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Preliminary phytochemical screening of *Basella rubra* Linn.

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Abstract

Basella rubra Linn. belongs to family Basellaceae. The present paper includes macroscopy, preliminary phytochemical and physicochemical evaluation & TLC profile. Physicochemical parameters such as total ash value, acid insoluble ash value and water soluble ash value were determined which were $27.192 \pm 1.171\%$ w/w, $0.7376 \pm 0.2459\%$ w/w, $15.464 \pm 1.879\%$ w/w respectively. Preliminary phytochemical analyses of extracts were carried out. The results were positive for carbohydrates, reducing sugar, protein, saponin. etc. These secondary metabolites are the active constituents of and it may be responsible for its pharmacological activities.

Keywords: *Basella rubra*, upodika, phytochemical and physicochemical

Introduction

Basella rubra L. (Basellaceae), commonly known as Indian or Malabar spinach belongs to family Basellaceae [1], is an herbaceous annual or biennial climbing herb found in tropical and sub-tropical areas. It is a succulent, branched, smooth, twining herbaceous vine, several meters in length. Stems are purplish or green. Leaves are fleshy, ovate or heart-shaped, 5 to 12 cms long, stalked, tapering to a pointed tip with a cordate base. Spikes are axillary, solitary, 5-29 cm long. Fruit is fleshy, stalkless, ovoid or spherical, 5-6 mm long, and purple when mature and contain only one seed. The flowers are pink, and about 4 millimeters long. The leaves of the plant contain flavonoids (133.1 ± 26.2 mg QC /100 g FM), β -cyanin and 7, 4'-di-ortho methyl kaempferol. The flower contain phenolic compounds (269.0 ± 3.1 mg GAE/100 g FM) such as Rutin, Quercetin, Scopoletin, Coumarin, β -xanthin and β -cyanin pigments and Caffeic, Homo-protocatechuic-, Chlorogenic-, trans- and cis-p-coumaric-, p-hydroxy-benzoic-, phloretic-, trans- and cis-sinapic-, cinnamic- acids; and the fruit consists of β -cyanin, gomphrenin I, gomphrenin II, and gomphrenin III [2]. *Basella rubra* Linn. is a rich source of nutrients and minerals. Per 100 grams (g) edible portion, alugbati leaves contain Water (g) – 92.5; Energy (kcal) – 23.0; Protein (g) – 2.0; Fat (g) – 0.3; Carbohydrates (g) – 3.0; Fiber (g) – 0.9; Ash (g) – 2.2; Calcium (mg) – 128.0; Phosphorous (mg) – 40.0; Iron (mg) – 4.9; Vitamin A (ug) – 456.0; Thiamine (mg) – 0.04; Riboflavin (mg) – 0.12; Niacin (mg) – 0.5; Ascorbic acid (mg) – 89.0²⁷. It also contains calcium 2.32, potassium 5.8, magnesium 0.06, sodium 5.11 iron 0.04mg/100gm [3].

Material and Methods

Basella rubra leaves were collected from surata and Vadodara, Gujarat herbal garden and authenticated at Botanical Survey of India, Arid Zone regional circle, Jodhpur-08 (Rajasthan) on date 7th March 2008. Voucher specimens were collected and placed in the herbarium of Department of Dravyaguna vigyan, National Institute of Ayurveda. Prior to all analysis of all the raw materials were cleaned to remove any foreign materials and dust. The *Basella rubra* Linn. leaves were dried in shade and powdered in electric grinder for physicochemical, phytochemical and TLC studies. Prepared powder was stored in an air tight container. For accuracy, each analysis was carried out in triplicate and average values of the parameters are reported. Plant images are shown in plate No1, 2 and 3. The various parameters analysed are as under:

Organo-Leptic & Macroscopic Evaluation

The freshly grinded seed powder was evenly spread on a clean dry plastic sheet and investigated for different organoleptic features by repeated observations by conventional methods were recorded.

Plate 1: *Basella rubra* Linn. leaves

Plate 2: Dry Leaves



Plate 3: Dry Leaves Powder

Physicochemical and Phytochemical Parameters

Physicochemical and phytochemical screening were carried out as per the guidelines given in Pharmacopoeia of India 2006 [4]. Physico-chemical parameters such as moisture content (loss on drying at 105 °C), water soluble extractive value, alcohol soluble extractive value, total ash value, acid soluble ash value and water soluble ash were calculated. The organic substance of the *Basella rubra* Linn. leaves show their solubility in various, solvents in different quantities. So for this purpose of determination of extractive values seven solvents (Benzene, Toluene, DCM, Ethyl acetate, Acetone, methanol and water) were selected according to their polarity. Coarsely powdered air dried drug material is accurately weighed and taken in a glass stopper conical flask. Solvent is added to the flask and the flask is attached to a reflux condense and boiled for 6 hours, on water bath. After 6 hours, the flask is allowed to cool and the content is filtered through filter paper. The filtrate is transferred to a pre-weighed flat bottomed dish and evaporated to dryness on a water bath. Then the dish kept in oven for six hours for the contents to get dried fully. The dish is cooled by keeping in a desiccator for 30 minutes and weighed without delay. The residual mass remained in filter paper is dried as

