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Der Pharmacia Sinica, 2013, 4(4):76-80

Der Pharmacia Sinica
ISSN: 0976-8688
CODEN (USA): PSHIBD

Ethnomedicinal and pharmacognostical studies on leaves of *Toddalia asiatica L.*

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ABSTRACT

Toddalia asiatica L. belongs to family Rutacee and commonly called as Jungli Mirachi. Toddalia asiatica grows in tropical and sub-tropical regions of India and used for variety of purposes in traditional medicine. Ethnomedicinal information was collected from local rural practitioners in villages of Kolhapur district of Maharashtra,India. The present investigation deals with macroscopic and microscopic characters of leaves, analysis of ash, dry matter and moisture content. The leaves of Toddalia asiatica are trifoliate, leaflets oblong, elliptic, crenulate and gland dotted. Locally leaves are used for the treatment of abdominal pains, malaria and to stimulate appetite. The leaves of Toddalia asiatica were extracted with different solvents and screened for their phytochemical constituents. Phytochemical tests revealed the presence of alkaloids, phenols, coumarins and reducing sugars. The behaviour of the powder drug with different chemical reagents and its fluorescence analysis are also observed. Macro and microsopical character will be helpful for correct botanical identification of the drug. In addition ash value, moisture content, dry matter, results of powder behaviour and fluorescence analysis and phytochemical data will be helpful for the standardization and quality control of precious indigenous drug. The study scientifically validates the use of plant in traditional medicine.

Keywords: Ethnomedicinal, Pharmacognostical, *Toddalia asiatica*, Leaves.

INTRODUCTION

Use of an herbal medicine for the treatment of diseases is a safe in traditional therapy. The medicinal values of these plants lie in some chemical substances that produce a definite physiological action on the human body [1].Hence medicinal plants have been receiving great attention worldwide by the researchers. The curative properties of medicinal plants are mainly due to presence of various complex chemical substances of different composition which occur as secondary metabolites [2].A medicinal plant forms a large group of economically important plants that provide the basic raw material for pharmaceuticals [3]. *Toddalia asiatica L.* belongs to family Rutaceae and commonly called as Jungly Mirachi. It grows in tropical and sub-tropical regions of India and used for variety of purposes. Traditionally leaves are used for the treatment of abdominal pains, malaria and to stimulate appetite. *Toddalia asiastica* L. was extensively used in herbal medicine in South Nandi district, Kenya[4]. Decoction of root and leaves of *Toddalia asiastica* L. used in treatment of cancer, chest and urinary problems, chronic asthma, cough/cold, pneumonia [4, 5], food poisoning, sore throat were also treated[6].Powder of root and stem bark of *Toddalia asiastica* was used as tooth powder [7, 8] and inhibit HIV-reverse transcriptase [8].*Toddalia asiatica* is used traditionally in Kenya by many communities for the treatment of malaria, fever, stomachache, toothache, coughs as well as nasal and bronchial pains, and although all parts of the plant are claimed to have medicinal value,

roots are believed to be more potent [9, 10]. Traditionally combination of *Toddalia asiatica*, *Ehretiacymosia* and *Clerodendrum myricoides* extract used in lactation [11].

MATERIALS AND METHODS

Ethnomedicinal information was collected through interview with traditional rural practitioners [12].Fresh plant material was collected from Kolhapur district of Maharashtra (India). Plant was identified with the help of Flora of Kolhapur District [13].Transverse sections of leaf were taken, stained and observes under the microscope [14]. Macro and microscopic character were studied [15]. Ash value, dry matter and moisture content of the material were determined by the AOAC method [16]. Leaf material was dried in shade so as to prevent decomposition of active principles and make fine powder for the further study of power behavior, fluorescence study and phytochemical tests as per given in Indian Pharmacopoeia. Fluorescence analysis of the powder was examined under U.V. light [17, 18].

RESULTS AND DISCUSSION

Macroscopic character

Toddalia asiastica L. is a strong robust shrub in ever green forest (Fig.1). The young branches were covered with sharp, hooked thorns and older branches forms thickened knobs. Leaves trifoliate, leaflets elliptic to obovate, shiny green paler below covered with translucent gland dots with a strong citrus smell when crushed. The lamina texture is rough and the venation is reticulate (Fig.2). Flowers are axillary and terminal cymes.

Microscopic Character

T.S of leaf (Fig.3) consists of single layers of upper and lower epidermis covered with thin cuticle. Mesophyll is differentiated in to upper palisade and lower spongy cells. Palisade consists of compactly arranged cylindrical cells and filled with chloroplast. Oil glands are observed on both surfaces (Fig.6). Midrib shows well developed vascular bundle. Unicellular and thick walled trichomes were present on midrib. Anisocytic stomata were present on dorsal surface of the leaf (Fig-4), Stomata index was 29.

