

PHARMACOGNOSTIC AND PHYTO-PHYSICOCHEMICAL EVALUATION OF *PEDALIUM MUREX* LINN

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ABSTRACT

Medicinal plants have been of age long remedies for human diseases because they contain components of therapeutic value¹. Plants are rich sources of ecologically developed secondary metabolites, which are potential remedies for different ailments. *Pedalium murex* L. (Pedaliaceae) is a diffuse, more or less succulent herb found near the sea coast of south India². In and around Visakhapatnam the plant is very prolific after summer rains. An infusion from leaves and stems was reported to be used in the treatment of gonorrhea and dysuria. Leaves are used for ulcers. Fresh leaves and young shoots dipped and kept for few minutes in boiling milk, such milk is used as an aphrodisiac. A decoction of the fruits was mentioned to be effective as demulcent, diuretic, antispasmodic and aphrodisiac. The decoction is useful in irritation of the urinary organs. Juice of the fruit is an emmenagogue. It contains alkaloids, a greenish fatty oil, small amount of resin and ash. Fruit contains a mucilagenous alkaloid, fat, resin, and gum. Caffeic acid, cumaric acid, daucosterol, ferulic acid, hepatatriacontonic acid³, vanillic acid⁴, ursolic acid and sitosterol were isolated from this plant. Flavonoids, triterpenoids, steroids, lipids, fatty acids, phenolic acids, amino acids and carbohydrates of *Pedalium murex* were reported⁵. The extensive literature survey revealed that *Pedalium murex* is important medicinal plant with diverse pharmacological spectrum. The plant shows the presence of many chemical constituents which are responsible for varied pharmacological and medicinal property. Therefore, the present investigation was intended to evaluate the preliminary phytochemical characters of this plant. Phytochemical studies facilitate new discovery for the synthesis of more potent drugs.

Keywords: *Pedalium murex* L., ethnobotanical uses, pharmacognosy, pharmacological activities, Phytochemical.

INTRODUCTION: India is a varietal emporium of medicinal plants and is one of the richest countries in the world in terms of genetic resources of medicinal plants. It exhibits a wide range in topography and climate, which has a bearing on its vegetation and floristic composition. Moreover, the agro-climatic conditions are conducive for introducing and domesticating new exotic plant varieties. Since time immemorial, the traditional medicinal practices have been known for the treatment of various ailments in India. A vast knowledge about the use of plants against different illnesses may be expected to have accumulated in

areas where the use of plants is still a great importance. The medicinal value of a plant lies in some of its chemical substances (phytochemicals) that produce a definite physiological action on the human body. The most important bioactive compounds of plants are alkaloids, flavonoids, tannins and phenolic compounds. Rural communities depend on plant resources mainly for herbal medicines, food, forage, construction of dwellings, making household implements, sleeping mats, and for fire and shade. The use of medicinal plants as traditional medicines is well known in rural areas of many developing countries. In developing countries, low-

income people such as farmers, people of small isolated villages and native communities use many native plants for the treatment of common diseases. An extensive survey and interaction with local ethno-pharmacologists, herbal drug sellers and rural native healers revealed that the native plants *P. murex* plant parts are routinely and widely used for the treatment of various ailments of humans and livestock. Traditionally Ayurveda emphasises its use to pacify vitiated vata, pitta, urinary retention, kidney stone, seminal weakness, amenorrhea, inflammation, flatulence and fever. Naturally, it tempted us to verify the traditional wisdom of local community in using these plants as herbal drugs. Further evaluations need to be carried out on *Pedalium murex* in order to elucidate out the appropriate uses and formulation of the plant in their practical clinical applications, which can be used for the welfare of the mankind. In fact, there are not many scientific studies that confirm the biological properties of this plant. As the phytochemical research based on the ethno-pharmacological information is generally considered an effective approach for logical conclusions. Therefore, the present investigation was intended to evaluate the preliminary phytochemical characters of this plant. Phytochemical studies facilitate new discovery for the synthesis of more potent drugs.

OBJECTIVES OF THE STUDY

1. To elucidate out a comprehensive review of the plant *Pedalium murex*
2. To carry out Phytochemical analysis to screen, identify, extract and isolate the phyto-constituents to evaluate the therapeutic potential of *Pedalium murex*.
3. To develop phytochemical standards of *Pedalium murex* for standardization and quality control purposes.

