Indigenous Use and Ethnopharmacology of Medicinal Plants in Far-west Nepal

Ripu M. Kunwar, Y. Uprety, C. Burlakoti, C.L. Chowdhary and R.W. Bussmann

Abstract

Ethnopharmacological knowledge is common and important among tribal populations but much of the information is empirical at best lacking scientific validation. Despite widespread use of plant resources in traditional medicines, bioassay analysis of very few plant species have been conducted to investigate their medicinal properties, and to ascertain safety and efficacy of traditional remedies. The present study analyses indigenous uses of medicinal plants of far-west Nepal and compares with earlier ayurveda studies, phytochemical assessments and pharmacological actions. A field study was carried out in Baitadi and Darchula districts of far-west Nepal. Group discussions, informal meetings, questionnaire surveys and field observations were employed for primary data collection. Voucher specimens were collected with field notes and codes and deposited at Tribhuvan University Central Herbarium (TUCH), Kathmandu. Only 50% of species surveyed shared common uses with ayurvedic medicine. This implies that these herbal remedies are part of an independent health care system in the Nepal Himalaya, which is indigenous and influenced by ayurveda. The folk uses of some of the species were contradicting to those of ayurveda and phytochemical bioassays. A detailed phytochemical study on those species would be an important line of research.

Introduction

Medicinal plants help in alleviating human suffering and are widely used for subsistence, home remedies, and trade (Kunwar et al. 2006). It is estimated that 70-80% of people worldwide rely on traditional herbal medicine to meet their primary health care needs (Farnsworth & Soejarto 1991). The ayurveda is an ancient traditional system of medicine with remedies for health and alleviation of illness. The acceptance of the ayurveda is gearing up and use of indigenous drugs of natural/plant origin is a major part of these theraies. Interest in phytomedicine is also renewed during the last decade and many medicinal plant species are being screened for pharmacological activities. The global demand of herbal medicine is growing and its market is expanding at the rate of 20% annually in India (Srivastava 2000, Subrat 2002). The world market for herbal remedies in 1999 was worth of U.S.$19.4 billion (Laird & Pierce 2002). Numerous drugs have entered into the international market through exploration of ethnopharmacology and traditional medicine (Bussmann 2002) with extensive uses of medicinal plants. It is estimated that 25% of prescription drugs contain active principles derived from higher plants (Tiwari & Joshi 1990). The first compound derived from herbal remedies to enter the international market was ephedrine, an amphetamine-like stimulant from Ephedra sinica Stapf. The next was artemisinin, a potent antimalarial drug from Artemisia annua L. (Patwardhan et al. 2005). Numerous other molecules have come out of the ayurvedic experiential base, including alkaloids of Rauvolfia for hypertension, Holarrhena for amoebiasis, Mu-
cuna pruriens (L.) DC. for Parkinson’s disease, Commiphora as a hypolipidemic, Asclepias as cardiotonic, psoralens for vitiligo, curcumines for inflammation, baccoside for mental retention, picrosides for hepatoprotective, diosgenin for the synthesis of steroidal hormones, guggulsterons as hypolipidemic, piperidine as bioavailability enhancers, asarone as hallucinogenic, phyllanthins as anti-virals, withanolides and many other steroidal lactones and their glycosides as immunomodulators (Jain 1994, Patwardhan 2000). As an example, the sale of drugs derived from the plant Taxus baccata L. was U.S.$23 billion in 2000 (Laird & ten Kate 2002).

The increasing use of traditional therapies demands more scientifically sound evidence for the principles behind therapies and for effectiveness of medicines (Patwardhan et al. 2005). The therapies are often criticized due to dearth of research, critical evaluation, in vivo studies and validations (Fong 2002, Houghton 1995) to support the safety of uses. At the same time, ethnopharmacological knowledge is percolating down these days among the tribal population. The present study, therefore aimed at documenting ethnopharmacological knowledge and then comparing the results with earlier reports of ayurvedic medicine, phytochemical findings and pharmacological uses and then developing recommendations for further use of the plants as guided by this study.

Methods

The study area was Baitadi and Darchula districts of far-west Nepal (Figure 1). Dashrathchand, Khodpe, Kulau, Pancheswor, Patan, Salena, and Sera villages of Baitadi district and Dumling, Gokule, Joljibi, Khalanga, Lali and Uku villages of Darchula district were selected as study sites. Baitadi district ranges with 29°19’–29°57’N latitude, 80°15’–80°57’E longitude and altitude 390-6936 m and Darchula district lies within 29°26’-30°15’N latitude, 80°22’-81°09’E longitude and 357-7132 m altitude. As there is varied topography and bioclimate, both the districts possess a diversity of non-timber forest products (NTFP) and knowledge of uses (Devkota & Karmacharya 2003, Pant & Pant 2004) and the products have been collected since ancient times for domestic use particularly for home herbal healing. Field visits for this study were carried out in May through June and December 2006 and January through February 2007. The first visit lasted for 24 days, and two other visits were of 20 days each.

Participatory interview tools including group discussions, informal meetings, questionnaire surveys and field observations were used for primary data collection. Group discussions were held in Khodpe and Anarkholi of Baitadi district and Khalanga and Dumling of Darchula district. Khodpe and Dumling are rural areas of the districts where local people collect and grow non-timber forest products. Anarkholi and Khalanga are collection centers where collectors and healers reside. Group discussions were carried out using fresh plant specimens from which voucher specimens were prepared and deposited with field notes in the herbarium of Tribhuvan University Central Herbarium (TUCH), Department of Botany, Tribhuvan University, Kathmandu, Nepal.

All informal meetings were held in villages while staying with them. Women actively participated in informal meet-
Kunwar et al. - Indigenous Use and Ethnopharmacology of Medicinal Plants in Far-west Nepal

ings. Schedule surveys were designed separately for different respondents. Community forest user groups, farmers, collectors, traditional healers (baidhya) and NTFP traders were selected for discussions, meetings and surveys. Elderly people, forest guards, nursery caretakers, indigenous people and women representing the major ethnic groups, castes and occupations were prioritized for selection. Respondents were requested to furnish for each plant: vernacular names, folk use and mode of preparation.

Primary data collection was facilitated by ten local assistants. The information was further validated by common response. The information from at least three or more respondents was considered as common response.

Species collection, identification, enumeration and analysis

Voucher specimens were collected with field notes and codes. Specimen collection was made following Cunningham (2001) and identified up to species level. Most of the species were identified in field and the remaining unidentified species were identified in Kathmandu with comparing deposited specimens in TUCH. Voucher specimens were housed at TUCH.

Species for enumeration in the present study were selected based on data/information availability. The criteria for selection were information of ayurvedic uses, chemical constituents, phytochemical screening, observations from earlier studies and present study. Earlier studies of Nepal (Anonymous 1997, Baral & Kurmi 2006, IUCN 2004, Joshi & Joshi 2001, Kunwar 2006, Lama et al. 2001, Manandhar 2002, Rajbhandari 2001, Watanabe et al. 2005) were taken as major sources of earlier information. Comparative analysis was made only for the selected plant species that contained all the requisite information of the ayurveda, phytochemical findings, earlier observations and present survey. The observations of the present survey were compared to earlier observations and common uses of the ayurveda. The common uses of the ayurveda for the present analysis were drawn from Anonymous (1995), Bajracharya (1979), Dash & Gupta (1994), Dey (1998), Longman (1994), Joshi 2006, and Sapkota and Adhikari (2001).

Table 1. Forty-eight plants used in Baitadi and Darchula districts of far-west Nepal (new results noted in light blue) that are also used in ayurvedic medicine and have information about their pharmacology, chemical constituents, and folk uses in Nepal. Each species identification is followed by the number of the voucher specimen that has been deposited in TUCH and an evaluation of resemblance between medicinal systems: * = Species’ use resembled ayurveda; † = Species’s use resembled pharmacological bioassays; ‡ = Species’ use resembled all categories (uses in other folk medicine, ayurveda and pharmacological bioassays); E = English, L = Local Nepali dialect, N = Nepali, S = Sanskrit.

