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Pharmacognostic and phytochemical study of leaves of *Quisqualis indica* Linn.

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ABSTRACT

Leaves of *Quisqualis indica Linn.* (Family Combretaceae) is commonly known as Rangoon creeper , traditionally used as anthelmintic.. The fresh leaf was studied for pharmaconostic evaluations, including examination of morphological and microscopic characters, determination of leaf constants, ash values and extractive values. The morphological studies revealed that the leaf is in dark green color with characteristic odour and slight bitter taste. The shape of *Quisqualis indica* leaves is as elliptical-acuminate with entire margin, cordate base, and length varying from 7-12cm . Dorsal side is glabrous and ventral surface is hairy .Powder study revealed the presence of covering trichomes, annular xylem vessell,calcium oxalate crystals and anomocytic stomata. The stomatal index 18.75-19.02 ,vein islet number is 7-10, vein termination is 3-5,palisade ratio 6-7. The Moisture content, Total ash, acid insoluble ash, water-soluble ash values and sulfated ash were observed to be 8% ,9%,12.5%,6.55%and 5.45% w/w respectively. Water-soluble extractive values , Alcohol soluble extractive value and petroleum ether soluble extractive value of the leaves were observed to be 10%, 3% and1% w/w respectively. The phytochemical test revealed the presence of alkaloids, slight amount of glycosides, tannins, flavonoids and protein in both extract.

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KEY WORDS: *Quisqualis indica,* Pharmacognostic evaluation, Phytochemical test, anomocytic, cordate.

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INTRODUCTION

In the last few decades there has been an exponential growth in the field of herbal medicine. It is getting popularize in developing and developed countries owing to its natural origin and lesser side effects. In olden times, *vaidyas* used to treat patients on individual basis, and prepared drugs according to the requirement of the patients. But the scene has been changed now; herbal medicines are being manufactured on a large scale in mechanical units, where manufacturers are facing many problems such as availability of good quality raw material, authentication of raw material, availability of standards, proper standardization methodology of drugs and formulations, quality control parameters and etc.[1,2]

Quisqualis indica Linn (Combreteceae) is a strong climber, ligneous vine that can reach from 2.5 meters to up to 8 meters(Fig 1). It is commonly known as Rangoon creeper. It is indigenous in Africa,Indo Malaysian region and cultivated all over India[3].Flower numerous,pendent,7.5cm long,3.8cm wide. At first they are white in colour then they become deep red. In amboynas ,the leaves are given in a compound decoction for flatulent distension of the abdomen. In China the ripe seeds are roasted and given in diarrhea and fever. A popular anthelmenic among the inhabitants of North Annan[4]. There was no report on the extensive pharmacognostic studies of this plant species. Meanwhile, in this investigation the phytochemical studies of the leaves extract is also carried out. To the best of my knowledge, this is the first time the leaf was screened for pharmacognostic study.

Figure 1: Leaves and flowers of plant *quisqualis indica* linn.

MATERIAL AND METHODS

PLANT MATERIAL AUTHENTICATION

The mature green leaves of ***Quisqualis indica*** **Linn** were collected in the morning locally from Jaipur District, Rajasthan ,India, in the month of August 2009. The plant was identified and authenticated by the Botanist, from the Department of Botany, University of Rajasthan, Jaipur, India. A voucher specimen **(RUBL20663)** is deposited in the Department of Botany, University of Rajasthan.