Drug Review: While taking the review of the Vedic literature the reference regarding “*BrihatGokshura*” (*Pedalium murex L.*) was not found in Vedic kala or Sangraha Kala. In *Raja Nighantu*⁹ description of *KshudraGokshura* and its 16 names are found along with its qualities. *Dravyagunapradakshika*, the hindu commentary written by Dr. IndradevaTripathi details it as *BrihatGokshura*. Direct references regarding *BrihatGokshura* is not available in *Dhanvantharinighantu*. Dr S.D Kamat had mentioned *Pedalium murex* of pedaliaceae family in his book “*Studies on medicinal Plants and Drugs*”. In *Dhanwantari Nighantu*¹⁰, it is classified in uttarardha under “*Tilladivarga*” with gunas quoted from Sivadatta stating that it can be used in *Sarkara,asmari,pameha,mutrakrcchra,pradara* and as *rasayana*. He also upholds *Brihatgokshura* as *sitavirya,snigdha,balya,mutrala,madhura* and *vrishya*. It is classified in *GuduchyadiVarga* under the name of *kshudragokshura* in *SaligramaNighantuBhushanam* along with a compilation of its gunas like *sakaguna,beejaguna, ksharaguna* etc. In this text details of definite qualities of *brihatgokshura* is mentioned as *seethala,balya,madhura,brumhana,vastisu dhikara,vrishya, pustikara,rasayana,agnideepaka,mutrkrichara,asmarihara,daha,pameha,swasa,kasa,hridroga,arsonasaka,vastivata,tridosha,ku shta* and *soolahara* was noted. In *Nighantu Adarsa*¹¹, this plant has been included under *TiladiVarga*. A detailed description of *BrihatGokshura* was found in *Vanaoushadhi Nidarshika*¹², regarding types distribution, components, morphology, dosage and indications of the

drug. The text also mentions of the use of *Brihatgokshura* in Unani medicine in which the drug is called as *faridbhooti*, which is used as a strengthening drug. It also describes the use of *Brihatgokshura* instead of small gokshura was found in Rajasthan and eastern parts of India. Acharya Priyavrat Sharma on describing gokshura had mentioned *Pedalium murex* Linnas *Brihatgokshura* from pedaliaceae family *Tilakula*. He also ascribes that it grows near ocean and the size of it is bigger than gokshura in *Dravyguna Vijnana*¹³. *Indian Medicinal Plants*¹⁴ details description of pedaliaceae family with explanations regarding *Brihatgokshura* is given, it described in the book that the properties and synonyms of *Brihatgokshura* are same as that of *Tribulus terrestris*. It also states that the fruit is considered as a demulcent and diuretic, anti-spasmodic and aphrodisiac, the decoction is useful in irritation of urinary organs; it's given as a remedy for spermatorrhoea, incontinence of urine, and impotence. In *Indian Materia Medica*¹⁵, *BrihatGokshura* is mentioned in this book with detailed explanations of the distribution names in different languages and has explained different uses of parts with reference to its medicinal value such as burning micturition, urinary calculi, gonorrhea, spermatorrhoea, impotence, and incontinence of urine. *Pharmacological Investigations of Certain Medicinal Plants And Compound Formulations Used In Ayurveda And Siddha*¹⁶, quotes from *Bhavaprakasha* guduchyadivarga about the paryayaguna, karma and paryaya of *Brihatgokshura*, it also states that *Brihatgokshura* is *Pedalium murex* Linn with Paryayanamas as Trkantaka, Palankasha, SvatuKantaka. Pharmacological actions of

the drug was mentioned along with information of acute toxicity study performed on albino rats the LD 50 value was 280 mg/kg i.p. *Pharmacognosy Of Ayurvedic Drugs*¹⁷, mentions *Brihatgokshura* as an adulterant to laghugokshura quoted under the title of common substitutes and adulterants. *Indian Plants and Drugs with their Medicinal Properties and Uses*³⁸, text describes *Pedalium murex* Linn with names used in different languages of India, habitat, properties and uses in detail.

Synonyms¹⁹ of BrihatGokshura (*Pedalium murex* Linn): It has been mentioned as, ***Ikshugandhika***-Smell resembles aroma with that of Ikshu, ***Kantaphala***-Fruits armed with spines, ***Kshuraka***- Long spines like that of kshura, ***Gokantaka***- Spine that injures grazing cattle, ***Chanadruma***- Plant has leaves like that of Bengal gram, ***Trikantaka***- Fruits armed with three spines, ***Palamkasha***- Its thorn can even remove one pala of mamsa when hit, ***Bhakshakanta***- Even if it has spine its edible, ***Bhookshura***- Pierces like Kshura, ***Vanasrinkataka***- Shape of the chestnut found in forest, ***Swadamshtra***- The thorns resembles the teeth of the dog, ***Sadanga***- Six useable parts along with thorns, ***Sthalasringataka***- Fruits resembles that of water chest nut, ***SwaduKantaka***- Friuts are edible and sweet.

