



## Phytochemical and proximate studies of *Tamilnadia uliginosa* (Retz.) Tiruvengadam. & Sastre fruits

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### ABSTRACT

*Tamilnadia uliginosa* (Retz) Tiruvengadam. & Sastre. (Rubiaceae) is a small tree distributed in Indian subcontinent and Indochina. In Kerala, it is usually growing in the moist deciduous forest ranging from Wayanad to Thiruvananthapuram. In the present study, *Tamilnadia uliginosa* fruits were analyzed for the phytochemical and proximate compositions. In phytochemical analysis, organoleptic characters, fluorescence analysis and presence of various phytochemicals were studied. In proximate analysis; moisture content, total carbohydrate, starch, reducing sugar, chlorophyll, phenol, ash values, extractive values, swelling index and forming index were determined. The present study will provide information on the potential use of the fruit as a medicine as well as food.

**Keywords:** *Tamilnadia uliginosa* fruits, phytochemical, proximate, organoleptic, fluorescence, nutrition.

### INTRODUCTION

Medicinal plants contain certain chemical substances that are of great importance to the health of individuals and communities. These substances produce a definite physiological action on the human body<sup>[10]</sup>. After decades of serious obsession with the modern medicinal system, people have started looking at the ancient healing systems like Ayurveda, Siddha and Unani. Herbal drugs play an important role in health care programs especially in developing countries. Ancient Indian literature incorporates and considers all plant parts to be potential sources of medicinal substances<sup>[24]</sup>. Hence it becomes extremely important to standardize the plant material to be used as medicine. The process of standardization can be achieved by phytochemical studies<sup>[17]</sup>. These studies help in correct identification and quality assurance of the starting materials, an essential prerequisite to ensure reproducible quality of herbal medicine which will contribute to its safety and efficacy<sup>[1]</sup>. Nowadays, the rapid rate of population growth has increased the demand for food supply and production. This has led to an increase in the incidence of malnutrition problems like Protein-Energy Malnutrition (PEM). Proximate and nutrient analysis of edible fruits and vegetables play a crucial role in assessing their nutritional significance. As various medicinal plant species are also used as food along with their medicinal benefits, evaluation of their nutritional significance can help to understand the worth of these plant species<sup>[18]</sup>.

*Tamilnadia uliginosa* (Retz.) Triveng. & Sastre is a small tree belonging to the family Rubiaceae rarely reaching the height of around 6m. Bark is reddish brown in colour and scaly appearance. Branches are thick, horizontal and numerous. Many of them are short and terminating in 1-2 pairs of strong sharp thorns of 1.3cm long. Fruits are 5-6.3cm long, ovoid, smooth, yellowish brown, crowned with the persistent calyx. Seeds numerous, compressed, smooth and closely packed in pulp. *Tamilnadia uliginosa* is widely used in Ayurveda, Siddha and Unani medicines. The root is considered as sweet, cooling and diuretic. In Ayurveda it is used as a single drug for aborting accumulated phlegm, bile and internal toxic substances. While in Unani it is considered as aphrodisiac, haematinic and good for heart and also used in

biliousness, dysuria, strangury. The unripe fruit roasted in wood ashes is used as a remedy in diarrhea and dysentery. The central portion of fruit is an astringent. The root boiled in ghee is sometimes given in similar cases. A paste of the nuts was applied externally in rheumatism and to disperse abscess<sup>[12]</sup>. The fruit is also used as a colour intensifier in dyeing. It is eaten as vegetable either alone or together with other vegetables in curries. It is also eaten boiled or roasted and also used as cattle fodder<sup>[20]</sup>. Various researchers isolated saponins and mannitol from the bark and rhamnose, mannitol and leucoanthocyanidin from fruits<sup>21, 23</sup>. The aim of the present study is to evaluate phytochemical and proximate composition of the fruits of *T. uliginosa*. Thus provide scientific identification, genuity and to determine its usefulness and suitability as an edible vegetable or otherwise.

### MATERIALS AND METHODS

#### Collection of plant material

The fruits of *T. uliginosa* used for the present study were collected from Wayanad Wild Life Sanctuary and identified by Dr. E.S. Santhosh Kumar from TBGRI. A voucher specimen has been deposited in the Department of Botany, University of Kerala (KUBH 5810).

#### 1. Phytochemical studies

The dried fruits were powdered and used for the following studies.

##### (a) Organoleptic evaluation

Organoleptic characters such as colour, odour, taste and nature of the powdered fruits were studied<sup>[2]</sup>.

##### (b) Fluorescence Analysis

The fluorescence characteristics of the powdered fruit drug were studied under long, short UV and visible lights after treating with different chemical reagents according to the method described by Kokoshi (1958)<sup>[15]</sup>, Chase and Pratt<sup>[3]</sup>.

##### (c) Preliminary phytochemical screening

The dried fruit powder was subjected to cold extraction with different solvents and tested for various phytochemicals according to the standard procedures Harborne (1998)<sup>[9]</sup>, Kokate (1998)<sup>[13]</sup>.

#### 2. Proximate Analysis

The fresh and dried fruits were used for the analysis of proximate, moisture

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contetnt, total carbohydrate, starch, reducing sugar, total chlorophyll and total phenol content as per methods prescribed by Evans (1997)<sup>[4]</sup>, Gibbs (1974)<sup>[6]</sup>, Gupta and Varshney (1997)<sup>[7]</sup>, Harborne (1973)<sup>[8]</sup>, Johanson(1940)<sup>[11]</sup>, Kokate(1986)<sup>[14]</sup>, Kulkarni (2000)<sup>[16]</sup>, Peach and Tracey (1979)<sup>[19]</sup> and Sadasivan and Manikan (2005)<sup>[22]</sup>.

