



## Omega-6 and Omega-9 from *Citrullus colocynthis* L. seed oil from arid zone of Rajasthan

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### ABSTRACT

This study examined physio-chemical properties and fatty acid composition of oil from seeds of *Citrullus colocynthis* L. from arid zone of Rajasthan. The fatty acids composition of *Citrullus colocynthis* L. have been analysed as their methyl esters by high performance liquid chromatography (HPLC) with  $\mu$ Bondapak C-18 column and UV/VIS detector. Physico-chemical characteristics were determined by standard AOCS methods. The oil has been found rich in unsaturated acids. Most predominant polyunsaturated fatty acid (PUFA) was linoleic acid (18:2n-6) or omega-6. Oleic or omega-9 was also found as major fatty acid. Among saturated acids palmitic acid was found in high amount. © 2014 Trade Science Inc. - INDIA

### KEYWORDS

Fatty acid composition;  
HPLC;  
Medicinal drug.

### INTRODUCTION

The plant *Citrullus colocynthis* is selected for present chemical studies is growing widely in Western Rajasthan and it is a source of medicinal drugs, oils, proteins and genetic material for breeding drought tolerance into other cucurbits of economic value<sup>[1]</sup>.

*Citrullus colocynthis* is a prostrate annual herb growing on sand-dunes. It belongs to a large cucurbitaceae family, which contains about 100 genera and 880 species, which are mainly tropical or sub-tropical in distribution with a few species extending upto temperate climates. Out of these genera *Citrullus* is one is represented by ten important species. *Citrullus vulgaris*, *C. lanatus*, *C. colocynthis*, *C. nanderanus*, *C. aedules* (sic) *panglo*, *C. Colocynthoides* (*panglo*), *C. anguria* (*puches*) *Hara*, *C. ecirrhous*, *C. hissutus* and *C. battich*. Out of the above ten species, India is represented by only three species. *C. vulgaris* (cultivated), *C. Lanatus* (cultivated)

and *C. cicutlbtgus* (wild).

*Citrullus colocynthis* is a creeping plant with its branches radiating in all directions to a distance of a few meters. Flowers of this species are yellow or white. The fruits of this plant are large; 5–10 cm is diameter, pale-yellow at ripening and fleshy berry. The mature seeds are brown in colour packed in pulp and are good source of crude oil. The dried alcohol extracted seed on percolation with petroleum-ether yields a golden yellow oil<sup>[2]</sup>.

*Citrullus esocynthis* is reported to have potential agricultural value for dry farming in arid zones. It is used as medicines such as – the pulp is used for anti-cancer<sup>[3-5]</sup>, antihistaminic and antiacetylcholine like activity<sup>6-8</sup>, the roots are useful in jaundice and urine disorders<sup>[9,10]</sup>.

Fatty acids are the basic building blocks of all lipids. They are generally constituted of a linear chain of 16 to 22 carbon atoms, with zero to six double bonds

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of *cis* or *trans* configuration. Fatty acids are traditionally analysed as methyl esters (FAME) by gas chromatography (GC), but it is usually considered that such derivatives are not suitable for locating double bonds or other centres of unsaturation<sup>[11]</sup>. Thus the present study deals with the identification of fatty acid by HPLC which operate at ambient temperature so there is little risk to sensitive functional groups<sup>[12]</sup>.

### MATERIAL AND METHODS

The matured seeds of *Citrullus colocynthis* were collected from nearby parts of Jodhpur during the month of October and were identified. The seeds (500 gm) were dried in shade, finely crushed and extracted with petroleum ether (40°-60°C) in a soxhlet extractor on steam bath. The petroleum ether was removed on rotary evaporator under reduced pressure. The physico-chemical characteristics of the oil were determined by standard AOCS methods and the results obtained are tabulated.



Figure 1 : A branch with fruit.

TABLE 1 : Physico Chemical Characteristics of the oil of *Citrullus colocynthis*

Characteristics	Value
Yield of the oil	20.6 %
Saponification value	173.0
Acid Value	3.82
Iodine Value	117.8
Specific gravity	0.9257
Unsaponified Value	2.40%
R.M. Value	0.3510

A sample of the oil (2 g) was saponified and the mixed fatty acids were separated from the non-saponifiable matter as earlier. Fatty acids methyl esters were prepared with 20%  $\text{BF}_3/\text{MeOH}$  at room temperature for 2 hour following by 80°C for 3 hour and extracted with petroleum ether (40-60°C)<sup>[13]</sup>.

### Analysis of fatty acid methyl esters by HPLC

For the analysis, a modified HPLC method (with gradient elution) was used. The equipment included Gilson HPLC with a degasser, a binary pump and a column (900×6.4 mm) was packed with  $\mu\text{Bondapak C-18}$  and was eluted with acetonitrile-water in the proportions 67:33 (by volume) initially and is gradually increased to 74:26 in 10 minutes then gradually increased in another 15 minutes which is also changed to 97:3 in another 15 minutes at flow rate of 2ml/minute, and detection was completed with UV/VIS detector.

TABLE 2 : Fatty acid composition of the *Citrullus colocynthis* Seed oil by HPLC

Fatty Acid	% Composition
Myristic acid	4.41
Palmitic acid	17.46
Stearic acid	6.77
Oleic acid	25.64
Recinoleic acid	0.92
Linoleic acid	41.22
Eicosatetraenoic	0.51

Values in bold indicate high values

### RESULTS AND DISCUSSION

The *Citrullus colocynthis* seeds contain a fairly good amount of oil (yield 20.6 %). The oil is of brownish yellow color and is liquid at room temperature. The oil contents and physico-chemical properties of the seed oil are presented in TABLE 1.

The HPLC analysis of the seeds collected from arid zone of Rajasthan state shows that the plant seed oil has different type variable fatty acid composition. The total percentage (32.7) of saturated fatty acids was found in which myristic acid and stearic acid were in the range of 4.41%, & 6.77% but palmitic acid was reported as major saturated acid as 17.46% respectively. Although its higher amount in some species<sup>[14-17]</sup>.

The major unsaturated fatty acids like oleic, linoleic acid ( $\omega$ -6) were found. Regarding the monounsaturated fatty acid oleic acid (25.64%) was dominant fatty acid in this species. In the polyunsaturated fatty acids (PUFAs) C18:3 ( $\omega$ -6) acid level was in the range of 41.22% respectively. In this study linoleic acid ( $\omega$ -6) was found in high percentage. The percentages of Recinoleic acid, Eicosatetraenoic acid were found in a little amount.

The above results shows that a plant species with high oil percentage and useful acids should be further studied to confirm advantage in quality of oils as well as exploitation on industrial scale to fulfill increasing demand of oil in various field.

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