<table>
<thead>
<tr>
<th>Indigenous use (Present study)</th>
<th>Indigenous use (Earlier studies)</th>
<th>Uses in ayurveda*</th>
<th>Pharmacological activity†</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Achyranthes aspera</em> L. Amaranthaceae; BUK 098</td>
<td><strong>Bipy kuro</strong>, (L), apamarga, dattiwan (N), apamarga, kharamanji (S). The root juice is used for cough, common cold, diarrhoea and dysentery. Prickly chaff flower (E). A leaf paste is taken for insect and snake bites (Manandhar 2002). Seed powder acts as brain tonic. Root extract is used in dysentery and menstrual disorders. Plant is used as a diuretic, purgative, and astringent (Baral &amp; Kurmi 2006). Whole plant is used in leprosy, bronchitis, expectorant, asthma, cough, skin diseases, sinusitis, headache, colic, boils and piles. Plant has emetic properties. In Chinese traditional medicine, hot water extract of the plant is used to alleviate arthritic pain (Bajracharya 1979, Dash &amp; Gupta 1994, Joshi 2006). A plant extract is antimycobacterial (Newton et al. 2002). Dry leaves are employed against asthma (Singh 1995). Ethanol extract of plant roots possesses anti-inflammatory, anti-implantation and abortifacient activity (Vasudeva &amp; Sharma 2006). Plant extract shows activity against Bacillus bacteria (Risal 1994). Seed is cardiotonic and diuretic. Oleanolic acid shows anti-inflammatory activity (Singh et al. 1992).</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Indigenous use (Present study)</td>
<td>Indigenous use (Earlier studies)</td>
<td>Uses in ayurveda*</td>
<td>Pharmacological activity!</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>----------------------------------</td>
<td>-------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td><em>!Acorus calamus</em> L. Araceae; BKU 176*!</td>
<td>Sweet flag, sweet sage (E). Fresh rhizome promotes memory longevity and good voice (Watanabe <em>et al.</em> 2005). It is a nerve tonic, emetic, stomachic and used in dyspepsia, calculi and epilepsy (Baral &amp; Kurmi 2006).</td>
<td>Plant is used for bronchitis, cough, dyspepsia, dysentery, and leprosy. It is also used as a brain tonic, emetic, antispasmodic, antipyretic, carminative and for gastritis, toothache, liver and kidney disorders and cancer (Bajracharya 1979, Dash &amp; Gupta 1994, Dey 1998).</td>
<td>Oil possesses antimycobacterial activity (Chopra <em>et al.</em> 1957). Antifungal, antibacterial and insecticidal properties from ethanolic extract of stem and rhizomes (Devkota <em>et al.</em> 1999, Shinwari &amp; Khan 2000).</td>
</tr>
<tr>
<td>‡<em>Aegle marmelos</em> (L.) Corrêa Rutaceae; BBU 097</td>
<td>Bengal quince, holy fruit tree, stone apple (E). Leaves are a febrifuge, antipyretic and laxative (IUCN 2004). Unripe fruit is astringent, digestive, and stomachic. Fruit is useful in diarrhoea and dysentery.</td>
<td>Fruit are used in cough. Fruit and bark are useful as an antipyretic, antihistamine, antidiabetic, antisympertic and antidiarrheal (Anonymous 1995, Bajracharya 1979, Dash &amp; Gupta 1994).</td>
<td>Alcoholic extract of fruit is anti-inflammatory, antipyretic, analgesic (Arun <em>et al.</em> 1999) and antimycobacterial (Newton <em>et al.</em> 2002). Methanolic fruit extract is used to treat dementia and increase memory (Vinutha <em>et al.</em> 2007). Aqueous fruit and seed extract reduces blood glucose level (Kamalakkannan &amp; Prince 2004, Kesari <em>et al.</em> 2006). Regular administration of seed extract normalizes lipid profile (Kesari <em>et al.</em> 2006). According to Veerappan <em>et al.</em> (2007), extracts of Bael leaf have a high margin of drug safety. Alkaloid leaf extract and stem bark exhibit hypoglycemic (Saxena &amp; Vikram 2004), antidiarrheal (Shoba &amp; Thomas 2001), antibacterial (Rani &amp; Khullar 2004) and antiviral (Badam <em>et al.</em> 2002) effects. Plant extract endows anti-cancer property (Lotufo <em>et al.</em> 2005). Fresh extracts have stimulant effect on heart and circulatory systems (Arul <em>et al.</em> 1999).</td>
</tr>
<tr>
<td>Alstonia scholaris* (L.) R.Br. Apocynaceae; BKU 033</td>
<td>Devils tree, dita bark tree (E). Bark juice is considered to increase lactation (Rajbhandari 2001). Milky juice is applied to ulcer (IUCN 2004). Bark has astringent, antipyretic, stomachic properties and it is useful in asthma, diarrhoea, and dysentery (Baral &amp; Kurmi 2006).</td>
<td>Stem bark has effective property against ulcers, liver complaints, dyspepsia and diarrhea and dysentery. It is also used as an astringent, antidiarrheal and febrifuge (Bajracharya 1979, Dash &amp; Gupta 1994, Sapkota &amp; Adhikari 2001).</td>
<td>Picrinine is used as depressant of central nervous system. Stem bark is hypotensive and anticanerous (Chandel <em>et al.</em> 1996).</td>
</tr>
</tbody>
</table>
### Indigenous Use and Ethnopharmacology of Medicinal Plants in Far-west Nepal

