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Research Article

PHARMACOGNOSTICAL AND PHYTOCHEMICAL ANALYSIS OF *DIGERA MURICATA LINN*. GROWING AS A WEED IN FIELDS OF UTTAR PRADESH REGION OF INDIA

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ABSTRACT

OBJECTIVE: An attempt has been made to highlight this folk herbal medicine through present study which will assist in the identification of the plant both pharmacognostically as well as physiochemically. METHOD: Various parameters like microscopy, physiochemical constants, fluorescence analysis of powdered as well as its extractives and phytochemical profile including TLC fingerprint of different extractives were studied. RESULT: The salient qualitative and quantitative parameters are reported.The plant is rich in flavonoids and phenolics. CONCLUSION:These studies will provide referential information for correct identification and help in checking adulteration in market samples used in the preparation of various herbal formulations.

INTRODUCTION

Digera muricata (L.), family *Amaranthaceae*, wild edible plant commonly known as 'latmahuria'. It is commonly distributed throughout the India. In Ayurveda, the herb is considered as a cooling, astringent to the bowels and also used as laxative. The flowers and seeds are used to treat urinary discharges [1].Boiled root infusion given to mother after child birth for lactation purpose [2].

Digera muricata is used in renal disorders in folk medicine. Generation of reactive radicals has been implicated in carbon tetrachloride-induced nephrotoxicity, which are involved in lipid peroxidation, accumulation of dysfunctional proteins, leading to injuries in kidneys. [3]

D. muricata treatment augments the antioxidants defense mechanism against carbon tetrachloride induced toxicity and provides evidence that it may have a therapeutic role in free radical mediated diseases [4].

Hence, *Digera muricata* (L.)Mart. is used in both folk and traditional system of medicine.The present investigation is performed to standardize the plant through pharmacognostical and phytochemical analysis.

Fig. 1: *Digera muricata*, amaranthaceae.

MATERIAL AND METHODS

Collection and authentification

The whole plant of *Digera muricata* was collected in the month of August, 2011 from fields behind Faculty of Pharmacy, Integral university, lucknow., UP, India.For identification and taxonomic authentification, sample of plant material was given to National Botanical Research Institute(N.B.R.I), Lucknow, India which confirmed the authenticity of the plant specimen.(voucher specimen no. NBRI/263/2011).The fresh plant was used for the examination of macroscopic and microscopic characters whereas the dried powder was used for the determination of physico-chemical parameters. Preliminary phytochemical investigation was done as per standard methods.

Preparation of plant extract

Air dried coarse plant powder was packed in four pouches of muslin cloth and subjected to extractor for continuous hot extraction with petroleum ether, chloroform, methanol and finally in water individually as well as successively. All extracts were filtered and filtrate was evaporated to dryness.

Macroscopic and microscopic studies

The macroscopy of the whole plant was studied according to standard methods.

A thin transverse section (TS) of the stem and leaf were cut by free hand sectioning and stained with different stains (safranin and aniline blue). The various histochemical colour reactions of powdered plant were carried out with Ruthenium red for mucilage, weak iodine solution for starch and Millon'sreagent for protein, Dragendorff's reagent was used for the detection of alkaloids. Aqueous NaOH was used to detect flavonoids and aq. ferric chloride for the phenolic compounds by reported methods [5].

Physico-chemical and fluorescence analyses

Physiochemical analysis i.e. Loss on drying, total ash, acid insoluble ash, water soluble ash, sulphated ash and foreign matter were performed as per Indian Pharmacopoeia (5). The extract of the powdered plant was prepared with different polar and non-polar solvents for the study of successive extractive values. Fluorescence analysis of the powder sample was carried out by treating with different chemical reagents in day light and UV light (254 nm and 365 nm). The dry powder was studied on glass slide whereas the different extracts were studied by adsorbing the extracts on Whatmann filter paper [6].

Preliminary phytochemical analysis

Preliminary phytochemical screening for the detection of various chemical constituents was carried out by using standard procedures described by Harborne [7, 8, 9]

TLC identity test

Thin layer chromatography of the petroleum ether, chloroform and methanol was carried out in various solvent system at 30^{0}C using silica gel G as adsorbent and the Rf values were determined [10, 11, 12].

