Asian J. of Adv. Basic Sci.: 3(1), 2014, 222-227
ISSN (Online): 2347 - 4114
www.ajabs.org

Morphological and Physicochemical Analysis of *Ipomoea cairica* Leaves

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(Received 11 Jan, 2015; Accepted 19 Jan, 2015; Published 24 Jan, 2015)

ABSTRACT: In this study the preliminary pharmacognostical studies such as, morphology and transverse section of the leaf were observed. Physicochemical evaluation such as, foreign matter, moisture content, different extractive values, different ash values and fluorescence analysis were performed to explore the constants of noxious weed *Ipomoea cairica*. The foreign matter adulterated in one gram powder was found to be 0.15gms, alcohol soluble extractive 0.25g and chloroform soluble extractive 1.75g. Total ash value 1.02g, Acid insoluble ash value (dil. HCl) 0.85 g; Sulphated ash value (H_2SO_4) 0.43g; Water soluble ash value (H_2O) 0.78g. Fluorescence analysis showed Orange fluorescence in concentrated sulphuric acid and 1N NaOH but no colour in Nitric acid, concentrated HCl, IN HCl and Dilute Nitric acid.

Keywords: *Ipomoea Ipomoea cairica*; bioactive constituents; Fluorescence; Morphology; Pharmacognostical study; physicochemical analysis; Transverse section.

INTRODUCTION

Ipomoea cairica (L) Sweet, Convolvulaceae–commonly known as "Rail road vine" (Figure 1) is an evergreen perennial climbing herb with twinning stems, which tend to lignify at the base and shows rooting at the nodes. This plant is found growing in the tropical and subtropical regions of the world. It bears fairly large, attractive flowers which range from white to lavender in colour. The mature fruit is small measuring close to 1 cm across and contain hairy seeds (Figures 2 & 3). *Ipomoea cairica* is used in Brazilian folk medicine for curing rheumatism and inflammations[1]. The major constituents of the extract are the coumarins, scopoletin, umbelliferon and the lignans, arctigenin, matairesinol and trachelogenin[2&3]. Aqueous extract from *I. cairica* showed anti-RSV (respiratory syncytial virus) activity *in vitro*[4]. The ethanolic extract of this plant presents an antinociceptive effect[5]. Arctigenin, the most cytotoxic compound shows antioxidant and anti-inflammatory activities[6], as well as, it inhibit the replication of human immunodeficiency virus[7]. The essential oil of *I. cairica* possesses remarkable larvicidal properties. It could induce 100% mortality in the larvae of *Culex tritaeniorhynchus* (100 ppm), *Aedes aegypti* (120 ppm), *Anopheles stephensi* (120 ppm) and *Culex quinquefasciatus* (170 ppm) [8, 9 & 10]. This plant shows high sun tolerance, high disease and pest tolerance[11.] The bioactive constituents isolated from the plant are alkaloids, sterols, flavonoids, reducing sugars, tannins, saponins, terpenoids, anthraquinones, glycosides and phenols[12].The plant has high medicinal value even though very little-known about its Pharmacognostical, Physiological, Phytochemical and Phytopharmacological properties. Hence, the study was undertaken with standard protocol for evaluation of its medicinal properties. This study reveals the preliminary information about its morphology, internal organization, pharmacognostical and physicochemical properties.

MATERIAL AND METHODS

Collection and preparation of plant: The whole plant of *Ipomoea cairica* was collected from the open field of Gorakhpur–Doeria road, Gorakhpur district, Uttar Pradesh during the month of July to November

2014. The collected samples were authenticated by Prof. K. Shukla Prof. & Ex-Head, Department of Botany, D.D.U Gorakhpur University, Gorakhpur, Uttar Pradesh and the specimen was deposited in the department. From the plant, leaves were separated and washed properly with water and are shade dried for 15 days. After drying the leaves are powdered using a mechanical grinder and was sieved with mesh no #60 (Drug sample), and are stored in air tight containers for further studies.

Figure 1: *Ipomoea cairica* plant with flowers

Figure 2: Fruits of *Ipomoea cairica*

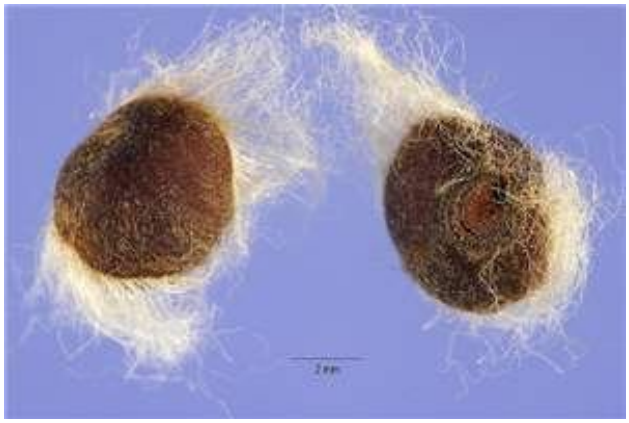

Figure 3: Seeds of *Ipomoea cairica*

Figure 4: Leaf of *Ipomoea cairica*

Pharmacognostical study:

*Leaf morphology***:** As per standard procedure matured 25 leaves are taken for the evaluation of morphology of leaves and various parameters such as length, width, margin, apex, surface, colour, odour, taste, type, base, midrib and size are studied.