<table>
<thead>
<tr>
<th>Indigenous use (Present study)</th>
<th>Indigenous use (Earlier studies)</th>
<th>Uses in ayurveda*</th>
<th>Pharmacological activity!</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>†Asparagus racemosus</strong> Willd. Liliaceae; BBU 065</td>
<td><strong>‡Asparagus racemosus</strong> Willd. Liliaceae; BBU 065</td>
<td><strong>‡Asparagus racemosus</strong> Willd. Liliaceae; BBU 065</td>
<td><strong>‡Asparagus racemosus</strong> Willd. Liliaceae; BBU 065</td>
</tr>
<tr>
<td><strong>Jhirjhirine</strong> (L), kurilo, satawari (N), abhiru, satmuli (S). Roots are used for milking cattle, fermenting and local brewing.</td>
<td>Asparagus (E). Root is tonic, aphrodisiac, diuretic, carminative, appetizer and antispasmodic. It is useful in mental disorders, dyspepsia and diarrhoea (Baral &amp; Kurmi 2006). Tender shoots are tonic and useful in dysentery and rheumatism (Rajbhandari 2001).</td>
<td>Asparagus roots are used in tuberculosis, measles, diarrhoea, epilepsy and liver problems and considered as a galactogogue, aphrodisiac, diuretic, antispasmodic, and nerve tonic. It is also considered to prevent ageing, impart immunity, improve mental functions and add vigor and vitality to the body (Anonymous 1995, Bajracharya 1979, Dey 1998).</td>
<td>Root extract increases mammary gland in post-partum period (Sabnis et al. 1968) and acts as a lactagogue (Sharma et al. 1996a). Dysmenorrhoea and premenstrual syndrome were found to be symptom free after usage of root extract (Nevrekar et al. 2002). Root extract is cardioprotective (Khanna et al. 1991). Plant extract is: antitumor (Kamat et al. 2000), antifungal, anti-ulcer (Sairam et al. 2003), immunostimulatory (Dhuley 1997), and diuretic (Balansand &amp; Rayband 1987). The crude saponins from the shoots are useful in dyspepsia (CSIR 1992). Ethanol plant extract is found to be an alpha-amylase digestive enzyme inhibitor (Manandhar 1999). Extracts of plant rhizomes reduce blood sugar levels (Manandhar &amp; Adhikary 1988) and cholesterol (Visavidaya &amp; Narasimhacharya 2005).</td>
</tr>
<tr>
<td><strong>†Berberis asiatica</strong> Roxb. ex DC. Berberidaceae; DKU 034</td>
<td><strong>‡Berberis asiatica</strong> Roxb. ex DC. Berberidaceae; DKU 034</td>
<td><strong>‡Berberis asiatica</strong> Roxb. ex DC. Berberidaceae; DKU 034</td>
<td><strong>‡Berberis asiatica</strong> Roxb. ex DC. Berberidaceae; DKU 034</td>
</tr>
<tr>
<td><strong>Kirmada</strong> (L), chutro, rasanjan (N), daruharidra, darwi (S). Root and stem bark paste is used to treat eye diseases and control worms.</td>
<td>Barberry (E). Root decoction is used in fever (IUCN 2004). Root bark is useful in skin diseases, diarrhoea, jaundice and eye problems (Baral &amp; Kurmi 2006).</td>
<td>Roots, stems and fruit are used in conjunctivitis, inflammation, diabetes, dysentery, jaundice, skin diseases and fever. They are astringent, antipyretic, antidiarrheal and stomachic (Anonymous 1995, Bajracharya 1979, Dey 1998).</td>
<td>Berberine effectively treats genital infections (Vermani &amp; Garg 2002) and has been shown to bind to DNA and inhibit its cleavage (Krey &amp; Hahn 1969). Its use, as an extract in eye drops for conjunctivitis is widespread. It is effective as an antipyretic, anaesthetic, and antihypertensive (Sabir &amp; Bhide 1971).</td>
</tr>
<tr>
<td><strong>†Bergenia ciliata</strong> (Haw.) Sternb.f. Saxifragaceae; DKU 124</td>
<td><strong>‡Bergenia ciliata</strong> (Haw.) Sternb.f. Saxifragaceae; DKU 124</td>
<td><strong>‡Bergenia ciliata</strong> (Haw.) Sternb.f. Saxifragaceae; DKU 124</td>
<td><strong>‡Bergenia ciliata</strong> (Haw.) Sternb.f. Saxifragaceae; DKU 124</td>
</tr>
<tr>
<td><strong>Siphode</strong> (L), pakhanved, dhungephool (N), asmahan, asyavedak, pashanveda (S). Rhizome and root are used in diarrhoea, dysentery, gallstone and gastritis.</td>
<td>Rock foil (E). Rhizomes are bitter, aphrodisiac, astringent, carminative and diuretic (Baral &amp; Kurmi 2006, IUCN 2004). Whole plants and rootstocks are used in diarrhoea, dysentery and liver and blood disorders in amchi system (Lama et al. 2001).</td>
<td>Piles, diarrhoea, dysentery, cancer, urinary calculi, heart problems and liver disorders are treated with rhizomes. Rhizome extract is considered as antipyretic, antidiarrheal, diuretic and expectorant (Bajracharya 1979, Dash &amp; Gupta 1994, Dey 1998).</td>
<td>Methanolic aqueous extract with its trypsin shows considerable antiviral activity against influenza virus (Rajbhandari et al. 2001).</td>
</tr>
<tr>
<td>Indigenous use (Present study)</td>
<td>Indigenous use (Earlier studies)</td>
<td>Uses in ayurveda*</td>
<td>Pharmacological activity!</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------------------------------</td>
<td>-------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td><strong>Bombax ceiba</strong> L. Malvaceae; BBU 105</td>
<td>Silk cotton tree (E). Gum or resin from bark is useful in blood disorders (Rajbhandary 2001). It is an aphrodisiac, astringent and tonic. Root bark is emetic, tonic and used in constipation. Flowers are useful in snake bite and seeds are taken for gonorrhoea (Baral &amp; Kurmi 2006).</td>
<td>Flowers are astringent and cooling. Young root juice is stimulant and tonic (Dash &amp; Gupta 1994, Joshi 2006, Longman 1994).</td>
<td>Shamimin shows a hypoglycemic effect but it has lethal effect at higher doses (Saleem et al. 1999). Seeds are cardiotimulant (Chandel et al. 1996).</td>
</tr>
<tr>
<td><strong>Calotropis gigantea</strong> (L.) W.T. Aiton Apocynaceae; BBU 054</td>
<td>Giant milkweed, crown plant (E). Latex as well as other parts have emetic, purgative and anthelmintic properties and are used for swelling and boils. Flowers are used in asthma and inflammation (Baral &amp; Kurmi 2006). Leaf buds are used for skin diseases (Anonymous 1997).</td>
<td>Useful in leprosy, asthma, cough, indigestion, piles and fistula. Flowers have the strongest anticancer properties. Milk is purgative and leaves are used in gout (Bajracharya 1979, Dash &amp; Gupta 1994, Joshi 2006).</td>
<td>The latex exhibits toxic irritation, inflammation and allergic reactions (Garg 1979, Tomar et al. 1970) but it does not act as an antidote for scorpion stings (Uawonggul et al. 2006). The flowers possess nematocidal activity (Iqbal et al. 2005), analgesic (Pathak &amp; Argal 2007) and antimycobacterial (Grange &amp; Davey 1990) activities. Cardenolide calotropin shows anticancer properties.</td>
</tr>
<tr>
<td><strong>Cedrus deodara</strong> (Roxb.) G.Don Pinaceae; DKU 027</td>
<td>Himalayan cedar (E). Wood is diuretic and useful to disintegrate kidney stones (Anonymous 1997). It is astringent and used in fevers, diarrhoea and dysentery (Anonymous 1995). Wood paste is applied on the forehead for relief from headaches (Manandhar 2002).</td>
<td>Leaves and cones are useful in bronchitis and tubercular gland diseases. Heart wood and oil have diuretic, carminative, anti-inflammatory, analgesic and antipyretic properties. Oil is useful in piles and snake bite (Anonymous 1995, Bajracharya 1979, Dash &amp; Gupta 1994).</td>
<td>Cone extracts show antimycobacterial activity (Digrak et al. 1999). Himachalol is a chief antispasmodic agent (Kar et al. 1975).</td>
</tr>
<tr>
<td>Indigenous use (Present study)</td>
<td>Indigenous use (Earlier studies)</td>
<td>Uses in ayurveda*</td>
<td>Pharmacological activity!</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------------------------------</td>
<td>-------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td><em>Centella asiatica</em> (L.) Urb. Apiaceae; DBU 006</td>
<td>Penny wort (E). Plant juice is valued for fever, dysentery and throat pain (IUCN 2004). The plant is a stomachic and used in leprosy, indigestion, skin diseases, epilepsy and asthma (Baral &amp; Kurmi 2006).</td>
<td>The whole plant is useful in bronchitis, skin diseases, blood disorders, asthma and leprosy. It is alterative, tonic and diuretic (Dash &amp; Gupta 1994, Joshi 2006).</td>
<td>Whole plant extract shows antimycobacterial activity (Newton et al. 2002). Methanolic and aqueous extracts of plant are moderately effective at lessening body pain, inflammation, vascular and bronchodilation (Kumar &amp; Muller 1999). Asiaticoside is used to treat leprosy and stimulate wound healing and skin grafts. It promotes mental calm and clarity. Asiatic acid and madecassic acid possess anti-inflammatory properties (Somchit et al. 2004). Brahmic acid treats ulceration. Extracts do not reduce sugar levels in blood (Manandhar &amp; Adhikary 1988) but lower uric acid (Manandhar et al. 1991). Plant extract is a potential antidiartheal agent (Mamtha et al. 2004).</td>
</tr>
<tr>
<td>Khochade (L), ghodtapre, (N), brahmi, manduka parni (S). Leaf juice is used in urinary problems and cuts and wounds.</td>
<td>Cinnamon (E). Bark and leaves are astringent, stimulant and carminative, relieving diarrhoea, colic pain, and ophthalmia (Baral &amp; Kurmi 2006).</td>
<td>Leaves are carminative and stimulant. Leaves and bark are used in gonorrhoea, rheumatism, diarrhoea, bronchitis and diabetes (Bajracharya 1979, Dash &amp; Gupta 1994, Dey 1998).</td>
<td>A plant extract exhibits hypoglycemic effects and reveals a phenomenon of less hypoglycemic response at a higher dose (Sharma et al. 1996b). Eugenol acts against herpes simplex virus (Bourne et al. 1999).</td>
</tr>
<tr>
<td>Batulpate (N), bahugandh, tachula, patra (S). Leaf is used in gastric problems. Bark is useful in checking nausea and vomiting.</td>
<td>False pareira, brava (E). Plant juice induces abortion and stops bleeding after delivery (Rajbhandary 2001). Root paste is applied on snake bites (Manandhar 2002).</td>
