



A PHYTOCHEMICAL AND PHARMACOLOGICAL APPROACH OF *CITRULLUS COLOCYNTHIS*: REVIEW.

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Abstract-

Rapid industrialization and urbanization has led to the over-exploitation and loss of valuable neutral resources, including medicinally important herbaceous plants. Medicinal plants are in important source of compound for the pharmaceutical industry. They are many species of **medicinal plant** which are rare, endangered or threatened with extinction. *Citrullus colocynthis* is widely distributed in the desert regions of the world. *C. colocynthis* has shown to improve constipation, liver diseases, jaundice, typhoid fever, diabetes and asthma in traditional use. As a kind of exterritorially medicinal material, *C. colocynthis* has been used in China and introduced successfully. His paper reviews the traditional application, chemical composition and pharmacological effects of C. colocynthis, and provides reference for the in-depth study for the efficacy and mechanism of different components of *C. colocynthis*.

Keywords: *Citrullus colocynthis*, medicinal plant, jaundice, Linolenic acid, tetradecane.

Introduction

"Bitter-apple" redirects here. For the species of nightshade, see Soda apple. For the species of *Momordica*, see *Momordica charantia*. *Citrullus colocynthis*, with many common names including Abu Jahl's melon, (native name in Turkey)¹ colocynth, bitter apple, bitter cucumber, egusi, vine of Sodom, or wild gourd, is a desert viny plant native to the Mediterranean Basin and Asia, especially Turkey (especially in regions such as İzmir), and Nubia. **colocynth**, (*Citrullus colocynthis*), also called **bitter apple** or **bitter cucumber**, hairy-stemmed perennial vine of the gourd family (Cucurbitaceae), native to the Mediterranean region. The colocynth grows in sandy, coastal, or desert soils and commonly spreads vegetatively. The plant has small, pale greenish yellow flowers, forked tendrils, and hairy, deeply cut leaves. The rounded yellow or green fruits have a bitter taste and yield a strong purgative sometimes used in folk medicine.

It is a desert viney plant that grows in sandy, arid soils. It is native to the Mediterranean Basin and Asia, and is distributed among the west coast of northern Africa, eastward through the Sahara, Egypt until India, and reaches also the north coast of the Mediterranean and the Caspian Seas. It grows also in southern European countries and on the islands of the Grecian archipelago. On the island of Cyprus, it is cultivated on a small scale; it has been an income source since the 14th century and is still exported today.

It resembles a common watermelon vine, but bears small, hard fruits with a bitter pulp. It originally bore the scientific name *Colocynthis citrullus*.

Taxonomy-

Common Name(s)	Colocynth [English], Bitter apple [English], Bitter cucumber [English], Vine of Sodom [English]
Synonym(s)	<i>Colocynthis vulgaris</i> Schrad, <i>Cucumis colocynthis</i> L.
Kingdom	Plantae
Subkingdom	<u>Viridiplantae</u>
Superdivision	<u>Embryophyta</u>
Division	<u>Tracheophyta</u>
Subdivision	<u>Spermatophytina</u>
Superorder	<u>Rosanae</u>
Order	<u>Cucurbitales</u>
Family	<u>Cucurbitaceae</u>
Genus	<u>Citrullus</u>

Description

Bitter Apple is an annual plant resembling the common watermelon. The stems are herbaceous and beset with rough hairs. Leaves, on long stalks, are alternately arranged. They are triangular, many time cut, variously undulating, blunt, hairy, a fine green on upper surface, rough and pale on the underside. Flowers are yellow, appearing singly at axils of leaves. Fruit is round, size of an orange, yellow and smooth, when ripe contains within a hard leathery rind, a white spongy pulp enclosing numerous ovate compressed white or brownish seeds. This species is globally distributed from Africa, Mediterranean, except Spain, to Indo-Malesia. Within India, it is found wild in the warm, arid and sandy parts throughout, up to an altitude of 1500 m.

The fleshy fruits are 5 to 8 cm in diameter, subspherical berry, almost white, and the density is very less. On the outer surface it has rind and impressions of the knife. Three splits of placenta, which run from centre to periphery is seen if the fruit is cut transversely. It has two groups of seeds near the periphery and the remaining portion filled with pithy parenchyma. It has characteristic odour and intense bitter taste.



Fig: Fruits of *Citrullus colocynthis*

Chemical Composition:

The seeds are rich in **fatty acids** such as myristic, palmitic, stearic, oleic, linoleic and Linolenic acid. It is reported that the de-oiled cake can be incorporated in the cattle feed of milking cows up to 25% and it did not exhibit significant effect on the milk yield. Tumba seed oil from is edible; its composition is similar to that of soybean oil. Refining and washing with citric acid removes its bitter taste.

