VOLUME-8, ISSUE-1, JANUARY-2019 • PRINT ISSN No 2277 - 8160

Original Research Paper

Pharmacology

PHARMACOGNOSTIC PROFILE OF LEAVES OF ANANAS COMOSUS L.

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ABSTRACT This study lays down parameters for standardization and authentication of leaves of *Ananas comosus* with the help of which adulteration and substitution can be prevented. All the parameters to be evaluated in pharmacognostic study such as macroscopic study, microscopic study, physicochemical analysis and fluorescence analysis are enlisted.

KEYWORDS : *Ananas comosus*, Pharmacognostic, Physicochemical, Fluorescence analysis

INTRODUCTION

Plants have been an important source of medicine for thousands of years. Many plant species possessing medicinally important compounds are disappearing at an alarming rate due to destruction of its natural habitats owing to rapid agricultural development, urbanization, indiscriminate deforestation and uncontrolled collection of plant materials (1). There are a large number of medicinal plants whose scientific importance has not been explored. All over the world, plants have served as the richest source of raw materials for traditional as well as modern medicine, particularly in Africa and Asia Knowledge acquired by ancient people was transmitted from generation to generation and new knowledge added to it by the next generation.

Ananas comosus (L.) Merr. (family Bromeliaceae), also, commonly named Pineapple, is a tropical fruit which grows in countries which are situated in the tropical and sub tropical regions. It is a herbaceous perennial plant. Plant is known for its folk medicinal utility, besides agricultural utilities such as the fruit for nutritional food. Total pineapple production worldwide is around 16-18 million tons (2) . *A. comosus* are actually not just one fruit but a composite of many flowers whose individual fruit lets fuse together around a central core. Each fruit let can be identified by an 'eye,' the rough spiny marking on the *A. comosus* surface. It is composed of several nutrients which are essential for human health (3). Most of the leaves especially the leaves at the top of the plant most exposed to the sun are oriented at an angle to the sun and this arrangement helps to reduce leaf temperature and moisture loss. Pineapple contains significant amounts of vitamins and it is considered as good source of essential trace elements (4). Bromelain, a proteolytic enzyme present in the fruits is reported to be responsible for its meat tenderizing properties and many of its medicinal properties (5).

Fresh leaves are dried for 1-2 days. It is then powdered and mixed with water, 2 tea spoons, twice daily in empty stomach for 3 days as an abortifacient (6). Leaf juice is used for helminthiasis and jaundice (7).

There are no reports on the pharmacognostical studies of leaves. Hence, the present work is an attempt in this direction to standardize the leaves by pharmacognostic studies, as these studies stand as evident proof for confirming its identity, authenticity and purity of the plant.

MATERIALS AND METHODS

The fresh leaf of *Ananas comosus* were collected from *Kottappuram ,Thrissur* Kerala, India. Taxonomic identification made with Flora of the Presidency of Madras by JS Gamble. The plant name checked with www.theplantlist.org. Leaves of the plant were shade dried for several days. The dried plant material was ground to a course powder.

Macroscopic study

The macroscopic study is the morphological description of the plant parts which are seen by naked eye or magnifying lens.

Microscopic study

Free hand transverse sections of leaf were taken and stained with safranin and observed for their peculiar characters.

Determination of stomatal index

As it is difficult to obtain satisfactory epidermal peelings of the leaves of *A.comosus*, a simple "fevicol impression method" developed by (8) in cassava was successfully adopted for the study of stomatal characters.

Physicochemical parameters

Ash values (Total ash, acid insoluble ash, water soluble ash) were determined (9). Ash values are used to determine quality and purity of crude drug. It indicates presence of various impurities like carbonate, oxalate and silicate. The water soluble ash is used to estimate the amount of inorganic compound present in drugs. The acid insoluble ash consist mainly silica and indicate contamination with earthly material.

Fluorescence analysis

A small quantity of dried plant powder is placed on grease free clean petriplate and 1 or 2 drops of freshly prepared reagent solution is added, mixed by gentle tilting the petriplate and wait for few minutes. Then the petriplate is placed inside the UV chamber and observe the colour in visible light, short (254 nm) and long (365 nm) ultra violet radiations. The colour observed by application of different reagents in different radiations is recorded. Generally the colour change is noted in reagents like Powder + Distilled water, Powder + $CuSO_4$, Powder + 1 M NaOH, Powder + Picric acid, Powder + acetic acid, Powder + dil. HCl, Powder + 5% Iodine, Powder + 5% $FeCl_3$, Powder + HNO_3 + 25% NH_3, Powder + Methanol, Powder + 50% HNO_3, Powder + Conc.H_2SO_4, Powder +Conc.HNO_3, Powder + Liquid ammonia etc. Some constituents show fluorescence in the visible range in daylight. The ultra violet light produces fluorescence in many natural products which do not visibly fluoresce in daylight. If substance themselves are not fluorescent, they may often be converted into fluorescent derivatives or decomposition products by applying different reagents. Hence crude drugs are often assessed qualitatively in this way and it is an important parameter for pharmacognostic evaluation of crude drugs.