<td>Leaves and stem parts are used in asthma. Roots are useful in skin diseases, blood disorders, leukorrhea, diarrhoea, dysentery and indigestion and have antiperiodic effects (Anonymous 1995, Dash &amp; Gupta 1994, Joshi 2006).</td>
<td>An alcoholic extract of stems and leaves possesses antimycobacterial activity (Antoun et al. 2001). Pelosine acts against urinary complaints. Hyatin is a muscle relaxant (Jain et al. 1991).</td>
</tr>
<tr>
<td><em>Curculigo orchioides</em> Gaertn. Amaryllidaceae; BKU 020</td>
<td>Black musale (E). Rhizome is an aphrodisiac, diuretic and tonic and used in piles, jaundice, asthma and skin disease (Anonymous 1995). The powered rhizome stops bleeding and treats cuts and wounds (IUCN 2004).</td>
<td>Roots are diuretic, tonic, aphrodisiac, antidiarrheal, and are used in liver problems, piles, asthma and gonorrhoea (Anonymous 1995, Bajracharya 1979, Joshi 2006).</td>
<td>Extracts are known to have vascular protective activities (Palazzino et al. 2000, Valls et al. 2006).</td>
</tr>
<tr>
<td>Indigenous use (Present study)</td>
<td>Indigenous use (Earlier studies)</td>
<td>Uses in ayurveda*</td>
<td>Pharmacological activity!</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>---------------------------------</td>
<td>-------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td><strong>Cuscuta reflexa</strong> Roxb. Convolvulaceae; BKU 053</td>
<td>Dodder (E). Plant paste is used for headache, body ache and itches.</td>
<td>Plant juice is used in jaundice, fever (Manandhar 2002, Rajbhandari 2001), asthma, bronchitis, headache, rheumatism, itches, skin diseases and bilious disorders (IUCN 2004). Seed is carminative, anthelmintic and alterative (Baral &amp; Kurmi 2006).</td>
<td>Whole plant extract is considered as antiviral (Awasthi 1981) and analgesic (Pal et al. 2003). Methanol extract of stem possesses broad-spectrum antibacterial activity (Pal et al. 2006). Plant extract has diaphoretic, demulcent, laxative and tonic properties. Plant is antifertility agent.</td>
</tr>
<tr>
<td><strong>Aakasbeli</strong> (N), <strong>amaruela</strong> (S).</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Cyperus rotundus</strong> L. Cyperaceae; BBU 096</td>
<td>Nut grass (E). Tuberous roots are used in fever, diarrhoea, dysentery and blood disorders.</td>
<td></td>
<td>Rhizome extract is used to lower blood glucose levels (Raut &amp; Gaikwad 2006). Beta-sitosterol possessed anti-inflammatory and antipyretic activity (Gupta et al. 1989). Methanol extract of rhizome is antidiarrheal (Uddin et al. 2006).</td>
</tr>
<tr>
<td><strong>Dhatura</strong> (N), <strong>kanak</strong>, <strong>dhatura</strong> (S).</td>
<td>Devil's apple, thorn apple, (E). Flower juice is applied to scalp for dandruff and hair loss (IUCN 2004).</td>
<td>Seeds and fruit are antispasmodic and narcotic in properties. Fruit juice is useful in dandruff and promotes hair growth. Plant is described as toxic (Dash &amp; Gupta 1994).</td>
<td>Seed extract causes increase in activity of brain lipids and reduction in glucose metabolism (Hasan &amp; Kushwaha 1987).</td>
</tr>
<tr>
<td><strong>Bhringraj</strong> (N), <strong>kal jira</strong> (N), <strong>kesaranjan</strong>, <strong>bhringraj</strong> (S).</td>
<td>Eclipta, false daisy (E). A plant paste is used on cuts and wounds, pimple and skin diseases (IUCN 2004). Plant is specific for curing eye problems. Roots are used as liver tonics, anti-septics, emetics and purgatives (Baral &amp; Kurmi 2006).</td>
<td>The whole plant has emetic and purgative effects and is useful in jaundice and filariasis (Anonymous 1995, Bajracharya 1979, Dash &amp; Gupta 1994).</td>
<td>Plant juice is antiviral and liver protective ( Dixit &amp; Achar 1979) with activity against hepatitis B virus (Subramonium &amp; Pushpangadan 1999). Alcoholic extracts confer protection against snake venom (Mors et al. 1989). It is anti-inflammatory (Chandra et al. 1987), a bronchodilator (Leal et al. 2000) and antimycobacterial (Al-Shamma &amp; Mitscher 1979). Plant powder counteracts an increase of liver weight (Chandra et al. 1987).</td>
</tr>
<tr>
<td>Indigenous use (Present study)</td>
<td>Indigenous use (Earlier studies)</td>
<td>Uses in ayurveda*</td>
<td>Pharmacological activity!</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>----------------------------------</td>
<td>-------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td><strong>Holarrhena pubescens</strong> Wall. ex G. Don Apocynaceae; BBU 093</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Bankhirra, desikhirra</strong> (L), <strong>indrajau</strong> (N), <strong>indrabriksha, kutaj, watsak</strong> (S). Bark is antidiarrheal, antipyretic and anthelmintic. Seed powder is uses for fevers.</td>
<td>Easter tree, ivory tree, conessi bark, kurchi (E). Seeds are used in fever, jaundice, diarrhoea, intestinal worms and gallstones (IUCN 2004). Root bark is used in dysentery and leaves are used in bronchitis, boils, ulcers and dysentery (Baral &amp; Kurmi 2006).</td>
<td>Bark and seeds show astringent, antipyretic, expectorant and stomachic effects and are taken for diarrhoea and dysentery. Seeds are used for treating jaundice, gall stone and intermittent fever (Bajracharya 1979, Dash &amp; Gupta 1994, Dey 1998).</td>
<td>Conisine is effective against dysentery. Conkurchine is vasodilator. Methanol extract of plant bark is antimycobacterial (Newton et al. 2002). Bark powder is hypotensive (Chaturvedi &amp; Singh 1983).</td>
</tr>
<tr>
<td><strong>Jatropha curcas</strong> L. Euphorbiaceae; BBU 056</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Inna</strong> (L), <strong>sajjwan</strong> (N), <strong>vyaghra eranda</strong> (S). Seed oil is applied for arthritis and boils. Bark juice is used on wounds, scabies and ringworm.</td>
<td>Physic nut (E). Twigs are used as tooth brushes. The latex is used on pimples and boils (Manandhar 2002). The plant juice is a purgative. Root bark is used in rheumatism and fruit is anthelmintic (Baral &amp; Kurmi 2006).</td>
<td>Seeds and latex are astringent and purgative and are employed in scabies, eczema, inflammation and wounds. Leaves are used in hemorrhage, hemoptysis, cough, fever and asthma (Joshi 2006).</td>
<td>Root extract is antidiarrheal (Mujumdar et al. 2000). Root paste is anti-inflammatory (Mujumdar &amp; Misar 2004). Curcin from seed produces deleterious effects to the blood. Plant extract has cytotoxic, antitumor and abortive effects (Goonasekera et al. 1995). Latex is a blood coagulant (Osoniyi et al. 2003) whereas dilute latex is anticoagulant.</td>
</tr>
<tr>
<td><strong>Juglans regia</strong> L. Juglandaceae; DBU 099</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Okhar</strong> (N), <strong>akshotaka</strong> (S). The bark is used in scabies, allergy and toothaches.</td>
<td>Walnut (E). Bark is used as anthelmintic, and leaves are astringent and tonic in properties (Manandhar 2002). Nut oil is anthelmintic and used in skin diseases (IUCN 2004). Bark and fleshy wall of the fruit are used as hair dye to make hair black and promote hair growth in amchi system (Lama et al. 2001).</td>
<td>Bark juice is considered as anthelmintic, astringent and tonic. Leaf extract is employed in tuberculosis (Joshi 2006).</td>
<td>Seeds are diuretic and a nervous system depressant. An aqueous extract of leaves is antinociceptive, and an ethanolic extract reveals anti-inflammatory activity (Erdemoglu et al. 2003). Napthoquinone is anthelmintic (Nardelli 1987).</td>
</tr>
<tr>
<td><strong>Justicia adhatoda</strong> L. Acanthaceae; BBU 057</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Vasakha</strong> (L), <strong>asuro</strong> (N), <strong>basa, brisha</strong> (S). Leaf juice is used to treat diarrhoea and dysentery.</td>
<td>Malabar nut (E). An infusion of dried leaves is used for respiratory problems (IUCN 2004). It is a reputed remedy for respiratory problems and cough and cold (Baral &amp; Kurmi 2006).</td>
<td>Leaves are used for leprosy, asthma, bronchitis, cough and skin diseases. Leaf and root juice possess antiseptic and hemostatic properties (Bajracharya 1979, Dash &amp; Gupta 1994, Joshi 2006).</td>
<td>Leaf extracts are antimycobacterial (Grange &amp; Snell 1996). Methanolic extract of flowers inhibits leukotriene, which causes pain, inflammation and broncho-muscular constriction (Kumar &amp; Muller 1999). Vasicine is a bronchodilator and expectorant (Johri &amp; Zutshi 2000).</td>
</tr>
<tr>
<td>Indigenous use (Present study)</td>
<td>Indigenous use (Earlier studies)</td>
<td>Uses in ayurveda*</td>
<td>Pharmacological activity!</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>-----------------------------------</td>
<td>-------------------</td>
<td>---------------------------</td>
</tr>
<tr>
<td><strong>Mallotus philippensis</strong> (Lam.) Müll. Arg. Euphorbiaceae; BKU 092</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Rohina (L), sindure (N), kampillak (S). Fruit are used for scabies.</td>
<td>Kamala (E). Bark decoction is used in typhoid and meningitis (Manandhar 2002). Fruit powder is anthelmintic, purgative and laxative. Bark juice has stomachic effect (Baral &amp; Kurmi 2006).</td>
<td>The plant is useful in bronchitis. The seed are a laxative. Glands and hairs are used as emetic, purgative and anthelmintic and useful in urinary problems (Bajracharya 1979, Joshi 2006).</td>
<td>A methanolic extract is active against herpes simplex virus (Taylor et al. 1996). A fruit extract is antibacterial (Kumar et al. 2006). A bark extract is both gram positive and negative antibacterial (Taylor et al. 1996). A fruit extract is hypoglycemic and anti-cancer (Chandel et al. 1996).</td>
</tr>
<tr>
<td><strong>Mentha spicata</strong> L. Lamiaceae; BKU 058</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pudina (L), tulsi pate (N), putitha (S). The plant is used for freshness, asthma and urinary complaints.</td>
