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Ayurvedic medicinal plant used for healthcare by Tharu tribes of Balrampur district (U.P.)

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Abstract

This study is an outcome of repetitive field trips made in Sohelwa forest during 2016 and 2017. About 15 species were collected from different localities. The extensive surveys were carried out in different areas of district Bahraich, Shrawasti, Balrampur and Gonda during February-March 2017. Historical aspects were studied with the help of local people and inventory is prepared. The documentation including name of deity, extent and status of total area has also been carried out.

The inhabitants of the area have to use the wild edible plants for various purposes and dependant on surrounding plant resources for a long time for their food and other cultural purposes. The tribes of the state largely depend on forests for their livelihood and have acquired a vast knowledge about plant wealth and utilization of forest products. An Ethno botanical field study reveals that the ethnic people have considerable traditional knowledge of wild edible plants and their utilization. Different plants available in the locality used by the tribals. The sustainable harvesting and management issue of Ethnomedicinal species are discussed in view of their conservation and managements.

Keywords: tribals, ayurvedic industries, sohelwa wildlife forest division Balrampur District, Uttar Pradesh

Introduction

Sohelwa wildlife forest division is situated in district Shrawasti and Balrampur. The geographical area of the, forest is 45,000 hectares and is located in within 27° 30' 01" and 27° 55' 92" N latitude and 81° 55' 36" and 82° 48' 35" E longitude. The two forest range East and West Sohelwa of Shrawasti district are in the administrative control of Sohelwa Wildlife Division, Balrampur.

Tharu tribes are most backward community which is localized both side of the Siwalik range in parallel strip of tarai at India-Nepal border. Presently this community lives in Gorakhpur, Baharaich, Basti, Balrampur, Lakhimpur Kiri, Pilibhit and Bijanaur district in U.P. and in Nainital, Udhamasingh Nagar, and Champavat district in Uttarakhand. In Balrampur, maximum population of Tharu tribe live in Gainsri and Panchperawa development blocks of Tulsipur tahasil. Out of total tharu tribes of district, 70.68% tribe live in Panchaperawa and 22.51% tribe live in Gainsara development block. 06.06% of tharu population is live in five forest village (vangram) which is reserved forest and attached with Gansari and Panchperawa development block. Due to those poor circumstances of survival, Tharu tribes do not get rich diet/meal. They survive themselves on self produced grain and forest products like fruits, vegetable and hunted animals. They get less nutrition and calories in their food. Environmetal their habitat has greatly affected their food culture. Ethnobotanical values of plants are of paramount importance because examination of drugs used in the traditional medicine in the various countries of the world is one of the priority programs of WHO (Pasquale, 1984). Pharmacognosy is undoubtedly one of the best of botanical sciences since the primitive man started to use medicinal plants to overcome his various ailments. However, in most of the medico ethnobotanical studies, this aspect of information is greatly neglected (Jain, 1993). Consequently in present study, due attentions has been paid on how the plant are plant product is utilized, the method of drug preparation and its mode of administration have been tried to collect. Extensive survey visits were conducted and tried to accompany the tribals. Plants were collected their local names, parts of the plant used in medicine, method of properation of the medicine and its mode of administration was noted in field notebook with the help of informants.

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Research Objectives

1. Invention or Documentation of Ethnobotanically important plants of Sohelwa wildlife forest Division.
2. Collection of ethnic utilization different plants from the ethnic groups.
3. Selection of five potential plants having different biological or medicinal properties.
4. Evaluation of the biological or medicinal claims by the ethnic groups for Conservation of potential plants of the area.

Methodology

This study is an outcome of repetitive field trips made in Sohelwa forest during 2016 and 2017. About some species were collected from different localities. The extensive surveys were carried out in different areas of district Bahraich, Shrawasti, Balrampur and Gonda during February-March 2017. Historical aspects were studied with the help of local people and inventory is prepared. The documentation including name of deity, extent and status of total area has also been carried out.