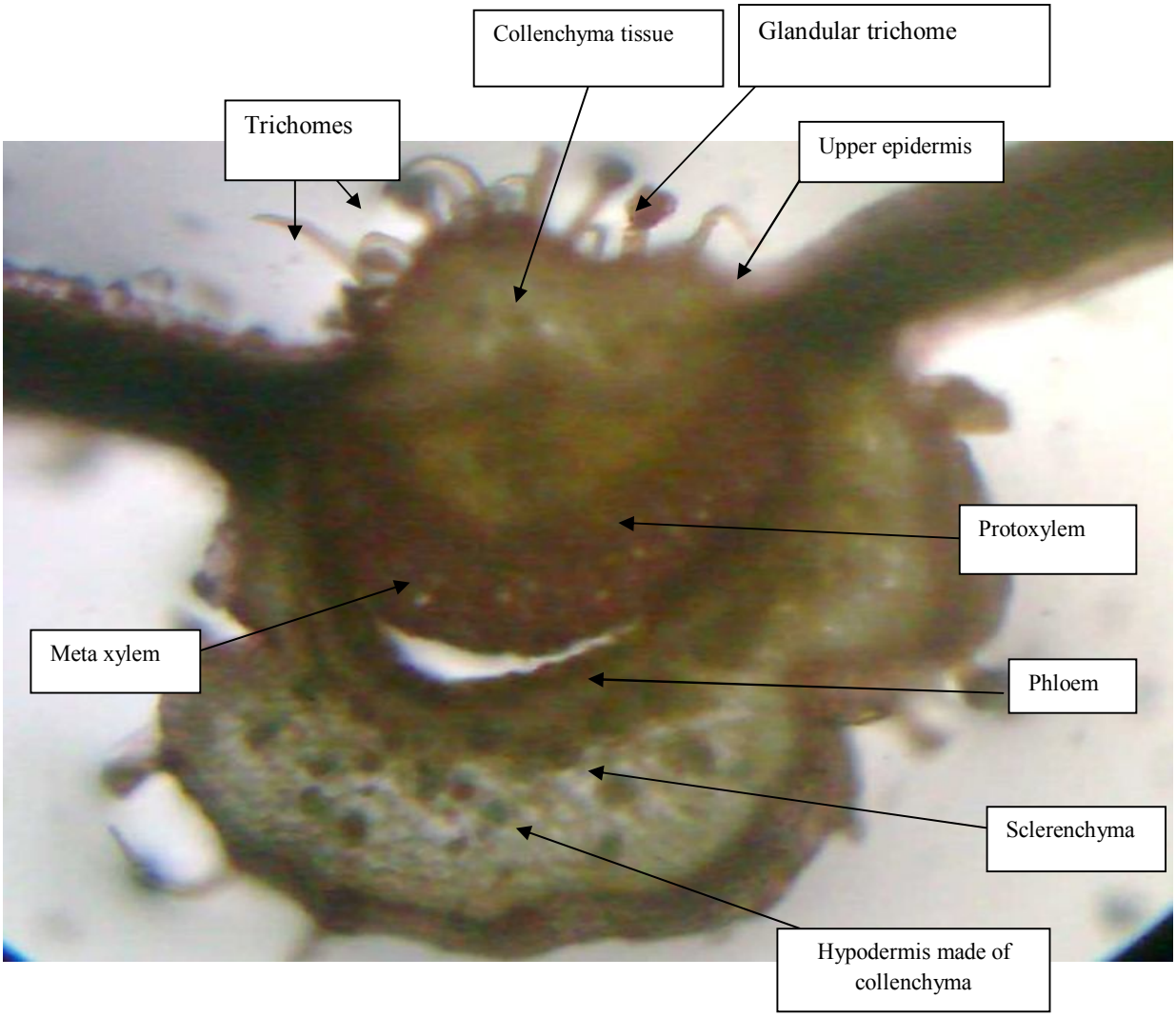


Figure 2: Transverse section of leaf of *quisqualis indica*

PHARMACOGNOSTIC STUDIES

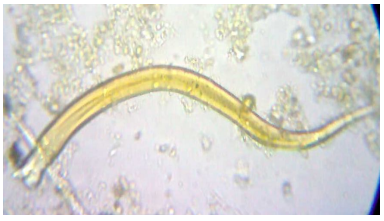
Macroscopy

Morphological studies were done by using simple microscope. The shape, apex, base, margin, taste and odor of leaves were determined.

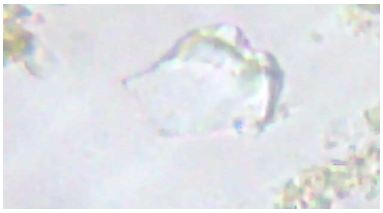
Microscopy

Microscopic studies were done by preparing a thin hand section of midrib and lamina region of *Quisqualis indica* leaf. The section was cleared with chloral hydrate solution, stained with phloroglucinol and hydrochloric acid, and mounted with glycerin.(Fig 2) A separate section was prepared and stained with iodine solution for the identification of starch grains.

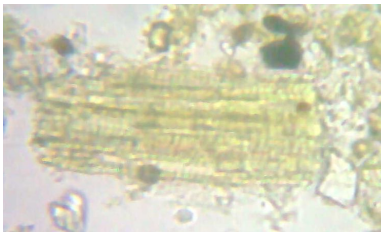
Powder of the dried leaves was used for the observation of powder microscopical characters. The powdered drug was separately treated with phloroglucinol and HCl solution, glycerin and iodine solution to determine the presence of lignified cells, calcium oxalate crystals, trichomes and starch grains[5](Fig 3).



