Fatty Acid Composition of Seed Kernel Oil of *Calodendrum capense* (L.f.) Thunb.

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ABSTRACT

Seed kernels of *Calodendrum capense* (L.f.) Thunb. yielded 60% of a light yellow oil which had the following fatty acid composition: 23.8% palmitic, 4.5% stearic, 33.7% oleic, 35.6% linoleic, 1.4% linolenic and 1.0% arachidic. Myristic and behenic acids were present in trace amounts, and the kernel cake contained 37.6% crude protein.

INTRODUCTION

Calodendrum capense (L.f.) Thunb. (Rutaceae) is a large deciduous tree which is widely distributed in East and Southern Africa (1). The fruit of the tree breaks open when it matures, releasing an average of three black elipsoidal seeds. The oil from the seed kernels has been used in Kenya as a skin emolient in the past. Fatty acid composition of the kernel oil of *C. capense* has not been reported, although a South African variety has been shown to yield 61% oil from the kernels (2,3).

We have determined the fatty acid composition of the kernel oil of *C. capense* as part of our ongoing program to identify new sources of seed oils which may be of commercial interest in Kenya. The results of our examination of this oil are the subject of this paper.

EXPERIMENTAL PROCEDURES

Extraction of *C. capense* Kernel Oil

Mature seeds of *C. capense* were collected from the Rift Valley escarpment in Kenya. The kernels were retrieved from the whole seeds manually, ground in a mortar, and extracted with petroleum ether (40-60 C) in a soxhlet extractor for 16 hr. Evaporation of the petroleum ether on a rotary evaporator gave a light yellow oil (60%) which had the following characteristics: refractive index 1.4718; specific gravity 0.8764; iodine value (Wijs) 102.4; saponification value 184.1; acid value 2.26; and unsaponifiable matter 0.9%.

Preparation and Analysis of Methyl Esters

Methyl esters of the constituent fatty acids were prepared by standard procedures (4,5) and analyzed by gas liquid chromatography (GLC) (6) using a Varian gas chromatograph, Model 3700, equipped with a thermal conductivity detector and a 5 ft × 1/8 in. (od) stainless steel column packed with 20% diethylene glycol succinate (DEGS) on 60-80 mesh chromosorb W. An automated Finnigan 4023 gas chromatograph-mass spectrometer (GC-MS) system fitted with a DEGS column was used to confirm the presence and identity of trace fatty acids. Helium was used as the carrier gas at a flow rate of 40 mL/min, and the column temperature was 185 C. The column temperature was programmed at 10 C/min from 80 C to 200 C for the GC-MS analysis.

TABLE I

Fatty Acid Composition of *Calodendrum capense* Seed Kernel Oil (area % by GLC)

Fatty acid	Composition %
C14:0	trace
C16:0	23.6
C18:0	4.5
C18:1	33.7
C18:2	35.6
C18:3	1.4
C20:0	1.0
C22:0	trace

RESULTS AND DISCUSSION

The fatty acid composition of the oil is shown in Table I. Unsaturated acids account for ca. 70% of the total fatty acids in *C. capense*, and the general fatty acid composition is found to be similar to that of other oils from Rutaceae, and to cotton seed (7). The kernel cake containing 11% of residual oil was analyzed and shown to contain 37.6% crude proteins (6.25 × N), 2.3% crude fiber, 4.3% ash and 35.0% carbohydrates. Although the high protein and low ash contents of the kernel cake indicate that it may be suitable for feed, the presence of bitter limonoides (8) in it may preclude its immediate utilization for this purpose.

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