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An Overview on the Ethnobotany of *Citrullus colocynthis* (L.) Schrad (Egusi Melon)

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ABSTRACT
Over the years, plants have been used medicinally in the treatment of various ailments with the sole aim to improve health and wellness. Lately, the consumption of synthetic drugs has increased; which further cause side effects and adversely affect health of the population. It is against this backdrop that this comprehensive review was aimed at evaluating the published information on the ethnobotanical knowledge, Phytochemistry and pharmacology of Citrullus colocynthis. A number of bioactive compounds are present in C. colocynthis which are grouped as cucurbitacin, essential oils, glycosides, alkaloids, flavonoids, fatty acids and carbohydrates. These compounds contributes greatly to its antidiabetic, anticancer, antioxidant, antimicrobial and anti-inflammatory properties. The present review discloses the plant significant potential for Nutritional and pharmacological applications. However, further investigations are required to explore the utility of such fruit crop particularly its potential therapeutic uses on respiratory systems for further improvement in health of individuals.

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INTRODUCTION

Health consciousness and increase in knowledge about side effects of synthetic drugs tends to further enhance the interest towards traditional medicines (Kumar and Kumar, 2018) and ethnobotany in particular. *Citrullus colocynthis* is an underutilized and less known fruit crop of arid region (Kumar and Pathak, 2019f) packed with abundance of nutrients which plays critical role in improvement of wellbeing. *Citrullus colocynthis* is commonly called bitter apple, colocynth and popularly called “Egusi” in Yoruba language (Van der Vossen *et al*., 2004). Egusi (*Citrullus colocynthis*) is an herbaceous annual crop (Agba *et al*., 2009) belonging to kingdom plantae, division Magnoliophyta, class Magnoliopsida, order Cucurbitales, family Cucurbitaceae and genus *Citrullus* (Ahmed, 2018). The first scientific name of egusi was *Colocynthis citrullus* but later it was changed to *Citrullus colocynthis*. The plant is tolerant to draught and intolerant to poorly drained and wet soils (Saini, 2016). Egusi is a well-known vegetable crop in West Africa commonly grown for its consumable seeds popularly called “Egusi” in Yoruba language (Van der Vossen *et al*., 2004), It known by different common names in different languages; "Bitter Apple" in English (Mohammad *et al*., 2009) and “Ipapara” in Ebira language.

History/Origin of *Citrullus colocynthis*

Citrullus colocynthis belongs to the deserts. It is a viny plant which grows in the sandy soils. Basically the origin place of *Citrullus colocynthis* is Asia and Mediterranean basin (Dane *et al.,* 2007) especially Turkey and Nubia which further distributed in Western coastal region of Africa, Sahara, Egypt in eastern region. Through India it also reaches the Northern coastal region of Caspian seas and Mediterranean seas. It is also cultivated on small scale in island of Cyprus (Saini, 2016). *Citrullus colocynthis* have been found in European

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countries located in south such as Islands of the Grecian archipelago and Spain. It is an ancient crop in West Africa, which is considered to be the center of diversity for the species (Achigan-Dako *et al.,* 2015). It is predominantly grown in forest and savanna ecological zones of Nigeria.

There are two common seeds of *Citrullus colocynthis* in Nigeria namely Egusi Bara and Egusi Serewe. They are differentiated by their seed edge. Egusi without pronounced seed edge are Serewe (Van der vossen *et al*., 2004) while those characterized by prominent thick black or white colour seed edge are known as Bara (Fayemi, 1999). The later variety has been found to have the widest distribution (Denton and Olufolaji, 2000). Out of the seed types, the characteristic thin seed coat and the absence of seed edge has made the 'Serewe' seed type to have higher shelling percentage, thus providing more edible endosperm than Bara (Denton and Olufolaji, 2000).

Morphology of *Citrullus colocynthis*

Citrullus colocynthis is 'herbaceous vine plant' of arid region with perennial nature. It shows alternately angular leaves on long petioles. The tendrils of plant are angular and rough in texture with prominent rough hairs (Amamou *et al.,* 2011) and can be spread up to 3 meters of length. Leaves are 5 to 10 cm long and lobes can be 3 to 7 having middle lobe with ovate structure (Upadhyay *et al.,* 2007). The leaves also have triangular shape and number of clefts. Leaves show two colours in surfaces, upper surface is green and lower is pale yellow. Leaves show variability in their sizes. *Citrullus colocynthis* produces 15 to 30 fruits green in color with yellow bands, globular in shape having diameter ranging from 7 to 10 cm and turns over all yellow after drying. When this fruit is ripened, it shows hard and thin rind (Gichimu *et al.,* 2009). Pulp of the fruit is bitter in taste, white, spongy and soft having compressed ovate seeds. Present at the axils of leaves is monoecious flower, single, pale yellow in color with pedunculated shape.

Citrullus colocynthis seeds are smooth, ovoid-shaped, compressed and 6 mm in size. Seed colour varies from dark brown to orange yellow attached on parietal placenta. The roots are perennial, slender, angular, tough vine like and long (Huh *et al.,* 2008).

Phytochemistry and Nutritional composition of *Citrullus colocynthis*

All the parts of *Citrullus colocynthis* have its benefit. Though it is widely cultivated fruit crop but less known and underutilized. A number of bioactive compounds are present in *Citrullus colocynthis* which are grouped as essential oils, glycosides, alkaloids, flavonoids, fatty acids and carbohydrates. But only few reports are present on isolation of individual chemical constituents and their identification. The main components of *Citrullus colocynthis* are Cucurbitacins. Cucurbitacins are bitter in taste, tetracyclic, oxygenated, triterpenic substances which are derived from skeleton of cucurbitane. Because of their cytotoxic behaviour, they play important role in discovery of drugs especially for the anticancer drug

The moisture content of the fresh mature fruit was estimated at 90% of the total weight of fruit. "As per data provided by 'National Research Council, (2006)' seed kernel of *Citrullus colocynthis* are rich source of oil and contains about 50% of oil content whereas other nutrients such as 'protein, 'carbohydrate, 'ash, 'fibre' etc. are present in amount of 30%, 10%, 4% and 3% respectively.