Vernacular²⁰ Names are as follows, **Sanskrit**-*BrihatGokshura*, **Tamil**-Anainerinji, perunerunji, **Hindi**-Bara gokhru, **Malayalam**-Kathenerinmil, Kakkamullu, ananerinnil, Kattunerinjal, **Telugu**-Enugapallerumullu, Peddapaleru, EnugapalleruMulla, yenugapalleru, **Kannada**-Annegalugida, Aneneggilu, Doddaneggilu, **Marathi**-Motto ghokru, Mother ghokharu, Hatti charatte,

Karonathia, **Gujarathi**-Kadvaghokru, Mothaghokru, Mothangokharu, Mottoghokru, Ubbaghokru, **Bengali**-Motto ghokru, Baraghokhu, Motharghokru, **Oriya**-Gokshura, Gokara, **Punjabi**-Gokrukalan, **Konkani**-Selusaran, **Arabic**-Khasakekabir, **Burmese**-Sulegi, **Persian**-Khasake Kalan.

Useful part²¹ of the plant BrihatGokshura are Fruit and Panchanga (whole plant). Dose^{22,23} of the drug in the form of Choorna (powder) is ¼- ½ tola and Kwatha (decoction) is mentioned as 2 pala (96 ml).

Properties and Actions²⁴ as per Ayurvedic classics are as follows, **Rasa**: Madhura, **Guna**: Snigdha,shita, **Virya**: Shita, **Vipaka**: Madhura, **Karma**: Vatahara, **Indication**: Prameha, Swasa, Kasa, Arsas, Hridroga,Mutrala, Vrushya,Balakrit.

Chemical Composition²⁵:

1. Fruit: Alkaloids 3.5%-5%, stable oil, aromatic oil, resins, glycosides, carbohydrates, saponins, triterpenoids two important flavanoids like 2', 4', 5' trihydroxy - 5, 7 dimethoxy flavones and triacontanyl dotriacontanoate.
2. Stem: Saponins, herman, phytosterols, tannins and carbohydrates were reported from stem.
3. Root: Reducing sugars Phenolic compounds, saponins, xanthoproteins, alkaloids, triterpenoids and flavonoids. The root contains novel phenolic compounds like phenol, 2 (5,6- di methyl pyrazinyl) methyl.
4. Leaves: Flavonoids, alkaloids, steroids, resins, saponins and proteins. It also contains some important flavonoids like dinatin and 7-glucoronide, diosmetin and its 7-glucaronide, pedalitin and pedalin alkaloids, steroids, resins, saponins and proteins.

5. Flower: Quercetin, dinatin, querimctrin and an unidentified di glycoside of quercetin were reported from the flower.

Taxonomical Classification²⁶: Kingdom- Plantae, Phylum/Division – Magnoliophyta, Class-Magnoliopsida-(Dicotyledonae), Subclass- Lamiidae, Order –Caryophyllales, Family- Pedaliaceae, Genus-*Pedalium*, Species-*Pedalium. murex Linn*.

Modern Review of the Drug: Botanical Name: *Pedalium murex* Linn.

Morphology of Pedaliaceae²⁷ Family: Herbs, rarely under shrub, Leaves: Leaves opposite or upper alternate, entire, toothed, incised or pedatifid; stipules 0, Flowers: Flowers irregular, hermaphrodite, solitary (rarely fascicled or racemose), usually axillary. Calyx-gamosepalous, usually deeply 4-5 lobed. Corolla tubular-ventricose; limb-5lobed, obscurely 2-lipped; lobes imbricate, Stamen 4, didynamous (rarely 2), Disk hypogynous, fleshy, Ovary-2 (rarely 1) celled; ovules many or few superposed; style-filiform; stigma shortly 2 lobed, Fruit-Fruit hard, indehiscent, or a 2-(rarely 3-4) valved capsule, Seeds in the Indian species wingless; albumen 0 Genera 14 species 45. Morphology²⁸ of the Plant: Stems and branches are slightly rough with scaly glands, a much branched herb growing up to 15-38 cm in height. Leaves are opposite pale glaucous-green, fleshy, 2.5-5 by 2.3 - 8 cm, broadly ovate oblong truncate or obtuse, coarsely crenate-serrate or sublobate, glabrous above. Lower side is usually covered with scales, base acute; petioles 6-20mm long. Flowers are axillary, solitary; pedicles 4 mm long. Calyx small, scarcely 3mm, long minutely scaled outside, divided half way down;

lobes 5, linear-triangular, acute, corolla 2.5 cm, across at the mouth, bright yellow; tubes 2 cm, long slender; lobes broad rounded. Filaments glandular- hairy at the base. Fruit 1.3 -2 cm long narrowed at the base pyramidal-ovoid above the spines, bluntly 4 -angled, with stout sharp conical horizontal spines from the ankles.

Distribution and Habitat²⁹: In India it's found mainly in Kathiyawar, Gujarat, Konkan, Deccan Peninsula along western and coromandel coasts, it is found in the countries of Ceylon-Tropical Africa.

