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## Contents

1. The Effect of Unani Coded Drug UNIM-211 in Type-II Diabetes Mellitus – A Clinical Study .....	1
<i>Radhey Shyam Verma, Shabana Parveen and M.K. Siddiqui</i>	
2. Pharmacognostic Studies of <i>Lactuca virosa</i> L. (Wild Lettuce) Used in Homoeopathy .....	7
<i>Rajat Rashmi and Kavita Tyagi</i>	
3. Ethnopharmacological Studies on <i>Careya arborea</i> Roxb. from Orissa, India .....	17
<i>Aminuddin, R.D. Girach, V.K. Singh and M.K. Siddiqui</i>	
4. Observations on Some Depletive Ethnomedicinal Taxa of Kumaon Region, Uttarakhand .....	25
<i>Zaheer Anwar Ali and Sarfraz Ahmad</i>	
5. Comparative Study for Anatomical Parameters, Toxic Elements and Minerals on Two Terminalia Species .....	33
<i>D. Ramasamy, Rampratap Meena, S. Mageswari, Shamshad Ahmed Khan and Gowher Sultana</i>	
6. Unani Medicinal Plants Used for Asthma by Irular Tribes of Coimbatore District, Tamil Nadu .....	41
<i>K. Venkatesan, R. Murugeswaran, Gowher Sultana, V.K. Singh and Aminuddin</i>	
7. Ethnobotanical Survey of Atmakur Forest Division of Andhra Pradesh .....	49
<i>V.C. Gupta, M.D. Alam, V.K. Singh and Aminuddin</i>	
8. Pharmacobotanical Studies on the Roots of <i>Withania somnifera</i> Dunal. ....	57
<i>Rajeev Kr. Sharma</i>	
9. Use of Finger Printing and Marker Compounds for Identification and Standardisation in <i>Luffa cylindrica</i> (L.) M. Roem. (Whole Plant) .....	71
<i>D. Ramasamy, Rampratap Meena, Shamsad Ahmed Khan, Shamsul Arfin, A. Saraswathy and Gowher Sultana</i>	
10. Standardisation of a Unani Herbal Drug 'Jawansa' .....	79
<i>Kiran Negi and M.S.Y. Khan</i>	
11. Standardisation of An Important Herbal Drug 'Khirmi' ( <i>Manilkara kauki</i> Dub.) .....	89
<i>M.A. Rashid, M.A. Qasim, Shamsul Arfin, Shamshad Ahmad and Mohammed Khalid Siddiqui</i>	



## EDITORIAL

Unani system of Medicine, although originated in Greece, is one of the recognized systems of medicine of the country. Although, the Unani medicine have been in use for centuries and are known for their therapeutic efficacies, there is a need to scientifically establish their efficacy and safety in order to achieve global acceptance. Organized research work in this system was, therefore, a need of the hour. In post independent era, Central Council for Research in Unani Medicine, through its clinical, drug research, literary, survey & cultivation of medicinal plants programme is cultivation of medicinal plants programme is contributing significantly for last three decades. *Vitiligo, sinusitis, filariasis, eczema, malaria, infective hepatitis* are some of the conditions where Unani therapies have earned recognition after scientific validation.

The Council has been publishing the *Hippocratic Journal of Unani Medicine* (HJUM), mainly to bring out fundamental and applied aspects of Unani Medicine. The journal also publishes recent advances in other related sciences and traditional medicines as well as different streams of medical sciences, which have bearing on validation and scientific interpretation of various concepts and strength of Unani medicine.

In view of an overwhelming response, the journal earlier published twice a year, its periodicity has now been changed to quarterly w.e.f. January 2008 to accommodate more articles for quick dissemination of research data among scientific community. The journal has sufficient room for invited articles from luminaries of modern medicine and sciences as well as scholars of Unani medicine. The broad areas being covered include clinical research on single and compound Unani drugs, validation of regimental therapy, clinico-pharmacological studies, standardization of single and compound drugs, development of standard operating procedures, ethnobotanical studies, experimental studies on medicinal plants and development of agro-techniques thereof, and literary research on classics of Unani medicine. The journal is also open for studies on safety evaluation of Unani and other herbo-mineral drugs, nutraceuticals, cosmotherapeutics, aromatics, oral health, life style disorders, sports medicine etc and such other newer areas which are the outcome of modern day living.

The current issue of this journal provides 11 original research and review papers in the areas of clinical research, drug standardization, bio-chemistry, pharmacology and ethnobotanical surveys contributed by eminent scholars in their respective fields. Council acknowledges the authors for their contributions included in this issue and hope for their continued support in this endeavor. We wish to ensure the readers to bring out the future issues of the journal on time.

We at the CCRUM have been constantly striving to reach to higher standard and make HJUM the leading journal of Unani Medicine and related sciences. We sincerely hope and trust that the mission can be accomplished with active partnership of quality-conscious individuals and institutions. Through these lines we seek your cooperation and support in materializing our dreams about the HJUM. In this regard, we request you for your as well as your colleagues' contributions for publication in and subscription to the journal. Further, we will appreciate if the journal is introduced far and wide. We would also welcome esteemed suggestions for achieving the highest standards of quality for the journal.



(Dr. Mohammad Khalid Siddiqui)  
Editor-in-Chief



# The Effect of Unani Coded Drug UNIM-211 in Type-II Diabetes Mellitus – A Clinical Study

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## Abstract

The effect of Unani coded drug UNIM-211 was evaluated in twenty five type-II diabetic patients administered UNIM-211 two tablets of 500 mg each twice daily, orally with water for a period of 150 days. All the patients were advised to take normal diet during the course of treatment. A significant decrease was observed in the levels of fasting (FF) glucose (37%), post prandial (PP) glucose (45%), serum cholesterol (SC) (12%), serum triglycerides (TG) (17%), blood urea (32%), serum creatinine (13%), serum glutamate pyruvate transaminase (SGPT) (34%), serum glutamate oxaloacetate transaminase (SGOT) (20%), serum albumin (A) (11%), and albumin/globulin (A/G) (12%) ( $P<0.001$ ), however a significant increase was observed in serum protein (11%) and serum globulin (G) (31%) levels ( $P<0.01$ ), when compared with pre-treatment values. In Ist, IInd, IIIrd and IVth follow-up studies, a significant reduction was observed in FF glucose (25 to 34%) and PP glucose (39 to 50%) levels. Haematological studies showed that UNIM-211 significantly lowered the erythrocyte sedimentation rate (ESR) (50%), total leucocytes count (TLC) (24%), Polymorphs (Pol.) (17%), and eosinophils count (EOS) (22%), ( $P<0.001$ ). However, there was a significant increase in RBC count (15%), haemoglobin (Hb) (6%), lymphocytes (48%), ( $P<0.0001$ ), when compared with pre-treatment values. Thus, the test Unani formulation is suggested to have anti-diabetic effect as well as hypolipidemic, haematimic, immunomodulatory and liver and kidney tonic effect. Thus, UNIM-211 is shown to have anti-diabetic effect with overall favourable metabolic effect that is safe for kidney and liver.

**Key Words:** Unani Medicine, Diabetes mellitus, Cholesterol, Triglycerides, Hypoglycemia, Hypolipidemia, Haematinic, Immunomodulatory.

## Introduction

Diabetes mellitus is a common metabolic and endocrine disorder, characterized by chronic hyperglycemia and disturbance of carbohydrate, fat and protein metabolism associated with absolute or relative deficiency of insulin secretion and/or insulin action (Bennet, 1998). A long duration of metabolic disturbance can cause vascular damage, leading to both macro – and microvascular complication. Patients with Type 2 Diabetes Mellitus have an increased risk for coronary heart disease, stroke, and peripheral vascular disease (Tong *et. al*, 2004). In modern medicine, no satisfactory effective therapy is yet available to cure diabetes mellitus (Sumana and Suryawashi, 2001). Currently available therapeutic options such as dietary modification, oral hypoglycemics and insulin have limitations of their own in treating non-insulin dependent diabetes mellitus (NIDDM) (Berger, 1985 and Hupponen, 1978). Now, attention is diverted to herbal formulation due to their versatile role in

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Diabetes without side effects, especially in treating Type-II Diabetes or NIDDM (Asima and Chandra, 2001; Gopalakrishnan and Solomon, 1992). Considering above facts, an attempt has been made to see the efficacy of Unani coded drug UNIM-211 in the management of Type II Diabetes Mellitus.

## **Materials and Methods**

UNIM-211 was obtained from Central Council for Research in Unani Medicine, New Delhi. The study was carried out at Regional Research Institute of Unani Medicine (RRIUM), Aligarh. Sixty patients attending in the out patients department (OPD), RRIUM of either sexes, age (25-65 yrs) were screened to assess the various biochemical and pathological parameters. Out of them, twenty five patients were selected for the clinical study. Criteria for selection of patients were based on the measurement of sugar level in fasting state (FF), (12 hours) and post prandial (PP) blood sugar after 1.30 hours.

### *Collection of blood and serum*

Blood samples were collected by puncturing the vein at each investigation. One ml. of blood with ethylene diamine tetra acetic acid (EDTA) was used for various pathological parameters and other 2-3 ml of blood samples were allowed to clot for 30 min and serum was separated by centrifugation, which was used for various biochemical parameters. Biochemical and haematological investigations were carried out as follows.

### *Biochemical analysis*

Blood glucose was estimated by O-toluidine method (1959). Serum cholesterol was measured by Wybenga and Pileggi method (1970). Triglyceride was measured by GPO/PAP method (1969). Blood urea was measured by di acetyl mono-oxime (DAM) method (1951). Serum creatinine was measured by alkaline picrate method (1945). Total protein, albumin and globulin were measured by modified Biuret and Dumas method (1971). Serum glutamic pyruvic transaminase (SGPT, E.C.2.6.1.2) and Serum glutamic oxaloacetic transaminase (SGOT, E.C. 2.6.1.1.) were estimated by Reitman and Frankel method (1957).

### *Haematological analysis*

It includes, Hemoglobin (Hb), Erythrocyte Sedimentation Rate (ESR), Red Blood Corpuscles (RBC), Total Leukocyte Count (TLC), Differential Leukocyte Count (DLC). The percent hemoglobin was done by Sahli's Acid Haematin Method, Newcomer (1919). ESR was measured by Westergreen method, (Mukherjee, 1990). TLC and RBC counts were made by Haemocytometry method, (Plum, 1936). DLC was done by Leishman stain method, (Mukherjee, 1990).

### *Drug, Dose and mode of administration*

Compound Unani formulation coded as UNIM-210 was administered in the dose of two tablets of 500mg each time, twice daily, orally with clean water after meals.

### *Duration of treatment and follow-up*

Duration of treatment was fixed for 150 days. After registration of patients; a pre-treatment base line was made by clinical examination and investigating all the biochemical and pathological parameters. Follow-up was done regularly at intervals of 30 days, 60 days, 90 days, 120 days and 150 days in which all clinical and laboratory parameters were studied.

### *Statistical Analysis*

Data was analyzed statistically by one-way analysis of variance (ANOVA) followed by Dennett's' test. The values were considered significant when the P-value was less than 0.05.

## **Results and Discussion**

### *Biochemical studies*

In the present study there was a significant reduction in the levels of (FF) glucose (37%), (PP) glucose (45%), serum triglycerides (TG) (17%), blood urea (32%), serum glutamate pyruvate transaminase (SGPT) (34%), (SGOT) (20%), ( $P < 0.001$ ), serum cholesterol (SC) (12%), serum creatinine (13%), serum albumin (A) (11%), and (A/G) ratio (12%) ( $P < 0.01$ ), serum protein (11%) were increased (Table-1, 2 & 3), when compared with pre-treatment values.

### *Haematological Studies*

Haematological studies had shown that UNIM-211 significantly lowered the erythrocyte sedimentation rate (ESR) (50%), total leucocytes count (TLC) (24%), Polymorphs (Pol) (17%), and eosinophils count (EOS) (22%), ( $P < 0.001$ ), when compared with before treatment group to the after treatment of UNIM-211. There was a significant increase in lymphocytes (48%), ( $P < 0.0001$ ), however a slight increase within the normal limit in red blood corpuscles (RBC) count (15%), haemoglobin (Hb) (6%), ( $P < 0.0001$ ), when compared with before treatment to the after treatment of UNIM-211. The increase in TLC may be due to con-current infections in type-2 diabetic patients (Earhart and Baugh, 2005; Ljubic *et. al.*, 2005; Stamm and Hooton, 1993). Pickup (2004) had also reported that activated innate immune system is closely involved in pathogenesis of type-2 diabetes and associated

**Table-1. Effect of Unani coded drug UNIM-211 on the levels of blood glucose, serum cholesterol, serum triglycerides, blood urea and serum creatinine.**

	Sugar level (mg/dl)		Serum Cholesterol (mg/dl)	Serum Triglycerides (mg/dl)	Blood Urea (mg/dl)	Serum Creatinine (mg/dl)
	Fasting Sugar (FF)	Post Prandial Sugar (PP)				
Pre-treatment	187.76 ± 21.18	359.31 ± 32.82	197.81 ± 4.31	155.99 ± 16.03	38.32 ± 1.60	1.36 ± 0.06
150 Days	118.75 ± 10.67**	198.28 ± 17.23**	174.34 ± 6.61**	129.76 ± 9.48 NS	25.91 ± 1.35**	1.18 ± 0.04*

\*p<0.01 \*\*p<0.001

**Table-2. Effect of Unani coded drug UNIM-211 on the levels of SGPT, SGOT, serum protein, serum albumin, serum globulin and A/G ratio.**

	S.G.P.T. (Unit/ml)	S.G.O.T. (Unit/ml)	Serum Total Protein (gm/dl)	Serum Albumin (gm/dl)	Serum Globulin gm/dl	A/G Ratio
Pre-treatment	22.29 ± 2.10	22.40 ± 2.01	7.18 ± 0.15	4.86 ± 0.16	2.27 ± 0.20	1.95 ± 0.15
150 days	14.71 ± 1.29**	17.87 ± 1.55 NS	7.93 ± 0.15**	4.33 ± 0.17*	2.97 ± 0.19**	1.72 ± 0.14 NS

\*p<0.05, \*\*p<0.01

complications such as dyslipidemia and atherosclerosis. Shim *et. al.*; (2006), they observed that WBC, neutrophil, lymphocyte; monocyte and eosinophil counts were higher in the patients with metabolic syndrome (MS) features than those without MS features. Further investigations are required to find out the mechanism. In conclusions, the present study indicates that Unani coded drug UNIM-211 exhibited hypoglycemic activity in Type II Diabetes Mellitus. The test formulation was also shown to have other beneficial metabolic and hypolipidemic, haematimic, liver and kidney tonic and immunomodulatory effect.

**Table-3. Effect of UNIM-211 on the blood glucose level at 30 days intervals.**

	Pre-treatment	30 Days	60 Days	90 Days	120 Days
Blood Glucose Fasting (FF) (mg/dl)	187.76 ± 17.49	140.66 ± 9.98	125.83 ± 5.34	124.84 ± 6.63	126.51 ± 8.83
Blood Glucose Post Prandial (PP) (mg/dl)	359.31 ± 29.35**	217.72 ± 11.77**	180.29 ± 7.97**	194.94 ± 13.31**	197.77 ± 15.56**

\*p&lt;0.05, \*\*p&lt;0.01

**Table-4. Effect of Unani coded drug UNIM-211 in the levels of haemoglobin, E.S.R., R.B.C. counts, total leucocytes count (T.L.C.) and differential leukocytes count (D.L.C.).**

	Hemo-globin (Hb) (gm %)	E.S.R. (mm/hr)	R.B.C. (10 <sup>6</sup> /m <sup>3</sup> )	T.L.C. (10 <sup>3</sup> /mm <sup>3</sup> )	Differential Leucocyte Count (DLC)		
					Poly-morphs (%)	Lympho-cytes (%)	Eosino-phils (%)
Pre-treatment	12.99 ± 0.17	17.00 ± 3.15	4.52 ± 0.06	8.19 ± 0.26	72.69 ± 0.80	25.94 ± 0.79	2.88 ± 0.35
150 Days	13.71 ± 0.13**	8.44 ± 0.88*	5.19 ± 0.06**	6.26 ± 0.23**	60.06 ± 2.52**	38.25 ± 2.51**	2.25 ± 0.23 NS

\*p&lt;0.05, \*\*p&lt;0.01

### Acknowledgement

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# Pharmacognostic Studies of *Lactuca virosa* L. (Wild Lettuce) Used in Homoeopathy

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## Abstract

*Lactuca virosa* L. (family: Asteraceae) is commonly known as Wild Lettuce or opium Lettuce, mainly found in European countries. Plant is mild sedative & nervine and contains lactucin, lactucrol, lactucinic acid, lectucopicrin, sugar, gum, pectic acid, oxalic acid, mannit and vitamins A&C. It is used in Homoeopathy for restless and insomnia because of its safety of use and calming effect, Wild lettuce is good Children's remedy. Drug is also used by Homoeopaths for cough, laryngitis, enlarged liver, pertussis, stragury and tracheitis. It is biennial herb having white milky substance called Lactucarium, turn brown when exposed to air like opium. Since ancient times it has been greatly valued as a sedative and pain killer. The seeds of plant are used to increase the flow of milk in nursing mothers.

The present paper deals with a detailed pharmacognostic studies of whole plant of *Lactuca virosa* L. including the macroscopical, microscopical, chemical analysis, TLC, powder analysis, extractive and ash values. Some other studies have also been carried out such as stomatal index, palisade ratio, vein terminal number and vein islets number of plant. These numerical data can be considered as a diagnostic, constant in identification of correct raw drug.

**Key Words:** *Lactuca virosa*, Pharmacognostic, Chemical analysis, Homoeopathy.

## Introduction

*Lactuca virosa* L. (Asteraceae) is a biennial latex containing herb widely distributed throughout Europe and commonly known as wild lettuce or opium lettuce. It is considered to be a mild sedative or hypnotic for insomnia and relaxation. The large leaves can attain length of 36 cm. stem is rich in milky sap that flows freely from the broken part. The sap is bitter and strong optate like odour, becomes brown when exposed in air known as lactucarium and have sedative & narcotic properties. Lettuce opium is obtained from the milky sap. (Grieve, 1970). The plant contains bitter principles lectucin, lectucoprin lectucrol, lectucinic acid, sugar, gum, pectic acid, oxalic acid, malic acid mannit vitamin A & C. plus minerals iron, calcium, thiamine, riboflavin, niacin. Hyoscyamine is also reported (Youngken, 1950).

Chinese medicine has made wide use of lettuce preparation. It is used as antiseptic, galactogage & very effective in reducing fever. Physiologically drug acts upon brain and circulatory system (Anonymous, internet).

This plant used traditionally as a pain killer, for insomnia, nervousness, hysteria, muscles spasm, colic pains, painful menstruation, bothersome coughs, and painful digestion. Wild lettuce resembles feeble opium without its tendency to upset the digestive system. In France, water distilled from wild lettuce is used as a mild sedative, and the fresh leaves boiled in water are same times used as cataplasm.

The leaves also assist in healing of wounds by protecting against infections and stimulating cell growth (Anonymous, internet).

In Homoeopathy, it is used mainly for restlessness and insomnia(Boerick, 1927). Because of its safety of use and calming effect. *Lactuca virosa* L. is good children's remedy (Christopher,2006). Drug is also used by the Homeopaths for cough, laryngitis, enlarged liver, pertussis, stragury, tracheitis, lactation, nosier in ear, illusion of spinal cord. etc. (James.1968)

In view of the efficacy of the drug the detailed pharmacognostic studies including phyto-chemical analysis, physical characters and TLC profile are worked out and reported in this contribution.

## Material and Methods

The fresh plant material was collected from "Medicinal Plant Garden", Homeopathic Pharmacopoeia Lab, Ghaziabad (U.P.) India, grown by the seeds, which were initially procured from Protugal and dry material also procured from Boiron Laboratory, France. Usual process of hand sectioning and double staining method using safranine and fast green was adopted for microscopical / anatomical studies and for quantitative studies, clearing of leaves with lactic acid was done. For microscopical studies metcalfe (1947) was consulted. Plant were dried, powdered and extracted with ethanol at room temperature in soxhlet apparatus. Extract was filtered and the filtrate was used for preliminary colour reaction tests. Standard methods were applied for powder analysis (Jackson & Snowdon, 1968). For chemical analysis Johansen (1940), Youngken (1951) ; Cromwell (1955); Trease & Evans (1983) & for physical evaluation I.P( 1970), Trease & Evans (1983) were followed. For fluorescence behaviour of plant Harborne (1973) were consulted.

## Drug Evaluation and Results

### *Organoleptic Evaluation*

**Macroscopical:** Stem often prickly below, otherwise glabrous, pale green, sometime spotted with purple, up to 2 meter long. Radical leaves large, 10-45 cm long, entire, small and obovate oblong; the cauline leaves are scanty, alternate and small , clasping the stem with two small lobes. Midrib of cauline leaves(stem leaves) contains stiff, pointed and long hairs, which are linearly arranged on lower surface. The heads are numerous and shortly stalked; the pale yellow corolla being strap shaped. Fruit is rough, black and oval ,with broad wing along the edge and prolonged above in to a long white beak carrying silvery tufts of hair. Plant is rich in milky juice which flow freely if cut any where .The taste of this juice is bitter, and odour narcotic. When dry, it hardens turns brown., (Plate 1 figure-a & b).





**a**  
**Cauline Leaves**

**b**  
**Radical Leaves**

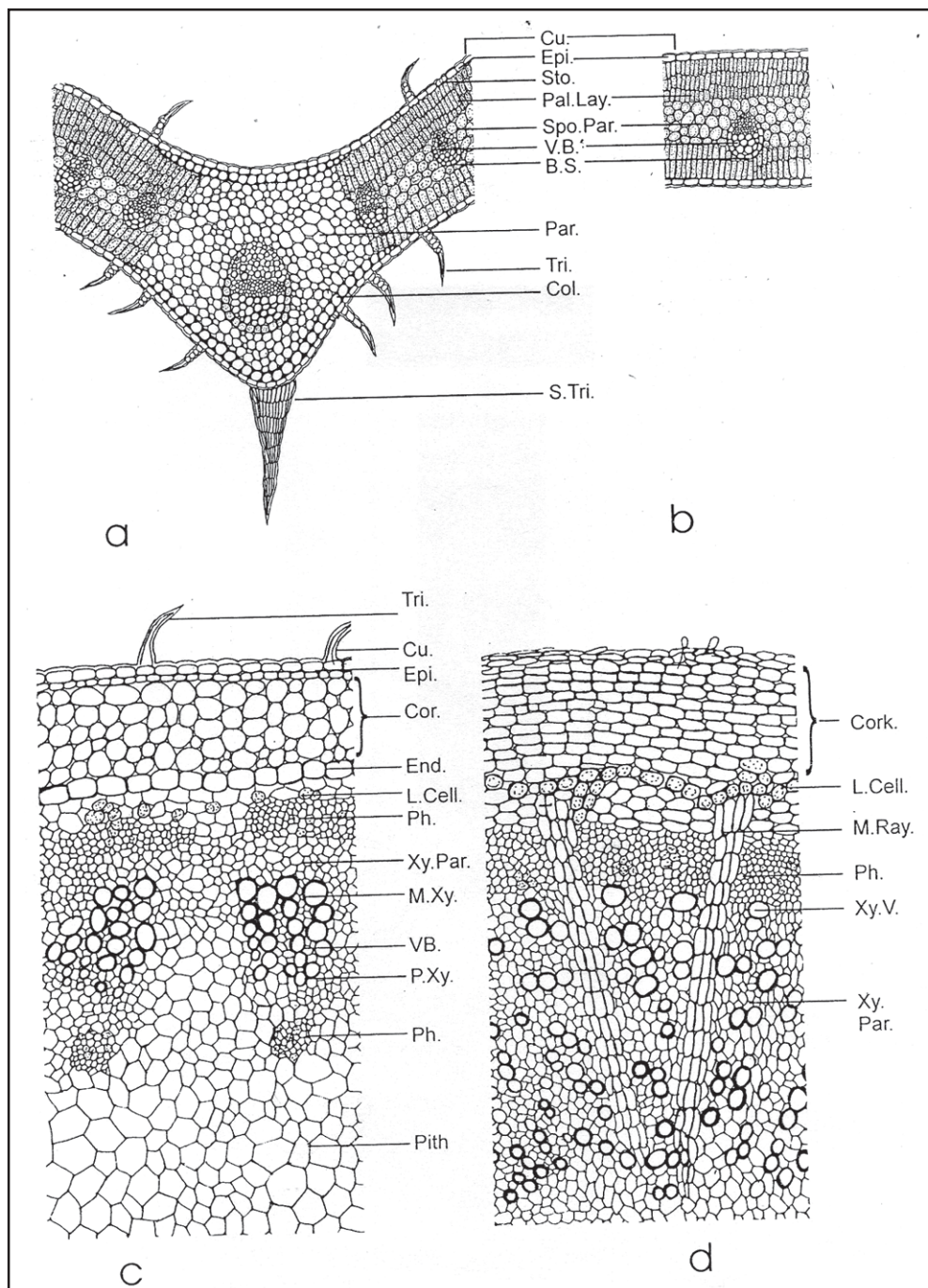
**Plate 1.** Morphology of *Lactuca virosa* L.

