



## Paradigm Shifts in Understanding *Citrullus colocynthis*-L: The Science of the Desert Apple

Mirza Hussain<sup>1</sup>, Shehr Yar Nasim<sup>2</sup>, Qeasar Habib<sup>3</sup>, Abdul Manan<sup>4</sup>, Ghulam Yasin Shaikh<sup>5</sup>, Azra khalhor<sup>6</sup>, Muhammad Sajawal<sup>7</sup>, Shehroz Shah<sup>7</sup>, Arz Muhammad Umrani<sup>8\*</sup>, Waqas Ahmad<sup>9</sup>

<sup>1</sup> Department of Botany Govt. Girls Degree Science College Gambat, Sindh, Pakistan

<sup>2</sup> Pir Mehr Ali Shah Arid Agriculture University, Rawalpindi, Pakistan

<sup>3</sup> Faculty of Agriculture, Lasbela University of Agriculture Water and Marine Sciences Uthal Balochistan, Pakistan

<sup>4</sup> College of Forestry, Sichuan Agricultural University, Chengdu, Sichuan, 611130, China

<sup>5</sup> National Nematological Research Center, University of Karachi

<sup>6</sup> Botany Department, Shah Abdul Latif University Khairpur

<sup>7</sup> Pakistan Forest Institute, Peshawar

<sup>8</sup> Department of Forest and Wildlife, Quetta

<sup>9</sup> Department of Geography and Geomatics (GIS/RS), University of Peshawar - Pakistan

\*Corresponding Author: - Arz Muhammad Umrani

\*Email: arz.forest87@yahoo.com

### Abstract:

*Citrullus colocynthis* L is a most important ethno-pharmaceutical herbal plant, 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. In Asia, it grows in the sandy desert of Pakistan, particularly in Sindh, North Baluchistan, Las Bella, KPK, and Kashmir etc. In Khairpur Mir it is commonly found in the Nara desert, the desert of Kotdiji, and the alluvial soils of Gadeji. It is very popular, round like melon and yellow in color. It is bitter in taste. Its flowers, leaves, roots, and seeds, are medicinally very useful It is used by common people for the cure of different diseases. Ethnobotanically, *Citrullus colocynthis* L is commonly used as a drug for various stomach diseases also. This preliminary report will offer basic information to pharmaceutical for further research and to discover new medicinal compounds derived from many other diseases.

**Keywords:** Science, Pharmaceutical herb; trooh plant.

### Hypotheses:

- 1) Trooh is a unique ethnobotanical herb
- 2) Trooh is a natural remedy for uncured diseases of human beings.
- 3) Trooh plays a key role in the pharmaceutical industry.
- 4) Trooh is a historical and homeopathic herb.
- 5) Trooh is beneficial for mankind.
- 6) It is the main source of saving the lives of human beings.

### Introduction

Plants have supplied many essential human needs, including a variety of therapeutic medications (Alagawany et al., 2020, 2021a, b; Dhama et al., 2021). Therefore, deliberate efforts towards cultivation are crucial for the continuous availability of those plant species. Medicinal plants have been used in healthcare for a long time, and their use to prevent and treat illness is expanding worldwide (Dhama et al., 2018; Bilal et al., 2021; Reda et al., 2021; Saeed et al., 2021). The medicinal properties of plants are due to the natural chemicals/compounds they contain (Saeed et al., 2019; Alagawany et al., 2021c; Garg et al., 2021; Zhang et al., 2021). Plants are a source of food and act as raw materials from which a variety of drugs are synthesized (Hassan, 2012). *Citrullus colocynthis* is a desert plant and a source of several bioactive compounds such as essential oils, glycosides, flavonoids, alkaloids, and fatty acids. Medicinal plants improve the immune system. The dried fruit pulp of *C. colocynthis* has been used to treat gastrointestinal disorders like indigestion, gastroenteritis, and intestinal parasites. *C. colocynthis* also has excellent pharmacological properties, such as being a laxative and purgative; it is anti-diabetic, anti-inflammatory, anthelmintic, and anti-cancerous. The fruit has been studied extensively for its antimicrobial, antioxidant, and anti-inflammatory activities (Hussain et al., 2014). *C. colocynthis* seed powder (CCSP) has been used as an emulsifier, fat binder, and flavoring (De Smet., 1997). *C. colocynthis* has also long been utilized in popular cuisine. Some of its medicinal characteristics include antioxidant, anti-inflammatory, anti-diabetic, and antibacterial activities (Kamran et al., 2018). Its pharmacological properties include antioxidative,

