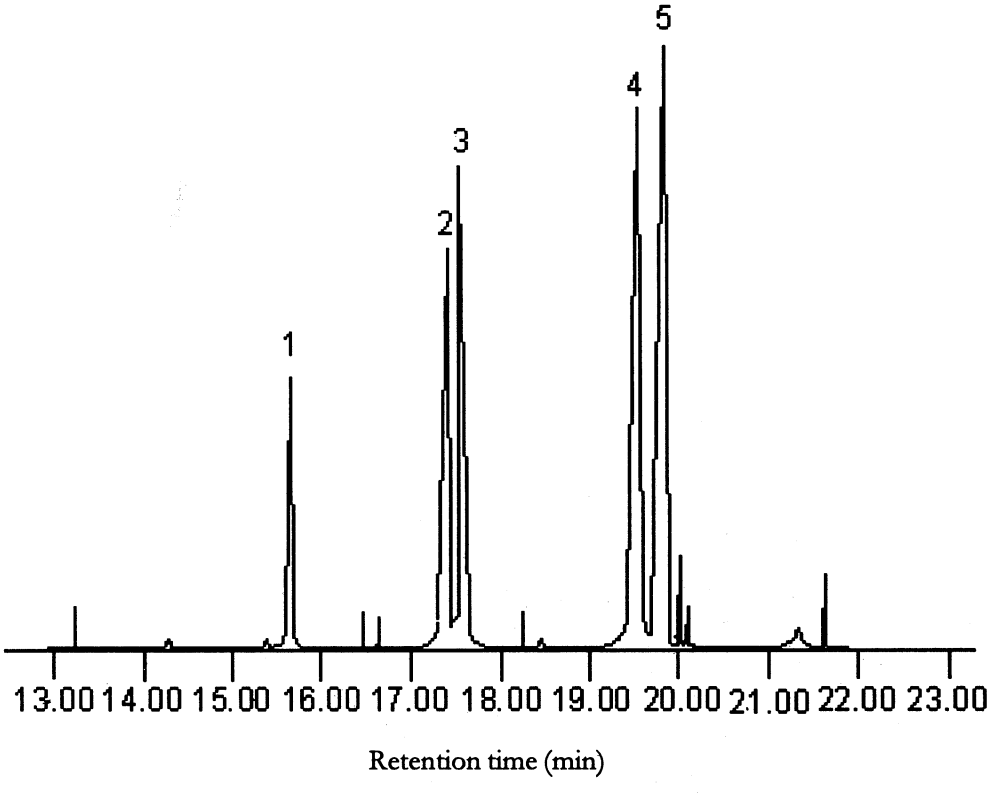

Figure 2. Gas chromatogram of the transesterifed Thai durian oil. (See 'Experimental' for GC conditions and Table 1 for peak identification).

Table 1. Components in the transesterified oil of Thai durian aril.

Peak No.	Compounds	RA[a] %	MW[b]	Quality %[c]	Identification[d]
1	Tetradecanoic acid methyl ester (Fig. 3a) (myristic acid methyl ester)	2.52	242	99	1, 2
2	9-hexadecenoic acid methyl ester (Fig. 3b) (palmitoleic acid methyl ester)	9.50	268	99	1, 2
3	Hexadecenoic acid methyl ester (Fig. 3c) (palmitic acid methyl ester)	32.91	270	99	1, 2
4	Mixture* of : 9, 12-octadecadienoic acid methyl ester(Fig. 3d) (linoleic acid methyl ester),	2.20	294	99	1, 2
	9-octadecenoic acid methyl ester (Fig. 3e) (oleic acid methyl ester),	4.68	296	99	1, 2
	10-octadecenoic acid methyl ester(Fig. 3f)	4.86	296	99	1, 2
5	Octadecanoic acid methyl ester (Fig. 3g) (stearic acid methyl ester)	35.93	298	99	1, 2

[a] RA, relative area (peak area relative to total peak area)

[b] molecular weight from GC-MS (EI) data

[c] MS quality comparison with database

[d] 1, based on comparison of mass spectra from NIST library; 2, based on comparison of mass spectra from Wiley library

* Peak 4 was a mixture. Manual deconvolution of the merged mass spectra suggests that it comprises 3 compounds.