1. Chemical Analysis of Generally Used for Tharus plant.
2. Herbs plant used by Tharu Tribes for Medicinal Purposes.

Some Ayurvedic Medicinal plant used by Kathuria & Dangauria Tharus of Sohelwa Forest, Balrampur U.P. India and their chemical analysis and uses by tharu tribes are as follows-

Rauwolfia serpentine (Sarpagandha)

Chemical analysis

Dried root of *R. serpentina* is called Radix Rauwolfiae. The *Rauwolfia* species chiefly contain alkaloids, iridoids, flavonoids, terpenes, sterols, sugars and fatty acids. The total alkaloid content ranges from about 1.5-3.0 % and is concentrated in the root bark, latex vessels and secretory cells. Radix Rauwolfiae contains more than 60 indole alkaloids, the principle hypotensive alkaloids are reserpine, ajmaline, ajmalicine, serpentine and yohimbine. The roots of *Rauwolfia* have been found to exhibit a variety of effects such as sedation, bradycardia, myosis, ptosis, tremors, relaxation of nictating membranes and diarrhea. It is highly reputed for hypertension and is useful in stangury, fever, wounds, colic, insomnia giddiness, anxiety states, maniacal psychosis, schizophrenia, dyspepsia, hyperglycemia and hypochondria. The roots are laxative, anthelmintic, thermo genic and diuretic. The decoction of the root is used to stimulate uterine contractions during child birth. The juice of the leaf is used for the removal of opacities of the cornea.

Major alkaloids of *Rauwolfia Serpentine*

Reserpina

Pharmacologically it is the most potent alkaloid found in *Rauwolfia*. It is a relatively weak tertiary base occurring in the oleoresin fraction of the roots. It is 3, 4 5- trimethyl benzoic and ester of reserpic acid, an indole derivative of 18- hydroxy yohimbine type. It is also present in traces in stem and leaves. It has a depressant action on central nervous system and produces sedation and lowering of blood pressure. Administration of reserpine depletes the brain and peripheral vessels of serotonin (5- hydroxy tryptamine) and catechol amines. Its primary effect on brain leads to sedation, whereas its secondary action on peripheral vessels produces antihypertensive action. Besides the amine concentration in

brain it is also reported to influence the concentration of glycogen, acetylcholine, α - amino butyric acid, nucleic acid and antidiuretic hormones. Reserpine is now being used as a tool in physiological studies of body functions and pharmacological studies of other drugs. Reserpine is added to poultry feed for growth promotion and feed efficiency (CSIR, 1969).

Ajmaline

Ajmaline is the major alkaloid of *R. serpentina*. It is ditertiary indole base. It is pharmacologically closely related to quinidine. It has been reported to stimulate respiration and intestinal movements. It is effective against extra systoles and exhibits useful adjunctive action in auricular fibrillation and a few other heart conditions. It is used in arrhythmia as it slows down the rhythm due to potent sodium channel blocking properties (Rolf *et al.*, 2003). Ajmaline produces no sedation. Ajmaline may be useful in combination with antihypertensive agents for the treatment of hypertension complicated by a cardiac condition.

Ajmalicine (Raubasine)

It is a stereo isomer of tetrahydro alstonine. It possesses a central depressant activity in addition to its adrenergic blocking activity. Ajmalicine causes hypotension with renal vasodilation. It is sympatholytic.

Serpentine

It is a yellow quaternary indolic anhydronium base. Serpentine causes marked inhibition of succinate dehydrogenase in brain and liver tissues. It produces systemic and pulmonary hypotension due to a decrease in cardiac output. It inhibits intestinal movements.

Yohimbine

Yohimbine (rauwolscine) causes hypotension. It is reported to be cardiovascular depressant with hypnotic activity. It is a 2-adrenoceptor antagonist with potential clinical applications in erectile dysfunction.

Sarpagandha used by Tharu tribes

1. Sarpagandha is one of the most important herbs in Ayurvedic medicine system learn what are its health benefits and how you can use this to treat different disease.
2. In Ayurvedic formulations, Sarpagandha is prescribed for Tharu treatment of high blood pressure, insomnia, asthma, stomach and pain delivery and for mental illness (Neuropsychiatric disorders psychosis, schizophrenia).
3. It is used in snake bite, insect stings and mental disorder.
4. Sarpagandha is also used in treatment of other disease such as gastric tumor, general weakness, hysteria, insomnia, insanity lipola, paraplegia, parapneumonia, pneumonia, splenomegaly, stomach disorder, tuberculosis and pain in abdomen body and chest.

