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LIPIDS FROM LUPINUS TERMIS SEEDS

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Gas-liquid chromatography was employed to determine the fatty acid compositions of lipid fractions obtained from *Lupinus termis* seeds as well as the unsaponifiable matter including hydrocarbon, tocopherol and sterol content.

Key words: Lupinus termis, lipids, fatty acids, sterols.

INTRODUCTION

This legume (*Lupinus* sp.) grows in many countries, ground to a meal and used as human or animal foodstuff. The protein, fat, and carbohydrate compositions are species dependent [1,2]. Considerable research [3-6] has been conducted on the nutrient composition of commercially available *Lupinus termis* seeds. However, little work seems to have been done on the lipid fraction of these seeds.

EXPERIMENTAL

Sample preparation. L. termis seeds (400 g) were homogenized and kept under acetone, diethylether, and methanol each for one week respectively, with occasional shaking at room temperature. Each extract was filtered off and dried under reduced pressure yield, 23, 76 g, 19.29 g and 8.1 g; total, 12.79 g %).

A sample from each extract was saponified [7] separately and each unsaponified layer was separated. The fatty acids obtained were converted to corresponding methyl esters [8].

G.L.C. of the fatty acids methyl esters from acetone (1) diethylether (2) and methanol (3) extracts were carried out on Perkin Elmer model Sigma 3 Gas Chromatograph equipped with a 15 % diethyleneglycol succinate column (8 ft. x 0.25 in.), on Chromosorb-WNB (100-120 mesh). Nitrogen gas was used with flow rate of 30 ml./min. The apparatus was equipped with flame ionization detector. Column and injector temperatures were 90-195° (5° min.), and 240° respectively. The unsaponifiable matter could be detected by using Varian 3700 model Gas Chromatograph, equipped with S-S column (50 cm X 0,32 cm) packed with 5 % OV-101 on Chromosorb-GHP (80-100 mesh), with N_2 flow rate 12 ml/min., H_2 30 ml/min. and air 300 ml/min. The column's temperature was 190-275°. Identification of the obtained fatty acids and sterols were

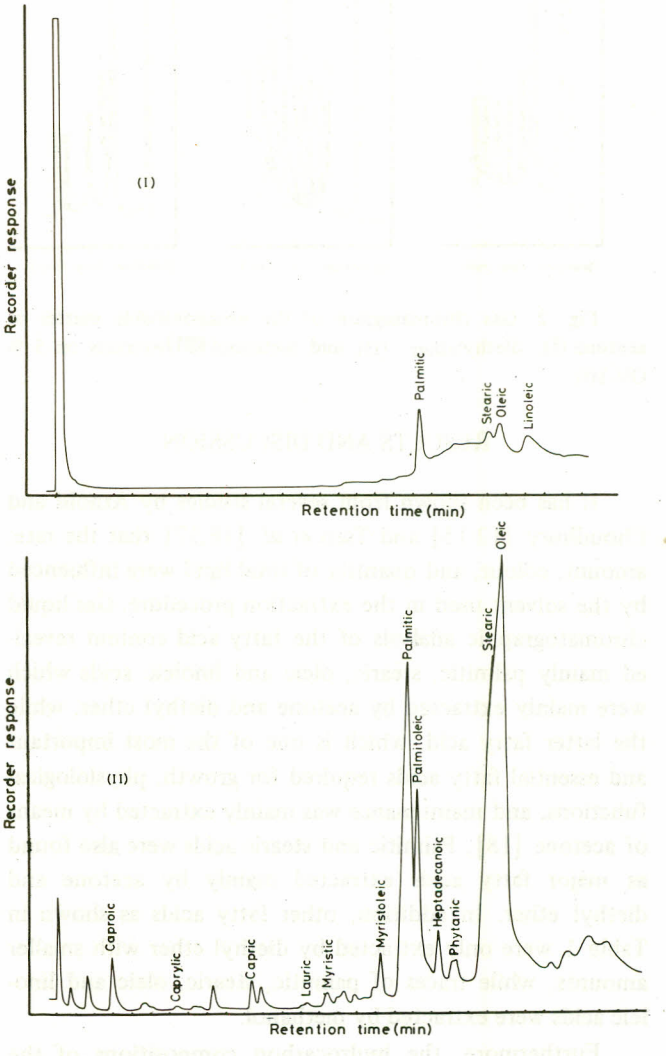

Fig. 1. Gas chromatogram of the fatty acid methyl-esters of acetone extract (I), and diethylether extract (II).

carried out by comparing their retention times with authentic specimens as well as already published retention times in the literature [9-11] Tables 1-2 and Fig. 1-2.

