Ethnopharmacological Survey of Wetland Plants Used by Local Ethnic People in Sub-Himalayan Terai and Duars of West Bengal, India

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ABSTRACT

Objective: In most of the remote places of Sub-Himalayan West Bengal (Terai & Duars), the tribal people have to rely and consider ‘Kaviraj’ or ‘Hakim’ or ‘Boidya’, the traditional medical practitioners as Panaca or only source in regards of medical service and treatment. They use several wetland plants in different formulations to cure the ethnic people (Mech, Munda, Rabha, Oraon Dukpa, Malpahari etc.) from various diseases. The objectives of this study are to recognize the wetland medicinal plants, ethno medicinal uses (in different ailments).

Methods: In field, several interviews have been conducted with the traditional practitioners and also with the traditional medicine healers. Plant specimens have been collected and identified at Central National Herbarium and North Bengal University Herbarium.

Result: The results show 53 species belonging to 33 families has been used in various diseases. 10 – 15 % peoples are directly involved in medico herbal treatment by wetland plants. More than 12 diseases were treated with the wetland medicinal plants.

Conclusion: This type of Ethnopharmacological research will helpful to plant based pharmaceutical industry and provide much information that are useful for framing conservational strategies of our indigenous medical knowledge. During field survey several anthropogenic stress were found to destroy the wetland biodiversity.

Keywords- Medicinal plants, Traditional treatment, Ethno medicine.
INTRODUCTION

Sub-Himalayan West Bengal is falling under the International Union for Conservation of Nature recognized ‘Himalaya’ Biodiversity Hotspot, Conservational International\(^1\) and is very important from environmental and view of social aspects. The areas harbor a large number of tropical and sub-tropical forests and quite a few Protected Areas has been established following IUCN guideline such as; Gorumara National Park, Jaldapara National Park, Mahananda Wildlife Sanctuary and Chapramari Wildlife Sanctuary etc. Much favorable climatic make-up of these areas coupled with high and broadly distributed precipitation supports a large number of seasonal wetlands, which are inhabited by wide diversity of wetland plants, some of those are ethno-medicinally important, (Panda and Misra 2011). Most of the regions of Terai & Duars are very remote and the people of these areas are mostly dependent on vegetation for their daily need. In modern civilized world, the demand of medicinal plants as pharmaceutical raw materials, herbal remedies and other natural products has greatly increased globally\(^2-7\).

Medicinal plants have always been an imperative constituent of healthcare throughout the human history\(^8\). From the origin of human beings, indigenous knowledge on medicinal plants played fundamental role in the disease diagnosis as well as health care practices. With the beginning of human civilization, many plant based therapy systems have been developed such as; Ayurveda, Sidda, Unani, Homeopathy, etc. It is estimated that 70-80 % of people worldwide rely chiefly on traditional method, largely herbal medicine to meet their primary health-care needs\(^9-11\). It has further been observed that a number of modern pharmaceutical industry have been derived from plants used by indigenous people\(^12\). The traditional medical systems continue to provide the primary health care to more than three-quarters of the world’s populations. In India many modern medicines are also based on plant based traditional system. The substantial amount of foreign money can be earned by exporting medicinal plants to other countries. In this way traditional medicinal plants play important role on economy of a country. Among the traditional medical system, Kaviraji treatment is one of the major reliable systems. The Kavirajes rely exclusively on medicinal plants or plant parts as their medicament when treating patients for various ailments.

METHODS AND MATERIALS

Study area

The present study was conducted in Terai & Duars of West Bengal, India which is actually situated under the foothills of Himalayan Hotspot. We conducted several interviews with 26 traditional medical practitioners, 341 ethnic people from 36 remote villages in two district namely Jalpaiguri & Darjeeling (foot hills). We are also interacted with the medicinal plants collector for the practitioners.

Data collection

The present data were collected from suffered and cured ethnic people and from kavirajes. We also visited kaviraji medical shops in villages and towns during February 2009 to December 2012. At the same time field visits were undertaken with the help of cured patients. During the field survey a large number of interactions have been done with the patient who is cured by Kaviraj or Hakim or Boidya. Collected plants were processed and herbarium specimens were prepared following standard herbarium techniques by Jain and Rao (1977)\(^13\). Identification has been done by matching at
Central National Herbarium and North Bengal University Herbarium.

