

Diversity and distribution of ethnomedicinal plants used by the *Adi* Tribe in East Siang District of Arunachal Pradesh, India

*Hui Tag¹, G. Murtem², A.K. Das¹, Ranjay K. Singh³

¹. Section of Higher Plant Systematic and Ethnomedicine, Department of Botany, Faculty of Life Sciences, Rajiv Gandhi University, Rono Hills, Itanagar -791 112, Arunachal Pradesh, India

². State Forest Research Institute, Van Vihar, Chimpu (Itanagar -791111), Arunachal Pradesh, India

³. College of Horticulture and Forestry, Central Agricultural University, Pasighat, East Siang, Arunachal Pradesh, India

*Corresponding author. E-mail: huitag@yahoo.co.in

Abstract

Siang Valley of Arunachal Pradesh is rich in bioresources guided by the indigenous knowledge system of its inhabitants. The present paper discusses some of our brief finding of ethnomedicinal plants survey for both human and animal healthcare system in rural areas conducted during year 2005 -2006 emphasized on the *Adi* tribe of East Siang District under Pasighat Forest Division. The survey revealed that due to lack of access to the modern medical system and high cost of modern allopathic drugs, the rural *Adi* folk of Siang Valley are still relaying more on herbal medicines for their primary healthcare system. In all, 41 species of ethnomedicinal plants have been studied taxonomically and ethnobotanically. Out of these 20 species are herbaceous, 8 species are shrubs; 6 species are climber and 7 species are tree belonging to 39 genera clubbed within 28 families. These species are put to various ethnobotanical/ethnomedicinal uses either single or in combined form in local treatment for wide range of human and veterinary (livestock) ailments.

Keywords: *Adi* tribe, Arunachal Pradesh, Ethnomedicine

INTRODUCTION

India's North East region including Arunachal Pradesh harbours more than 8500 species of angiosperms which accounts for about 50% of the flora of the country and of both general and ethnomedicinal importance (Mao & Hyniewta 2000). The state of Arunachal Pradesh with a total geographical area of 83,743 sq km is exceptionally rich in biodiversity in its varied agro-climatic zone. The region is falling within the Himalaya Hotspot of IUCN. The state of Arunachal Pradesh in particular is not only global biodiversity Hotspot but also a biocultural hotspot with 26 major tribes and 110 subtribes and, thereby, rich in age old traditions of using biological resources for the sustenance of their livelihood (Murtem 2000). The state has been frequently cited as hub center of rare and potential medicinal plants mostly used as ethnomedicines among the tribes. In recent decades, the significance of botanicals as safe and natural medicinal agents for human health has been reemphasized by WHO (Anonymous 2005) for traditional medicine strategies in its Geneva Declaration that still 80% of the global population are depending on herbal medicines in their rural healthcare system. However, a systematic documentation on role of botanicals in rural healthcare system in Arunachal Pradesh is still cited as least attempted (Tag *et al* 2005). With little or without modern health care system in far flung rural area, the tribes of Arunachal Pradesh are still relaying on their age-old herbal traditions for treating various ailments of both human and domesticated animals. The *Adi* tribe, in particular, of East Siang District of Arunachal Pradesh has been relaying on plants for food, shelters, cloth, weaponry, and medicines for maintaining health and wellbeing since antiquities. Their prolong association with nature has resulted into the development of a potential indigenous knowledge system, which serves as wisdom and valuable treasure of the present generation of the Abotani descendant of the Siang Valley in Arunachal Pradesh. The *Adis* of East Siang District belonging to Abotani descendant are groups of tribes living in pristine forest of

