

# 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<sup>1</sup> 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<sup>2-7</sup>.

Medicinal plants have always been an imperative constituent of healthcare throughout the human history<sup>8</sup>. 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<sup>9-11</sup>. It has further been observed that a number of modern pharmaceutical industry have been derived from plants used by indigenous

people<sup>12</sup>. 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)<sup>13</sup>. 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*, *Aeschenomene 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.

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**Table 1.** Medico herbal treatment by using wetland plants (All the informations are collected from Traditional practitioners and plants collector)

Botanical name [Family]; Local name; Voucher no.	Parts used	Used against	Mode of use
<b><i>Acmella calva</i></b> (de Candolle) R.K. Jansen [Compositae]; L.N.: <i>Jang</i> ; V.N.: <i>Anurag &amp; A. P. Das</i> 03681	Shoot apex, root, whole plant	Toothache, affections of throat and gums, tongue paralysis, dysentery etc.	<ul style="list-style-type: none"> <li>Flower heads are chewed once daily against toothache and affections of throat and gums and tongue paralysis</li> <li>Shoot apex is a popular remedy for stammering</li> <li>Two teaspoonful of boiled plant extract with water is given against dysentery, twice a day</li> <li>Decoction of whole plant in water is used as bath in rheumatism and as a lotion in scabies</li> </ul>
<b><i>Acorus calamus</i></b> Linnaeus [Acoraceae]; L.N.: <i>Botch</i> ; V.N.: <i>Anurag &amp; A. P. Das</i> 03684	Rhizome extract, dried rhizome, tender leaf	Cough and cold, fever, stomach ulcer, bleeding piles, whooping cough of children; prepare hair lotion	<ul style="list-style-type: none"> <li>Two tea spoonful rhizome extract is given to cure cough and cold, fever and stomach ulcer twice daily before meal</li> <li>Rhizome oil is applied around the piles twice a day to relief from pain</li> <li>Dried rhizome pieces are worn along with neck chain to cure whooping cough in children</li> <li>Tender leaf is an ingredient for the preparation of traditional hair lotion</li> </ul>
<b><i>Aeschynomene aspera</i></b> Linnaeus [Fabaceae]; L.N.: <i>Bhat-Sola</i> ; V.N.: <i>Anurag &amp; A. P. Das</i> 03689	Shoot apex	Cough and cold, fever and increase the consistency of semen	<ul style="list-style-type: none"> <li>One tea spoonful extract of aerial part is given four times a day to cure from cough, cold and fever</li> <li>Dried young shoot powder with half teaspoonful sugar powder is given 3-4 times in a week to increase the consistency of semen</li> </ul>
<b><i>Ageratum conyzoides</i></b> Linnaeus [Leguminosae]; L.N.: <i>Elame Jhar</i> ; V.N.: <i>Anurag &amp; A. P. Das</i> 03698	Leafy shoot	Minor injuries; prevents dandruff	<ul style="list-style-type: none"> <li>Leaf paste is applied in fresh cuts and injuries as required</li> <li>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</li> </ul>
<b><i>Alternanthera philoxeroides</i></b> (C. Martius) Grisebach [Amaranthaceae]; L.N.: <i>Panimatikaduri</i> , V.N.: <i>Anurag &amp; A. P. Das</i> 03686	Leafy shoot	Dysentery & fever	<ul style="list-style-type: none"> <li>Shoot extract along with little salt is administered in dysentery</li> <li>Two tea spoonful leaf extract is taken daily in early morning</li> </ul>