<td>Spearmint (E). Leaf juice is taken to treat dysentery and boils (Manandhar 2002).</td>
<td>The leaf oil is antiemetic, antispasmodic, carminative, diuretic and stomachic (Dash &amp; Gupta 1994, Joshi 2006).</td>
<td>An aqueous leaf extract is antimycobacterial (Fitzpatrick 1954). Leaf extract is fungicidal (Sarbhoy et al. 1978).</td>
</tr>
<tr>
<td><strong>Moringa oleifera</strong> Lam. Moringaceae</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sahjwan (N), shigru, shobhanjana (S). Raw fruit is valued for liver disorders.</td>
<td>Drumstick tree, horseradish tree (E). Roots are purgative. Leaves are a galactagogue. Gum is useful in dysentery (Manandhar 2002). The plant is antispasmodic, expectorant, cardiotonic and diuretic (Baral &amp; Kurmi 2006).</td>
<td>The seeds are used for bronchitis, asthma, and leprosy. Bark and fruit are taken for epilepsy, urinary tract infection, and rheumatism. The plant is astringent, aphrodisiac, carminative and stomachic (Bajracharya 1979, Dash &amp; Gupta 1994, Dey 1998).</td>
<td>A plant extract is considered as a source of anti-cancer compounds (Dhawan et al. 1980, Lotufo et al. 2005). Plant juice shows liver protective properties (Subramonium &amp; Pushpangadan 1999). A leaf extract possesses hypotensive activity (Faizi et al. 1995). Plant root wood extracts reduce the risk of stone formation (Karadi et al. 2006). Ethanol root extract are hypocholesterolemic (Mehta et al. 2003). Root extract is effective in preventing implantation (Shukla et al 1988). Bark extract has been shown to possess antifungal and antitubercular activities (Bhatnagar et al. 1961). Ethanolic extract of stem bark is hypoglycemic (Kar et al. 2003).</td>
</tr>
<tr>
<td>‡<strong>Mucuna pruriens</strong> (L.) DC. Fabaceae; BKU 059</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Kauchho (N), kapikachhu (S). Roots are used as a tonic and stimulant.</td>
<td>Cowhage, velvet bean (E). Seeds are used as an aphrodisiac, purgative and tonic and in scorpion stings (HMG 1970). Pod is most active anthelmintic against tapeworms (Baral &amp; Kurmi 2006).</td>
<td>Roots used for dysentery, fever and urinary troubles. Seeds are aphrodisiac, nerve tonic, anthelmintic, antipyretic and purgative (Bajracharya 1979, Dash &amp; Gupta 1994).</td>
<td>Seed powder has been reported to be anti-diabetic (Dhawan et al. 1980, Pant et al. 1968) and is useful in Parkinson’s disease (Manyam et al. 1995). Root juice is a nervous system stimulant (Chandel et al. 1996).</td>
</tr>
<tr>
<td>Indigenous use (Present study)</td>
<td>Indigenous use (Earlier studies)</td>
<td>Uses in ayurveda*</td>
<td>Pharmacological activity!</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>----------------------------------</td>
<td>--------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>&quot;Murraya koenigii&quot; (L.) Spreng. Rutaceae; BBU 091</td>
<td>Ganiuel, mechiya sag (L), desi neem, mitha neem, kari patta (N), maharista, mahanimba (S)</td>
<td>Plant used to treat diarrhoea, diabetes, constipation and menstrual troubles. Leaves and bark are tonic, stomachic and purgative (Joshi 2006).</td>
<td>Seed oil is anti-bacterial and anti-fungal. Aqueous leaf extract is hypoglycemic (Kesari et al. 2005, Narayan &amp; Shastri 1975) but the effect is promising only for early diabetes (Yadav et al. 2002).</td>
</tr>
<tr>
<td>&quot;Nardostachys grandiflora&quot; DC. Valerianaceae; DBU 060</td>
<td>Bhulte (L), jatamansi (N), jatamanshi, gandhamasi (S)</td>
<td>Plant is useful in epilepsy, hysteria, ulcers, insomnia, blood disorders, digestion and respiratory problems, measles, syncope, mental disorders and skin diseases. It is antispasmodic, carminative, diuretic and sedative (Anonymous 1995, Bajracharya 1979, Dey 1998).</td>
<td>Methanolic rhizome extract is used to treat dementia and increase memory (Vinutha et al. 2007). Extract of rhizomes contains hepatoprotective compounds (Ali et al. 2000) and it moderates epilepsy with low neurotoxic effects (Rao et al. 2005). Rhizome extract shows antibacterial activity (Kumar et al. 2006).</td>
</tr>
<tr>
<td>&quot;Neopicrorhiza scrophulariiflora&quot; (Pennel) D.Y. Hong Scrophulariaceae; DKU 090</td>
<td>Katuko (L), kutki (N), aristha, katuka, matsyapitta (S)</td>
<td>Plant used for fever, cough, jaundice, liver and blood disorders and hepatitis (Bajracharya 1979, Dash &amp; Gupta 1994, Dey 1998). Rhizomes and roots are used for bile diseases, high blood pressure, sore throat, cough and cold and gastritis in amchi system (Lama et al. 2001).</td>
<td>Root powder is active against viral hepatitis (Luper 1999, Subramonium &amp; Pushpangadan 1999). Picroliv and kutkoside are hepatoprotective (Doreswamy &amp; Sharma 1995) and immunostimulatory (Puri et al. 1992). Powdered tuberous root relieve bronchial asthma (Rajaram 1976).</td>
</tr>
<tr>
<td>&quot;Oroxylum indicum&quot; (L.) Kurz Bignoniaceae; BKU 061</td>
<td>Sanna, tatelo (N), shyonaka (S)</td>
<td>Root bark and seeds are carminative, stomachic, tonic, diaphoretic and astringent. Root bark is also used to treat bile problems, cough, diarrhoea, and dysentery (Bajracharya 1979, Dash &amp; Gupta 1994, Rajhandari et al. 1995).</td>
<td>The fruit is spasmolytic. The bark is diuretic. The plant extract is considered as a source of anti-cancer compounds (Lotufo et al. 2005). An Ethanol extract of stem bark reveals activities against breast cancer (Lambertini et al. 2004) and arthritis (Laupattarakasem et al. 2003).</td>
</tr>
<tr>
<td>Indigenous use (Present study)</td>
<td>Indigenous use (Earlier studies)</td>
<td>Uses in ayurveda*</td>
<td>Pharmacological activity!</td>
</tr>
<tr>
<td>-------------------------------</td>
<td>----------------------------------</td>
<td>------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>Paris polyphylla Smith Liliaceae; DBU 134</td>
<td>Love apple, paris (E). Root paste is used as an antidote for insect and snake bites (Rajbhandari 2001). The plant is anthelmintic and tonic (Watanabe et al. 2005).</td>
<td>The rhizome is used as an anthelmintic, expectorant, antispasmodic, digestive, tonic and alterative (Bajracharya 1979).</td>
<td>An ethyl acetate extract is antioxidant (Yingming et al. 2004) and immunostimulatory (Zhang et al. 2007). Diosgenin is renowned for antibacterial and anticancer properties (Zhang et al. 2007). A methanolic extract of the plant rhizome is gastroprotective (Matsuda et al. 2003).</td>
</tr>
<tr>
<td>Satuwa (N), haimavati, satuwa (S). Roots are used for epilepsy, shock, fever, and vomiting control. Its paste is applied on snake bites.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Phyllanthus emblica L. Phyllanthaceae; BKU 135</td>
<td>Love apple, paris (E). Root paste is used as an antidote for insect and snake bites (Rajbhandari 2001). The plant is anthelmintic and tonic (Watanabe et al. 2005).</td>
<td>The rhizome is used as an anthelmintic, expectorant, antispasmodic, digestive, tonic and alterative (Bajracharya 1979).</td>
<td>An ethyl acetate extract is antioxidant (Yingming et al. 2004) and immunostimulatory (Zhang et al. 2007). Diosgenin is renowned for antibacterial and anticancer properties (Zhang et al. 2007). A methanolic extract of the plant rhizome is gastroprotective (Matsuda et al. 2003).</td>
</tr>
<tr>
<td>Aunla (L), amala, rikiya (N), dhatri, aadiphala (S). Fresh fruit is used as a diuretic and laxative and for cold and cough.</td>
<td>Gooseberry (E). The plant is used in hemorrhage, diarrhoea, dysentery, jaundice and dyspepsia (Anonymous 1995). The root is an astringent and the seeds are used in asthma (IUCN 2004). The fruit is diuretic, laxative, ophthalmic and useful in diarrhoea, dysentery, jaundice, ulcer and skin diseases (Baral &amp; Kurmi 2006).</td>
<td>The fruit is an aphrodisiac, diuretic and hemostatic used in anaemia, diarrhoea, dysentery and jaundice. Fruit should be avoided at bedtime to prevent harmful effects on teeth (Dash &amp; Gupta 1994, Dey 1998, Joshi 2006). Fruit are used in blood, liver and spleen disorders (Tibetan). Flowers are used as a hypothermic agent (<em>unani</em>).</td>
<td>The fruit possess high levels of potassium and low levels of sodium, suitable for cardiovascular patients (Devi et al. 2000). Because of high calcium content in fruit, it is recommended for lactating and pregnant women. It stimulates the immune system, increases interferon and protects against cancer (Xia et al. 1997). Fresh fruit juice reduces cholesterol levels. Plant juice is liver protective (Gulati et al. 1995, Subramonium &amp; Pushpangadan 1999). A fruit butanol extract relieves gastric ulcers (Bandyopadhyay et al. 2000, Maulik et al. 1997). A methanolic fruit extract inhibits leukotriene, which causes pain, inflammation and broncho-muscular constriction (Kumar &amp; Muller 1999). A fruit extract is anticarcinogenic (Rajeshkumar et al. 2003) and antidiabetic (Sabu &amp; Kuttan 2002). Putranjivein shows inhibition of HIV reverse transcriptase (Mekkawy et al. 1995).</td>
</tr>
<tr>
<td>Khote salla (L), rani salla (N), sarala (S). A bark paste is used in burns and scalds. Resin is applied on boils.</td>
<td>Chir pine (E). Resin is used to in relieve cough (Rajbhandari 2001) and gastric troubles (Manandhar 2002).</td>
<td>Wood oil is used as a nerve tonic, hemostatic, expectorant and diuretic. It is used for skin diseases, burns and cracks. Bark is used for skin diseases and ulcers (Bajracharya 1979, Dash &amp; Gupta 1994).</td>
<td>Turpentine oil is antiseptic and used as an expectorant in chronic bronchitis. Needle oil is antibacterial (Chauhan 1999).</td>
</tr>
</tbody>
</table>
### Indigenous Use and Ethnopharmacology of Medicinal Plants in Far-west Nepal