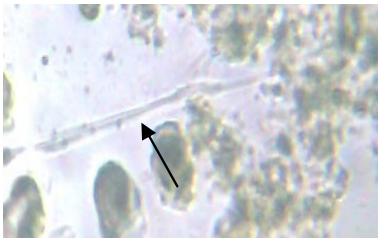
Trichome at 40 X



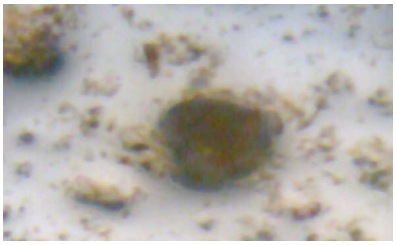
Calcium oxalate crystal at 40X



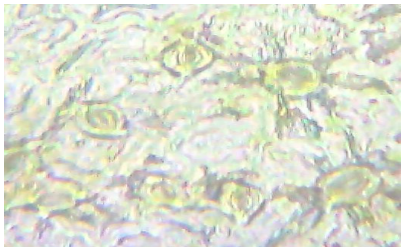
Xylem vessel at 40X



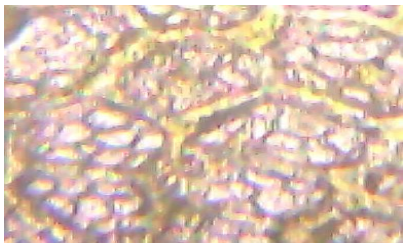
Phloem fibre at 40 X



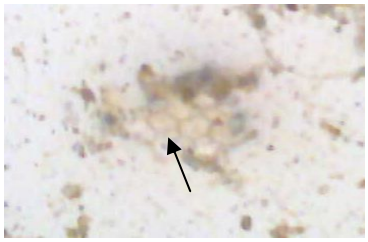
Starch grain at 40 X



Stomata cells at 40X



Palisade cells at 40 X



Epidermal cell at 40 X

Figure 3: Photographs taken during powder microscopy at 40 x

Quantitative microscopy

As a part of quantitative microscopy, stomatal number, stomatal index, vein islet and vein termination number were determined by using fresh leaves of the plant[6]. Total ash, water soluble ash, acid insoluble ash and sulphated ash were determined .Alcohol and water soluble extractive values were determined to find out the amount of water and alcohol soluble components.[7,8]

Fluorescence analysis

Powdered leaf parts were subjected to analysis under day/visible light and ultra violet light after treatment with various chemical and organic reagents.[9]

Extraction and preparation of plant extract

The plant material leaves were air-dried at room temperature for 10 days and pulverized by grinder. Five hundred grams of the powered plant material was defatted with petroleum ether using cold maceration mehod for 7-8 days. The extract was then concentrated and greenish yellow semi solid mass (coded "PEE") was obtained. The resulting marc was exhaustively extracted by same method using methanol and a greenish–brown mass coded "ME" was obtained after concentration on a water bath The extracts were stored aseptically in a desiccator at room temperature until demanded.

PHYTOCHEMICAL SCREENING

The crude Petroleum ether extract and methanol extracts were screened phytochemically for the presence of its constituents utilizing standard methods of analyses [10,11,12]

RESULTS AND DISCUSSIONS

The morphological studies revealed that the leaf is in dark green color with characteristic odour and slight bitter taste. (Table 1).The shape of *Quisqualis indica* leaves is as elliptical-acuminate with entire

margin, cordate base, and length varying from 7-12cm. Dorsal side is glabrous and ventral surface is hairy(Table 2). Microscopic studies showed the presence of covering trichomes and glandular trichome .Midrib is having hypodermis which is made up of collenchymas. Lamina showed the presence of chlorenchyma next to epidermis. Midrib region showed xylem towards upper epidermis. Protoxylem found to move towards upper epidermis and meta xylem towards lower epidermal cells, Phloem moves towards lower epidermis.(Table 3)

Powder study revealed the presence of covering trichomes, annular xylem vessel, epidermal cell, and anomocytic stomata.(Table 4). The fluorescence analysis of the powder drug was observed in day/visible light and UV light.(Table 5 and 6)

The stomatal index 18.75-19.02 ,vein islet number is 7-10, vein termination is 3-5,palisade ratio 6-7. (Table 7)The Moisture content, Total ash, acid insoluble ash, water-soluble ash values and sulfated ash were observed to be 8% ,9%,12.5%,6.55%and 5.45% w/w respectively. Water-soluble extractive values , Alcohol soluble extractive value and petroleum ether soluble extractive value of the leaves were observed to be 10%, 3% and1% w/w respectively(Table 8). The qualitative chemical test revealed the presence of alkaloids, slight amount of glycosides, tannins, flavonoids and protein in both extract. Gum and mucilage is present in PEE and absent in ME. Carbohydrate is present in ME and slight present in PEE.(Table 9)

Table 1: Identification of morphological feature

S. NO.	FEATURES	OBSERVATION
1	Colour (Upper surface)	Dark green color
2	Colour (Lower surface)	Light green color
3	Odour	Characteristic
4	Taste	tasteless
5	Shape	Ellipticle
6	Size	7-12cm
7	Arrangement	Opposite