Helminthostachys zeylanica (Kamraj)

Chemical analysis

For the present work, soil color was recorded by Munsell's soil color chart, soil texture was recorded by hand touch, soil moisture and water holding capacity were estimated as methods described by Misra, (1968), soil pH was recorded by ELICO LI 613 pH meter, organic carbon was recorded by method given by Walkley and Black, (1934), organic matter was calculated as formula organic carbon x factor 1.724, total

nitrogen was estimated by the Micro- Kjeldahl method Misra, (1968), available phosphorus and available potassium were estimated by Phosphomolybdc Blue Colorimetrically and Flame.

Photometer (Jackson, 1958) respectively.

Major alkaloids of *Helminthostachys zeylanica*.

Hepatoprotective

Study of ethanolic extracts of rhizome of HZ showed significant hepatoprotective effect against CCl₄-induced damage liver damage in rats and presents scientific rational for its folkloric use in liver diseases.

Antioxidants

1. Study yielded eight flavonoides, ugonins E-L(1-8) from the rhizomes of HZ. Compounds 6,7 & 8 showed significant antioxidants activity.
2. Study yielded three new cyclised stilbenes ugonstilbene A,B&C which exhibited moderate antioxidant activity.

Neuroprotective

Study has isolated Ugonin K, a flavonoid from the rhizome of *H. zeylanica*. Results suggest ugonin K has neuroprotective activity through activation of ERK1/2 and PI3K/Akt signal pathways which protects against H₂O₂-induced apoptosis.

Anti-Inflammatory / Flavonoids

Study isolated 8 new prenylated flavonoids, ugonins M-T together with five known compounds, ugonins J-L (9-11), 5,4'-dihydroxy-4'',4''-dimethyl-5''-methyl-5''H dihydrofuran[2'',3'';6,7]flavanone, and quercetin. Some compounds showed inhibition of superoxide anion generation and elastase release by human neutrophils in response to FMLP/CB.

Aphrodisiac

Administration of a methanol extract of *H. zeylanica* rhizome to male mice significantly stimulated the sexual behavior as shown by increase in number of mounts, mating and reproductive performance.

Antioxidant flavonoids

Eight flavonoids, ugonins E-L were isolated from the rhizomes of *Helminthostachys zeylanica*. Compounds 3-8 were evaluated for their antioxidative activity in a DPPH assay. Compounds 6, 7 and 8 were more active than Trolox.

Ugonin J Flavonoid / Antioxidant

Study isolated Ugonin J from the dried rhizomes of *H. zeylanica*. A previous study has shown antioxidant activity with Ugonin J, K, and L.

Cytotoxicity / toxicity of combinations

Three plants -- *Tacca integrifolia*, *Helminthostachys zeylanica*, and *Eurycoma longifolia*. All three were cytotoxic to human cell lines, Hep2 and HFL1. A combined extract of *E. longifolia* and *H. zeylanica* was more cytotoxic than a single extract on Hep2 cell line. Study suggests there is higher toxicity risk of consuming combination of *H. zeylanica* with either *T. integrifolia* or *E. longifolia*, and products using these combinations should be avoided.

Ugonin K flavonoid / promotion of osteoblastic differentiation and mineralization

Study showed a potential anabolic effect of ugonin K on bone

probably through activation of p38- and ERK-mediated Runx2 and osteon expressions to induce synthesis of osteoids and formation of bone nodule.

Helminthostachys zeylanica used by Tharu Tribes-

1. The tender shoot and leaves are fried with oil, chillies and salts to a taste eaten as vegetables.
2. The crushed leaves are taken with sugar for health improvement (Chakma).
3. Boiled fronds are taken to stop burning sensation during urination (dysurea).
4. The plant has intoxicating properties used in sciatica. It is regarded in the Moluccas as a mild aperitif. The plant is also used to stop hemorrhage by tribal in khagrachari.
5. Decoction of rhizome is used in impotency. In Bandarban, root juice along with other plant is given orally in jaundice by the marma.
6. Leaf juice relieves tongue blisters.

