



PHARMACOGNOSTICAL & PHYTOCHEMICAL EVALUATIONS OF LEAVES OF AMARANTHUS SPINOSUS LINN. IN CHHATTISGARH

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ABSTRACT

The present study aimed at detailed pharmacognostic evaluation of the crude drug, Morpho-anatomy of the leaves of *A. spinosus* Linn. was studied to aid pharmacognostic and taxonomic species identification using light and confocal microscopy, WHO suggested Physico-chemical determinations and authentic phytochemical measures. *Amaranthus spinosus* Linn. (Family Amaranthaceae), a very common Indian plant is known for its medicinal properties and is commonly known as 'spiny amaranth' or 'pig weed', "Kate wali Chaulai (Kanatabhajii)" in 'Hindi', cultivated throughout in India, Sri Lanka and distributed throughout the tropics and warm temperate regions of Asia, it has antidiabetic, antitumor, analgesic, antimicrobial, anti-inflammatory, spasmolytic, bronchodilator, hepato-protective, spermatogenic, anti-fertility, anti-malarial, antioxidant properties. The present study aims at developing a standardized profile of leaf, stem and root of *A. spinosus* which would be of immense use to identify and establish the authenticity of the plant *A. spinosus*

Keywords: *A. spinosus*. Linn., kanta cholai, Pharmacognostical, Phytochemical

INTRODUCTION

IT has a rich cultural heritage of traditional medicines which chiefly comprised the two widely flourishing systems of treatments i.e. Ayurvedic and Unani systems since ancient times. Herbal medicines, also referred to as botanical medicine or phytomedicine, include herbs, herbal materials, herbal preparations and finished herbal products that contain parts of plants or other plant materials as active ingredients both Ayurveda, Unani and Siddha systems of medicine use plants and minerals as a source of drugs, plants are a major source of medicine. *Amaranthus spinosus* Linn. (Family Amaranthaceae) a very common Indian plant is known for its medicinal properties and is commonly known as 'spiny amaranth' or 'pig weed', "Kate wali Chaulai (Kanata bhaji)" in 'Hindi', cultivated throughout in India, Sri Lanka and distributed throughout the tropics and warm temperate regions of Asia, *Amaranthus spinosus* is used for the treatment of fever

in traditional system of medicine. This plant is considered as one of the vegetables having a high concentration of antioxidant components and nutritional values due to the presence of fibres, proteins and high concentration of essential amino acids, especially lysine.

Aim & Objectives

The present work aims to carry out Pharmacognostic, Phytochemical, and antioxidant activity leaves of *Amaranthus spinous Linn.* leaves.

Material & Methods

In the present study, plant samples were collected from Chhattisgarh especially from the Bilaspur range of Chhattisgarh. It was selected based on availability and accessibility to study their pharmacognostic, and phytochemical analysis so that they can be studied in their drug form to avoid adulteration and maintain the purity of the drugs.

Sl. No.	Sample	Plant name
1.		Leaves of <i>Amaranthus spinosus</i> Linn.

Collection of the plant - Leaves of *Amaranthus spinosus* Linn. was collected in Bilaspur regions (19.10710N latitude and 81.9535° E longitude) of Chhattisgarh, India. Fresh leaves were collected from the field and washed; shade dried and packed in a paper bag for further Physico-chemical, phytochemical and antioxidant analyses.

Authentication of the Drug - A voucher specimen of the collected plant material was prepared, authenticated by Mr RS Jayasomu Senior Principal Scientist Head, RHMD and CSIR-NISCAIR institute and Drug Testing & Research Laboratory, Raw Material Herbarium and Museum Delhi

Instruments & Chemicals

For Pharmacognostic study - Compound binocular microscope (Olympus-CH20i model) with a built-in analogue camera (CMOF, 1.4 megapixels), camera lucida (prism type/plane type), stage micrometre, glass slides, coverslips, watch glass and other common glasswares were used during the microscopic study.

Solvents viz. formalin, glacial acetic acid, ethyl alcohol and reagents viz. safranin, glycerin, chloral hydrates were procured from Ranbaxy Fine Chemicals Ltd., Mumbai, India.

Macroscopic Characteristics - For morphological observations, leaves were used. The macro-morphological feature of leaves was observed under a magnifying lens and photographed using a digital camera (DSC W220, Sony Corp, Japan).

