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## A report on pharmacognostical and quality control parameters of root of *Caesalpinia digyna* (Rottler)

**Yogesh, Charu Bharti, Arvind Kumar and Nitin Kumar Goswami**

**Abstract**

*Caesalpinia digyna* Rottler belongs to family Fabaceae is a big, Climbing, Spiky, bush which grows in the forests of the eastern Himalayas in Assam and west Bengal and Esatern Ghats of Andhra Pradesh and Madhya Pradesh and used in Traditional drug Preparation 'Geriforte' which has been used for curing Senile Prurites with excellent result. Root is used as astringent and also used to inhibit mycobacterium tuberculosis. Present study is an effort to establish the Pharmacognostical and quality control parameters for its standardization and commercial use in herbal drug industry. Presence of medullary rays collenchyma, cork cells, Ray cells are unicellular or multicellular in secondary xylem and spiral Xylem vessel, Calcium oxalate, starch grains Patches of fibers which are some of the distinguishing characters observed in this plant.

**Keywords:** *Caesalpinia digyna* Rottler, quality control astringent, physiochemical properties

**Introduction**

*Caesalpinia digyna* Rottler is belongs to the family (Fabaceae) is a big, everlasting, Spiky and Bushy climber. Leaves are twice-compound and panicle are axillary as well as terminal. It is called as Vakeri mul in Hindi, Nune-Gacca in Telugu and Umul-Kuchi in Bengali. It is chiefly found near villages in Eastern Ghats of Andra Pradesh, Madhya Pradesh, and West Bengal and also reported to be found in parts of Eastern Himalayas. Roots are medicinally useful. They are astringent, given internally in phthisis, scrofulous affections and diabetes. It is also useful as a febrifuge and is said to have an intoxicating effect <sup>[1, 2, 3]</sup>. The pods popularly known as Teri pods, contains about 28 percent of tannin, whereas pods with seeds contain more than 54 percent tannin. The bark also contains tannin of 28 percent. The tannin is a pure Gallo tannin and Gallic acid. Chemical investigations of the plant have shown the presence of caesalpinine A, cellalocinnine, ellagic acid, Gallic acid, bergenin, bonducellin, intricatinol and tannins <sup>[4]</sup>. A crystalline like substance provisionally named as Vikerin was isolated<sup>4</sup> and later confirmed as Bergenin <sup>[5]</sup>, which has anti-inflammatory property <sup>[6]</sup> Caesalpinine A and Caesalpinine C were isolated and their structures were determined <sup>[7, 8]</sup>. 2,3-Dihydro-7-hydroxy-3-[(4methoxyphenyl) Methylene]-4 H-1benzopyran-4-one was isolated from the leaves and twigs <sup>[9]</sup>. Phytochemical screening of caesalpinia digyna root Phytochemical examination of petroleum ether extract of *Caesalpinia digyna* root resulted in the isolation of four compounds namely, friedelin, hexacosanoic acid,  $\beta$ -sitosterol and stigmaterol <sup>[10]</sup>. A new homoisoflavonoid, Isointricatinal(1), together with eight known homoisoflavonoids, three flavonoids, bergenin and 11-O-galloylbergenin were isolated from the EtOAc fraction of MeOH extract of *Caesalpinia digyna* roots and evaluated for the antioxidant activity against DPPH and ABTS free radicals <sup>[11]</sup>.

**Material and Methods**

The shade dried *Caesalpinia digyna* Rottler was collected from the ML Manilal Lallubhai & Co Mumbai and authenticated by Dr. Devendra Kumar Pandey, Dr. Udai Chand Agrahari, Assistant Professor Domain of Botany, Lovely Professional University Phagwara Punjab. For Pharmacognostical studies Plant is size reduced and stored in air tight container. Free hand section was taken for microscopical evaluation studies were conducted by as per standard Method <sup>[10]</sup>. Iodine, Potassium iodide (IKI), Safranin Sudan Red III was used for differential staining along with the Phloroglucinol & HCl. Powdered drug was used for powder microscopy, moisture content <sup>[11]</sup> ash values <sup>[12]</sup> swelling index, foaming index, foreign organic matter, extractive values were carried out and fluorescence studies were carried out by treating 0.5 gm of powdered drug with different reagent and observation in colour was made in visible

light, U.V light of short (254nm) and long wavelength (365nm) under U.V chamber [13-15]. Preliminary Phytochemical screening was carried out as per standard procedure [16]