hypoglycemic, antibacterial, anti-cancerous, anti-inflammatory, analgesic (Sanafi et al., 2006). *C. colocynthis* has antidiabetic, hypolipidemic, antineoplastic, profibrinolytic, antiallergic, antimicrobial, pesticidal, and immune-stimulatory effects. It also affects the reproductive system and fertility (Meybodi, 2020). *C. colocynthis* acts as an antioxidant and anesthetic in humans (Hyderi et al., 2015); its oil can be used to treat constipation (Qureshi et al., 2010), while an extract showed anti-tumor activity on cancerous cells (Abdulridha et al., 2020) and its leaves are anti-cancerous and anti-adipogenic (Perveen et al., 2020). Phytochemical screening of *C. colocynthis* fruit extract revealed anti-diarrheal properties (Dhakad, 2017). The irregular use of antimicrobials results in drug resistance in animals and humans, adversely affecting their health. Therefore, in 2006, the European Union prohibited antibiotics as growth promoters (Milanov et al., 2016). Due to this restriction, many alternative antimicrobials are being used, and preferences trend towards photogenic products extracted from herbs and spices with known antimicrobial properties (Bajagai et al., 2020).

*Citrullus colocynthis* L is a ethno medicinal herb, belongs to the family cucurbitaceae. has been advocated for various ailments. Such as anti tumor activity on cancerous cells and its leaves are anti adipogenic Paste of root is put in vagina at the time of delivery to facilitate . Plant is considered for the treatment of skin diseases, rheumatism ,blood pressure , D.M(diabetic Mellitus & digestion . It is effective and useful for head ache, flue, eye-diseases, paralysis, trembling of organs, epilepsy, the dropsy [Abdul ridha et al 2020, Perveen et al 2020] Root is very bitter and used for tumors, bronchitities , and anemia [ Balatter et al 1918] The fruit and seeds are purgative and also used to cure disturbed digestive system due to improper function of liver. The pulp of the fruit in small quantity is used for constipation and intestinal disorders and in making pasts, which are considered as stomach tonic. Fruit is also used for horse stomach diseases. Its fruit is collected and exported also [M Tahir et al 1991]

#### **Citrullus colocynthis L.**

- **Family:** Cucurbitaceae
- **Ethnic Name:** Trooh (Sindhi) Hinzal (Arabic) Kaviste-talkh (Persian) [ Indravaruni and chitrapala (Sanskrit) Rakhalsasa (Bengali) Bitter apple (English) Tuma (Urdu). Tumbi (Punjabi) Indrayan, Makhal (Hindi)
- **Soil Type:** Calcareous rock and sandy soil
- **Flowering Period:** November to January

#### **TAXONOMIC CHARACTERS**

- **Habitat:** Kohistan (Sindh)
- **Habit:** Perennial rooted, diffuse, large creeping herb
- **Stem:** Herbaceous branched
- **Leaves:** With deeply dissected lobulate leaves On 2-3 fid tendrils (Leaves size Up to 15 cm long)
- **Flowers:** Solitary monoecious, yellow colored. Fruit: Fruits rounded, 7-9 cm in diameter, green and white striped become yellowish when ripe smooth.

