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PHARMACOGNOSTICAL EVALUATION OF ROOT OF *ALPINIA GALANGA* WILLD

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ABSTRACT

Pharmacognostic studies of crude drug plays a very important role in identification the purity and quality of crude drugs. Medicinal plants which are found on earth have renowned medicinal significance and their usage is increasing day by day in our daily life. Different investigations are in continuously progressing towards exploring the pharmacological and therapeutical properties of herbal drugs. The present work embodies the investigations carried out to establish methods for quality control of drugs as per WHO guidelines for pharmacognostically untapped drugs. The root of *Alpinia galanga,* belonging to the family Zingiberaceae is one of the same. Complete botanical evaluations which comprise macroscopic, microscopy, physicochemical parameters and phytochemical screening were carried out for the quality control of the drug. Thus it was thought worthwhile to explore this most functional plant on the basis of this standardization parameter. The study will provide referential information for the correct identification of the crude drug.

Keywords: *Alpinia galanga,* Pharmacognostic evaluation, Quality standards, Standardization.

INTRODUCTION

Alpinia galanga Willd, synonyms *Languas galangal* [1] (Family - Zingiberaceae) is used in medication, culinary and cosmetics for centuries. [2] It is widely used as a spice in food as well as in traditional system of medicine, such as Ayurveda, Unani, and Chinese and Thai medicine. [3] It is commonly known as *rasna* in Sanskrit, Greater galangal in English and Kulanjan in Hindi. Most of the South Indian physicians of traditional Ayurveda and Siddha medicine system use *Alpinia galanga* to treat various kinds of disease including diabetes mellitus. [4]The plant is a perennial herb occurs naturally in shady and marshy lands in tropical areas, particularly in Western Ghats, Mysore, Goa and Gujarat. It is also found in other countries like Thailand, Indonesia, China, and Malaysia. [2]

The plant is a rhizomatous, attains a height of about 1.5–2.5 m. The rhizome is very prominent and aromatic. Externally it is reddish brown-white and internally reddish-white along with root stocks which are tuberous and slightly aromatic. [4, 5] Leaves are leathery about 30–60 cm long and 10–15 cm wide, lanceolate and smooth with white margins and glossy surfaces on both sides. Flowers are greenish-white about 3 cm long and occur in dense panicles. Corolla has distinctly clawed lips. Flowering occurs in May and June while fruiting occurs in August and September.

This plant is reported to be rich in essential oils such as cineole, methyl cinnamate, myrecene and methyl eugneol and is also said to contain various flavones such as galangin, alpinin, kampferide and 3-dioxy-4-methoxy. [6] Studies have shown the plant to possess anti-inflammatory, analgesic, antioxidant, antifungal, antibiotic, antibacterial, antiulcer and anticancer properties[1]. For standardization and quality assurance purposes, the following three attributes must be verified: authenticity, purity and assay. Hence, in this work we report some pharmacognostical,

physicochemical and phytochemical characteristics. The main objective of this study is to supplement some information with regards to its identification, Characterization and standardization of *Alpinia galanga* root.

MATERIALS AND METHODS

Collection of sample: *Alpinia galanga* roots were purchased from local market, Pune. Their identity and Authentication was confirmed by Department of Pharmacognosy Marathwada Mitra Mandal's College of Pharmacy Pune by correlating their morphological and microscopical characters with those given in literatures. The remaining root samples were dried in shade. Coarse powder (60 #) of dried roots of plants was stored for its pharmacognostical investigations.

Macromorphology: The organoleptic characters of the dried root like color, odor and taste in addition to the macroscopic characters viz, size, shape, texture, surface, fracture were evaluated as per standard WHO guidelines. [7-9]

Cytomorphology: Free hand transverse sections (T.S.) of fresh *Alpinia galanga* roots were taken and stained with different but specific staining reagents. Microphotographs of the sections were made by using Motic Image Plus microscopic unit (MOTIC-B1). [10-12] Fine powder of the root was subjected to powder microscopy, as per standard procedures mentioned. [13-14]

