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Chemical Composition and Characteristics of *Taverniera Cuneifolia* (Roth) Ali Seed Oil

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Abstract

The seeds of *Taverniera cuneifolia* (Roth) Ali contains 6.24 ± 0.41% oil. The fatty acid composition of *Taverniera cuneifoia* seeds was studied: a potential substitute of Licorice. Gas liquid chromatography of the methyl esters of the fatty acids shows the presence of 25.73% saturated fatty acids and 68.69% unsaturated fatty acids. The fatty acid composition is as follows: palmitic acid 20.72%, stearic acid 5.01%, oleic acid 16.99% and linoleic acid 51.70%.

Keywords: *Taverniera cuneifolia;* Indian licorice; Fatty acids; Seeds

Introduction

The genus *Taverniera* belongs to the family of Fabaceae and includes twelve species. It is endemic to the Northeast African and Southwest Asian countries [1]. It is often referred to as Indian licorice owing to its sweet taste which is very similar to that of *G. glabra* [2]. *Taverniera cuneifolia,* locally known as Jethimadh is used by the tribal's of Barda Hills of Jamnagar in Western India as a substitute of Licorice or in other words the plant itself is considered to be *G. glabra* [3]. It is known to have various medicinal properties like expectorant, blood purification, antiulcer, anti-inflammatory, wound healing, and used in treating spleen tumors [4]. In addition, the seeds of *T. cuneifolia* are a potential source of edible pulse during extreme drought conditions used by the tribes of Barda Hills, Saurashtra, Gujarat, India [5]. Thus it is important to know its nutritional potential and oil compostion. There is no documentation on the oil content, chemical properties and fatty acid composition of *Taverniera cuneifolia* seed oil (TCSO). The purpose of the present work is to study the chemical properties and fatty acid composition of the TCSO.

Experimental methods

Sampling

The fresh fruits of *Tc* were collected from Munjka village, Rajkot, Gujarat, India during the favorable season between March and May. The specimens collected were identified with the help of the Flora of Gujarat State. Further the species was confirmed by comparison with the specimen lying in the herbaria of Botanical Survey of India, Jodhpur, Rajasthan, India (BSI/AZC I. 12012/ Tech./2011-12 (Pl.ID.)-551. The *Tc* seeds were powdered without removing the fruit cover and were then extracted with petroleum ether (60-80°C) in a Soxhlet apparatus. The extract was at that juncture filtered and distilled off in a rotary evaporator leaving behind dark olive coloured greenish oil. It was assessed for its various chemical properties by AOCS standard methods [6]. Replicates were taken for the analysis of chemical properties (Tables 1,2).

GLC Analysis

Samples were taken for the analysis of the fatty acid composition. The methyl esters of extracted oil were prepared in accordance with the Bureau of Indian Standards (BIS-548, part III). A NUCON-GLC chromatograph with a flame ionization detector (FID) was used for the analysis in which nitrogen gas was used as a carrier gas. The column used was 30M X 0.53 mm I.D. 5.0 µm DB-1 Type MXT-1 capillary column. The injection port temperature was 250°C and the detector temperature was 280°C. Sample injection was done at 60°C and the temperature programming was fixed at 2°C rise per minute to a maximum of 280°C. The total run time was 40 min. Identification of component was prepared by comparing its retention time with that of a Sigma-Aldrich standard fatty acids mixture.

Results and Discussion

The oil content in *TC* was found to be 6.24 ± 0.41%. The study shows that the oil is composed of four fatty acids with 25.73% saturated fatty acids and 68.69% unsaturated fatty acids. The saturated fatty acids are palmitic acid (20.72%) and stearic acid (5.01%) while unsaturated fatty acid includes oleic acid (16.99%) and linoleic acid (51.70%). Half

Fatty acid	Isomers	% Composition
Saturated fats		
Palmitic	(16:0)	20.72 ± 5.95
Stearic	(18:0)	5.01 ± 0.96
Monounsaturated fats		
Oleic	(18:1n9c)	16.99 ± 1.90
Polyunsaturated fats		
Linoleic	(18:2n6c)	51.70 ± 3.69
Saturated		25.73 ± 6.91
Unsaturated		68.69 ± 5.59

Table 1: Extraction and Analysis of Oil.