The yield of oil content present in seeds of this respective fruit crop is equivalent to oil yield from oilseeds (sunflower and safflower) which was comparatively higher than the oil production from soyabean and cotton seeds (Sadou *et al.,*2007)

Diseases of *Citrullus colocynthis*

The most important constraints of melon are diseases caused by viruses, bacteria, nematodes and fungi. The major bacterial diseases that pose a serious threat to melon cultivation are angular leaf spot, bacterial fruit blotch and bacterial soft rot whereas the common viral diseases of *Egusi* melon includes *Watermelon mosaic virus* (WMV-2), and *Papaya*

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ringspot virus (PRSV-W) which are all transmitted by silver leaf whitefly and aphids respectively (Van der Vossen *et al.,* 2004). Root knot nematode (*Meloidogyne* spp.) is a notable **Nematode** disease of melon. The major fungal diseases of melon includes Anthracnose, Vine wilt, Powdery mildew, Gummy stem blight, Wet rot of flower and fruit, *Alternaria* leaf spot, *Cercospora* leaf spot and Leaf blight (Kehinde, 2011).

Utilization of *Citrullus colocynthis*

Melon seed is rich in oil (53.1 %) and protein (Ogbona, 2013). Melon seed is used for several purposes in Nigeria: for sauces and '*egusi*' soup, snacks, seasoner (Denton and Olufolaji, 2000). It is commonly used in house hold cooking and industrial purposes (canned fish, margarine and salad oil, medicine and soap) (Adewusi *et al.,* 2000). The industrial usages are in the manufacturing of pomade, metal polish, lubricant, adhesive and candles (Osunde and Kwaya, 2012).

Pharmacological Uses of *Citrullus colocynthis*

Citrullus colocynthis has also been used in folk medicines for centuries and also as the source of energy e.g. biofuel and oil seed. Medicinally sliced young fruit of melon is used in healing stomach troubles (Achigan-Dako *et al*., 2008). Fresh fruits of colocynth are collected, stuffed with the salt and Ajawain. Fruits are then dried and grind to make the powder. Two grams powder is used orally two times daily for two days for the treatment of stomach ache (Eddouks *et al.,* 2002). Raw fruits and fresh roots of colocynth are used to make a fine paste. This fine paste is applied thoroughly, externally two times daily for the treatment of carbuncles and boils.

Fresh colocynth roots are also boiled in the cow's milk in a ratio of 1:8. 5 ml of milk is orally administered two times daily for forty-one days for the treatment of amenorrhoea (Hussain *et al.,* 2014). By grinding fresh melon roots with little water to make paste is applied to the chronic wounds three times daily till it is healed completely (Marzouk *et al.,* 2010). Also, equal quantities of the fresh colocynth roots grounded with *Piper nigrum* L. and small amount of water to make fine paste of both. One gram of paste is used three times daily for atleast three days for the treatment of abdominal pain. Melon Roots are grinded to form a fine paste which is applied to a pan leaf (*Piper betle* L.,) and then used orally within only 2 hours of the snake bite (Huseini *et al*., 2009).

Decoction of the fresh fruits using water can be prepared in the ratio of 1:6. 5 ml decoction is then administered orally, at bed times for atleast three days for the treatment of constipation while 2 ml decoction can be administered orally two times a day for complete 7 days to promote lactation. Also decoction obtained after boiling the chopped ripened fruits of colocynth in water can be used for mouth wash two times daily for at least seven days for the treatment of dental caries (Hussain *et al.,* 2014).

Melon is abortifacient in nature as fresh root can be grounded to form a fine paste and then applied over vagina (Huseini *et al.,* 2009). The paste is used for the termination of pregnancy when 2g paste is taken orally one time daily. Leaf extract obtained by squeezing the pounded leave in muslin cloth is used for the treatment of leucoderma when applied to the affected area of skin two or three times daily.

Other medicinal values of *Citrullus colocynthis*

Fruits are pungent, bitter and purgative in nature thus acts as antipyretic, anthelmintic, carminative and used to cure ascites, tumors, ulcers, leucoderma, bronchitis, asthma, jaundice, urinary discharges, tuberculosis glands of neck, enlargement of spleen, constipation, dyspepsia, throat diseases, anemia and joint's pain elephantiasis (Sidra *et al.,* 2017). Roots of *Citrullus colocynthis* are useful in remediation of ascites, jaundice, urinary diseases and given in abdominal enlargements and in cough and asthmatic attacks of children. Root is also useful in the inflammation of breast. Root or fruit is rubbed to form a paste with water and applied to pimples and boils. *Citrullus colocynthis* is also

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very important for traditional use in the remedy for carcinoma, cancer, leukemia, endothelioma and tumors of eye, spleen and liver (Delazar *et al.,* 2006).

CONCLUSION

The desert plant *Citrullus colocynthis* is a fruit crop with number of health benefits and well-known medicinal herb of all traditional systems of medicines due to its excellent therapeutic potentials which can further help in formation of different drugs to treat various disorders. Although, it is a fruit crop with abundance of nutritional significance but it is still unfamiliar for the huge population. So further investigations are required to enhance the utility of such fruit crop and can use as functional food for further improvement in health of individuals.

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