<table>
<thead>
<tr>
<th>Indigenous use (Present study)</th>
<th>Indigenous use (Earlier studies)</th>
<th>Uses in ayurveda*</th>
<th>Pharmacological activity!</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Plumbago zeylanica</strong> L. Plumbaginaceae; BBU 089</td>
<td>Chhittu (N), agnimata, chitrak (S). Leaf juice treats skin diseases. Root paste is used against scabies.</td>
<td>Roots are used for indigestion, dysentery, skin diseases and piles. Plant stems are effective as appetizers, and used for skin diseases in unani (Anonymous 1995, Bajracharya 1979, Dash &amp; Gupta 1994).</td>
<td>Plumbagin has been reported to have anticancer and antimitotic activity (Purushothaman et al. 1983).</td>
</tr>
<tr>
<td><strong>Prinsepia utilis</strong> Royle Rosaceae; BKU 136</td>
<td>Dhayal (L), dhatelo (N). The seed oil is used for cough and cold.</td>
<td>The oil is rubefacient and applied for rheumatism and pains (Sapkota &amp; Adhikari 2001).</td>
<td>A leaf extract was found be effective against mycobacterial reactions (Taylor et al. 1995). A fresh leaf extract contains cyanogenic glycosides which cause food poisoning (Shrestha &amp; Agrawal 1994).</td>
</tr>
<tr>
<td><em>Punica granatum</em> L. Punicaceae; DKU 088</td>
<td>Anar, darim (N), dadima (S). Root and stem bark are anthelmintic and used for tapeworms.</td>
<td>The plant is used in chest pain, sore throat, and bronchitis. It is stomachic, astringent, anthelmintic, antidiarrheal, diuretic, expectorant, hemostatic and aphrodisiac (Anonymous 1995, Dash &amp; Gupta 1994, Joshi 2006).</td>
<td>A methanolic extract is active against herpes simplex virus (Taylor et al. 1995) and mycobacteria (Wang 1950). Flowers are anti-diabetic (Jafri et al. 2000). A plant extract is resolves allergic symptoms and cardiovascular disorders (Watanabe &amp; Hatakoshi 2002). Juice, peel and oil extracts inhibit pregnancy (anti-implantation) and are anticancerous and anti-inflammatory (Lansky &amp; Newman 2007). Punicin and punicalagin inhibit HIV reverse transcriptase, and maslinic acid is an antioxidant (Wang et al. 2006).</td>
</tr>
<tr>
<td><strong>Rhododendron arboreum</strong> Sm. Ericaceae; DBU 063</td>
<td>Laliguras (N), pollasa, raktakarniyara (S). Flower juice is used to treat dysentery.</td>
<td>The bark is analgesic and used in liver disorders, jaundice, diabetes and obesity. Stems are used in enlargement of liver and root is taken for leukorrhea (Bajracharya 1979).</td>
<td>An alcoholic leaf extract depresses respiration. Flower juice is used for diarrhoea and dysentery (Chauhan 1999).</td>
</tr>
</tbody>
</table>

