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THE FATTY ACIDS OF INDIGENOUS RESOURCES FOR POSSIBLE INDUSTRIAL APPLICATIONS

Part XVII. The Fatty Acids Composition of the Fixed Seed Oils of *Ocimum basilicum* and *Ocimum album* Seeds

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The fixed oils of the seeds of *Ocimum basilicum* and *O. album* (Lamiaceae) were investigated for their physico-chemical properties and chemical composition. The percentage yields of the oils are 21.4 and 15.5 respectively. The fatty acid composition of the seeds oils of *Ocimum basilicum* and *O. album* as determined by GLC are Capric (0.00, 1.30%), lauric (0.85, 0.78%), myristic (0.36, 0.65%), palmitic (9.70, 11.68%), stearic (5.45, 2.33%), oleic (13.33, 44.16%), linoleic (21.81, 36.36%), linolenic (48.50, 0.00%) and arachidic (0.00, 2.73%) acids respectively.

Key words: Seed oil, Fatty acid, *Ocimum basilicum*, *Ocimum album*.

INTRODUCTION

Ocimum basilicum (Lamiaceae) is a medium sized strong fragrant aromatic shrub called English basil and locally known as 'Niazbo'. It is cultivated as an ornamental and medicinal plant throughout Pakistan. It bears small black mucilaginous and demulcent seeds. The seeds of *O. basilicum* swell up in water due to the presence of a large amount of mucilage, forming the upper coating of the seeds. They find an extensive use in the treatment of genitourinary diseases, catarrh, chronic diarrhoea, dysentery, gonorrhoea, nephritis, cystitis, and internal piles [1-2]. The seeds are also used in case of snake bite and unhealthy sores and sinuses [37].

Ocimum album (Lamiaceae) is a small sized aromatic plant, locally known as 'sukla tulsi'. It bears small reddish-brown seeds. The plant is cultivated in India, Ceylon and Pakistan. The seeds of *O. album* are also mucilaginous and demulcent and are usefully employed in the treatment of dysentery and in disorders of genito-urinary system by the local 'hakims'. In earlier studies the seeds oils of other species including *O. pilosum*, *Salvia spinosa*, *Plantago ovata*, *O. sanctum* and *S. aegyptica* were investigated [4,5]. The physico-chemical properties and chemical composition of the seed oil of *O. album* have been studied for the first time. The present study describes a comparative composition of the fatty acids in the seed oils of *O. basilicum*, *O. album*, *O. sanctum* and *S. aegyptica*.

EXPERIMENTAL

The seeds of *Ocimum basilicum* and *O. album* were collected from the local market. Fixed oils of the seeds were extracted separately. The extract was dried over anhydrous sodium sulphate and the solvent removed under reduced pressure of the oils thus obtained the physico-chemical properties were measured and the fatty acid composition analyzed. The specific gravity, refractive index, acid value, saponifica-

tion value and iodine value were determined using standard methods [6,7]. The results are given in Table 1.

Table 1 Physico-chemical properties of the seed oils of *Ocimum basilicum* and *Ocimum album*.

Values	<i>Ocimum basilicum</i>	<i>Ocimum album</i>
Yield	21.4%	15.5%
Colour	light yellow	light yellow
Specific gravity at 25°	0.907	0.962
Ref. index	1.477	1.458
Acid value	9.73	13.25
Saponification value	190.4	186.3
Iodine value	187.8	172.6
Unsaponifiable matter	2.46%	1.94%

Preparation of methyl esters of the fatty acids. Saponification of the oils and preparation of the methyl esters from the fatty acids thus obtained were carried out separately for each oil, according to the methods described in previous communications [8-17]. The methyl esters were checked by TLC and infrared spectroscopy. The appearance of an intensive peak at 1720 cm⁻¹ and disappearance of peak at 3450-3600 cm⁻¹ indicated a complete esterification.

Examination of the methyl esters by GLC [18]. The chemical composition of the oils was determined by GLC of the methyl esters on a Pye Unicam 204 Series Unit, using a glass column, 1.5 m x 4 mm, packed with 20 per cent PEGS on diatomite (80-100 mesh); column temperature 200° carrier gas nitrogen; flow rate 40 ml/min; detector temperature 250°.

The identification was carried out by running a standard mixture of methyl esters under identical conditions and comparing their retention times. Confirmation was made by coinjection.

The percentage compositions were recorded with a Pye Unicam DP 88 computing integrator. The results are given in Table. 2

DISCUSSION

The present studies were carried out in order to evaluate the physico-chemical properties of the seed oils of *Ocimum basilicum* and *O. album* (Lamiaceae) as well as their fatty acid composition. The fatty acid composition, as determined by gas chromatography, indicated the presence of saturated fatty acids, capric (0.00%, 1.30%) lauric (0.85%, 0.78%) myristic (0.36%, 0.65%), palmitic (9.70%, 11.68%) and stearic acid (5.45%, 2.33%) respectively (Table 2). Both oils have been shown to contain relatively large amounts of unsaturated fatty acids (83.64% and 80.46% respectively). The seed oil of *O. basilicum* contained 13.33% oleic, 21.81% linoleic and 48.50% linolenic acid. Oleic 44.10% and linoleic acid 36.36% were found in the seed oil of *O. album*. The physico-chemical properties of the oils and the percentage composition of the fatty acids of both oils are favourably when compared with the oils of other species of Lamiaceae family [5].

Table 2. Percentage composition of the fatty acid of the seeds oils of *Ocimum basilicum* and *Ocimum album*.

Fatty acids	<i>Ocimum basilicum</i>	<i>Ocimum album</i>
Capric acid	0.00	1.30
Lauric acid	0.85	0.7%
Myrestic acid	0.36	0.65
Palmitic acid	9.70	11.68
Stearic acid	5.45	2.33
Oleic acid	13.33	44.16
Linoleic acid	21.81	36.36
Linolenic acid	48.50	0.00
Arachidic acid	0.00	2.73

Table 3. Percentage composition of the fatty acids in the seed oils of some Lamiaceae species.

Fatty acids	<i>Ocimum basilicum</i>	<i>Ocimum album</i>	<i>Ocimum sanctum</i>	<i>Salvia aegyptica</i>
Capric	0.00	1.30	0.00	1.34
Lauric	0.85	0.78	2.84	0.00
Myristic	0.36	0.68	1.90	0.00
Palmitic	9.70	11.68	5.54	9.42
Stearic	5.45	2.33	3.12	3.18
Oleic	13.33	44.16	6.00	0.00
Linoleic	21.18	36.36	59.1	84.53
Linolenic	48.50	0.00	21.27	0.00
Arachidic	00	2.73	0.00	1.53

A comparison of the fatty acid composition (Table 3) showed interesting qualitative and quantitative differences. So, linolenic acid occurred in *O. sanctum* and *O. basilicum* (21.7% and 48.50% respectively), but not in *Salvia aegyptica* and *O. album*. Linoleic acid was present in all four species, though in varyign amounts. Similarly, oleic acid occurred in smaller amounts in all species except for *S. aegyptica*. Saturated acids were present in all oils, with minor variation in their percentages. The cause of the variations observed is not know but it is assumed that it may be due to soil and climatic differences.

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