RESULT

During the field survey, a total of 52 wetland medicinal plants belonging to 44 genera covering 33 families were recognized. The recorded plants were also summarized with their scientific name, family, local name, voucher number, parts used, used for and dosage (Table 1). The present survey revealed that, Asteraceae is dominating with 4 species followed by Hydrocharitaceae (3 species) and Nymphaeaceae (3 species) etc.

In the study area 10 – 15 % peoples are directly involved in medico herbal treatment by wetland plants. Different plant parts such as rhizome used in the treatment of more than 11 diseases, roots in 18 diseases, leaves in 29 diseases and the whole plant in 12 diseases. Most of the recorded plants were wild.

More than 12 diseases were treated with the wetland medicinal plants. Plants were used to cure of 20 % cough and cold, 16 % dysentery, 13 %, orthopedic problems, 11 %, toxic fever and 7 % in urinary complications in a year. During field survey several anthropogenic stress were found to destroy the wetland biodiversity such as; rapid expansion of civilization, construction of road, rail, increase in population and rapid extension of crop field were the major ones. To save wetland biological resources, conservation of wetland and its plant diversity is very much essential.

DISCUSSION

The medicinal plants prescribed by the Kavirajes of this area are reported in the traditional medicinal systems to be effective against cough and cold, dysentery, toxic fever, orthopaedic problems, urinary complications, gynaecological problems, peptic ulcer, leprosy, asthma, jaundice, bronchitis, diarrhoea, skin diseases, cuts and wounds, digestive problems, skin burns, diabetes, sexual disorders, etc. Acorus calamus, Aescenomene aspera, Monochoria hastata, Marsilea minuta, Colocasia esculenta, Monochoria vaginalis, Nelumbo nucifera, Nymphaea nouchali, Nymphaea pubescens, Pistia stratiotes, Ipomoea aquatica, Spilanthus calva, Hygroryza aristata, Hydrolea zeylanica, Ranunculus scleratus, Eclipta prostrate, Enydra fluctuens, Centella asiatica, etc. are commonly used in various diseases. Leaves, roots, shoot apex are used more frequently by traditional healers.

Finally, it can be concluded that this type of Ethnopharmacological research will helpful to pharmaceutical industry and provide much information useful for framing and/or finalizing strategies for conservation of our indigenous medical knowledge through sustainable utilization of our biological resources.

ACKNOWLEDGMENTS

Authors are thankful to the people of ethnic community and traditional medical practitioners. We are also thankful to the Director, Botanical Survey of India and Additional director of Central National Herbarium, Calcutta for their all possible assistance. University Grant Commission is highly acknowledged for the financial support during the survey which helps to fulfill the said work.

REFERENCES

3. Khan MASA, Mukul SA, Uddin MS, Kibria MG, Sulatana F. The use of medicinal plants in healthcare practices by Rohingya refugees in a degraded forest and conservation area of