Upper Siang and East Siang Districts. They are rich in traditional knowledge related to use of plants in human and animal health care system. Perusal of literature revealed that the bulk of the prevalent indigenous knowledge systems of the *Adis* of East Siang are still remaining undocumented in modern literature. Earlier, Burkill (1924, 1925) pioneered the botanical work in Abors Hills. The floristic account of Rao & Joseph (1965), and Rao (1972) have mentioned the dominant flora of Kameng, Subansiri, Siang, Tirap and Lohit (NEFA). Haridasan *et al* (2003) has reported 500 species of important medicinal plants used by different tribes of Arunachal Pradesh. The first ethnobotanical survey on *Adis* of Pasighat forest and adjacent region of Siang Valley was done by Das (1986) and Rawat *et al* (1996). However, till date, no systematic record is available emphasized on ethnomedicinal plants and its role in rural health care system of the *Adi* tribes. Against these backdrop, the present paper discusses some of our brief finding of ethnobotanical survey conducted during year 2005 – 2006 emphasized on ethnomedicinal account of the above mentioned tribe in order to unveil some of its ethnomedicinal plants used in both human and animal healthcare practices in 8 rural localities within Pasighat Forest Division.

Study Area: Due to its unique topography, forests of Siang Valley of Arunachal Pradesh comprise of all the characteristics vegetation types which favours the luxuriant growth of different types of flora and fauna (Das, 1986). Villages of Pasighat forest area are located at the manipulation zone of Dying Ering Wildlife Sanctuary in the South and Dehing Dibang Wildlife Sanctuary in the North. The preliminary record on land, flora, climate and ethnicity were obtained from District Statistical Office, East Siang (Pasighat). The district has a total area of 4005 sq km and is lying approximately between 27° 43' and 20° 20' North latitudes and 94° 42' and 95° 35' East longitudes and at an altitude from 130 to 1400 m from the mean sea level. The districts derived its present name from the mighty Siang River, which later joined with Bramaputra at Sadiya in Assam. The entire district is administered under single central forest division and one Wildlife Sanctuary (Dying Ering WLS). The area experience both tropical and subtropical climate with high precipitation during July and August and humidity ranges from 80 – 90% that greatly influence the life in its forested vegetation types. The maximum summer temperature was recorded to be 38° C in the month of July and minimum winter temperature was recorded at 13° C during the month of December. The average annual rainfall varies from 150 - 1460 mm during April to September. A medium to high velocity wind and torrential rainfall is a frequent phenomenon throughout the year (Anonymous, 2004). The soil pH ranges from 4.0 - 6.8 with sandy to silt loam and organic content of 0.11 to 3.9 % and P₂O₅ and K₂O in the available forms (13,38 -110 and 26.80-751.00 kg/ha) (Anonymous 2001).

METHODS OF SURVEY

Ethnobotanical and floristic survey was done in Pasighat Forest Division of East Siang District of Arunachal Pradesh during the year 2005 – 2006 in 8 villages namely Balek, Mirbuk, Raneghat, Bascota, Boleng, Mebo, Mirmir, Yagrung and Niglok with high concentration of herbalists. Rao & Jain (1977), Jain (2004), Martin & Sempler (1994) field method were followed in present study. Random samplings of herbalists were done with the help of local resource person of each village prior to the main interview. Prior Inform Consent (PIC) was sought from the traditional healers before field survey. A total of 80 herbal healers were interviewed from 8 selected villages and at least 2 persons from 40 household were surveyed from both rural and semi-urban localities. The vegetation and climatic data were obtained from Divisional Forest Office, and Meteorological Department of the Office of Deputy Commissioner, East Siang District (Pasighat). Survey through

questionnaire formats was accompanied by field collection. One to two days time was spent with each herbalist in village, countryside, visited in forest and observed the plants in natural conditions. All necessary information about plants and part(s) used in curing different ailments were recorded. Nature of ailments and symptoms were recorded through phrase description and the use of medical terminology was avoided for time being to avoid misinformation. The mode of administration, cultural history of usage and certain related taboos observed were also recorded based on informant reports. The specimens were identified with Standard Indian Flora and finally examined at Herbaria of BSI Arunachal Field Station, Itanagar, BSI Eastern Circle, Shillong, and the correct nomenclature were verified with Kew Electronic Plants Information Centre (ePIC) UK, IPNI, GRIN taxonomy and the Flora of China website. The well labeled herbarium specimens were deposited in Herbarium of Department of Botany, Rajiv Gandhi University, Itanagar for future reference.

