

LIPID FRACTIONS AND FATTY ACID COMPOSITION OF DIFFERENT VARIETIES OF BASIL SEED OIL

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Basil seed oil (10.56 - 15.55%) has been examined for its physico-chemical characteristics and fatty acid composition. Thin layer chromatography of the oil into lipid classes resulted into polar lipids (2.2%) and neutral lipids (97.8%). Fractionation of the neutral lipids afforded hydrocarbons (2.1%), wax esters (2%), triglycerides (87.9%), free fatty acid (1.8%), diglycerides (0.8%), sterols (3%), and monoglycerides (0.2%). The fatty acid composition of various lipids classes ranged from C₁₆ to C₂₂ acids in different amounts.

Key words : Lipids, Basil seed, Varieties.

Introduction

Ocimum basilicum Linn. Belonging to N.O. Labiatae commonly known as Niazbo [1,2] is a small scented herb cultivated throughout Pakistan and India. The leaves and seeds of *O. basilicum* find numerous uses in local system of medicines. The seeds are mucilaginous and are given in infusion in gonorrhoea, diarrhoea and chronic dysentery. In addition the seeds are also prescribed by local Hakims as a substitute for *Lallemantia royeana*, which is given internally with sherbet in cases of habitual constipation and in internal piles. Although a lot of work has been carried out on the different aspects of *O. basilicum* [3,4] yet its fixed oil especially from this part of the world has not been studied in detail. The present study was undertaken to provide detailed information regarding physico-chemical characteristics (Table 1) and fatty acid composition of different varieties of basil (Table 3). Moreover, it was also intended to explore the constitutional variation, of different varieties of *O. basilicum*.

Materials and Methods

Basil seeds of different varieties were collected from the experimental fields of PCSIR Laboratories Complex Lahore, dried in the shade and sieved to free from dust and other plant materials. The seeds of each variety were dried, crushed and extracted with distilled *n*-hexane in a Soxhlet apparatus. The extracts were dried over anhydrous sodium sulphate and filtered. The solvent was removed in a rotatory evaporator at 40° under reduced pressure.

Various physico-chemical investigations i.e. specific gravity, refractive index (Abbe's) acid value, saponification and iodine values were determined according to the standard procedures [5] and are given in Table 1.

Fractionation of the oil into lipid classes. 0.8 gram of the oil was charged on ten 20 x 20 cm. glass plates coated with 1 mm. (Kieselgel 60 G Art. 7731). Chromatograms were developed in hexane/diethylether/acetic acid (80: 20: 1)

(v/v/v) [6] and the resulting bands were visualised under UV light by spraying with 2', 7' -dichlorofluorescein in methanol. Typical R_f's of the lipid classes were hydrocarbons 0.9, wax esters 0.9, triglycerides 0.56, free fatty acids 0.47, diglycerides 0.31, sterols 0.25, monoglycerides, 0.17 and polar lipids 0.00 lipid classes were identified by comparison of their R_f's with those of standard under identical conditions.

The bands made visible under UV light by spraying with 2', 7'-dichlorofluorescein were marked, scrapped and extracted with chloroform and filtered. The solvent was removed under reduced pressure. The content of each lipid class is given in Table 2.

Methyl esters of the oil were prepared by the standard method of saponification, with alcoholic potash, removal of

TABLE 1. PHYSICO-CHEMICAL CHARACTERISTICS OF *O. BASILICUM* (COMORO) SEED OIL.

Moisture content of the seeds (w/w)	7%
Fixed oil (w/w)	12%
Specific gravity at 32°	0.89
Refractive index at 32°	1.4732
Acid value	1.53
Saponification value	170.00
Iodine value	106.00
Unsaponifiable matter (w/w)	10.1%

TABLE 2.

Neutral lipids	97.8%
Polar lipids	2.2%
<i>Fractions of the neutral lipids</i>	
Hydrocarbons	2.1%
Wax esters	2.5%
Triglycerides	87.4%
F.F.A.	1.8%
Diglycerides	0.8%
Sterols	3.0%
Monoglycerides	0.2%

TABLE 3. FATTY ACID COMPOSITION (WT%) OF TOTAL LIPIDS IN DIFFERENT VARIETIES OF BASIL SEED OIL.

Fatty acid	<i>O. basilicum</i> (Comoro)	<i>O. basilicum</i> (Pakistani)	<i>O. basilicum</i> (Mixed)	<i>O. americanum</i>	Triglycerides (Comoro)	Wax esters (Comoro)
C _{8:0}	—	—	—	—	—	0.41
C _{10:0}	—	—	—	—	1.30	0.10
C _{14:0}	—	—	—	—	—	0.22
C _{16:0}	10.75	9.29	8.49	5.81	7.80	40.26
C _{16:1}	0.12	0.12	0.07	—	0.07	0.85
C _{18:0}	3.67	3.72	3.09	2.31	2.81	11.19
C _{18:1}	10.22	9.76	12.75	6.40	8.35	25.06
C _{18:1}	1.08	0.92	0.89	0.52	0.66	1.46
C _{18:2}	21.59	26.29	27.18	15.68	21.20	8.59
C _{18:3}	50.63	48.91	45.47	68.59	56.79	8.42
C _{20:0}	0.12	0.26	0.31	0.08	0.14	1.69
C _{20:1}	0.31	0.50	0.90	—	0.29	0.87
C _{22:0}	0.26	—	0.10	—	—	—

unsaponifiable matter by extraction with ether and esterification of liberated fatty acids with methanol and sulphuric acid. The methyl esters were purified by column chromatography on silica gel and elution with hexane/diethyl ether (99.5: 0.5 v/v). The purity of the methyl esters was checked by T.L.C. and IR spectra.

The methyl esters of neutral fractions triglycerides and wax esters were prepared by using a mixture of boron trifluoride in methanol [7].

Methyl esters were analysed by GC on Pye-Unicam 104 gas chromatograph equipped with a flame ionization detector. WCOT fused quartz column 25m x 0.22 mm. i.d., coated with free fatty acids phase (FFAP) was used. Hydrogen gas was used as a carrier with a flow velocity of 36 cms/sec. and a split ratio 1:60. The column temperature programmed at 100° for 0 min with 5°/min. increase to 210° while detector and injection temperatures of 300° and 250° respectively were used. Various components were identified by their retention times and peak enhancement with standard esters. Percentage composition of individual components was calculated on the basis of peak area using SP-4100 (Spectra Physics) computing integrator.

Results and Discussion

The results for the total neutral and polar lipids for *O. basilicum* (Comoro) are given in Table 1 and 2. The oil content of basil seeds varies from 10 to 15% T.L.C. showed that the oil of *O. basilicum* (Comoro) consisted primarily (97.8%) of neutral lipids (mainly triglycerides but including hydrocarbons, wax esters, sterol, free fatty acids mono and diglycerides) and only (2.2%) of polar lipids were observed.

The fatty acid composition of total lipids and that of triglycerides and wax esters of this region being reported for the first time is given in Table 3.

The oil consists mainly of unsaturated fatty acids (84%) and its composition differs markedly for the *O. pilsum* as reported by Khan *et al.* [8]. *O. americanum* has a higher percentage of linolenic acid (68.59%) as compared to other varieties.

Studies on the proteins, carbohydrate content and also the unsaponifiable matter are in hand and will be reported elsewhere.

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