RESULTS AND DISCUSSION

Macroscopic characters

(a) Leaves are alternately arranged alternately arranged leaves, 1-9 cm long and 0.2-5 cm broad, are narrowly linear to broadly ovate. Leaf stalks are long, up to 5 cm, base is narrowed, and the tip pointed.

(b) Flowers are borne on slender spike-like racemes, which can be as large as 30 cm long. Flowers are hairless, white mixed with pink to carmine or red.

(c) Fruit are subglobose, slightly compressed, 2-2.5 mm, bluntly ribbed along each side, surmounted by a thick rim.

Microscopic characters

Stem

The transverse section of the stem is irregularly circular in outline showing a layer of epidermis, a narrow zone of cortex and a ring of fibrovascular bundles encircling the wide central pith.

The detailed T.S. of stem shows

(a) A layer of epidermis with striated cuticle traversed with very stomata and bearing multicellular trichomes; two or three rows of collenchymatous hypodermis lies underneath the epidermis except at the ridges where it is many more layered;

(b) Cortex is composed of 4 to 6 rows of parenchymatous cells.

(c) Endodermis is distinct, enclosing a ring of conjoint, collateral vascular bundle with pericyclic fibres;phloem is narrow; xylem consist of radially arranged vessels ;

(d) Pith is wide and parenchymatous.

Leaf

The detailed transverse section of leaf shows upper and lower epidermis covered with thin cuticle, bearing simple trichomes ;

(a) A well developed conjoint, collateral meristele consisting of radially arranged xylem vessels, an arc of phloem and sheath of scelerenchymatous band, encircled by a layer of endodermis, embedded in the centre of parenchymatous tissue of midrib.

(b) Lamina is dorsiventral with 2-3 layers of ill developed palisade cells underneath the upper epidermis ;

(c) Trichomes are just like stem but longer and whiplike.