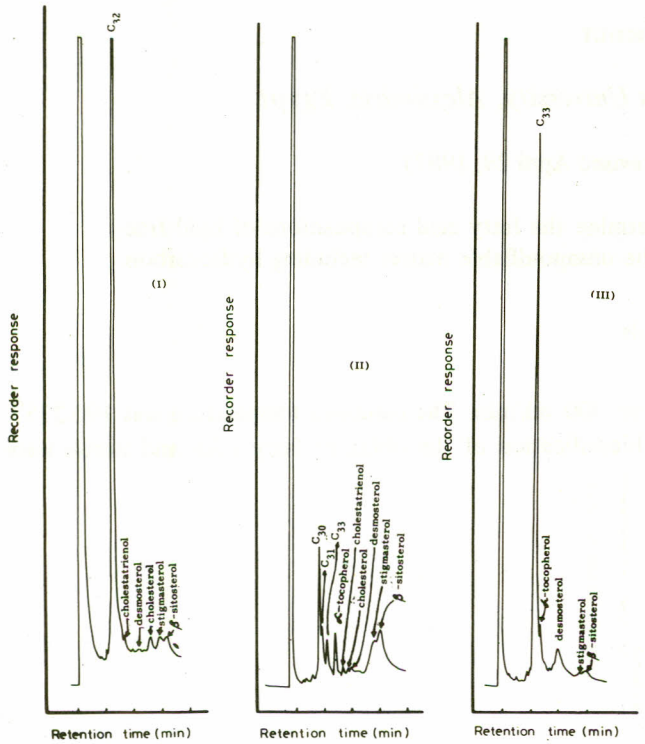

Fig. 2. Gas chromatogram of the unsaponifiable matter of acetone (I), diethylether (II). and methanol (III) extracts on 5 % OV-101.

RESULTS AND DISCUSSION

It has been shown from several studies by Arnold and Choudhury [12-15] and Tsen *et al.* [16,17] that the rate, amount, colour, and quantity of total lipid were influenced by the solvent used in the extraction procedure. Gas liquid chromatographic analysis of the fatty acid content revealed mainly palmitic, stearic, oleic and linoleic acids which were mainly extracted by acetone and diethyl ether, while the latter fatty acid, which is one of the most important and essential fatty acids required for growth, physiological functions, and maintenance was mainly extracted by means of acetone [18]. Palmitic and stearic acids were also found as major fatty acids extracted mainly by acetone and diethyl ether. In addition, other fatty acids as shown in Table 1 were only extracted by diethyl ether with smaller amounts, while traces of palmitic, stearic, oleic and linoleic acids were extracted by methanol.

Furthermore, the hydrocarbon compositions of the three extracts were different. C_{32} and C_{33} represented the main components of acetone and methanol extracts respectively, while diethyl ether extract had a mixture of hydrocarbons C_{30}, C_{31} and C_{33}.

α-Tocopherol was found in the diethyl ether and methanol extracts with relatively the same amounts 8.08 and 7.41 % respectively.

Stigmasterol and β-sitosterol were the main sterols in the diethylether extract, while smaller amounts of them were found in the acetone extract and traces in the methanol extract, as well as desmosterol which was mainly extracted by methanol. On the other hand, cholesterol was found in the acetone extract to the extent of only 2.54 %, and cholestanol was extracted only by diethyl ether, while traces of △ 5,7,22 cholestatrienol were extracted by acetone and diethyl ether.

According to the data, obtained it was noticed that the components of the lipid fractions of *L. termis* seeds exracted by acetone, diethyl ether, and methanol were shown to

Table 1. Retention time and percentage of fatty acids methylesters composition of *Lupinus termis* seeds in comparision with extraction solvents used.

Fatty acid	No. of carbon	R_t min.	Acetone %	Ether %.	Methanol %
–	–	1	–	0.83	–
–	–	1.7	–	0.39	–
–	–	2.6	–	0.53	–
Caproic	6:0	3.9	–	1.28	–
–	–	5.5	–	0.24	–
Caprylic	8:0	7.3	–	0.18	–
–	–	9.3	–	0.58	–
Capric	10:0	11.4	–	0.53	–
–	–	11.9	–	0.44	–
Lauric	12:0	14.3	–	0.88	–
Myristic	14:0	15.5	–	0.41	–
–	–	16.2	–	0.29	–
Myristoleic	14:1	18.2	–	1.07	–
Palmitic	16:0	19.5	40.18	13.26	Trace
Palmitoleic	16:1	20.3	–	0.65	–
Heptadecanoic	17	21.3	–	1.16	–
Phytanic	17:1	22.0	–	1.13	–
Stearic	18:0	23.0	9.04	34.71	Trace
Oleic	18:1	23.7	19.64	35.85	Trace
Linoleic	18:2	25.2	32.14	–	Trace
–	–	27.3	–	0.22	–
–	–	28.2	–	0.81	–
–	–	29.5	–	2.39	–
–	–	30.5	–	2.13	–

Table 2. Retention time and percentage of the unsaponifiable compositions of *L. termis* seeds.

Content	Compound	R_t min.	Acetone (%)	Ether (%)	Methanol (%)
Hydro-carbon	C_{30}	1.1	–	25.58	–
	C_{31}	1.2	–	9.69	–
	C_{32}	1.25	88.41	–	–
	C_{33}	1.35	–	7.00	81.48
Toco-pherol	α-tocopherol	1.7	–	8.08	7.41
Sterol	$\Delta^{5,7,22}$ choles-tatrienol	1.9	0.36	2.15	–
	Cholestanol	2.1	–	8.07	–
	Desmosterol	2.2	0.72	0.65	8.23
	Cholesterol	2.65	2.54	–	–
	Stigmasterol	3.0	3.62	18.58	0.82
	β-Sitosterol	3.25	4.35	20.19	2.06

be quite different in fatty acids, hydrocarbons, tocopherol and sterol compositions.

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