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# NEUTRAL LIPID FRACTIONS AND FATTY ACID COMPOSITION OF *CALLISTEMON LANCEOLATUS* DC. BERRIES OIL

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*Callistemon lanceolatus* seed oil (2.8%) has been examined for its physico-chemical values and fatty acid composition. Thin layer chromatography of the oil into lipid classes, resulted into neutral lipids (98%), polar lipids (2%). Fractionation of the neutral lipids afforded hydrocarbons (2.3%), wax esters (1.8%), triglycerides (86.9%), free fatty acids (2.8%), diglycerides (2.4%), and monoglycerides (1.8%). The oil is found to contain caprylic (0.8%), lauric (0.7%), Myristic (0.1%), palmitic (9.3%), stearic (1.6%), oleic (12.3%), linoleic (74.5%), linolenic (0.2%) arachidic (0.3%) and behenic (0.2%) acids.

*Key words:* Neutral, Lipid, *Callistemon lanceolatus*, Composition.

## INTRODUCTION

*Callistemon lanceolatus* DC. family Mytraceae commonly known as the bottle brush is a small evergreen tree indigenous to Queensland and New South Wales but is often grown in gardens all over the world. Flowers are crimson, in terminal spikes, about 6 in. long, the branches soon growing through the spikes [1]. This plant flowers from March to August and then bears seeds known as berries.

Hashim *et. al.* [2] have carried out the phytochemical screening of the various organs of *C. lanceolatus* and *C. rigidus* and reported the presence of volatile oil, carbohydrate, sterols and tritepenes in all plant organs. Although a lot of work has been carried out on other aspects of *C. lanceolatus* [2-6], the berries fixed oil especially from this part of the world has not been studied in detail. The present studies deal with the physico-chemical characteristics (Table 1) and fatty acid composition (Table 3) of the oil.

## MATERIALS AND METHODS

*C. lanceolatus* berries were collected localy in the first week of December. On drying the berries in the shade seeds were shed. The seeds were then sieved to free them from dust and other plant materials, dried, finely ground and extracted at room temperature with chloroform/methanol (2:1 V/V) according to the procedure of Folch *et. al.* [7].

Various physico-chemical investigations, i.e., specific gravity, refractive index (Abbe's) acid value, saponification value, peroxide value and iodine value were determined according to the standard procedures [8] and are given in (Table 1).

*Fractionation of the oil into lipid classes.* 0.5 g of the oil was charged on six 20x20 cm glass plates coated with 1 mm (kieselgel 60 G Art. 7731). Chromatograms were developed in hexane/diethyl ether/acetic acid (80:20:1 (V/V/V) [9,10] and the resulting bands were visualised under UV light by spraying with 2,7-dichloro fluorescein in methanol. Typical $R_f$'s of the lipid classes were, hydrocarbons 0.90, wax-esters, 0.82, triglycerides, 0.54, free fatty acids, 0.43, diglycerides, 0.32, monoglycerides 0.18, and polar lipids 0.0. Lipids classes were identified by comparison of their $R_f$'s with those of the standard under identical conditions. The polar band having $R_f$ (0.0) did not move and remained at the origin of the chromatogram.

The bands, made visible under UV lamp by spraying with 2,7-dichlorofluorescein, were marked, scrapped and extracted with chloroform/methanol (2:1 V/V) and filtered. The solvent was removed under reduced prassure. The content of each lipid class is given in Table 2.

Methyl esters of the whole oil were prepared by the standard method [11] of saponification, with alcoholic pot-

Table 1. Physico-chemical characteristics of *C. lanceolatus* seeds and oil.

| | |
|---|---|
| Moisture content of the seeds (W/W) | 13.92% |
| Fixed oil (W/W) | 2.8% |
| Colour | Orange Yellow |
| Specific gravity at 28° | 0.9473 |
| Refractive index (Abbe's) at 20° | 1.4730 |
| Acid value | 1.66 |
| Saponification value | 154.7 |
| Iodine value | 112 |
| Peroxide value | 8 m. eqs/kg |
| Unsaponifiable matter (W/W) | 3.5% |

Table 2. Weight per cent of lipids fractions of *C. lanceolatus* oil.

| | |
|---|---|
| Neutral lipids | 98% |
| Polar lipids | 2% |
| Fractions of neutral lipids. | |
| Hydrocarbons | 2.3% |
| Wax esters | 1.8% |
| Triglycerides | 86.9% |
| Free fatty acids | 2.8% |
| Diglycerides | 2.4% |
| Monoglycerides | 1.8% |

Table 3. Percentage fatty acids composition of total lipids and lipid classes of *C. lanceolatus* berries oil.

| Fatty acids | Total lipids | Wax easters | Trigly-cerides | F.F. acids | Digly-cerides | Monog-cerides |
|---|---|---|---|---|---|---|
| C8:0 | 0.8 | 0.9 | – | – | – | – |
| C12 | 0.7 | 0.5 | - | - | - | - |
| C14:0 | 0.1 | 0.9 | - | 4.0 | - | 2.3 |
| C16:0 | 9.3 | 6.7 | 8.6 | 31.8 | 24.4 | 33.8 |
| C18:0 | 1.6 | 4.8 | 2.7 | 0.6 | 13.9 | 16.7 |
| C18:1 | 12.3 | - | 10.1 | 0.6 | 11.6 | 32.3 |
| C18:2 | 74.5 | - | 77.2 | 57.6 | 7.6 | 11.3 |
| C18:3 | 0.2 | - | 0.5 | - | - | - |
| C20:0 | 0.3 | 0.4 | 0.7 | 5.4 | 21.8 | 3.5 |
| C22:0 | 0.2 | 85.8 | - | - | 20.6 | - |

ash, removal of unsaponifiable matter and esterification of liberated fatty acids with methanol and sulphuric acid.

The methyl esters of each neutral fractions were prepared by the method of Kumar and Tsunoda [12].

The methyl esters were purified on glass plates coated with silica gel. The purity of the methyl esters was checked by TLC and IR spectra.

Methyl esters were analysed by GC on Pye-Unicam 104 Gas Chromatograph equipped with a flame ionization detector, and 25 m carbowax 20 M WCOT fused silica column. Hydrogen gas with a flow velocity of 26.7 cm/sec. and a split ratio 1:6 was used as carrier. The temperature was programmed at 150° for 4 min. with 10°/min. increase to 220°, while detector and injection temperatures of 300° and 250° were used respectively. Various components were identified by their retention times and by co-injection of standard samples. Percentage composition of individual components was calculated on the basis of peak area using SP-4100 (spectra physics) computing integrator.

## RESULTS AND DISCUSSION

The oil content of *C. lanceolatus* seeds is 2.8%. The physico-chemical characteristics of the oil (Table 1), suggest it to be a semi-drying one. The oil consists primarily (98%) of neutral lipids (mainly triglycerides, but including hydrocarbons, wax esters, free fatty acids, mono and diglycerides) and only 2% of polar lipids were observed (Table 2). The fatty acids composition of the total lipids and that of neutral ones, being reported for the first time is given in (Table 3). The oil consists mainly of unsaturated (87.4%) fatty acids. These findings of our are very much different from those of Sallusto [13], who reported that the fat contained 50% saturated and 50%unsaturated fatty acids with a iodine value 97. The variations can perhaps be attributed to the ecological conditions.

Studies on the proteins and carbohydrate contents and also the unsaponifiable matter of the oil are in hand and will be reported elsewhere.

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