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## Evaluation of pharmacognostic, phytochemical, physiochemical activity of *Karcura (Curcuma zedoaria* Rosc.)

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**Abstract**

**Background:** Herbal medications are time tested and are known to be effective in treatment since Vedic periods. Now a days due to increased drug resistance and side effects of synthetic medications people are more inclined towards traditional systems of medicine and the global market for herbal medicines has grown exponentially. However, the major impediment is lack of proper standardization and quality control measures in manufacturing process. Hence the documentation of standard protocols to ensure drug quality, safety and efficacy is the need of the hour. The present article emphasizes the standardization of *Curcuma zedoaria* Rosc., which is popularly known as Amba Haldi or white turmeric. It is a perennial herb and is member of genus *Curcuma* and Zingiberaceae family. It is native to India and Indonesia but has also been cultivated in Europe and in the US. It was introduced to Europe by Arabs around the sixth century, but its use as a spice in the West today is extremely rare, having been replaced by ginger. The rhizome of the drug has been taken up for the present study

**Aims:** To evaluate pharmacognostic, phytochemical and Physiochemical analysis of Rhizome of *Curcuma zedoaria* Rosc.

**Materials and Methods**

- Macroscopic study was done based on the external appearance and organoleptic properties.
- Microscopic study of rhizome was done by free hand section cutting method of dried rhizome
- Phytochemical and Physiochemical analysis were done based on standard protocols

**Results:** The results obtained were compared with that of standards of API and it was found that drug was of good quality and devoid of any adulterants or impurities.

**Keywords:** Pharmacognostic study, phytochemical study, physiochemical analysis, *Curcuma zedoaria* Rosc., Karcura

**Introduction**

*Curcuma zedoaria* Rosc. is often referred to as Zedoaria or Amba Haldi, white turmeric. It is a perennial herb and is a member of genus *Curcuma* and Zingiberaceae family.

It is Found wild in the Eastern Himalaya (Hooker, 1973), and in Chittagong, moist deciduous forests of the coastal tract of Kanara; native to north East India, also Cultivated more or less throughout India, especially in Eastern Bengal, Districts of Chittagong and Tipperah (Nadkarni, 1976; Kirtikar and Basu, 1989), also cultivated in Sri Lanka and China (Anonymous, 1950; Anonymous, 1996).

- **Latin name:** *Curcuma zedoaria* Rosc.
- **Family:** Zingiberaceae/Scitaminae

**Taxonomical classification**

- Kingdom: Plantae.
- Division: Magnoliophyta
- Class: Liliopsida
- Order: Zingiberales
- Family: Zingiberaceae
- Genus: *Curcuma*
- Species: zedoaria

**Vernacular names**

- Hindi: Karcūra, Kalihaldi.
- English: Zedoary.
- Tamil: Kichilikilhangu, Pulankilhangu.

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- Kannada: Kachora, Bileshunti.
- Malayalam: Kachcholam, Kachchurikizhanna, Pulakizhanna.
- Telugu: Kachoram, Kichchiligaddalu
- Urdu: Karcūra

### Morphology

- Root stock of palmately branched sessile cylindrical oblong annulate tubers, pale yellow inside, with a camphoraceous odor and bitterish spicy taste, also bearing long fleshy fibers that terminate in smaller oblong less fragrant tubers.
- **Leaves:** 4-6 with oblong petioles 30-60 cm long, oblong-lanceolate, finely acuminate, glabrous on both surfaces, clouded with purple down the middle.
- **Flowers:** Flowering stem 20-25 cm long, appearing before the leaves, stout, clothed with obtuse sheaths. Flowers yellow in spikes 7.5-12.5 by 5-7.5 cm.
- **Bracts:** 3.8 cm long, ovate, recurved, cymbiform, green tinged with red; bracts of the coma reaching 5 cm long crimson or purple.
- **Calyx:** 8 mm long obtusely 3-toothed.
- **Corolla:** tube twice as long as the calyx, funnel shaped; lateral lobes oblong, the dorsal lobe larger vaulted, arching over the anther. Lip 13 mm broad suborbicular, deflexed, obscurely 3-lobed, deep yellow.
- **Fruit:** Capsule ovoid, trigonous, thin, smooth and bursting irregularly.
- **Seeds:** Ellipsoid with a white lacerate aril

**Flowering:** January and February



**Image:** Curcuma zedoaria

### Therapeutic indications mentioned in Ayurveda

Gridhrasi (S.S.Ci.38.67), Śoṭha (A.H.Ci.17.24), Aruci, Agnimāndya, Admāna, Anāha, Grahani (C.S.Si.3.38; A.H.Ci.10.46; S.S.U.51.50), Arśas (C.S.Si.3.38; S.S.U.51.50), Krimi, Hrid Daurbalya, Raktavikāra, Kāsa, Svāsa, Hikka (C.S.Su.27.155; S.S.U.51.50), Rajorodha, Kastārtava, Dhvajabhanga, Mutrakrchhra (A.H.Ci.14.14), Jvara, Sūla, Gulma (S.S.Ci.38.67; C.S.Si.3.38).