## Result and Discussion



Fig 1: Plant of *Caesalpinia digyna* Rottler



Fig 2: Roots of *Caesalpinia digyna* Rottler

### Macroscopic characters

The bulk material of roots consists of root pieces of up to 15 cm in length and up to 5 cm in thickness. They are slightly astringent with characteristic pleasant odour. They are reddish brown to dark brown to brick red in colour. Cut ends and wood are mild brown to reddish brown in colour. Outer surface is longitudinally shrunk and has root scars. They are very hard in nature. The bark is easily peeled off on handling. Texture is rough and fracture is fibrous. Lenticels are circular or irregularly shaped, nearly cup like, white in colour and few in young barks and abundant in matured ones. Wood is finely porous and vessels are visible with naked eye at broken and cut ends. Surface of the woody portion (where the bark was peeled) is smooth with longitudinal running ridges. Secondary

and tertiary roots of 13 mm in thickness and up to 40 cm in length are observed [19].

### Microscopic characters

Transverse section of root (Figure-3A) depicts the Secondary phloem, multicellular or unicellular Medullary rays few resin ducts are observed with yellowish brown content, some Patches of fibres are also shown. While the Longitudinal section of root Figure-3B) consist Collenchyma cells and spiral xylem vessel and cork cells.

### Powder microscopy

Powder of roots are yellowish brown It primarily consist of vessel, fibres Parenchyma cells and starch grains.

Figure-4(A) shows the Polygonal or thin walled Parenchyma cells, Starch grains and patches of fibres with Dark brown content Figure-4(B) shows the Thin narrow fibres with tapering ends, Spiral xylem vessels and prismatic calcium oxalate crystals and cork cells.