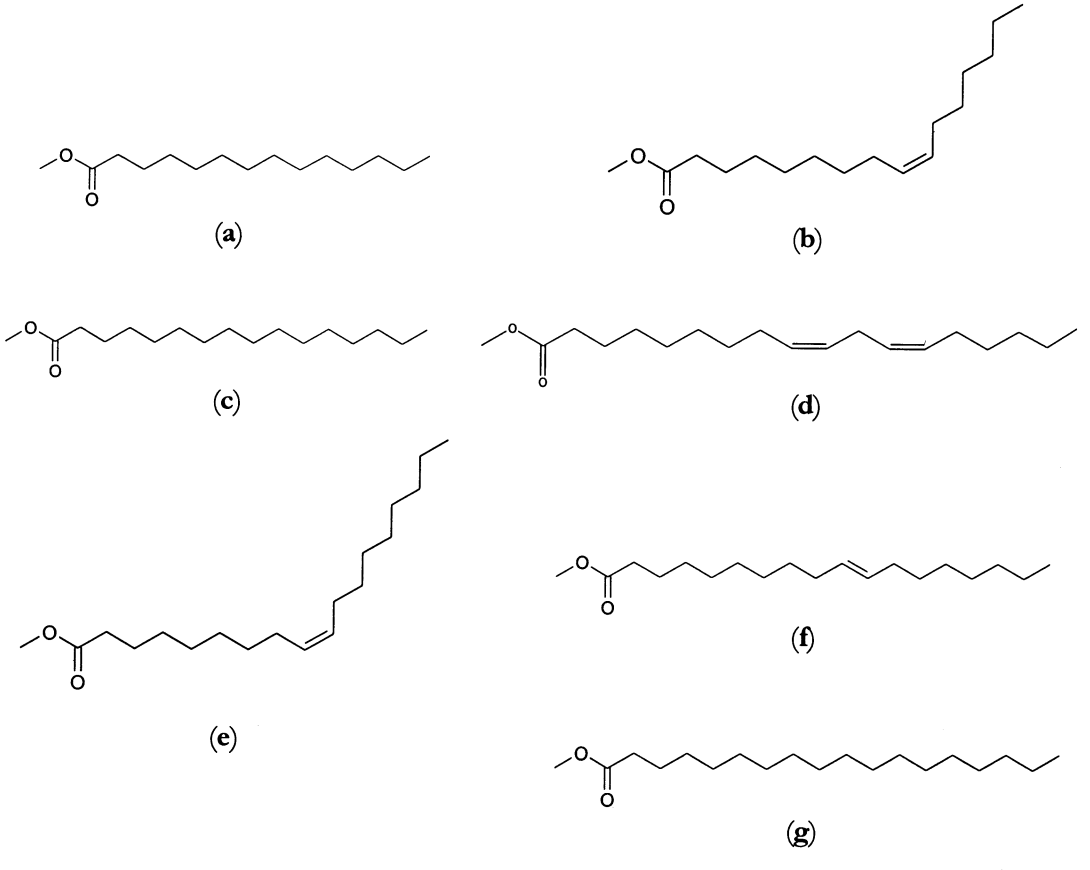

Figure 3. Compound structure.

It is clear from Table 1 that, in the durian oil after transesterification, five prominent peaks of methyl esters can be distinguished and identified. These consist of both saturated (Peak Nos. 1, 3 and 7) and unsaturated (Peak Nos. 2 and 4) esters. The major components found were stearic acid methyl ester (35.93%), palmitic acid methyl ester (32.91%), palmitoleic acid methyl ester (9.50%), 10-octadecenoic acid methyl ester (4.86%), oleic acid methyl ester (4.68%), myristic acid methyl ester (2.52%) and linoleic acid methyl ester (2.20%), with integrator peak areas expressed as percentages of the total peak area for the chromatographable components of the oil. Thus it was found that 'Mon Thong' durian contains more unsaturated fatty acids (51.4 %) than saturated ones (39.1%).

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