Physicochemical evaluation: Analysis of Physicochemical Constants of the ingredient has been done to evaluate the quality and purity of the powder drug. The dried plant material was subjected for determination of physicochemical parameters such as foreign organic matter, all type of Ash Values, alcohol soluble extractive and water soluble extractive, moisture content and pH[14-17]. Determination of these physicochemical constants was done as per procedures mentioned in accordance with WHO guidelines. [12-14]

Preliminary Phytochemical Investigations: Preliminary qualitative phytochemical analysis of powder root was carried out by employing standard conventional protocols. [15-18]

RESULT AND DISCUSSION

Macrmorphologcal Description: The *Alpinia galanga root* is branched out into many pieces. The organoleptic evaluation of the Roots revealed that roots were dark brown in color, with Aromatic odor and Bitter taste. Average root length was observed to be 5-10 cm in length and 3-5 mm in diameter. The morphological studies revealed that the roots occur in entire condition with secondary and tertiary roots attached to it. The extra features observed showed that the uinpeeld roots having more or less cylindrical shape, slightly tapering at end with rough fibrous surface [8,14,15] (Figure 1). The detail macromorphological evaluations of the roots were mentioned in Table 1.

Cytomorphological Description: Figure 2 reveals the transverse section of the Root which shows the presence of thick brownish continuous layer of cork cells. The cork cells are narrow, tangentially elongated, isodiametric cells with light brown granular matter. Beneath this a multiple layers of Phelloderm was observed. The Phelloderm consists of one or two rows of tangentially elongated thin wall cells. [16,17] The region inner to Phelloderm was formed of several layers of compactly arranged thin walled parenchymatous cells which are known as Cortex Layer (Figure 3).

The phloem was characterized by the presence of thick walled rectangular and oval shape cells. Many patches of these phloem cells were present above the cambium some of which are characteristic lignified phloem fibers. [15] Underneath this a horizontal track of cambium was observed followed by thick walled polygonal cells of xylem. Xylem contains xylem parenchyma and lignified xylem vessels. Xylem parenchymatous cells are packed with starch grain. [18] At center the small circular pith like arrangement was seen with dark brown colored outer covering (Figure 4). Rhomboid crystals of calcium oxalate were also present with simple or compound starch grains. Powder microscopy of the root exhibited the presence of lignified fibers with tapering ends also observed xylem vessels with simple pits on their walls. [14] Numerous starch grains, cortex cell with reddish brown content and few bundles of acicular crystals also observed.

Physicochemical parameters: The results of the physicochemical parameters of root powder lie within the limit which is depicted in Table 2; this signifies that the quality and purity of raw material was good enough; the results of foreign organic matter denote presence of any organism, part or product of an organism, other than that named in the specification and description of the herbal material concerned[9]; which was found to be 04.35±1.66, it indicates that their may be present of part or product of an organism in very less amount. The results of Ash values signify the purity of drug that is the

presence or absence of foreign matter such as metallic salt or silica present in the raw material. The total ash usually consists of carbonates, phosphates; silicates and silica which include both physiological ash and non-physiological ash [13], the values are 11.66± 0.33% for total ash. Acid insoluble ash particularly indicates contamination with silicious materials e.g., earth and sand, comparisons of this with the total ash value of the same sample will differentiate between contaminating materials and variations of the natural ash of the drug which was found to be 02.53± 0.25 %.

The water soluble ash was found to be 04.66±0.16 %, this parameter is used to detect the presence of material exhausted by water whereas the value for Sulphated ash was found to be 03.66±0.16 % which is within fairly wide limit. As the ash values of the crude drugs lies with in the fair limit which signify its quality and purity and gives idea about the total inorganic content. [9, 12, 13] The water soluble extractive value found to be 15.33±2.66 % while the alcohol soluble extractive value was found to be 14.66±1.76 % which signifies the nature of the phytoconstituents present in plant. Moisture is an inevitable component of crude drugs, which must be eliminated as far as practicable. Deterioration time of the crude drugs depends upon the amount of water present in formulation. If the water content is high, the crude drugs can be easily deteriorated due to fungus and the moisture content of the crude drugs[13] was found to be 04.50±0.16which signify that the both churna was properly dried and properly stored. The pH conventionally represents the acidity and alkalinity, as the pH was determined which was near to 5 which was in acidic range and may be because of acidic salts present in the root.