### *Microscopic*

**Leaf:** Dorsiventral, lamina thin, midrib pronounced towards lower surface; epidermis single layered with cuticle and multicellular trichomes; in midrib a layer of collenchyma present beneath both upper and lower epidermises. Palisade present on both the sides but not continuous on the midrib : upper palisade double layered and sometimes 3 layered, lower palisade single layered and at some places double layered; spongy parenchyma 3-4 layered containing chloroplast. Merestele conjoint, collateral, capped by thick walled parenchymatous cells and incompletely surrounded by bundle sheath, some cells of which contain granular contents. Stomata anomocytic. Midrib bears a strong, big, multicellular hair on lower side (Plate-2, fig. a & b; Table-1).

**Stem:** Epidermis double layered with thin cuticle, second layer of epidermis made up of smaller cells; 4 to 6 layered parenchymatous cortex; endodermis distinct, made up of barrel shaped, rather thick walled cells; pericycle not distinct; vascular bundles present in a ring, xylem parenchyma thick walled present with tracheary elements, metaxylem placed towards cortex and protoxylem towards pith; phloem present on both the side of bundles; medullary rays multiseriate, multicellular & parenchymatous present in between vascular bundles; pith large contains thin walled parenchymatous cells. Laticiferous cells/ducts are present in the phloem region. (Plate-2 fig. c).





**Plate 2.** Fig. a – Transverse section of Leaf through Midrib.  
 Fig. b – Transverse section of Leaf through lamina.  
 Fig. c – Transverse section of stem.  
 Fig. d – Transverse section of Root.

**Abbreviations:** B.S.- Bundle sheath., COL.- Collenchyma., CU.- Cuticle., END.- Endodermis., EPI.-Epidermis., L.Cell-Latex Cell., M. Ray- Medullary Ray., M.Xy.-Metaxylem., Pal.Lay.-Palisade Layer., Par.-Parenchyma., Ph.- Phloem., P.Xy.-Protoxylem., Spo.Par.- Spongy Parenchyma., Sto.-Stomata., S.Tri.-Stiff Trichome., Tri.-Trichome., V.B.- Vascular Bundle., Xy.V.- Xylem Vessel., Xy.Par.- Xylem Parenchyma.

**Table-1. Stomatal studies of *Lactuca virosa* L.**

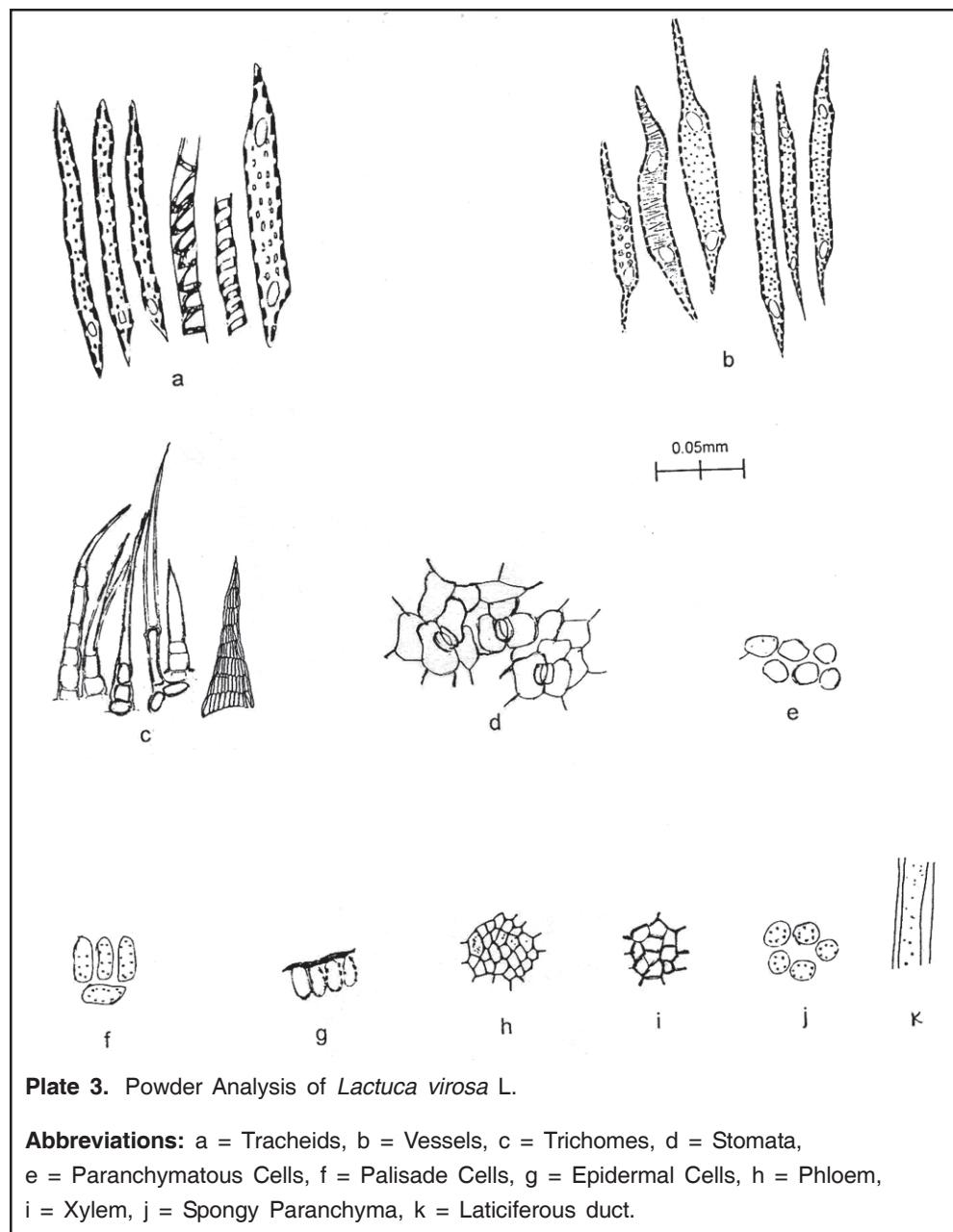
S.No.	Characters	Observations
1.	Stomata Range (Lower Surface)	24.44 – 27.27
2.	Stomata Range (Upper Surface)	18.18 – 20.45
3.	Stomatal Index (Lower Surface)	SD = 25.74 ± 1.02 CV = 3.00
4.	Stomatal Index (Upper Surface)	19.18 ± 1.51 CV = 7.00
5.	No. of Stomata/ Sq.mm. (Upper Surface)	R = 67 – 100 SD = 86.50 ± 6.30 CV = 7.28
6.	No. of Stomata/ Sq.mm. (Lower Surface)	R = 122 – 133. SD = 127.50 ± 4.90 CV = 3.84
7.	Palisade Ratio	6.00 – 7.50 SD = 6.00 ± 1.30 CV = 21.66

**Root:** Transection shows 2 to 3 layers of flaking off cork, followed by parenchymatous cortex containing 8 to 10 layers of compactly arranged parenchymatous cells. Phloem large in continuous ring with bi to tri seriate medullary rays, ray cells broadens tangentially and become funnel shaped in phloem; laticiferous cells also present in this region. Wood diffuse porous type and form a solid core. Pith absent (Plate-2, fig. d).

**Powder Analysis:** Straw colour powder contains anomocytic stomata, nonglandular, multicellular trichomes ; spongy & palisade cell with chlorophyll content, patches of epidermal cells. Fragments of collenchymatous and parenchymatous cells; xylem vessels and tracheids with spiral and sclariform thickening; laticiferous ducts are also present. (Plate-3.)

### **Chemical Analysis**

- (i) **Phytochemical Tests:** phytochemical tests show the presence of alkaloids, lignin, carbohydrate, sugars, flavonoids, protein, steroids, some amount of saponin and absence of oils (Table-2).
- (ii) **TLC (Thin Layer chromatography):** TLC observations show the number of chemical compounds. The three different colour sports are found. These are shown in (Table-3).



### Physical Behaviour

- (i) The fluorescence behavior of plant powder with their extracts in different solvents are studied under visible and UV light. The observations are shown in Table-4.
- (ii) Extractive values are tabulated in Table-5.
- (iii) Total ash value -  $13.81 \pm 1.20$ ., CV=8.69

### Discussion

Above-mentioned distinguished characters give easy clue to detect out the drug from other common species of lettuce and help in checking adulteration and achieving

**Table-2. Phytochemical Test (Colour Reaction tests) of *Lactuca virosa* L.**

S.No.		Test Performed	Nature of Colour	Results
1	Alkaloids	Dragandroft's Reagent	Red	+ ve
2	Lignin	Phloroglucinol + HCl	Pink	+ ve
3	Protein	Millon's Reagent	Red ppt	+ ve
4	Protein	Xanthoproteic Test	Yellow	+ ve
5	Carbohydrates	Molish's Test	Red	+ ve
6	Sugars	Molish's test	Red	+ ve
7	Flavonoids	Alc. Ext. + Conc. HCL + Mg.	Green Yellow	+ ve
8	Steroids	Libermann – Buchard Test	Bluish Green	+ ve
9	Oils	Sudan IV .	Negative	– ve
10	Saponin	Powder + 10 ml H <sub>2</sub> O + Heat	Slight forth	+ ve

**Table-3. Rf Values of *Lactuca virosa* L. (Mobile phase – CHCl<sub>3</sub>: CH<sub>3</sub>OH; 9:3 v/v)**

S.No.	Colour of Spot	Rf Value
1	Green	0.40
2	Bluish Green	0.58
3	Violet	0.67

**Table-4. Flourescence behaviour of plant powder of *Lactuca virosa* L.**

	Extracts	Visible Light	U.V. Light (365nm)
(i)	Powder as such	Light straw	Middle brown
(ii)	Powder rubbed on filter paper	Portland stone	vellum
(iii)	Water	Dark stone	Nut Brown
(iv)	Alcohol	Sea green	Bluish Green

**Table-5. Extractive values of *Lactuca Virosa* L.**

S.No.	Reagents	Values (%)
1.	Ethyl Alcohol	23.6 ± 1.42CV 6.02
2.	Acetone	6.50 ± 0.04CV = 0.61
3.	Benzene	4.60 ± 0.23CV = 5.00
4.	Petroleum Ether	2.90 ± 0.02CV = 0.69
5.	Water	15.50 ± 0.14CV = 0.04
6.	Chloroform	5.20 ± 0.03CV = 0.57

desired therapeutic values of plant. The leaves of common adulterant, *Lactuca sativa* L. differ in being sub orbicular ,roundish, overlapping each other & slightly lobed. (Gleason 1968)

Stomatal index of *Lactuca virosa* L. is 25.74 on lower surface and 19.18 on upper surface, No. of stomata per sq.mm are 127.50 on lower & 86.50 on upper surface, palisade ratio is 6-7 (Table-1). These numerical data can be considered as a diagnostic constant in the identification of correct raw drug.

### Acknowledgement

The author (RR) is grateful to the Director, Homoeopathic Pharmacopoeia Laboratory, Ghaziabad (UP), for providing facilities.

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# Ethnopharmacological Studies on *Careya arborea* Roxb. from Orissa, India

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## Abstract

*Careya arborea* Roxb. belonging to family Lecythidaceae is a common medicinal plant found throughout greater part of India. Different parts of the plant viz., stem bark, leaves and flowers are used as medicine among various ethnic and rural societies. The present communication deals with new or less known ethnopharmacological uses of the plant recorded from different folk and tribal communities in the state of Orissa for various ailments. The information recorded have been compared with the published literature for its medicinal uses along with available data on phytochemical reports and pharmacological action with a view to support or contradict the claims, and also to record certain, hitherto, unknown uses of the plant. The plant has been suggested to be taken up for its scientific investigations so as to validate the medicinal claims presented herein and to utilize its maximum therapeutic potential.

**Key Words:** *Careya arborea* Roxb., Ethnopharmacology, Tribal communities, Orissa.

## Introduction

*Careya arborea* Roxb. (Fig. 1 & 2), belonging to family Lecythidaceae is a deciduous tree with thick dark brown bark. Leaves obovate, cranulate, clustered at the tips of branch lets. Flowers yellowish white arranged in short spikes. Fruit a globose berry, 4-8 cm across, crowned with persistent calyx lobes, many seeded. The tree is found throughout greater part of India (Haines, 1978).

Different parts of the plant are used as medicine to cure various ailments in indigenous system of medicine (Nadkarni, 1976; Chopra *et al.*, 1956; Kirtikar and Basu, 1975).

In recent years medicinal plants research has received renewed interest in India and abroad and much work is now being done on botany, pharmacognosy, chemistry, pharmacology and biotechnology of herbal drugs. Further, the value of ethnomedicine has been realized, house hold remedies and the drugs sold by street drug vendors, besides medicinal folk claims collected from different parts of the country are being investigated with a view to discover new drugs of natural origin. In India ethnomedicinal surveys among the tribal groups have yielded new uses of some little known plant species (Jain, 1981).

Keeping the above facts in view ethnopharmacological uses of *Careya arborea* Roxb., collected from different tribal and ethnic societies in the state of Orissa have been compiled and presented in this paper. Information have been screened from the literature for its medicinal uses, phytochemistry and pharmacological reports to understand the medicinal potential of the plant in its proper perspective. Further scientific investigations have been suggested to validate the medical claims presented herein, so as to utilize its maximum therapeutic potential for the benefit of mankind.





**Fig. 1.** A flowering tree of *Careya arborea* Roxb.



**Fig. 2.** A flower of *Careya arborea* Roxb.

## Materials and Methods

Folk information on *Careya arborea* Roxb., recorded from various tribal and rural societies during a series of ethno-botanical survey tours in Bolangir, Dhenkanal, Kalahandi, Mayurbhanj, Phulbani, Puri and Sundargarh districts of Orissa form the material of this paper. To record the information, knowledgeable persons belonging to tribal communities namely, Bathuri, Bhuinya, Gond, Kharia, Kol, Kondh, Majhi, Munda, Santal and other rural inhabitants were interviewed. Details of specific uses like, plant part, disease, mode of preparation and administration of the drug, popularity and precaution if any, were recorded in the field diary.

Plant specimens were collected in the presence of key informant to make sure that proper plant has been collected. Voucher specimens of the plant are preserved in the Unit herbarium of Regional Research Institute of Unani Medicine, Bhadrak.

## Observations

As a result of the information recorded it was observed that different parts of the plant i.e., stem bark, leaves, flowers, fruits etc. are used as medicine by the inhabitants of the study area to overcome various ailments as shown in Table-1.

### *Therapeutic action as per traditional system of medicine*

Stem bark	– Astringent, Antipyretic, Antipruritic, Demulcent
Flowers	– Demulcent.
Fruit	– Astringent, Demulcent (Chopra <i>et al.</i> , 1956; Nadkarni, 1976)

In Unani texts like, “Makhzanul Mufradat” (Kabeeruddin, undated), the plant *Careya arborea* Roxb. has been named as ‘Baukhamba’ and reported as Motadil (moderate) towards hot and dry in its temperament. Its fruit has reported to be used for abdominal disorders in children being carminative in action.

### *Chemical constituents and pharmacological action*

It has been reported that the plant forms a rich source of saponins. Stem bark contains tannins, lupeol, b-sitosterol, betulin and unidentified compound. Leaves contain hexacosanol, taraxerol, taraxerylacetate, b-sitosterol, quercetin and ellagic acid. Seed contain barringtogenol C, 16-deoxybarringtogenol C and barringtogenol D, besides careyagenol D and careyagenol E. (Jain *et al.*, 1991; Rastogi and Mehrotra, 1990, 1991 and 1993). The plant is reported to exhibit hypotensive activity (Jain *et al.*, 1991).

**Table-1. Ethnopharmacological uses of *Careya arborea* Roxb. recorded from tribal and rural folks of Orissa**

Disease/ condition	Part used	Mode of administration	Source of information and local name of the Plant	Reported uses
Conjunctivitis	Stem bark	Stem bark decoction is filtered and used as eye drop.	Kondh — Kumbhi (District Phulbani) Rural folks — Kumbhi (Distt. Kahahandi)	Use of stem bark for eye diseases reported from Madhya Pradesh (Jain, 1991)
Dysentery	-do-	Juice of the stem bark mixed with rice water and 7 black pepper is given (one tea spoonful thrice a day).	Kondh — Kumbhi Other villagers — Kumbhi, Kumbai (District Dhenkanal, Bolangir, Puri).	Use of stem bark reported for blood dysentery from Orissa (Sexena & Dutta, 1975)
Diarrhoea	-do-	Stem bark decoction (one tea spoonful) is given in case of infants.	Majhi — Kumbhi (District Koraput)	Same use reported from Madhya Pradesh (Jain, 1991)
	-do-	Powdered stem bark (3-5 g at every 3 hours interval) is given.	Rural folks — Kumbai (District Bolangir)	Unreported
	Flowers	Flowers powder (5g twice a day) is given.	Gond — Khumbhai (District Bolangir)	Unreported
Fever	Stem bark	Decoction of the stem bark mixed with vinegar is given to lactating mother in case of infants fever.	Bathuri — Kumbhi (District Mayurbhanj)	Unreported

Table-1. (Contd.)

Disease/ condition	Part used	Mode of administration	Source of information and local name of the Plant	Reported uses
Fracture	Stem bark	Paste prepared from stem bark is applied on bone fracture.	Kol — KumbhiMunda — Kumbo (District Mayurbhanj, Sundargarh)	Unreported
Indigestion	-do-	Stem bark decoction (50 ml) is given.	Paudi Bhuinya — Kumbo (District Sundargarh)	Unreported
Joints pain	-do-	Paste prepared from stem bark with Mustard oil is applied locally.	Kharia — Kumbh (District Sundargarh)	Unreported
Menstrual disorders	Leaf	Leaf decoction (50 ml in the morning) is given daily.	Santal — Kumbhi (District Mayurbhanj)	Unreported
Post-natal disorders	Stem bark	Stem bark decoction 100 ml in the morning) is given.	Bhuinya — Kumbo (District Sundargarh)	Unreported
Weakness	-do-	Stem bark decoction (Two tea spoonful daily) is given as tonic to babies to improve/ maintain health.	Bhuinya — Kumbo (District Sundargarh)	Unreported
Wounds	-do-	Stem bark paste is applied locally.	Munda — Kumbo (District Sundargarh)	Unreported

## Results and Discussion

*Careya arborea* Roxb. popularly known as Kumbhi in the area surveyed is an important medicinal plant among the tribal and rural societies of Orissa. In indigenous system of medicine it is reported as astringent, antipyretic, antipruritic and demulcent (Chopra et al., 1956; Nadkarni 1976). Bark juice and flowers are administered in cough and cold and the fruit decoction is used to promote digestion (Nadkarni, 1976).

Scrutiny of literature on Indian folk medicine (Jain, 1991; Saxena and Dutta, 1975) reveals that all the recorded folk uses of plant except its use in dysentery are new for Orissa. Whereas, the use of stem bark decoction, in conjunctivitis and diarrhoea is similar to that, reported from tribal areas of Madhya Pradesh (Jain, 1965).

Phytochemical reports reveal that the bark contains tannins and b-sitosterol in addition to other compounds, while the leaves contain b-sitosterol besides some other compounds. Sener and Bingol (1988) have reported that b-sitosterol possess potent anti-inflammatory and antipyretic activities. Therefore, the recorded use of stem bark to alleviate fever, subside swelling, in joints pain and wounds as claimed by the tribal communities may be attributed to the presence of b-sitosterol. Similarly, according to Ortiz de Montellano and Browner (1985), tannins exhibit cooling and astringent properties, and thus its use in diarrhoea may be justified.

On the basis of aforesaid facts it is suggested that the drug plant, which is easily available, may be used against the ailments like fever, diarrhoea, swellings etc. where indications of potent therapeutic uses are available.

It is further suggested that more scientific investigations may be carried out to validate the medical claims recorded in the present communication, so as to utilize its maximum therapeutic potential.

## Acknowledgements

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# Observations on Some Depletive Ethnomedicinal Taxa of Kumaon Region, Uttarakhand

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## Abstract

During ethnobotanical surveys of different forest divisions in the Kumaon region of Uttarakhand a large number of information regarding the uses of plants for medicine was recorded. This study has also yielded information on some 15 medicinal taxa that are becoming scarce in the area due to overexploitation, unsustainable harvesting practices and habitat destruction. Hence, an attempt has been made to highlight such species in this report. Each entry has been provided with correct botanical and prevalent local names, habit, habitat ethnomedicinal use(s) and other observations. The threat of extinction of these useful and commercially viable medicinal plants has been discussed and also the need for their conservation and cultivation has been re-stressed.

**Key Words:** Ethnobotany, Threatened medicinal taxa, Biodiversity, Conservation, Kumaon.

## Introduction

Kumaon region of Uttarakhand lies in the Western Himalayas between 28° 43' 55"- 30° 20' 12" N latitude and 78° 44' 30"- 80 ° 18' 45" E longitude, with an area of about 21.035 Km.<sup>2</sup> Except for the Tarai-Bhabar belts, the whole region is mountainous. There is wide range of natural habitats which provide varied plant life including medicinal and aromatic plants. It is a land of diverse culture and ethnic groups. This part of the country has always been reputed as a steady supplier of a good number of potent medicinal herbs and also one of the leading regions in the use of herbal drugs or preparations. Some published ethnobotanical reports available for many areas of this region are encouraging (Agnihotri *et al.*, 2003; Arya and Prakash, 1999; Arya *et al.*, 1999; Aswal, 1992; Datt and Lal, 1993; Garbyal *et al.*, 2005; Gupta, 1960; Joshi, 1993; Joshi *et al.*, 1993; Kalakoti and Pangtey, 1988; Pandey and Pande, 1990; Pandey *et al.*, 1995; Pant and Pandey, 1998; Rawat and Pangtey, 1987; Shah and Gupta, 1976; Shah and Jain, 1988; Shah and Joshi, 1971; Singh and Ali, 1997, 1998; Singh, *et al.*, 1980, 1987; Singh and Maheshwari, 1990, 1993, 1994). Therefore, an ethnobotanical study was conducted in this region. The study was aimed at recording different types of medicinal plants especially those used in Unani medicine and their ethnobotanical importance. Besides this, information on present status of some highly exploited medicinal taxa were also recorded.