*T. S. of leaf***:** The transverse section of the leaf of *Ipomoea cairica* was done by using method described in the standard protocol[13].

Physico-chemical studies[14 & 15]:

Foreign matter: Weighed 100–500 g of the drug sample to be examined and spread it out in a thin layer. The foreign matter was detected by inspection with the unaided eye or by the use of lens (6 xs). Separate and weigh it and calculate the percentage present

$$\%\ \text{of foriegn matter} = \text{Amount of Foreign matter}\ X\ \frac{100}{\text{Amount of drug taken}}$$

Moisture content: Place about 10g of drug (without preliminary drying) after accurately weighing (accurately weighed within 0.01g) it in a tarred evaporating dish. For example, for underground or unpowered drug, prepare about 10g of the sample by shredding so that the parts are about 3mm in thickness. Seeds and fruits, smaller than 3mm were cracked. Avoided the use of high speed mills in preparing the samples, and exercise care that no appreciable amount of moisture is lost during preparation

and the portion taken is representative of the official sample. After placing the above said amount of the drug in the tarred evaporating dish dry at 105°C for 5 hours, and weigh. Continued the drying and weighing at one hour interval until difference between two successive weighing corresponds to not more than 0.25 per cent. Constant weight is reached when two consecutive weighing after drying for 30 minutes and cooling for 30 minutes in a desiccator, showed not more than 0.01 g difference.

Extractive values:

Alcohol soluble extractive: Macerated 5g of the air dried drug, coarsely powdered, with 100 ml of Alcohol of the specified strength in a closed flask for twenty four hours, shaked frequently for six hours and allowed to stand for eighteen hours. Filtered rapidly, taking precautions against loss of solvent, evaporated 25 ml of the filtrate to dryness in a tared flat bottomed shallow dish, and dry at 105°C to constant weight and weigh. The percentage of alcohol soluble extractive with reference to the air dried drug was calculated.

Chloroform soluble extractive: Macerated 5g of the air dried drug, coarsely powdered, with 100 ml of chloroform water of the specified strength in a closed flask for twenty four hours, shaked frequently for six hours and allowed to stand for eighteen hours. Filtered it rapidly, taking precautions against loss of solvent, evaporated 25 ml of the filtrate to dryness in a tared flat bottomed shallow dish, and dry at 105°C, to constant weight and weigh. Calculate the percentage of chloroform water soluble extractive with reference to the air dried drug.

Determination of ash values:

Total Ash value: Incinerated 3 gm accurately weighed, of the ground drug in a tared silica dish at a temperature not exceeding 450°C until it is free from carbon, cool and weighed. If a carbon free ash cannot be obtained in this way, exhausted the charred mass with hot water, collected the residue on an ash less filter paper, incinerated the residue and filter paper, added the filtrate, evaporated to dryness, and ignited at a temperature not exceeding 450°C. The percentage of ash with reference to the air dried drug was calculated

Determination of Water soluble Ash: Boiled the ash for 5 minutes with 25 ml of water, collected insoluble matter in a Gooch crucible. Subtracted the weight of the insoluble matter from the weight of the ash, calculated the percentage of water-soluble ash with reference to the air dried drug.

Determination of Acid Insoluble Ash: Boil the ash obtained in total ash for 5 minutes with 25 ml of dilute hydrochloric acid, collect the insoluble matter in a Gooch crucible, washed it with hot water and ignite to constant weight. Calculate the percentage of acid- insoluble ash with reference to the air dried drug.

Determination of Sulphated Ash: Weigh 1 gm of fresh powder in a Gooch crucible and ignite it at 600°C for 10 minutes remove the crucible and add 10 ml of sulphuric acid and again ignite for 10mins at 600°C. Remove and calculate the percentage of sulphated ash with reference to the air dried drug.

Fluorescence analysis: Fluorescence characteristics of the powdered leaves of *Ipomoea cairica* was observed in the daylight and UV light. Also the fluorescent study was performed by treating the drug powder with different chemical reagents, and the samples are studied under UV-cabinet at 254 and 365 nm.

RESULTS AND DISCUSSION

In this study the preliminary pharmacognostical studies such as, morphology and transverse section of the leaf were observed. Physicochemical evaluation such as, foreign matter, moisture content, different extractive values, different ash values and fluorescence analysis were performed to explore the constants of the study species.