<table>
<thead>
<tr>
<th>Botanical name [Family]; Local name; Voucher no.</th>
<th>Parts used</th>
<th>Used against</th>
<th>Mode of use</th>
</tr>
</thead>
</table>
| **Acmella calva** (de Candolle) R.K. Jansen [Compositae]; L.N.: Jang; V.N.: Anurag & A. P. Das 03681 | Shoot apex, root, whole plant | Toothache, affections of throat and gums, tongue paralysis, dysentery etc. | • Flower heads are chewed once daily against toothache and affections of throat and gums and tongue paralysis  
• Shoot apex is a popular remedy for stammering  
• Two teaspoonful of boiled plant extract with water is given against dysentery, twice a day  
• Decoction of whole plant in water is used as bath in rheumatism and as a lotion in scabies |
| **Acorus calamus** Linnaeus [Acoraceae]; L.N.: Botch; V.N.: Anurag & A. P. Das 03684 | Rhizome extract, dried rhizome, tender leaf | Cough and cold, fever, stomach ulcer, bleeding piles, whooping cough of children; prepare hair lotion | • Two tea spoonful rhizome extract is given to cure cough and cold, fever and stomach ulcer twice daily before meal  
• Rhizome oil is applied around the piles twice a day to relief from pain  
• Dried rhizome pieces are worn along with neck chain to cure whooping cough in children  
• Tender leaf is an ingredient for the preparation of traditional hair lotion |
| **Aeschynomene aspera** Linnaeus [Fabaceae]; L.N.: Bhat-Sola; V.N.: Anurag & A. P. Das 03689 | Shoot apex | Cough and cold, fever and increase the consistency of semen | • One tea spoonful extract of aerial part is given four times a day to cure from cough, cold and fever  
• Dried young shoot powder with half teaspoonful sugar powder is given 3-4 times in a week to increase the consistency of semen |
| **Ageratum conyzoides** Linnaeus [Leguminosae]; L.N.: Elame Jhar; V.N.: Anurag & A. P. Das 03698 | Leafy shoot | Minor injuries; prevents dandruff | • Leaf paste is applied in fresh cuts and injuries as required  
• Shoots are used to prepare traditional hair lotion and is used on the scalp before 10 minutes of bath 2-3 times in a week or as required |
| **Alternanthera philoxeroides** (C. Martius) Grisebach [Amaranthaceae]; L.N.: Panimatikaduri, V.N.: Anurag & A. P. Das 03686 | Leafy shoot | Dysentery & fever | • Shoot extract along with little salt is administered in dysentery  
• Two tea spoonful leaf extract is taken daily in early morning |
| **Alternanthera sessilis** (Linnaeus) R. Brown ex de Candolle [Amaranthaceae]; L.N.: *Khenchi shak, Nuni shak*; V.N.: Anurag & A. P. Das 036888 | Leafy twigs, roots | Head ache, dizziness, snakebites, bronchitis, asthma, hepatitis, hypertension, diarrhea, dysentery, fever; prevents blood vomit; enhances milk secretion in new mothers | • One teaspoonful of leaf extract along with little sugar is given once for 5-6 days to cure headache and dizziness  
• Crashed plants, especially roots are used in snakebites  
• Two to three teaspoonful of leaf extract is given to cure blood vomiting, bronchitis, asthma, hepatitis, cramps, diarrhea, dysentery and hypertension  
• Two teaspoonful leaf extract with one cup of lukewarm water is given before sleeping at night for 10 – 15 days to enhance milk secretion in mother  
• Leaf paste is used twice daily in fever as a cooling agent for two to three days |
| **Bacopa monnieri** (Linnaeus) Wettst. [Plantaginaceae]; L.N.: *Brhami*; V.N.: Anurag & A. P. Das 03693 | Leafy shoot, whole plants | To enhance memory power | • Two teaspoonful leaf juice and one teaspoonful honey mixed in one cup of lukewarm water is given in empty stomach early in the morning to enhance memory power |
| **Cardamine hirsuta** Linnaeus [Brassicaceae]; V.N.: Anurag & A. P. Das 03692 | To cure strangury and other urinary complicacies; controls blood pressure | • Cooked plant is eaten for 2-3 days in a week to cure the various urinary complicacies  
• Juice of one leaf is taken once daily to control the blood pressure |
| **Centella asiatica** (Linnaeus) Urban [Apiaceae]; L.N.: *Thankuni*; V.N.: Anurag & A. P. Das 03696 | Fresh plant parts (except root) | Jaundice, leucorrhea, acidity and peptic ulcer, leprosy, mental fatigue, bronchitis, asthma, dysentery, kidney trouble, arthritis, allergy, toxic fever, piles; improves memory | • Paste of freshly collected is boiled in 1 glass of cow milk and taken in the early morning for 7 days for jaundice and leucorrhea  
• Fresh tender leaves are chewed to relieve from acidity and peptic ulcer in the early morning, once daily to till cure  
• Plant paste is used externally in skin diseases and leprosy, two times in a day  
• Two teaspoonful shoot extract is used for memory improvement, treatment of mental fatigue, bronchitis, asthma, dysentery and kidney trouble  
• Plant juice mixed with sugarcane molasses is taken twice a day for 10-15 days against urinary calculus  
• The plant is boiled with the leaves of *Oxalis corniculata* Linnaeus and *Ocimum sanctum* Linnaeus in water and the decoction is taken against dysentery  
• Plant paste and extract is effective in treating pediatric diseases, throat disorders and piles |
| **Chenopodium album** Linnaeus | Leafy shoot | Burns and strangury | • Freshly prepared leaf paste with coconut oil is given in boils and burns |
### Amaranthaceae; V.N.: Anurag & A. P. Das 03695