Fieldwork was carried out in different forest divisions during the period 1999-2006. The area covers Udham Singh Nagar, Nainital, Champawat and Pithoragarh districts of the region. In the course of this investigation, it was found that wild plants are still predominantly in use by the natives for their health purposes and all the basic raw drugs are collected from the forest without replenishing the growing stocks. Moreover, the natural habitats are being disturbed due to a variety of factors such



as diversion of land for expansion of agriculture, dwellings and other developmental needs; recurring forest fire; soil erosion; invasion of some foreign weed species; etc. Consequent to this, populations of some commonly used drug yielding plants have become reduced in the area. The present communication highlights such species along with relevant information. Earlier authors have reported many endangered/threatened medicinal and aromatic plants that were extracted for commercial purposes from this region (Pangtey and Samant, 1988; Shah, 1983; Singh, 1993; Shah and Kapoor, 1978; Sinha, 1975). This contribution is an addition to the above reports. The information presented herein is mainly based on our field observations and enquiries made with knowledgeable village elders belonging to various indigenous communities and officials of the forest department. The study might be useful for planning strategies on conservation and management of medicinal flora particularly threatened taxa of this region. In the following enumeration the plants are listed in alphabetic order by their botanical names with respective family in parenthesis, local name(s), habit and habitat, ethnomedicinal uses and locality from which a particular species was collected and field book number (F. B. No.). This is followed by a remark on availability and present status. All voucher specimens were prepared and deposited in the herbarium of Survey of Medicinal Plants Unit, Regional Research Institute of Unani Medicine, Aligarh (U.P.), India.

## Observations

*Acorus calamus* L. (Araceae); *Bach*, *Boj*, *Ghiroch*, *Ghurvach*

- Habit & habitat : A perennial herb with aromatic rhizome. The plant was recorded from wet places like edges of pond and streams near villages.
- Ethnomedicinal uses : Rhizome is believed to act as an anthelmintic and also used for hoarse-ness of voice, dog bite and stomachache.
- Locality and F.B. No. : Gadgadia (6233), Gebua (6769), Paharpani (7192), Champawat (7409), Pithoragarh (8321)
- Remark : Not observed in the forest but now, cultivated by the forest department.

*Berberis lycium* Royle (Berberidaceae); *Harindra*, *Kingor*

- Habit & habitat : An evergreen shrub. Found in association with other species of *Berberis* along roadsides near agricultural fields.
- Ethnomedicinal uses : Root is commonly used for controlling diabetes. Extract of stem is used for eye ailments.
- Locality and F.B. No. : Paharpani (7187), Sornlekh (8042)
- Remark : Overexploited in past for trade. It is an endangered taxon.

*Bergenia ciliata* (Haw.) Sternb. (Saxifragaceae); *Silphori*, *Patharphori*, *Pashanbhed*

Habit & habitat : A perennial herb with thick rootstock, found in forest, especially on moist rocky slopes.

Ethnomedicinal uses : The root of this plant has from very early times been in much repute for its medicinal properties, particularly for kidney stones. It is also used for jaundice, diabetes, anuria and furunculosis.

Locality and F.B. No. : Gagar (7093), Rosal (7331), Didihat (8094)

Remark : Presently common, but the population of this taxon is on decline due to continuous over collection by the unauthorized collectors.

*Cinnamomum tamala* (Buch.-Ham.) Nees ex Eberm. (Lauraceae); *Tejpat*, *Kakaria*

Habit & habitat : An evergreen small tree, found in shady places in forest.

Ethnomedicinal uses : Leaf decoction is used for cough and cold.

Locality and F.B. No. : Deosthal (7366), Rosal (7366), Bhanara (8098)

Remark : Leaves and stem bark are heavily extracted which have much value for condiments. Now, it is under cultivation.

*Curculigo orchioides* Gaertn. (Hypoxidaceae); *Kali musli*

Habit & habitat : A small perennial herb with an elongated thick, tuberous root stock. This species is characteristics in Sal trees in the Tarai-Bhabar belts.

Ethnomedicinal uses : Root is commonly used for sexual weakness and leucorrhoea.

Locality and F.B. No. : Tanda (6094), Kotkharra (6276), Phanto (6542), Chhakata (6842), Baluti (6542)

Remark : The tuberous root is heavily exploited and also greedily eaten by wild animals. It is a low risk taxon.

*Dactylorhiza hatagirea* (D. Don) Soo (Orchidaceae); *Hathajari*, *Salam panja*

Habit & habitat : A terrestrial orchid with tuberous roots which are digitate or finger shape. Rarely found in damp and shady places in Oak forest.

Ethnomedicinal uses : Tubers are commonly used as general tonic and also believed as an aphrodisiac agent.

Locality and F.B. No. : Kiloli (7351), Thalkedar (8028).

Remark : It is a critical taxon. Export already banned (Jain and Sastry, 1980). It is cultivated in Nandadevi Biosphere Reserve by the tribal (Maikhuri et al., 2002).

*Drimia indica* (Roxb.) Jessop. (Liliaceae); *Jangli piyaz*, *Kori kanda*

Habit & habitat : A scape bearing herb rarely found in forest.

Ethnomedicinal uses : The bulb is commonly used for burning micturition.

Locality and F.B. No. : Joulasal (6460), Phanto (6716)

Remark : A vulnerable taxon.

*Eulophia herbacea* Lindl. (Orchidaceae); *Salam misri*

Habit & habitat : A herb with tuberous roots, rarely found in forest.

Ethnomedicinal uses : Root is commonly used for leucorrhoea and as a general tonic.

Locality and F.B. No. : Palra (7136)

Remark : An endangered taxon. Export already banned (Jain and Sastry, 1980).

*Gloriosa superba* L. (Liliaceae); *Kalihari*

Habit & habitat : A climbing herb with tuberous rootstock; climbing by means of leaves. It is readily recognized by its beautiful flowers. Rarely found in outskirts of villages in Sub-Himalayan forest tracts.

Ethnomedicinal uses : Tuber in the form of poultice is used for joint pain.

Locality and F.B. No. : Surai (6423), Nakhatal (65070), Pawalgarh (70750)

Remark : Due to removal of tubers, the whole plant is destroyed as such wild populations have been reduced very much.

*Hedychium spicatum* Buch.-Ham. ex Sm. (Zingiberaceae); *Kapoor kachri*, *Jangli haldi*

Habit & habitat : A robust herb with horizontal root, found in moist and shady places in forest.

Ethnomedicinal uses : Root is regarded by the natives as a remedy for inflammation and also used for urticaria and kidney stones.

Locality and F.B. No. : Ampokhra (6062), Kelakhur (7063), Chhoi (6780), Nainital (7171), Champawat (7331), Thalkedar (8037)

Remark : It has become vulnerable.

*Helminthostachys zeylanica* (L.) Hook. (Helminthostachyaceae); *Kamraj*

Habit & habitat : Terrestrial perennial fern. Found as undergrowth in Sal trees. It is restricted to Tarai region.

Ethnomedicinal uses : Rhizome is used for impotency and leucorrhoea.

Locality and F.B. No. : Surai (6431), Jaspur (6602)

Remark : This is an endangered species.

*Rauwolfia serpentina* (L.) Benth. ex Kurz (Apocynaceae); *Sarpgandha*, *Swaitbarua*

Habit & habitat : A small erect shrub. It is seen growing wild in shady situations in Sal forest.

Ethnomedicinal uses : The root is believed to be an antidote to snake poison and also considered effective for fever and abdominal pain.

Locality and F.B. No. : Nihal (6083), Surai (6515), Jaspur (6639), Musabangar(7017)

Remark : Musabangar forest of Ramnagar is the natural habitat of this plant where it is still occurs in good quantity. This species has been depleted in other forest areas due to excessively exploitation for trade in past. It has poor regeneration. Now, it is under cultivation in Kaladhoongi.

*Swertia chirayita* (Roxb. ex Fleming) Karsten (Gentianaceae); *Chiraita*

Habit & habitat : An erect herb, found in shady forest up to 2400m.

Ethnomedicinal uses : Leaves are used for worm infestation, skin diseases and as an antipyretic.

Locality and F.B. No. : Nainital (7300), Thalkedar (8025), Munsiyari (8174)

Remark : It is highly threatened due to trade and destruction of natural habitat. Now, it is under cultivation.

*Taxus baccata* L. (Taxaceae); *Thuner*, *Laventa*

Habit & habitat : An evergreen tree. Found in forest at higher altitudes associated with other species of gymnosperms.

Ethnomedicinal uses : Decoction of leaves and stem bark is commonly used to prevent cold.

Locality and F.B. No. : Darmanichoth (7169), Munsiyari (8540)

Remark : The plant yields taxol, a remedy for cancer. It is threatened to illegal trade and destruction of habitat. Now, it is cultivated by the forest department.

*Valeriana jatamansii* (DC.) Jones (Valerianaceae); *Samoy*

- Habit & habitat : Herb with white flowers. Found in forest, but also grows along roadsides near villages.
- Ethnomedicinal uses : Root is used for headache. It is also used as an insect repellent by the natives.
- Locality and F.B. No. : Bhowali (7091), Rosal (7333), Thalkedar (8027)
- Remark : Often exploited commercially in the past. It is an endangered taxon.

### Discussion and Conclusion

This communication has brought to light 15 medicinal taxa which are facing the danger of depletion in most of the forests of the present study area due to several factors. Among other factors, continued exploitation, unsustainable harvesting practices and destruction of natural habitats are largely responsible for their dwindling number. It is predicted that some of them may face extinction in course of time. Since the wealth of wild medicinal plants of a region is one of the vital resources having important bearing on health, economy and environment. Therefore, preservation of this precious herbal heritage and their natural habitats must be given an increased priority, before it is too late. Creating awareness about the conservation of threatened species of medicinal plants among the inhabitants, and cultivation, rational as well as sustainable utilization may reduce the pressure on existing wild population of these medicinal plants. This can lead to the rehabilitation and maintenance of the important germplasm and biodiversity. Most of these plants have high demand for manufacturing many drugs of ISM. Therefore, their mass scale cultivation might become a good source of income to the local farmers. Such observations are of special significance for the area where there is a threat to the natural habitats and vegetation owing to increasing human interference.

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# Comparative Study for Anatomical Parameters, Toxic Elements and Minerals on Two *Terminalia* Species

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## Abstract

Herbal medicines currently used by large sections of the population. Because they are regulated as medicines and are easily available to everyone. The safety concern has become necessary issue with these herbal medicines. Based on the safety of herbal drug the present study characterizes the comparative anatomical studies, content of toxic elements lead, cadmium, arsenic and mercury and also the minerals like calcium, iron, copper, manganese, zinc, nickel, cobalt and chromium in the pericarp of *Terminalia bellerica* Roxb., and *Terminalia chebula* Retz., family Combretaceae. The toxic elements are present within the permissible limit.

**Key Words:** *Terminalia bellerica* Roxb., *Terminalia chebula* Retz., Anatomy, Toxic elements, Minerals

## Introduction

The World Health Organization (WHO) has estimated that most of the world's population relies on these "alternative" plant-based medicines as their primary medical intervention (Kroll *et al.* 2003). The popularity and availability of the traditional remedies have generated concerns regarding the safety, efficacy and responsibility of practitioners using traditional remedies (Chan, 1995).

*Terminalia* is a genus of large trees of the flowering plant, family Combretaceae, comprising around 100 species distributed in tropical regions of the world.

Balela in Unani and Vibhitaki in Ayurveda is botanically equated as *Terminalia bellerica* Roxb., fruit nearly spherical to ovoid, 2-4 cm in diameter; fresh ripe fruits slightly silvery or with whitish shiny pubescent surface; mature fruits grey or greyish-brown with slightly wrinkled appearance; rind of fruit shows variation in thickness from 3-5 mm; taste astringent. The fruit are ripening during the month of November to February (Anonymous, 2007). The chemical constituents of pericarp contains  $\beta$ -sitosterol, gallic acid, ellagic acid, ethyl gallate, galloyl glucose, chebulagic acid, mannitol, glucose, galactose, fructose, rhamnose, bellericanin, tannin and glycosides (Anonymous, 1976). In Unani system of medicine the fruit is used in the ailments of dyspepsia, bilious headache diarrhoea, applied to the eyes, piles and brain tonic. According to the Ayurveda system of medicine the fruit is bitter, pungent, acrid, digestible, laxative, anthelmintic and useful in bronchitis, sore throat, biliousness, inflammations, strangury, asthma and indiseases of eye, nose, heart and bladder (Kirtikar *et al.*, 1998).

Halela in Unani Haritaki in Ayurveda is botanically equated as *Terminalia chebula* Retz., intact fruit yellowish-brown, ovoid, 2-3.5 cm long, 1.3-2.5 cm wide, wrinkled and riped longitudinally; pericarp fibrous, 3-4 mm thick, non-adherent to seed; taste astringent. The fruit are ripening in the month of October to January (Anonymous,



2007). The chemical constituents of pericarp contains tannin, anthroquinones, polyphenolic compounds, gallic acid, chebulinic acid, chebulagic acid, ellagic acid, ethaedioic acid, terpenes, ethyl gallate and galloyl glucose (Anonymous, 1976). The unripe fruit is astringent and aperient, useful in dysentery and diarrhoea. The ripe fruit is purgative, tonic, carminative, enriches the blood; good in ophthalmia. In the Unani system of medicine it is used in the various diseases such as spleen, piles, cold in the head, in paralysis and strengthens to the brain and eyes. The fruit is dry and hot, stomachic, tonic, carminative, alterative, expectorant, anthelmintic, antidysenteric and alterative. In the Ayurveda system of medicine it is very effective drug in the ailments of asthma, sore throat, thirst, vomiting, hiccough, eye diseases, diseases of the heart and bladder, strangury, vesicular calculi, urinary discharges, ascites, biliousness, inflammation, tumors, bleeding, piles, typhoid fever, leucoderma, dysphoea, itching, pain, constipation, anaemia, gout elephantiasis and delirium (Kirtikar *et al*, 1998).

## Materials and Methods

### *Collection of Plant Material*

The pericarp of Terminalia species namely *Terminalia bellerica* Roxb., and *Terminalia chebula* Retz., were procured from Chennai local market and identified with the help of Flora of the Presidency of Madras (Gamble J S, 1979) by botanist and a dried specimen deposited in the Herbarium of RRIUM, Chennai.

### *Anatomical studies*

Microscopic and powder analysis of both the species were studied individually. Free hands section of the pericarp of fruit were taken and treated with safranin, haematoxylin and chemical reagents like phloroglucinol and concentrated hydrochloric acid to observe various characters. Microscopic drawings were made using camera lucida and observations were recorded. Powder of the individual drugs were analyzed microscopically after clearing it in chloral hydrate and jeffreys solution. The powders of the both drugs were also treated individually with iodine dissolved in potassium iodide solution (Johansen D A, 1940).

## Toxic elements and minerals analysis

### *Instrument*

Perkin Elmer-400 model atomic absorption spectroscopy (AAS) was used in the analysis of toxic elements and minerals. The operating procedure were slit width: 0.5 mm, current: 3.0mA, carrier gas: argon, flow rate: 2 ml/3min.

### *Wet digestion of sample for AAS*

Analysis of Toxic elements and minerals were carried out by Atomic Absorption Spectroscopy using the following method (Sahito *et al*, 2001).

Accurately weighed 500 mg of air-dried powder was taken in round bottom flask. To this, 5 ml of conc. nitric acid was added and refluxed for half an hour in a hot plate at 60-80°. It was cooled, added 5 ml of conc. nitric acid and warmed on water bath. 2 ml of 30% hydrogen peroxide solution was added to the above mixture and warmed till obtained the clear solution. Then it was cooled, filtered through whatman-42 filter paper, diluted with deionised water and made upto 100 ml in volumetric flask.

## **Results and Discussion**

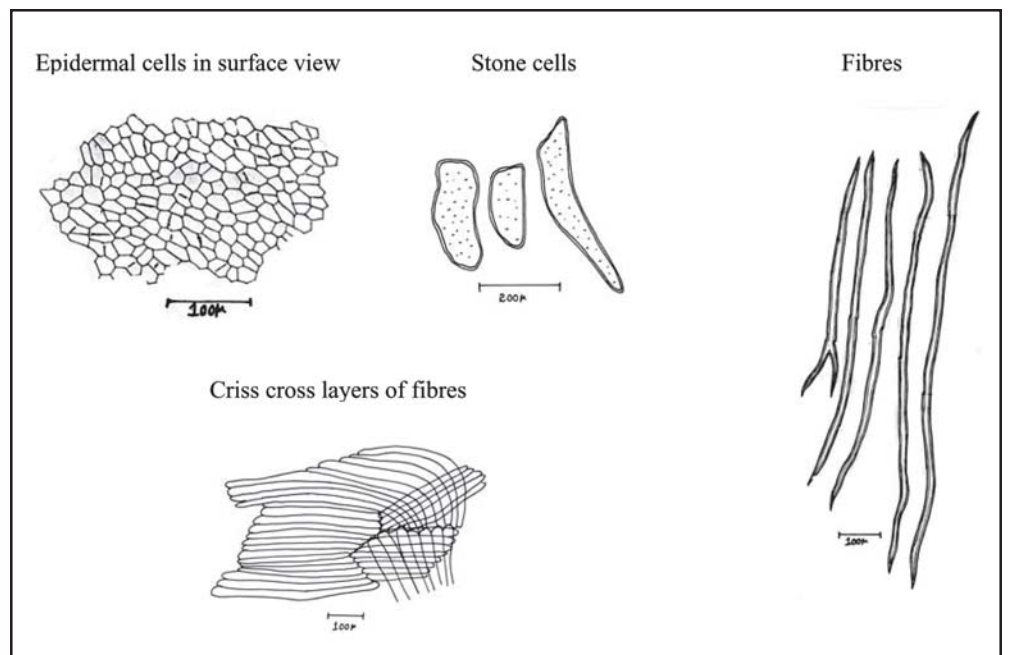
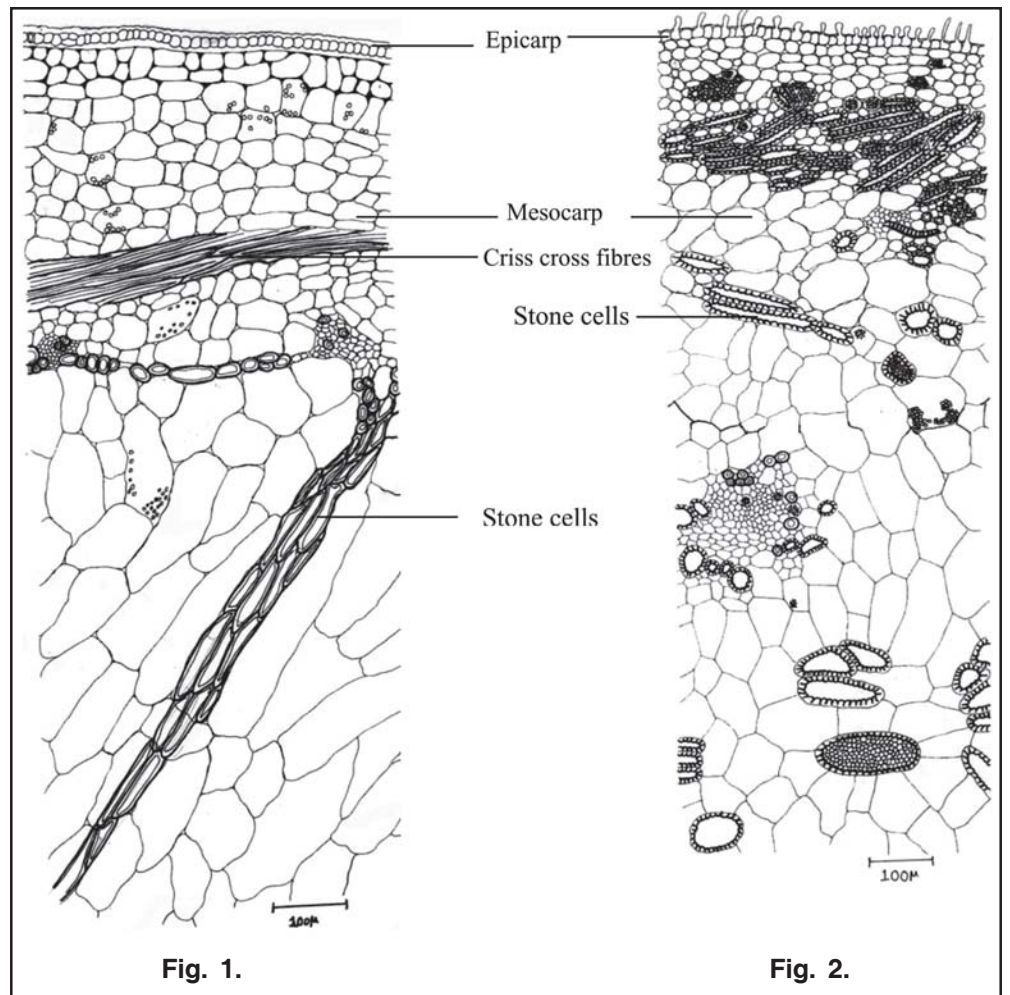
### *Microscopy*

Transverse section of the pericarp of fruit of *Terminalia chebula* Retz. Fig 1. shows outer epicarp consisting of single layer of epidermal cells; mesocarp consisting of outer and inner region, outer region consisting of 2 to 3 layers of collenchyma cells, followed inner region consisting of broad parenchyma in which fibres and sclereids or stone cells in groups and vascular bundles scattered; sclereids or stone cells of various size and shape; starch grains simple round or oval in shape and found in plenty in almost all cells of the mesocarp.

Transverse section of the pericarp of fruit of *Terminalia bellirica* Roxb Fig 2. shows outer epicarp consisting of single layer of epidermal cells elongate to form hair like protuberance with swollen base; mesocarp consisting of outer and inner region, outer region consisting of 3 to 8 layers of smaller parenchyma cells in which groups of sclereids or stone cells of different shape and sizes present with narrow lumen, followed by inner region consisting of parenchyma cells of larger sizes in which fibres and sclereids or stone cells with broad lumen in groups or isolated filled with starch grains and vascular bundles scattered; almost all the cells of the mesocarp densely packed with starch grains; starch grains simple or compound, round or oval in shape.