<p><b><i>Alternanthera sessilis</i></b> (Linnaeus) R. Brown ex de Candolle [Amaranthaceae]; L.N.: <i>Khenchi shak, Nunia shak</i>; V.N.: <i>Anurag &amp; A. P. Das</i> 036888</p>	<p>Leafy twigs, roots</p>	<p>Head ache, dizziness, snakebites, bronchitis, asthma, hepatitis, hypertension, diarrhea, dysentery, fever; prevents blood vomit; enhances milk secretion in new mothers</p>	<ul style="list-style-type: none"> <li>• One teaspoonful of leaf extract along with little sugar is given once for 5-6 days to cure headache and dizziness</li> <li>• Crashed plants, especially roots are used in snakebites</li> <li>• Two to three teaspoonful of leaf extract is given to cure blood vomiting, bronchitis, asthma, hepatitis, cramps, diarrhea, dysentery and hypertension</li> <li>• 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</li> <li>• Leaf paste is used twice daily in fever as a cooling agent for two to three days</li> </ul>
<p><b><i>Bacopa monnieri</i></b> (Linnaeus) Wettst. [Plantaginaceae]; L.N.: <i>Brhami</i>; V.N.: <i>Anurag &amp; A. P. Das</i> 03693</p>	<p>Leafy shoot, whole plants</p>	<p>To enhance memory power</p>	<ul style="list-style-type: none"> <li>• 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</li> </ul>
<p><b><i>Cardamine hirsuta</i></b> Linnaeus [Brassicaceae]; V.N.: <i>Anurag &amp; A. P. Das</i> 03692</p>		<p>To cure strangury and other urinary complicacies; controls blood pressure</p>	<ul style="list-style-type: none"> <li>• Cooked plant is eaten for 2-3 days in a week to cure the various urinary complicacies</li> <li>• Juice of one leaf is taken once daily to control the blood pressure</li> </ul>
<p><b><i>Centella asiatica</i></b> (Linnaeus) Urban [Apiaceae]; L.N.: <i>Thankuni</i>; V.N.: <i>Anurag &amp; A. P. Das</i> 03696</p>	<p>Fresh plant parts (except root)</p>	<p>Jaundice, leucorrhea, acidity and peptic ulcer, leprosy, mental fatigue, bronchitis, asthma, dysentery, kidney trouble, arthritis, allergy, toxic fever, piles; improves memory</p>	<ul style="list-style-type: none"> <li>• 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</li> <li>• Fresh tender leaves are chewed to relieve from acidity and peptic ulcer in the early morning, once daily to till cure</li> <li>• Plant paste is used externally in skin diseases and leprosy, two times in a day</li> <li>• Two teaspoonful shoot extract is used for memory improvement, treatment of mental fatigue, bronchitis, asthma, dysentery and kidney trouble</li> <li>• Plant juice mixed with sugarcane molasses is taken twice a day for 10-15 days against urinary calculus</li> <li>• The plant is boiled with the leaves of <i>Oxalis corniculata</i> Linnaeus and <i>Ocimum sanctum</i> Linnaeus in water and the decoction is taken against dysentery</li> <li>• Plant paste and extract is effective in treating pediatric diseases, throat disorders and piles</li> </ul>
<p><b><i>Chenopodium album</i></b> Linnaeus</p>	<p>Leafy shoot</p>	<p>Burns and strangury</p>	<ul style="list-style-type: none"> <li>• Freshly prepared leaf paste with coconut oil is given in boils and burns</li> </ul>



[Amaranthaceae]; V.N.: <i>Anurag &amp; A. P. Das</i> 03695			<ul style="list-style-type: none"> <li>• One teaspoonful shoot extract is used once in a day in empty stomach for 15 days against strangury</li> </ul>