Microscopic Characteristics - The freehand section of the stem was taken and stained by the reagent safranin to confirm its lignification. Powder microscopy was also carried out and their specific diagnostic characters were recorded. Photomicrographs were obtained by observing the sections under a compound binocular microscope and the figures of the section were drawn with the help of Camera Lucida.

Phytochemical study -

Fluorescence analysis - The leaf powders were subjected to fluorescence analysis, as it is and also after treating separately with 1N NaOH, H₂SO₄, HNO₃,

NH₃, Iodine, FeCl₃, Acetic acid against normal and ultraviolet light (254 nm & 366 nm).

Extraction of Plant materials: The stem bark of *Amaranthus spinossus* Linn. was dried in shade under normal environmental conditions and subjected to size reduction. Such powdered drug was charged into Soxhlet apparatus and extraction was carried out with Methanol & water.

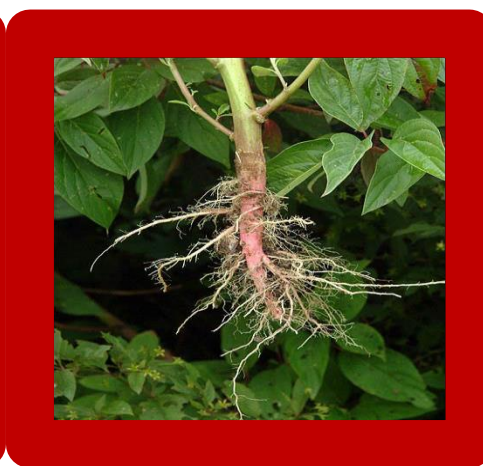
Physicochemical parameters – Leaves were studied for various physicochemical standards like foreign

matter, loss on drying at 105°C, total ash, acid-insoluble ash, alcohol soluble extractive and water-soluble extractive using standard methods.

For Phytochemical study: A CAMAG HPTLC system (Muttens, Switzerland) equipped with a semi-automatic TLC applicator Linomat IV, twin trough plate development chamber, Win CATS software version 1.4.2. and Hamilton (Reno, Nevada, USA) Syringe (100 µl). All chemicals, reagents and solvents used during the experimentation were of analytical grade were purchased from E. Merck Pvt. Ltd. (Mumbai, India).



Leaf of *Amaranthus spinossus* Linn.



The root of *Amaranthus spinossus* Linn.

RESULT

Pharmacognostic study For *Amaranthus spinossus* Linn.

a. Organoleptic characters

Colour: Dark greenish, dry brown

Odour: Characteristic odour

Stem colour: Light green, angular

Seed colour: Black

Taste: Sweet

b. Macroscopic characters

Part: Leaf

Occurrence: Pieces

Shape: Curved

Colour: Greenish

Odour: Odourless

Taste: Tasteless

c. Microscopic characters

The diagnostic characters are:

Epidermis: It is uniseriate and cuticularised. It is wavy in outline.

Cortex: It is parenchymatous and bounded internally by a starch sheath layer.

d. Powder microscopy

Organoleptic characters

Colour: Greenish

Odour: Odourless

Touch: Smooth

Physicochemical analysis

Table 1: Physicochemical characters of *A. spinosus* Linn. leaf.

S.N	Physicochemical Parameters	Results
1.	Foreign Matter	Nil
2.	Total Ash (Average value in w/w)	18.007%
3.	Loss on drying	4.190%
4.	Acid Insoluble Ash (Average value in w/w)	3.631%
5.	Alcohol Soluble extractive (Average value in w/w)	4.234%
6.	Water Soluble extractive (Average value in w/w)	34.948%

Fluorescence characters -

The results of fluorescence analysis of the powdered leaf are presented in Table 2, which helps in detecting the presence of various constituents like phenolic com-

pounds, flavonoids, steroids and other natural compounds based on different fluorescence with different chemical reagents. These studies help in the authentication of the plant.

Table 2: Fluorescence analysis of *A.spinousus* Linn. powder of leaf.