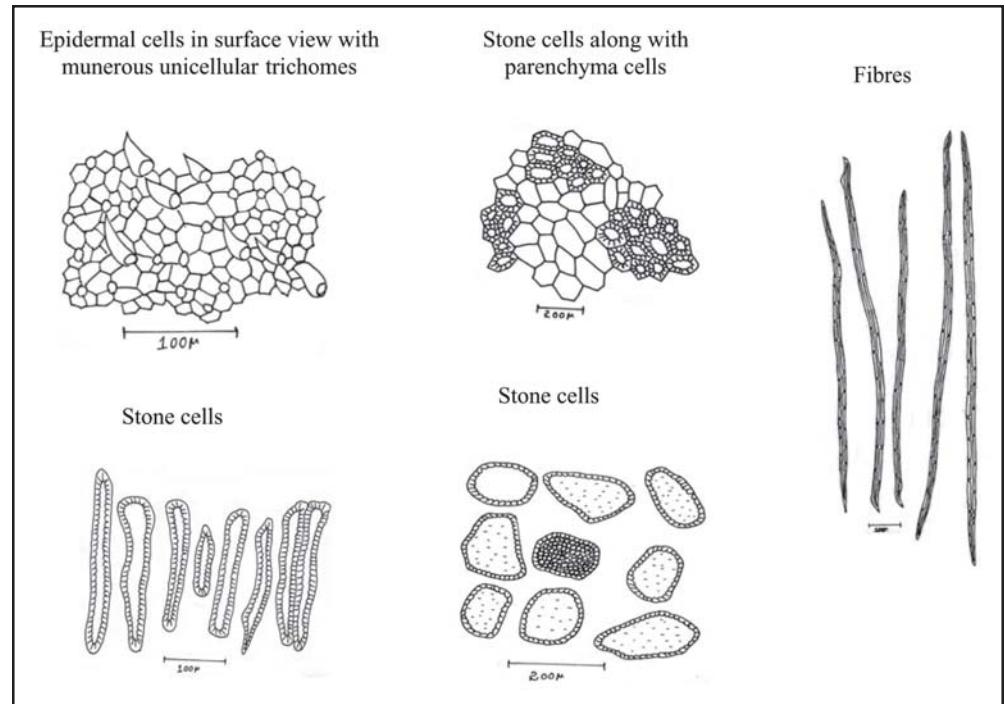
The powder analysis of *Terminalia chebula* Retz. shows the epidermal cells in surface view with polygonal cells uniformly thick walled, several of them divided into two by a thin septa; fragments of criss cross fibres; stone cells with pitted walls upto 400µ length and upto 100µ breadth with broad lumen; fibres upto 1200µ length and upto 25µ breath. The salient features are given in Fig 3.

The powder analysis of *Terminalia bellirica* Roxb. shows the epidermal cells in surface view with numerous unicellular trichomes; stone cells pitted with broad and narrow lumen, stone cells upto 250µ length, 150µ breadth and with 125µ (broad)



**Fig. 3. Powder analysis**

lumen and filled with starch grains; stone cells upto 300 $\mu$  length, 60 $\mu$  breadth and with 40 $\mu$  (narrow) lumen; fibres upto 1400 $\mu$  length and upto 30 $\mu$  breadth with numerous pits on their lateral walls. The salient features are given in Fig. 4.



**Fig. 4. Powder analysis**

#### *Toxic elements and minerals*

Studies of toxic elements and minerals contents of the pericarp of two terminalia herbal medicines have been documented. Minerals are non-organic substances, which are not in the category of plant or animal, but comes from the soil. There are 16 minerals, which are essential for the human body and needs in order to function properly. Minerals are elements required for human body for the several purposes like formation of blood, bones, teeth even other tissues, osmoregulation of body fluids, control of physico-chemical process etc. Although minerals comprise only a fraction of total body weight but they are also crucial for many body functions including transporting oxygen, normalizing the nervous system and simulating growth, maintenance and repair of tissues and bones. Excessive levels of non-essential mineral contaminants such as arsenic, cadmium, lead and mercury can also affect the absorption and efficient use of mineral in the body. These toxic minerals can create an “unbalancing” effect on the body cells. Cadmium acts like a classical stress agent; it has also been implicated in learning disabilities. Unlike lead, which has a short half-life in human tissue of from 30-100 days, cadmium has a half-life of between 10-30 years.

The essential minerals, which prevent the body from the contamination of toxic elements are given in table.

S. No.	Toxic elements	Body Part Affected due to contamination	Protective Nutrient
1.	Lead	Bones, liver, kidney, pancreas, heart, brain, nervous system	Zinc, iron, calcium, vitamin C, vitamin E, sulfur and amino acids
2.	Cadmium	Renal cortex of the kidney, heart, blood vessels to the brain appetite and smell center of the brain, every known process in the development of cancer	Zinc, calcium, sulfur and amino acids
3.	Arsenic	Cells (cellular metabolism)	Selenium, iodine, calcium, zinc, vitamin C, sulfur and amino acids
4.	Mercury	Nervous system, appetite and pain centers of the brain, immune system, cell membranes	Selenium, vitamin C, sulfur and amino acids

### *Usage of minerals and effect of deficiency*

**Calcium** is needed for the formation of strong bones and teeth and for controlling blood-clotting mechanisms and to regulate the excitability of nerves and muscles. Sufficient calcium act against the allergies, viruses and tooth decay. Lack of calcium can cause rickets, back pain, osteoporosis, osteomalacia, insomnia, irritability, nervousness, tension, uneven heartbeat, indigestion, stomach cramps and spasms, constipation, pre-menstrual tension and cramping of the uterus. **Nickel** is needed in the heart muscle, the liver and the kidneys. It is involved in hormone, lipid and membrane metabolism. Significant concentrations are found in DNA and RNA and it may contribute to the stabilisation of nucleic acids. Nickel deficiency in adults has been connected with cirrhosis of the liver and chronic liver failure. **Iron** is needed to make haemoglobin, the substance in the red blood cells, which carries oxygen in the blood. It aids resistance to infection. Shortage of iron can lead to weakness, shortage of breath, excessive fatigue, depression, mental confusion and poor memory. Iron deficiency in the foetus can cause eye defects, bone defects, brain defects and neonatal mortality. **Zinc** is needed for the health and maintenance of bones, muscles, eyes, organs and sperm and acts as a co-factor in over 90 enzymes. It is needed in the liver for the conversion of carotene to plasma Vitamin A. Lack of Zinc in women can lead to difficulties with parturition (childbirth). **Chromium** is very essential for regulation of the glucose as tolerance factor in combination with nicotinic acid and some proteins. Glucose is required for entire body function. Lack

of chromium is known to cause serious eye abnormalities. **Cobalt** is essential to humans as part of the structure of Vitamin B<sub>12</sub>. Lack of Vitamin B<sub>12</sub> can cause pernicious anemia, but as little as 3 µg of B<sub>12</sub> daily can prevent. **Copper** aids the development of brain, bones, nerve and connective tissue. Lack of copper can cause porous bones, loss of hair, demyelination, heart damage and anemia. **Manganese** is needed for numerous enzymes and for utilizing fats. It is necessary for bone growth and development, reproduction, lipid metabolism and moderation of nervous irritability. Lack of co-ordination, head retraction, tremor, loss of righting reflexes, hyperirritability, faulty cartilage and bone matrix formation, heart problems and learning difficulties also occur.

The content of calcium, iron and manganese were found to be highest in *Terminalia chebula* compare to *Terminalia bellerica*, whereas the nickel, zinc, cobalt and copper content were found to be same in both the species. Chromium was found to be very low in both the species. The values are shown in table-2.

**Table-1. Toxic elements analysed for two terminalia species**

S. No.	Name of the elements	<i>Terminalia bellerica</i> (ppm)	<i>Terminalia chebula</i> (ppm)
1.	Lead	0.2008	0.5482
2.	Cadmium	0.0081	0.0016
3.	Arsenic	0.0416	0.0128
4.	Mercury	0.2697	0.1648

All values are mean of three determinations

**Table-2. Minerals analysed for two terminalia species**

S. No.	Name of the Minerals	<i>Terminalia bellerica</i> (ppm)	<i>Terminalia chebula</i> (ppm)
1.	Calcium	3.5523	5.6387
2.	Nickel	0.7082	0.7822
3.	Chromium	0.0092	0.0786
4.	Zinc	0.4254	0.4272
5.	Manganese	0.3698	1.0415
6.	Cobalt	0.5684	0.6430
7.	Iron	2.6285	3.9408
8.	Copper	0.0903	0.1454

All values are mean of three determinations

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# Unani Medicinal Plants Used for Asthma by Irular Tribes of Coimbatore District, Tamil Nadu

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## Abstract

Asthma is a common respiratory disease, affecting the population globally. The condition is characterized by dyspnea, inflammation of the airways, bronchospasm with airway obstruction, increased mucus secretion, oedema of bronchial walls and bronchial hyperactivity. For treating this disease some ethnopharmacological observations have been made from the tribal area of Coimbatore district forests. The paper records the first hand information on 21 medicinal plants species used as anti-asthmatic by the Irular tribal community of Coimbatore forests. Mode of application is given for all recipes discussed in the text.

**Key Words:** Asthma, Ethnobotanical study, Medicinal plants, Tribal.

## Introduction

Information of folk medicinal uses of the plants have recently become of renewed interest in the search for new therapeutic agents. A vast knowledge on medicinal plants exist as oral among the folklore and primitive societies of India, where a large number of potent medicinal herbs are found growing wild. Although, a great amount of ethnopharmacological research work has been undertaken in various tribal pockets and rural population scattered throughout the country, there is, still much to be discovered (Singh *et al.*, 2007). Based on this rationale the present work was taken up and provides first-hand field data to treat asthma through folk herbal recipes.

Many civilizations employed herbal remedies and dietary modifications to treat symptoms that are today referred as asthma. Perhaps, the first known text to provide information in the 1927 edition of Cecil's "*A text book of Medicine*" suggested the use of the smoke of stramonium leaves, atropine and belladonna for asthma. Rakemann (1947) suggested that the use of asthma powder or cigarettes of plants for strongest cure. A review of literature indicates that hundreds of plants have been traditionally used in various cultures for the treatment of asthma. Some of these include; *Curcuma longa* L. (Gagliardo *et al.*, 2003), *Ocimum sanctum* L. (Patel *et al.*, 1983; Godhawari, 1987), *Piper longum* L. (Dhanukar, 1984), *Embllica officinalis* Gaertn. (Nosalova, 2003), *Terminallia bellerica* Roxb. (Sabu and Kuttan, 2002), *Zingiber officinale* Rosc. (Kluchi, 1992), *Cyperus rotundus* L. (Seo *et al.*, 2001). Moreover, the Indian systems of medicine like Ayurveda, Unani, Siddha, and Homoeopathy, have recommended number of drugs from indigenous plants sources for the treatment of asthma.

Plant based medicaments have been man's prime therapeutic weapons and are still in the front line as one of the useful element of traditional health practices in developing countries. Since in the case of sever asthma, Doctors give steroids

because it is the strongest cure for asthmatic person but they give side effects when used on regular basis for long period of time, there are documented adverse effect such as loss of stature, decrease bone mineralization, glaucoma and cataracts. The leaves of holly basil (*Ocimum sanctum* L.) and turmeric (*Curcuma longa* L.) are used by the Ayurvedic physicians (and also in Indian folklore) in the treatment of asthma, the anti-asthamatic activity of the leaves and rhizome has been studied by several workers in animal models (Patel *et al.*, 1983; Wu, 2003; Godhavari *et al.*, 1987). A number of studies have been made in the last five decades on plants screened for anti-asthmatic activity in India (Gupta *et al.*, 1979; Rajaram, 1975) and else where (Wu, 2003).

In an attempt to search a novel anti asthmatic drugs from natural plant resources the paper provides first-hand information recorded during medico-ethnobotanical survey on the plants used by tribe “Irular” and rural people of Coimbatore district, Tamil Nadu located at the foot hills of the Nilgris in Western Tamil Nadu at an altitude of 470 mts.

## Materials and Methods

Ethnopharmacological surveys were conducted in rural and forest villages of Coimbatore district during 2006, and based on personal interviews; informal discussions and personal observations, information on medicinal plants used in the treatment of asthma by the tribal and local population were recorded. Voucher specimen were collected, identified and deposited in the herbarium of the Regional Research Institute of Unani Medicine (RRIUM), Chennai, for further reference and study.

## Results

For treating this disease ethno pharmacological uses of 21 plant species belonging to 17 families have been reported from Irular tribal community of Coimbatore district (Table-1). A range of preparations are used to treat asthma disease and most popular medicinal preparations are plant extract, decoction, smoke, fresh juice and pills. Information on botanical name, family name, Unani mane, voucher specimen no., local name, part used, mode of preparation and dosage are given for each species reported.

The species *Allium cepa*, *Abutilon indicum*, *Argemone mexicana*, *Cassia tora*, *Euphorbia hirta*, *Ocimum sanctum* and *Tylophora asthmatica*, are used in the form of fresh extract. Some plants like *Aegle marmelose*, *Adhatoda vasica*, *Boerhavia diffusa*, *Solanum indicum*, *Solanum xanthocarpum*, *Sphaeranthus indicus*, *Trachyspermum ammi* and *Vitex negundo* are used in the form of decoction. The plants like *Calotropis gigantea*, *Datura metal*, *Cardiospermum helicacabum*, *Ferula asafoetida*, *Terminalia chebula* are used in the form of inhaled smoke. Other plants

Table-1. Folk Medicinal Plants Used for Treatment of Asthma.

S. No.	Botanical Name/Family Name/ Voucher Specimen No.	Unani Name/ Local Name	Part Used	Mode of Preparation/ Application
1	<i>Abitulon Indicum</i> (L) Sweet./Malvaceae 1332-RRRIUM(M)	Kanghi/ Tuththi	Leaves	20 ml leaf extract mixed with 2 ml of ghee is orally given once in daily.
2	<i>Aegle marmelose</i> Corr./Rutaceae 3772-RRRIUM(M)	Belgiri/ Vilvam	Fruit Bulb	50 g of fruit bulb boiled in 100 ml water and the decoction is orally taken twice daily.
3	<i>Adhatoda vasica</i> Ness./Acanthaceae 7253-RRRIUM(M)	Arusa/ Adadodai	Leaves	50 ml of leaf decoction with 10 ml honey is orally given once in daily.
4	<i>Allium cepa</i> L./Liliaceae 7522-RRRIUM(M)	Piyaz/ Vengayam	Bulb	20 ml bulb extract orally taken daily after food in night.
5	<i>Argemone mexicana</i> L./Papaveraceae 0613-RRRIUM(M)	Sathiyawasi/ Pramathandu	Flower	Flower extraction 10-20 ml orally taken daily after once in morning.
6	<i>Boerhaavia diffusa</i> L./Nyctaginaceae 1288/RRRIUM(M)	Safed Santh/ Mukarrattai	Root	10 g dried root and 10 no of pepper powder mixed in 50 ml of warm water taken daily.
7	<i>Calotropis procera</i> (Ait) R.Br./Asclepadaceae 3422-RRRIUM(M)	Madar/ Vellerukku	Leaves	The dried leaves made into powder and filled in paper vessel and used as cigarette to get relief form asthma pain.

Table-1. (Contd.)

S. No.	Botanical Name/Family Name/ Voucher Specimen No.	Unani Name/ Local Name	Part Used	Mode of Preparation/ Application
8	<i>Cardiospermum helicacabum</i> L./Sabindaceae 3422-RRUM(M)	QuilQil/ Mudakuneethan	Whole plant	Dried plant made in to powder and used as cigarette.
9	<i>Cassia tora</i> L./Caeselpinaceae 0115-RRUM(M)	Panward/ Thakarai	Leaves	20 ml leaf extract is orally taken daily in empty stomach.
10	<i>Datura metel</i> L./Solanaceae 3647-RRUM(M)	Datura/ Vellaioomathai	Leaves	The smoke of the dried leaves are inhaled to relief from asthma pain
11	<i>Euphorbia hirta</i> L./Euphorbiaceae 3652-RRUM(M)	Duddhi/ Ammanpachirici	Leaves	20 ml leaf extract taken orally.
12	<i>Ferula asafoetida</i> Reg./Umbelliferaceae 18-Museum Specimen-RRUM(M)	Heeng/ perungayam	Resin	The dried resin made in to powder and spread upon a cup of wood fire and the smoke is inhaled to relief from asthma
13	<i>Lippia nudiflora</i> Rich./Verbenaceae 0169-RRUM(M)	Bukhan Butti/ Poduthali	Leaves	50 g leaves and 10g ginger made in to paste and divided in to three pills are orally taken daily thrice.
14	<i>Ocimum sanctum</i> L./Lamiaceae 8975-RRUM(M)	Rehan/ Thulasi	Leaves	20 ml leaf extract is mixed with 5 ml of honey is orally taken daily twice.

Table-1. (Contd.)

S. No.	Botanical Name/Family Name/ Voucher Specimen No.	Unani Name/ Local Name	Part Used	Mode of Preparation/ Application
15	<i>Punica granatum</i> L./Punicaceae 7317-RRIMUM(M)	Anar/ Madulai	Fruits	50 ml fresh juice is mixed with 10 ml ginger juice and 10 ml honey is orally taken twice daily.
16	<i>Solanum indicum</i> Lam./Solanaceae 2639-RRIMUM(M)	Hadaq/ Paparamulli	Root/ fruit	20 g equal part of dried powder of fruits and roots are boiled in 100 ml water and the decoction is orally taken daily.
17	<i>Solanum virginium</i> L./Solanaceae 7433-RRIMUM(M)	Katai Khurd/ Mullukathiri	Fruit	10 g dried fruit boiled in 100 ml water and made in to decoction is orally taken daily twice.
18	<i>Spharanthus indicus</i> L./Astraceae 8145-RRIMUM(M)	Mundi/ Kottaikaranthi	Whole plant	50 g dried plant made in to powder and boiled in 200 ml of water from this 50 ml decoction taken orally twice daily.
19	<i>Terminalia chebula</i> Retz./Combretaceae 7334-RRIMUM(M)	Halela/ Kadukai	Fruit	Fruits are made into powder and smoked in pipe to relief asthma attack.
20	<i>Trachyspermum ammi</i> L./Apiaceae 3517-RRIMUM(M)	Nankhwash/ Omam	Fruit	50 g fruit are made in to powder then boiled in 200 ml of water from this 50 ml of decoction taken orally daily thrice after food.
21	<i>Vitex negundo</i> L./Verbenaceae 27- Museum imen-RRIMUM(M)	Sambhalu/ Vennochi	Leaf	50 ml leaf decoction taken daily twice.

are used as pills or fruit juice. The leaves are chiefly used as anti asthmatic drug followed by fruit, root, bulb and flower. Mostly the medicines are taken in the form of extract, decoction, smoke, pills and fruit juice.

## Discussion and Conclusion

Medicinal plants used locally in Coimbatore district by Irular tribe to cure asthma are easily available and do not have adverse or side effects. These have been in use by the ancient peoples of Irular tribal community since time immemorial and are well accepted. These formulations work with synergism in human to fight out the disease causing factors or elements. So these herbal medicines have shown excellent results without any ambiguity in bronchial asthma.

Data on folk medicinal uses for asthma have been analysed and compared with available literature on medicinal and economic plants of the country. It is observed that some of the therapeutic uses of plants reported were not recorded earlier or imperfectly known. Therefore, there is a need to re-investigate all such species for their chemical constituents and pharmacological effects to discover new and effective natural drugs for treatment of asthma.

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# Ethnobotanical Survey of Atmakur Forest Division of Andhra Pradesh

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## Abstract

Based on an ethnopharmacological survey of Atmakur forest division of Andhra Pradesh conducted during August 2008, the paper presents some 45 contemporary folk-recipes comprising 45 taxa of folk medicinal plants used by various tribes eg. Chenchus, Erukas, Koyas and Telaga agriculturists etc. for the treatment of various common ailments. Botanical name, family, local name, Unani name, field book number, part(s) used, name of the disease(s) against which used and mode of administration is given for each recipe discussed. The information provided will help to discover new drugs of natural origin for many of the diseases and conditions, thus far, incurable in modern medicine.

**Key Words:** Ethnopharmacological survey, Tribal medicine, Atmakur forest

## Introduction

Based on an ethnopharmacological survey of Atmakur forest division of Kurnool district of Andhra Pradesh undertaken in August 2008 and first-hand information on folk medicinal uses of plants for treatment of various diseases and conditions were recorded. The area from which data were derived is situated in North Latitude 15°30' to 16°15' and between East longitudes of 78°15' and 79°. The areas explored included 5 forest ranges such as (i) Atmakur (ii) Bairluti, (iii) Nagluti (iv) Srisalam (v) Velugode, and the important forest areas visited included Sivapuram, Nagluti, Bairluti, Rolapenta, Pasurutla, Velgode, GBM, Srisalam and Sunipenta.

The study presents 45 folk medicinal species used by the tribal and other ethnic groups for various ailments among local population in the areas surveyed. The area has not been investigated exhaustively earlier in this direction except for some sporadic reports on medicinal uses of plants (Balaji Rao *et al.*, 1995; Chetty & Rao, 1989; Gupta *et al.*, 1997, 2005, 2007, 2008; Reddy *et al.*, 1989; Suryanarayana, 1996; Veda Vathy, 1986; Kapoor & Kapoor, 1973; Khan, 1953; and Pullaiah & Yasoda, 1989).

## Methodology

An ethnopharmacological survey of Atmakur forests of Kurnool district was conducted during August 2008 with a view to study the medicinal herbs of the area and also to record the folk-wisdom of tribals known as Erukas, Chenchus, Koyas and Telaga agriculturists who have since long settled in the river side villages. The data on folk medicinal uses of plants were collected from the well reputed herbalists (medicine men) through their direct field interviews who also accompanied the survey team in the field to help identify the folk plants and also from the tribals who have long been prescribing the folk-medicines to locals for treatment of various common and chronic diseases. Information about the efficacy of the herbs was also recorded.

Botanical specimens of all folk drugs were collected, identified and voucher specimens prepared and deposited in the herbarium of Survey of Medicinal plants Unit, Central Research Institute of Unani Medicine, Hyderabad, for future reference and study. Ingredients & adjuvant drugs in a particular recipe have been recoded by their local names in field and scientifically identified at the institute.

### Enumeration of Folk Medicinal Species

Adverting shortly to the scheme of presentation of data, the medicinal plants used as folk medicine in the study area are arranged in alphabetical order. Each entry gives the information – Plants' scientific name with family (in bracket), Field Book no., Local Name(s), Unani name (wherever available), part(s) used, disease and condition, and method of usage, in sequence:

*Achyranthes aspera* Linn. (Amaranthaceae); CRI 8543; Uttareni; Chirchitta; Seeds; Piles; 50 gms of the fresh seeds of Uttareni are to be ground with 100 ml. of water and the paste is to be taken orally with rice water twice a day, for 2-3 weeks.

*Acorus calamus* Linn. (Araceae); CRI 8556; Vaja; Bach; Rhizome; Stomach ache; rhizome of vaja, voma and sonth are to be grind to powder and 2 g of the powder is to be taken orally 3 times a day for 2-3 days.

*Albizzia lebbeck* Benth. (Caesalpinaceae); CRI 8518; Dirisena; Siris; Stem bark; for longer life; the bark of the plant is collected freshly and dried in shade and powdered, 5-6 g of the powder is to be taken orally twice a day for 15-20 days.

*Aloe vera* Linn. (Liliaceae); CRI 8599; Chinnakalabanda; Ghee-gawar; leaves; joint pains; the flesh of leaves are to be heated on gentle fire and the pulp is obtained by removing the epidermis. This pulp is to be tied as a plaster on the knee/affected part.

*Amaranthus spinosus* Linn. (Amaranthaceae); CRI 8592; Mullatotakura; Kantimaat; leaves; mother's lactation; the leaves are to be cooked and eaten as vegetable with any pulse.