MATERIALS AND METHODS

A] Methods for Drug Collection and Authentication: *Brihatgokshura* was collected from the natural Habitat from Coimbatore and the plant sample was authenticated by the Department of Botany of Gauhati University, Guwahati (Assam).

B] Methods for Drug Analysis: The sample was subjected for Organoleptic, Macroscopic and Microscopic Examinations as follows;

1. Organoleptic Evaluation³⁰: Qualitative Evaluation based on the sensory profiles refers to observation by colour, odour, taste and touch. Here the sample was subjected for the organoleptic evaluations.

2. Macroscopic Study: The macroscopic study refers to the physical evaluation of the drug in terms of size, shape, surface, fracture, etc. The sample was subjected to the macroscopic study with the help of simple microscope and magnifying glass.

3. Method of Microscopic Examination: Transverse or longitudinal sections of seeds of *Pedalium murex* were prepared. Sections were cut with razor, moisten the surface of the seed with glycerol solution, remove the section with brush and place them on the slide. The sections were treated with various reagents before examining.

4. Methods for Powder Analysis: All the seed samples were made in to a powder using pulveriser to size of coarse powder (Passing through 60 No mesh). Then all the powder samples were subjected for Macro and Microscopic examination. Then powder of the sample was tested for organoleptic characters like Colour, Appearance, Taste, Odour and Fineness. Examination for Lignin was done by moistening the powder with an alcoholic solution of Phloroglucinol and allowed to stand until nearly dry, added concentrated Hydrochloric acid. Apply a cover glass and examine. Note the presence or absence of lignified vessels, fibers, parenchyma, sclerids or hairs.

5) Methods for Determination of Foreign Matter³⁰: Weighed 100 gm of the drug sample to be examined spread it out in a thin layer. The foreign matters were detected by inspection with the unaided eye or by the use of lens 5x, separated, weighed and calculated the percentage.

6) Methods for Ash Value Estimation³⁰: Weighed accurately 2 grams of the air dried drug in a tare platinum or silica dish and incinerated at a temperature not exceeding 450°C for 3 hours until free from carbon, cool and weigh. Calculated the percentage of ash with reference to air dried drug.

7) Methods for Determination of Sulphated Ash³⁰: Heated a silica crucible to redness for 10 minutes; allowed cooling in a desiccators and weighed. Then 2 g of the substance was accurately weighed into the crucible; ignited gently at first and then until the substance was thoroughly charred. Cooled, moistened the residue with 1 ml of sulphuric acid, heated gently until white fumes were no longer evolved and ignited at 800 ± 250 until all black particles disappeared. Ignition was

conducted in a place protected from air currents. Allowed the crucible to cool, added a few drops of *sulphuric acid* and heated. Ignited as before, allowed cooling and weighed. Repeated the operation until two successive weighing did not differ by more than 0.5mg.

8) Methods for Determination of Acid

Soluble and Insoluble Ash³⁰: The ash obtained by the method mentioned above was boiled. Added 25 ml of dilute hydrochloric acid for 5 minutes. Collected the acid insoluble ash in a pre-weighed crucible along with the ash less filter paper kept in muffle furnace for an hour at around 450°C ± 5°C. Calculated the percentage of acid insoluble ash with reference to the air dried drug.

Acid insoluble ash = Weight of ash x 100
Original sample weight

9) Methods for determination of water soluble and insoluble ash³⁰: Boiled the ash for 5 minutes with 25 ml of water; collected insoluble matter in an ash less filter paper, washed with hot water, and ignited for 15 minutes at a temperature and calculated percentage of water soluble ash with reference to the air dried drug.

10) Methods for Extractions³¹: Powder sample was subjected for Cold maceration method for extraction.

a) Alcoholic Extraction:

Equipments - Conical Flask: 2-litre Capacity.

- Measuring Cylinder: 25-ml. capacities.
- Silver Foil, Filter Paper
- Emulsion cloth.

Other materials: (a) Filter Paper (b) 500 ml beaker (c) Glass funnel

Ingredients: Seed powder 5 gms and 100ml Ethanol

Procedure: Macerated 5 g of the air dried drug, coarsely powdered, with 100 ml of Ethanol in a closed flask for twenty-four

hours, shaking frequently during six hours and allow to stand for eighteen hours. Filtered rapidly, taking precautions against loss of solvent, evaporated 25 ml of the filtrate to dryness on water-bath in a tared flat bottomed shallow dish, and dry at 105°, then cooled it.

b) Aqueous extraction (water extract):

Equipments - Conical Flask: 2-litre Capacity.

- Measuring Cylinder: 25-ml. capacities.
- Silver Foil, Filter Paper
- Emulsion cloth.