<b><i>Commelina benghalensis</i></b> Linnaeus [Commelinaceae]; L.N.: <i>Kanshira</i> ; V.N.: <i>Anurag &amp; A. P. Das</i> 03694	Leaves, roots	Constipation, earache, leprosy, skin, inflammations, rheumatic pain, headache, cough & cold	<ul style="list-style-type: none"> <li>• Fried leaves are taken as vegetable to cure constipation</li> <li>• Warm leaf juice is dropped in ear to get relief from earache twice a day minimum for 10-12 days</li> <li>• Leaf juice with coconut oil is applied externally at least one month to cure leprosy and skin inflammations</li> <li>• Warm dried leaves are given in twice daily to cure rheumatic pain</li> <li>• Leaf paste is applied on boils and burns, thrice daily</li> <li>• Plant extract along with little honey is effective in cough and cold</li> <li>• Root juice with mustard oil is prescribed in headache</li> </ul>
<b><i>Commelina diffusa</i></b> N.L. Burman [Commelinaceae]; L.N.: <i>Kane Jhar</i> ; V.N.: <i>Anurag &amp; A. P. Das</i> 03687	Leaves, whole plants	Burns, itches, dysentery	<ul style="list-style-type: none"> <li>• The bruised plant is used locally against burns, itches and boils</li> <li>• Leaves are used in dysentery</li> </ul>
<b><i>Cheilocostus speciosus</i></b> (J.König) C.Specht [Costaceae]; L.N.: <i>Kust or Keu</i> ; V.N.: <i>Anurag &amp; A. P. Das</i> 03699	Roots	To enhance sexual potency; prevents pregnancy	<ul style="list-style-type: none"> <li>• Dust of Roots are used as dysgenic and precursors of steroids like sex hormones and oral contraceptives</li> <li>• Root juice is used as tonic</li> </ul>
<b><i>Cynodon dactylon</i></b> (Linnaeus) Persoon [Poaceae]; L.N.: <i>Durbaghash</i> ; V.N.: <i>Anurag &amp; A. P. Das</i> 03700	Stolons, roots	Strangury, dysmenorrheal problems	<ul style="list-style-type: none"> <li>• 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</li> <li>• Plant is chewed in dysmenorrheal disorders; 10 gm thrice a day for 2 – 3 days</li> </ul>
<b><i>Cyperus rotundus</i></b> Linnaeus [Cyperaceae]; L.N.: <i>Mutha ghash</i> ; V.N.: <i>Anurag &amp; A. P. Das</i> 03705	Tubers, rhizomes or whole plants	Cough, bronchitis, vomiting, digestive disorders; anti-poison, stomachache, antifungal, improves memory	<ul style="list-style-type: none"> <li>• Fresh rhizomes boiled with cow milk is given to children in the early morning and in empty stomach to get relief from stomachache</li> <li>• Roots and tubers are prescribed as excellent antidote to all kind of poisons</li> <li>• One teaspoonful of root juice is given once daily for 2-3 months for developing high memory power</li> <li>• Sometimes plants are prescribed as anti-fungal, anti-parasitic, and anti-rheumatic</li> <li>• It cures dyspepsia, vomiting, indigestion, cough, bronchitis, and toxic affections</li> <li>• Two teaspoonful of tuber extract is given twice daily at least for one week</li> </ul>

			against indigestion in children
<b><i>Drymaria cordata</i></b> (Linnaeus) Willdenow ex Schultes [Caryophyllaceae]; L.N.: <i>Avijal</i> ; V.N.: <i>Anurag &amp; A. P. Das</i> 03709	Plant parts except roots	Muscular pain, cough, dysentery	<ul style="list-style-type: none"> <li>Plant is given to use externally twice a day against muscular pain</li> <li>In cough and dysentery, plant extract along with little honey is given once daily at least for one week</li> </ul>