OBSERVATION

Our close observation on the *Adi* communities and their interaction with medicinal plants and wildlife resources has revealed some important aspects of the people's biocultural knowledge, rural healthcare system and wildlife heritage conservation methods of the Siang Valley of Arunachal Pradesh which is being summarized as under:

People's Biocultural Knowledge and Plant Diversity: The Pasighat Forest Division and its adjoining areas are predominantly inhabited by the population of indigenous tribes of *Adis* – comprises number of subtribes known as *Padam*, *Minyong*, *Galong*, *Komkar*, *Payi*, *Simong* and admixtures of migrants communities with a total population of 87,397 (Census 2001), which is approximately 8% of the total state population. The subtribes and clans of the *Adis* have their owned forest land for operating *jhum* and settled agriculture and for trapping and hunting ground by using indigenous technology. They have their own age-old indigenous knowledge system of using herbs in their health care system, and such biocultural knowledge issues are usually debated in *Kebang* - the highest constitutional body of the *Adi* communities and maintained through local customary laws. The rural populations sustain their livelihood through agricultural, ethnoforestry, fishing and hunting activities. Individual clans have their own forest land for agricultural practices and wildlife conservation and management. Overall, they are mostly dependent on forest resources for the sustenance of their livelihood. Their age-old and time tested cultural and ecological knowledge has help them in conservation of many valuable crop cultivars and landraces, wild edible plants and medicinal plants since time immemorial.

Diversity of Ethnomedicinal Plants: Our investigation has also revealed that the indigenous *Adi* communities are mostly dependent on medicinal plants for managing rural healthcare needs. In all, 41 species of ethnomedicinal plants have been recognized during the present survey. This includes 20 species of herbs, 8 species of shrubs; 6 species of climber and 7 species of trees belonging to 39 genera covering 28 families. These species are put to various ethnobotanical/ ethnomedicinal uses either single or in combined form in local treatment of wide range of human and veterinary (livestock) ailments. In far-flung areas, beyond 10-30 km away from Pasighat town, the tribe uses medicinal botanicals as best alternatives for their rural healthcare need. However, some of the plants put to frequent use are having both medicinal and food values. Most of the useful medicinal/ poisonous plants are collected from the wild. The *Adi* women usually play an important role in conservation of vegetable plants having both nutritional and medicinal values in their home garden.

Enumeration of Medicinal Plants

A brief taxonomy of selected ethnomedicinal plants studied through field collection, morphological study, herbarium & literature consultation up to species level and their distribution pattern, ethnomedicinal usage, cultural usage and ecological habitat are as under:

***Aconitum ferox* Wallich ex Seringe**, Mus. Helv. Hist. Nat. i. 160. t. 15. 1823. [**Ranunculaceae**].

Local Name: *Omi* (Adi); **Exsiccatu**s: *Hui Tag 1361HAU*: 2005, Abor Hills; **Flowering & Fruiting:** Jun – July; ES: H/Alp/Tm/R/EN/W.

Ethnomedicinal use: Dried roots are shaved and a pinch of few microgram of powder is mixed with lemon juice and applied on joints to cure rheumatic swelling; few microgram of powder is diluted in water and applied to cured snake and scorpion bites; paste is used as arrow poison.

Distribution: In 2800 – 4000 m elevation of Abor Hills of Siang, Subansiri, and Kameng Districts.

***Aesculus assamica* Griffith**, Notul. 4: 540. 1854. *A. panduana* Wall ex Hiern. in Hook.f., FBI 1: 675. 1875; Kanjilal *et al.*, Fl. Assam 1(2): 313. 1936. [**Sapindaceae**].