<table>
<thead>
<tr>
<th>Species</th>
<th>Uses</th>
<th>Remedies</th>
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</thead>
<tbody>
<tr>
<td>Commelina benghalensis</td>
<td>Leaves, roots</td>
<td>Constipation, earache, leprosy, skin inflammations, rheumatic pain, headache, cough &amp; cold</td>
</tr>
<tr>
<td>Commelina diffusa</td>
<td>Leaves, whole plants</td>
<td>Burns, itches, dysentery</td>
</tr>
<tr>
<td>Cheilocostus speciosus</td>
<td>Roots</td>
<td>To enhance sexual potency; prevents pregnancy</td>
</tr>
<tr>
<td>Cynodon dactylon</td>
<td>Stolons, roots</td>
<td>Strangury, dysmenorrheal problems</td>
</tr>
<tr>
<td>Cyperus rotundus</td>
<td>Tubers, rhizomes or whole plants</td>
<td>Cough, bronchitis, vomiting, digestive disorders; anti-poison, stomachache, antifungal, improves memory</td>
</tr>
</tbody>
</table>

### Notes
- One teaspoonful shoot extract is used once in a day in empty stomach for 15 days against strangury.
- Fried leaves are taken as vegetable to cure constipation.
- Warm leaf juice is dropped in ear to get relief from earache twice a day for 10-12 days.
- Leaf juice with coconut oil is applied externally at least one month to cure leprosy and skin inflammations.
- Warm dried leaves are given in twice daily to cure rheumatic pain.
- Leaf paste is applied on boils and burns, thrice daily.
- Plant extract along with little honey is effective in cough and cold.
- Root juice with mustard oil is prescribed in headache.
- The bruised plant is used locally against burns, itches, and boils.
- Leaves are used in dysentery.
- Dust of Roots are used as dysgenic and precursors of steroids like sex hormones and oral contraceptives.
- Root juice is used as a tonic.
- Decoction of ±20 gm of stolon is soaked in half a liter of drinking water for 2-3 hours and is taken in empty stomach with one spoonful of honey, twice daily for a week to cure strangury.
- Plant is chewed in dysmenorrheal disorders; 10 gm thrice a day for 2-3 days.
- Fresh rhizomes boiled with cow milk is given to children in the early morning and in empty stomach to get relief from stomachache.
- Roots and tubers are prescribed as an excellent antidote to all kind of poisons.
- One teaspoonful of root juice is given once daily for 2-3 months for developing high memory power.
- Sometimes plants are prescribed as anti-fungal, anti-parasitic, and anti-rheumatic.
- It cures dyspepsia, vomiting, indigestion, cough, bronchitis, and toxic affections.
- Two teaspoonful of tuber extract is given twice daily at least for one week.
| **Drymaria cordata** (Linnaeus) Willdenow ex Schultes [Caryophyllaceae]; L.N.: Avijal; V.N.: Anurag & A. P. Das 03709 | Plant parts except roots | Muscular pain, cough, dysentery | • Plant is given to use externally twice a day against muscular pain  
• In cough and dysentery, plant extract along with little honey is given once daily at least for one week |
| **Enydra fluctuens** DC. [Compositeae]; L.N.: Shanchi; V.N.: Anurag & A. P. Das 03701 | Shoots or entire plants | Calculus, food poisoning | • Two teaspoonful of boiled plant extract with 50 ml water is given twice a day for 10–15 days to cure calculus  
• One teaspoonful of shoot extract in a day is given as antidote to food poisoning |
| **Eclipta prostrata** (Linnaeus) Linnaeus [Compositae]; L.N.: Kesut; V.N.: Anurag & A. P. Das 03708 | Leaves, shoot apex | Ulcer, spleen enlargement, skin diseases, toothache, headache, improves hair growth | • One teaspoonful of fresh plant juice is given twice daily for 2 months against chronic ulcer  
• Shoot juice is recommended as tonic against spleen swelling  
• The leaf paste is applied externally once daily against skin diseases  
• Application of leaf paste is suggested to get relief from toothache and headache.  
• Leaf juice is mixed with *Sessamum* oil to prepare a hair-gain lotion which is applied directly on scalp to prevent hair loss and dandruff |