Organoleptic evaluation, Powder Behavior and Fluorescence character

Colour, odour, taste, texture, ash value, moisture content, and dry matter of the leaf powder of *Toddalia asiastica* L. were represented in table-1. Powder was subjected to different chemical reagents and colour changes were observed (Table –2). Powder behavior indicates the presence of tannins, flavonoids, carbohydrates, xanthoprotein, glycosides, oil and alkaloids. The fluorescence study of powder as such and with different chemical reagents were observed under visible light and UV light (254nm and 366 nm) which shows predominantly fluorescence effect (Table – 3).

Phytochemical screening

All the plant was found to contain various compounds after subjecting them to preliminary phytochemical composition. Phytochemical tests performed and obtained results were represented in table- 4.Phytochemical tests reveal maximum concentrations of alkaloids, phenols, reducing sugars, xanthoprotein and coumarins.

Pascaline[11]carried out phytochemical constituents of some medicinal plants used by the Nandis of South Nandi district, Kenya. They were assessed and compared ten medicinal plants belonging to different families for alkaloids, saponins, anthraquinones, glycosides, phenols, terpenoids and flavonoids distribution, *Toddalia asiatica* one of them. Leaves of *Toddalia asiatica* extracted in three solvents like methanol, chloroform and water which showed that presence of alkaloids, saponins, anthraquinones, glycosides, phenols, terpenoid and flavonoids in preliminary phytochemical test while absence of anthraquinones was observed in chloroform extract. The present study carried out the extraction of *Toddalia asiatica* leaves in six solvents like methanol, petroleum ether, acetone, chloroform, ethanol, and distilled water. Preliminary phytochemical screening reveals that presence of alkaloids, phenols, flavones, tannins, reducing sugar, xanthoprotein; coumarins and glycosides while absence of saponin and anthraquinones. Phytochemical studies on the stem of *Toddalia asiatica L.*[6]showed presence of carbohydrates, amino acids, alkaloids, flavonoids, glycosides, tannins, steroids saponins and coumarins. In present study leaf powder of *Toddalia asiatica* L. have been used for phytochemical analysis. The present study reveals the diagnostic tool in the correct identification of plant. The adulterants if any in the plant material can also easily identify.

Table -1. Organoleptic evaluation of *Toddalitaasiatica L*eaves

Sr. no	Particulars	Observations
1	Colour	Apple green
2	Odour	Citrus
3	Taste	Astringent
4	Texture	Coarse
5	Ash value	5.0%
6	Moisture content	61.11%
7	Dry matter	38.89%

Table 2. Powder behavior with different chemical reagents

Treatment	Behavior	Inference
Powder as such	Apple green	-
Powder + 1N NaoH	Camel brown	Flavonoids present
Powder + 5% Iodine	Apple green	Starch absent
Powder + Conc. H_2SO_4	Brown	Carbohydrate present
Powder + conc. HNO_3 + Ammonia	Brown	Xanthoprotein present
Powder + 5% $Fecl_3$	Olive green	Tannins present
Powder + 5% KOH	Cordovan brown	Glycoside present
Powder + 1% $AgNo_3$	Dark grey	Protein absent
Powder + Picric acid	Fern green	Alkaloids present
Powder + 40% NaOH + Lead acetate	Buff brown	Tannins present
Powder + Sudan III	Brown	Oil present

Table – 3. Fluorescence study of powder with different chemical reagent in Visible and U.V. light

Treatment	Visible Light	UV light (254 nm)	UV light (366 nm)
Powder as such	Apple green	Asparagus green	Dark brown
Powder + NaOH in water	Dark green	Seal brown	Dark brown
Powder + NaOH in alcohol	Dark olive green	Pthalogreen	Black
Powder + conc. HCL	Dark olive green	Forest green	Black
Powder + conc. H_2SO_4	Blackish	Black	Black
Powder + conc. HNO_3	Orange red	Green	Black
Powder + Acetone	Apple green	Asparagus green	Black
Powder + 5% KOH	Brown	Dark brown	Bistre brown
Powder + Iodine	Apple green	Asparagus green	Black
Powder + $FeCl_3$	Olive green	Fern green	Black
Powder + D.W.	Dark olive green	Pthalogreen	Black