Asparagus racemosus (Santawar)

A study of ancient classical Ayurvedic literature claimed several therapeutic attributes for the root of *A. racemosus* and has been specially recommended in cases of threatened abortion and as a galactagogue. Root of *A. racemosus* has been referred as bitter-sweet, emollient, cooling, nervine tonic, constipating, galactagogue, aphrodisiac, diuretic, rejuvenating, carminative, stomachic, antiseptic³⁵ and as tonic. Beneficial effects of the root of *A. racemosus* are suggested in nervous disorders, dyspepsia, diarrhoea, dysentery, tumors, inflammations, hyperdipsia, neuropathy, hepatopathy, cough, bronchitis, hyperacidity and certain infectious diseases. This review describes various pharmacological properties of the root extract of *A. racemosus* evaluated/reported so far. The major active constituents of *Asparagus racemosus* are steroidal saponins (Shatavarins I-IV) that are present in the roots. Shatavarin IV has been reported to display significant activity as an inhibitor of Core 2 GlcNAc transferase in cell free assays and recently to exhibit immuno-modulation activity against specific T-dependent antigens in immuno compromised animals.

Chemical analysis

Recent chemical analysis indicate that the following active constituents are present in *Shatavari* plant: Steroidal saponins, known as shatavarins (I, IV), sarsasapogenin, ascendin (A, B), asparanin (A, B, C). Shatavarin I is the major glycoside with 3 glucose and rhamnose moieties attached to sarsasapogenin. Shatavarin IV is a glycoside of sarsasapogenin having 2 molecules of *Asparagus* rhamnose and 1 molecule of glucose. Sarsasapogenin and shatavarin I-IV are present in roots, leaves, and fruits of *Asparagus* species.

Synthesis of sarsasapogenin in the callus culture of *A. racemosus* was also reported^{18, 91}. A new isoflavone, 8-methoxy-5, 6, 4'-trihydroxyisoflavone-7-O-β-d-glucopyranoside was also reported from *A. racemosus* previously.

Asparagus racemosus used by Tharu Tribes

Asparagus racemosus (Shatavari) is used by ayurvedic doctors for the prevention and treatment of gastric ulcers, dyspepsia and as a galactagogue. It has also been used successfully by some ayurvedic practitioners for nervous disorders, inflammation, liver diseases and certain infectious diseases. Recently few reports are available demonstrating

beneficial effects of alcoholic and water extracts of the root of *Asparagus racemosus* in some clinical conditions and experimentally induced diseases, e.g. galactagogue effect, antihepatotoxic and immunomodulatory activities.

Malva parviflora (Bariyara)

Diabetic rats were treated with the hexane, chloroform and methanol extracts of the *M. parviflora* leaves for 28 days and a set of biochemical parameters were studied including: glucose level, total cholesterol, triglycerides, lipid peroxidation, liver and muscle glycogen, superoxide dismutase, catalase, glutathione peroxidase and glutathione reductase. We also looked into liver function by determining glucose-6-phosphatase, glucokinase and hexokinase activities, and the effect of the extracts on insulin level and protein glycation. As a result we found that with the hexane extract the blood glucose level, serum biochemical parameters, hepatic enzymes, thiobarbituric acid reactive substances, glycosylated hemoglobin, advanced glycation end products, and insulin level were restored in streptozotocin induced diabetic rats to normal

Chemical Analysis

All analytical grade chemicals used in this study were purchased from E. Merck, Germany. Formalin, absolute alcohol, safranin, fast green, acetic acid, canada balsam, chloral hydrate, bees wax, H₂SO₄, NaOH, NHO₃, FeCl₃, distilled water, aniline, potassium hydroxide, and chloroform.

Plant collection

The whole plant was washed and 3/4th part was shade dried and then pulverized while 1/4th part was subjected to separation of its different parts *i.e.* leaves, roots, stem and fruit.

Organoleptic evaluations

Organoleptic evaluations were performed according the color, size, odor and taste parameters.