*Andrographis paniculata* (Burm.) Wall. (Acanthaceae); CRI 8550; Nelavemu; Kalmegh; Entire plant; snake-bite; both the ingredients (Nelavem (entire plant) and bark of Kuchla) to be grind with sufficient amount of water and 2 teaspoons of the juice is to be given orally to the victim of snake-bite alongwith 50 ml of rice water 2-3 times cures the patient.

*Bambusa arundinacea* Retz. (Poaceae); CRI 8585; Bonguveduru; Bans; Tabasheer; Asthma; Tabasheer is used in the treatment of asthma (present in internodes).

*Butea monosperma* (Lam.) Taub. (Fabaceae); CRI 8570; Moduga; Palas/ Tesu; Leaves; Eczema; leaves are to be shade dried and powdered and mixed with water to get a thick paste and mixed in equal weight of lemon juice. This preparation is ointment applied on the part affected by eczema.

*Caesalpinia crista* Linn. (Caesalpiniaceae); CRI 8576; Gachcha-kaya; Gajaga; seeds; painful menstruation; 10 g seeds grind with 10 g of sugar and made into pills (6 Nos.). one pill is to be taken orally twice a day for 3 days with water for painful menstruation.

*Calotropis gigantea* (L.) R.Br. ex. Ait. (Asclepiadaceae) ; CRI 8538 ; Jilledu; Madar; Latex; Warts: By applying the latex to the affected part, the warts are damaged.

*Chloroxylon swietenia* DC. (Rutaceae); CRI 8530; Billydu; Bhirra; Root & Stem bark: Root and stem bark powder with black pepper is useful for rheumatism.

*Citrus aurantifolia* (Christm.) Swingle.; (Rutaceae) CRI 8535; Imam; Nimbu; fruit: Earache; both the ingredients (juice of Aare wood and lemon) in equal weight are to be mixed and dropped in the ear, 2-3 times a day.

*Commiphora wightii* (Arnott.) Bhandari; (Burseraceae); CRI 8574; Guggul; guqgul; gum; Leucorrhoea: 10 g of the gum powder is to be boiled with water for 7 times and added 20 g of misri and made into powder which is to be taken twice daily for Leucorrhoea.

*Crotalaria juncea* Linn. (Fabaceae); CRI 8532, Janumu; Sunn; Seeds; Burns: Equal proportion of seeds are to be grind with butter and applied to the affected part.

*Curcuma domestica* Valetton (Zingibraceae); CRI. 8507,; Pasupu; Haldi; Rhizome; jaundice: Turmeric rhizomes and lime, both the ingredients in equal weight are to be mixed and made into pills of Pea size and given orally 5 times at an intervals of 12 hours.

*Datura innoxia* Mill. (Solanaceae); CRI 8502; Nellaummetta; Kaladhatura; seeds; chronic fevers: the seeds of Nallaummetta are to be soaked in lemon juice for 24 hours and dried. 10 g of these seeds, 10 g of black pepper and 5 g of raskapoor are to be powdered and made into pills of the size of ghungchi seeds: One pill is to be taken orally with water twice a day for 3-4 days.

*Diospyros ebenum* Koenig. (Ebenaceae); CRI 8565; Tuniki chettu; Abnus; Stem bark; Snake bite: 50 g of the bark is to be grind with 100 ml. of water and given orally to the victim of snake-bite.

*Emblica officinalis* Gaertn. (Euphorbiaceae); CRI 8595; Usirika; Amla, fruit pulp; polyurea in women: 30 g of Usirika fruits juice and 10 g vasaka leaves are to be burnt to ash and mixed with 20 g of honey and taken orally twice a day for 6 days.

*Feronia limonia* (L.) Swingle. (Rutaceae); CRI. 8511; Velaga; Kaviti; Gum; Tooth pain: 100 g each of gum and harati karpur are to be grind and applied to the gums.

*Ficus religiosa* Linn. (Moraceae); CRI 8514; Ashvalthamu; Pipal; Leaves' Depression and heart palpitation: 20-25 fresh leaves are to be soaked in water over night, filtered in the morning and filtrate is to be stored in a glass bottle: 50 g of the juice is to be taken orally thrice a day for 15-20 days.

*Hemidesmus indicus* R.Br. (Asclepiadaceae); CRI 8540; Sugandhi-pala; Ushbahindi; roots; ringworms: Equal weight of roots with other ingredients eg. Sompu; Miryalu; bark of jilledu and yalakulu are to be grind and mixed with cow ghee and the pills are given orally twice a day for ringworms.

*Hibiscus rosa-sinensis* Linn. (Malvaceae); CRI 8595; Mandara; Gudhale; flowers; inducing menses: 5-6 flowers are to be eaten raw twice a day for one week.

*Hybanthus enneaspermus* (Linn.) F.Muell. (Violaceae); CRI 8546; Nilakobari; Ratanpurus; Leaves; Bone fractures and sprains: The leaves of the plant are dried and powdered: 1 g of powder is to be taken alongwith 1 g of jaggery and 50 ml. of goat milk on empty stomach, twice daily for 5-7 days.

*Jatropha curcas* Linn. (Euphorbiaceae); CRI 8587; Nepalamu; Jangli errand/Jangli jamalgota; twigs; Leucorrhoea: paste of young twigs mixed with paste of long pepper, is given twice a day to women.

*Lannea coromandelica* (Houtt.) Merrill. (Anacardiaceae); CRI 8553; Gumpena, Jingan; bark; bone fractures: the bark is to be grind with sufficient amount of water to get a thick paste which is to be applied as a plaster on the fractured bone.

*Mimosa pudica* Linn. (Mimosaceae); CRI 8567; Attapatti; Chui-mui; Entire Plant; Infantile-diarrhoea: 5-10 g of the fresh plant is to be grind with 50 ml. of water and given orally twice a day for 2 days.

*Momordica charantia* Linn. (Cucurbitaceae); CRI. 8509; Kakra; Karela leaves; the leaves are to be crushed to get the juice: 3-5 drops of the juice is to be mixed with a cup of curd and given orally daily once in the morning on empty stomach, for 3 days.

*Moringa oleifera* Linn. (Moringaceae); CRI 8500; Mulaga, Soanjna; whole plant; cracks in feet; decoction of the whole plant is applied for cracks in feet and palms.

*Mucuna pruriens* (Linn.) DC. Hook. (Fabaceae), CRI 8525. Doolagondi; Kanchkuri; Roots; sexual vigour: Roots of doolagondi mixed with Bengal gram, badam pappu, powder of Akkalakarra, Jajikoya and zafran and grind with water. This is made into pills: One pill with ½ glass of milk taken half an hour before intercourse.

*Nymphaea alba* Linn. (Nymphaeaceae); CRI 8516; Tamara; Nilofar; seeds; for allaying thirst and hunger. Seeds of Tamara and rice in equal weight are to be ground with sufficient amount of goat's milk and cooked with ghee: The preparation is taken orally which will ally the thirst and hunger for 12 days.

*Opuntia dellinii* Haw. (Cactaceae); CRI 8604; Nagajemudu; Chappal send; Latex; Piles: all the ingredients in equal weight (Nagajemudu, ginger and haldi) are to be mixed, ground and a cotton piece is dipped in this juice which is to be made into swabs and the swab is to be inserted in the anus and kept for 8-12 hours.

*Piper longum* Linn. (Piperaceae); CRI 8590; Pippuloo; Dar-e-filfil; fruits and seeds: for pregnancy: all the ingredients Pippaloo, sonth, kalimirch in equal weight are to be ground to get powder.: 10 g of the powder is to be taken orally with ghee twice a day regularly till conception occurs.

*Psidium guajava* Linn. (Myrtaceae); CRI 8568; Ettajama; Amrud; Leaves; Antidote of alcoholic effect: 50 g of the leaves are to be chewed and the juice is to be swallowed.

*Punica granatum* Linn. (Punicaceae); CRI 8597; Danimma; Anar; Flowers; amenorrhea; Flowers of Danimma with other ingredients (seeds of sudab, bang and munaka) are to be ground and made into two halves: The preparation in the dose of one half in the morning and one in the evening given orally for seven days.

*Randia spinosa* Poir (Rubiaceae); CRI 8513; Madiphalam; Mainphal; fruits; pyrrhoea: all the three ingredients in equal weight (Lemon juice; madiphalam juice and honey) are to be mixed and applied to the gums.

*Rubia cordifolia* Linn. (Rubiaceae); CRI 8602; Manjista-teega; Majeet; Root; Rat-bite; all the ingredients in equal weight (Majista-teega + Turmeric and rock salt) are to be ground with sufficient amount of water and the paste is applied as ointment on the bitten spot.

*Semecarpus anacardium* Linn.f. (Anacardiaceae); CRI 8505; Bhallataki; Bhilawa; Seeds; Poisonous fevers seeds of bhilawa with other ingredients (mercury, ash of copper, sulphur and black pepper) are to be ground with sufficient root juice of chitramulam for 24 hours and made into pills of black gram seed size: One pill is to be taken orally twice a day for one week.

*Sesamum indicum* Linn. (Pedaliaceae); CRI 8520; Nallanuvvulu; Til; seeds; grey hair and blindness. Seeds are dried with fruit rind of Usirika and powdered and 400 g of sugar is to be added.: 10 g of the preparation is to be taken twice a day for one year.

*Solanum surattense* Burm.f. (Solanaceae); CRI 8558; Vankuda; Katai; fruit seeds; dental carries; ripen fruits with seeds are to be collected and shade dried. When needed the 2-4 fruits along with little castor oil are put on cow dung cake fire and smoke is to be inhaled.

*Strychnos nux-vomica* Linn. (Loganiaceae); CRI 8610; Vishamusti; Kuchla; Root; Snake-bite; 5-10 g of root is to be ground with 50 ml of water to get paste: Little paste is applied in both the eyes of the snake-bite victim and mantra to be chanted with neelu shoots.

*Strychnos potatorum* Linn. (Loganiaceae); CRI 8562, 8528; Chilla-ginja, Kunigotiginja; Nirmali; Seeds; Scorpion sting. One seed is to be triturated with water to get thick paste which is applied to scorpion bite spot.

Conjunctivitis; the seed coat is removed by heating it on the cow dung cake and cotyledons are separated, these are ground with little water to get the juice: 4-5 drops of the juice are poured in the eyes with the leaves of Aare.

*Terminalia chebula* Retz. (Combretaceae); CRI 8582; Karakkaya; Halela/Harad; fruits; cancer; all the ingredients (fruit rind of Karakkaya, stem bark of munaga, stem bark of ganuga, root of jilledu and tellagalijeru (entire plant), sonth and salt) in equal quantity are ground to powder: 2-3 g of the powder is to be taken orally twice a day for 30 days.

*Thevetia peruviana* (Pers.) Schum. (Apocynaceae); CRI 8523; Pachchoganeru; Pilakaner; Leaves; Antidote for snake bite; leaves of Pilakaner with root bark of Madar root, salt of roots of lotus are ground and made into pills of the size of soap nut seed. One pill is given orally to the victim of snake-bite for 5-6 times.

*Trachyspermum ammi* (Linn.) Sprague (Apiaceae); CRI 8579; Vaamu; Ajowan, ajwain; seeds; Diarrhoea: 50 g seeds are to be fried and boiled with water and filtered and concentrated. This preparation is made into pills of Pea size and given orally for diarrhoea.

## Discussion

The great potential of ethno-botanical knowledge as a key resource for developing new kinds of pharmaceuticals and other chemicals of industrial use has been increasingly realized. In the present study some traditional therapeutic methods employed by the natives of Atmakur forest division of Kurnool district have been discussed. Out of 125 taxa of medicinal plants collected and identified from the study area 45 are used locally in folk medicines by local tribals and other ethnic people viz, Chenchus, Erukas, Koyas and Telaga agriculturists etc. for the treatment of various common ailments; including, cough & cold, fever, diarrhoea and dysentery, ulcers, skin diseases, cardiac troubles and rheumatic arthritis. In many recipes most wordily used local names of the ingredients have been mentioned and efforts have been made to botanically identify them. Although, they do not have as high as modern medicines, these folk drugs are relatively inexpensive and easily available to locals at their door steps.

The data on folk medicinal uses have been compared with recent available literature (Vedavathy, 1986; Chetty & Rao, 1989; Hemadari, 1987, 1988, 1991; Vijay Kumar & Pullaiah, 1998; Nagaraju & Rao, 1990; Balaji Rao *et al.*, 1995; Gupta, *et al.* 1997, 2005, 2007 & 2008; Surya Narayana, 1996; Kapoor & Kapoor, 1993; and Jain, 1991 and found that most of the folk medicinal plants are duly reported in the literature, however, their mode of application, ingredients and parts used are different. Therefore, the present study represents contemporary folk uses of medicinal plants of the area investigated. It would, therefore be worth while to subject all these folk drugs to scientific testing in the context of claims reported herein. It is likely that



through such investigations new drugs of natural origin may be discovered for treatment of many of the diseases for which there is no satisfactory cure in modern medicine, thus far.

## Acknowledgements

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# Pharmaco-Botanical Studies on the Roots of *Withania somnifera* Dunal.

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## Abstract

Pharmaco-botanical studies on the roots of *Withania somnifera* Dunal. has been carried out to lay down standards for the genuine drug. The diagnostic characters of dried roots in microscopy reveal secondary structure of dicotyledonous structure wherein fibres are absent, calcium oxalate crystals microsphenoid; medullary rays uni to triseriate; parenchymatisation of lignified xylem tissues except xylem vessels; formation of interxylary phloem. Other parameters studied include physico-chemical constants, fluorescence behavior, U.V. Spectrophotometry, Chromatography etc.

**Key Words:** *Withania somnifera* Dunal., Pharmacognosy, Drug standardisation, Asgand.

## Introduction

*Withania somnifera* Dunal. (Family-Solanaceae ) is botanical source of 'Asgand' or 'Ashvagandha' which has been used in Unani System of Medicine since a long time. It is an official drug and one of the ingredient of a number of important Unani classical and patent formulations. *W. somnifera* Dunal. is indicated as abortifacient, alexipharmica, alternative, aphrodisiac, astringent, deobstruent, diuretic, hypnotic and sedative, narcotic, pungent, restorative and tonic. It is medicinally used in carbuncles, cough, debility of old age, dropsy, emaciation of children, general weakness, promotes urination, functional obstruction of body, rheumatism, scrofula, senile decay, ulcers and vulnerary treatment. It is an evergreen perennial undershrub. The generic name of the plant is supposed to be in honour of H. Withan, a British geologist and writer on Paleontobotany, in the nineteenth century. The drug finds mention in various literature of Unani System of Medicine. The tender shoots of the plant are also used as a vegetable and seeds are used as masticatory. The green berries are bruised and rubbed on ringworm in human beings and on animal sores and girth-galls in horses. They are also employed to curdle milk. The drug is substituted with *W. coagulans* Dunal. (Kirtikar and Basu, 1933; Chopra *et al.*, 1949; Aiyer and Kolamal, 1953-66; Nadkarni, 1954; Anonymous, 1976, 1983).

## Methodology

Drug samples were collected from different places with a view to find out any significant difference present within the same species. Hand sections were stained and mounted in Canada balsam for anatomical studies. Lignification on smoothed cross-surfaces was studied with phloroglucinol-HCl. For studying powder, Jackson and Snowdon (1968) was followed. To determine physico-chemical constants, Indian Pharmacopoeia (Anonymous, 1966) was consulted and for fluorescence study schedules mentioned by Trease and Evans (1972) were followed. Colours were named by consulting Rayner (1970). Standard prescribed procedures for

Histochemical studies (Johanson, 1940; Youngken, 1951; Cromwell, 1955, Trease and Evans, 1978), Organic group detection (Robinson, 1963), Elemental quantitation (Khan, *et. al.*, 1985), U.V. Spectrophotometry (Willard, *et. al.*, 1965) and Chromatography (Shellard, 1968, Stahl, 1969, Smith and Feinberg, 1972) were adopted.

## Systematics

*Family: Solanaceae* Juss. Lindl. Veg. Kingd. 618, Endl. Gen. 662. Miers, Illustr. S. Amer. Pl. 1849-1857, Gen. Pl. II: 882.

The family comprises about 20 genera and 2,000 species in tropical and temperate regions of the world with the prime centres in central and South America. In India, this family is spread over 15 genera and 88 species, mostly in the Himalayas and the mountains of Southern India.

*Genus: Withania* Pauquy. Diss. de Bellad. Paris, 1824, ex Endl. Gen. 666; Gen. Pl. II: 893, FBI 4:239.

The genus consists of ten species which are distributed in South America, South Africa, Canaries and Mediterranean to India. In India, 2 species are distributed in drier regions.

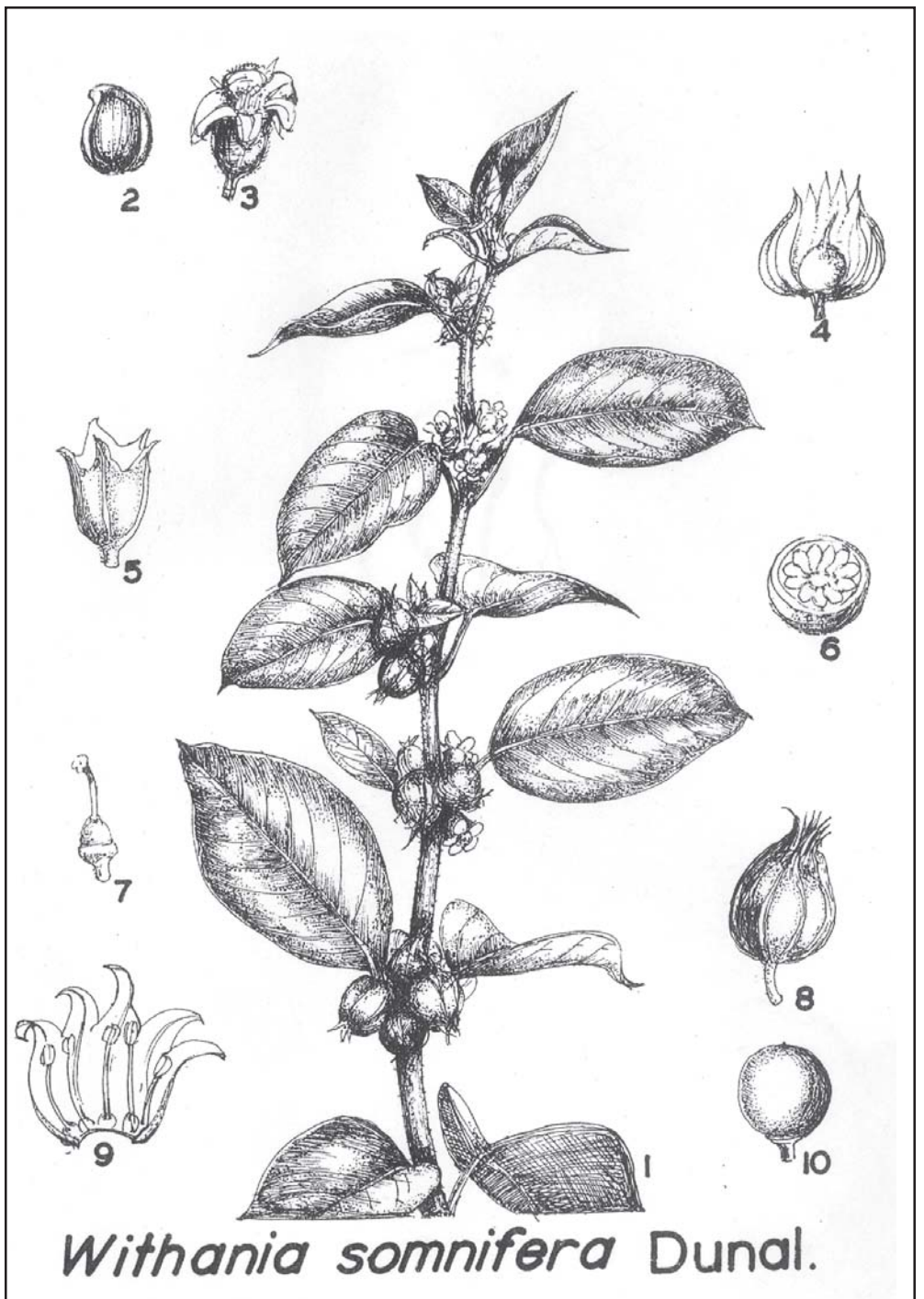
*W. somnifera* (Linn) Dunal. In DC. Prodr. 13: 453. 1852; FBI 4:239; FUGP 2:128, *Physalis somnifera* Linn. Sp. Pl. 182. 1753, *P. flexuosa* Linn. Sp. Pl. 182. 1753.

*Synonyms: Physalis flexuosa* Linn, *P. somnifera* Linn.

An erect much branched, evergreen, perennial, undershrub with glutinous cells sap. Roots fairly long, stem very short, stellate hairy often with hoary mealy exteremites. Leaves simple, short petioled, alternate, or in sub-opposite pairs at a node, exstipulate, elliptic-oblong or ovate rounded with an acute decurrent base. Flowers greenish or yellowish, small, sessile or short pedicellate, axillary fascicles or in crowded fascicles of two to five. Calyx gamosepelous, five or six lobed, campanulate, stellate-hairy, lobes ovate-triangular, acute, corolla small, gamopetalous, campanulate, three to six lobed to more than half way down, ovate, stellate, hairy outside. Stamens five, inserted on the tube of the corolla near its base, anthers broadly elliptic oblong and dehiscing longitudinally, pistil bicarpellary, many ovuled, syncarpous, ovary ovate-globose, style glabrous, linear filiform and stigma bifid. Fruit berry, globose, enclosed within the enlarged calyx, stellate hairy, seed very many and discoid (Plate I).

*Flowering and Fruiting:* January to September.

*Distribution:* It is distributed throughout the drier subtropical regions of India. In global distribution it is reported from Arabia, Mediterranean regions, Pakistan to Persia, the Canaries and to tropical and South Africa (Chopra *et al.*, 1958, Sharma and Kachroo, 1983).



**Plate-I. Habit and Taxonomic Details of Drug Plant (*Withania somnifera* Dunal.)**

1. Flowering and fruiting branch, 2. Seed, 3. Opened flower, 4. Half the calyx cut of ovary to show the berry enclosed in calyx, 5. Calyx, 6. Berry in transection, 7. Gynoecium, 8. Fruit enclosed in large calyx, 9. Corolla and androecium and 10. Berry.

## Observations

### *Organoleptic Characteristics*

- A. The drug consists of dried and matured tap roots which are more or less straight and buff to grey yellow in colour. The roots are cut into pieces of varying length of 4.0 – 10.5 cm. The diameter of the roots vary with the age, ranging from 0.5 – 1.5 cm. The surface of the roots are smooth except a few occasional lenticels and longitudinal wrinkles. Some of the pieces of roots bear card like secondary roots or parts thereof. The root pieces which are cut with stem base bear root crown and remnants of stems (Plate II). The roots break with short and starchy fracture. The broken ends exhibit white transverse plane with scattered pores on them. The roots are mucilaginous, acrid and bitter in taste having no characteristic odour.
- B. *Powdered Drug*: The powdered drug is yellowish brown in colour with mucilaginous, acrid and bitter taste. It has no characteristic odour.

