Academic Sciences International Journal of Pharmacy and Pharmaceutical Sciences

ISSN- 0975-1491 Vol 5, Issue 3, 2013

Research Article

PHARMACOGNOSTIC STUDY OF *CITRULLUS COLOCYNTHIS LINN* SCHARD LEAVES

BHAGYASHRI.B.TALOLE[1*], DWARKADAS.G.BAHETI[1], MINAKSHI.K.WAJE[2]

[1]Department of Pharmacognosy, Sitabai Thite College of Pharmacy, Shirur, M.S., India, [2] Department of Pharmaceutics, Sitabai Thite College of Pharmacy, Shirur, M.S., India. Email: bhagy_pharma2009@yahoo.com

Received: 10 Feb 2013, Revised and Accepted: 31 Mar 2013

ABSTRACT

Citrullus colocynthis Linn belongs to family Cucurbitaceae. This study includes preparation of different polar and nonpolar extracts by soxhlet extraction for detailed analysis. Establishment of its quality parameters were done as per WHO guidelines including macroscopy and microscopy, ash values, extractive values, loss on drying, phytochemical screening. The preliminary phytochemical studies showed the presence of alkaloids, saponins, tannins, flavonoids, steroids, glycosides, carbohydrate. Qualitative studies indicated presence of trichomes, also have deposition of crystals, anomocytic stomata, There are two Vascular bundles in the midrib, dorsiventral type of leaf, calcium oxalate crystals .These findings will be useful towards establishing pharmacognostic standards on identification, purity, quality and classification of the plant, which is gaining relevance in plant drug research.

Keywords: *Citrullus colocynthis*, Stomatal index, Vein islet, Dorsiventral, Pharmacognostic.

INTRODUCTION

Citrullus colocynthis (L.) Schrad. (Cucurbitaceae), commonly known as 'bitter apple', 'colocynth', and vine-of-Sodom' 'tumba' or 'wild gourd' is a tropical plant that grows abundantly in the south of Iran, and widely in other parts of the world [1]. Leaves are very variable, usually deltoid in outline pale green above ashy beneath, scarbid on both surfaces. Leaves are 5-7 lobed or very commonly 3-lobed. The segment is obtuse, petioles are 13-2.5cm and densely hairy. Fruit is globular, slightly depressed, 2-3inch in diameter. It is variegated green and white glabrous when ripe, filled with dry, spongy, very bitter pulp and epicarp is thin. Seed is 0.16-0.25inch long, pale brown and not margined. Flower having hairy calyx, long and peduncles [2, 3]. In the traditional medicine of Iran, this plant has been used to treat constipation, oedema, bacterial infections, cancer and diabetes, and as an abortifacient, cathartic, purgative and vermifuse, and for the treatment of fever, amenorrhea, jaundice, leukemia, rheumatism Dried pulp of ripe fruit use as cathartic, drastic purgative, irritant and toxic.[4, 5, 6, 7]. For this reasons we report the macroscopic and microscopic and some other pharmacognostic characters for the leaves of the *C. colocynthis*, which could be used to prepare a monograph for the proper identification of the plant.

MATERIAL AND METHODS

Plant Material

Fresh Leaves of *C. colocynthis* were collected from Ahmednagar district of Maharashtra in September 2009 and authenticated by Mr. S.C. Majumdar, Botanical Survey of India, Pune, where a sample specimen (Voucher number: BSI/ 501) has been deposited.

Qualitative Investigation

The macroscopic features of the fresh leaves of *C. colocynthis* were determined using the method of Evans [8]. Anatomical sections, surface preparations of the fresh leaves and powdered samples for the microscopy and chemo-microscopy were carried out according to methods outlined by Brain and Turner [9].

Quantitative Investigation

The moisture content, ash and extractive values of the powdered leaves samples and the quantitative microscopy on the anatomical section and the epidermal strips of the fresh leaf of the plant to determine the stomatal index, vein islet and were carried out as described in the Indian Pharmacopoeia [10] and Khandelwal [11].

Phytochemical Investigation

The preliminary phytochemical investigation was done by the standard chemical tests of Evans [8].

RESULTS AND DISCUSSION

The leaf is dorsiventral, mesomorphic and amphi stomatic.It consists of thick squarish and wide abaxial midrib and smooth thick lamina (Fig.1.A). It consists of narrow epidermal layer of thick walled cylindrical cells and angular thick walled compact paranchymatous ground tissue. On the adaxial end of the midrib the palisade tissue continues, leaving gap of parenchyma cells. There are two Vascular bundles in the midrib. Both bundles are bicollateral .Phloem occurs both on the inner and outer part of the xylem and so that bundles are called bicollateral (Fig 1, B).