Preliminary phytochemical screening: The preliminary phytochemical investigations of powdered root were performed which shows the presence of Volatile oil, Alkaloids, Tannins type of major secondary metabolites which revealed their potent therapeutic activity. [15, 18] The results of the screening were express in table 3.

CONCLUSION

Standardization is essential measure for quality, purity and sample identification. Macromorphology and Cytomorphology along with the Quantitative analytical microscopy is one of the simplest and cheapest methods to start with for establishing the correct identity of the source materials. Physiochemical and qualitative Chemical analysis of roots confirm the quality and purity of plant and its identification. Here the information collected was useful for further pharmacological and therapeutically evaluation along with the standardization of plant material.

Table 1: Macroscopic Characters of *Alpinia galanga* Root

Characters	Observation
Organoleptic characters	
Colour	Dark Brown
Odour	Aromatic
Taste	Bitter
Quantitative macromorphology	
Length	5-10 cm
Diameter	3-5 mm
Extra features	
Shape	Cylindrical and slightly tortuous
Type	Unpeeled drug
Texture	Rough
Surface	Fibrous
Fracture	Short and irregular
Wrinkles	Longitudinal

Table 2: Physicochemical Evaluation

Parameters	**Standard**
Foreign organic matter (% w/w)	04.35±1.66
Ash Values	
Total ash (% w/w)	11.66± 0.33
Acid insoluble ash (% w/w)	02.53± 0.25
Water soluble ash (% w/w)	04.66±0.16
Sulphated ash (% w/w)	03.66±0.16
Extractive values	
Alcohol soluble extractive value (% w/w)	14.66±1.76
Water soluble extractive value (% w/w)	15.33±2.66
Physical Constants	
Moisture content (LOD) (% w/w)	04.50±0.16
P^{H}10 % solution (% w/v)	05.00±0.00

Table 3: Preliminary Phytochemical Screening

Parameters	Observation
Carbohydrates	+
Amino acids	-
Glycosides	-
Flavonoids	-
Volatile oil	+
Alkaloids	+
Tannins	+
Steroids	-

+ indicates presence

.