Fruits of *Citrullus colocynthis* contains seventeen compounds were broadly identified and divided into five classes viz., alcohols, ketones, epoxy compounds, hydrocarbons and an acid. The alcohols identified were 4-(1-methyl) ethoxy, 1-Butanol; 5-methoxy, 2-methyl, 2-pentanol; 1-cyclopentyl, 2-propene-1-ol and 2-Furanmethanol, tetrahydro-5-methyl-*cis* and *trans* isomers. The ketones characterized were 3, 4-Dimethyl, 2-hexanone; 2-Methyl, 4-heptanone and 3-Methyl, 2-heptanone. Two epoxy compounds were 1-propoxy pentane and 2, 3-epoxy methyl propionate and palmitic acid. Four hydrocarbons might have been present on the surface the fruit in minimum quantities viz., tridecane, tetradecane, pentadecane and hexadecane. The two remaining compounds-one (viz., Trimethylsilylmethanol) impurity component derived from silicone oil used in the isolation process and the other impurity (viz., 1, 2-benzenedicarboxylic acid, di-isooctylester) was stabilizer for plastics.

Pharmacological activity:

C. colocynthis has many therapeutic uses and has also been studied for its various pharmacological effects. It is considered an excellent therapeutic agent for the trachea, gut, and cardiovascular system.

Anti-Hyperglycemic Activity:

Various extracts of *C. colocynthis* peel–aqueous, alkaloidal, saponin, and glycosidic–were examined for their effects on plasma glucose levels in rabbits. The activity of the saponin extract on fasting blood sugar levels of alloxan-induced diabetic rabbits was examined.

Anti-Obesity Activity:

Results from the administration of 4% colocynth oil to the offspring of overweight rats suggest that it can aid in weight reduction, maintenance of a healthy lipid profile, and controlling glucose levels. This suggests that the oil has a remedial and regulating effect on obesity.

Anti-Inflammatory and Analgesic Properties:

C. colocynthis water extracts were found to possess anti-inflammatory and analgesic activities. All extracts displayed palliative and anti-inflammatory potential at unique doses despite causing acute toxicity. The outcomes of the problem were acquired from unripe fruits and seeds.

Anti-Tumor Activity:

The anti-tumor activity of *C. colocynthis* can be attributed to different pathways and properties, including apoptotic pathways, antioxidant and anti-inflammatory effects, inhibition of the Wnt/ β -catenin signaling pathway, and anti-metastatic effects.

Cardioprotective Activity:

Experiments on male rabbits suggest that the administration of adrenaline prompted myocardial damage, as shown by the increased ranges of histomorphological adjustments in the myocardium associated with free radical manufacturing in cardiac tissue. *C. colocynthis* provided cardiac protection by decreasing oxidative stress caused by the experimental myocardial infarction, preventing the free radical-arbitrated damage of a catecholamine attack. The hydro-alcoholic extract of *C. colocynthis* peel also showed cardioprotective potential in experimentally induced myocardial infarction in rabbits, as shown by improvements in histological variations and the estimation of different biochemical and inflammatory markers in injured cardiac tissue.

Larvicidal and Pesticidal:

Along with its structural analogues, 4-methylquinoline extracted from *C. colocynthis* can be used to deal with stored grain weevils and spider mites as a natural pesticide. Furthermore, the ingredients separated from *C. Colocynthis* had the great larvicidal activities.

Hypolipidemic:

In an experiment performed on 40 rats, there was a significant decrease in triglyceride, cholesterol and blood sugar range of the samples using various doses of the powder of *Citrulluscolocynthis*.

Fertility:

In a research, the possible impact of *Citrullus colocynthis* on significant enhancement of histological and hormonal symptoms of polycystic ovarian syndrome (PCOS) was demonstrated. In a study conducted on rats, which were diabetes due to streptozotocin induction, the pulp extract of *Citrullus colocynthis* had positive impacts on antioxidants and oxidants alternations in the reproductive system of samples

Antioxidant Effects:

The methanolic fruit extract of *C. colocynthis* was found to be a good antioxidant. It exhibited good free radical scavenging activity due to the presence of gallic acid, a phenolic compound. The highest antioxidant and free radical scavenging ability of the fruit extract was observed at a concentration of 2,500 mg ml⁻¹.

Antidiabetic:

The effect of *Citrullus colocynthis* hydraulic extract on rats, which had diabetes induced by streptozocin and normoglycemic rats was evaluated in a research, the results showed the alleviated blood glucose level of diabetic rats using a specific dose of the extract. However, the extract had no significant impact on blood glucose level in normoglycemic rats.

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