Morphological Characters:

Size: The alternately arranged leaves were divided into five or seven narrow lobes, like the fingers of a hand (*i.e*. they are palmately lobed). Length-3 to 10 cm; Width-3 to 10 cm; Colour: dark green- pale green; Odour: characteristic; Taste: Acrid to sour; Surface: plain surface green in colour darker on the upper side and pale on the lower side of the leaf. Margin: Entire; Apex: sharp; Midrib: Upper surface-

midrib is prominent; Lower surface- midrib is prominent .These leaves are hairless (*i.e.* glabrous) and borne on stalks (*i.e.* petioles) 2-6 cm long (Figure 4).

Transverse section: The observed microscopical characteristics are discussed (Figures 5 & 6)

Figure 5: T. S. of leaf *of Ipomoea cairica*

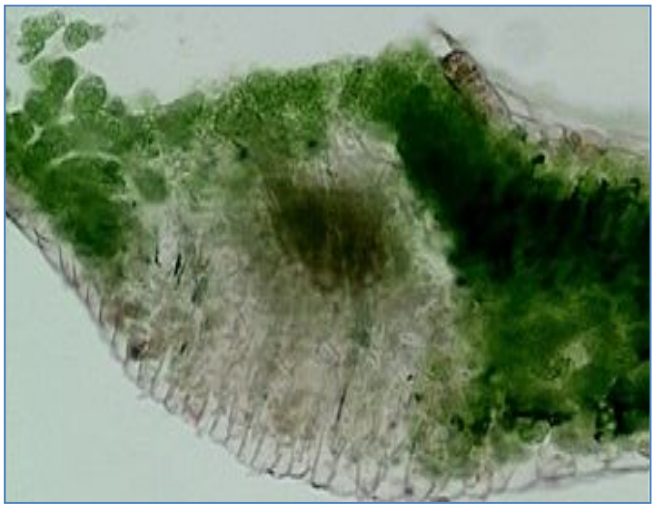

Figure 6: T.S. of leaf of *Ipomoea cairica* showing midrib

Upper Epidermis: The epidermal cells are polygonal, transverse, elongated, thick walled, non lignified cells.
Lower Epidermis: Lower epidermis is arranged as that of upper epidermis.
Palisade Cells: They are vertically, compactly arranged below the upper epidermis and above the lower epidermis. The palisades are continued up to the lamina portion at lower epidermis and are terminated at the midrib portion, replaced by collenchyma. In the upper part, the palisades continued, but at the centre of the midrib they are occupied by reticulate parenchyma.
Vascular bundle: The centre portion of the midrib is occupied by mono arc type of vascular bundle embedded with lignified xylem and non lignified phloem. Both xylem and phloem are encircled by parenchymatous cells.
Trichomes: In both the epidermal layers, glandular trichomes are seen. They are uniseriate, unicellular and glandular in nature.
Collenchyma: Irregular, spherical shaped collenchymatous cells are present in the midrib as well as in the bottom of midrib.
Lamina: Spongy parenchyma: The lamina portions between the upper and lower palisade cells are occupied by spongy parenchyma and some of the cells have calcium oxalate crystals and starch grains.

Physicochemical constants:
Determination of Physicochemical constants is performed as per the standard protocol followed in the Ayurvedic pharmacopoeia. The values are tabulated in (Table 1 and 2).
The foreign matter adulterated in one gram powder was found to be 0.15gms.
The moisture content was found to be 0% in one gram of powder

Table 1: Different extractive values

Extractive value	Values in grams
Alcohol soluble extractive	0.25
Chloroform soluble extractive	1.75

Table 2: Different ash values of *Ipomoea cairica* leaves

ASH value	Values in gram
Total ash value	1.32
Acid insoluble ash value (dil. HCl)	0.85
Sulphated ash value (H_2SO_4)	0.43
Water soluble ash value (H_2O)	0.78

Fluorescence analysis: Fluorescence analysis was studied under ultraviolet light and daylight background of UV cabinet and the observations was tabulated in Table 3.

Table 3: Fluorescence analysis

Reagent used	Result obtained
Concentrated sulphuric acid	Orange fluorescence
Nitric acid	No fluorescence
Concentrated HCl	No fluorescence
1N HCl	No fluorescence
1N NaOH	Orange fluorescence
Dilute nitric acid	No fluorescence

CONCLUSION

This study reveals preliminary idea about microscopical and physicochemical observation of the leaf of *I.cairica.* The plant shows the presence of many chemical constituents which are responsible for various pharmacological medicinal properties. Hence *Ipomoea cairica* has a leading capacity for the development of good efficacy drugs in future. The present investigation adds to the existing knowledge of *Ipomoea cairica* and will be quite useful for development of a formulation for treating various ailments.

ACKNOWLEDGEMENT

The authors are thankful to Kalash Institute of Pharmacy, Gida, Gorakhpur for providing necessary facilities to carry out this work. One of the authors Dr. Deepa Srivastava is thankful to UGC, New Delhi for providing post doctoral fellowship.

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