Macroscopic evaluations

Different macroscopic parameters of stem, root, fruit and leaves were noted. Leaves evaluation include absence or presence of petioles and different characters of lamina *i.e.* shape indentations, base, texture, venations, apex. Root was studied for its size, shape, surface, fracture.

Microscopic evaluations

Microscopy evaluations were done on both qualitative and quantitative basis. All evaluations were performed on labomed compound microscope.

Qualitative microscopy

For qualitative microscopic analysis transverse section of stem, leaf, and root were made by using microtome. Staining procedure was performed as per standard procedure.

Malva parviflora Used by Tharu Tribes

In the present studies we have focus our investigations on one of the commonly available plant *i.e.* *Malva parviflora*. It belongs to Malvaceae family. The plants of this family have a major contribution in the treatment of cough, throat infection and other bronchial problems as well as stomach and intestine irritations. The flowers and leaves are emollient and used for the softening of sensitive area of the skin. It is applied as poultice to reduce swelling and draw out toxins. The leaves

help to reduce gut irritation and have laxative effects. Different species are used to treat various diseases, *e.g.* *Gossypium*: to treat new born baby ailments, flu, cold, fever and tuberculosis. *Hibiscus*: to treat cough, stomach troubles, syphilis, urethral discharge, urethritis, ulcers, gonorrhea, tooth ache and leg disease. *Sida* spp.: to treat arthritis, sores, cough, bile, anemia, guinea worms, general weakness, snake bite, kidney problem, impotence, placental expellant, lumps, constipation and stomach cramps.

1. *M. parviflora* has also been used for the treatment of headache, fever, sores and various digestive complaints. A decoction of roots or leaves has also been used as a hair rinse to remove dandruff and to soften the hair.
2. It was further investigated that hexane, methanol and water extract of whole *M. parviflora* exhibited strong antibacterial activities against broad range of both Gram positive and Gram negative bacteria ^[10]. Further, hexane extract of whole herb also showed anti-inflammatory activity.
3. Wound healing properties of whole herb of *M. parviflora* was also investigate.
4. Herbal plants or botanical medicines have been used traditionally by herbalist worldwide for the prevention and treatment of liver disease.

Eclipta prostrate (Bhagaraiya)

Eclipta prostrata commonly known as False Daisy, yerba de tago, and bhringraj, is a plant belonging to the family Asteraceae. Roots well developed, cylindrical, grayish. It is also named 'kehraj' in Assamese and karisalankanni in Tamil. Floral heads 6-8 mm in diameter, solitary; florets white; achene compressed and narrowly winged. *Eclipta prostrata* grows commonly in moist places as a weed in warm temperate to tropical areas worldwide. It is widely distributed throughout India, China, Thailand, and Brazil. In ayurvedic medicine, the leaf extract is considered a powerful liver tonic, rejuvenative, and especially good for the hair. A black dye obtained from *Eclipta prostrata* is used for dyeing hair and tattooing. *Eclipta prostrata* also has traditional external uses, such as for athlete's foot, eczema and dermatitis, and on the scalp to address hair loss; the leaves have been used in the treatment of scorpion stings. It is used as anti-venom against snakebite in China and Brazil. It is reported to improve hair growth and color.

Chemical analysis

Phytochemistry

The roots are very rich in thiophene, also contains wedelolactone and demethyl wedelolactone. The partially purified ethyl acetate extract (PEE) of *Eclipta prostrata* was found to contain 47% of wedelolactone as its major constituent. The whole plant contains nicotine and stigmaterol. Proximal analysis of seeds: water: 0%; proteins: 15.6%, fats: 13.1%. The entire plant contains triterpenes: ecalbatin, echinocystic acid, oleanic acid, ursolic acid; flavone: luteoline.

Pharmacological Actions

It is alterative, antiinflammatory, anthelmintic, digestive, carminative, haematonic, depurative, deobstruent, antihepatotoxic, hepatoprotective, antiviral, antibacterial, antioxidant and febrifuge.

It is deobstruent, antihepatotoxic, anticatarrhal, hepatoprotective and febrifuge.