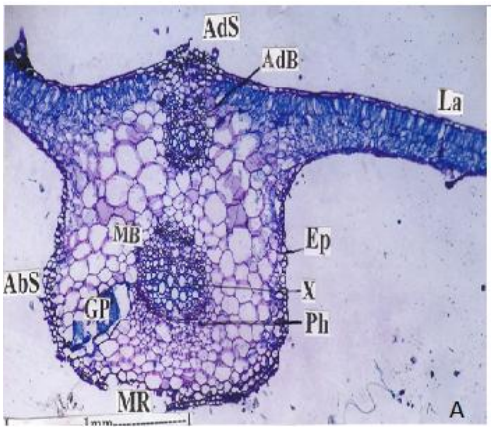

Fig. 1: A: Histology of *C.colocynthis* leaf through midrib with lamina.

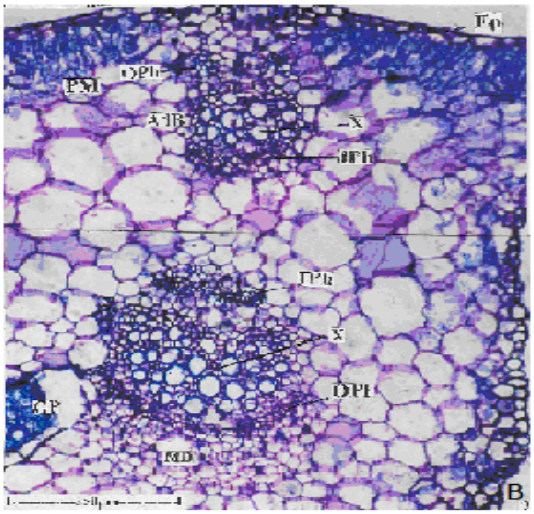

Fig. 1.B: Transverse section of *C.colocynthis* leaf showing Xylem and Phloem

The mesophyll tissue consists of adaxial broad zone of palisade cells and lower zone of spongy parenchyma. The palisade is single layered. The spongy parenchyma has about 5 layers of large, lobed cells forming inter cellular air-chambers (Fig 1, C.C'). Calcium carbonate crystals are often seen deposited in the epidermal cells, especially in the adaxial epidermal cells, beneath the trichomes (Fig 1, D). The stomata are of anomocytic type of stomata.Parenchyma cells of different size and shapes are seen in the powder (Fig 1, E). Some of them are long and fiber like with thin walls. Some of them are wide and cylindrical .The quantitative determination of some pharmacognostic parameters is useful for setting standards for crude drugs.

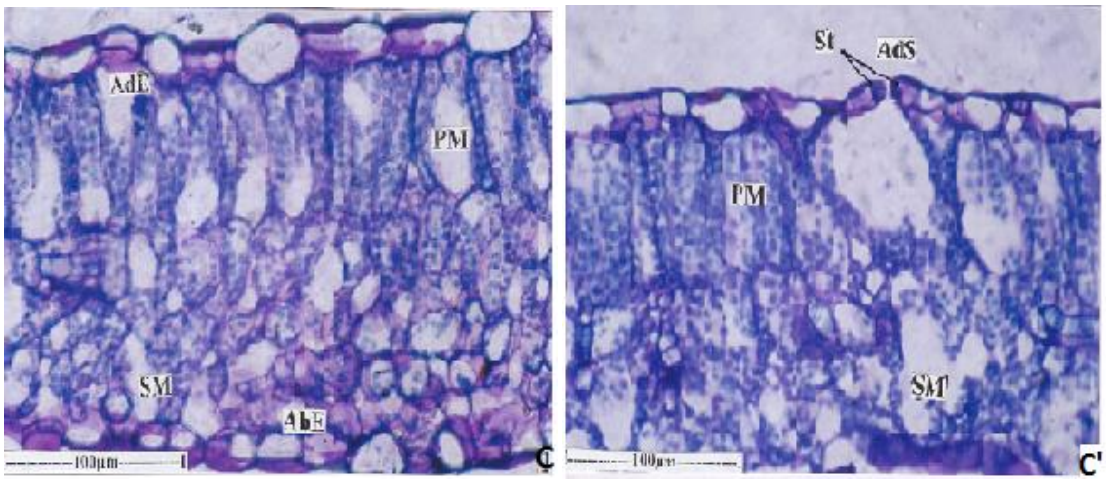

Fig. 1.C, C': Transverse section of lamina.

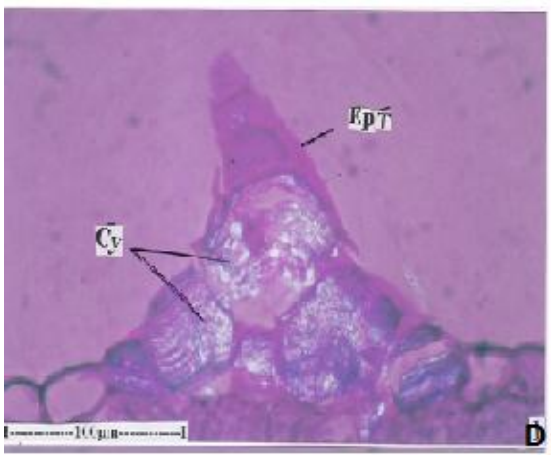

Fig. 1.D: Transverse section of leaf through epidermal trichome.