| **Glinus oppositifoilus** (Linnaeus) Aug. DC. [Molluginaceae]; L.N.: Gimma; V.N.: Anurag & A. P. Das 03715 | Leaves or whole plants | Gastrointestinal disorders, skin diseases, fever, malaria and wounds | • The leaf juice is recommended once daily against gastrointestinal disorders  
• Paste of whole plant is applied externally twice daily for 2–3 weeks against various types of skin diseases like scabies and itches; also used in joint pains, inflammations, fever, malaria and wounds |
| **Heliotropium indicum** Linnaeus [Boraginaceae]; L.N.: Hatisur; V.N.: Anurag & A. P. Das 03710 | Tender shoots, flowers, leaf | Skin diseases, scorpion sting, conjunctivitis, cuts and wounds | • Paste of tender shoots is applied externally against skin inflammations for two weeks, twice daily  
• Paste of fresh whole plant is applied on affected area against scorpion sting, thrice daily for a week  
• Leaf juice is strained and dropped into eyes to cure conjunctivitis  
• Paste of whole plant along with the rhizome of *Curcuma longa* Linnaeus and applied externally on cuts and wounds as antiseptic |
<p>| <strong>Hydrilla verticillata</strong> (RLinnaeus f.) Royle [Hydrocharitaceae]; L.N.: Jhangi, V.N.: Anurag &amp; A. P. Das 03711 | Leaves, whole plants | Toxic fever, gastrointestinal disorders | • Leaves are crushed with black pepper and made into pills; recommended one pill in once daily against toxic fever and gastrointestinal disorders |</p>
<table>
<thead>
<tr>
<th>Scientific Name</th>
<th>Common Name</th>
<th>Parts Used</th>
<th>Uses</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Hydrolea zeylanica</em> (Linnaeus) Vahl [Hydroloeaceae]; V.N.: Anurag &amp; A. P. Das 03714</td>
<td>Shoots, leaves, whole plants</td>
<td>Cuts and wounds</td>
<td>Shoots are crushed and applied against leprosy, The leaves are used as antiseptic, Boiled plant paste with coconut oil is applied in minor cuts and wounds</td>
</tr>
<tr>
<td><em>Hygrophila auriculata</em> (Schumacher) Heine [Acanthaceae]; L.N.: Kulekara; V.N.: Anurag &amp; A. P. Das 03712</td>
<td>Leaves, seeds</td>
<td>Anemia, impotency, spermatorrhoea</td>
<td>Two spoonful of leaf extract diluted in 50 ml of water is given once daily for 3 months to cure anemia, Powdered dry seeds mixed with goat milk is taken in the morning for treating impotency, Powdered dry seeds mixed with milk and sugarcane molasses is taken twice daily to cure spermatorrhoea</td>
</tr>
<tr>
<td><em>Hygroryza aristata</em> (Retzius) Nees ex Wight. &amp; Arn. [Poaceae]; V.N.: Anurag &amp; A. P. Das 03716</td>
<td>Grains, leaves</td>
<td>Indigestion, skin inflammations</td>
<td>Powder of one table spoonful of grains is given with half cup of lukewarm water in indigestion, once daily, Leaves are recommended to use externally against skin inflammations</td>
</tr>
<tr>
<td><em>Ipomoea aquatica</em> Forsskål [Convolvulaceae]; L.N.: Jal-Kalmi; V.N.: Anurag &amp; A. P. Das 03713</td>
<td>Leaves, stem</td>
<td>Burns, headache, gonorrhea; blood purifier</td>
<td>The leaf juice is given in burns, Fried leaves are taken to cure headache and is recommended as blood purifier, The stem extract are given once daily in empty stomach for a week against ring worm, The plant juice is given to the mentally retarded persons, Two spoonful of leaf juice along with little amount of cow-milk ghee is given once daily for at least one month to cure gonorrhea</td>
</tr>
<tr>
<td><em>Lemna minor</em> Linnaeus [Araceae]; L.N.: Khudipana V.N.: Anurag &amp; A. P. Das 03719</td>
<td>Young fronds</td>
<td>Skin diseases and opthalmic wash</td>
<td>Extract of the shoot part is used against skin diseases, Extract of young fronds is applied drop wise, twice in a day for opthalmic wash</td>
</tr>
<tr>
<td><em>Limnophila indica</em> (Linnaeus) Druce [Plantaginaeaceae]; L.N.: Karpur; V.N.: Anurag &amp; A. P. Das 03691</td>
<td>Shoot apex or whole plant</td>
<td>Dysentery, elephantiasis, cuts and wounds</td>