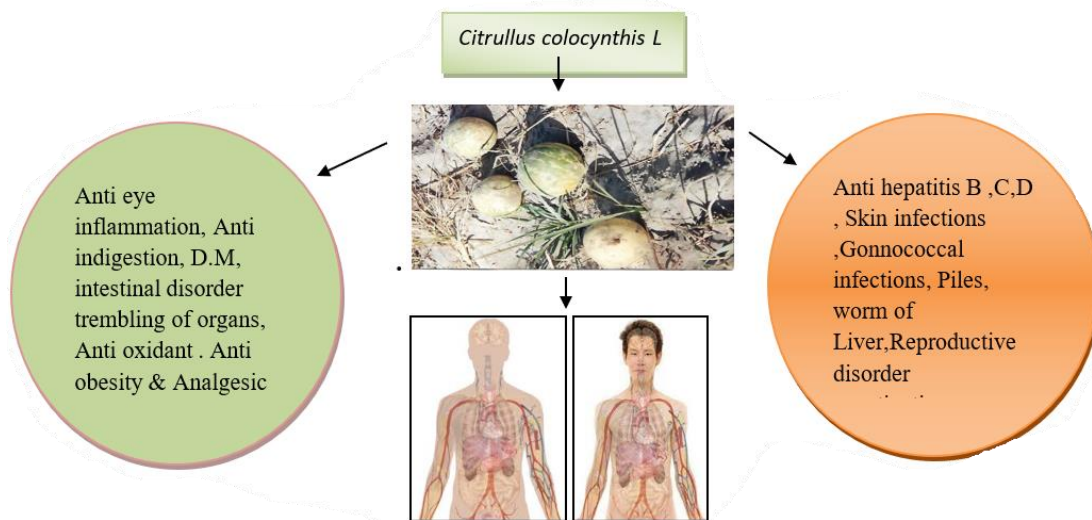
#### **1. MATERIL AND METHODS:**

Ethno botanical knowledge on trooh *Citrullus colocynthis* L has been sought from various areas of Sindh and from local Hakims as well. The full account and reports on species, uses parts of plants (The types of trooh are given in different forms as fig: (1.2&3) ailments mode and preparation and dispensation of the medicine popularity and precaution are available on the field book. Plant species were collected and got them confirmed by the local in habitants whether the plants are proper/original or not. Voucher specimen of the plant is preserved in the Herbarium Department of Botany, Shah Abdul Latif University, Khairpur.

**Figure : 1 showing the bitter apple with leaves and roots**



Figure no. 2 shows bitter apple is curable for human diseases.



**2. RESULT & DISCUSSION:**

The present study reveals that the trooh is the medicinally useful plant in the area. All the parts of plant are used by Hakims to cure various diseases such as Gonnococcal infections, Piles, worm of Liver, constipation, eye inflammation, digestion, D.M, intestinal disorder and trembling of organs etc.

Unani physicians use this drug extensively as a drastic inpurgative in ascents and jaundice. Also used for various uteric disorders especially in amenorrhoea. Fruit in small dozes for bile disorders, constipation and fever. The root is also used for ascites, amenorrhoea and rheumatism [ . Perveen et al., 2021 , Aftab et al 1990] . The *C. colocynthis* plant acts as a good anti-diabetic agent in humans with type II diabetes as it reduces glucose and cholesterol levels (Youshan et al., 2015; Chenghe et al., 2014). *C. colocynthis* fruit pulp of mature seed can also be used to treat tuberculosis, and it was found to have active anti-bacterial properties against various strains of normal and drug-resistant *mycobacterium* (Archana et al., 2013). The methanolic extract of *C. colocynthis* fruit is also active against several food-borne bacteria hazardous to human health (Kim et al., 2014). In company with Hakim Sahib, some fields were visited, during the survey three No of trooh (*Citrullus colocynthis L*) were obtained then cut in slices. We mixed 250 gm corn into slices than we put the slices into pan in order to boil them. During boiling, we mixed a small quantity of water into the slices. When the water of dried up we put the slices of the pan. When the juice of the slices was mixed into the corn the slices were thrown away. The juice mixed corn was pounded and we got powder from it, such powder as used to cure the above said diseases.[ Table no: I ] *Citrullus colocynthis L* (trooh) is particularly found in desert, semi desert, and alluvial soils and known as herbal remedy in the region, as per flora Hippocrates’s advice common diseases of local can be treated with medicinal plants growing in this region. Trooh is more effective medicine than the other medicines for purpose of treatment of many diseases. It was concluded that this ethno medicinal research and discover new medicinal compounds derived from this substance that could be helpful for the treatment of many other diseases . Power of trooh was applied accompanied with Hakeem Muhammad Juman Dayo [ figure no: 4&5 ] for selected three categories of human diseases such as : Diabetes , Paralysis & Constipation & Abdominpain [ Table no: 1] and weekly wise recovery of Patients was noted .

