

## PHARMACOGNOSTICAL, PHYTOCHEMICAL AND ANTIMICROBIAL STUDIES ON STEM BARK OF TECOMELLA UNDULATA SEEM

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**ABSTRACT:** *Tecomella undulate* Seem is used in Ayurveda for diseases of liver and spleen. Pharmacognosy, Chemistry and antimicrobial activities of the plant are described in this article.

### INTRODUCTION

*Tecomella undulate* Seem (fam – Bignoniaceae) commonly known as “Rohira”, “Rohitaka” and “Rakta – Rohida” has been used in the indigenous system of medicine for spleen, liver and abdominal complaints. The plant is also useful in urinary discharges due to “kapha” and “pitta”, enlargement of spleen, leucorrhoea and lucoderma. The bark of the young branches is often employed in Sind as a remedy for syphilis<sup>(1)</sup>.

The research paper deals with Pharmacognostical, Phytochemical and Antimicrobial studies on *T.undulata*.

### MATERIALS AND METHODS

The stem bark was obtained from Zandu Pharmaceutical Works, Dadar, Bombay. Histological sections were taken using a hand-razor after softening the material. Ash<sup>(3)</sup> and extractive values<sup>(5)</sup> were carried out as per I.P. method. Fluorescence analysis was done as per the method described by Pratt and Chase<sup>(2)</sup>. The extracts were subjected to antimicrobial studies against gram positive and gram negative organisms using the cylinder plate technique<sup>(6)</sup>. Phytochemical studies were carried out on the successive extracts in

order to screen the various extracts for the presence of different phytoconstituents<sup>(7, 8)</sup> and their percentage estimated<sup>(9, 10, 11, 12)</sup>.

#### Macroscopical features of the bark:

The bark of *T.undulata* occurs as flat or slightly curved pieces ranging from 6 to 9 mm. in thickness. The outer surface of the bark is dark brown in colour. Longitudinal furrows and transverse cracks are present on the outer side making the surface rough. The inner surface of the bark is smooth and brownish in colour. The bark is odourless but the taste is bitter.

#### Microscopical Characters:

*History of the Bark:* The transverse section of the bark showed the following characteristics: The outermost layer is of cork cells that are generally squarish to somewhat radially elongated. Below the cork, cells of cork cambium are present. Cork cambium is followed by secondary cortex. Medullary rays are 1 – 1 celled throughout their radial course and are homogeneous. Stone cells and pigment cells are clearly seen throughout the transverse section. Starch grains are absent. (Fig.1).

# T.S. OF STEM BARK OF T. UNDULATA

## POWDER CHARACTERS

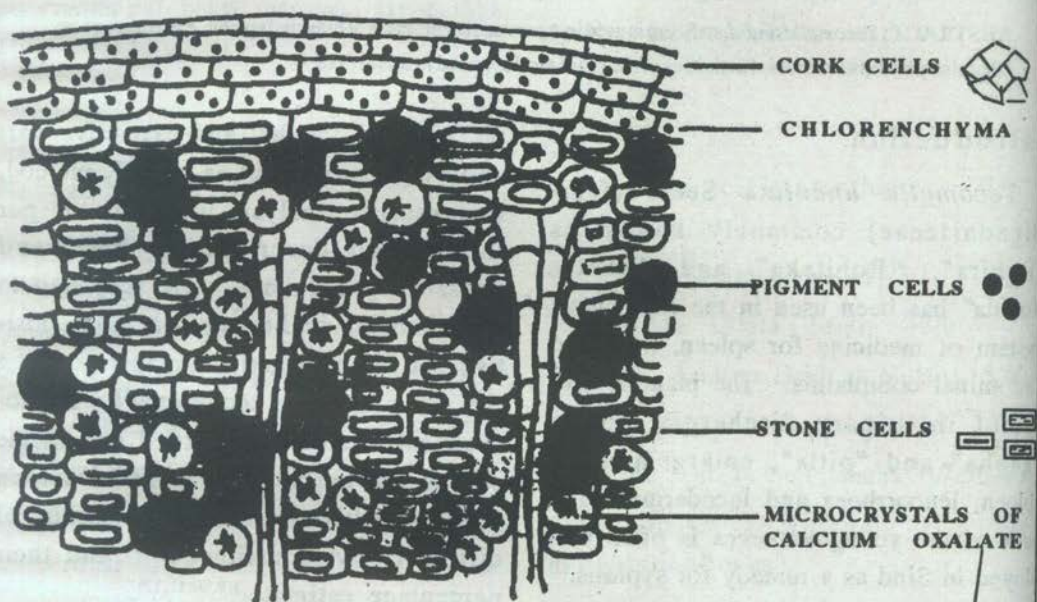


FIGURE 1

FIGURE 2

**Cell Contents:**

Identification characters include prisms of calcium oxalate crystals, pigment cells, four sided stone cells and cork cells. (Fig.2) Dimensions of the various characteristic particles are as in the table.1