## RESULTS AND DISCUSSION

### 1. Phytochemical studies

#### (a)Organoleptic evaluation

Organoleptic characterstic is one of the criteria for identification of the plant drug. The organoleptic characters of *T. uliginosa* were given in Table-1.

**Table 1 Organoleptic characters of *T. uliginosa***

Sl. No.	Parameters	Characters
1	Colour	Cream
2	Odour	No characteristic odour
3	Taste	Slight bitter
4	Nature	Rough

#### (b)Fluorescence Analysis

The fruit powder when treated with various chemicals exhibited various colours in the long and short UV and visible lights (Table-2). Fruit powder exhibited yellow colour when treated with all the chemicals. In long UV it exhibited green to yellowish green colour with all the chemicals with petroleum ether. In short UV it varied from dark brown to light brown with almost all the chemicals. But with petroleum ether and benzene it showed dark green colour. Same pattern of colours exhibited with ethyl acetate in long and short UV and visible lights

**Table 2: Fluorescence analysis of *T. uliginosa***

Sl. No.	Treatment with Chemical Reagent	Long UV	Short UV	Visible
1	Acetone	Yellow green	Reddish brown	Yellow
2	Benzene	Yellowish green	Dark green	Yellow
3	Distilled Water	Light green	Light brown	Light yellow
4	Ethyl Acetate	Yellowish green	Reddish brown	Yellow
5	Ethyl Alcohol	Green	Reddish brown	Yellow
6	Methyl Alcohol	Green	Reddish brown	Yellow
7	Petroleum Ether	Pale yellow	Dark green	Pale yellow

#### (c)Preliminary phytochemical screening

The preliminary phytochemical analysis of fruits (Table-3) showed that the fruit contain alkaloids, coumarin, cardiac glycosides, glycosides, phenol, saponin and tannin. Morphine alkaloids, quinones, steroids and terpenoids were tested negative.

**Table 3: Preliminary phytochemical screening of various extracts of *Tamilnadia uliginosa*.**

Sl. No.	Types of constituents	Methanol	Hexane	Ethyl acetate	Petroleum ether	Chloroform	Dis. Water
1	Alkaloids	+	+	+	+	+	+
2	Coumarin	+	+	+	+	+	+
3	Cardiac glycosides	+	+	+	+	+	+
4	glycosides	+	+	+	+	+	+
5	Morphine alkaloids	-	-	-	-	-	-
6	Phenol	+	+	+	+	+	+
7	Quinones	-	-	-	-	-	-
8	Steroids	-	-	-	-	-	-
9	Saponins	+	+	+	+	+	+
10	Tannin	+	-	+	-	-	+
11	Terpenoids	-	-	-	-	-	-

### 2. Proximate Analysis

The proximate analysis of fruits (Table-4) showed that it has moderate level of moisture (66%). The moisture content help in maintaining the protoplasmic content of the cells; also makes susceptible to spoilage by micro-organism during storage<sup>5</sup>. Hence it showed that the fruits can be stored for several days without spoilage. The available carbohydrate (0.4mg/100mg), starch (0.43mg/100mg), and reducing sugar (0.3mg/100mg) were low as compared to the conventional edible fruits, showed that the fruit has less energy requirements.

**Table 4: Proximate composition of *T. Uliginosa***

Sl. No.	Parameters	Values
1	Moisture content	66.00%
2	Total carbohydrate	0.4mg/100mg
3	Starch	0.43mg/100mg
4	Reducing sugar	0.3mg/100mg
5	Total chlorophyll	0.001mg/g
7	Total phenol	31mg/100mg
8	Ash Values	
	Total ash	3.50%
	Acid insoluble ash	0.50%
	Water soluble ash	5.50%
	Sulphated ash	6.00%
9	Extractive values	
	Alcohol soluble	0.93%
	Water soluble	5.50%
10	Foaming index	<100
11	Swelling index	11.5ml

The total chlorophyll content in fruits was found to be very low (0.001mg/gm tissue).The total phenolic content observed was 931mg/100mg. Another important parameters analyzed was ash value determination. Various ash values are important to determine purity of the drug such as the presence or absence of foreign inorganic matter. The water soluble extractive value (5.5%) was higher than the alcohol soluble extractive value (0.93). The foaming index is less than 100 showed that fruit produce less foaming property. The swelling index is the volume in milli liters occupied by one gram of a dry, including any adhering mucilage, after it has swollen in an aqueous liquid. These results that *Tamilnadia uliginosa* as have good water retaining capacity (swelling index 11.5) due to the presence of glycosides, glucose and saponins etc.

### CONCLUSION

The present study is the first report of phytochemical and proximal analysis of *T. uliginosa* fruits. The results of the preliminary phytochemical studies showed that *T. uliginosa* fruits are good source of various phytochemicals such as alkaloids, coumarin, cardiac glycosides, phenol, saponin and tannin. It is an indication of the active metabolites that give it its pharmacological activities. The proximate study which includes moisture content, carbohydrates, starch, reducing sugar, chlorophyll, phenol, ash values, extractive values swelling and foaming index gives valuable information. This will help for correct identification of this plant for future investigation. The data obtained from total phenolics is a basis for assessment of the preventive role of fruits against free radicals effects and will enrich the national food composition database.

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