---

Please note that the table above summarizes the indigenous use of various medicinal plants in Far-west Nepal, along with their pharmacological activities and earlier studies. For detailed information, please refer to the full text of the paper by Kunwar et al.
<table>
<thead>
<tr>
<th>Indigenous use (Present study)</th>
<th>Indigenous use (Earlier studies)</th>
<th>Uses in ayurveda*</th>
<th>Pharmacological activity!</th>
</tr>
</thead>
<tbody>
<tr>
<td>Majitho (N), majistha (S). A fruit and stem decoction is used to treat wounds. The root is used as a digestive and in leprosy.</td>
<td>Indian madder (E). The plant is astringent, antidysenteric and antiseptic in properties (Rajbhandari et al. 1995). Stems are used for snake bite and scorpion stings. The plant is used as a blood purifier and against skin and urinary diseases (Baral &amp; Kurmi 2006).</td>
<td>The roots are astringent, digestive, expectorant and hypnotic and used in leprosy, urinary complaints and snakebite (Anonymous 1995, Bajracharya 1979, Sapkota &amp; Adhikari 2001).</td>
<td>A root extract is hepatoprotective (Rao et al. 2006) and useful for disintegration and elimination of urinary stones (Mischenko et al. 1999). It is anti-proliferative against epidermal keratinocytes (Tse et al. 2006). Rubiadin is a potent antioxidant, inhibits lipid peroxidation (Tripathi &amp; Sharma 1998) and is anti-inflammatory and immunomodulatory (Jokharapukar et al. 2003).</td>
</tr>
<tr>
<td>Sapindus mukorossi Gaertn. Sapindaceae; DKU 087</td>
<td>Rithha (N), arishthaka, phenila (S). The fruit is used for snake bites, scorpion stings, and dandruff.</td>
<td>The fruit is emetic, laxative and expectorant (Bajracharya 1979).</td>
<td>The plant's saponins are active against Chlamydia (Garg et al. 2004).</td>
</tr>
<tr>
<td>Semecarpus anacardium L.f. Anacardiaceae; BBU 066</td>
<td>Bheul, bhalla (L), bhlayo (N), bhelalatake (S). A mixture of its fruit and cow dung solution keeps snakes out and acts as an ant repellent.</td>
<td>The plant and its nuts are well known for anti-arthritic and anti-cancer properties. The fruit is astringent, aphrodisiac, nerve tonic, stomachic, digestive and expectorant and used for leucoderma and leprosy (Bajracharya 1979, Dash &amp; Gupta 1994, Joshi 2006).</td>
<td>A methanolic seed extract is used to treat dementia and increase memory (Vinutha et al. 2007). It is neuroprotective especially in the hippocampal region (Shukla et al. 2000). An ethanolic nut extract is antimicrobial, anti-inflammatory, anthelmintic and anti-amoebic (Singh et al. 2006) and antifungal (Tripathi &amp; Singh 2001). A seed extract is anti-inflammatory. An extract is anticarcinogenic (Premalatha &amp; Sachdanandam 1999).</td>
</tr>
<tr>
<td>Solanum surattense Burm.f. Solanaceae; DKU 086</td>
<td>Jhyaure bhanta, jware baigan (L), kantakari (N), kantakari (S). A seed infusion is taken for toothache.</td>
<td>The berries are carminative and expectorant and used for sore throat (Anonymous 1995). Fruit juice is applied to treat chapped feet (Rajbhandari 2001). Nut is aphrodisiac, astringent, purgative and liver tonic. Nut oil is used externally for rheumatism (Baral &amp; Kurmi 2006).</td>
<td>A capsule extract is hypoglycemic (Kar et al. 2006).</td>
</tr>
<tr>
<td>*Swertia chirayita (Roxb. ex Flem.) Karst. Gentianaceae; DBU 067</td>
<td>Lek tite (N), kirat, bhunimwa (S). The whole plant is used for cough and fever.</td>
<td>Plant paste is anthelmintic, stomachic and laxative (Anonymous 1995). It is used to treat skin diseases (IUCN 2004).</td>
<td>The plant juice is liver protective (Subramonium &amp; Pushpangadan 1999). Swerchirin significantly lowers blood sugar levels (Saxena et al. 1991). An ethanolic plant extract is antibacterial and antifungal (Devkota et al. 1999). An aqueous plant extract is anti-inflammatory (Chowdhury et al. 1995).</td>
</tr>
<tr>
<td>Indigenous use (Present study)</td>
<td>Indigenous use (Earlier studies)</td>
<td>Uses in ayurveda*</td>
<td>Pharmacological activity!</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>----------------------------------</td>
<td>------------------</td>
<td>--------------------------</td>
</tr>
<tr>
<td>†Syzygium cumini (L.) Skeels Myrtaceae; BBU 085</td>
<td>Jamun (N), brahhaspati, jambhu (S). A seed powder and bark decoction is used in diarrhoea, dysentery, diabetes and inflammatory activity.</td>
<td>The plant has astringent, carminative, diuretic, anthelmintic, and stomachic. Bark is specially used in dysentery (Baral &amp; Kurmi 2006).</td>
<td>A decoction of dry leaves and seeds is hypoglycemic (Grover et al. 2000, Prince et al. 1998). A plant extract is antibacterial (Shafti et al. 2002). An ethanolic extract is anti-inflammatory (Muruganandan et al. 2001).</td>
</tr>
<tr>
<td>Terminalia chebula Retz. Combretaceae; BBU 068</td>
<td>Sele, harado (L), harra (N), avaya, haritaki (S). An infusion of fruit is used in cough and cold.</td>
<td>The fruit pulp is anti-inflammatory, analgesic, stomachic, laxative, expectorant and diuretic. The plant should be avoided in pregnancy (Anonymous 1995, Bajracharya 1979, Sapkota &amp; Adhikari 2001).</td>
<td>A methanolic fruit extract is antianaphylactic (Shin et al. 2001) and an aqueous extract acts against herpes simplex virus (Kurokawa et al. 1995). An ethanolic fruit extract is antibacterial and antifungal (Bonjar 2004, Devkota et al. 1999). The species’ tannins are antibiotic (Tanaka et al. 1991). Punicalin, punicalagin inhibit viral adsorption into cells (Mekkawy et al. 1995). Chebulin is antispasmodic.</td>
</tr>
<tr>
<td>*Valeriana jatamansi Jones Valerianaceae; DKU 084</td>
<td>Juge jadi, simme, samayo (L), sugandhwal (N), tagarah, nataha, washim (S). The root is anthelmintic and tonic.</td>
<td>The plant rhizome is used for diarrhoea, stomachache, nervous system disorders, and eye problems. It is anthelmintic, an aphrodisiac and applied on arthritis, sore throat, liver and spleen disorders in unani system (Anonymous 1995, Bajracharya 1979, Dash &amp; Gupta 1994, Dey 1998).</td>
<td>The root extract is antitymocobacterial (Taylor et al. 1995) but is chiefly used in insomnia (Chauffard et al. 1981). Curcumin is a chief constituent for anti-inflammatory activity (Ammon et al. 1993).</td>
</tr>
<tr>
<td>†Woodfordia fruticosa (L.) Kurz Lythraceae; DKU 083</td>
<td>Dhula (L), dhainyaro (N), agnijwala, tamra pushpi, dhakati (S). Flowers are used as an antipyretic and for dysentery.</td>
<td>The plant and fruit are useful in cough, wound and energy recovery. The flowers are astringent, hemostatic, antipyretic and useful in diarrhoea, dysentery and burns (Anonymous 1995, Bajracharya 1979, Dash &amp; Gupta 1994, Joshi 2006).</td>
<td>Ellagic acid, a major flower constituent, inhibits bacterial infections in stomach and arrests ischaemic gastric lesions (Lino et al. 2002). Ellagic acid use for gastroduodenal disorders has been patented (Rajagopalan &amp; Khambe 1998). It is also effective for rheumatism (Paper et al. 2005) and uterine disorders (Oudhia et al. 2003). It also has promising antitumor and anti-inflammatory activity (Das et al. 2007).</td>
</tr>
</tbody>
</table>