Figure 2: T.S of *Alpinia galanga roots*

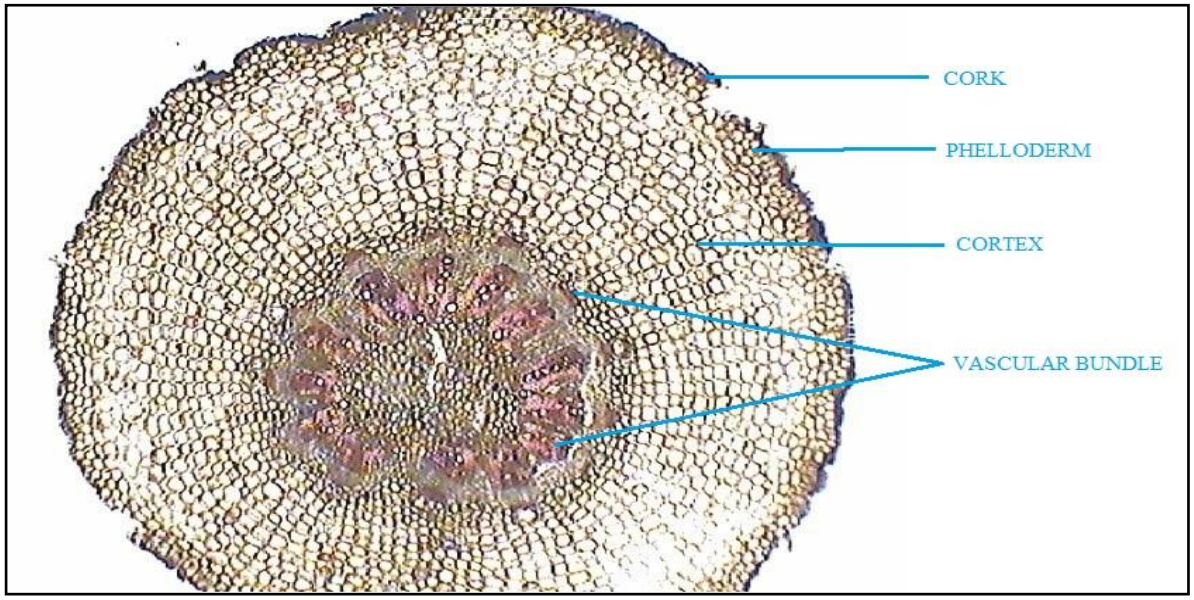

Figure 3: Cork, Phelloderm and Cortex

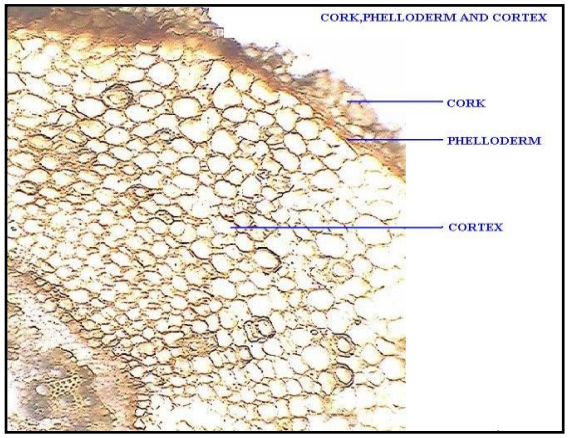

Figure 4: Vascular bundle

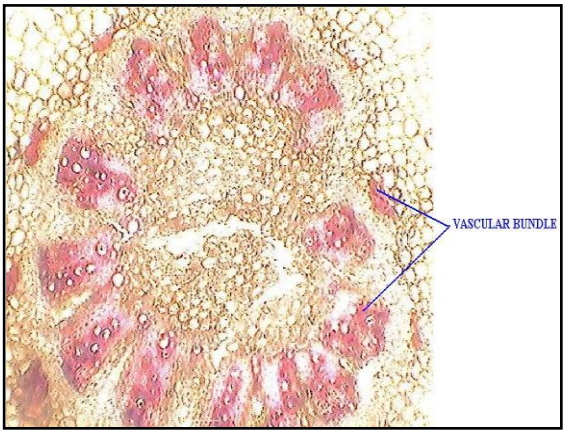

Figure 5: Powder microscopy-Cortex cell

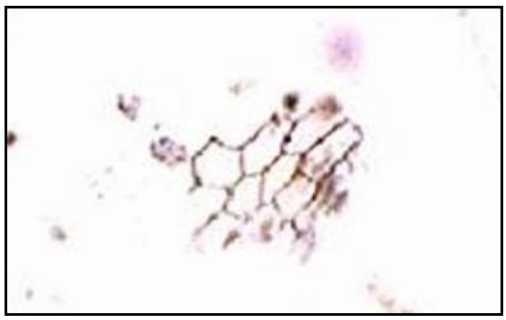

Figure 6: Powder microscopy-Xylem vessels

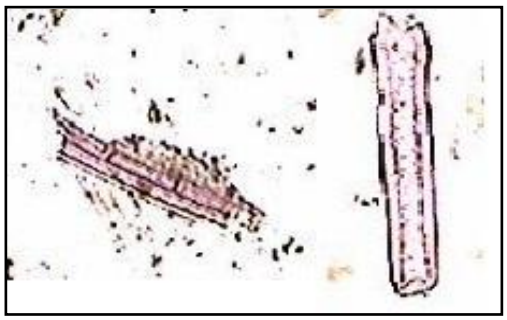

Figure 7: Powder microscopy- Fibers

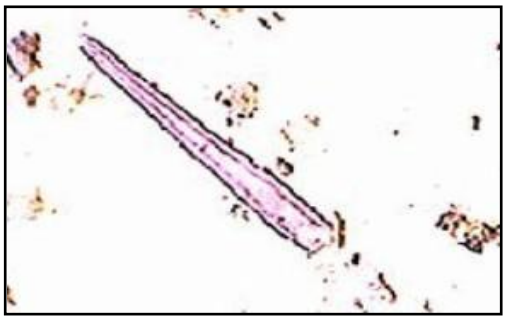

Figure 1: Macromorphology of root

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