Mean wisely result was obtained . The highest result was 4 of Constipation & Abdominpain Patients and the lowest 1.3 of Paralysis Patients shown in[Graph no: 1]



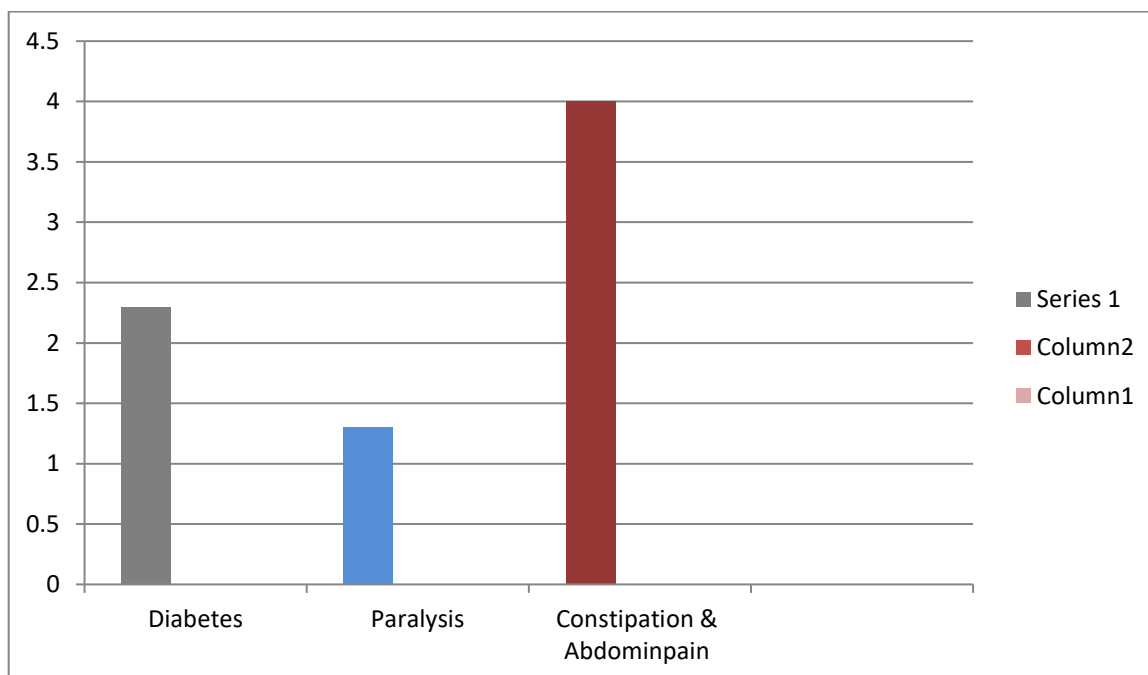
Figure no: 3 A & B Showing research scholar with Hakeem preparing medicines from bitter apple.