<b><i>Enydra fluctuens</i></b> DC. [Compositae]; L.N.: <i>Shanchi</i> ; V.N.: <i>Anurag &amp; A. P. Das</i> 03701	Shoots or entire plants	Calculus, food poisoning	<ul style="list-style-type: none"> <li>Two teaspoonful of boiled plant extract with 50 ml water is given twice a day for 10 – 15 days to cure calculus</li> <li>One teaspoonful of shoot extract in a day is given as antidote to food poisoning</li> </ul>
<b><i>Eclipta prostrata</i></b> (Linnaeus) Linnaeus [Compositae]; L.N.: <i>Kesut</i> ; V.N.: <i>Anurag &amp; A. P. Das</i> 03708	Leaves, shoot apex	Ulcer, spleen enlargement, skin diseases, toothache, headache, improves hair growth	<ul style="list-style-type: none"> <li>One table spoonful of fresh plant juice is given twice daily for 2 months against chronic ulcer</li> <li>Shoot juice is recommended as tonic against spleen swelling</li> <li>The leaf paste is applied externally once daily against skin diseases</li> <li>Application of leaf paste is suggested to get relief from toothache and headache.</li> <li>Leaf juice is mixed with <i>Sessamum</i> oil to prepare a hair-gain lotion which is applied directly on scalp to prevent hair loss and dandruff</li> </ul>
<b><i>Glinus oppositifolius</i></b> (Linnaeus) Aug. DC. [Molluginaceae]; L.N.: <i>Gimma</i> ; V.N.: <i>Anurag &amp; A. P. Das</i> 03715	Leaves or whole plants	Gastrointestinal disorders, skin diseases, fever, malaria and wounds	<ul style="list-style-type: none"> <li>The leaf juice is recommended once daily against gastrointestinal disorders</li> <li>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</li> </ul>
<b><i>Heliotropium indicum</i></b> Linnaeus [Boraginaceae]; L.N.: <i>Hatisur</i> ; V.N.: <i>Anurag &amp; A. P. Das</i> 03710	Tender shoots, flowers, leaf	Skin diseases, scorpion sting, conjunctivitis, cuts and wounds	<ul style="list-style-type: none"> <li>Paste of tender shoots is applied externally against skin inflammations for two weeks, twice daily</li> <li>Paste of fresh whole plant is applied on affected area against scorpion sting, thrice daily for a week</li> <li>Leaf juice is strained and dropped into eyes to cure conjunctivitis</li> <li>Paste of whole plant along with the rhizome of <i>Curcuma longa</i> Linnaeus and applied externally on cuts and wounds as antiseptic</li> </ul>
<b><i>Hydrilla verticillata</i></b> (Linnaeus f.) Royle [Hydrocharitaceae]; L. N.: <i>Jhangli</i> , V.N.: <i>Anurag &amp; A. P. Das</i> 03711	Leaves, whole plants	Toxic fever, gastrointestinal disorders	<ul style="list-style-type: none"> <li>Leaves are crushed with black pepper and made into pills; recommended one pill in once daily against toxic fever and gastrointestinal disorders</li> </ul>



<b><i>Hydrolea zeylanica</i></b> (Linnaeus) Vahl [Hydroleaceae]; V.N.: <i>Anurag &amp; A. P. Das</i> 03714	Shoots, leaves, whole plants	Cuts and wounds	<ul style="list-style-type: none"> <li>Shoots are crushed and applied against leprosy</li> <li>The leaves are used as antiseptic</li> <li>Boiled plant paste with coconut oil is applied in minor cuts and wounds</li> </ul>
<b><i>Hygrophila auriculata</i></b> (Schumacher) Heine [Acanthaceae]; L.N.: <i>Kulekhara</i> ; V.N.: <i>Anurag &amp; A. P. Das</i> 03712	Leaves, seeds	Anemia, impotency, spermatorrhoea	<ul style="list-style-type: none"> <li>Two spoonful of leaf extract diluted in 50 ml of water is given once daily for 3 months to cure anemia</li> <li>Powdered dry seeds mixed with goat milk is taken in the morning for treating impotency</li> <li>Powdered dry seeds mixed with milk and sugarcane molasses is taken twice daily to cure spermatorrhoea</li> </ul>