### Standardization procedure

#### Pharmacognostic study

Name of the sample: Rhizome of Karcura

Scientific name: *Curcuma zedoaria* Rosc.

Family: Zingiberaceae

Place of Collection: Local markets of Tirupati

**Drug description:** Dried rhizomes cut in to transverse slices, cylindrical and greyish – buff color.

### Macroscopic properties of rhizome

Size: Transversely cut pieces 2 to 3.5 cm in diameter

Shape: Cylindrical

Color: Externally Greyish-buff and internally cream coloured

Odor: Camphoraceous

Taste: Slightly bitter

Drug occurs as transversely cut pieces, cylindrical, surface rough due to longitudinal wrinkles and occasional protuberances. Distinct nodes and internodes are present, a few pieces bear thin root and root scars at places.

### Microscopic properties of rhizome

**T.S. of Rhizome:** Transverse Section of Rhizome is done by Free hand Section cutting and Simple staining procedure and findings are as mentioned below.

Transverse section of rhizome shows

1. Cork
2. Cortex
3. Vascular Bundles

#### Cork

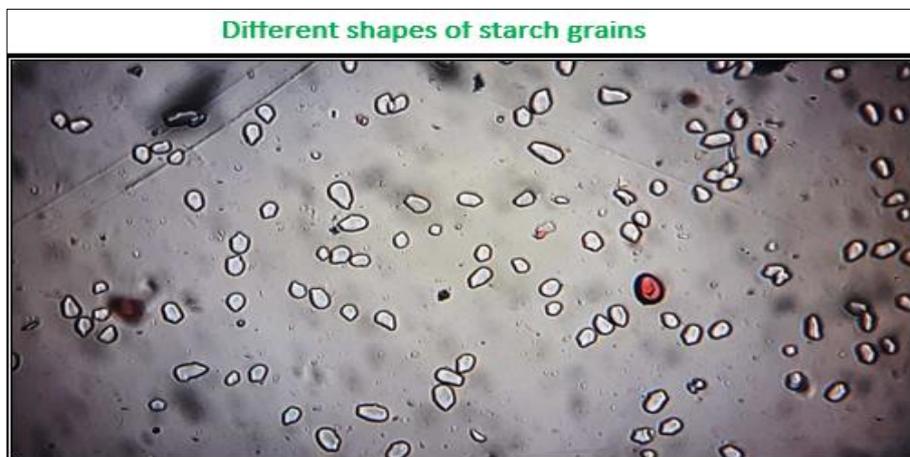
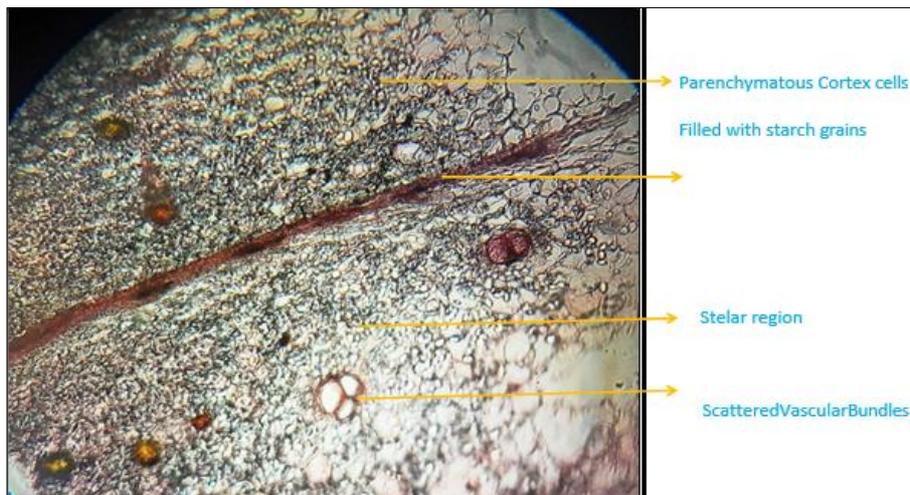
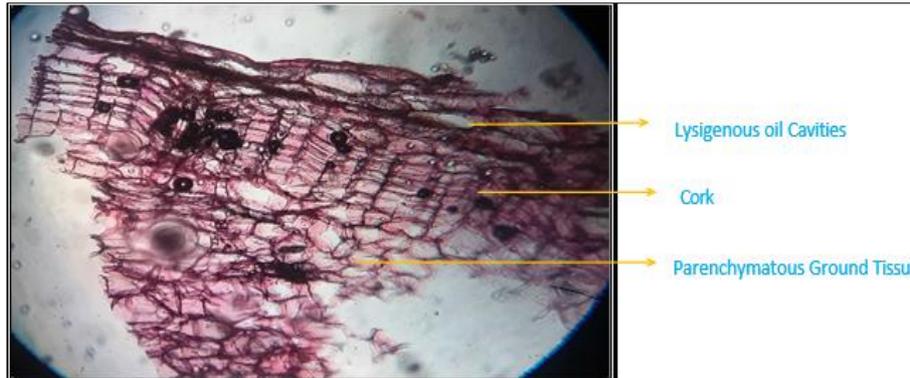
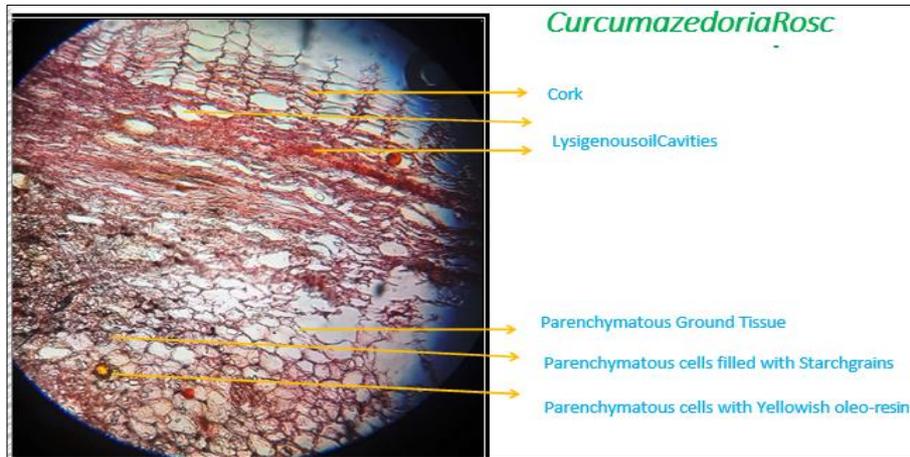
- Cork composed of 6 to 10 layers of thin-walled, tangentially elongated rectangular cells.
- Sometimes epidermis intact with cork having uni-seriate covering trichomes.