Determination	Present study (%)
Acid value	32.66 ± 3.16
Saponification value	162.55 ± 2.33
Iodine value	88.31 ± 10.96

Table 2: Chemical properties of TCSO.

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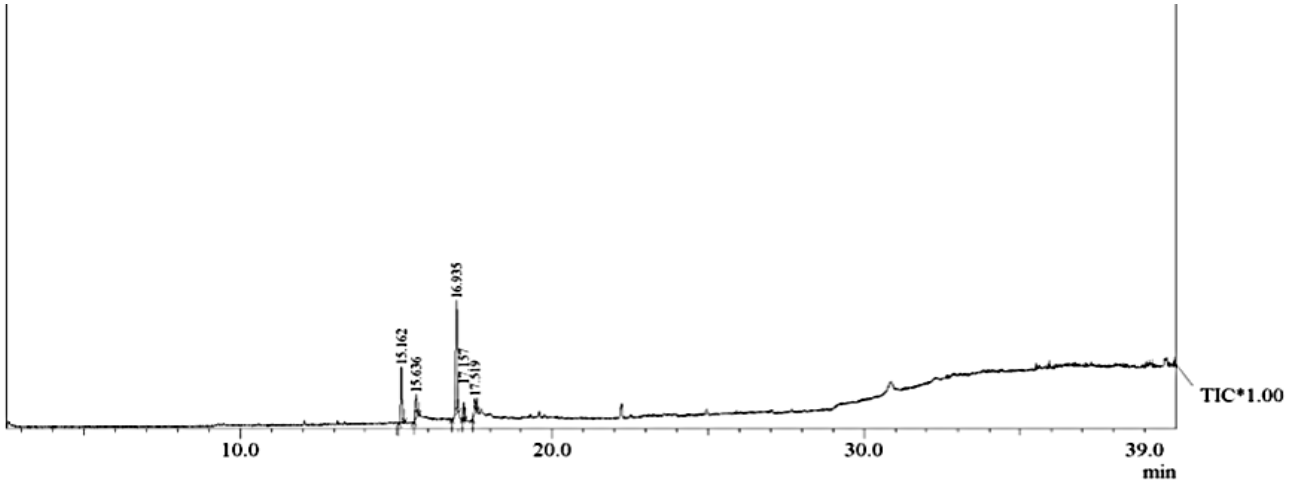

Peak Report TIC

Peak#	R.Time	Area	Area%	Height	Name
1	15.162	424820	15.51	201275	
2	15.636	284187	10.38	87180	
3	16.935	1611089	58.84	413599	
4	17.157	139663	5.10	64525	
5	17.519	278480	10.17	61187	
		2738239	100.00	827766	

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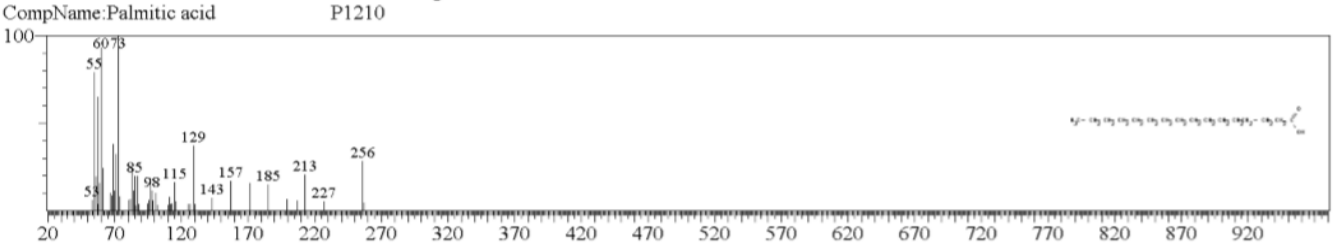
SI:88 Formula:C16H32O2 CAS:57-10-3 MolWeight:256 RetIndex:0
CompName:Palmitic acid P1210