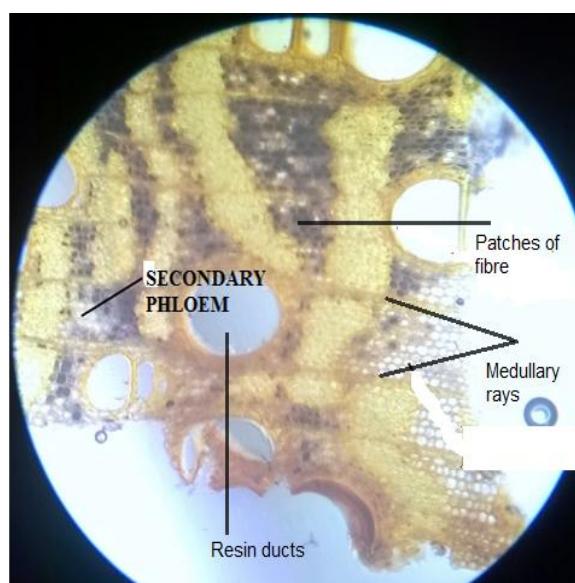


Fig 3(A): T.S. of *Caesalpinia digyna* Rottler

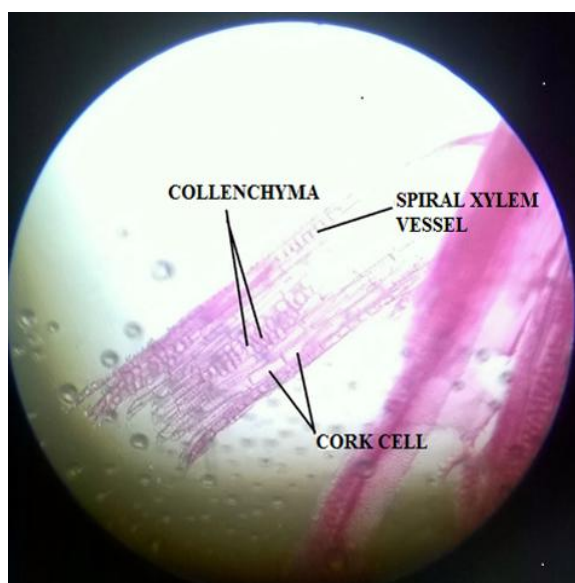


Fig 3 (B): L.S. of *Caesalpinia digyna* Rottler

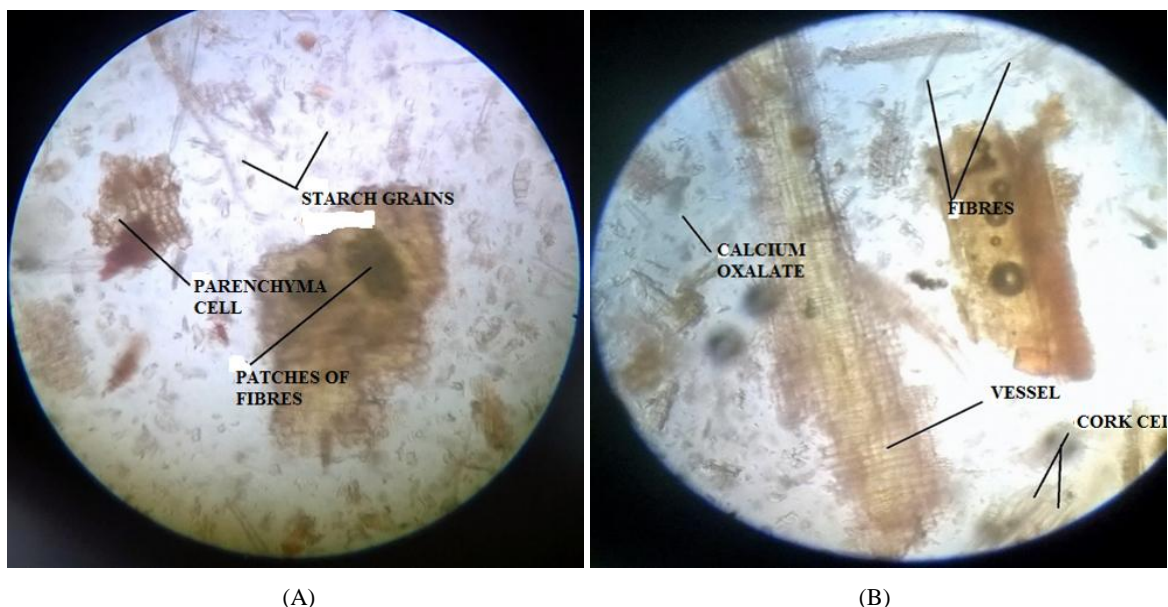


Fig 4(A, B): Powder microscopy of *Caesalpinia digyna* Rottler

### Physicochemical analysis

Air dried materials was used for quantitative determination of physicochemical values. Ash value (table1), Moisture content (table2), extractive values (table3), foreign organic matter, foaming index (table 4) were also performed. Fluorescence analysis of the drug powder was carried out and data is presented in the (table4).

Foreign organic matter: No foreign organic matter is present.

Table 1: Ash values of *Caesalpinia digyna* Rottler

| S. No. | Parameters         | % Values (w/w) |
|--------|--------------------|----------------|
| 1      | Total ash          | 2.79           |
| 2      | Acid insoluble ash | 0.16           |
| 3      | Water soluble ash  | 0.12           |

Table 2: Moisture content of *Caesalpinia digyna* Rottler

| S. No. | Parameter        | % Value (w/w) |
|--------|------------------|---------------|
| 1      | Moisture content | 0.62          |

Table 3: Extractive values of *Caesalpinia digyna* Rottler

| S. No. | Solvent         | % Value(w/w) | Consistency  |
|--------|-----------------|--------------|--------------|
| 1      | Petroleum ether | 0.32%        | Yellow Brown |
| 2      | Chloroform      | 1%           | Brown        |
| 3      | Ethyl acetate   | 1.48%        | Orange brown |
| 4      | Ethanol         | 10.32%       | Brown        |
| 5      | Distilled water | 3.0%         | Brown        |