Solvent - Distilled Water

Ingredients – 5 gm seed powder and Water (As required)

Procedure: Macerated 5 g of the air dried drug, coarsely powdered with 100 ml of Distilled Water in a closed flask for twenty-four hours shaking frequently during six hours and allowed to stand for eighteen hours. Filtered rapidly, taking precautions against loss of solvent, evaporated 25 ml of the filtrate to dryness on water-bath in a tare flat bottomed shallow dish, and dried at 105°, then cooled it.

11. Methods for preliminary phytochemical screening³²: Both, aqueous and alcohol extracts were subjected for qualitative preliminary phytochemical screening:

a) Test for Reducing Sugars (Benedict's test): Mixed equal volume of Benedict's reagent and test solution in the test tube and heated on water bath for 5 minutes. Solution appears green, yellow or red depending on amount of reducing sugar present in test solution.

b) Test for monosaccharides (Barfoed's test): Mixed equal volume of Barfoed's reagent and test solution. Heat for 1-2min. on water bath and cool it. Red precipitate is observed.

c) Test for pentose sugars (Bial's Orcinol test): To boiling Bial's reagent added few drops of test solution. Green or purple coloration appears.

d) Test for hexo sugars (Selwinoff's test): Heated 3 ml Selwinoff's reagent and 1ml. test solution on water bath for 1-2 min. Red colour is formed.

e) Test for proteins (Million's test): Heated 3 ml Million's reagent 1ml. test solution.

f) Tests for steroids (Salkowski reaction): To 2 ml of extract, add 2 ml of chloroform and 2 ml concentrated H_2SO_4 were added. Shaked well. Chloroform layer appears. Red and acid layer shows greenish yellow fluorescence.

g) Test for alkaloids (Wagner's Test): To 2-3 ml of filtrate with few drops of Wagner's Reagent shows reddish brown ppt.

h) Tests for tannins and phenolic compounds: To 2 – 3 ml of aqueous or alcoholic extracts, add few drops of following reagents: 5% $FeCl_3$ solution deep blue-black colour.

12. Test for Inorganic Elements: The ash of drug was taken in a test tube and 50% HCl v/v or 50% HNO_3 v/v was added to. Keep for 1 hr. filter and with filtrate performed following tests. **Test for Sodium-** To 10 ml filtrate add 2 ml of potassium pyroantimonate gives white precipitate. **Test for Potassium-** To 2-3 ml test solution, add few drops of sodium cobalt nitrite solution. Yellow precipitate of potassium cobalt nitrite observed. **Test for Iron** – To 5 ml test solution add few drops of 5% ammonium thiocyanate solution turns blood red. **Test for Calcium**–Filtrate with solution of ammonium carbonate gives white precipitate which is insoluble in ammonium chloride solution

Test for Chloride – To 3 ml test solution prepared in HNO_3 add few drops of 10% $AgNO_3$ soln. White precipitate. Of $AgCl_2$ observes which is soluble in dilute ammonia solution. **Test for Sulphate** – To 5ml filtrate, add few drops of 5% $BaCl_2$ solution white crystalline $BaSO_4$ ppt. Appears that is insoluble in HCl.

RESULTS: Table 1.BrihatGokshura fruit powder microscopy:

Microscopic study		
Sl. No.	Character	Recorded details
1.	Trichome	Uniseriate, sessile
2.	Cork cells	Stomata absent
3.	Stone cells	Horse shoe shaped
4.	Crystals	Prismatic
5.	Vessels	Pitted, spiral
6.	Tracheids	Present

Table .2 Physico chemical analysis:

Parameter	Recorded Value	Standard
Foreign matter	6.118%	NA
Total Ash value	3.178%	NA
Acid insoluble Ash	1.209%	NA

Table .3 Extractive values of BrihatGokshura fruit:

Sl. No	Solvent	Extractive Value recorded	API standard
01.	Water	0.632%	Not less than 7%

02.	Ethanol	18.524%	Not less than 4%
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Table .4 Test for inorganic components:

Sl. no	Test	Result
1.	Test for Iron:Test soln. + Ammonium thiocyanate	+
2.	Test for Calcium a)Solution + Ammonia+ Potassium ferrocyanide b)Ammonium carbonate solution + filtrate = insoluble in Ammonium chloride solution	+
3.	Test for Sodium:Test soln. + Potassium pyroantimonate	+
4.	Test for Chlorides:Test soln. + AgNO_3	-
5.	Test for Potassium: Test soln. + Sodium cobalt nitrate	-
6.	Test for Sulphates: Test soln. + 5% BaCl_2 Solution	-

Table .5 Preliminary phytochemical screening:

