

## Chemical Studies on Fatty Oil of *Trewia nudiflora* Kernels

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**Abstract**—*Trewia nudiflora* Linn belongs to family Euphorbiaceae, sub-family Acalyphoideae and it is one of the important medicinal plants in Indian systems of medicine like Ayurveda, Siddha, etc. It has numerous phytochemical and pharmacological significance. The kernels of *Trewia nudiflora* were chemically examined and fatty oil was isolated and characterized by Gas Liquid Chromatography. The fatty oil content in the kernels was found to be 20.99% on moisture free basis. Arachidic acid (40.25%) and Linolenic acid (30.26%) were identified as major constituent. Physico-chemical analysis of fatty oil was also carried out.

**Keywords:** Euphorbiaceae, *Trewia nudiflora*, Fatty acid composition, Gas -Liquid Chromatography.

### Introduction

*Trewia nudiflora* (Family : Euphorbiaceae) is a rapidly growing, soft wooded versatile dioecious tree which grows within the semi-

evergreen and moist tropical forests. It is commonly known as tumri, and distributed in India, Srilanka and in Indo Malaya region. The tree is naturally found along the foot hills and river banks, where moisture is assured. It flourishes in the Terai and Bhabar Division of UP. Flowers are green in colour usually solitary axillary. Male and female flowers appear on separate trees, males are yellow in long lax drooping inflorescences while females are green, solitary or 2-3 together in the leaf Axis. Fruits are pale green, drupaceous, obscurely quadrangular, 2.5-3.8 cm in diameter, borne in large numbers. Seeds are black, usually four and surrounded by yellowish fleshy arils<sup>1</sup> (figure-1). The bark contains Taraxerone and  $\beta$ -sitosterol. A poultice prepared from the roots is applied in gout and rheumatism. The roots contain resinous matter and fats. Decoction of the

shoots is said to relieve flatulence and is also used for the treatment of swelling. The oil is pale yellow in colour and very similar to tung oil. An alkaloid, nudiflorine (1-methyl-5-cyano-2-pyridone) has been reported in the leaves<sup>2-3</sup>. A minor unprecedented diterpene, 3 $\beta$ , 17-dihydroxycleistantha-12,15-dien-2-one, two known triterpenes (glutin-5-en-3-ol and Olean-18-en-3-one (Germanic one)) and three known Sterols (22*E*,24*R*)-5 $\alpha$ , 8 $\alpha$ -epidioxyergosta-6,22-dien-3 $\beta$ -ol, (22*E*,24*R*)-5 $\alpha$ , 8 $\alpha$ -epidioxyergosta-6, 9 (11), 22-trien-3  $\beta$ -ol, and (22*E*,24*R*)-6-methoxyergosta-7, 22-dien-

3,5-diol) was isolated from pericarp of *Trewia nudiflora*<sup>4</sup>. Some maytansinoids isolated from *T.nudifloraseeds* are tumor inhibitors and may be responsible for the resistance of the seeds to fungal degradation<sup>5-6</sup>. Powell and his colleagues isolated two novel compounds namely trenudine and treflorine which contain two fused macrocyclic rings and these compounds fully retain activity against KB cells and P388 Lymphocytic leukemia<sup>7</sup>. Seed oil of *T.nudiflora* is known to contain glycerides of  $\alpha$ -Kamlolenic acid (18-hydroxy-cis-9, trans-11, trans-13-octadecatrienoic) acid<sup>8</sup>.



**Figure-1 Flowers and fruits of *Trewia nudiflora***

### **Material and Methods**

Ripped fruits of *Trewia nudiflora* were collected from the campus of Forest Research Institute, Dehradun. The kernels were removed and crushed to obtain a coarse powder. The powdered kernels were extracted with petroleum ether (60-80°C) by using soxhlet apparatus. Removal of the solvent under reduced pressure gave pale yellow coloured fatty oil. The physico-chemical properties of the fatty

oils were determined using standard methods<sup>9</sup>.

The oil was saponified with 0.5N alcoholic potassium hydroxide for 2hr and mixture of fatty acids were isolated following normal procedure. Fatty acid methyl esters were prepared by refluxing the mixture of fatty acid with 1% Sulphuric Acid /MeOH on water bath for 4hr, cooled and usual

work up yielded methyl esters. The analysis of fatty acid methyl esters was carried out on Chemito Gas Liquid Chromatography fitted with FID (240<sup>o</sup>). The temperature of the injector was maintained at 230<sup>o</sup>C. Capillary column (25m, BPX 70, 0.22 mm ID, 0.25 $\mu$ m) was used. Nitrogen used as carrier gas (40ml/min.). Split was maintained at 60ml/min and purge was maintained at

2ml/min. The oven temperature was programmed from 150-230<sup>o</sup>C (with increase in temperature 3<sup>o</sup>C) followed by a final hold up of 25ml/min. Methyl esters were identified by comparing the retention times of standard fatty acid methyl esters and also by their co-injection. The percentages were considered as weight percentage.

**Table-1 Physico-chemical Characteristics of Table-2 Fatty Acid Composition (wt %) of**

***Trewia nudiflora* Seed Oil**

***Trewia nudiflora* Seed Oil**

Characteristics	<i>Trewia nudiflora</i>
Oil (wt. %)	20.99
Specific gravity (d <sup>19</sup> )	1.1805
Refractive Index ( $\eta_D^{20}$ )	1.509
Acid value	34.782
Saponification value	204.765
Ester value	166.056
Unsaponifiable matter (wt. %)	0.7317
Protein content	20.985

## Results and Discussion

*Trewia nudiflora* fatty oil content was determined on the moisture free basis and it was found to be 20.99%. Their physico-chemical properties are given

of the mixture of fatty acids obtained from the fatty oil. The fatty acid composition (Table-2) indicated that Arachidic acid (40.25%) is the major constituent of the followed by Linolenic acid (30.26%), Oleic acid

Fatty acid	<i>Trewia nudiflora</i>
C:9	1.06
C:10	0.11
C:15	9.75
C: 18:0	0.51
C: 18:1	10.65
C:18:3	30.26
C:20	40.25
C:21	2.77
C:22	2.41
C:24	2.11
Unidentified	0.12

in Table-1. GLC analysis of a mixture of methyl esters of the fatty acids prepared from the fatty oil showed the presence of eleven fatty acids in the oil. Out of which, ten were characterized (Table-2). The identified fatty acids constituted 99.88% (10.65%) and Pentadecanoic acid (9.75%) while Heneicosanoic acid (2.77%), Behenic acid (2.41%), Lignoceric acid (2.11%), Nonaoicacid (1.06%) and Capricacid (0.11%) are the minor constituents. Literature

survey revealed that in an earlier report T.nudifloraseed oil was reported to contain  $\alpha$ -elaeosteraic acid (39.50%), Linoleic acid (25.13%), Oleic and saturated acids (35.37%) as the chief constituent but in this study Arachidic acid and

Linolenic acid are present in good amount. The fatty oil may be of drying nature due to higher content of Arachidic acid, Linolenic acid and other unsaturated acids. Linolenic acid is an important component of lipids.<sup>10-13</sup>

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