such and is collected fully. This mass is again put into the conical flask and added with next solvent according to polarity, and fitted with reflux condenser, and extract is prepared in the same method used above. This procedure is repeated with all the seven solvents. The content of the extractable matter is calculated in mg per gms of air dried material. Preliminary tests were carried out on ethanolic and water extract for presence/ absence of phytoconstituents like carbohydrates, reducing sugar, protein, saponin, alkaloid, starch, tannin, phenol and glycosides [4, 5].

The ethanolic extract of drug was subjected to thin layer chromatographic analysis. T.L.C. plates pre-coated with 0.25 mm layer of silica gel GF 254 with fluorescent indicator, (Merck's) were used. It was cut in size of 8×2 cm. ethanolic extract was applied on the plate above 1 cm from base line. The separated spots were visualized under UV 366 nm. The qualitative evaluation of the plate was done by determining the migratory behavior of the separated substances given in the form of R_f values [6].

Observations

Ayurvedic pharmacodynamics [7-10]

Rasa -Madhura

Guṇa – pichhala, Snigdha and sara

Virya - Shita

Vipaka- Madhura

Effect on dosha- Vātaghna, Pittaghna, Kaphakara action

Organoleptic Character- [7, 8]

Sparsh (Touch)- *Snigdha (smooth)*

Rupa (Appearance) – *Dark green*

Rasa (Taste)- *Madhura*

Gandha (Smell)- No particular smell

Table 1

Total ash	Acid insoluble ash	Water soluble ash
27.192 ±1.171	0.7376 ± 0.245	15.464 ±1.879

Table 2: Extractive values of leaves of *Basella rubra*

S. No.	Solvent	Percentage of Extract
	Benzene	.0084%
	Toluene	.000264%
	Dichloromethane	.0026%
	Ethylacetate	0.001116%
	Acetone	.00733%
	Methanol	.011522%
	Water	.0002%

Table 3: Observation of Qualitative analysis of Inorganic matter in *Leaves of Basella rubra*.

S. No.	Name of the minerals / electrolytes	<i>Basella rubra</i> Linn. leaves
1.	Calcium	+
2.	Iron	+
3.	Phosphorus	+
4.	Potassium	-
5.	Sulphur	+
6.	Cobalt	-
7.	Copper	-
8.	Mercury	-
9.	Nickel	-
10	Zinc	-
11.	Silver	-
13.	Zinc	- ve

Table 4: Observation of Qualitative analysis of Organic matter in *Leaves of Basella rubra*.

S. No.	Chemical constituent	Test Applied	Result
1.	Carbohydrates	Molisch's reagent	+
2.	Reducing sugar	Fehling solution	+
3.	Starch	Iodine solution	+
4.	Tannin	Vanillin solution	-
5.	Protein	Ninhydrin solution	+
6.	Saponin	Shaking with water	+
7.	Phenol	FeCl ₃ solution	+
8.	Glycoside	FeCl ₃ + H ₂ SO ₄ solution	-
9.	Alkaloid	Dragendroff's reagent	-

T.L.C. of *Basella rubra* Linn.**Ethanol Extract**

Mobile phase- Chloroform: methanol: hexane: Benzene ::5:1:3.5 :1.5

Visualization: Short Wave (254 nm) UV

Table 5.1: Showing T.L.C of the leaves of *Basella rubra* of Ethanol Extract.

Spot No.	Distance traveled by solvent	Distance traveled by solute	R _f Value
1.	5.9	.3	0.05084
2	5.9	2.5	0.4237
3	5.9	2.3	0.389
4	5.9	3	0.5084

Aqueous Extract

Mobile phase-Methanol: Petroleum ether: 1:1

Visualization::Short Wave (254 nm) UV

Table 5.2: Showing T.L.C of the leaves of *Basella rubra* of Aqueous Extract.

Spot No.	Distance traveled by solvent	Distance traveled by solute	R _f Value
1.	4.9	.2	0.04
2.	4.9	.5	0.10
3	4.9	.9	0.18

Results and Conclusion: The Ash values are given in table no 1. Different extractive values are given in Table no 2. Preliminary phytochemical tests for inorganic and organic matter are given in table no 2 & table no.4. Details of TLC were given in table no.5.1 and table no-5.1

This study is in line with the quality parameters prescribed in Ayurvedic Pharmacopeia of India and also standards set by other international agencies. This work provides qualitative and quantitative standards for the identification of *Basella rubra* Linn. and from this study it is concluded that phytochemical studies on *Basella rubra* Linn. will be highly useful in determining qualitative and quantitative standards which can ascertain the identity, quality and purity of this plant drug.

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