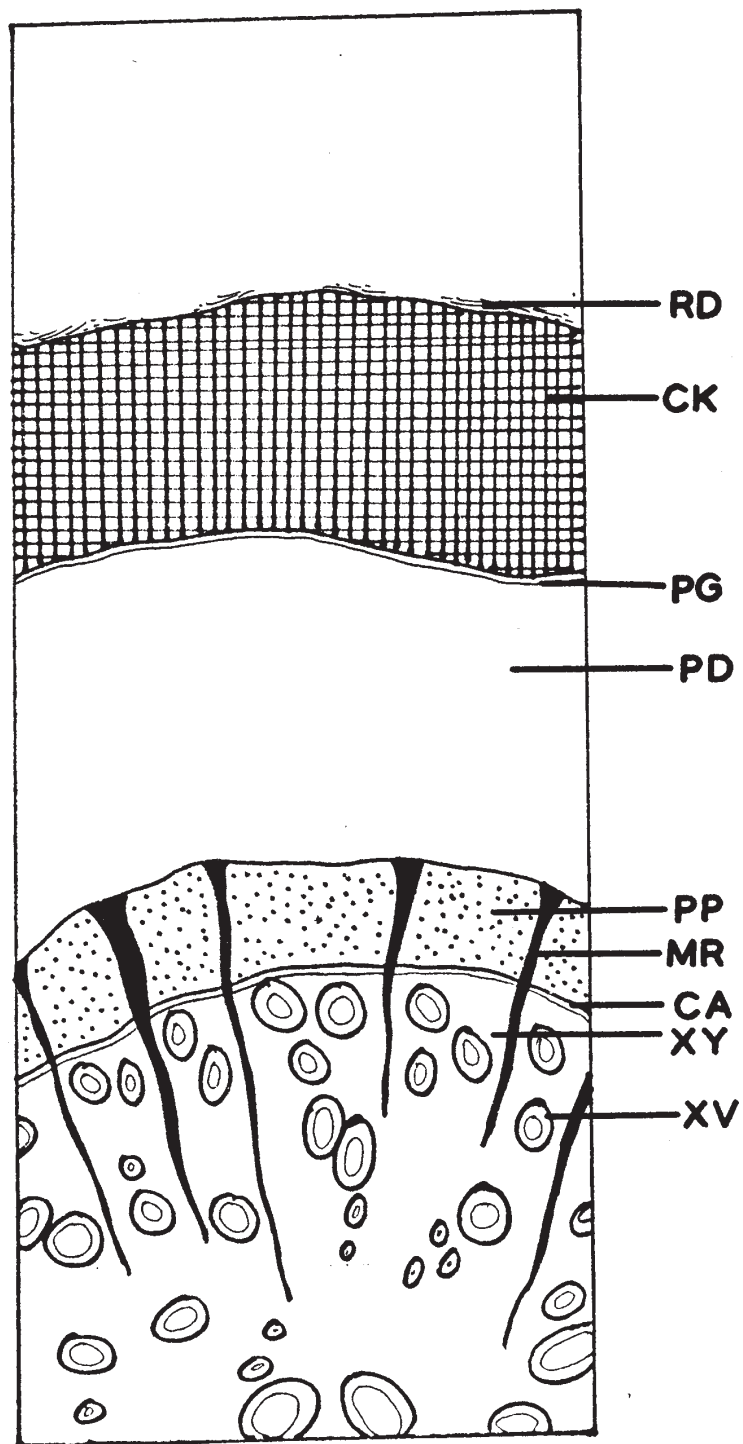
### *Micro-Morphological Characteristics*

- A. The transverse section of root is almost circular in outline (Plate III). The outer most layer is phellem which is composed of eight to twelve layers of thin walled, square to rectangular cells. These cells are generally crushed or exfoliated towards the outermost region. The phellem is followed by phellogen formed of two to four rows of thin walled tangentially elongated to oval parenchymatous



**Plate-II. Macroscopic Feature of Drug (Dried roots of *Withania somnifera* Dunal.)**





**Plate-III. Diagrammatic Representation of Transection of Drug (Dried roots of *Withania somnifera* Dunal.) 25 X**

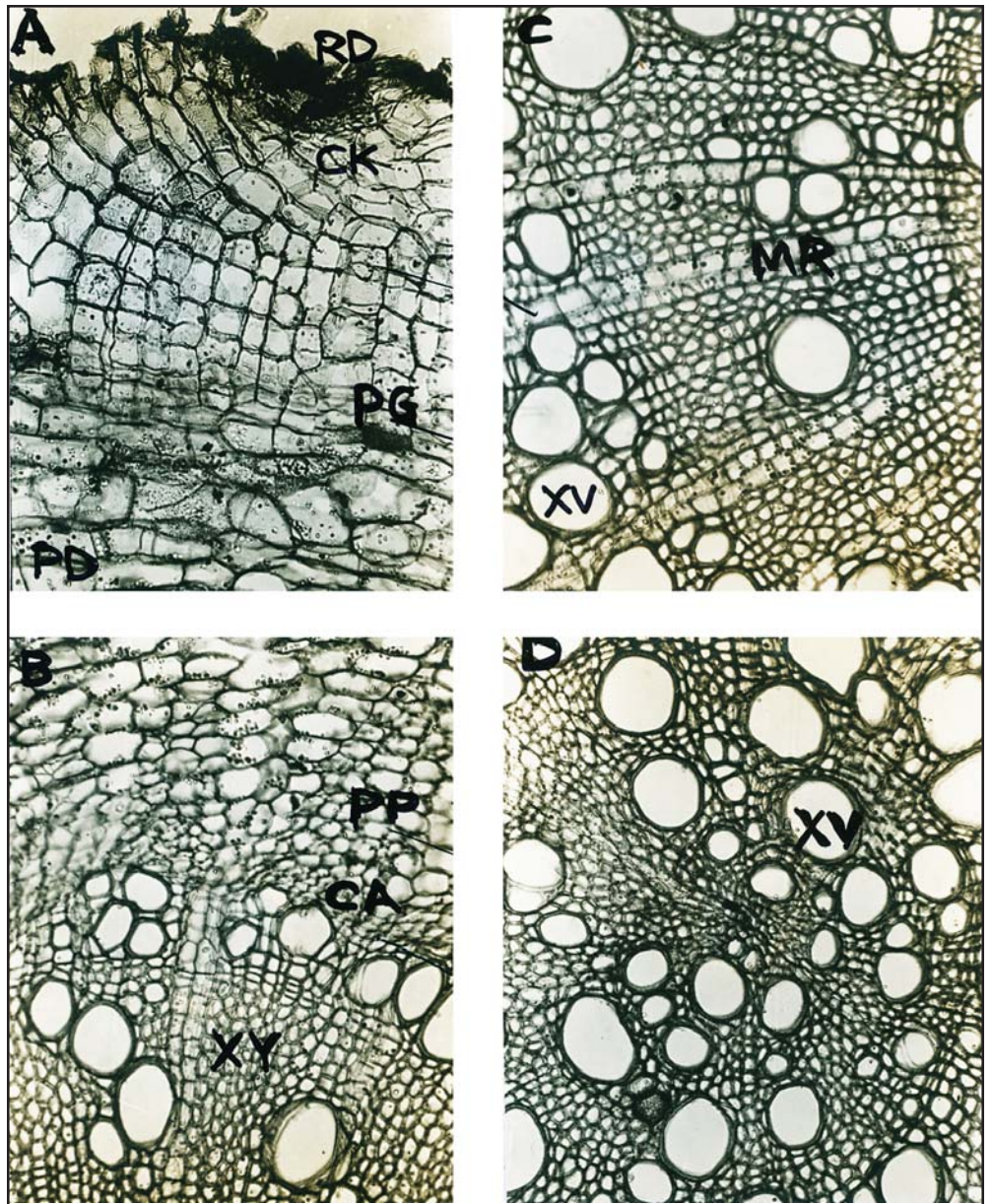
Abbreviations: CA-Cambium, CK-Phellem, MR- Medullary ray, PD-Phelloderm, PG-Phellogen, PP-Secondary phloem, RD- Crushed phellem, XV-Xylem vessels and XY- Secondary Xylem.



cells packed with starch grains (Plate IV A). The starches grains are mostly simple and ovoid to circular in shape, but reniform or characteristically club shaped starch grains are also present. The hilum is fissured and eccentric. The larger starch grains have striations. There are also occasional compound starch grains with two to three components. Several phelloderm cells are found compactly filled with micro-sphenoidal crystals of calcium-oxalate. The minute crystals are mostly triangular in shape. Secondary phloem consists of phloem parenchyma, sieve tubes associated with companion cells and traversed by multiseriate medullary rays. Phloem fibres are absent. The phloem parenchyma forms the major part of phloem where as sieve tubes and companion cells are not very prominent and also few in number. Some of the cells in this region are also filled with starch grains and microspenoidal crystals identical in nature to that of phelloderm region. The cambium is in the form of distinct strip composed of one or two layers of narrow thin walled tangentially elongated rectangular cells. Xylem region occupies the major and central part of the root which is composed of secondary xylem and medullary rays (Plate IV B, C). The secondary xylem consists of xylem vessels, tracheids, fibres, tracheidal fibres and parenchyma intercepted by medullary rays. The vessels are scattered and occur either singly or in groups of two to four. These are short wide, drum shaped, tailed at both the ends or long, thickwalled with tapering ends and show mostly bordered pits with slit like opening. Some of the vessels also have spiral and annular thickening. The tracheids have pitted thickening with tapering ends. The vessels and tracheids increase in number with the maturity of root. The fibres are few in number thickwalled and have pointed or bifurcated ends with oblique elliptical simple pits. The tracheidal fibres are pitted, elongated and septate or non-septate. The xylem parenchyma cells are fairly large and rectangular in shape. These cells contain starch grains and microspenoidal crystals identical to those in the phelloderm cells. All the cellular elements of xylem region are lignified but in some of the matured roots the lignified tissues of xylem region except vessels and few neighbouring tracheids are delignified due to the parenchymatisation. In this process, some of the portion of xylem parenchyma adjacent to the vessels also gets delignified and becomes meristematic in nature and form intraxylary phloem strands. This parenchymatisation of cellular elements of xylem do not takes place in daughter roots. Medullary rays are numerous and uniseriate to tri-seriate. Most of them extending from the centre upto phelloderm. In xylem region ray cells are thin walled, radially elongated while at the peripheral portion of xylem some of the ray cells are moderately thick walled. The ray cells also contain starch grains similar to those of phelloderm cells (Plate IV B, C, D).

The microscopical measurements of individual cells of different tissues and cells contents in microns are give below (Table 1).

- B. *Powdered Drug*: The powdered drug shows the presence of occasional fragments of phellem cells composed of thin walls and of rectangular shape, abundant



**Plate-IV. Photomicrographs of Transection of Drug (Dried roots of *Withania somnifera* Dunal.)**

Transection of drug showing a portion of –

- A. Periderm (phellem, phellogen and phelloderm), 600 X.
- B. Phelloderm, cambium and secondary xylem, 600 X.
- C. Secondary xylem and medullary ray, 600 X.
- D. Secondary xylem, 600 X.

**Abbreviations:** CA-Cambium, CK-Phellem, MR- Medullary ray, PD-Phelloderm, PG-Phellogen, PP-Secondary phloem, RD- Crushed phellem, XV-Xylem vessels and XY- Secondary Xylem.

**Table-1. Dimensional data of Cellular elements in transactions and cell contents.**

Sl.No.	Cellular Elements/Cell Contents	Measurements in microns
1.	Phellem cells	30.0-92.2 x 30.4-78.6
2.	Phellogen cells	22.5-60.8 x 18.6-36.0
3.	Phelloderm cells	52.0-156.2 x 26.2-108.4
4.	Phloem parenchyma cells	13.5-40.0 x 9.0-24.0
5.	Cambium cells	12.2-20.0 x 4.5-10.2
6.	Xylem vessels	20.0-140.2 x 16.2-96.8
7.	Medullary ray cells	12.0-40.8 x 20.0-48.0
8.	Starch grains	6.0-12.4 (D)
9.	Microsphenoidal crystals of calcium oxalate	8.2-10.0 (D)

Abbreviation: 'D' – Diameter

parenchymatous cells of phelloderm, phloem and medullary ray. Some of these are packed with starch grains or microsphenoidal crystals of calcium oxalate, very occasional fragments of sieve tissue composed of small elongated elements and vessels in groups, mostly fragmented showing bordered pit or spiral or annular thickening. Lignified xylem parenchyma cells are also scattered and a few fragmented patches are associate with the vessels and fibres. A few elements of trecheids with pitted thickening and fibres having pointed or bifurcated ends are also present. Abundantly present starch grains are generally simple and have characteristic markings of fissured and eccentric hilum. Starch grains are varying in shape and sizes and are ovoid to circular or reniform or club shaped. Compound starch grains are with two to three or more components. Scattered microsphenoidal crystals of calcium oxalate, which are not very abundant as most of the crystals are found enclosed in parenchymatous cells.

### *Histochemistry*

- A. *Micro-Chemical Tests and Behaviour of specific reagents towards Plant/Drug Tissues:* Observations and results pertaining to micro-chemical tests and behaviour of specific reagent towards plant tissues are presented in Table-2.
- B. *Organic Groups of Chemical Constituents:* The extracts of the drug were tested for presence of different organic groups and results are presented in Table-3.

**Table-2. Micro-chemical Tests and behaviour of specific reagents towards plant tissues and cells contents.**

Sl. No.	Reagent	Test for	Inference	Histological zone/cell contents responded
1.	Dragendorff's reagent	Alkaloids	+	Cells of phelloderm, parenchymatous cells of phloem, medullary rays
2.	Marme's reagent	Alkaloids	+	Same as above.
3.	Wagner's reagent	Alkaloids	+	Same as above.
4.	Potassium hydroxide solution (5% w/v)	Anthocynin	–	Not Responded
5.	Sulphuric acid (66% v/v)	Anthocynin	–	Not Responded
6.	Acetic acid	Calcium oxalate	+	Microsphenoidal calcium oxalate crystals.
7.	Potassium hydroxide solution (5% v/v ) + Hydrochloric acid	Calcium oxalate	+	Same as above.
8.	Sulphuric acid	Calcium oxalate	+	Same as above.
9.	Kedde reagent	Cardiac glycoside	–	Not Responded
10.	Iodine Solution followed by Sulphuric acid	Cellulose	+	Cells of phelloderm, a few cells of phloem xylem parenchyma and medullary rays.
11.	Sudan III	Fixed oil and fats	–	Not Responded
12.	Chlor-zinc-Iodine Solution	Latex	–	Not Responded
13.	Aniline sulphate Solution followed by Sulphuric acid	Lignin	+	Some of the Cells of phellem, xylem, vessels and parenchymatous cells of xylem.
14.	Phloroglucinol HCl	Lignin	+	Same as above
15.	Lugol's solution	Protein	+	Most of the cells of phelloderm, phloem and xylem.
16.	Millon's reagent	Protein	+	Same as above
17.	Picric acid	Protein	+	Same as above
18.	Heating with KOH (5% w/v) + H <sub>2</sub> SO <sub>4</sub>	Suberin	+	Occasional cells of phellem
19.	Sudan III	Suberin	+	Same as above
20.	Weak Iodine solution	Starch	+	Starch grains
21.	Potassium hydroxide solution (5% w/v)	Starch	+	Same as above
22.	Sulphuric acid	Starch	+	Same as above

Indications: - Absence and '+' presence of constituent.



**Table-3. Major Group of Organic Chemical Constituents of Drug.**

Sl. No.	Organic Groups of Chemical Constituents	Reagents/Tests	Inference
1.	Alkaloid	Dragendorff's and Mayer's reagents	+
2.	Anthraquinone	Borntrager reaction	–
3.	Coumarin	Alcoholic potassium hydroxide	+
4.	Flavonoid	Shinoda reaction	–
5.	Glycoside	Mollisch's test	–
6.	Protein	Xanthoprotein test	+
7.	Resin	Ferric chloride reagent	+
8.	Saponin	Liebermann-Burchard reaction	–
9.	Steroid	Salkowski reaction	+
10.	Tannin	Gelation test	–

*Identity, Purity & Strength*

- A. *Physico-Chemical Constants*: The analytical values in respect of physico-chemical constant of drug were established and results are reported in Table-4.
- B. *Medicinal Inorganic Elements*: The quantitative data in respect of medicinal inorganic elements detected in drug are presented in Table-5.

**Table-4. Analytical Values of Physico-chemical Constants**

Sl.No.	Physico-Chemical Constants	Analytical values
1.	Moisture content, % w/w	7.0
2.	pH	5.0
3.	Crude fibre, % w/w	7.5
4.	Total Ash, % w/w	7.8
5.	Acid insoluble ash, % w/w	0.9
6.	Alcohol soluble extractive % w/w	7.2
7.	Water soluble extractive % w/w	6.1
8.	Total Alkaloids, % v/w	0.6

**Table-5. Quantitative estimation of Medicinal Inorganic Elements.**

Sl.No.	Physico-Chemical Constants	Analytical valuesMg/g of ash
1.	Cadmium	0.0016
2.	Calcium	1.2860
3.	Copper	0.0731
4.	Iron	0.2180
5.	Magnesium	0.1900
6.	Manganese	0.0038
7.	Nickel	0.1262
8.	Potassium	6.8722
9.	Sodium	15.0801
10.	Zinc	0.0026

### *Fluorescence & Spectroscopy*

- A. *Fluorescence Characteristic of Powdered drug under Ultra-Violet Light:* Powdered drug was screened for fluorescence characteristic with or without chemical treatment. The observations pertaining to their colour in daylight and under ultra-violet light were noticed and are presented in Table-6.

**Table-6. Fluorescence Characteristic of Powdered Drug under Ultra-Violet Light.**

Sl. No.	Treatments	Colour in day light	Nature of colour in fluorescence
1.	Powder as such	White	Light buff
2.	Powder with		
	i. Carbon tetra chloride	Colourless	Colourless
	ii. Ethyl acetate	Colourless	Colourless
	iii. Hydrochloric acid	Yellowish green	Light yellow
	iv. Nitric acid + water	Light green	Colourless
	v. Sodium hydroxide + methanol	Light yellow	Colourless
	vi. Sodium hydroxide + water	Greenish yellow	Yellow tinge
	vii. Sulphuric acid + water	Yellowish green	Light brown
	viii. Buffer- pH 5	Light green	Whitish
	ix. Buffer- pH 7	Greenish yellow	Light buff
	x. Buffer- pH 9	Light green	Yellow tinge

- B. *Ultra-Violet Spectroscopy*: The data related to Ultra-Violet Spectrophotometric characteristics as computed in Table-7.

### Chromatography

- A. *Paper Chromatography*: The amino acids and free sugars were resolved and detected by paper chromatographic techniques. The comparison of R<sub>f</sub> Values of reference standards of different amino acids and free sugars confirms the presence of –
- (i) Amino Acids – DL-3:4- Dihydroxyphenyl-alanine, L-hydroxyproline, L-proline, DL- Serine and DL- Tryptophan
  - (ii) Free Sugars – Raffinose and sucrose.
- B. *Thin-Layer Chromatography*: Best separation for TLC fingerprinting were obtained by using different layers and solvent systems. Inferences are shown in Table-8.

### Discussion

There are a number of the reports on the pharmacognosy of *Withania somnifera* Dunal, but the results of the different workers are contrary with each other. Datta and Mukerjee (1950), Mukerjee (1953) and Anonymous (1955, 1966) reported the monographs on drug, but they did not describe the presence of microsphenoid crystals of calcium oxalate, parenchymatisation of xylem elements and formation of

**Table-7. Ultra-Violet Spectrophotometer characteristic of drugs.**

Sl.No.	Specifications	Data
1.	Tincture dilution ml/ml	0.00267
2.	Maximum absorption peak	1.145 & 0.195
3.	I Maxima at, nm	206 & 270

**Table-8. TLC fingerprinting data**

Sl.No.	Technical details	I	II
1.	Layer	Silica gel GF, Buffered layer, NaOH, 0.1N	Silica gel GF, Buffered layer, KOH, 0.5N
2.	Solvent system	Methanol	Methanol
3.	No. of spots	03	04
4.	h R <sub>f</sub> Values of visualised spots	23.7, 53.3 and 90.3	14.0, 22.4, 57.3 and 89.5



interxylary phloem strands. Prasad *et al* (1959) studied the histology of the drug and compared it with *Withania coagulans* Dunal. The study concluded with the remark that both the species have close similarity between the roots except few anatomical features. Shah *et al*. (1959) also studied the drug, but their findings did not indicate the parenchymatisation of xylem and formation of interxylary phloem. Aiyer and Kolamal (1953-66) carried out the work on this drug but the studies are contrary to the fact of occurrence of the parenchymatisation of xylem and interxylary phloem in the present findings. Dhalla *et al* (1961) also carried the work on drug and studied the pharmacognosy of wild form of *W. somnifera* Dunal. and the cultivated form of *W. somnifera* Dunal so called *W. ashwagandha* Kaul. They observed the difference in both the varieties but did not mention occurrence of parenchymatisation of xylem and interxylary phloem. However, present studies are in agreement with the findings of Prasad *et al* (1959) and confirm their observations.

### Acknowledgement

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# Use of Finger Printing and Marker Compounds for Identification and Standardisation in *Luffa cylindrica* (L.) M. Roem. (Whole Plant)

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## Abstract

For analysis of herbal raw drugs, single chemical entities "marker compound" may be used as potency standard in High Performance Thin Layer Chromatography analysis. Using well characterized marker compound, the raw drug whole plant of *Luffa cylindrica* (L.) M. Roem. Syn. *Luffa aegyptiaca* Mill., (Cucurbitaceae) was standardized. HPTLC analysis for herbal plants may provide additional information in the form of "chromatographic finger prints". The whole plant of *Luffa cylindrica* contains many chemical constituents and it has many medicinal usage in the Indian System of Medicine. An intent of this paper is to illustrate how, in certain instance, chromatographic finger printing and marker can be used to make consistent herbal medicinal plants. The present study deals with the standardization of the plant in aspect of essential minerals, toxic elements and HPTLC finger printing.

**Key Words:** *Luffa cylindrica*, Toxic elements, Essential minerals, HPTLC finger print, Oleanolic acid.

## Introduction

The plant *Luffa cylindrica* (L.) M. Roem. Syn. *Luffa aegyptiaca* Mill. (Mozhukupir-kankai), belongs to the Cucurbitaceae family. It grows throughout India, wild in wasterlands especially in coastal areas. The plant is large climbers, fruit smooth, cylindrical, usually 20-50 cm. long, rarely reaching 250 cm.; seed narrowly weiged, blackish (Anonymous, 1962). (The plant has the medicinal properties such as tonic, emetic, diuretic and purgative. It is used internally for rheumatism, backache, internal hemorrhage, chest pains as well as hemorrhoids. The fruits are anthelmintic, carminative, purgative, laxative, depurative, emollient, expectorant, tonic and galactagogue and useful in fever, syphilis, tumors, bronchitis, splenopathy, dropsy, nephritis, chronic bronchitis, lung complaints, putrid fevers, jaundice and leprosy. The fibro-vascular of the ripe fruits affords a sponge widely used for scrubbing and cleaning purposes. The chemical constituents of the plant are apigenin, oleanolic acid,  $\beta$ -sitosterol and uncharacterized saponin, methyl oleanolate, glucose and arabinose from male flowers. Seed oil contains palmitic, stearic, oleic, linolenic, linoleic, margaric and arachidonic acids (yoganarsimhan, 2000). The following compounds machaerinic acid lactone as its acetate and apigenin, oleanolic acid bearing saponin, 21 $\beta$ -hydroxyoleanolic acid, 3-O- $\beta$ -D-glucopyranosylmaslinic acid, 3-O- $\beta$ -D-glucosyl-2 $\alpha$ -hydroxygypsogenin, lucyin A, lucyoside N have isolated from leaves. The roots of the mature plants contain an acidic pentacyclic triterpene, bryonolic acid. The bryonolic acid shows antiallergic activity and anti-inflammatory activities in experimental animals (Khare, 2007). The seed contains aminoacids- arginine, glutamic acid serine, cucurbitacin B and tyrosine (Anonymous, 2004).