<td>Shoot extract with ginger and black peeper is prescribed once daily in empty stomach for 15 days to cure dysentery, Shoot paste is applied externally on cuts and wounds as antiseptic, The plant paste with coconut oil is externally used in elephantiasis</td>
</tr>
<tr>
<td><em>Lindernia crustacea</em> (Linnaeus) F. von Mueller [Linderniaceae]; L.N.: Bhumi-nim; V.N.: Anurag &amp; A. P. Das 03717</td>
<td>Leaves, whole plants</td>
<td>Dysentery, ring worm, indigestion</td>
<td>Three spoonful of leaf paste is given orally in early morning to cure dysentery and ring worm, The plant is crushed, mixed with little amount of lukewarm water and is taken in the early morning in empty stomach to clear indigestion and it is also applied to cure excess bile secretion</td>
</tr>
<tr>
<td><em>Ludwigia adscendens</em> (Linnaeus)</td>
<td>Whole plants</td>
<td>Peptic ulcer</td>
<td>The paste of whole plant with rhizome of <em>Curcuma longa</em> Linnaeus is applied</td>
</tr>
<tr>
<td>Plant Name</td>
<td>Part Used</td>
<td>Conditions</td>
<td>Notes</td>
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<tr>
<td>H. Hara [Onagraceae]</td>
<td>Whole plant except root</td>
<td>Fever</td>
<td>• Paste of the areal part of the plant is applied externally thrice a day on forehead in fever</td>
</tr>
<tr>
<td>Ludwigia octovalvis (N. Jacq.)</td>
<td>Whole plant except root</td>
<td>Headache, muscle pain, insomnia, increase sperm formation</td>
<td>• 10 grams of raw leaf paste is applied twice daily on forehead to cure headache</td>
</tr>
<tr>
<td>Marsilea minuta Linnaeus [Marsiliaceae]</td>
<td>Leaves, roots, sometime whole plants</td>
<td>Insanity, boils, burns</td>
<td>• Root extract are used in insanity twice in a day for 12 days</td>
</tr>
<tr>
<td>Monochoria hastata (Linnaeus) Solms [Pontederiaceae]</td>
<td>Roots or rhizome, leaves</td>
<td>Toothache, stomach and liver complaints, orthopedic problems</td>
<td>• Dried root powders are used to relief from toothache</td>
</tr>
<tr>
<td>Monochoria vaginals (Burm.f.) Presl. [Pontederiaceae]</td>
<td>Roots, leaves</td>
<td>Vomiting, ring worm, headache, asthma, piles, stomach and urinary complicacies</td>
<td>• Two spoonful paste of its rhizome along with the shoots of Andrographis paniculata (Burman f.) Nees is applied in ring worm</td>
</tr>
<tr>
<td>Murdannia nudiflora (Linnaeus) Brenan. [Commelinaceae]</td>
<td>Whole plants</td>
<td>Vomiting, ring worm, headach, diarrhea, piles, foot cracks, diabetes, skin diseases</td>
<td>• The milky juice of leaves and flowers are used against toxic infections and to check vomiting and diarrhea</td>
</tr>
<tr>
<td>Nelumbo nucifera Gaertner [Nelumbonaceae]</td>
<td>Rhizome, flowers, young leaf, whole plants</td>
<td>Leprosy, headache, asthma, piles, stomach and urinary complicacies</td>
<td>• Paste of young leaf is applied on forehead to get relief from headache</td>
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<tr>
<td></td>
<td></td>
<td></td>
<td>• One spoonful paste of flower buds with little water is prescribed twice daily for one month as cardiac tonic and also in fever and liver complicacies</td>
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<td></td>
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<td></td>
<td>• Young seed paste is used externally once daily in skin diseases</td>
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<td></td>
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<td></td>
<td>• The 5 gm root paste in 20 ml of lemon juice is taken twice daily for the</td>
</tr>
</tbody>
</table>
| **Nymphaea nouchali** N.L. Burman | Rhizome, flowers, seeds | Skin infection, Dysentery, cardiac problems | • Paste of rhizome and seed is given in dysentery, - one spoonful daily for 30 days  
• Flowers and seeds are soaked in water overnight and 50 ml of decanted water is given once daily for 30 days against various cardiac problems  
• Dry seed powder is applied locally for the treatment of skin infection |
| (Nymphaeaceae); L.N.: Nil Sapla; V.N.: Anurag & A. P. Das 03723 |