**figure no: 4** Showing research scholar accompanied with Hakeem apply medicines of bitter apple to patients at Hakeem’s clinic.

S.No	Medicine	Human Diseases	Treatment of Patients			Mean
			1 <sup>st</sup> week no: of recovered Patients	2 <sup>nd</sup> week no: of recovered Patients	3 <sup>rd</sup> week no: of recovered Patients	
1	Powder of Trooh	Diabetes	3	2	2	2.3
2	Powder of Trooh	Paralysis	1	2	1	1.3
3	Powder of Trooh	Constipation & Abdominpain	4	3	5	4

**Table no 01** shows treated patients and their recovery from two medicines .



**Graph No. 001** shows weekly wise recovery of patients from Trooh Medicians.

### 3. Conclusion

In the present assessment, the nutrient composition and medicinal qualities of *C. colocynthis* have been evaluated based on various previous studies. This review strongly indicates that *C. colocynthis* is a fruit crop that could benefit the treatment of a range of diseases. Although *C. colocynthis* has high dietary value, it is not widely known. More investigations are required to spotlight the utility of such fruit crops as a dietary supplement that can enhance fitness.

It was concluded that trooh an ethno botanical herb, which only exist in sandy regions of sindh, north balochistan, KPK and kashmir. Medicinally most important and this preliminary report will help pharmacutal industry in future research and discovery of this substance derived compounds in the treatment of many diseases. It is main source of saving lives of human beings from dangerous un cure diseases as well.