**Table – 1**

	<i>Max.</i>	<i>Min.</i>	<i>Avg.</i>
Cork cells	18	12.6	9
Calcium oxalate	45	27	36
Pigment cells	63	27	45
Stone cells	81	54	59.4

**Fluorescence Analysis:**

The powdered bark was examined under ultra – violet light according to the methods A, B and C described by Pratt and Chase (2). The fluorescence was observed at 254 nm and 365 nm (Table.2)

<i>Method</i>	<i>254</i>	<i>365</i>
A	Green	Dark Green
B	Green	Dark Green
C	Green	Greenish Blue

*Examination of the powdered bark with different chemical Reagents:* The powdered bark was subjected to treatment with different chemical reagents and the colour changes as well as the other were observed. (Table 3).

**Table – 3**

Behaviour of the powdered bark upon treatment with different chemical reagents:

<i>Reagents</i>	<i>Observation</i>	<i>Conclusion</i>
Iodine	Powder does not turn blue but remains brown	Starch absent
5% FeCl <sub>3</sub>	Turns dark blue	Tannins present
30% Hcl	Effervescence	Ca-carbonate present

**Physio – chemical Analysis :**

The powdered bark was subjected to various analysis such as determination of ash value, acid insoluble ash, sulphated ash, water soluble ash, elemental analysis of ash and extractive value. (Table 4).

**Ash Analysis<sup>(3)</sup>**

**TABLE – 4**

Total Ash	14.8 % w/w
Acid Insoluble Ash	0.6% w/w
Water Soluble Ash	4.7 % w/w
Sulphated Ash	23.52 % w/w

**Elemental Analysis of Ash :**

Elemental analysis was carried out for the content of Calcium, Potassium and Sodium using Atomic Absorption Spectra <sup>(4)</sup>. (Table 5)

**Table – 5**

<i>Elements</i>	<i>Mgs/gm of the drug</i>
Calcium	56.98
Potassium	9.028
Sodium	0.31

### Extractive Values:

Alcohol extractive and water extractive values were determined for the powdered bark <sup>(5)</sup>.  
Table (6)

**Table – 6**

Water Soluble Extractive	9 % w/w
Alcohol Soluble Extractive	8.6 % w/w

### Antimicrobial Studies:

Cold macerated petroleum ether (60 – 80<sup>0</sup>C), acetone, alcohol and water extracts were used for carrying out the antimicrobial studies against two gram positive and two gram negative organisms. The method used was the cylinder plate technique. Inhibitions were measured in mm <sup>(6)</sup>. (Table 7).

**Table – 7**

	<i>P.E.E.</i>	<i>A.E</i>	<i>ALC.E</i>	<i>W.E</i>
<i>B. subtilis</i>	-	17	-	-
<i>E. coli</i>	10	-	9	-
<i>P.aeruginosa</i>	-	-	-	-
<i>S.aurens</i>	-	10	-	-

Key : P.E.E = Petroleum Ether Extract  
A.E = Acetone Extract  
ALC.E = Alcohol Extract  
W.E = Water Extract

### Petroleum Phytochemical Screening:

The powdered bark was subjected to continuous hot extraction in a Soxhlet apparatus and the extract so obtained were subjected to preliminary phytochemical screening <sup>(7,8)</sup>. The presence of various phytoconstituents were detected. The results obtained are below (Table 8).

**Table – 8**

<i>Phytoconstituents</i>	<i>P.E.E</i>	<i>A.E.</i>	<i>ALC.E</i>	<i>W.E</i>
Carbohydrates	-	-	+	+
Proteins	-	-	-	+
Alkaloids	-	-	+	-
Glycosides	-	-	+	+
Tannins	-	-	-	+
Saponins	-	-	-	-
Fats & Fixed oils	-	-	-	-
Phytosterols	+	-	-	-

*Key* : P.E.E = Petroleum Ether Extract

A.E = Acetone Extract

ALC.E = Alcohol Extract

W.E = Water Extract

### **Quantitative Estimation of Phytoconstituents:**

The preliminary phytochemical screening indicated the presence of glycosides, alkaloids, tannins etc., and these phytoconstituents were estimated using various methods<sup>(9, 10, 11, 12)</sup>. The results obtained were as follows:

**Table – 9**

Free Reducing Sugars	3.31 % w/w
Total reducing Sugars	5.70 % w/w
Tannins	4.82 % w/w
Glycosides	8.21 % w/w
Alkaloids	0.02 % w/w
Resins	2.09 % w/w

## Conclusion

*T.undulata* has shown specific diagnostic characters during the observation of the powder. It mainly constitutes stone cells and pigment cells. From its chemical investigation it was shown that the drug contains a high percentage of glycosides. All parameters that have been indicated in the research paper could be used for the authentication of the crude drug as the preformulation study.

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