Eclipta prostrate used by Tharu Tribes

- 1 The leaf extract is considered a powerful liver tonic, rejuvenative, and especially good for the hair.
- 2 Eclipta alba also has traditional external uses, like athlete foot, eczema and dermatitis, on the scalp to address hair loss and the leaves have been used in the treatment of scorpion stings.
- 3 It is reported to improve hair growth and colour.
- 4 A preparation obtained from the leaf juice boiled with sesame or coconut oil is used for anointing the head to render the hair black and luxuriant.
- 5 It is useful in Hepato-splenomegaly and its associated disorders, anorexia, jaundice, hepatitis and liver disorders.
- 6 It is used in hepatitis, spleen enlargements and liver disorders.
- 7 It is a hair tonic and is good for blackening, strengthening and promoting of hairs.
- 8 It promotes hair growth. Its extract in oil is applied to scalp before bed time in insomnia.

Equisetum arvense (Harjor)

Researchers believe that the medicinal property of horsetail is due to its high silica content. Horsetail has been used as a folklore medicine for treatment of various conditions such as tuberculosis, as a catarrh in the kidney and bladder regions, as a hematostatic for profuse menstruation, nasal, pulmonary and gastric hemorrhages, for brittle fingernails and loss of hair, for rheumatic diseases, gout, poorly healing wounds and ulcers, swelling and fractures and for frostbite.

Chemicals analysis

The mineralization technique for the sample analysis required nitric acid HNO₃ (65%) and hydrofluoric acid HF (46%) which were bought from the Sigma Aldrich Co. The silicon standard (Si) was from company Ultra scientific. We used a 2% solution of HNO₃ and deionized water with the conductivity of <0.1 μS for extract stabilization. We used a Speedwave 2 Berghof for mineralization, with a voltage of ~230 V, frequency of 50/60 Hz, power consumption of 1610 W, and a magnetron frequency of 2450 MHz. Pressure vessels DAP-60K, volume 60 ml, maximum pressure 40 bar, maximum temperature 230 °C, maximum weight < 300 mg, minimum volume of acids > 5 ml. Atomic Absorption Spectrophotometers (AAS 7000) from Shimadzu company. Fully automatic dual-beam instrument with 3D-optic system, automatic 6-lamp holder, correction of background by D-lamp with SR-correction of spectral interferences.

Equisetum arvense Used by Tharu Tribes

1. Silicic acid is a soluble form of silicon and one of the basic form, which is absorbed and used by plants. Polymerized silicates belong to the group of the hardest materials in plant tissues. Silicon helps to raise the plant health by the creating of strongest and more resistant structures. Plants which are attacked by the herbivores tend to accumulate more oxides.
2. It is one of the oldest plants on earth and what remain today from tree-sized fossils are the field horsetails. They were used in historical times for scouring pots and polishing pewter and were commonly called "scouring rushes". Horsetails have found extensive application in medicine as a source of silica, as it can amount to 25% of the dry weight of the plant.
3. Silicon from horsetail promotes the growth and stability of the skeletal structure. An invention describing a

pharmaceutical composition based on *Equisetum arvense* for the treatment of bone diseases, particularly osteoporosis.

4. A few European clinical studies have determined that fractured bones heal much more quickly when horsetail is taken. The incidence of osteoporosis is, likewise, more greatly reduced when some horsetail is added to the diet. Horsetail extract is also added in a composition used against psoriasis.
5. Researchers believe that the medicinal property of horsetail is due to its high silica content. Horsetail has been used as a folklore medicine for treatment of various conditions such as tuberculosis, as a catarrh in the kidney and bladder regions, as a hematostatic for profuse menstruation, nasal, pulmonary and gastric hemorrhages, for brittle fingernails and loss of hair, for rheumatic diseases, gout, poorly healing wounds and ulcers, swelling and fractures and for frostbite.
6. Silicon increases the resistance against mold. Recent researches noted that first reaction after fungi attack is higher at silicic acid presence.
7. Growing of the plants is supported by the silicates, which allows better flexibility and extensibility of cells walls. The content of silicon had negative correlation with lignin and cellulose at wetland macrophytes. It substitutes the mechanical role of these polymers.

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