Local Name: *Dum Kur* (Adi); **Exsiccatu**s: *Hui Tag 148HAU*: 2002, Pasigaht; **Flowering & Fruiting:** January – August; ES:Tr/T/ST/Tm/R/W

Ethnomedicinal uses: Paste of fresh bark and leaf is used as fish poison in small rivers. Pinch of sun dried leaf powder is mixed with honey and used as purgative. It is advised to use the powder at lowest concentration.

Distribution: Abundant in tropical and subtropical rain forests from Sikkim eastward to South China (Guangxi) and North Vietnam. Very common in Arunachal Pradesh and Assam.

***Ammomum subulatum* Roxburgh**, Corom. Pl. t. 277; Fl. Indica ed. Carey 1: 43. 1820. [**Zingiberaceae**].

Local Name: *Jepo* (Adi); **Exsiccatu**s: *Hui Tag 510HAU*: 2007, Mebo; **Flowering & Fruiting:** August – February; ES:H/T/ST/Tm/R/W

Ethnomedicinal uses: Fresh paste of rhizome is applied on allergic skin and freshly cut wounds; rhizome powder is boiled in water and taken as stimulant and body tonic; cause perspiration and purgation during headache and viral fever; young flower buds are cooked and taken as vegetable.

Distribution: In isolated patches of forest and stream margins and hill slopes in Siang valley; restricted to Eastern Himalaya (600 – 3000 m).

***Ageratum conyzoides* L.**, Sp.Pl.839.1753; Chauhan *et al.*, in Hajra, Fl. Namdapha 1996. *A.hirta* Lamk., Dict.1:54.1783. [**Asteraceae**].

Local Name: *Namsing Eang* (Adi); **Exsiccatu**s: *Hui Tag 1185HAU*: 2006, Mirku Village, Pasigaht; **Flowering & Fruiting:** January – December; ES: H/T/ST/Tm/C/W.

Ethnomedicinal uses: Leaf paste and extract used as antiseptic in fresh wounds to stop bleeding.

Distribution: Abundant cosmopolitan obnoxious weeds in jhum field and degraded forest (upto 2600 m).

***Alstonia scholaris* (L.) Robert Brown**, Mem. Wern. Nat. Hist. Soc. 1: 75. 1811(1810); Kanjilal *et al.*, Fl. Assam 3: 253. 1939. *Echites scholaris* L., Mant.Pl.53. 1767. [**Apocynaceae**].

Local Name: *Singger/Pumlor* (Adi); **Exsiccatu**s: *Hui Tag 211HAU*: 2005, Mebo; **Flowering & Fruiting:** January – July; ES: Tr/T/ST/C/W.

Ethnomedicinal uses: Bark paste used to feed cow to cure indigestion. Leaf exudates and paste of used to cure cuts and wounds in ruminant animals.

Distribution: Common in tropical and subtropical areas of Arunachal Pradesh (upto 1000 m).

Begonia roxburghii (Miquel) DC., Prodr. 15 (10: 398. 1864; *Diploclinium roxburghii* Miq., Fl. Ind. Bat. 1(1): 692. 1856. *B. malabarica* Roxb., Fl. Ind. 3: 648. 1832, *nom. nud.* Lamk. 1785; Chowdhery *et al.*, in Hajra *et al.*, Mat. Fl. Arun. Prad. 1: 532.1996. [**Begoniaceae**].

Local Name: *Boku* (Adi); **Exsiccatus:** *Hui Tag 115HAU*: 2002, Pasighat; **Flowering & Fruiting:** March – November; ES: H/T/ST/C/W.

Ethnomedicinal uses: Petiole extract is applied in toothache, gum swelling and is consumed against stomach pain, chronic indigestion and excessive flatulence.

Distribution: In foothill and lowland areas, beside the streams in shady places. Common throughout Arunachal Pradesh (upto 2500 m).