<b><i>Hygroryza aristata</i></b> (Retzius) Nees ex Wight. & Arn. [Poaceae]; V.N.: <i>Anurag &amp; A. P. Das</i> 03716	Grains, leaves	Indigestion, skin inflammations	<ul style="list-style-type: none"> <li>Powder of one table spoonful of grains is given with half cup of lukewarm water in indigestion, once daily</li> <li>Leaves are recommended to use externally against skin inflammations</li> </ul>
<b><i>Ipomoea aquatica</i></b> Forsskål [Convolvulaceae]; L.N.: <i>Jal-Kalmi</i> ; V.N.: <i>Anurag &amp; A. P. Das</i> 03713	Leaves, stem	Burns, headache, gonorrhoea; blood purifier	<ul style="list-style-type: none"> <li>The leaf juice is given in burns</li> <li>Fried leaves are taken to cure headache and is recommended as blood purifier</li> <li>The stem extract are given once daily in empty stomach for a week against ring worm</li> <li>The plant juice is given to the mentally retarded persons</li> <li>Two spoonful of leaf juice along with little amount of cow-milk ghee is given once daily for at least one month to cure gonorrhoea</li> </ul>
<b><i>Lemna minor</i></b> Linnaeus [Araceae]; L.N.: <i>Khudipana</i> V.N.: <i>Anurag &amp; A. P. Das</i> 03719	Young fronds	Skin diseases and ophthalmic wash	<ul style="list-style-type: none"> <li>Extract of the shoot part is used against skin diseases</li> <li>Extract of young fronds is applied drop wise, twice in a day for ophthalmic wash</li> </ul>
<b><i>Limnophila indica</i></b> (Linnaeus) Druce [Plantaginaaceae]; L.N.: <i>Karpur</i> ; V.N.: <i>Anurag &amp; A. P. Das</i> 03691	Shoot apex or whole plant	Dysentery, elephantiasis, cuts and wounds	<ul style="list-style-type: none"> <li>Shoot extract with ginger and black peeper is prescribed once daily in empty stomach for 15 days to cure dysentery</li> <li>Shoot paste is applied externally on cuts and wounds as antiseptic</li> <li>The plant paste with coconut oil is externally used in elephantiasis</li> </ul>
<b><i>Lindernia crustacea</i></b> (Linnaeus) F. von Mueller [Linderniaceae]; L.N.: <i>Bhumi-nim</i> ; V.N.: <i>Anurag &amp; A. P. Das</i> 03717	Leaves, whole plants	Dysentery, ring worm, indigestion	<ul style="list-style-type: none"> <li>Three spoonful of leaf paste is given orally in early morning to cure dysentery and ring worm</li> <li>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</li> </ul>
<b><i>Ludwigia adscendens</i></b> (Linnaeus)	Whole plants	Peptic ulcer	<ul style="list-style-type: none"> <li>The paste of whole plant with rhizome of <i>Curcuma longa</i> Linnaeus is applied</li> </ul>

H. Hara [Onagraceae]; L.N.: <i>Kessardam</i> ; V.N.: <i>Anurag &amp; A. P. Das</i> 03708			against peptic ulcers and skin diseases
<b><i>Ludwigia octovalvis</i></b> (N. Jacq.) P.H. Raven [Onagraceae]; L.N.: <i>Polte Pata</i> ; V.N.: <i>Anurag &amp; A. P. Das</i> 03707	Whole plant except root	Fever	<ul style="list-style-type: none"> <li>Paste of the areal part of the plant is applied externally thrice a day on forehead in fever</li> </ul>
