Pharmacognostic evaluation of *Curcuma haritha* Linn

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*Curcuma haritha* Linn (Family: Zingiberaceae), a lesser-known medicinal zingiber, is wildly distributed in Kerala. It is common throughout the costal regions and grows along with *C. caesia* and *C. raktakanta*, but is rarely found in high altitude grasslands. It is closely related to *C. aromatica*, but differs in the yellowish-grey, non-aromatic rhizome, leathery, semi-pilicate, erect leaves, white corolla and yellow tip with a median dark yellow band. It also resembles *C. raktakanta* but differs from it in having green pseudostem with light pink spots, white corolla lobes and swollen placenta. A paste of rhizome is useful externally for cuts, wounds, itching and in sprains. Pharmacognostic evaluation of its rhizome showed: total ash, 7.4; acid insoluble ash, 1.5; alcohol soluble extractives, 8.50; water soluble extractives, 19.50; sugar, 5.11; starch, 42.88 and tannins, 1.78%. On hydro distillation, rhizomes and sessile tubers yield oil (0.58%).

**Keywords:** *Curcuma haritha*, Pharmacognosy, Rhizome, Standardization

**Introduction**

*Curcuma haritha* Linn (Family: Zingiberaceae) is a lesser-known, wildly distributed medicinal zingiber from Kerala. It is common throughout the costal regions and grows along with *C. caesia* and *C. raktakanta*, but is rarely found in high altitude grasslands. It is closely related to *C. aromatica*, but differs in the yellowish-grey, non-aromatic rhizome, leathery, semi-pilicate, erect leaves, white corolla and yellow tip with a median dark yellow band. It also resembles *C. raktakanta* but differs from it in having green pseudo stem with light pink spots, white corolla lobes and swollen placenta. Rhizome is expectorant, astringent and useful in diarrhea and used as substitute of arrowroot by natives in different parts of Kerala. Study presents pharmacognostical evaluation of *C. haritha* Linn.

**Materials and Methods**

Plant material was collected from Trivandrum (Kerala, India) [Sharad, LWG 222349, 2004] and rhizomes were preserved in 70% ethyl alcohol for histological studies. Microtome sections were cut and stained with safranin and fast green and photographed with Nikon F70X camera. Physico-chemical and phytochemical studies were carried on shade dried powdered material. The behavior of the powdered drug with different chemical reagents was also studied.

**Results and Discussion**

**Macroscopic Characters of the Rhizome**

Rhizome (Fig. 1) laterally flattened, longitudinally wrinkled, 2-6 cm long, 0.5-2 cm in diam, branched, non-aromatic, pale yellowish-green inside; sessile tubers fleshy, finger shaped, branched; root tubers absent surface, branching sympodial, horizontal; roots long, unbranched, tapering, thread like, yellowish brown; rhizome pale yellowish-green with short and smooth fracture and sweet in taste.

**Microscopic Characters of the Rhizome**

Transverse section of rhizome (Fig. 1) is circular in outline. Epidermal cells are rectangular-oval covered with thick cuticle, long unicellular trichomes present. Followed to these is storied suberized cork cells, 4-7 layered, interrupted by lysigenous oil glands. Wide cortex present having irregularly scattered vascular bundles. Each vascular bundle is enclosed within a prominent fibrous sheath, inner limit of cortex marked by endodermis, and pericycle followed by vascular bundles, devoid of bundle sheath, arranged in a ring; schizogenous canals and abundant oil cells with suberized walls are also found in central region of cortex. Most of the parenchymatous cells are filled with starch grains, which are oval-ellipsoidal,
Fig. 1—Macro and microscopic characters of the rhizome of *Curcuma haritha* ICO, Inner cortex; CK, Cork cells; IVB, Inner vascular bundle; OVB, Outer vascular bundle; CO, Cortex; FR, Fiber; ST, Starch; VS, Vessels; XY, Xylem; ED, Endodermis; PR, Pericycle; HR, Hairs; TC, Tannin containing cells
sometimes polygonal, 10-60 µm, simple, hilum circular or a 2-5 rayed cleft, lamellae distinct and concentric. Vascular bundles in the central cylinder are similar to those in the cortex, scattered, closed, collateral, surrounded by thick walled bundle sheath. Secondary wall thickening reticulate, fibres thin walled with lignified narrow central lumen. In transverse longitudinal section, cortex cells irregular with variable size. Vessels elongated with spiral or annular thickenings and with no clear end-walls. Tracheids are observed with bordered pits. Powder pale yellowish-grey with sweet, non-aromatic odour, shows fragments of storied cork, xylem vessels with reticulate thickenings, lignified xylem fibres, oil cells, patches of parenchymatous cells filled with starch grains, which are oval-ellipsoidal, sometimes polygonal, 10-60 µm, simple, hilum circular or a 2-5 rayed cleft, lamellae distinct and concentric.

**Physico-chemical Studies**

Physico-chemical values of rhizome were found as follows: water soluble extractives, 19.50; alcohol soluble extractives, 8.50; starch, 42.88; sugar, 5.11; tannins, 1.78; essential oil 0.58; total ash, 7.4 and acid insoluble ash, 1.5%. Successive Soxhlet extractives were found as follows: water, 35.6; hexane, 6.1; methanol, 5.1; chloroform, 5.0 and acetone, 2.3%.

**Essential Oils**

On hydro distillation, rhizomes and sessile tubers yield essential oil (0.58%) having following values: Colour, bluish violet, turning reddish when exposed to light; Odour, penetrating camphoraceous; Monoterpenoids/hydrocarbons, 48.51 and Sesquiterpenoids/oxygenated compounds, 51.49%. Gas Liquid Chromatography of rhizome (Fig. 2) gave following components: α-pinene, 1.75; β-pinene, 6.67; p-cymol, 2.89; camphor, 21.24; camphene, 14.59; borneol, 1.37; terpinyl acetate, 2.43; pentadecane, 1.84; tumerone, 5.39; ar-tumerone, 9.63; and ethyl-p methoxy cinnamate, 3.53%.

**HPTLC Studies**

A densitometric HPTLC analysis (Fig. 3) was performed for the development of characteristic fingerprint profile, which may be used as markers for quality evaluation and standardization of the drug. The bands in the sample were obtained at Rs 0.28, 0.31, 0.36, 0.40, 0.61 & 0.84 (acetone fraction) and 0.18, 0.57 & 0.84 (methanol fraction), which can be used as identifying markers. When compared both the
profile with curcumin as a reference, it was present only in traces in both the extracts.

**Discussion**

Odour and taste of rhizome are quite characteristic and non-aromatic with sweet taste. On microscopical examination, rod shaped starch grains are observed in the rhizome. Similarly numbers of curcumin containing cells are also very low in the rhizome. Total ash (7.4%) and acid insoluble ash (1.5%) are considered to be an important and useful parameter for detecting the presence of inorganic substances.

Similarly, alcohol (8.50%) and water-soluble extractives (19.50%) are indicators of the total solvent soluble component. Likewise, essential oil (0.58%) is an important parameter for identification and authentication. *C. haritha* rhizome possesses an exceptionally low amount of acetone extractives (2.30%), which may be due to the lesser percentage of curcumin, soluble in acetone.

**Conclusions**

Above parameters are very useful for the identification of the species, which may be useful to
pharmaceutical industries for the authentication of the commercial samples.

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