

Pharmacognostical and Phytochemical study of *Costus igneus* NE Br leaf



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Abstract

For acceptance and globalization of Ayurveda there is need to analyze herbal drugs according to modern techniques. Assessment of complete and accurate physicochemical value of herbs used in Ayurveda provides scientific basis of its quality. This study is a preliminary effort to provide basic analytical values for *Costus igneus* leaf powder. *Costus igneus* is traditionally known as insulin plant in Maharashtra. In India it is grown in garden as ornamental plant. This plant is becoming popular because of its anti diabetic property. The present study includes organoleptic, pharmacognostical and physicochemical examination of leaf of this species.

Key words: *Costus igneus*, pharmacognostical, phytochemical.

Introduction

Nature has provided a complete store- house of remedies to cure all ailments of mankind. The knowledge of drugs has accumulated over thousands of years as a result of man's curiosity towards nature, so that today we possess much effective recourse for ensuring health care. The medicinal use of plants is carried since ancient time in India, China, Greece etc. [1]. The concept of standardization and quality control of drug can be found in ancient Ayurvedic texts [2]. In those days the physician used to collect the drug himself. He identified and checked the drugs with the help of *Shabda* (sound), *Sparsha* (texture), *Rupa* (color), *Rasa* (taste), *Gandha* (smell) and also based on habitat, morphology etc. After checking all these factors the drug would be used as medicine. The nomenclature of many herbs denotes their physical, chemical characteristic and therapeutic uses which are considered as primitive standardization parameters [3]. For example the name *Magadhi* (*Pippali*) denotes its habitat, *Shothaghni* (*Punarnava*) means its action on *Shotha* (oedema),

Shwandanshra (*Gokshura*), *Triparna* (*Palasha*) etc. represents morphology of individuals[4]. In current period recent advances has identified many test and parameters to evaluate quality control of drugs. Therefore it is necessary to provide standard parameters for the quality control of *Costus igneus* leaf powder which can be beneficial for further quality control researches.

Costus igneus, common known as *Fiery Costus* or *Insulin plant* or *Spiral Flag*, is a species of herbaceous plant in the *Costaceae* family [5]. The plant grows very quickly and the propagation is by stem cutting. The plant also grows in slightly shady areas too [6]. This plant has large fleshy looking leaves. The undersides of these large, smooth, dark green leaves have light purple shade. The leaves are spirally arranged around the stem, forming attractive, arching clumps arising from underground rootstocks. The maximum height of these plants is about two feet. The flowers are orange in color and are beautiful, 1.5-inch diameter.(Fig. A1) Flowering occurs during the

warm months and they appear to be cone-like heads at the tips of branches [7]. This plant was initially grown in America and is now becoming popular in India because of its medicinal properties. [8] It is now accepted and used widely as a medicinal herb. It is observed that consumption of the leaves helps in lowering the blood glucose levels, and diabetics who consumed the leaves of this plant reported fall in their blood glucose level [9,10,11,12]. Present day advances have identified many parameters to evaluate the quality and standardization of herbs. The present study carried out was to establish the methods of proper identification of *Costus igneus* leaf with the help of preliminary analytical studies that are helpful in further quality control researches of the drug.

Materials and methods

This study was carried out in the department of Bio-Technology, Mahatma Gandhi Rural Industrialization, Wardha in collaboration with Department of Dravyaguna of Mahatma Gandhi Ayurved College and Research Center Wardha (MS).

Collection of Plant material

Leaves of *costus igneus* were collected from 'Bhavamishra vatica' (Herbal garden) of Mahatma Gandhi Ayurved college and Research Center, Wardha (MS). The drug was properly identified with the help of identification features mentioned in floras [13, 14, 15,16].

The *Costus igneus* leaf was studied for pharmacognostical i.e. macroscopic and microscopic characters, organoleptic characters i.e. colour, texture, odor, taste. physicochemical tests like pH, Loss on drying, Total ash, Acid insoluble ash, Alcohol soluble extract, Water soluble extract and Phyto-chemical array [17].

Colour	Brown dry powder
Texture	Smooth and powdery
Odor	Not specific
Taste	Amla, Kashaya

Pharmacognostical study-

Microscopic characters like epidermal cell, stomatal index, vein islet number was carried out by using standard procedures [18,19,20].