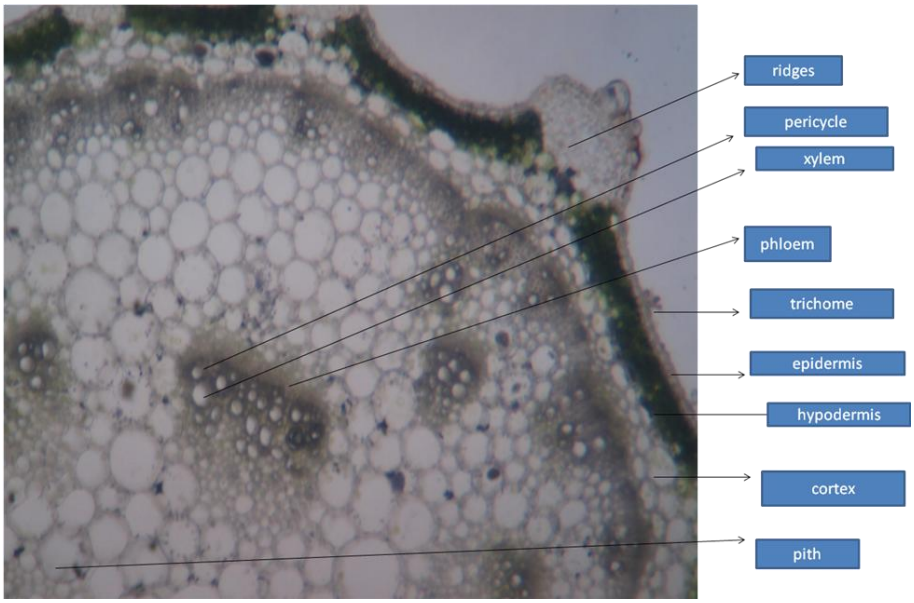

Fig. 3: Transverse section of stem of Digera muricata

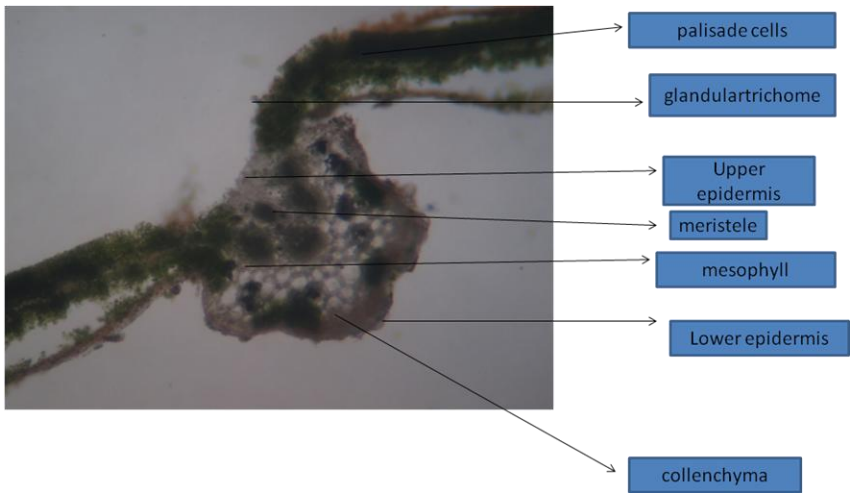

Fig. 2: Transverse section of leaf through midrib of Digera muricata

Physico-chemical and fluorescence analyses

Physico-chemical data like loss on drying, ash values, foreign matter and successive extractive values with different solvents of powdered plant were determined.

The percentage of all values in triplicate and their mean values ± SEM were calculated with reference to the air dried drug (Table 1).

The fluorescence analysis of the powdered drug in various solvents and chemical reagents was performed under normal and ultraviolet light (Table-2).

Preliminary phytochemical analysis

Preliminary phytochemical screening for the detection of various chemical constituents was carried out by using standard procedures described by Harborne [7, 8, 9]

Table 1: Quantitative standards of powdered aerial parts of *Digera muricata*

1(a) Extractive values of different extracts of *Digera muricata*

Solvent used		Cold extractive values (g)	Hot extractive values Individual(g)	Successive extractive values (g)
1.	*Petroleum ether*	0.34±0.56	0.42±0.115	0.42±0.162
2.	*Chloroform*	0.43±0.321	0.77±0.040	0.57±.061
3.	*Methanol*	1.56±0.45	2.55±0.052	2.08±0.074
4.	*Water*	2.78±0.08	3.99±0.11	2.67±0.412

1(b) Ash values of the powdered aerial parts of *Digera muricata*

1.	Ash value	
	Total ash value	13.9±.113
	Acid insoluble ash	6.34±.043
	Water soluble ash	4.00±0.011
2.	Loss on drying	19.0±0.012

1(c) Powder characterstics of the aerial parts of *Digera muricata*

S. No.	Reagent with powdered drug	Colour	Constituents
1.	Ruthenium red	Pink	Mucilage
2.	Phloroglucinol Hcl	pink	Lignified cells
3.	Iodine	blue	Starch
4.	Millons reagent	Brick red	Protein
5.	Dragendroff reagent	Reddish brown	Alkaloids
6.	Salkowski test	orange	Steroids
7.	Conc.NAOH	Wine colour	Flavonoids
8.	Aq. Ferric chloride	smoky	Phenolics and tannins.

Table 2: Fluorescence analyses of the powdered aerial parts of *Digera muricata.*

S. No.	Test	Visible	U.V.(254nm)	U.V.(365nm)
1.	Powder + 50% HCL	Light brown	Black	Green
2.	Powder + 50% HNO3	Orange	Blue	Bright green
3.	Powder + 50% H2SO4	Black	Black	Brown
4.	Powder + Petroleum ether	Colourless	Blue-black	Green
5.	Powder + Chloroform	Light green	Light brown	Green
6.	Powder + Methanol	Dark green	Brown	Bright green

Table 3: Qualitative phytochemical analysis of various extractives of aerial parts of *Digera muricata.*

S. No.	Chemical test	Petroleum ether	Chloroform	Methanol	Water
1.	*Alkaloids*				
	Meyer s	+	+	+	+
	Dragendroff	+	+	+	+
	Wagner	+	-	+	+
2.	*Flavonoids*				+
	Shinoda	+	+	+	+
	Lead acetate	+	+	+	
3.	*Phenols*				+
	Ellagic acid	+	-	+	+
4.	*Sterols*				
	Leibermann	+	+	+	+
	Salkowski	+	-	+	
5.	*Saponins*				+
	Foam test	+	-	+	+
6.	*Terpenoids*				
	Salkowski	+	+	+	+

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