*Valeriana jatamansi Jones Valerianaceae; DKU 084

†Valeriana jatamansi Jones Valerianaceae; DKU 084

†Woodfordia fruticosa (L.) Kurz Lythraceae; DKU 083

††Woodfordia fruticosa (L.) Kurz Lythraceae; DKU 083

www.ethnobotanyjournal.org/vol7/i1547-3465-07-005.pdf
**Discussion**

The folk uses identified possess moderate affinity with ayurvedic traditions with 50% of species surveyed sharing at least one common use. This illustrates that the home herbal remedies are an independent health care system of Nepal Himalaya, which are indigenous but influenced by the ayurvedic system. However, the folk uses of the plant species in study area are being changed through perception and social transformation.

The affinity and validity between the indigenous use and phytochemical tests was less significant. 41.66% of the plant species were validated by phytochemical bioassays. Eight species and uses were commonly supported across all earlier studies and this one: *Asparagus racemosus* as a galactogogue, *Berberis asiatica* for treating eye problems, *Mucuna pruriens*, as nerve tonic and stimulant, *Aegle marmelos*, *Bergenia ciliata*, *Holarrhena pubescens*, *Syzygium cumini* and *Woodfordia fruticosa* as anti diarrhoeal and anti dysenteric.

There are forty-seven medicinal plants found as ethnomedicinal and ethnopharmacological properties (Table 1). The families Rutaceae and Euphorbiaceae contributed the most species i.e. each contributed three species.

A total 66.66% species and their uses were common between present and earlier study findings. The findings of this present survey was enumerated in Table 1 in order of species name, family name, English, local, Nepali and Sanskrit names and voucher code in column one; earlier findings in column two, Ayurvedic uses in column three, chemical compounds in column four and phytochemical findings in column five.

Based on the criteria stated above, only 48 plant species consisting of 39 families were selected and preceded for comparative analysis of ethnomedicinal and ethnopharmacological properties (Table 1). The families Rutaceae and Euphorbiaceae contributed the most species i.e. each contributed three species.

<table>
<thead>
<tr>
<th>Indigenous use (Present study)</th>
<th>Indigenous use (Earlier studies)</th>
<th>Uses in ayurveda*</th>
<th>Pharmacological activity!</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Ziziphus mauritiana</em> Lam. Rhamnaceae; BKU 082</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bewari (L), bayer (N), badar (S). Root paste is applied for diarrhea, dysentery and vomiting. The fruit are used for fever and digestion.</td>
<td>Chinese date, jujube (E). The fruit are used for as a tonic and aphrodisiac (Joshi &amp; Joshi 2001). They are used in fever and digestion (Manandhar 2002).</td>
<td>Root and fruit are used for thirst, bronchial asthma, diarrhoea and an aphrodisiac, emetic, carminative and digestive (Bajracharya 1979, Dash &amp; Gupta 1994, Joshi 2006).</td>
<td>Root extract is antimycobacterial (Taylor et al. 1995). The plant has antifertility, analgesic and antidiabetic properties (Erenmemisoglu et al. 1995). Used for antifertility (Gupta et al. 2004). Betulinic acid is an antibiotic and antitumor agent (Maurya et al. 1989).</td>
</tr>
<tr>
<td><em>Zanthoxylum armatum</em> DC, Rutaceae; DKU 069</td>
<td>Prickly ash peeper, Nepali peeper (E). Essential oil from the fruit has deodorant and antiseptic properties. A fruit decoction is used for abdominal pain (Rajbhandari 2001). Berries are carminative, antispasmodic, and used for rheumatism and skin diseases. Bark is used for ch leora, diabetes and asthma. It is used for toothache (Baral &amp; Kurmi 2006).</td>
<td>The plant is used in toothache, headache, skin diseases, indigestion, and diarrhoea. It is employed as a tonic, analgesic, carminative, expectorant, diuretic and used in gastritis, liver problems, blood disorders in unani system (Bajracharya 1979, Dey 1998, Sapkota &amp; Adhikari 2001).</td>
<td>Ethanol fruit extract is antibacterial against gram positive bacteria (Bacillus subtilis, Staphylococcus aureus, Mycobacterium phlei) (Taylor et al. 2002).</td>
</tr>
</tbody>
</table>
The folk uses of some of the species were contradicting to the ayurveda and phytochemical bioassays. Calotropis does not act as an antidote for scorpion sting (Uawong et al. 2006) but it was locally used in scorpion sting in study area. Acorus calamus was reported to be used as pesticide in study area and anticancer in the ayurveda but the experiment showed its insignificant inhibitory effect (Smit et al. 1995). Because of the bitter alkaloids of Swertia chirayita, it is beneficial to the indigestion (Reynolds 1982) but it was used only for headache and fever in study area. The indigenous knowledge on uses of plants of the species should be discouraged and further investigation, phytochemical screening and the validity assessments of the species would be an important line of research. Contradicting uses of the species should be discouraged and further investigation, phytochemical screening and the validity assessments of the species are worthwhile.

Literature Cited


Anonymous. 2006. against skin diseases, diarrhea, fever and insomnia. The study obtained its uses against fever, diarrhea, dysentery and indigestion but the species possesses anti-inflammatory, antibacterial antitumor properties in phytochemical tests (Maurya et al. 1989).


Bonjar, G.H.S. 2004. Inhibition of clotrimazole resistant Candida albicans by plants used in Iranian folkloric medicine. Fitoterapia 75:74-76.


www.ethnobotanyjournal.org/vol7/i1547-3465-07-005.pdf


www.ethnobotanyjournal.org/vol7/i1547-3465-07-005.pdf