Observation and results

Macroscopic study:

Leaves are simple, sessile, alternate, exstipulate with sheathing leaf base, green, thin with smooth glabrous leathery surface, Lanciolate, elliptical, uncostate. Convergent is parallel with equally thick venation. Each leaf measures 10 to 11 cm long, 5 to 8 cm breadth and 1 mm thickness. Margin is entire, wavy, leaf apex is acute. The tender leaves projects growing apex, leaves are dark green adaxially (upper), light green abaxially. (Fig. A2)

Microscopy of Leaf:

The T.S. of leaf (Fig. A3, A4) shows the upper irregular transversely elongated thin walled two to three layered epidermis. Below it is 4-5 layered thin walled mesophyll cells which are wide and elongated. Figure A5 shows the vascular bundles at the lamina are collateral having wide xylem and small clusters of phloem. At the end of the bundles a band of sclerenchyma is prominent. A bundle sheath is not prominent. There are uniseriate filamentous hairs at the upper epidermis. Starch grains inside the parenchyma of mesophyll is conspicuous. Figure A6 shows the stomatal Index is 9-10 on the lower side. Vein islet no. 7 to 13/sq.mm.

Physico-chemical study:

Figure A7 shows Isolation of saponin and flavonoid by TLC, a) Isolation of saponin, b) Isolation of flavonoid, c) Flavonoid conformation test. The organoleptic study conducted as per the standard protocol [21,22] is depicted in Table 1.

S.N.	Particular	Value
1	pH	8
2	Loss on drying	0.48 gm%
3	Total ash	15.5 % w/w
4	Acid insoluble ash	0.1%w/w
5	Water soluble ash	0.17%
6	Water soluble extractive	38%
7	Alcohol soluble extractive	8%

Physicochemical values [23,24,25] (Table 2) were analyzed by standardized quality control methods for medicinal plants materials.

Powder microscopy:

Figure A8 shows the uniseriate hairs, parenchymatous cells, xylem elements, sclerenchymatous cells and starch grains.

Discussion

Costus igneus leaves were studied for organoleptic, pharmacognostical, physicochemical and phytochemical in order to provide the standard hypoglycemic herbal medicine for diabetes management. Leaves are simple, sessile, alternate smooth glabrous leathery surface, margin is entire, wavy, and leaf apex is acute. T.S. of leaf shows epidermis, elongated mesophyll cells, vascular bundles, pigments, xylem and small clusters of phloem. Physicochemical values reveal the standard values of *Costus igneus* for provide standard drug for therapeutic uses as well as prevents the adulteration in it. The fresh leaf of *Costus igneus* were extracted in ethanol, methanol. Among the both extracts, ethanol extract contained most of the compounds such as Tannins, Phlobatannins, Saponin, Flavonoids, Terpenoids and Cardiac Glycosides. Quantitative phytochemical analysis revealed that Saponin and Flavonoids were in leaf. Flavonoid and saponin were studied to responsible for antidiabetic activity in *Costus* (family: *Costaceae*) [27]. Therefore flavonoid and saponin compounds were isolated.

Conclusion

It can be concluded that the good organoleptic, pharmacognostical, physicochemical values and phytochemical study are useful in authentication of *Costus igneus*.

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Table 3: phytochemicals study

Sr No	Leaf Extract	tannins	phlobatannins	saponin	Flavonoid	Steroid	Terpenoids	Cardiac glycosides
1	Methanol	+	+	-	+	-	+	+
2	Ethanol	+	+	+	+	+	+	+

Qualitative analysis of phytochemicals in leaf of *Costus igneus* (Table 3): Presence of various compounds i.e. tannins, phlobatannins, saponin, steroid, terpenoids, cardiac glycosides were analysed in ethanol, methanol extracts of leaf[26].



Fig: A1 - Natural habitat of *Costus igneus* N.E.Br. (Side)
Fig A2 - *Costus* Leaf to the scale (above)

Order: Zingiberales, Family: Costaceae
Genus: *Costus*, Species: *Costus igneus* N.E.Br.