<b><i>Marsilea minuta</i></b> Linnaeus [Marsiliaceae]; L.N.: <i>Susni Saak</i> ; V.N.: <i>Anurag &amp; A. P. Das</i> 03703	Leaves, roots, sometime whole plants	Headache, muscle pain, insomnia, increase sperm formation	<ul style="list-style-type: none"> <li>10 grams of raw leaf paste is applied twice daily on forehead to cure headache</li> <li>Plants are used to cure pain of leg calf muscles and also given in insomnia</li> <li>Leaf juice along with root extract of <i>Asparagus racemosus</i> Willdenow is taken orally with honey to enhance spermatozoa formation</li> </ul>
<b><i>Monochoria hastata</i></b> (Linnaeus) Solms [Pontederiaceae]; L.N.: <i>Baro Nukha</i> ; V.N.: <i>Anurag &amp; A. P. Das</i> 03706	Roots or rhizome, leaves	Insanity, boils, burns	<ul style="list-style-type: none"> <li>Root extract are used in insanity twice in a day for 12 days</li> <li>Leaf-paste is applied on burns and boils</li> <li>Roots are chewed to get relief from toothache</li> </ul>
<b><i>Monochoria vaginalis</i></b> (Burm.f.) Presl. [Pontederiaceae]; L.N.: <i>Nukha</i> , V.N.: <i>Anurag &amp; A. P. Das</i> 03704	Roots, leaves	Toothache, stomach and liver complaints, orthopedic problems	<ul style="list-style-type: none"> <li>Dried root powders are used to relief from toothache</li> <li>Leaf juice is given twice daily for cough and also useful for stomach and liver complicacies</li> <li>Plant paste is recommended to join cracked bones</li> </ul>
<b><i>Murdannia nudiflora</i></b> (Linnaeus) Brenan. [Commelinaceae]; V.N.: <i>Anurag &amp; A. P. Das</i> 03737	Whole plants	Leprosy, headache, asthma, piles, stomach and urinary complicacies	<ul style="list-style-type: none"> <li>10 grams of plant paste is applied twice daily for 6 months on leprosy</li> <li>Leaf paste is used on forehead to cure from headache</li> <li>One table spoonful of leaf juice is given to cure asthma, piles, stomach and urinary complicacies.</li> </ul>
<b><i>Nelumbo nucifera</i></b> Gaertner [Nelumbonaceae]; L.N.: <i>Paddma</i> V.N.: <i>Anurag &amp; A. P. Das</i> 03727	Rhizome, flowers, young leaf, whole plants	Vomiting, ring worm, headache, diarrhea, piles, foot cracks, diabetes, skin diseases	<ul style="list-style-type: none"> <li>Two spoonful paste of its rhizome along with the shoots of <i>Andrographis paniculata</i> (Burman f.) Nees is applied in ring worm</li> <li>The milky juice of leaves and flowers are used against toxic infections and to check vomiting and diarrhea</li> <li>Paste of young leaf is applied on forehead to get relief from headache</li> <li>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</li> <li>Young seed paste is used externally once daily in skin diseases</li> <li>The 5 gm root paste in 20 ml of lemon juice is taken twice daily for the</li> </ul>

			<p>treatment of piles</p> <ul style="list-style-type: none"> <li>Ash of dry leaf with coconut oil is used for curing foot cracks</li> <li>One spoonful petiole juice is given once daily regularly in peptic ulcer</li> <li>One spoonful of rhizome paste along with little honey is taken once daily against diabetes for 4 weeks.</li> </ul>
<b><i>Nymphaea nouchali</i></b> N.L. Burman [Nymphaeaceae]; L.N.: <i>Nil Sapla</i> ; V.N.: <i>Anurag &amp; A. P. Das 03723</i>	Rhizome, flowers, seeds	Skin infection, Dysentery, cardiac problems	<ul style="list-style-type: none"> <li>Paste of rhizome and seed is given in dysentery, - one spoonful daily for 30 days</li> <li>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</li> <li>Dry seed powder is applied locally for the treatment of skin infection</li> </ul>
