

TABLE II

Mineral Concentration in the Seed Meal of *Acacia* Species^a

Name of the seeds	Na	K	Ca	Mg	Fe	Mn	Cu	Zn	Pb	Ni
<i>A. auriculiformis</i>	0.5000	1.7000	0.4230	0.1800	0.0850	0.0210	0.0042	0.0042	0.0042	0.0042
<i>A. catechu</i>	0.4000	1.8200	0.2950	0.1750	0.0890	0.0191	0.0035	0.0059	0.0029	0.0029
<i>A. coriacea</i>	0.4000	1.9300	0.0670	0.0470	0.0950	0.0036	0.0036	0.0016	0.0067	0.0025
<i>A. farnesiana</i>	0.5150	1.8100	0.0530	0.0220	0.0990	0.0011	0.0064	0.0061	0.0018	0.0008
<i>A. mellifera</i>	0.4550	1.0000	0.0910	0.0480	0.0800	0.0036	0.0036	0.0039	0.0016	0.0002
<i>A. minbassi</i>	0.4620	0.4800	0.0830	0.2010	0.0980	0.0036	0.0069	0.0034	0.0069	0.0042
<i>A. nilotica</i>	0.4110	0.4600	0.1510	0.2000	0.0750	0.0151	0.0020	0.0051	0.0030	0.0029
<i>A. pennata</i>	0.4950	1.1800	0.1270	0.0590	0.0770	0.0082	0.0081	0.0035	0.0036	0.0042

^aConcentrations are given in g/100 g of dry material.

II) were consistent with the reported values of *Bauhinia* spp. (11) and also of *Glycine max* (8).

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✱The Lipid Composition of Karaka Seeds (*Corynocapus laevigatus*)

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ABSTRACT

The kernels of karaka seeds (*Corynocapus laevigatus*) contained 9.6% oil by wt. The lipid constituents were characterized by silicic acid column chromatography and thin layer chromatography, and their individual fatty acid compositions by gas liquid chromatography. Of the seed oil, triacylglycerol was the major component which contained high proportions of linoleic (45%) and oleic (26%) acids. The major component of husk oil (0.9% of husk by wt) was polar lipid (glycolipids and pigments).

INTRODUCTION

Little is known of the lipid composition of the seeds from the only extensive nut-bearing tree, "Karaka" (*Corynocapus laevigatus*) (15 m tall), endemic to the New Zealand forests (1). The Maori used the kernel of this fruit as a source of carbohydrate but they respected the toxic effects of the raw fruit (orange-colored elliptic shape, 2.5-4.0 cm long). Extensive baking and washing procedures removed the toxin, β -nitropropionic acid (2), which is the hydrolyzed product of karakin [1,4,6-tris-O-(3-nitropropanyl)- β -D-glucopyranoside] (3).

This communication presents the fatty acid composition of the individual lipid constituents isolated from the kernel and husky-skin layer of Karaka seeds.

EXPERIMENTAL PROCEDURES

Fallen ripe seeds were collected from a mature Karaka tree growing in a pastoral area near Palmerston North. Whole

seeds were washed, air-dried at 50 C, weighed and measured. The husky-skin layers were removed from the kernels by hand and both were separately mechanically ground into fine powders. These were extracted with $\text{CHCl}_3/\text{MeOH}$ (2:1, v/v) according to the procedures of Folch et al. (4) to yield the respective total oil extracts from both sources.

The lipid extracts were fractionated with silicic acid column chromatography (5) and the recovered fractions were identified by comparing their chromatographic properties with authentic standards by thin layer chromatography (TLC) (5).

The fatty acid methyl esters were recovered as transesterification products with the BCl_3/MeOH reagent (6) from their different lipid constituents and analyzed by gas liquid chromatography (GLC) (7).

RESULTS AND DISCUSSION

The average size and weight of a seed were $3.0 \pm 0.2 \times 1.4 \pm 0.1$ cm and 2.81 \pm 0.66 g, respectively. By weight, the kernels represented 80.4% of the seed to yield 6.9% oil and the remaining husks (19.6%) contained very little oil (0.9%). By comparison (Table I) the kernel oil was predominantly triacylglycerol, whereas the major lipid constituents of the husks were polar lipids (glycolipids and pigments).

The fatty acids (Table II) of the kernel triacylglycerols were high in linoleic acid (45%) and oleic acid (27%) and resembled those of corn oil (9). Considering the husks, although the range of fatty acids (between C_{14} and C_{24}) in

COMPOSITION OF KARAKA SEEDS

TABLE I

Lipid Composition of Karaka Seed Oil

Components	Lipid composition(%)	
	Kernels	Husks
Hydrocarbons/wax esters/sterol esters	0.7	8.9
Triacylglycerols	89.3	15.8
Fatty acids	—	11.4
Sterol/alcohols	3.5	14.3
Polar lipids	6.5 ^a	49.6 ^b

^aMainly phospholipids.^bMainly glycolipids and pigments.

the triacylglycerols and polar lipids is similar to those of the kernel lipids, the unesterified fatty acids range differed and extended up to C₂₈. This portion of long-chain fatty acids (C₁₉-C₂₈) represents as much as 22% of these fatty acids. Since these are solely contained in the outer husks they probably contribute, together with the other identified wax esters, steryl esters and hydrocarbon fraction, part of the protective surface waxes of these seeds. Surface waxes that are common to other plant tissues have been established to include similar classes of neutral lipids (9).

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TABLE II

Fatty Acid Composition of Major Lipid Constituents of Karaka Seed Oil^a

Fatty acid	Fatty acid composition (wt %)				
	Kernels		Husks		
	TG	PL	TG	FA	PL
<i>n</i> -Saturated					
14:0	0.1	0.1	0.4	0.7	1.6
15:0	tr	0.1	0.2	0.7	0.7
16:0	13.1	24.9	18.6	35.7	37.9
17:0	tr	0.2	0.2	1.0	1.3
18:0	7.2	5.5	4.4	5.1	5.1
19:0	—	—	—	0.2	—
20:0	4.2	0.8	1.6	1.8	2.5
21:0	—	—	—	0.6	0.9
22:0	1.4	0.2	0.9	2.6	1.3
23:0	—	—	—	3.0	0.6
24:0	0.4	0.3	0.7	5.2	1.2
25:0	—	—	—	3.5	—
26:0	—	—	—	3.7	—
27:0	—	—	—	0.6	—
28:0	—	—	—	0.6	—
<i>n</i> -Unsaturated					
15:1	—	—	0.1	0.2	0.8
16:1	tr	0.2	0.7	0.8	0.7
17:1	—	—	tr	0.1	tr
18:1	27.2	20.8	20.7	14.1	10.2
18:2	45.3	44.9	41.8	15.9	26.7
18:3	1.1	2.0	9.7	3.9	8.5

^aAbbreviations: TG (triacylglycerols); PL (polar lipids); FA (unesterified fatty acids); tr (traces, less than 0.1%); — (undetected).

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