Bidens pilosa L. var. *minor* (Blume) Scherff., in B. Gaz. 80: 387. 1925; Balak., Fl. Jowai. 1; 257. 1981; *B. sundaica* Bl. var. *minor* Bl. Birjdr. 913. 1826. [**Asteraceae**].

Local Name: *Tangam* (Adi); **Exsiccatus:** *Hui Tag 1300HAU*: 2004, Pasighat; **Flowering & Fruiting:** January – November; ES:H/T/ST/Tm/C/W.

Ethnomedicinal uses: Leaf juice is pour into ear and nostril against infection and ache. Leaves are cooked and consumed to cure high blood pressure and insomnia. Stem powder is taken with hot water in asthma and jaundice.

Distribution: In middle and low elevation tropical and subtropical (upto 2000) areas of Arunachal Pradesh.

Chenopodium album L., Sp. Pl. 2. 219. 1753. *Chenopodium album* var. *album* L. Magyar Botanikai Lapok 1. 1902. [**Chenopodiaceae**].

Local Name: *Yaing* (Adi); **Exsiccatus:** *Hui Tag 651HAU*: 2006, Niglok; **Flowering & Fruiting:** August - December. ES: Sr/T/ST/Tm/R/Cult.

Ethnomedicinal uses: Seeds are cooked and consumed as carbohydrate source. Tender leaves are cooked and eaten as vegetable to relieve indigestion, constipation, and chest complaint.

Distribution: Cultivated in Jhum field for seeds as food and leafy vegetable in tropical and temperate Arunachal Pradesh (between 200 – 3000 m).

Clerodendrum colebrookianum Walpers, Rep. 4: 114. 1845; Kanjilal *et al.*, Fl. Assam 3: 488. 1939. [**Verbenaceae**].

Local Name: *Onyen* (Adi); **Exsiccatus:** *Hui Tag 218HAU*: 2006, Mirbuk; **Flowering & Fruiting:** June – December; ES: Sr/T/ST/Tm/R/W.

Ethnomedicinal uses: Boiled leaves are eaten as vegetable during indigestion, high blood pressure and liver pain. Leaf paste is applied over forehead during viral fever.

Distribution: In tropical and temperate belt of entire northeast India (upto 2500 m).

Coptis teeta Wallich, Trans. Med. & Phys. Soc. Calcutta, 7: 347. 1838; Chowdhery *et al.*, in Hajra *et al.*, Mat. Fl. Arun. Prad. 1: 53-54. 1996. *C. teeta* subsp. *lohitensis* M.K. Pandit & C.R. Babu, Bot. J. Linn. Soci. 111(3): 377. 1993. [**Ranunculaceae**].

Local Name: *Mishmi teeta* (Adi); **Exsiccatus:** *Hui Tag 603HAU*, 2005, Mishmi Hills; **Flowering & Fruiting:** February – May; ES:H/Tm/R/E/W

Ethnomedicinal use: Highly bitter macerated particles from underground roots are mixed with lukewarm water and consumed against malarial fever, dysentery and stomach pain. It is also taken as tonic during debility and dyspepsia.

Distribution: Mid-temperate region of Hyuliang in Mishmi Hills, Dibang Valley, Siang and Kurung Kame District of Arunachal Pradesh. Prefer moist humus rich loose soil in forest floor or sometime on rock and tree trunks (between 1500 – 3000 m).

Cyclosorus parasiticus (L.) Farwell, Amer. Midl. Nat. 12:259. 1929. [**Thelypteridaceae**].

Local Name: *Rukji* (Adi); **Exsiccatus:** *Hui Tag 278HAU*: 2006, Mirbuk; **Flowering & Fruiting:**

Sori appears in winter; ES: H/T/ST/C/W.

Ethnomedicinal uses: Dry leaves are used as cushion in chicken cage to prevent infection from microscopic insect found in chicken cage or nest during hatching; leaf pastes used as fish poison. Leaves are kept near corridor of local houses to keep away evil spirits.

Distribution: Grow in open wasteland in tropical and temperate regions of Siang Valley, Subansiri, Lohit and Changlang (upto 2600 m).