**REFERENCES:**

- 1) Alagawany, M., Abd El-Hack, M. E., Saeed, M., Naveed, M., Arain, M. A., Arif, M., et al. (2020). Nutritional Applications and Beneficial Health Applications of green tea and L-Theanine in Some Animal Species: A Review. *J. Anim. Physiol. Anim. Nutr. (Berl)* 104, 245–256. doi:10.1111/jpn.13219
- 2) Aftab Saeed and Mohammad AfzalRizvi (1990). Wild medicinal plant of Madinatul -al-Hikmat and its adjacent areas quarterly journal of Bail -A]-HikmatHamdard Foundation Pakistan Vol: xxx111 Page No.96.
- 3) Bilal, R. M., Liu, C., Zhao, H., Wang, Y., Farag, M. R., Alagawany, M., et al. (2021). Olive Oil: Nutritional Applications, Beneficial Health Aspects and its Prospective Application in Poultry Production. *Front. Pharmacol.* 12, 723040. doi:10.3389/fphar.2021.723040
- 4) Dhama, K. (2021b). Curcumin and its Different Forms: A Review on Fish Nutrition. *Aquaculture* 532 (2021), 736030. doi:10.1016/j.aquaculture.2020.736030
- 5) Reda, F. M., El-Saadony, M. T., El-Rayes, T. K., Farahat, M., Attia, G., and Alagawany, M. (2021). Dietary Effect of Licorice (*Glycyrrhiza Glabra*) on Quail Performance, Carcass, Blood Metabolites and Intestinal Microbiota. *Poult. Sci.*, 100, 101266, doi:10.1016/j.psj.2021.101266
- 6) Saeed, M., Naveed, M., Arif, M., Kakar, M. U., Manzoor, R., Abd El-Hack, M. E., et al. (2021). *Biomed. Pharmacother.* 270, 113772. doi:10.1016/j.jep.2020.113772
- 7) Garg, A. K., Faheem, M., and Singh, S. (2021). Role of Medicinal Plant in Human Health Disease. *Asian J. Plant Sci. Res.* 11 (1), 19–21.
- 8) Rasool Hassan, B. A. (2012). Medicinal Plants (Importance and Uses). *Pharm. Anal. Acta* 03, 32153–32435. doi:10.4172/2153-2435.1000e139
- 9) Hussain, A. I., Rathore, H. A., Sattar, M. Z., Chatha, S. A., Sarker, S. D., and Gilani, A. H. (2014). *Citrullus colocynthis* (L.) Schrad (Bitter Apple Fruit): A Review of its Phytochemistry, Pharmacology, Traditional Uses and Nutritional Potential. *J. Ethnopharmacol* 155 (1), 54–66. doi:10.1016/j.jep.2014.06.011
- 10) De Smet, P. A. G. M. (1997). “*Citrullus Colocynthis*,” in *Adverse Effects of Herbal Drugs* (Berlin, Heidelberg: Springer), 29–36. doi:10.1007/978-3-642-60367-9\_4
- 11) Kamran, Z., Ruby, T., Hussain, M., Ali, S., Ahmad, S., Koutoulis, K. C., et al. (2018). Comparative Efficacy of *Citrullus colocynthis* Fruit Powder and Popular Antibiotic Growth Promoters in Broilers. 6th Mediterranean Poultry Summit.
- 12) Meybodi, M. S. K. (2020). A Review on Pharmacological Activities of *Citrullus colocynthis* (L.) Schrad. *Asian J. Res. Rep. Endocrinol.*, 25–34.
- 13) Heydari, M., Homayouni, K., Hashempur, M. H., and Shams, M. (2015). Topical *Citrullus colocynthis* (Bitter Apple) Extract Oil in Painful Diabetic Neuropathy: A Double-Blind Randomized Placebo-Controlled Clinical Trial. *J. Diabetes* 8, 246–252. doi:10.1111/1753-0407.12287
- 14) Qureshi, R., Bhatti, G. R., and Memon, R. A. (2010). Ethnomedicinal Uses of Herbs from Northern Part of Nara Desert, Pakistan. *Pak J. Bot.* 42 (2), 839–851
- 15) Abdulridha, M. K., Al-Marzoqi, A. H., and Ghasemian, A. (2020). The Anticancer Efficiency of *Citrullus colocynthis* toward the Colorectal Cancer Therapy. *J. Gastrointest. Cancer* 51 (2), 439–444. doi:10.1007/s12029-019-00299-6
- 16) Perveen, S., Ashfaq, H., Shahjahan, M., Manzoor, A., and Tayyeb, A. (2020). *Citrullus colocynthis* Regulates De Novo Lipid Biosynthesis in Human Breast Cancer Cells. *J. Cancer Res. Ther.* 16 (6), 1294–1301. doi:10.4103/jcrt.JCRT\_206\_20
- 17) Dhakad, Pk. (2017). Phytochemical Investigation and Anti-diarrheal Activity of Hydroalcoholic Extract of Fruits of *Citrullus colocynthis* (L.) Schrad. (Cucurbitaceae). *J. Mol. Genet. Med.* 11 (305), 1747–0862. doi:10.4172/1747-0862.1000305
- 18) Milanov, D., Ljubojevic, D., Cabarkapa, I., and Aleksic, N. (2016). Impact of Antibiotics Used as Growth Promoters on Bacterial Resistance. *Food Feed Res.* 43 (2), 83–92. doi:10.5937/FFR1602083M
- 19) Bajagai, Y. S., Aalsemgeest, J., Moore, R. J., Van, T. T. H., and Stanley, D. (2020). Phytogenic Products, Used as Alternatives to Antibiotic Growth Promoters, Modify the Intestinal Microbiota Derived from a Range of Production Systems: an In Vitro Model. *Appl. Microbiol. Biotechnol.* 104 (24), 10631–10640. doi:10.1007/s00253-020-10998-x
- 20) Kim, M. G., Lee, S. E., Yang, J. Y., and Lee, H. S. (2014). Antimicrobial Potentials of Active Component Isolated from *Citrullus colocynthis* Fruits and StructureActivity Relationships of its Analogues against Foodborne Bacteria. *J. Sci. Food Agric.* 94 (12), 2529–2533. doi:10.1002/jsfa.6590