RESULT AND DISCUSSION

Macroscopic characterstics

The plant is an herbaceous perennial, which grows to 1.0 to1.5m tall (Fig .1a). The plant has a spiral morphology due to the arrangement of leaves. It has short, stocky stem with tough waxy leafs. It has long

petioled leaf and is 51-54 inch in length. Leafs are simple with parallel venation. Apex of leaf is cuspidate. A fully grown pineapple plant has 68-82-leaves arranged in the form of a dense compact rosette. The older leaves are located at the base of the plant and the younger ones are in the centre. Leaves are usually sword shaped (exept for the ones at the tip) and taper toward the tip. The margin contains spines. The upper and lower surfaces of the leaves are covered with hairs and are more pronounced on the lower surface. Length and width of lamina are 51 to 54 cm long and, 2.5 to 4.5 centimeters wide, the margins sharply spiny-toothed, green and shiny on the upper surface, pale beneath(Fig.1b). Heads are terminal, solitary, ovoid, 6 to 8 millimeters long, much enlarged in fruit; with the bracteoles reddish, numerous, triangular-ovate to oblong-ovate, acute and imbricated. Sepals are ovate, thick and fleshy, about 1 centimeter long. Petals are three, oblanceolate, about 2 centimeters long, white below, violet-purple above. Mature fruit is up to 20 centimeters or longer (Table . 1)

Table. 1 Morphology of the leaf *of A. comosus*

MORPHOLOGICAL PARAMETER	OBSERVATION
Condition	Fresh
Type	Simple
Phyllotaxy	Whorled
Length of lamina	51-54cm
Width of lamina	2.5-4.5cm
Venation	Parallel
Modification of leaf	Leaf spines
Margin of leaf	Spiny
Apex of leaf	Cupsidate
Length of leaf sheath	4-8cm

Microscopic characteristics

T.S of leaf

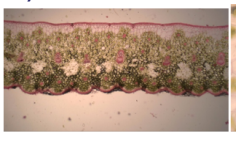
T.S of leaf shows upper and lower epidermis . Outer wall of the epidermis is cutinized . Silica is present on upper epidermis. Epidermis is interrupted by stomata. The mesophyll layer beneath the epidermis has chlorophyll containing loosely arranged thin walled cells (Fig 1.c). Vascular bundles are conjoint, collateral and closed. Each vascular bundle is surrounded by a layer of thin walled parenchyma cells (Fig:1.d).

Stomatal index

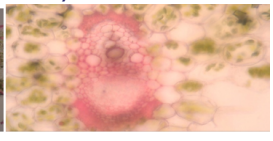
Stomata is dumbell shaped. Stomatal index of the lower surface of leaf of A. *comosus* is 12.6 (Fig 1.e) .

a)Habit

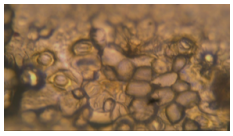
b)Leaf



c) T.S of leaflet



d) Vascular Bundle



e) Stomata

Fig:1 Macroscopic and microscopic characters of Ananas comosus

Physicochemical parameters

Leaves were subjected to ash test and results presented in Table 2.

Parameters	Values
Total Ash	10.6%
Water soluble Ash	4.66%
Acid Insoluble Ash	2.33%

Fluorescence analysis

Result of fluorescence analysis are presented in Table 3.The characteristic appearance of powder upon treated with various chemicals and their difference in daylight and UV lights are important diagnostic characters for the proper identification of crude drug in its dried and powdered form.

Table. 3 Fluorescence analysis of Leaves of *A.comosus*

Treatment	Visible/ Day light	UV 254 nm(short)	UV 365nm(long)
Powder As Such	Light-cream	Light-green	Light-green
Powder+Water	Brownish-green	Light green	Dark-green
Powder+CuSO4	Light green	Dark green	Blackish-green
Powder+1m NaOH	Dark green	Dark-green	Blackish-green
Powder+ 1%Picric Acid	Pale-green	Light green	Dark-green
Powder+Acetic Acid	Light-green	Dark-green	Grey
Powder+HCl	Dark green	Dark green	Black
Powder+ 5%Iodine	Yellowish-green	Dark-green	Dark-green
Powder+ 5%FeCl3	Olive-green	Dark-green	Black
Powder+HNO3 + 25%NH3	Orange	Brownish green	Black
Powder+ Methanol	Dark-green	Dark-green	Orange
Powder+ 50% HNO3	Orange	Brownish-green	Black
Powder+ H2SO4	Blackish-green	Black	Black
Powder+ ConcHNO3	Yellowish-green	Pale-green	Black
Powder+Liquid NH3	Dark green	Blackish-green	Black

CONCLUSION

Towards authentication and quality assurance of medicinal plants, pharmacognostic, physicochemical studies of *A. comosus* were carried out. The macroscopic and microscopic evaluation revealed characters that are of diagnostic value and useful in authentication of the plant. Physicochemical analyses reveals values for total ash, water soluble ash and acid insoluble ash are within the World Health Organisation (WHO) standards for crude drug from medicinal plants.

ACKNOWLEDGEMENT

The authors are gratefully acknowledges Kerala State Council for Science Technology and Environment for the financial assistance to accomplish the project work

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