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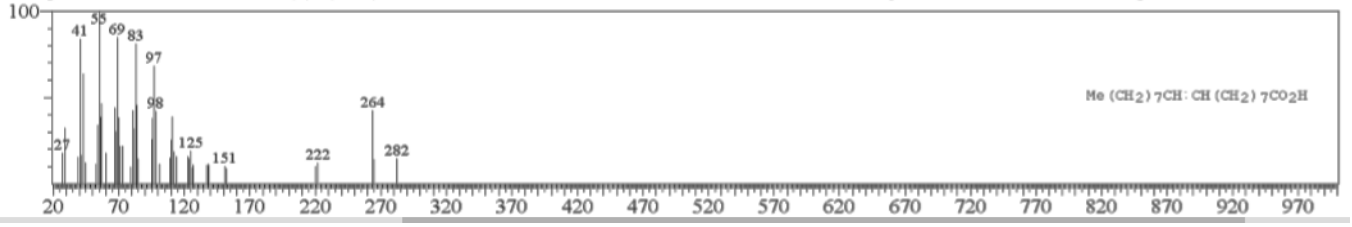

Hit#:2 Entry:209854 Library:WILEY7.LIB
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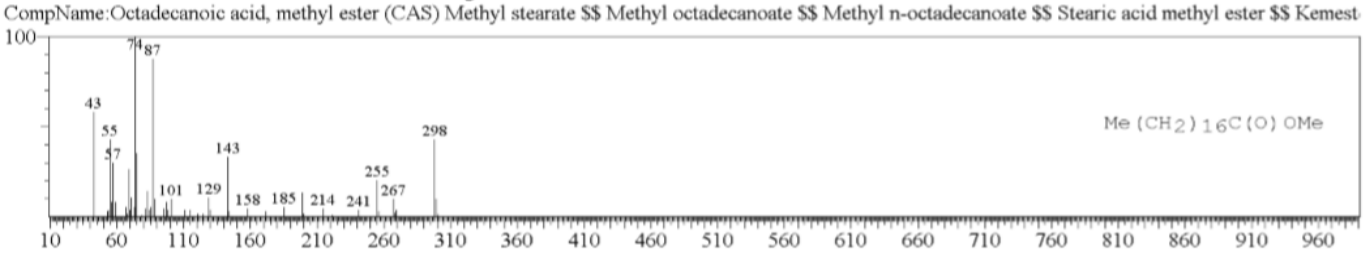

Figure 1: GLC analysis of the fatty acid composition in *Taverniera cuneifolia* seed oil.

of the FA composition is of linoleic acid (6-omega FA). The total seed oil fatty acid composition of *Glycyrrhiza uralensis* Fisch. is 61.84% consisting of linoleic acid 24.3%, α-linolenic acid 25.51%, stearic acid 3.02%, palmitic acid 7.98% [7]. The oil composition of *Tc* is having quite similar Fatty acid composition as that of *Sesamum indicum* [8], *Madhuca indica* [9], *Carthamus tinctorius* [10] and *Prunus amygdalus* [11]. The oil composition of *T. cuneifolia* varies with that of fabaceae members like, *Crotolaria juncea* [12], *Medicago spps* [13], *Arachis hypogea* [14], *Glycine max* [15] (Figure 1).

Conclusion

The study provided the evidence that the TCSO has the presence of Poly Unsaturated Fatty Acid (PUFA), Mono Unsaturated Fatty Acids (MUFA) and Saturated Fatty Acids (SFA).

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