Table 4: Swelling Index of *Caesalpinia digyna* Rottler

| S. No. | Parameter      | Value (cm.) |
|--------|----------------|-------------|
| 1      | Swelling index | 1.5         |

Table 4: Foaming Index of *Caesalpinia digyna* Rottler

| S No. | Parameter     | Value         |
|-------|---------------|---------------|
| 1     | Foaming index | Less than 100 |

Table 5: Fluorescence studies of *Caesalpinia digyna* Rottler

| S. No | Treatment                                | Visible (UV light)  |
|-------|--|---------------------|
| 1     | Powder as such                           | Yellowish Brown     |
| 2     | P + 1N NaOH in water                     | Nil                 |
| 3     | P + 1N NaOH in alcohol                   | Bluish fluorescence |
| 4     | P + 1N HCl                               | Nil                 |
| 5     | P + 50% HNO <sub>3</sub>                 | Nil                 |
| 6     | P + Conc. HNO <sub>3</sub>               | Yellow              |
| 7     | P + Conc. HCl                            | Brownish            |
| 8     | P + Conc. H <sub>2</sub> SO <sub>4</sub> | Black               |
| 9     | P + Acetic acid                          | Brown               |
| 10    | P + 10% NaOH                             | Brownish black      |
| 11    | P + 1N HCl                               | Brown               |
| 12    | P + 5% Ferric chloride                   | Violet              |

**Preliminary Phytochemical analysis**

The phytochemical profiling of the plant revealed the

presence of alkaloids, carbohydrates, Glycosides, phenolic compounds, fixed oils and fats as reported in table 6.

**Table 6:** Preliminary Phytochemical analysis of *Caesalpinia digyna* Rottler

| Category                     | Name of the test       | Pet. Ether | Ethanol | Distilled water |
|------------------------------|------------------------|------------|---------|-----------------|
| Alkaloids                    | Mayer's test           | +          | +       | -               |
|                              | Wagner's test          | -          | -       | +               |
|                              | Hager's test           | -          | -       | -               |
|                              | Dragendorff's Test     | -          | -       | -               |
| Carbohydrates & Glycosides   | Molish test            | +          | -       | -               |
|                              | Fehling test           | -          | +       | -               |
|                              | Barfoed's test         | -          | +       | +               |
|                              | Benedict's test        | -          | +       | +               |
|                              | Brontrager's test      | -          | -       | -               |
|                              | Legal test             | -          | -       | -               |
| Saponins                     | Foam test              | -          | -       | +               |
| Protein & Amino acid         | Millon's reagent       | -          | -       | -               |
|                              | Biuret test            | +          | -       | -               |
| Fixed oils & Fats            | Spot test              | -          | +       | +               |
|                              | Saponification test    | +          | +       | +               |
| Tannins & Phenolic compounds | FeCl <sub>3</sub> test | -          | +       | +               |
|                              | Gelatin test           | +          | -       | -               |
|                              | Lead acetate           | +          | +       | +               |
|                              | Alkaline reagent       | -          | +       | +               |

“+” = Present “-” = Absent

**Conclusion**

*Caesalpinia digyna* Rottler belongs to the Fabaceae is an huge scandent, spiky shrub, in the forest of Eastern Himalayas and common in coastal areas commonly known as Vakeri-mool. Commonly used in Indian folk medicines. A significant amount of literature is available on its pharmacological properties but there are scanty reports on its Pharmacognostical and quality control parameters. Morphological characters and Microscopical findings, presence of Patches of fibers, Polygonal thin walled parenchyma cells Prismatic calcium oxalate and Few resin ducts in secondary xylem in the root and other parameters viz. ash values, extractive values, moisture content, foaming index, foreign organic matter, fluorescence studies will lay down the standard which will be useful for the detection of its identity, authenticity, and quality assurance for its commercial and scientific use. Thus the above findings will serve the purpose for standardization and quality control for future studies.

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