Studies on Pharmacognostical features of *Curcuma domestica* Val.

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**Abstract**

The microscopic and macroscopic characters of the rhizome of *Curcuma domestica* Val. were studied. The behavior of the powdered drug in the presence of various chemicals was also studied. Preliminary phytochemical screening on the various extracts of the rhizome was done in order to ascertain the various chemical constituents present. These studies were carried out to identify this plant for future research work.

**Introduction**

*Curcuma domestica* Val. (Family: Zingiberaceae; synonym: *Curcuma longa* Linn.) is a perennial plant with roots or tubers oblong-palmate and deep orange inside. Leaves about 2 feet long, lanceolate long, petioled, tapering at each end, smooth and of a uniform green colour. Flowers are funnel shaped, dull yellow, three or five together surrounded by bracteolate. It is propagated by cuttings from the root. In fresh state, the roots have an aromatic and spicy fragrance, which by drying give way to a more medicinal aroma (1).

It is known as Turmeric or Indian saffron (English), Huldee (Hindi), Hullud (Bengali), Uruk-uz-safr (Arabian), Kurkum (Persian), Haridra (Sanskrit), Gelbwurtz or Gilbwurtz (German), and Yu-chin or Kiang-hoang (Chinese). Because of ancient trade, the origin of Turmeric cannot accurately be
reconstructed, probably South-East Asia, i.e., a native of India and Indonesia. Other known species of Curcuma are Curcuma xanthorzzhiza (Japanese turmeric), C. zedoaria (Zedoary), C. wenyujin and C. amada (2).

Turmeric is a very important herb in Ayurvedic medicine. As symbol of prosperity, it was considered as a cleansing herb for the whole body. Medicinally, it was used as a digestive aid and for treatment of fever, infections, dysentery, arthritis and jaundice and other liver problems. Traditional Chinese physicians used it to treat liver and gallbladder problems, stop bleeding and treat chest congestion and menstrual discomforts. Turmeric has long been considered as an essential spice of the Indian and other ethnic cuisines. In India, turmeric is used for the treatment of anorexia, liver disorders, cough, diabetic wounds, rheumatism and sinusitis. It is a natural antibiotic, which also improves intestinal flora, inflammatory bowel syndromes (e.g., ulcerative colitis), chronic diseases, chronic hepatitis, chronic bronchial asthma, psoriasis, all inflammatory conditions, external acne, insect bites and sore eyes. It is currently being evaluated for its anticarcinogenic and antimutagenic properties (3, 4).

Considering the various therapeutic efficacy and usage in traditional practice, it was thought desirable to investigate some of its pharmacognostical parameters for further identification of the active material(s). The present investigation deals with studies on some important pharmacognostical profiles of the rhizome in its powdered form.

Materials And Methods

Plant material

Whole plant of Curcuma domestica Val. was collected from the forest land of Jharkhand in September 2005 and was identified by Dr. S. Jha, Taxonomist of the Department of Pharmaceutical Sciences, Birla Institute of Technology, Mesra, Ranchi-835215, India. A voucher specimen [Ref No. SJAN 03/05] of the plant herbarium has been preserved in the laboratory for future reference. After collection the rhizomes were cut into small pieces and dried properly. The dried rhizomes were then ground to a coarse powder by passing through a 40-mesh sieve.

Reagents

All the reagents were of analytical grade and obtained from S. D. Fine Chemicals Ltd., Mumbai.

Methods

The macroscopic characters (color, size, shape, odor, surface, texture, taste) of the rhizome of the plant under study were observed (5). The powder microscopy of the rhizome was performed following the standard method (6). The physical constant values of the plant under study were determined by standard pharmacopoeial methods (7). The behavior of the powder drug with different chemical reagents was studied (8). Preliminary phytochemical tests for
the various extracts of the rhizome were performed by using specific reagents (6,9). Further the extractive values of the methanolic extract of the rhizome of Curcuma domestica were determined.

Results and Discussion

The macroscopic characters of the rhizome under study are shown in Table 1. The microscopical characters as observed with powdered rhizome showed the presence of abundant starch granules, cork cells, yellow colored oleoresin cells and wood elements. The various physical constant values of rhizome of the plant have been reported in Table 2. The behavior of the powder drug on treatment with different chemical reagents is presented in Table 3. Phytochemical screening of the rhizome reveals the presence of the active constituents as reported in Table 4. The methanolic extract of the rhizome is found to be yellow in color and its yield value is 6.0 % w/w.

Conclusion

The various studies of Curcuma domestica Val. Rhizome including its microscopy and macroscopy, physical constant values, behavioral studies of the powder drug with different chemical reagents, preliminary phytochemical screening of the various extracts of the rhizome will definitely help in proper identification of its active constituent(s) and authentication of the plant and its powder form for further studies.

Table – 1.
Macroscopic characters of the rhizome of Curcuma domestica Val.

| CHARACTERISTIC  | DESCRIPTION                       |
|----------------|-----------------------------------|
| COLOR          | Orange-yellow.                    |
| SHAPE          | Irregular.                        |
| SIZE           | 1-2 cm thick and 6-11 cm long.    |
| TEXTURE        | Rough.                            |
| TASTE          | Pungent and slightly bitter.      |
| ODOUR          | Aromatic and spicy.               |

Table – 2.
Physical constant values of rhizome of Curcuma domestica Val.

| CONSTANT                        | YIELD IN PERCENTAGE (%W/W) |
|---------------------------------|----------------------------|
| Total ash                       | 8.46                       |
| Acid insoluble ash              | 0.76                       |
| Foreign organic matter          | 0.43                       |
| Alcohol soluble extractive      | 7.36                       |
| Loss on drying                  | 12.52                      |
Table - 3.
Behavioral pattern of the powdered sample of *Curcuma domestica* rhizome on treatment with different reagents

| CHEMICAL REAGENT                      | COLOR DEVELOPED  |
|----------------------------------------|------------------|
| Powder as such                         | Yellow           |
| Picric acid (saturated aqueous solution)| Yellowish        |
| Concentrated nitric acid               | Reddish          |
| Nitric acid dilute                     | Light brown      |
| Hydrochloric acid concentrated         | Dark brown       |
| Hydrochloric acid dilute               | Light brown      |
| Sulphuric acid concentrated            | Brownish black   |
| Glacial acetic acid                    | No change in color|
| Ferric chloride                        | Dark brown       |
| Aqueous iodine solution                | Blood red        |
| Dilute sodium hydroxide                | Light brown      |
| Antimony trichloride                   | Brownish gray    |

Table - 4.
Preliminary phytochemical tests for various extracts of *Curcuma domestica* Val. rhizome

| Type of extract                  | Alkaloids | Tannins | Glycosides | Steroids | Saponins | Reducing sugars |
|----------------------------------|-----------|---------|------------|----------|----------|-----------------|
| Methanol                         | +         | -       | +          | +        | -        | +               |
| Aqueous                          | +         | -       | +          | +        | -        | +               |
| Benzene                          | -         | -       | +          | +        | -        | +               |
| Pet. Ether (60°-80°)              | -         | -       | +          | +        | -        | +               |
| Chloroform                       | +         | -       | +          | +        | -        | +               |
| Acetone                          | +         | -       | +          | +        | -        | +               |

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