## Materials and Methods

### *Collection of Plant Material*

The whole plant of *L.cylindrica* was collected from Chennai and identified with the help of by botanist and a dried specimen deposited in the Herbarium of RRIUM, Chennai.

### *Chemical parameters*

Powder of the dried whole plant of *L.cylindrica* was used for chemical analysis. Physico-chemical studies like total ash, acid insoluble ash, water soluble ash, alcohol and water solubility, loss on drying at 105°C and successive extractive values using Soxhlet extraction method were carried out as per the WHO guidelines (Anonymous, 1998). Preliminary phytochemical tests were done as per the standard methods (Lala, 1993; Harborne, 1973; Overtone, 1963). The plate was derivatised using vanillin-sulphuric acid. Then heated at 105° till colored spots appeared.

## Toxic metals and minerals analysis

### *Instrument*

Perkin Elmer-400 model atomic absorption spectroscopy (AAS) was used in the analysis of toxic elements and essential minerals. The operating procedure were slit width: 0.5 mm, current: 3.0mA, carrier gas: argon, flow rate: 2 ml/3min.

### *Wet digestion of sample AAS*

Heavy metal analysis was carried out in Atomic Absorption Spectroscopy by the following method<sup>9</sup>.

Accurately weighed 500 mg of air-dried powder was taken in round bottom flask. To this, 5 ml of conc. nitric acid was added and refluxed for half an hour in a hot plate at 60-80°. It was cooled, added 5 ml of conc. nitric acid and warmed on water bath. 2 ml of 30% hydrogen peroxide solution was added to the above mixture and warmed till obtained the clear solution. Then it was cooled, filtered through whatmann-42 filter paper, diluted with deionised water and made upto 100 ml in volumetric flask.

## HPTLC analysis

### *Preparation of extract for HPTLC*

The collected whole plant of *L.cylindrica* was air dried, coarsely powdered and stored in air tight container at 27°. The powder drug (2 g) was extracted with

chloroform, concentrated and made up to 10 ml in a volumetric flask. This solution was used for the HPTLC analysis.

#### *Preparation of the standard solution*

10 mg of oleanolic acid was weighed in volumetric flask, dissolved in chloroform and made upto 10 ml.

The HPTLC finger print profile of chloroform extract of *L.cylindrica* with marker compound such as oleanolic acid was performed using precoated silica gel 60 F<sub>254</sub> TLC plate (E.merck) as obsobent and employing CAMAG Linomat IV automatic sample spotter. HPTLC studies of chloroform extract were carried out using the solvent system of chloroform: methanol (9.5:0.5). After drying the plate was scanned through CAMAG TLC scanner (030618) with CATS V 4.06 software at a wavelength of 254 nm using deuterium lamp. The plate was derivatised using vanillin-sulphuric acid and heated at 105° till colored spots appeared (Igon, 1969; Sethi, 1996; wagner and Blatt, 1984).

#### *UV-spectrum*

The whole plant was extracted in chloroform and HPTLC was run along with the marker compound oleanolic acid. The UV spectrum was recorded for each spot of the sample as well as oleanolic acid. The superimposability of UV spectrum was tested for the presence or absence of the marker compound in the plant extract.

### **Results and Discussion**

Physico-chemical data of the whole plant of *L.cylindrica* (L.) M. Roem. are tabulated in table-1. Quantitative standards revealed that the ash content was 8.48% and negligible amount of siliceous matter detected from acid insoluble ash in the drug. The content of water soluble extractive 12.64% indicates the presence of inorganic contents. The alcohol soluble extractive value (8.52%) shows the extraction of polar constituents like sugars, phenols, tannins, steroids, glycosides, quinone and flavonoids from the whole plant. The results were shown in table-1. Phytochemical screening of *L.cylindrica* (L.) Roem. whole plant shows the presence of flavone, quinone, phenol, tannin, glycoside, steroids, terpenoid, amino acids and sugar in ethyl acetate and alcohol extract, whereas steroids, quinone are found in petroleum ether and chloroform extracts.

Excessive levels of nonessential mineral contaminants such as arsenic, cadmium, lead and mercury can also affect the absorption and efficient usage of minerals in the body. Minerals are elements required for human body for the several purposes like formation of blood, bones and teeth even other tissues, osmoregulation of the body fluids, control of physico-chemical process etc. Cadmium acts like a classical

**Table-1. Physico-chemical parameters of the whole plant of *L.cylindrical* (L.) M. Roem**

Sl.No.	Parameters	Results (n=3) $\pm$ S.D
1.	% Loss on drying at 105°C	5.83 $\pm$ 0.04
2.	% Ash	8.48 $\pm$ 0.14
3.	% Water soluble ash	3.53 $\pm$ 0.06
4.	% Acid insoluble ash	0.56 $\pm$ 0.01
5.	% Extractive values: a. Petroleum ether b. Chloroform c. Ethyl acetate d. Ethanol	2.15 $\pm$ 0.08 0.78 $\pm$ 0.03 0.29 $\pm$ 0.11 8.41 $\pm$ 0.06
6.	% Solubility at room temperature. a. Ethanol b. Water	8.52 $\pm$ 0.09 12.64 $\pm$ 0.13
7.	Alkalinity of water soluble ash (cc of 0.1 N HCl/g)	1.30 $\pm$ 0.03

*All values are mean of three determinations*

stress agent. It has also been implicated in learning disabilities. Unlike lead, which has a short half-life in human tissue. The essential minerals can protect the body from the effects of toxic elements. The toxic elements like lead, cadmium, arsenic and mercury were present within the permissible limit, so this drug have non toxic nature (Table 2).

The highest content of calcium in the drug (8.1103) compare to other minerals, it plays important role in the formation of strong bones and teeth, controlling blood clotting mechanisms and regulate the excitability of nerves and muscles. Lack of calcium can cause rickets, back pain, osteoporosis, osteomalacia, insomnia, irritability, nervousness, tension, uneven heartbeat, indigestion, stomach cramps and spasms, constipation, premenstrual tension and cramping of the uterus. Copper (0.2142) aids the development of brain, bone, nerve and connective tissue. Lack of copper can cause porous bones, loss of hair, demyelination, heart damage and anemia. Content of iron (3.3041) is needed to make hemoglobin, the substance in the red blood cells, which carries oxygen in the blood. It aids resistance to infection. Shortage of iron can lead to weakness, shortage of breath, excessive fatigue, depression, mental confusion and poor memory. Manganese (0.1596) is need for numerous enzymes and for utilizing fats, it is also necessary for bone growth, reproduction, lipid metabolism and moderation of nervous irritability. Zinc (0.8316) is needed for

**Table-2. Toxic elements analysis of whole plant of *L.cylindrica* (L.) M. Roem**

Sl.No.	Parameters	Value (ppm)
1.	Lead	0.2878
2.	Cadmium	0.0038
3.	Arsenic	0.0123
4.	Mercury	0.0121

*All values are mean of three determinations*

the health and maintenance of bones, muscles, eyes, organs and sperm and acts as a co-factor in over 90 enzymes and it is needed in the liver for the conversion of carotene to plasma Vitamin A. Lack of zinc in women can lead to difficulties with parturition (Childbirth). Chromium is need for regulation of the glucose tolerance factor in combination with nicotinic acid and some proteins. Deficiencies are believed to be a factor in arteriosclerosis and hypertension and possibly in diabetes and cataract. Lack of chromium is known to cause serious eye abnormalities. Cobalt (0.3524) is essential to humans as part of the structure of vitamin B<sub>12</sub>. Lack of vitamin B<sub>12</sub> can cause pernicious anemia. Nickel (0.6886) is needed in the heart muscle, liver and kidneys. It is involved in hormone, lipid and membrane metabolism. Significant concentrations are found in DNA and RNA and it may contribute to the stabilization of nucleic acids. Recent research indicates that adequate dietary intake of essential minerals and trace minerals may prevent and reduce affects of poisoning by environmental pollutants and enhance the ability to work and learn. They can protect the body from the effects of toxic minerals. The results were shown in table-3.

HPTLC finger print profile of the chloroform extract of whole plant *L.cylindrica* (L.) M. Roem. shows 13 peaks of which peak at R<sub>f</sub> 0.90 was the major peak whereas

**Table-3. Essential mineral analysis of whole plant of *L.cylindrica***

Sl.No.	Parameters	Value (ppm)
1.	Calcium	8.1103
2.	Nickel	0.6886
3.	Chromium	0.0864
4.	Zinc	0.8316
5.	Manganese	0.1596
6.	Cobalt	0.3524
7.	Iron	3.3041
8.	Copper	0.2142

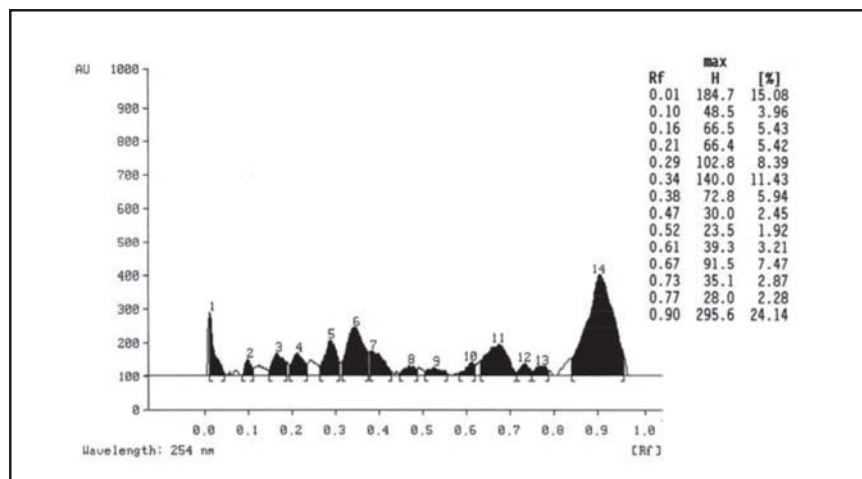
*All values are mean of three determinations*



peaks at  $R_f$  0.10, 0.16, 0.21, 0.29, 0.34, 0.38, 0.47, 0.52, 0.61, 0.67, 0.73 and 0.77 are moderately smaller peaks (Fig.2). Peak at  $R_f$  0.71 corresponded to marker chemical oleanolic acid (Fig.3). The presence of oleanolic acid in the chloroform extract of whole plant of *L.cylindrica* (L.) Roem. was confirmed by the superimposable UV spectra (Fig.4). The  $R_f$  values are presented in table-4. The presence of oleanolic acid further confirmed in the drug by after derivatisation of vanillin-sulphuric acid shows the colour spots (Fig.1). HPTLC is useful for identification of plants and their extracts because each plant species produces a distinct chromatogram. HPTLC finger print analysis is used for rapid identity check for monitoring purity of drugs, for detection of adulterants, for determining whether a material is derived from a defined botanical species and also to know whether the constituents are clearly characterized.



**Fig. 1. TLC of *L. cylindrica* with marker Oleanolic acid**  
**(1) *L. cylindrica* (L.) M. Roem (2) Oleanolic acid**



**Fig. 2. HPTLC finger print profile of *L. cylindrica* (L.) M. Roem 10 $\mu$ l.**

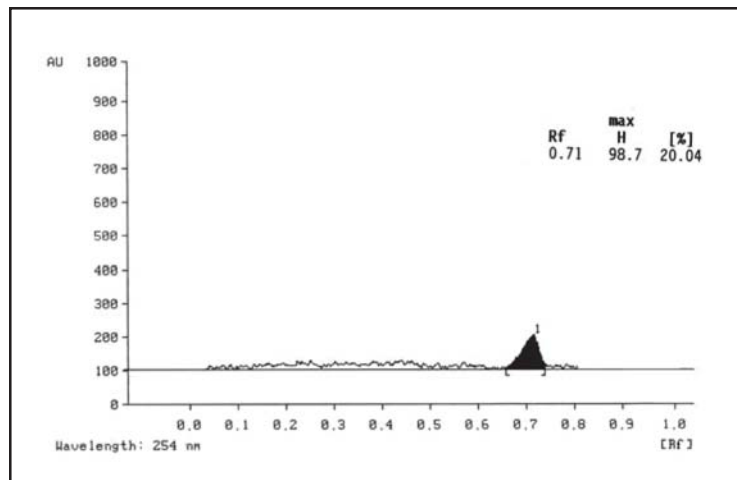


Fig. 3. HPTLC finger print profile of Oleanolic acid (L.) M. Roem 5µl.

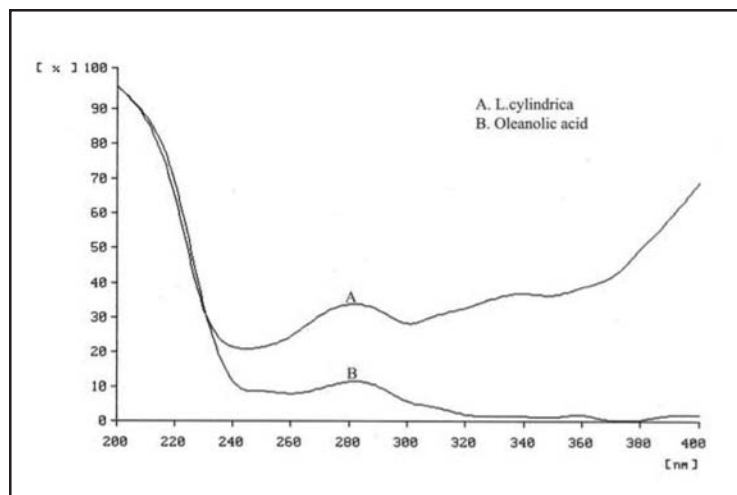


Fig. 4. Superimposable UV spectra of *L.cylindrica* (L.) M. Roem and Oleanolic acid

Table-4. HPTLC data of the whole plant of *L.cylindrica* and oleanolic acid

Name of the extractives	Solvent system	No. of spots	R <sub>f</sub> Values
Chloroform	Chloroform: Methanol (9.5:0.5)	13	0.10, 0.16, 0.21, 0.29, 0.34, 0.38, 0.47, 0.52, 0.61, 0.67, 0.73, 0.77 and 0.90
		1	0.71

The data generated from the present study would help in the authentication of the drug both in dry and powder form. Total tannin content and HPTLC finger print profile will be definitely useful in dry form and in standardization of the drug.

### Acknowledgement

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# Standardisation of a Unani Herbal Drug 'Jawansa'

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## Abstract

Jawansa; a thorny xerophyte finds mention in almost all the classical texts of Unani. Being bitter, hot and dry 2<sup>o</sup> the plant possesses anti-bilious and antiseptic properties. It is laxative, diuretic and expectorant. It purifies the blood and is good for piles. Present study deals with standardization of Jawansa (whole plant) in order to lay down the standards for quality assurance. The main aspects included in the study are detailed macro and microscopic characters, quantitative studies, features of the powdered drug and response to U.V. light, maceration, extractive values and thin layer chromatography.

**Key Words:** Standardization, *Alhagi pseudalhagi* (Bieb) Desv.

## Introduction

Jawansa which is botanically identified as *Alhagi pseudalhagi* (Bieb.) Desv. syn. *A. camelorum* Fisch. ex D.C.; *A. maurorum* Medic (Family: Fabaceae) is a thorny xerophyte widely spread in North-West India. It contains tannin, flavonoids, coumarin derivatives, ascorbic acid, mucilage and essential oil (Anonymous, 1985). The whole plant of Jawansa is used by unani physicians to cure bawaseer (piles), sude-e-muzmin(chronic headache) and wajul-mafasil (rheumatism) (Kabiruddin, 1955). Considering the medicinal importance of the drug it was felt desirable to standardize Jawansa (whole plant) in order to lay down the standards for quality check.

## Material and Methods

The plant was collected locally in New Delhi and identified with the help of standard flora (Maheshwari, 1953). Macro and microscopical characters were observed. The cell content and the cell wall structures were studied accordingly to the method laid down by Johansen (1940) and Trease and Evans (1983). The representative micro-photographs were taken from computer with microscopic attachment. Measurement of the individual cell/tissues of the various parts of the plant were recorded. The powder and its behaviour on treatment with different chemical reagents were studied and the physico-chemical contents values were determined. Fluorescence characters of the powdered drug was observed under U.V. according to the method described by Kokoski et. al. (1958). Standard analytical methods were followed for chemical analysis (Anonymous, 1988).

## Observations

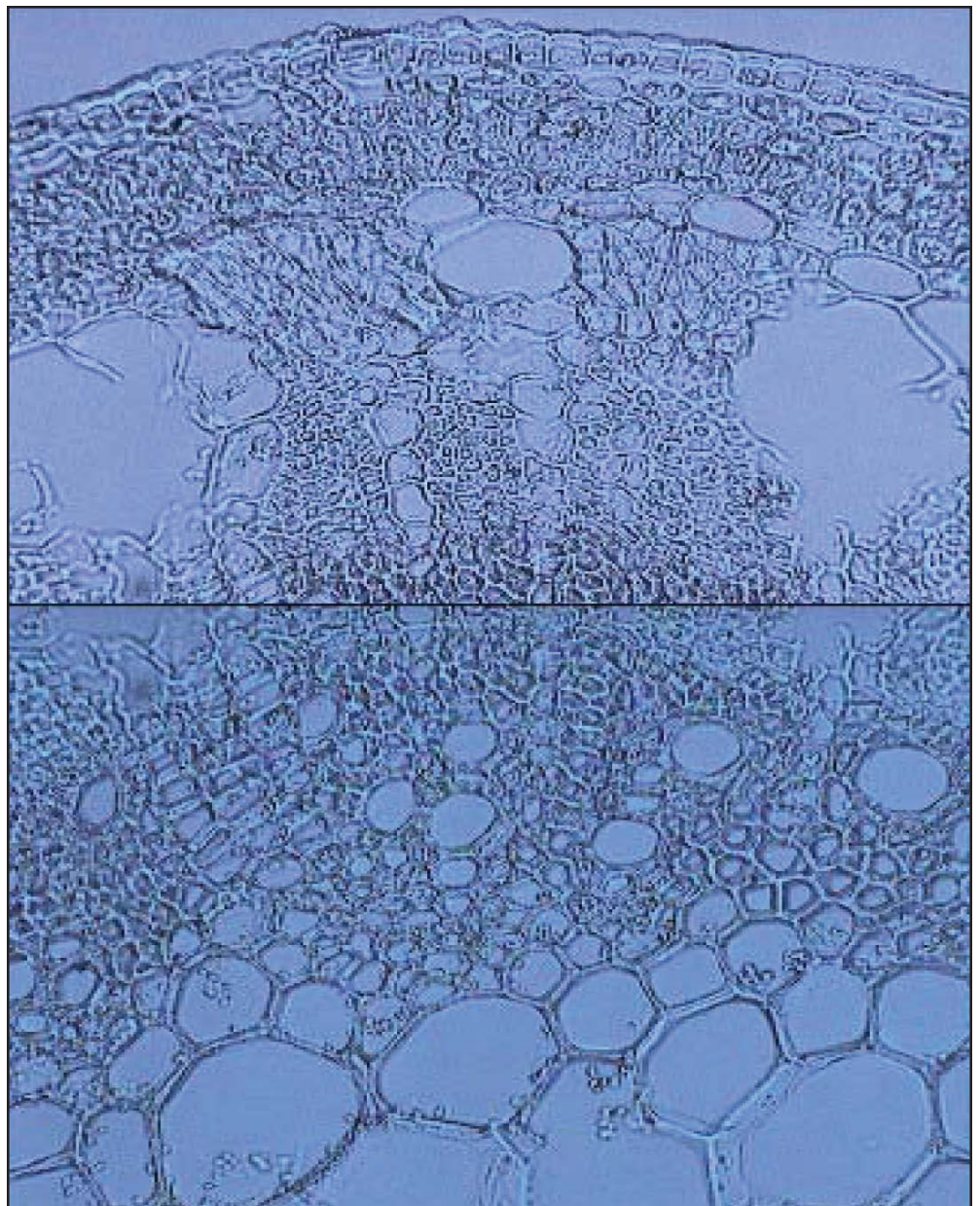
### *Macroscopic characters*

Stem erect, cylindrical, much branched, rigid, armed with axillary spines (2-2.75 cm. long) terete, glabrous, yellowish – green to yellowish – brown; leaf simple, entire,

obovate-oblong, obtuse, coriaceous, glabrous, 0.75-1.50 cm. long, petiole very short, stipules minute.

#### *Microscopic characters*

T.S. of stem shows single layered epidermis covered by thick cuticle; hypodermis 1-2 layered, collenchymatous, cortex 4-5 layered, radially elongated thin walled parenchyma cells, pericycle represented by patches of sclerenchyma with intervening masses of parenchyma. (Fig. 1) Vascular bundles conjoint and collateral; pith at the center composed of round to polygonal, thin walled parenchyma cells. All the cells give positive test with ferric chloride.



**Fig. 1.** T.S. of stem x 40



T.S. of leaf shows –

*Petiole:* Circular in outline; single layered epidermis covered by thick cuticle; epidermal cells square to rectangular, thick walled; cortex 4-5 layered, thick walled, oval-polygonal parenchyma cells filled with tannin; vascular bundle conjoint and collateral. (Fig. 2, 3)

*Lamina:* T.S. of lamina shows an upper and lower epidermis covered by cuticle; hypodermis single layered, parenchymatous, several oval-elongated cells containing brownish content are present; mesophyll undifferentiated, oval- elliptical shaped, thin walled, parenchyma cells filled with chlorophyll. (Fig. 6)

Anomocytic and paracytic type of stomata are present on both the surfaces. Stomata are greater in number on the abaxial surface than on the adaxial surface. (Fig. 8-11)

*Mid-rib:* T.S. of mid-rib consists of an upper and lower epidermis and several layers of oval to spherical shaped parenchyma cells in between. Vascular bundle present at the center is conjoint, collateral and closed. (Fig. 5)

### *Maceration*

Maceration of the plant with conc. nitric acid shows the presence of simple, unbranched, unseptate, elongated fibres of various length and of thickness  $6\mu$ - $13\mu$  (Fig. 15); pieces of vessels in various sizes with width  $4\mu$ - $9\mu$ , vessels having spiral thickening with width  $13\mu$  (Fig. 12) and vessels having reticulate thickenings with width from  $15\mu$ - $20\mu$ , epidermal cells; stomata (Fig. 14) and mesophyll cells.

### *Powder analysis*

Greenish brown powder having bitter and acrid taste with a distinct flavour. Microscopic examination of powder reveals the presence of numerous elongated, unseptate, simple, unbranched fibres; pieces of vessels with reticulate and spiral thickening; epidermal cells in surface view; stomata and parenchyma cells.