Table -4. Preliminary Phytochemical screening

Solvents / Constituents	Methanol	P. ether	Acetone	Chloroform	Ethanol	D.W
Alkaloids	++	++	-	-	++	++
Phenols	+	-	+	++	++	++
Anthraquinones	-	-	-	-	-	-
Flavones	++	-	-	-	-	-
Tannins	-	-	-	++	-	-
Saponins	-	-	-	-	-	-
Reducing sugars	-	-	-	+++	-	-
Xanthoprotein	+	-	-	-	+++	++
Coumarins	++	++	++	-	++	++
Glycosides	-	++	-	-	++	-

+++ High, ++ Moderate, + Slight, - Negative, P. ether- Petroleum ether

Fig. 1 - Flowering twig

Fig.2 - Leaf

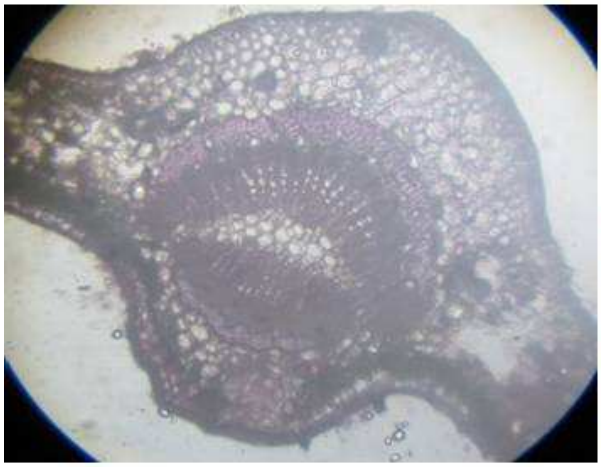

Fig.3 -T.S. of Leaf

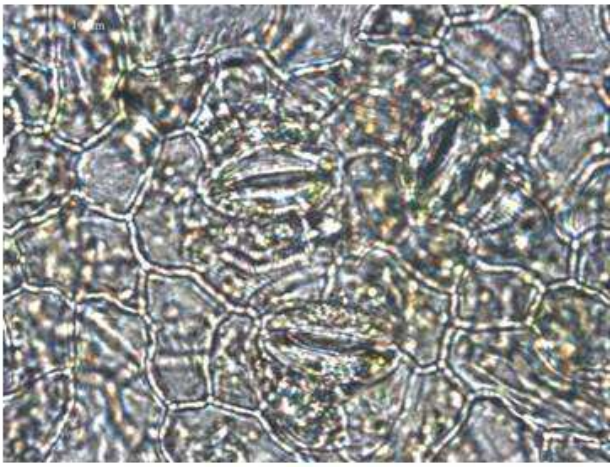

Fig.4 - Stomata on lower surface

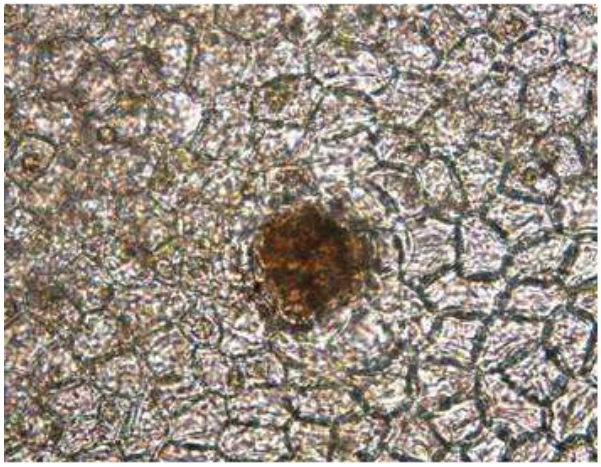

Fig. 5- Gland on upper surface

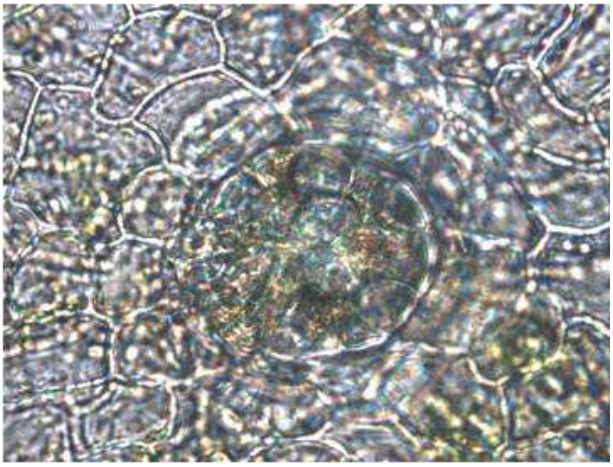

Fig. 6 - Gland on lower surface

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