<b><i>Nymphaea pubescens</i></b> Willdenow [Nymphaeaceae]; L.N.: <i>Sada Sapla</i> ; V.N.: <i>Anurag &amp; A. P. Das 03732</i>	Rhizome or roots, flowers	Blood dysentery, leucorrhoea, abortion, menorrhagia	<ul style="list-style-type: none"> <li>Paste of its rhizome and shoots of <i>Centella asiatica</i> and given twice daily for 15 days in blood dysentery.</li> <li>Juice of only one rhizome is given against leucorrhoea and menorrhagia</li> <li>One spoonful powdered rhizome with honey is given for piles and dysentery, - once daily for 30 days</li> <li>Two spoonful paste of root and flowers of <i>Hibiscus rosa-sinensis</i> Linnaeus, bark of <i>Ficus religiosa</i> Linnaeus and seeds of <i>Sesamum indicum</i> Linnaeus is taken once daily to induce abortion</li> </ul>
<b><i>Nymphaea rubra</i></b> Roxburgh ex Andrews [Nymphaeaceae]; L.N.: <i>Lal Sapla</i> ; V.N.: <i>Anurag &amp; A. P. Das 03724</i>	Roots, flowers	Skin diseases, diarrhea	<ul style="list-style-type: none"> <li>Root powder is used externally in piles to check bleedings and in skin diseases</li> <li>3-4 petals are taken directly in diarrhea</li> </ul>
<b><i>Nymphoides indica</i></b> (Linnaeus) Kuntze [Menyanthaceae]; L.N.: <i>Bara-panchuli</i> ; V.N.: <i>Anurag &amp; A. P. Das 03725</i>	Leaves, rhizomes	Cuts and wounds, urinary complains	<ul style="list-style-type: none"> <li>Plant paste is applied on cuts and wounds as cooling agent</li> <li>Paste of dried rhizome along with little honey is taken in urinary complicacies</li> </ul>
<b><i>Ottelia alismoides</i></b> (Linnaeus) Pearson [Hydrocharitaceae]; V.N.: <i>Anurag &amp; A. P. Das 03731</i>	Leaves, seeds	Boils, burns, skin diseases	<ul style="list-style-type: none"> <li>Paste of dry seed is used externally on boils to get relief from burning sensation</li> <li>Dry leaf powder is applied externally on several skin diseases</li> </ul>
<b><i>Oxalis corniculata</i></b> Linnaeus [Oxalidaceae]; L.N.: <i>Amrul</i> ; V.N.: <i>Anurag &amp; A. P. Das 03721</i>	Whole plants	Jaundice, indigestion, piles	<ul style="list-style-type: none"> <li>Leafy shoot is crushed along with the leaves of <i>Cajanus cajan</i> (Linnaeus) Millspaugh and used for preventing jaundice, - two spoonful, thrice daily</li> <li>10 ml juice of freshly collected plant is taken once daily against piles and indigestion</li> </ul>

<b><i>Pistia stratiotes</i></b> Linnaeus [Araceae]; L.N.: <i>Baropana</i> ; V.N.: <i>Anurag &amp; A. P. Das</i> 03729	Leaves, whole plants	ENT complains, eczema, leprosy, ulcers, piles, skin diseases, rheumatism, urinary complains	<ul style="list-style-type: none"> <li>• Leaf extract is used as drops to cure ENT complications</li> <li>• The leaf paste is used in eczema, leprosy, ulcers and piles</li> <li>• Leaf juice is boiled with coconut oil and applied externally to cure skin diseases including leprosy and eczema</li> <li>• Whole plant is boiled and tied on the swollen parts of body to reduce the rheumatic swellings</li> <li>• Two teaspoonful plant extract is applied twice daily for curing urinary complicacies</li> </ul>
<b><i>Persicaria hydropiper</i></b> (Linnaeus) Delarbre [Polygonaceae]; L.N.: <i>Jal pepper</i> ; V.N.: <i>Anurag &amp; A. P. Das</i> 03730	Leafy shoot, seeds	Fever, dysentery	<ul style="list-style-type: none"> <li>• Paste of fresh shoot is applied as pultice on forehead to reduce the body temperature during fever</li> <li>• 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</li> </ul>