| **Nymphaea pubescens** Willdenow | Rhizome or roots, flowers | Blood dysentery, leucorrhoea, abortion, menorrhagia | • Paste of its rhizome and shoots of *Centella asiatica* and given twice daily for 15 days in blood dysentery.  
• Juice of only one rhizome is given against leucorrhoea and menorrhagia  
• One spoonful powdered rhizome with honey is given for piles and dysentery, - once daily for 30 days  
• Two spoonful paste of root and flowers of *Hibiscus rosa-sinensis* Linnaeus, bark of *Ficus religiosa* Linnaeus and seeds of *Sesamum indicum* Linnaeus is taken once daily to induce abortion |
| [Nymphaeaceae]; L.N.: Sada Sapla; V.N.: Anurag & A. P. Das 03732 |

| **Nymphaea rubra** Roxburgh ex Andrews | Roots, flowers | Skin diseases, diarrhea | • Root powder is used externally in piles to check bleedings and in skin diseases  
• 3-4 petals are taken directly in diarrhea |
| [Nymphaeaceae]; L.N.: Lal Sapla; V.N.: Anurag & A. P. Das 03724 |

| **Nymphoides indica** (Linnaeus) Kuntze [Menyanthaceae]; L.N.: Bara-panchuli; V.N.: Anurag & A. P. Das 03725 | Leaves, rhizomes | Cuts and wounds, urinary complains | • Plant paste is applied on cuts and wounds as cooling agent  
• Paste of dried rhizome along with little honey is taken in urinary complicacies |

| **Ottelia alismoides** (Linnaeus) Pearsoon [Hydrocharitaceae]; V.N.: Anurag & A. P. Das 03731 | Leaves, seeds | Boils, burns, skin diseases | • Paste of dry seed is used externally on boils to get relief from burning sensation  
• Dry leaf powder is applied externally on several skin diseases |