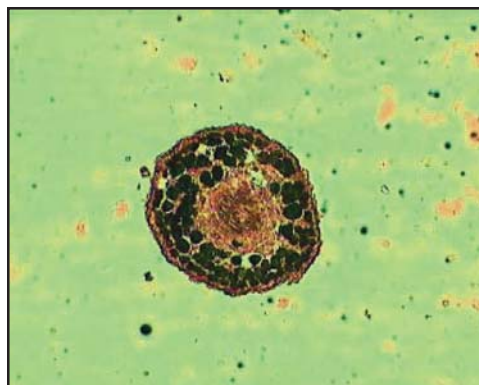
### *Quantitative Microscopy*

(In  $1\text{ mm}^2$  Area)

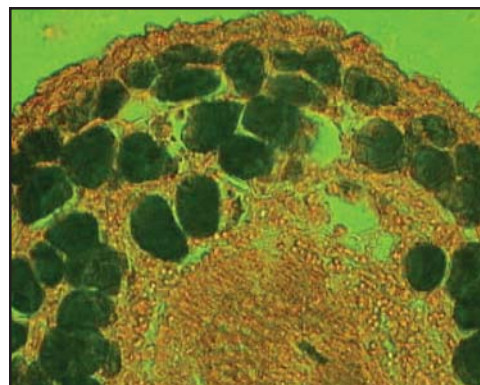
Stomatal Number	: Abaxial surface – 388-528
	Adaxial surface – 365-412
Palisade Ratio	: 3.5-4.7
Vein islet Ratio	: 43-48

### *Chemical Reaction and Fluorescence Analysis*

Results of acid/chemical reagent reaction and fluorescence analysis are given in Table 1 & 2.



**Fig. 2.** T.S.of Petiole x 10



**Fig. 3.** T.S. of Petiole x 40



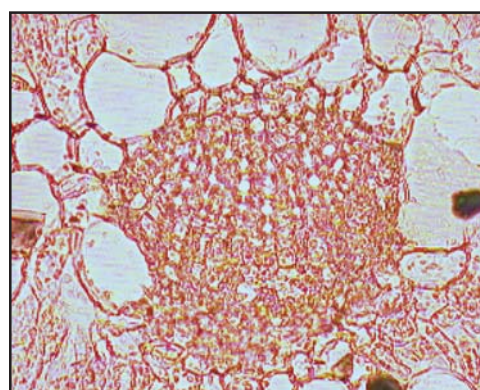
**Fig. 4.** T.S. of Leaf through margin x 40



**Fig. 5.** T.S. of Leaf through mid-rib x 40



**Fig. 6.** T.S. of Leaf x 10



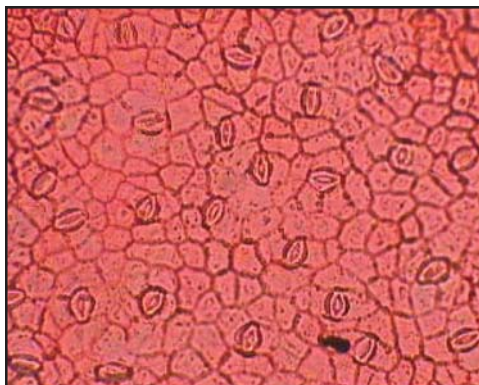
**Fig. 7.** T.S. of Leaf through mid-rib (V.B.) x 100

### *Identity, Purity and Strength*

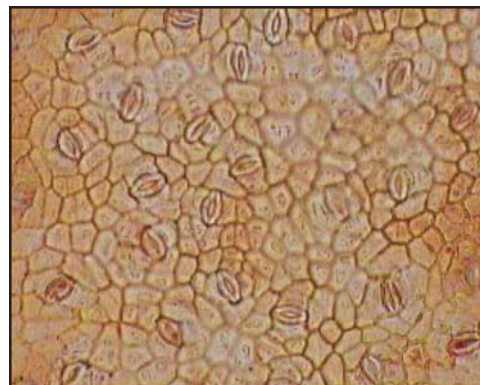
Analytical values of different physico-chemical constants are shown in Table-3 and the results of TLC behaviour of petroleum ether (60-80°) extract are shown in Table-4.



## Surface Study of Leaf



**Fig. 8.** Upper surface of leaf x 40



**Fig. 9.** Lower surface of leaf x 40



**Fig. 10.** Upper surface of leaf x 100

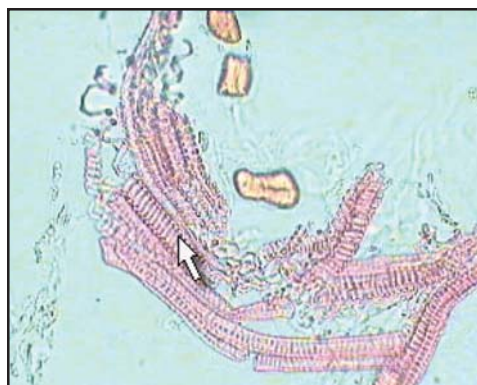


**Fig. 11.** Lower surface of leaf x 100

**Table-1. Acid/Chemical Reagent Reaction with Powder**

S.No.	Acid/Chemical Reagent	Observation
1.	Conc. Sulphuric Acid	Black
2.	Conc. Hydrochloric Acid	No Change
3.	Conc. Nitric Acid	Orange
4.	Glacial Acetic Acid	No Change
5.	Picric Acid	No Change
6.	Iodine Solution	Greenish blue
7.	Ferric chloride Solution (aq.)	Bluish green
8.	Sodium hydroxide Solution (5%)	Brown
9.	Potassium hydroxide Solution (5%)	Brown
10.	Powder as such	Greenish brown

## Maceration and Powder analysis



**Fig. 12.** Vessels showing spiral thickening x 40



**Fig. 13.** Vessel showing reticulate thickening x 40



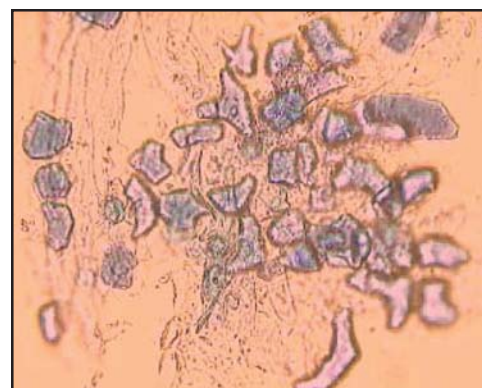
**Fig. 14.** Stomata in surface view x 40



**Fig. 15.** Fibre in maceration x 40



**Fig. 16.** Elongated cell showing contents x 40



**Fig. 17.** Cells showing contents x 40

## Conclusion

The present study has brought out many diagnostic key characters of the plant covering morphological, anatomical as well as physico - chemical aspects on the basis of which the drug can easily be identified from its possible adulterants and

**Table-2. Fluorescence Analysis**

S. No.	Reagent	Colour in Day-Light	Observation under U.V.Light		
			Modifying colour	Quality of colour	Degree of radiance
1	Mounted in Nitro-Cellulose	Brown	Orange	Dark	Bright
2	1N Sodium hydroxide in methanol	Dark green	Green	Dark	Bright
3	Treated with 1N Sodium hydroxide in methanol & mounted in Nitro-Cellulose	Coffee brown	Green	Dark	Bright
4	1N Hydrochloric Acid	Light brown	Brown	Light	Bright
5	Treated with 1N Hydrochloric Acid & Mounted in Nitro-Cellulose	Brown	Orange	Dark	Bright
6	1N Sodium hydroxide in Water	Dark green	Green	Dark	Bright
7	Treated with 1N Sodium hydroxide in water & mounted in Nitro-Cellulose	Coffee brown	Green	Dark	Bright
8	Dilute Nitric Acid (1:1)	Orange	Orange	Dark	Bright
9	Dilute Sulphuric Acid (1:1)	Dark green	Green	Dark	Bright
10	Powder as such	Greenish brown	Brown	Light	Dull

**Table-3.**

Parameter	Analytical Value
Foreign Matter	Not more than 2 percent
Total Insoluble Ash %, W/W	9.00
Acid Insoluble Ash %, W/W	2.5
Alcohol Soluble Matter %, W/W	8.8
Water Soluble Matter %, W/W	21.6

**Table-4. TLC behaviour of Petroleum Ether (60-80°) extract**

Solvent system values	Spray/Treatment	No. of spots	Rf. values
Pet. ether: Diethyl ether: Acetic acid (9:1:0.5)	Exposed to iodine vapour	3	0.38, 0.51, 0.61
Pet. ether: Chloroform: Acetic acid (19:1:0.5)	Exposed to iodine vapour	2	0.59, 0.68

other wasteful matter present in the commercial sample. Salient morphological features include: bitter and acrid taste with distinct flavour, stem erect, cylindrical, much branched, armed with axillary spines (2- 2.75 cm long), glabrous. In T.S. the stem shows collenchymatous hypodermis, pericycle represented by patches of sclerenchyma with intervening masses of parenchyma. Leaf is simple, coriaceous, glabrous with anomocytic and paracytic type of stomata on both the surfaces, mesophyll undifferentiated. Rf values and number of spots in different extracts also provides reliable diagnostic characters.

### Acknowledgements

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# Standardisation of An Important Herbal Drug 'Khirni' (*Manilkara kauki* Dub.)

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## Abstract

Seeds of the plant *Manilkara kauki* Dub. are used as drug 'Khirni' in Unani and other traditional systems of medicine. Pharmacognostical studies on herbal drugs are indispensable, in providing characters to identify genuine drugs and check adulterations.

Pharmacognostical studies carried out on the seeds have been described covering morphological and anatomical details, features of the powdered drug including response to UV light exposure, qualitative determination of chemical constituents, some physico-chemical constants and results of thin layer chromatography and HPTLC profile. The salient distinguishing features of the seed have been discussed.

**Key Words:** Unani medicine, Herb, Adulteration, Genuine drug, Standardization, Identification, HPTLC.

## Introduction

The plant *Manilkara kauki* Dub. of family Sapotaceae is an evergreen large spreading tree with coriaceous long petioled leaves; flowers densely clustered near the end of branches. Fruits globose, orange red 3-4 seeded berries. The plant is a native of Malay peninsula and widely planted in India (Anonymous, 1962; Hooker, 1882; Kirtikar and Basu, 1935).

While the root and bark are used as astringent given in infantile diarrhoea, it is the seed which is used as drug khirni for its tonic, febrifuge and anthelmintic actions. The powder is used in ophthalmia, thirst, delirium and disorders of secretions. The drug is a constituent of Habb-e-Hindi Chasm (Anonymous, 1981; Chopra and Chopra, 1956; Karim Noor; Khan, 1913; Kirtikar and Basu, 1935).

The seeds are reported to contain 16% of fatty oil and 1% saponin.<sup>2,6</sup>

A review of the up to date literature indicated that no pharmacognostical work on the drug has so far been reported (Anonymous, 2002 & 1986-2005; 2003-2005; Farooq, 2005; Mitra, 1985). The present work has been carried out to provide comprehensive pharmacognostical description of the drug.

## Material and Methods

The seeds were collected from Dawakhana Tibbia College, Aligarh and identity established by comparing with the authentic sample available in Tibbia college, AMU, Aligarh. Free hand sections were used for microscopic study. The diagrams were sketched using a camera lucida and measurement of cells were done by using a standardized eyepiece micrometer. Method described by Johansen<sup>9</sup> was followed for maceration of the material. Fluorescence analysis was done according



to method described by Kokoski et al.<sup>13</sup>. Physico-chemical parameters and thin layer chromatography of different extracts was done according to standard methods.

## Observations

### *Macroscopic*

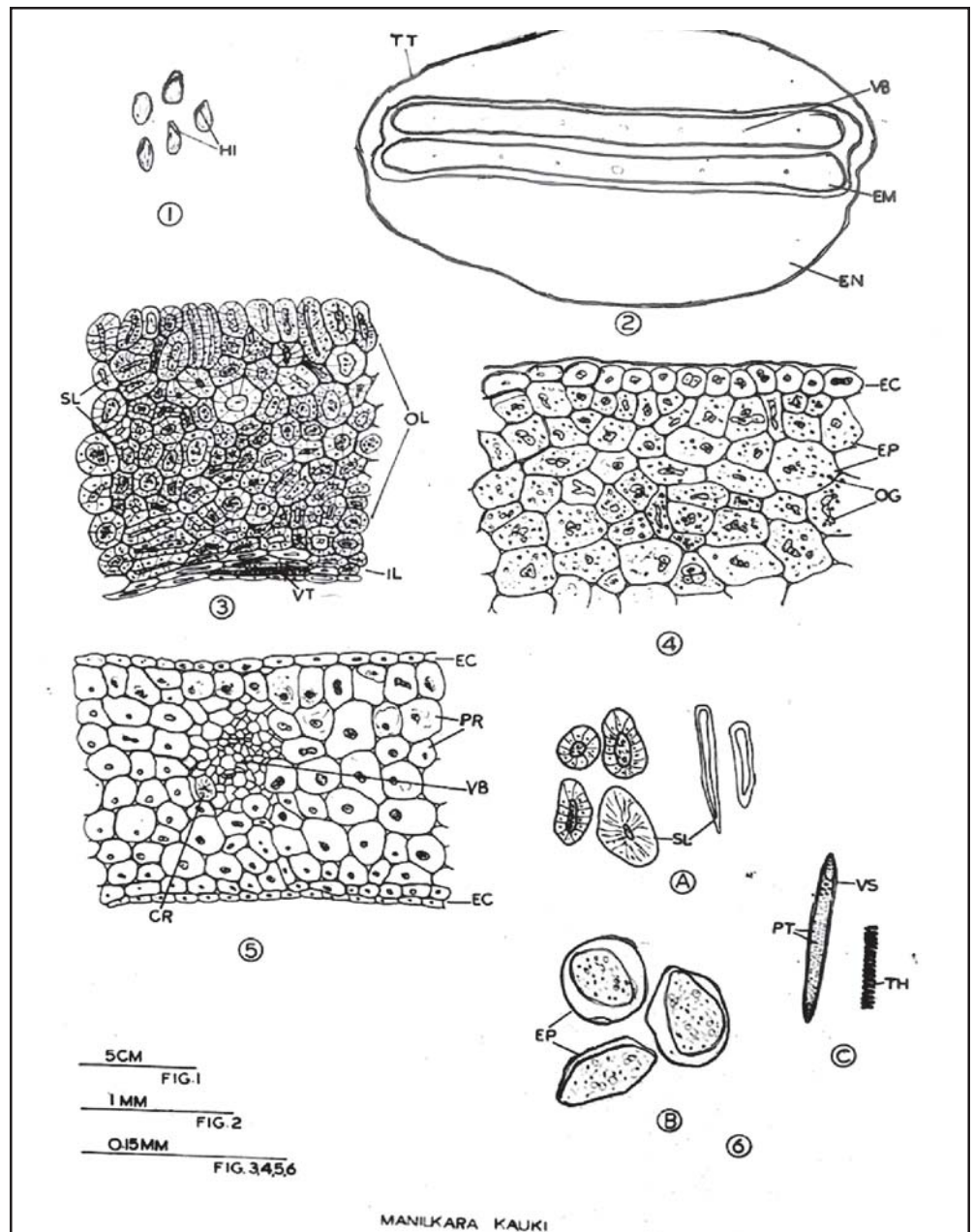
The seeds are exarillate with a hard, smooth, dark brown outer surface; compressed, ovoid to obliquely ovate in shape. The hilum is laterally placed and elongated. The length varies between 1.1cm. to 1.3cm. while the width ranges between 5mm.to 8mm. Average weight of 10 seeds is 1.30 gms. The seeds are odouresless and bitter in taste.

### *Microscopic*

The seeds are albuminous. The cross section shows a dark brown coloured testa, large greyish oily endosperm and thin leafy embryo, consisting of two cotyledons joined at the hypocotyl (fig. 2). The seed coat shows a multilayered outer layer



**Khirni (Seed)**



**Khirni** (*Manilkara kauki* Dub.)

### Explanation of Figures

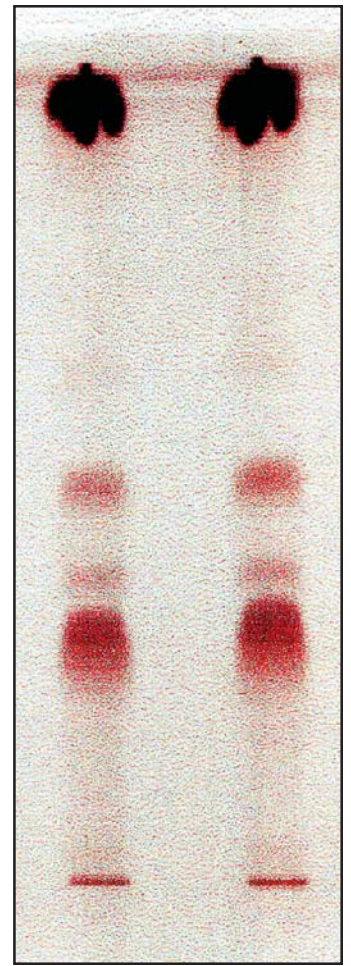
Figures : 1. Drug sample, 2. Transverse section of seed-Diagrammatic, 3. T.S. portion showing structure of seed coat, 4. T.S. portion showing endosperm cells, 5. Portion of T. S. of embryo (cotyledons), 6. Macerates:

A. Sclereids; B. Endosperm parenchyma C. Vessel & thickenings.

**Abbreviations:** CR = Calcium oxalate crystals, EC = Epidermal Cells, EM = Embryo, EN = Endosperm, EP = Endosperm Parenchyma, HI = Hilum, IL = Inner layer, OG = Oil globules, OL = Outer layer, PR = Parenchyma, PT = Pits, SL = Sclereids, TH = Thickening, TT = Testa, VB = Vascular bundle, VS = Vessel, VT = Vascular Trace.



UV light – 366 nm



After derivatization

**Mobile Phase**

– Toluene: Ethyl acetate (9 : 1)

**Derivatizing Reagent**

– Anisaldehyde – Sulphuric acid followed by heating at 110°C for 10 minutes

consisting of a compact more or less isodiametric, non palisade lignified sclereids, light brown in colour and an inner layer of several rows of comparatively thinner walled crushed, dark brown cells, having the vascular bundles (fig.3). Inner to the seed coat is a large zone of endosperm consisting of thin walled nucleated cells with oil globules (fig.4). The cotyledons show a simple leaf like structure with an outer and inner epidermis having tightly packed parenchyma and vascular bundles in between (fig.5)

Microscopic examination of the macerated seed tissue, done with 20%  $\text{HNO}_3$  and  $\text{KClO}_3$ , predominantly shows isodiametric brachysclereide or stone cells which are more or less isodiametre with some elongated ones. The other conspicuous cells are those of endosperm which are parenchymatous, nucleated with small oil droplets. The vessels are short thin with simple pits and spiral thickenings. (fig.6).

i)	Powder triturated with water	An emulsion formed.
ii)	Powder shaken with water in a test tube	No frothing occurs.
iii)	Powder treated with 66% H <sub>2</sub> SO <sub>4</sub>	Turns dark bright Brown.
iv)	Powder treated with 5% NaOH	Turns dark Brown.
v)	Powder treated with 5% FeCl <sub>3</sub>	Turns greenish Brown.
vi)	Powder pressed between two filter papers for 24hour:	An oil stain appears which is retained on heating.

#### Fluorescence analysis of the powdered drug (After Kokoski et. al. 1958)

S. No.	Treatment	Observation under	
		Ordinary Light	U. V. light
i)	Powder as such	Greyish Brown	Dull light Brown
ii)	Powder treated with 1N NaOH in methanol	Bright Dark Brown	Dull light Brown
iii)	Powder treated with 1N NaOH in water	Bright Dark Brown	Colourless
iv)	Powder treated with 1N HCl	Light brown	Colourless
v)	Powder treated with 50% HNO <sub>3</sub>	Bright Brown	Colourless
vi)	Powder treated with 50% H <sub>2</sub> SO <sub>4</sub>	Bright Dark Brown	Dull Brown
vii)	Powder mounted in Nitrocellulose in Amylacetate	Brown	Dull Brown
viii)	Powder treated with 1N NaOH in methanol, dried and then mounted in Nitrocellulose in Amylacetate	Dark Brown	Dull Brown
ix)	Powder treated with 1N NaOH in water, dried and then mounted in Nitrocellulose in amylacetate	Dark Brown	Colourless
x)	Powder treated with 1N HCl, dried and then mounted in Nitrocellulose in Amylacetate	Light Brown	colourless

**Note:** Reactions (ii) to (vi) observed immediately after treatment, within one minute while reactions (vii) to (x) are observed after being allowed to dry.

#### Measurement of cells (in Microns):

Sclereids	: 28.7x28.7; 37.1x23.6; 60.7x37.1
Parenchyma	: 59.0x59.0; 65.7x57.3; 75.9x38.8; 79.2x53.9
Vessels (Length)	: 75.8; 118.9; 235.9

#### *Study of the powdered drug*

The powder obtained after grinding and straining through a 30 hole mesh, is greyish brown in colour, some what sticky and non granular due to presence of oil, giving a slight oily odour and bitter in taste. The powder after clearing in chloral hydrate shows under microscope plenty of oil droplets and sclereids of various shapes and sizes. Vessels are few and thin having spiral thickenings. The powder on treatment with certain reagents gives following reactions.

#### *Chemical Constituents*

- Organic:* Sterols, triterpene acid, flavonoids, carbohydrates, glycosides, tannins, vitamin C, phenols and saponins.
- Inorganic:* Fe, Ca, Mg, P, Na and K.

#### **Physico-Chemical Constants (%)**

##### *Ash Values*

a. Total Ash	: 1.88
b. Acid insoluble Ash	: 0.27
c. Water soluble Ash	: 0.61
Loss of weight on drying at 105°C	: 3.6
Solid Contents	: 80.93

##### *Successive Extractives*

a. Pet. Ether (60-80)	: 26.6
b. Chloroform	: 3.97
c. Acetone	: 1.37
d. Absolute Alcohol	: 9.22
e. Distilled water	: 5.04

Extract	Solvent system	Spray/ treatment	No. of Spots	Rf. Values
Petroleum Ether (60-80°)	Petroleum Ether (40-60°): Solvent ether (4:1)	Exposed to Iodine Vapours	06	0.93, 0.62, 0.56, 0.40, 0.35, 0.28
Acetone	Benzene: Methanol (85:15)	-Do-	04	0.70, 0.44, 0.24, 0.11
Abs. Alcohol	-Do-	-Do-	05	0.69, 0.48, 0.45, 0.30, 0.12
-Do-	Toluene: Ethyl formate: Formic acid (5:4:1)	5% H <sub>2</sub> SO <sub>4</sub> heated at 105°c for few minutes	05	0.60, 0.57, 0.30, 0.21, 0.16

### *T.L.C. of Successive Extractives*

### *HPTLC*

HPTLC of petroleum ether (60-80°) extract of the drug on pre coated aluminium plate of silica gel 60 F 254, using Toluene-ethyl acetate (9:1) as mobile phase showed single fluorescent band at Rf 0.61 under UV light 360 nm and shows three bands at Rf 0.18, 0.25 & 0.50 after derivatization using anisaldehyde sulphuric acid and heating the plate at 110°c for 10 minutes.

## **Results and Discussion**

The present comprehensive standardisation work has brought out many diagnostic key characters of the seed covering morphological, anatomical as well as physico-chemical aspects on the basis of which the drug can be identified. Salient morphological feature include characteristic compressed ovoid-obliquely ovate shape laterally placed hilum and smooth exarillate appearance in surface view.

Internally the seed coat is multilayered having sclereids, large endosperm with nucleated cells packed with oil globules and thin leafy embryo. Sclereids and endosperm parenchyma are also conspicuous in powdered drug.

A dull brownish fluorescence under U V light, physico-chemical data and features of thin layer chromatography of different extracts provide reliable diagnostic characters.



The study assumes great significance as it will facilitate identity of genuine material and detection of adulterants and other waste material in the drug available commercially.

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