Phytochemical and phramacognostic parameters for evaluation of the rhizomes of *Curcuma amada* Roxb.

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**ABSTRACT**

*Curcuma amada* Roxb. (known as mango ginger) is one of the important species belonging to Zingiberaceae family with its very less known potential and characteristics. The present work attempts to establish the necessary phytochemical and phramacognostic standards for evaluating the plant material of *Curcuma amada* Roxb. various parameters such as morphology, microscopy, ash value, extractive value, moisture content, phytochemical studied and documented. We believe this study of *Curcuma amada* medicinal plant presented in research paper may provide consolidated information to researchers, as well as practitioners to plan future studies. Finally it has great potentiality both from the pharmacological, economic and botanical points of view.

**Keywords:** *Curcuma amada*, mango ginger, phytochemical parameter and phramacognostic parameter.

**INTRODUCTION**

*Curcuma amada* Roxb. (Zingiberaceae) is commonly known as mango ginger, amrardrakam, aambe halad belonging to the family Zingiberaceae. The genus *Curcuma* (Zingiberaceae) originate from the Indo-Malayan region and are widely distributed in the tropics of Asia to Africa and Australia. Mango ginger is cultivated in Gujarat and found wild in parts of West Bengal, U. P. Karnataka and Tamil Nadu. The rhizomes are useful in vitiated conditions of *pitta*, anorexia, dyspepsia, flatulence, colic, bruises, wounds, chronic ulcers, skin diseases, pruritis, fever, constipations, stranguary, hiccough, cough, bronchitis, sprains, gout, halitosis, otalgia, cooling, appetiser, carminative, digestive, stomachic, demulcent, vulnerary, febrifuge, alexertic, aphrodisiac, laxative, diurectic, expectorant, antitumor and antipyretic. The rhizomes are used externally in the form of paste as an application for bruises and skin diseases generally combined with other medicines. *Curcuma amada* Roxb. is a unique spice having morphological resemblance to ginger. The main use of mango ginger rhizome is in the manufacture of pickles, as a source of raw mango flavour for foods and for therapeutic purpose. Ayurveda, the oldest system of medicine in India, has given importance to rhizome as an appetizer, alesxiteric, antipyretic, aphrodisiac and laxative. It is also used in treatment of biliousness, itching, skin diseases, asthma, hiccups and inflammation due to injuries. According to Unani systems of medicine, it is a diuretic, maturant, emollient, expectorant, antipyretic and appetizer. It is useful against inflammation in the mouth, ear, as well as gleet, ulcers on the male sex organs, scabies, lumbago and stomatitis. According to Unani systems of medicine, it is a unique spice having morphological resemblance to ginger. The main use of mango ginger rhizome is in the manufacture of pickles, as a source of raw mango flavour for foods and for therapeutic purpose. Ayurveda, the oldest system of medicine in India, has given importance to rhizome as an appetizer, alesxiteric, antipyretic, aphrodisiac and laxative. It is also used in treatment of biliousness, itching, skin diseases, asthma, hiccups and inflammation due to injuries. According to Unani systems of medicine, it is a diuretic, maturant, emollient, expectorant, antipyretic and appetizer. It is useful against inflammation in the mouth, ear, as well as gleet, ulcers on the male sex organs, scabies, lumbago and stomatitis. Not any specific type of data is available to identify and to ensure quality of *Curcuma amada* Roxb. Therefore, the present work may give contribution in the various pharmacognostical and phytochemical parameters for authentication and quality control of commercial samples of crude drug.

**MATERIALS AND METHODS**

**Plant material**

Fresh and healthy rhizomes of *Curcuma amada* Roxb. was collected in the month of October 2011 from the local market, Kashti, Shrigonda of Ahmednagar district of Maharashtra, India, and authenticated on the basis of morphologic features in the botany department. Rhizomes were washed, sliced, shade dried and ground to fine powder atleast 7 to 8 days and powdered.

**Chemicals**

The following chemicals were used, n-hexane (RFCL Ltd, India), ethyl acetate (RFCL Ltd, India), methanol (MERCK Ltd, India), Sudan III (Research Lab Fine chem. Indus., Mumbai), phosphoglcinol (Research Lab Fine chem. Indus., Mumbai).

**Macroscopic and microscopic characters**

Fresh rhizomes of plant were collected and depending upon physical evaluation macroscopic characters documented. Then thin transverse section of middle plat of rhizome was taken. This section was observed under microscope and reported. This section was then stained with phosphoglcinol-HCl, concentrated H$_2$SO$_4$ and iodine solution to observe the different part and reported.

**Physicochemical constants**

Physicochemical constants, such as the percentage of total ash, acid-insoluble ash, moisture content (on the basis of dry weight), water and alcohol soluble extractives were calculated as per the Indian pharmacopoeia.

**Phytochemical screening**

Preliminary phytochemical studies were carried out using 100 g powdered material and subjecting it to successive extraction in a Soxhlet apparatus with n-hexane, ethyl acetate, methanol and water, the obtained extracts so were dried and weighed. Various phytoconstituents, namely, carbohydrate (Molish’s test), protein (Millon’s test, Biuret test), amino acids (Ninhydrin test), steroids (Salkowski reaction), alkaloids (Dragendorff’s test, Mayer’s test, Wagner’s test), glycosides (Legal’s test), Flavonoids (Lead acetate test) and so on, were detected by standard chemical methods. Preliminary phytochemical tests are used for detection of organic constituents and char-
characterization of plant extracts for various chemical constituents by chemical methods.