Dendrocnide sinuata (Blume) Chew, Gard. Bull. 21:206.1965. *Urtica sinuata* Bl.Bijdr. 505.1832. *Laportea crenulata* Wedd, Mon. Urtic. 133. 1856; Kanjilal *et al.*, Fl. Assam 4: 281.1940. [**Urticaceae**].

Local Name: *Mat pepereng* (Adi); **Exsiccatus:** *Hui Tag 669HAU*: 2005, Balek; **Flowering & Fruiting:** July – December; ES: Sr/T/ST/Tm/C/W.

Ethnomedicinal uses: Leaves are use as disinfectant. The fresh leaves are spread on wounds of animal to kill microbes and to prevent further infection. Fibrous bark is used as rope for crafting traditional baggage.

Distribution: Abundant in wasteland, degraded forest and in forest margin and near streams in tropical and temperate parts of Arunachal Pradesh (upto 2000 m).

Dillenia indica L., Sp. Pl. 1: 535. 1753; Chowdhery *et al.*, in Hajra *et al.*, Mat. Fl. Arun. Prad. 1: 62. 1996. [**Dilleniaceae**].

Local Name: *Hati pol* (Adi); **Exsiccatus:** *Hui Tag 524HAU*: 2006, Balek; **Flowering & Fruiting:** July – December; ES: Tr/T/ST/Tm/C/W.

Ethnomedicinal use: The fleshy acriescent calyx is cut into thin slices, sun-dried, ground to powder and mixed with a glass of water and administered during Piles and Indigestion. Leaf paste is taken to cure dysentery. Jelly like extract from pulp is used for curing dandruff. Dry fruit-powder, dried pulp of *Embllica officinalis* and powdered leaves of *Stachytarpheta indica* are formulated into polyherbal drug and given to sexually debilitated males.

Distribution: Common throughout upto 700 m in Siang Valley and tropical and subtropical plains of Assam and Arunachal Pradesh.

Eupatorium odoratum L., Syst. Nat. Ed. 10, 2: 1205. 1759; Kanjilal *et al.*, Fl. Assam 3: 108. 1939; *Chromolaena odorata* (L.) R.M. King & H. Rob., Phytologia 20: 204. 1970. [**Asteraceae**].

Local Name: *Hoven Yuar* (Adi); **Exsiccatus:** *Hui Tag 1189HAU*: 2005, Balek; **Flowering & Fruiting:** November – March; ES: Sr/T/ST/Tm/C/W.

Ethnomedicinal uses: Leaf paste is antiseptic for cut wounds as haemostate. The juice is applied on blistered and general skin irritation; also applied on forehead in severe headache and cough.

Distribution: Abundant in open places in tropical and subtropical region of Arunachal Pradesh and the states of Northeast India (upto 1400 m).

Fagopyrum esculentum Moench, Methodus (Moench) 290. 1794. *Polygonum fagopyrum* L. ex Roxb. Fl. Ind. 2: 292. 1824. [**Polygonaceae**].

Local Name: *Nupuk* (Adi); **Exsiccatu**s: *Hui Tag 1169HAU*: 2005, Bascota. **Flowering & Fruiting:** March – May; ES: H/T/ST/Tm/C/W.

Ethnomedicinal uses: Leaves of whole plant is cooked and consumed without salt during liver complaint due to excessive alcohol consumption; also consumed with rice as vegetable during lack of appetite, constipation and indigestion, hotness in chest and stomach.

Distribution: Common in wasteland, ditches and pond areas, hill slopes in Siang Valley, Lohit Valley and rest of Arunachal Pradesh around 2700 m elevation.

Glochidion multiloculare Voigt, Hort. Suburb. Calc. 152. 1845; Kanjilal *et al.*, Fl. Assam 4: 181. 1940. [**Euphorbiaceae**].