Sl.no	Name of Test	Alcoholic Extract	Aqueous Extract
1.	Test for Carbohydrates: a) BBenedict's Test b) Fehling's Test c) Molish Test	-	-
2.	Test for pentose sugars $\text{Sol}^n + \text{HCl} + \text{Phloroglucenol}$	+	+
3.	Test for Hexose sugars Selvinoff's Test	-	-
4.	Test for non-reducing Sugars 3ml sol^n . + few drops of Iodine	+	+
5.	Test for Tannins & Phenolic compounds:	-	-
6.	Test for Alkaloids: Wagner's reagent	-	-
7.	Test for Steroids: Salkowski reagent	-	-
8.	Test for Proteins & amino acids:Million's test	-	-
9.	Test for Flavonoids With NaOH With H_2SO_4 With Mg/HCl	-	-

Table .6 HPTLC ANALYSIS PROFILE:**Rf value @ 254 nm**

Sl. No	Sample	Rf Values
01.	BrihatGokshura	0.62

Table .7 Rf value in 366 nm after derivatization

Sl. No	Sample	Rf Values
01.	BrihatGokshura	0.82

Table .8 Rf value in after spray

Sl. No	Sample	Rf Values
01.	BrihatGokshura	0.17, 0.2, 0.29, 0.35, 0.50, 0.62, 0.73, 0.79

PHYSICOCHEMICAL ANALYSIS : Foreign matter Content was 6.118% in the collected sample. The section cutting of the fruit of Brihatgokshura was difficult so powder microscopy was done. The parameters like, total ash (3.178%), acid insoluble ash (1.209%), water soluble within standards shows standard quality of the drug. The aqueous & alcohol extractive values were 0.632%, 18.524%, respectively. It shows the amount of ingredients extracted in the water as compared to alcohol, in alcohol extract the amount of ingredients extracted was more than the aqueous extract. Alcoholic extractive methods as that of *arishta* and *asava* may prove to be more effective than that of *kwatha* or aqueous extract in case of *BrihatGokshura*.

Preliminary Phyto-chemical tests show presence of Steroids, alkaloids reducing sugar present in both Alcoholic and Aqueous extract but absence of proteins, monosaccharides, pentose sugars in both the extracts. Presence of hexose sugars, Phenolic compounds and tannins only in alcoholic extract but absent in aqueous extract. The presence of hexose sugar, reducing sugar shows sweet taste of root. HPTLC of *BrihatGokshura* has shown only one ingredient is separated at same RF at 0.82 in both the extracts. Otherwise all the ingredients separated in aqueous as well as alcoholic are at different rf. The active ingredient separated in alcohol is more as compared to aqueous because of high extractive value in alcohol.

DISCUSSION

According to ancient research methodology, prior to establishing any theory, *Upanaya* (Discussion) is the step preceding *Nigamana* (Conclusion). Botanical identity of *Pedalium Murex* is

correlated with *BrihatGokshura* by almost all the contemporary texts. There is a controversy related to the authenticity of *BrihatGokshura* (*Pedalium murex* Linn) and Small variety *Gokshura* (*Tribulus terrestris* Linn). This study was undertaken assuming that *Brihatgokshura* is *Pedalium murex* Linn. The fruit was collected as told by acharya Charaka, as 'yathaRitu' according to the season of fruiting.

Conclusion: These studies revealed that *P. murex* is a source of medicinally active compounds and have various pharmacological effects, hence, the plant encourages finding its new therapeutic uses. Dinatoin glycoside and diosmetin glucuronides are isolated from the leaves of *P. murex*⁶. Recently, two new compounds are isolated from the fruits Heptatriacontan-4-one, tetratriacontanyl octacosanoate⁷. The decoction of root is used as antibiliary. 2',4',5'-trihydroxy 5,7-dimethoxy flavones and triacotanyldotriacontanoate were isolated from the fruits. It is also used in the treatment of urogenital disorders⁸. The extensive literature survey revealed that *Pedalium murex* is important medicinal plant with diverse pharmacological spectrum. This study of the plant shows the presence of many chemical constituents which are responsible for varied pharmacological and medicinal property. This plant can be explored as biopesticidal plant in the near future and potent fertility enhancing drug. The article will help the researchers of Ayurveda as well as in other field of Bio-medical sciences to explore more about the said tree for the larger benefit of society.

REFERENCES:

1. Adegoke A, A Adebayo-tayo and C Bukola. Antibacterial activity and phytochemical analysis of leaf extracts of *Lasientherafricanum*. African Journal of Biotechnology 2009; 8 (1): 77-80.