RESULTS

Macroscopy (Morphology of the Plant)

Colour: pale to buff yellow,
Odour: like raw mango,
Taste: like raw mango with slightly pungent,
Size: 12 X 8 cm,
Shape: flattened, longitudinal wrinkled,
Fracture: short and smooth.

Figure 1. Dry Curcuma amada rhizomes

Table 1. Morphological and organoleptic characters of rhizome of Curcuma amada Roxb.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Parameters</th>
<th>Features (Fruit seed)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Colour</td>
<td>pale to buff yellow</td>
</tr>
<tr>
<td>2</td>
<td>Odor</td>
<td>like raw mango</td>
</tr>
<tr>
<td>3</td>
<td>Taste</td>
<td>like raw mango, with slightly pungent</td>
</tr>
<tr>
<td>4</td>
<td>Size</td>
<td>various</td>
</tr>
<tr>
<td>5</td>
<td>Shape</td>
<td>flattened, longitudinal wrinkled</td>
</tr>
<tr>
<td>6</td>
<td>Fracture</td>
<td>short and smooth</td>
</tr>
</tbody>
</table>

Powder pale to buff yellow, odour like raw mango, taste like raw mango with slightly pungent, lignified xylem fibres, oil cells, patches of parenchymatous cells filled with starch grains. Rhizome is flattened, longitudinal wrinkled with like raw mango odor, about 8 to 12 cm in diameter, the shape and size is often variable. It is covered with adventitious roots, on rhizomes presence of nodal and internodal zones. It presence in short and smooth as fracture.

Microscopy

Xylem composed of scattered vessel strands and xylem parenchyma; vessels mostly presence in single or in groups. Xylem parenchyma are present in round or oval shaped. Starch grains present in the phloem. Parenchyma nearly spherical like cells in the forms of grains. The starch grains distributed all over area and give blue apparence with iodine solution. Oligorasin crystals free in powder and covers major area. Calcium oxalate crystals observed in the form of small acicular raphides. T.S. of rhizome circular in outline; epider-

Figure 2. T.S. of Curcuma amada rhizome

Powder characteristic

In powder characteristic free flowing, characterized by the presence of calcium oxalate crystals observed in the form of small acicular raphides, sclerenchymatous cells, showing radial pit canals and starch grains are also present.

Figure 3. Calcium oxalate crystal of Curcuma amada

Table 2. Powder characteristics chemical tests of rhizome of Curcuma amada

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Reagents</th>
<th>Observation</th>
<th>Characteristics</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Alcoholic picric acid</td>
<td>Yellow</td>
<td>Small acicular raphides calcium oxalate crystals</td>
</tr>
<tr>
<td>2</td>
<td>Phlorogl. + Con. HCl (1:1)</td>
<td>Pink</td>
<td>Lignified reticulate parenchymas of mesocarp &amp; vascularbundles.</td>
</tr>
</tbody>
</table>

Figure 4. Powder microscopy of Curcuma amada
Phytochemical studies
Various physicochemical constants, such as moisture content, ash value, acid-insoluble ash, LOD, and water and alcohol soluble extractives were determined (Table 3 and Table 4). The percentages of successive Soxhlet solvent extractives were calculated (Table 6). Preliminary phytochemical studies showed that the rhizome of Curcuma amada Roxb, presence of phytochemicals like carbohydrates, alkaloids, steroid, glycosides and flavonoids (Table 7).

Table 3. Determination of moisture content (LOD) of Curcuma amada rhizome

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Time (Min)</th>
<th>Loss of moisture (%w/w)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0.0</td>
</tr>
<tr>
<td>10</td>
<td>1.2</td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>1.9</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>3.1</td>
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</tr>
<tr>
<td>90</td>
<td>3.4</td>
<td></td>
</tr>
<tr>
<td>120</td>
<td>4.7</td>
<td></td>
</tr>
<tr>
<td>150</td>
<td>4.8</td>
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<tr>
<td>180</td>
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<tr>
<td>210</td>
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<tr>
<td>240</td>
<td>5.2</td>
<td></td>
</tr>
<tr>
<td>270</td>
<td>5.2</td>
<td></td>
</tr>
</tbody>
</table>

The percentage of loss on drying was found to be 5.2% w/w.

The extracts show presence of carbohydrates and steroid in all types of extracts, alkaloids and glycosides in methanol and aqueous extract, flavonoids in ethyl acetate, methanol and aqueous extract. This help for isolation of constituents from respective extracts.

DISCUSSION
Very less documentation and information is available related to the Curcuma amada. Therefore, under this pharmacognostic, phytochemical screening related to the extractive values, total ash values, water soluble ash values and acid insoluble ash values done. The microscopic and macroscopic features of the various parts of the plant have been documented along with physicochemical constants and pharmacognostic parameters, which may provide important information regarding to the plant of Curcuma amada.

CONCLUSION
The genus Curcuma represents many species; most of them are fully explored but Curcuma amada Roxb. not much studied. Traditional claims of this crude drug are yet to be pharmacologically explored to develop new compounds, which may be beneficial for future studies. Curcuma amada Roxb. is a very less documented data as well as almost untouched drug although it has high potential value related to botanical, economical and pharmacological point of view. This research paper may provide consolidated information to researchers, as well as practitioners to plan future studies in isolation of phytochemical as well as elucidate the mechanisms behind its traditional effects under pharmacological activities. Finally this work may prove that Curcuma amada will be natural gift to human being.

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