| **Oxalis corniculata** Linnaeus [Oxalidaceae]; L.N.: Amrul; V.N.: Anurag & A. P. Das 03721 | Whole plants | Jaundice, indigestion, piles | • Leafy shoot is crushed along with the leaves of *Cajanus cajan* (Linnaeus) Millspaugh and used for preventing jaundice, - two spoonful, thrice daily  
• 10 ml juice of freshly collected plant is taken once daily against piles and indigestion |
| **Pistia stratiotes** Linnaeus [Araceae]; L.N.: Baropana; V.N.: Anurag & A. P. Das 03729 | Leaves, whole plants | ENT complains, eczema, leprosy, ulcers, piles, skin diseases, rheumatism, urinary complains | • Leaf extract is used as drops to cure ENT complications  
• The leaf paste is used in eczema, leprosy, ulcers and piles  
• Leaf juice is boiled with coconut oil and applied externally to cure skin diseases including leprosy and eczema  
• Whole plant is boiled and tied on the swollen parts of body to reduce the rheumatic swellings  
• Two teaspoonful plant extract is applied twice daily for curing urinary complicacies |
| --- | --- | --- | --- |
| **Persicaria hydropiper** (Linnaeus) Delarbre [Polygonaceae]; L.N.: Jal pepper; V.N.: Anurag & A. P. Das 03730 | Leafy shoot, seeds | Fever, dysentery | • Paste of fresh shoot is applied as pultice on forehead to reduce the body temperature during fever  
• One teaspoonful seed powder is soaked in 50 ml lukewarm water for 1-2 hours and the liquid is given twice a day for 30 days to cure dysentery |
| **Persicaria barbata** (Linnaeus) H. Hara [Polygonaceae]; V.N.: Anurag & A. P. Das 03722 | Leaves, seeds | Constipation, skin infections | • One teaspoonful fresh shoot and leaf extract is given against stomach disorder and constipation once a day for 30 days  
• Leaf paste is applied externally against skin infection |
| **Ranunculus scleratus** Linnaeus [Ranunculaceae]; L.N.: Polica, V.N.: Anurag & A. P. Das 03728 | Leaves or whole plant except roots | Eczema, burns, cardiac problems | • Fresh plant is wrapped with banana leaf is slightly burnt and applied on burns for 15 days  
• 20 gm of shoots are boiled with 50 ml of water and the residue is applied externally, once a day for 20 - 30 days on eczema |
| **Rotala rotundifolia** (Buch.-Ham. ex Roxb.) Koehne [Lythraceae]; L.N.: Panijhuri V.N.: Anurag & A. P. Das 03740 | Whole plants except roots | Eczema | • Dry plant powder is mixed with little lime and applied locally, once daily for one week, to cure eczema |
| **Rumex maritimus** Linnaeus [Polygonaceae] L.N.: Pahari palong; V.N.: Anurag & A. P. Das 03726 | Leaves, stem | Burns, injuries, ENT problems | • Leaf paste is wrapped with banana-leaf and half-burnt in wooden fire and then applied externally on burns and wounds  
• The stem juice is warmed and applied drop wise in the ear against ear-pain |
<p>| <strong>Sagittaria sagittifolia</strong> Linnaeus [Alismataceae]; L.N.: Chhota-kut; V.N.: Anurag &amp; A. P. Das 03739 | Roots | Cough and cold | • 15-20 gm of fresh root paste is taken along with 10 ml of honey in cough and cold, once daily for 7 days |
| <strong>Scoparia dulcis</strong> Linnaeus [Plantaginaceae]; V.N.: Anurag &amp; A. P. Das 03733 | Whole plants | Urinary complications | • 10 ml plant extract mixed in fresh raw cow milk is given for relieving urinary complications and removing kidney stones once daily for 30 – 45 days |</p>
<table>
<thead>
<tr>
<th>Plant Name</th>
<th>Part Used</th>
<th>Uses</th>
<th>Treatment Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Typha angustifolia</em> Linnaeus [Typhaceae]; L.N.: <em>Hogla</em> V.N.: Anurag &amp; A. P. Das 03738</td>
<td>Rhizome</td>
<td>Blood dysentery, gonorrhea, measles</td>
<td>Rhizomes paste is given (5-10 ml/ 1 – 2 table spoonful) to cure blood dysentery, gonorrhea and measles, once daily for 10-15 days</td>
</tr>
<tr>
<td><em>Trapa natans</em> Linnaeus [Lythraceae]; L.N.: <em>Panipal</em>; V.N.: Anurag &amp; A. P. Das 03739</td>
<td>Seeds</td>
<td>Dysentery, menstrual disorders</td>
<td>Seeds are pasted with little lukewarm water and are given to cure dysentery and menstrual disorders, twice daily for 21 days</td>
</tr>
<tr>
<td><em>Vallisneria spiralis</em> Linnaeus [Hydrocharitaceae]; L.N.: <em>Pata Syola</em>; V.N.: Anurag &amp; A. P. Das 03741</td>
<td>Whole plants</td>
<td>Rheumatism</td>
<td>Paste of whole plant is used externally on rheumatic swelling to cure rheumatism, once daily for 15 days</td>
</tr>
</tbody>
</table>

L.N. = Local name, V.N. = Voucher number
**Figure 1.** A. Signboard of a kaviraji centre B. Interaction with plant collector C. Interview with practitioner D. Medicine preparing centre E. Roots of *Acorus calamus* F. Fruits of *Trapa natans* G. *Colocasia esculenta* H. *Typha latifolia* I. *Hygrorhiza aristata* J. *Nymphaea rubra* K. *Alternanthera philoxeroides* L. *Hydrolea zeylanica* M. *Pistia stratoites* N. *Monochoria hastata* O. *Hygrophila auriculata*