2. Anonymous. The Wealth of India, Raw Materials, Vol VII, Publication and Information Directorate, CSIR, New Delhi. 1966: 284.
3. Bedigian D and Harlan JR. Sesamin, Sesamolin and other origin of sesame. Biochemical system of Ecology 1985; 13 (2): 133-139.
4. Mithal BM and Sagar SC. Study of *Pedalium murex* gum (Ethoxy gum). Indian Journal of Pharmacy 1974;36:33.
5. Khanuja SPS, Shukla YN. Chemical, pharmacological and botanical studies on *Pedalium murex*. Journal of Medicinal and Aromatic Plant Sciences, 2004; 26 (1): 64-69.
6. Sankara Subramanian S, Nair AGR. Flavonoids of the leaves of *P. murex*. Phytochemistry. 1972;11:464-465.
7. Yogendra N, Shukla Raghunath S, Thakur Hepta triacontan-4-1, tetratriacontanyl octacosanoate and other constituents from *P. murex*. Phytochemistry. 1983;22(4):973-974.
8. Mangle MS, Jolly CI. HPTLC studies on *Tribulusterrestris* L. (ChotaGokhru) and *P. murex* L. (BadaGokhru) Indian Drugs. 1998;35(4):189-194.
9. Dr .IndradevaTripati I (Editor) “Pt.Narahari’s “Raj Nighantu” Edited withDravagunaprakashika Hindi commentary by KrishnadasAcademi,Varanasi,U.P, 3rdEdition, ‘SatahvadiVarga’ Page No.69
10. Dr.S.DKamat (M.F.A.M) (edited) Commented by D.K Kamat‘Studies OnMedicinal Plants And Drugs In DhanwanthariNighantu’ChaukhambaSanskrit Pratishthan,Chaukambaayurvijnan Studies, page no: 38.
11. 30. Vaidya Bapalal G. (edited) “NighantAdarsha” Chaukhamba BhartiAcademy, Varanasi, ‘TrunadiVarga’ edition-2005, Page No.725.
12. Prof.RamSusheel Singh(edited) ‘VanaoushadhiNidarsika’(Ayurvedic pharmacopeia), Uttarpradesh Hindi Samsthan,HindiSamithiPrabhag Granthamala-274,Luknow ,page no: 139,140.
13. Sharma Priyavrat “DRAVYAGUNA VIGNAN” Vol-2 (Aadbhit-oushadhadravya) Varanasi, ChaukhambhaBharati Academy, Reprint-2003, Page no.633.
14. KirtikarK.R.,Basu B.D. & Lalit Mohan Basu, “Indian Medicinal Plants”Vol.No.3, Allahabad, Reprint-1999, Page No.1856-1857.
15. Dr.K.M.Nadkarni “Indian MateriaMedica” Vol-1Revised and enlarged by A.K Nadkarni Bombay Popular Prakashan,Page no: 926,927.
16. Government of India, Ministry of health and Family welfare “Pharmacological Investigations Of Certain Medicinal Plants And Compound Formulations Used In Ayurveda And Siddha” by Central council for research in Ayurveda and Siddha, Printed by Government press, New Delhi page No:79.
17. Government Ayurveda college,Trivandrum “ Pharmacognosy of Ayurvedic Drugs” Series No: 1 printed in 1978 No: 2 by Dept of Pharmacognosy Government Ayurvedic college Trivandrum Page no: 60
18. Dr K.M.Nadkarni ,F.S.Sc.L.A “Indian Plants And Drugs with their medicinal properties and uses” Printed by Asiatic Publishing House, New Delhi India ,3rd Impression,Page no: 289.
19. Sharma P.V. (edited) “Namrupajanam” SatyapriyaPrakashan, Varanasi,1st edition-2000, Page No.77.
20. KirtikarK.R.,Basu B.D. & Lalit Mohan Basu, “Indian Medicinal Plants”Vol.No.4, Allahabad, Reprint-1999, Page No.1856-1857.

21. Vaidya Bapalal G. (edited) "NighantAdarsha" Chaukhamba Bharti Academy, Varanasi, 'TrunadiVarga' edition-2005, Page No.201.

22. Vaidya Bapalal G. (edited) "NighantAdarsha" Chaukhamba Bharti Academy, Varanasi, 'TrunadiVarga' edition-2005, Page No.201.

23. PanditSarangadharacharya son of PanditDamadara "Sarangdhara Samhita" with the gadharthadipika Ede. With foot notes by PanditParashurama Sastra VidhyasagarMadhamaKhandaAdhyaya no 2 Shloka no 2 Page.No132,Chaukhambhaorientalia Varanasi 2002.

24. Government of India, Ministry of health and Family welfare "Pharmacological Investigations of Certain Medicinal Plants And Compound Formulations Used In Ayurveda And Siddha" by Central council for research in Ayurveda and Siddha, Printed by Government press, New Delhi page No:79.