Figure- A3 T.S. of leaf under 10x

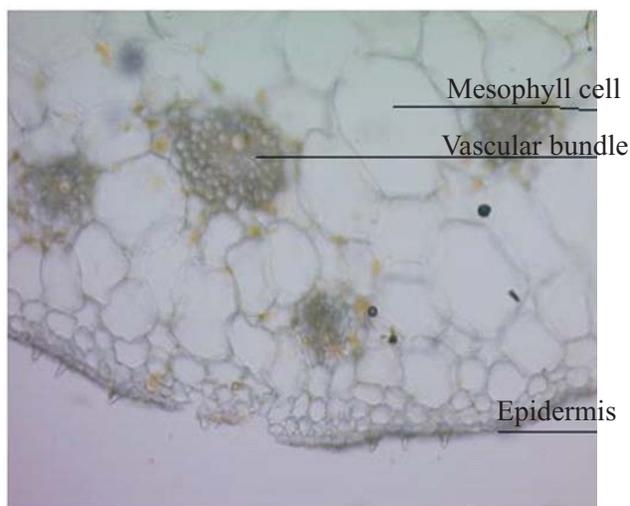
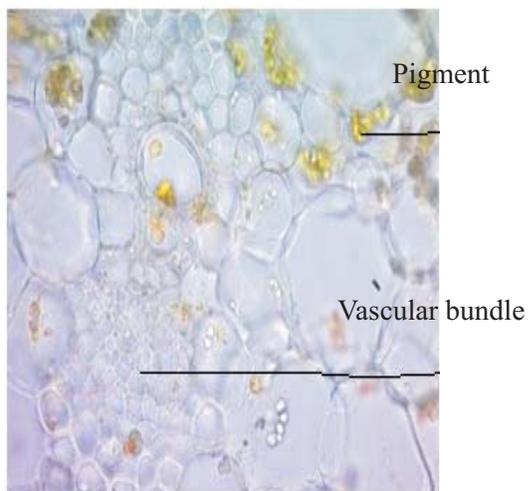


Figure A4 T.S. of leaf under 10x



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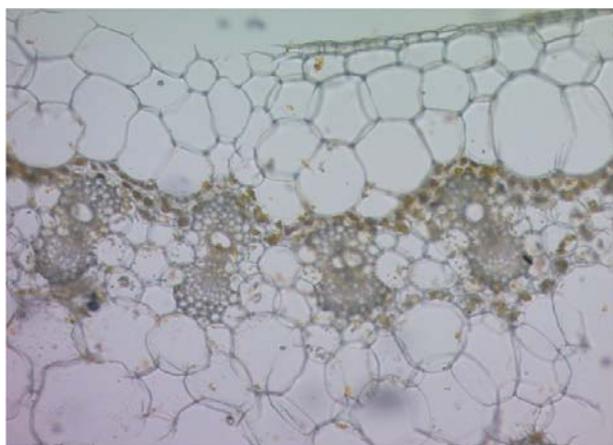


Figure A5 T.S. of leaf under 10x

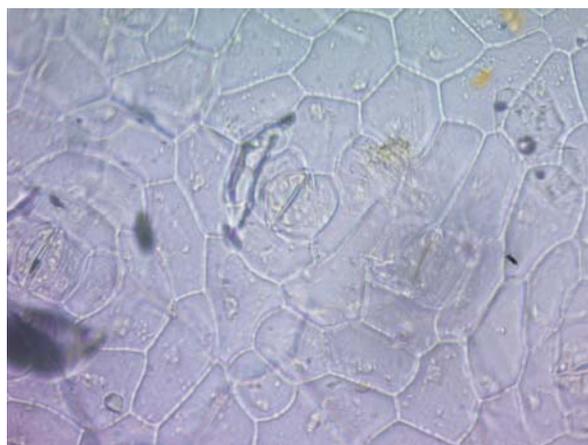


Figure A6 T.S. of leaf under 40x

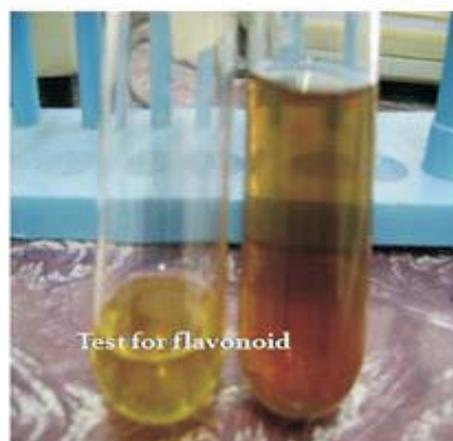
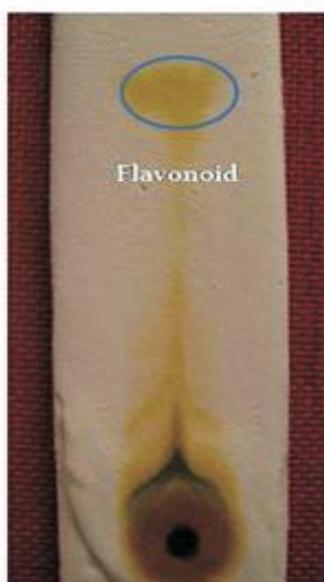


Figure A7 shows Isolation of sapogenin and flavonoid by TLC[28]



Figure A8 showing powder 10x.
The powder Microscopy

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