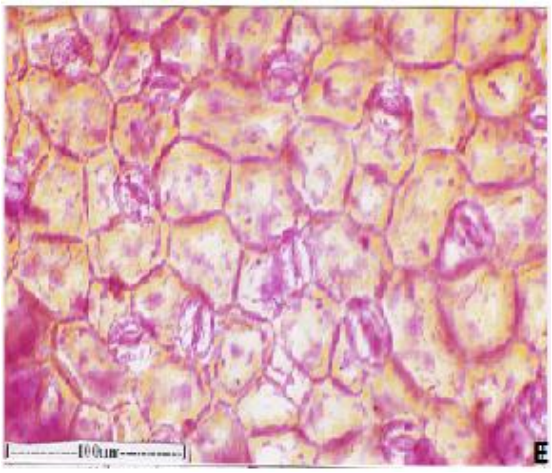

Fig. 1.E: Stomata of *C.colocynthis* leaves.

Fig. 1.F: (A-Chains of spherical shape, B-Elongated parenchyma, C- Fiber like parenchyma)

The various leaf constants determined in the quantitative microscopy are relatively constant for plants and can be used to differentiate closely related species. The physical constant evaluation is an important parameter in detecting adulteration or improper handling of the drug (Table.no.1). Various ash values are important to determine purity of the drug i.e. the presence or absence of foreign organic matter (Table.no.2). Different chemical compounds such as steroids, alkaloids and flavonoids, carbohydrates, proteins, glycosides, saponins, amino acids and phenolic compounds were detected in *C. colocynthis*, which could make the plant useful for treating different ailments and having potential of providing useful drugs of human use (Table.no.3). Since the plant *C. colocynthis* is useful in the traditional medicine for the treatment of some ailment, it is important to standardize it for use as a drug. The pharmacognostic constants for the leaves of this plant, the diagnostic microscopic features and the numerical standards reported in this work could be useful for the compilation of a suitable monograph for its proper identification.

Table 1: Quantitative microscopy of the leaves of *C. colocynthis*

S. No.	Determinations	Range*
1	Stomatal number	19.8-22.6
2	Stomatal index (Upper surface)	12.5-28.5
3	Stomatal index (Lower surface)	25.0 -31.2.
4	Vein islet number	29-38

*Range is of ten counts

Table 2: Evaluation of some Pharmacognostic standards of the powdered leaves of *C.colocynthis*

S. No.	Evaluation parameters	Value (%w/w*)
1	Foreign organic matter	1
2	Moisture content	5.5
3	Total ash value	16
4	Water-soluble ash value	3.5
5	Acid-insoluble ash value	4.5
6	Water soluble extractive value	19.2
7	Alcohol soluble extractive value	16.8

*Mean value of five counts

Table 3: Preliminary phytochemical investigation of various extracts of *C.colocynthis*

S. No.	Chemical Test	Petroleum-ether Extract	Ethanol Extract	Aqueous Extract
1	Flavonoids	++	++	++
2	Alkaloid	+	+	+
3	Saponins	-	+	+
4	Steroid	++	++	-
5	Glycoside	-	++	-
6	Tannin (Phenolic compounds)	-	+	+
7	Carbohydrate	-	++	++
8	Amino acid	-	-	-
9	Protein	-	-	-

+: indicates presence of constituents

-: indicates absence of constituents

REFERENCES

1. GRIN Database, USDA, ARS, National Genetic Resources Program, Germplasm Resources Information Network (GRIN), National Germsplasm Resources Laboratory, Beltsville, Maryland; 2006. p.10674
2. Kirtikar KR, Basu BD. Indian Medicinal Plants, Vol-I, 2nd ed, Dehradun, International Book Distributors; 1991.p.1147-1149
3. Nadkarni KM. Indian Materia Medica, Vol-I, 3rd ed, Bombay Popular Prakashan; 1982.p.335-337.
4. Madari H, Jacobs RS. An analysis of cytotoxic botanical formulations used in the traditional medicine of ancient Persia as abortifacient, J. Nat. Prods 2004; 67: 1204-1210.
5. Dr. Duke's Phytochemical and Ethnobotanical Databases, Ethnobotani Dr. Duke's Phytochemical and Ethnobotanical Databases, Ethnobotanical uses of *Citrullus* (Cucurbitaceae); 2006.
6. Ambasta SP. The Useful Plants of India, New Delhi; 1992.p.127
7. Agrawal SS, Paridhavi M. Herbal Drug Technology, Hyderabad, University press; 2007.p.52
8. Evans WC. Trease and Evans' Pharmacognosy. 15th ed, London, W.B. Sounders Company Ltd; 2005.p.545-547.
9. Brain KR, Turner TD. The Practical Evaluation of Phytopharmaceuticals, Bristol Wright Science Technical; 1975.p. 81-82.
10. Anonymous. The Indian Pharmacopoeia, Vol. II, New Delhi, The Controller of Publications, Government of India; 1996. A-53, A-54, A-89.
11. Khandelwal KR.Practical Pharmacognosy Techniques and Experiments. 13th ed, Nirali Prakashan; 2005.p.149-153.