Table 2: Botanical evaluation of *Quisqualis indica* linn. Leaf

S. NO	LEAF PORTION	OBSERVATION
1	Apex	Acuminate
2	Margin	Entire
3	Shape	Ellipticle
4	Lamina	Pinnate
5	Venation	Reticulate
6	Midrib	Contiuous from base to apex
7	Dorsal surface	Glabrous
8	Ventral surface	Hairy
9	Petiole size	1 cm
10	Petiole shape	Cylindrical
11	Colour	Green
12	Leaf base	Cordate

Table 3: Transverse section of leaf

S NO.	FEATURES	OBSERVATION
1	Trichomes	Present both glandular and covering
2.	Upper epidermis	Present
3	Midrib	Hypodermis is made up of collenchymas
4	Lamina	After epidermis collenchyma is present
5	Midrib(vascular bundles)	Xylem towards upper epidermis. Proto xylem towards upper epidermis and meta xylem towards lower epidermal cells,Phloem towards lower epidermis.
6.	Sclerenchyma cell	Present

Table 4: Powder microscopy

S no.	Feature	Observation
1	Nature	Coarse powder
2	Colour	Light green
3	Odour	Charecteristic
4	Taste	Slight bitter
5	Covering trichome	Present
6	Xylem vessel	Present (Annular)
7	Epidermal cell	Present
8	Stomata	Present (Anomocytic)
9	Fibres	Present
10	Starch grain	Present
11	Calcium oxalate crystals	Present

Table 5: Analysis of powdered drug through naked eye

Reagents	**Colour observed**
Powder as such	Fade green
Powder + conc.HCL	Green
Powder + Conc.HNO3	Brown
Powder + Conc.H2SO4	Dark brown
Powder + Glacial acetic acid	Green
Powder + 5%NaOH	Brownish green
Powder + 5%KOH	Brownish green
Powder + 5%Ferric chloride	Dark green
Powder + Picric acid(saturated Aq. Solution)	Yellowish green
Powder + Ammonia	Brownish green

Table 6: Fluroscence analysis of powder drug

Chemical	Fluorescence Observed
Powder as such	Green
Powder + 1N NaOH in methanol	No fluroscence
Powder + 1N NaOH in water	Green
Powder + 50%HCL	Brown
Powder + 50%HNO_3	Brown
Powder + 50%H_2SO_4	Green
Powder + Petroleum ether	Green
Powder + chloroform	Black
Powder + picric acid	Brown
Powder + 5%Ferric chloride solution	Green
Powder + 5% Iodine solution	Green
Powder + Methanol	Green
Powder + HNO_3 + NH_3	Green

Table 7: Data representing values of microscpical study

S. No	Microscopical parameter	Value
1.	Phloem fibre:	Length:8.52-82.36 Width :1.09-1.42
2.	Calcium oxalate crystals:	Length:1.6-3.2 Width :1.4-1.6
3.	Starch grains	1.42-7.1
4.	Trichomes:	Length:15.62-52.54 Width :1.42-2.84
5.	Stomatal no.	0.23-0.28
6.	Stomatal index	18.75-19.02
7.	Vein islet	7-10
8.	Vein termination no.	3-5
9.	Palisade ratio	6-7

Table 8: Data representing physiological parameter

S.no.	Parameter	Values (%)w/w
1.	Loss on Drying	8% w/w
2.	**Ash Values**	
	Total Ash	9% w/w
	Acid insoluble ash	12.5% w/w
	Water soluble ash	6.55 w/w
	Sulphated ash	5.45%W/W
3.	**Extractive Values**	
	Water soluble extractive	10% w/w
	Alcohol soluble extractive	3% w/w
	Petroleum ether soluble Extractive	1% w/w

Table 9: Phytochemical analysis of the petroleum ether and methanol extract of leaves of *Quisqualis indica* linn.

S. No	Constituents/tests	Petroleum ether extract	Methanolic extract
	Alkaloids		
1	Dragendorff's	++	-
2	Mayers	-	-
3	Wagners	++	++
4	Hagers	++	++
5	Tannic acid test	++	++
	Glycosides		
1	Legal test	++	++
2	Baljet tet	-	-
3	Borntrager'test	-	-
4	Keller killiani test	+	+
	Carbohydrates		

1	Molish test	+	+
2	Fehlings test	-	++
3	Barfoeds test	+	+
4	Test for starch	-	-
	Protein and amino acid		
1	Biuret test	-	-
2	Xanthoproetic test	++	-
3	Copper sulphate test	-	++
	Gum and mucilage		
1	Test with ruthenium red	-	++
	Phytosterols		
1	Salkowski test	-	-
2	Libermanns burchard reaction	-	-
	Flavanoid		
1	Shinoda test	-	-
2	Lead acetate test	++	++
3	Ferric chloride test	-	++
4	Reaction with alkali and acid	+	++
	Tannin and phenolic compound		
1	Lead acetate test	++	++
2	Ferric chloride test	++	++
3	Potassium dichromate test	-	-

Key: ++ = Highly present, + = faintly present, - = absent.

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