Local Name: *Gaam Oying* (Adi); **Exsiccatu**s: *Hui Tag 1062HAU*: 2006, Pasighat; **Flowering & Fruiting:** April – May; ES: Sr/T/ST/R/Cult.

Ethnomedicinal uses: Extract of fresh leaves is used as abortifacient. The leaves are cooked and consumed as vegetable during indigestion and chest congestion.

Distribution: Subtropical and tropical regions of Assam and Arunachal Pradesh (upto 500 m).

Gynocardia odorata R. Brown in Roxburgh, Pl. Corom. 3: 95, t. 299. 1820; Chowdhery *et al.*, in Hajra *et al.*, Mat. Fl. Arun. Prad. 1: 152. 1996. [**Flacourtiaceae**].

Local Name: *Sibi-tulpai* (Adi); **Exsiccatu**s: *Hui Tag 680 HAU*: 2003, Siang Valley; **Flowering & Fruiting:** December – January; ES: Tr/T/ST/Tm/C/W.

Ethnomedicinal uses: Powder of sun-dried pericarp is used to cure gonorrhoea, chest distension but cause tooth fall when juice of young pericarp is used to care toothache and bleeding gum. Extract from fresh bark is used in skin allergy, cuts and wounds.

Distribution: Widely distributed under canopy coverage and secondary forest, throughout Siang Valley, Kameng, Subansiri, Tirap & Lohit district of Arunachal Pradesh.

Gynura crepidioides Benth, in Hook.f., Fl. Brit. Ind. 438. 1849; Kanjilal *et al.*, Fl. Assam 3: 127. 1939. *Crassocephalum crepidioides* (Benth.) Moore in J. Bot. 50: 211. 1912. [**Asteraceae**].

Local Name: *Ogen* (Adi); **Exsiccatu**s: *Hui Tag 517HAU*: 2003, Mebo; **Flowering & Fruiting:** October – January; ES:H/T/ST/Tm/C/W

Ethnomedicinal Uses: Leaf paste is applied over forehead during headache. Cooked leaf is consumed to cure constipation and insomnia. The boiled leaf is often given to pregnant mother for easy delivery.

Distribution: Abundant throughout Arunachal Pradesh and NE India (upto 2800 m).

Houttuynia cordata Thunberg, Fl. Jap. 234. t. 26; Kong. Vetensk. Akad. Handl., Stockholm, 4: 149. 152, t. 5. 1783. *Wulferia nepalensis* in Bull. Nat. Sci. Mus. (Tokyo) 6(4): 53. 1963; Kanjilal *et al.*, Fl. Assam 4: 31. 1940. *Polypara cochinchensis* Lour., Fl. Cochinch. 1: 61. 1790. [**Saururaceae**].

Local Name: *Roram* (Adi); **Exsiccatu**s: *Hui Tag 798HAU*: 2006, Pasighat; **Flowering & Fruiting:** December – January; ES: H/T/ST/Tm/C/Cult/W.

Ethnomedicinal uses: The root-paste is taken raw to cure jaundice. The paste of whole plant is used to cure dysentery and diarrhea. The leaves are cooked and consumed with rice to overcome indigestion, insomnia.

Distribution: In forest floor, and open places in both tropical and temperate parts of Arunachal Pradesh (upto 2500 m).

***Kalanchoe pinnata* (Kurz) Persoon**, Syn. Pl. 1: 446. 1805; Chowdhery *et al.*, in Hajra *et al.*, Mat. Fl. Arun. Prad. 1: 458. 1996. *Cotyledon pinnatum* Lamk., Encyl. 2: 141. 1786; *Bryophyllum calycinum* Salisb. Parad. Lond. t. 3, 1805 in DC. Prodr. 3:396. 1828. *B. pinnatum* Kurz. in J. Asiat. Soc. Beng. 25: 52. 1871. [**Crassulaceae**].