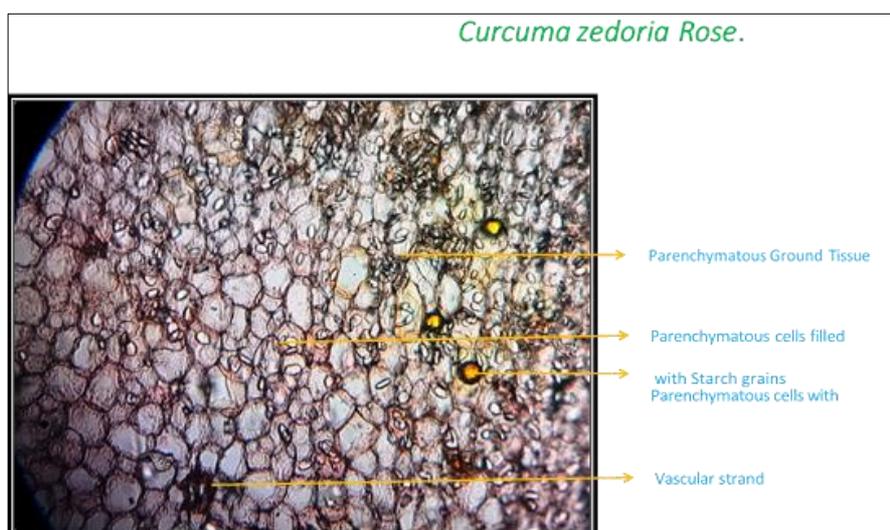
#### Cortex

- Cork region followed by Cortex region.
- Cortex consists of ground tissue composed of thin-walled, circular, oval or polygonal, parenchymatous cells.
- Cells mostly filled with simple starch grains but some cells also contain yellow color oleo-resin
- Stellar region demarked from cortex by somewhat collapsed cells of endodermis and consists of rounded and oval to polygonal cells mostly filled with starch grains but some having yellow masses of oleo-resin.
- Starch grains round to oval, a few with slight projection at one end, striations distinct, numerous. Hilum cleft like, indistinct at the narrow end

#### Vascular Bundles

- Vascular bundles distributed throughout cortical and stellar region.
- Vascular bundles are conjoint, collateral and closed type.
- Vascular bundles consisting of few xylem and phloem elements.
- Vascular bundles found in the form of a ring in the cortical region and in the stellar region, just below endodermis.
- Most of the vascular bundles in rest of the stellar region smaller in size and scattered.
- Number of vessels in each bundle varies from 2 to 10, bundle with single vessels being very rare.
- Xylem composed of Tracheids, Xylem vessels and Xylem parenchyma
- Vessels mainly spirally thickened, a few are with reticulate and annular thickenings.
- Phloem composed of Sieve cells, Sieve tubes, Companion cells and Phloem parenchyma.