25. V.Rajashekhar,EUpenderRao,Sriniv as P "Biological activities and medicinal properties of Gokhru(*Pedalium murex L*) Published by Asian Pacific Journal of Tropical Medicine www.elsevier.com/locate/apjtb

26. V.Rajashekhar,EUpenderRao,Sriniv as P "Biological activities and medicinal properties of Gokhru(*Pedalium murex L*) Published by Asian Pacific Journal of Tropical Medicine www.elsevier.com/locate/apjtb.

27. KirtikarK.R.,Basu B.D. & Lalit Mohan Basu, "Indian Medicinal Plants" Vol.No.3, Allahabad, Reprint-1999, Page No.1856.

28. KirtikarK.R.,Basu B.D. & Lalit Mohan Basu, "Indian Medicinal Plants" Vol.No.3, Allahabad, Reprint- 1999, Page No.1856.

29. Raghunathan K. Pharmacopeal Standards for Ayurvedic Formulation, central council for Research in Indian Medicine and Homeopathy, New Delhi,1976,P.No.A54.

30. Khandelwala K. R. "Practical Pharmacognosy", 9th edition, NiraliPrakashan. Pune; 2002.Pg.No.149-153.

31. Khandelwal K.R., "Practical Pharmacognosy" NiraliPrakashan Pune, Page no. 149 – 153.

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PHOTOGRAPHS



1.(a) *Pedalium murex* Plant Seeds



1.(b) *Pedalium murex* Raw Seeds



1.(c) *Pedalium murex* Dry

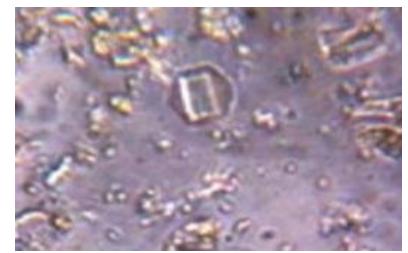
Fig. 1: *Pedalium murex* Plant with seeds



1. (a) Stone Cells



2. (b) Sessile Trichome



2.(c) Multiserrate Trichomes



2.(d) Multiserrate Trichomes



2.(e) Reticulate Vessels



2.(f) Pitted Vessels

Fig. 2: *Pedalium murex* seeds powder microscopy

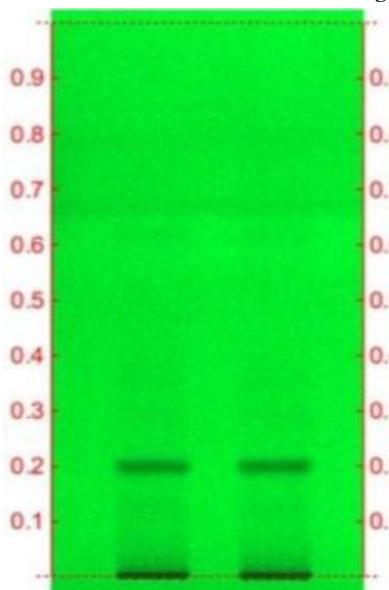


Image @254 nm

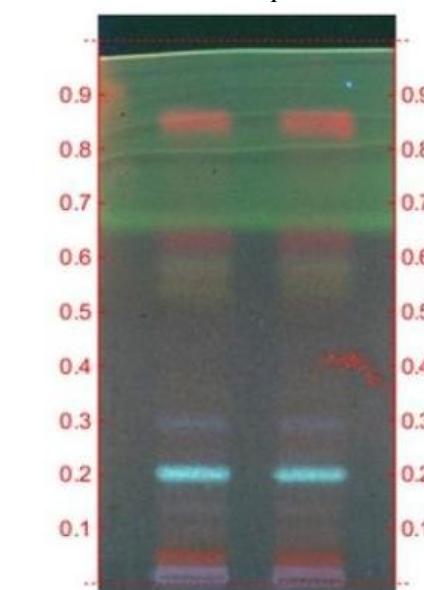


Image @366 nm

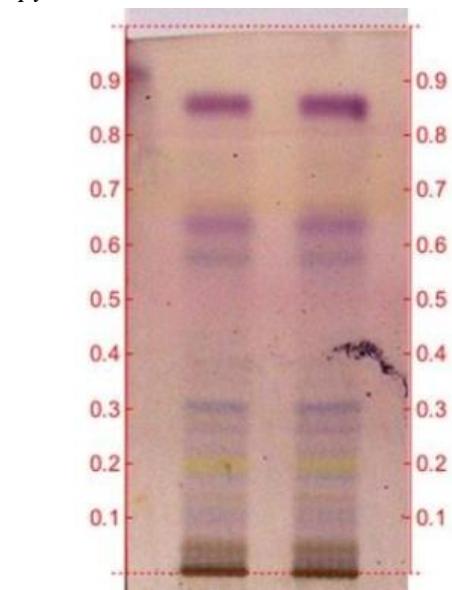


Image @white emission

Fig. 3: TLC of *Pedalium murex*