

# *Aphananthe aspera* Kernel Oil: A Rich Source of Linoleic Acid

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## ABSTRACT AND SUMMARY

The seed kernels of *Aphananthe aspera* Planch. yielded 50.8% of a pale yellow oil. The fatty acid composition determined by gas liquid chromatography was: 5.3% palmitic, 0.1% hexadecenoic, 3.0% stearic, 6.1% oleic, 85.1% linoleic, and 0.4% linolenic acids.

## INTRODUCTION

*Aphananthe aspera* Planch., a member of the family Ulmaceae, order Urticales, is a deciduous tree widely distributed in Japan, Korea, and China. No report has been known to us on the gas liquid chromatographic (GLC) analysis of the component acids of *A. aspera* oil except that by Okada and Koyama (1). They have shown that linoleic acid amounts to 80.8% of the fatty acids of the oil extracted from the whole seeds.

In the present investigation sample seeds from a different district were freed from shells and the resulting kernels were subjected to extraction of oil. GLC examination of the component acids revealed the presence of as high as 85.1% of linoleic acid in the kernel oil. Probably this is one of the highest levels of linoleic acid so far found in a seed oil. It has been noted by Koyama, Okada, and Toyama (2) that the seed oil from *Morus bombycis* Koidz., a species belonging to the same order as *A. aspera*, also contains a high proportion (80.8%) of linoleic acid.

## PROCEDURES AND RESULTS

### Extraction and Characteristics of the Oil

The mature fruits of *A. aspera* were collected from trees grown at Kawagoe-shi, Saitama-ken, Japan. Seeds were separated from fruits, the air-dried seeds were shelled and 82.9 g of kernels were obtained. The kernels were crushed and then extracted in a Soxhlet apparatus with ether. To the ether-extract was added about ten times its weight of hexane, and the hexane-insoluble matter was removed by filtration. The filtrate, after evaporation of the solvent, gave 42.1 g (50.8%, based on the weight of kernels) of a pale yellow oil having the following characteristics: sp gr (20 C/20 C) 0.9236,  $n_D^{20}$  1.4769, acid value 0.60, saponification value 193.5, iodine value (Wijs) 152.5, and unsaponifiable matter 1.09%.

The oil was saponified in the usual manner and the mixed fatty acids obtained after removal of the unsaponifiable

TABLE I

Fatty Acid Composition of *A. aspera* Oils Extracted from Kernels and Whole Seeds

Fatty acid	Percent composition	
	Kernel	Whole seed <sup>a</sup>
14:0	trace	-
16:0	5.3	6.4
16:1	0.1	-
18:0	3.0	4.1
18:1	6.1	7.3
18:2	85.1	80.8
18:3	0.4	1.4

<sup>a</sup>Mol %, data reported by Okada and Koyama (1).

matter showed neutralization value 200.4 and iodine value 159.4, and gave no UV absorption indicative of conjugated diene.

### Preparation and GLC of Methyl Esters

The mixed fatty acids prepared from the oil were esterified with methanol using p-toluenesulfonic acid as a catalyst. The individual fatty acids were determined by GLC of the methyl esters. Analysis was run on a Hitachi 063 gas chromatograph equipped with a hydrogen flame ionization detector. A 2 m x 3 mm stainless steel column, packed with 15% diethylene glycol succinate polyester on 60/80 mesh Celite 545, was employed under the following conditions: flow rate of helium, 40 ml/min; temperature of injection port, 300 C; temperature of column, 190 C; temperature of detector, 220 C. Peaks were identified by comparing their retention times to those of authentic standards. Peak areas were calculated by multiplying the peak height by the width at half-height. Fatty acid composition (% by wt) was estimated from the GLC data. The results, along with the figures reported for the oil from whole seeds (1), are given in Table I.

## ACKNOWLEDGMENTS

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## REFERENCES

1. Okada, Y., and Y. Koyama, *Yukagaku* 18:480 (1969).
2. Koyama, Y., Y. Okada, and Y. Toyama, *Ibid.* 19:251 (1970).

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