Images of transverse section of dried rhizome

The Pharmacognostic studies revealed the presence of starch grains, parenchymatous ground tissue, yellow oil globules, Vascular strands and Spiral thickenings.

**Physio- chemical analysis**

The Physio- chemical analysis were performed based on the standard methods mentioned in API and the results were compared.

**Powder Analysis:** Powder Analysis is carried out by clarifying the powder in chloral hydrate solution and prepared Glycerin mount, Iodine solution mount and Saffranin solution mount and the following characters are identified.

**Organoleptic properties**

- Color:** Greyish-buff to cream
- Odor:** Camphoraceous
- Taste:** Slightly Bitter
- Texture:** Fine Powder

Physio- chemical analysis of karcura

Parameter	Results	Limits
	Karcūracurna	
Total ash	5.323% w/w	Not more than 7%
Acid insoluble Ash	1.966% w/w	Not more than 2%
Water soluble Extract	18.38% w/w	Not less than 10%
Alcohol soluble Extract	7.918% w/w	Not less than 4%
Foreign Matter	Nil	Not more than 2%

The results were compared, and the drug is identified as original crude drug without adulterants and impurities. Hence, its safety and efficacy is assured.

**Phytochemical analysis**

The dried rhizome of Karcura is powdered and sieved. The obtained powder is soaked in Water for 24 hours. Later it is filtered through Whatman’s filter paper and the filtrate is used for performing Phytochemical analysis based on standard procedures available and the results are analyzed.

## Results of phyto chemical analysis of Karcūra

S.no	Phyto chemical	Test name	Result	Endpoint
I	Alkaloids	Mayer's Test	Present	White precipitate
II	Carbohydrates	Molisch Test	Present	Reddish color
III	Reducing Sugars	Benedict's Test	Moderately Present	Orange color
IV	Proteins	Biuret Test	Present	Dark violet color
V	Xantho-proteins	Xantho- protein test	Mildly Present	Light orange color
VI	Aminoacids	Ninhydrin Test	Present	Purple color
VII	Starch	Iodine test	Absent	Nil
VIII	Tannins	Ferric chloridetest	Mildly Present	Light orange precipitate
IX	Steroids	Salkowski reaction	Present	Orange ring
X	Saponins	Frothtest	Present	Foam appearance
XI	Flavonoids	Dilute NaOH test	Present	Dilution of color
XII	Phenols	Ferric chloridetest	Absent	Bluish color

**Results and Observations**

**Karcūra Curna:** It showed the presence of Alkaloids, Carbohydrates, Sugars, Proteins, Amino acids, Steroids, Saponins, Tannins, Flavonoids, Phenols.

**Discussion**

Karcūra is a Herbaceous and rhizomatous perennial plant composed of an upright pseudo stem, a corm (an ovate rhizome), underground cylindrical branches or rhizomes (that develop up to the third order when fully matured), and fleshy roots.

**Macroscopically:** Drug occurs as transversely cut pieces, cylindrical, surface rough due to longitudinal wrinkles and occasional protuberances. Distinct nodes and internodes are present, a few pieces bear thin root and root scars at places.

**Microscopically:** It contained 6- 10 layered cork cells which were tangentially elongated followed by cortex which contains thin walled, circular parenchymatous cells mostly filled with Starch grains and Yellow masses of oleo resin and Conjoint, Collateral, Closed type of Vascular bundle was present.

**On performing powder analysis the following were noted.**

It was a fine powder with Greyish Buff – Cream color, Camphoraceous odor and slightly Bitter taste. Physicochemical analysis performed for Total ash, Acid insoluble Ash, Water soluble Extract, Alcohol soluble Extract Foreign matter showed the following values of 5.323% w/w, 1.966% w/w, 18.38% w/w, 7.918% w/w, Nil respectively.

Phytochemical analysis showed the presence of Alkaloids, Carbohydrates, Sugars, Proteins, Amino acids, Steroids, Saponins, Tannins, Flavonoids, Phenols and pH of Karcūra Cūrṇa is 5.1

**Conclusion**

These Pharmacognostic, Phytochemical, Physicochemical studies help in proper identification and standardization of crude drug. This type of research helps in authentication additionally, ensures reproducibility of herbal merchandise in marketing.

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