<b><i>Persicaria barbata</i></b> (Linnaeus) H. Hara [Polygonaceae]; V.N.: <i>Anurag &amp; A. P. Das</i> 03722	Leaves, seeds	Constipation, skin infections	<ul style="list-style-type: none"> <li>• One teaspoonful fresh shoot and leaf extract is given against stomach disorder and constipation once a day for 30 days</li> <li>• Leaf paste is applied externally against skin infection</li> </ul>
<b><i>Ranunculus scleratus</i></b> Linnaeus [Ranunculaceae]; L.N.: <i>Polica</i> , V.N.: <i>Anurag &amp; A. P. Das</i> 03728	Leaves or whole plant except roots	Eczema, burns, cardiac problems	<ul style="list-style-type: none"> <li>• Fresh plant is wrapped with banana leaf is slightly burnt and applied on burns for 15 days</li> <li>• 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</li> </ul>
<b><i>Rotala rotundifolia</i></b> (Buch.-Ham. ex Roxb.) Koehne [Lythraceae]; L.N.: <i>Panijhuri</i> V.N.: <i>Anurag &amp; A. P. Das</i> 03740	Whole plants except roots	Eczema	<ul style="list-style-type: none"> <li>• Dry plant powder is mixed with little lime and applied locally, once daily for one week, to cure eczema</li> </ul>
<b><i>Rumex maritimus</i></b> Linnaeus [Polygonaceae] L.N.: <i>Pahari palong</i> ; V.N.: <i>Anurag &amp; A. P. Das</i> 03726	Leaves, stem	Burns, injuries, ENT problems	<ul style="list-style-type: none"> <li>• Leaf paste is wrapped with banana-leaf and half-burnt in wooden fire and then applied externally on burns and wounds</li> <li>• The stem juice is warmed and applied drop wise in the ear against ear-pain</li> </ul>
<b><i>Sagittaria sagittifolia</i></b> Linnaeus [Alismataceae]; L.N.: <i>Chhota-kut</i> ; V.N.: <i>Anurag &amp; A. P. Das</i> 03739	Roots	Cough and cold	<ul style="list-style-type: none"> <li>• 15-20 gm of fresh root paste is taken along with 10 ml of honey in cough and cold, once daily for 7 days</li> </ul>
<b><i>Scoparia dulsis</i></b> Linnaeus [Plantaginaceae]; V.N.: <i>Anurag &amp; A. P. Das</i> 03733	Whole plants	Urinary complications	<ul style="list-style-type: none"> <li>• 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</li> </ul>

<b><i>Typha angustifolia</i></b> Linnaeus [Typhaceae]; L.N.: <i>Hogla</i> V.N.: <i>Anurag &amp; A. P. Das</i> 03738	Rhizome	Blood dysentery, gonorrhoea, measles	<ul style="list-style-type: none"> <li>Rhizomes paste is given (5-10 ml/ 1 – 2 table spoonful) to cure blood dysentery, gonorrhoea and measles, once daily for 10-15 days</li> </ul>
<b><i>Trapa natans</i></b> Linnaeus [Lythraceae]; L.N.: <i>Paniphal</i> ; V.N.: <i>Anurag &amp; A. P. Das</i> 03739	Seeds	Dysentery, menstrual disorders	<ul style="list-style-type: none"> <li>Seeds are pasted with little lukewarm water and are given to cur dysentery and menstrual disorders, twice daily for 21 days</li> </ul>
<b><i>Vallisneria spiralis</i></b> Linnaeus [Hydrocharitaceae]; L.N.: <i>Pata</i> <i>Syola</i> ; V.N.: <i>Anurag &amp; A. P. Das</i> 03741	Whole plants	Rheumatism	<ul style="list-style-type: none"> <li>Paste of whole plant is used externally on rheumatic swelling to cure rheumatism, once daily for 15 days</li> </ul>

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 stratiotes* N. *Monochoria hastata* O. *Hygrophila auriculata*