Powder drug+ reagents	Normal light	UV Light254 nm	UV Light366nm
Powder as such	Green	Green	Green
Powder + 1 N HCL	Colourless	Colourless	Colourless
Powder + aqueous 1 N NNaOH	Yellowish Green	Fluorescence Yellowish Green	Yellowish Green
Powder + alcoholic 1 N NNaOH	Green	Fluorescence Green	Fluorescence Green
Powder + 50% HNO ₃	Light Yellow	Fluorescence Green	Fluorescence Green
Powder + 50% H ₂ SO ₄	Pale brown	Greenish brown	Brown
Powder + Methanol	Dark green	Green	Green
Powder + Water	Off-colour	Green	Green

Preliminary phytochemical screening

The results of Preliminary phytochemical screening in powder of leaf on *Amaranthus spinosus* Linn. are represented in

Table 3: Preliminary phytochemical screening of *A.spinousus* Linn. (powder of leaf.)

Sr. No.	Plant constituent (Test)	Test/Reagent	Water	Alcohol
01	Test for Steroids	Salkowski reaction Liebermann-Burchard test	Negative	Positive
02	Test for Alkaloids	Dragendorff's reagent Mayer's reagent Hager's reagent Wagner's reagent	Negative	Positive
03	Test for Tannins	Ferric chloride test Lead acetate test Potassium dichromate	Positive	Positive
04	Test for Flavonoids	Shinoda test	Positive	Positive
05	Test for Carbohydrates	Molish's test Barfoed's test	Positive	Positive
06	Test for Proteins	Biuret test Xanthoproteic test	Positive	Negative
07	Test for Saponins	Foam test	Positive	Positive
08	Test for Amino acid	Ninhydrin test	Positive	Negative
09	Test for Reducing sugar	Molisch's test Barfoed's test	Positive	Positive
10	Test for Monosacchrides	Molisch's test Barfoed's test	Positive	Negative

11	Test for Pentose sugar	Molisch's test Barfoed's test	Negative	Positive
12	Test for non-reducing sugar	Molisch's test Barfoed's test	Negative	Negative
13	Test for Hexose Sugar	Molisch's test Barfoed's test	Negative	Negative
14	Test for Glycosides	-	Positive	Negative

DISCUSSION

Macroscopic characters are *Amaranthus spinosus* Linn. leaves Occurrence is Pieces, Shape-Rhomboid, Surface smooth, size 2-5cm long and 1-3 mm thick. Power microscopy was colour-Brownish, Odour-Characterstatic odour, Taste Sweet, touch fine, Diagnostic characters are of the powder show, Cork cells-Thick-walled, lignified, Stone cells- In groups, Crystals -Calcium oxalate, Starch Grains-Simple, round to oval, Fibre -Thick walled with pointed ends and narrow lumen.

- Foreign matter is directly related to the presence of impurities. *Amaranthus spinosus* Linn leaves are both drugs in the foreign matter is nill. The total Ash Value obtain are sample *Amaranthus spinosus* Linn -18.007%w/w It indicates that the inorganic material has slightly fewer impurities.
- Moisture content ranged from the sample (*Amaranthus spinosus* Linn.) was 4.190% so, makes them a good source of hydration or glucose for the body as well as possessing then the ability to good health.
- Extractive values are primarily useful for the determination of exhausted or adulterated drugs Alcohol soluble extractive (A.S.E.) and. Water-soluble extractive (W.S.E.) values are an indication of the solubility of active principles of the plant. Alcohol soluble extractive values of given 4.234%w/w respectively. The result shows that the sample is LESS Alcohol soluble. Water-soluble extractive values are 34.948%w/w respectively. The sample has LESS soluble in alcohol. If we compare the A.S.E. and W.S.E. then the given sample is more soluble in alcohol.

CONCLUSION

The pharmacognostic and phytochemical studies were carried out on the leaf of *Amaranthus spinosus* Linn. The morphological, macroscopical and microscopic features observed during the study will be helpful for the proper identifications of these plant species. The Physico-chemical parameters are important analytical features and are constant within a range. The preliminary phytochemical analysis revealed the presence of different chemical constituents in crude extracts. This study will be helpful for quality control of single and polyherbal formulations. These chromatographic studies will be helpful as a tool in the quality control of the raw materials and finished products. This marker analysis of Phyto-constituents may also be helpful in phytoequivalence studies and other parameters can be established by studying the absorption, distribution, metabolism and elimination of pharmacologically active agents in the body.

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Conflict of Interest: None Declared

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