Local Name: *Nebi Nilam* (Adi); **Exsiccatu**s: *Hui Tag 127HAU*: 2003, Pasighat; **Flowering & Fruiting:** February – January; ES:H/T/ST/Tm/C

Ethnomedicinal uses: The paste and juice of fresh stem and leaves are applied on burnt skin, cuts and wounds, headache. The raw extract is taken orally during sensational urination.

Distribution: In open places, wasteland, near stream and river valley in study area. Cultivated in backyard or found naturalized (upto 3000 m).

***Leea indica* (Burm.f.) Merrill**, in Philipp. J. Sci, Bot. 14: 245. 1919; Chowdhery *et al.*, in Hajra *et al.*, Mat. Fl. Arun. Prad. 1: 319. 1996; *Staphyllea indica* Burm. f., Fl.Ind. 75.t.23.f. 1768 *Leea sambucina* Willd, Sp. Pl. 1: 1177. 1797; Kanjila *et al.*, Fl. Assam 1(2): 30. 1936. [**Leeaceae**].

Local Name: *Kukura thengia* (Adi); **Exsiccatu**s: *Hui Tag 1189HAU*: 2006, Yangrung; **Flowering & Fruiting:** June – December; ES: H/T/ST/Tm/C/Cult/W.

Ethnomedicinal uses: Slightly warmed fresh leaves are spread over the body parts to relieve tiredness and muscle pain.

Distribution: Grows near stream, shady areas, forest floor and degraded areas throughout Arunachal Pradesh (upto 2800 m).

***Mikania micrantha* Kunth** in HBK. Nov. Gen. Pl. 4: 134. 1820; *M. scandens* C.B Clarke in Hkf, Fl. Brit. Ind. 3: 244. 1882. [**Asteraceae**].

Local Name: *Japanese Lata*; **Exsiccatu**s: *Hui Tag 806HAU*: 2006, Pasighat; **Flowering & Fruiting:** October – February; ES: Cl/T/ST/Tm/C/W.

Ethnomedicinal uses: Leaf paste is consumed during mild stomach pain and diarrhea; applied as antiseptic in newly cut wounds. Leaf juice is mixed with salt and taken during dysentery.

Distribution: Now an obnoxious pantropic weed, growing upto 2500 m in Arunachal Pradesh.

***Oxalis griffithii* Edgwerth et Hook.f.** in Fl. Brit. Ind. 1: 436. 1874. [**Oxalidaceae**].

Local Name: *Piwaj Ekum* (Adi); **Exsiccatu**s: *Hui Tag 491 HAU*: 2003, (Siang Valley); **Flowering & Fruiting:** May – July; ES: H/T/ST/Tm/C/W.

Ethnomedicinal uses: Fresh leaf is consumed as digestive and stimulant. Leaf extract is taken during cough and chest congestion. The raw leaf is taken as salad during diabetes and liver disorder.

Distribution: Plant is growing in wild in secondary forest, open habitat, often raring in garden for vegetable (upto 2000 m) in entire Arunachal Pradesh.

***Paederia scandens* (Loureiro) Merrill**, in Contr. Arn. Arb. 8: 163. 1943. *Gentiana scandens* Lour., Fl. Cochinch. 171. 1790. *Paederia tomentosa* Bl. Bijdr. 968. 1826; Kanjilal *et al.*, Fl. Assam 3: 77. 1939. *P. foetida* auct. Pl. non. Linn. Mant. Pl. 7: 52. 1767. [**Rubiaceae**].

Local Name: *Apatare* (Adi); **Exsiccatu**s: *Hui Tag 258HAU*: 2002, Mirku; **Flowering & Fruiting:** July – January; ES:Cl/T/ST/Tm/C/W.

Ethnomedicinal uses: Leaf juice is consumed during blood dysentery and mild diarrhoea; cooked leaves are consumed to cure stomach pain, hypertension and insomnia. The paste is used in inflammation, cuts & wounds. Stem powder is used to cure chest pain, gastritis and fever.

Distribution: In secondary and disturbed forests throughout Arunachal Pradesh (upto 2500 m).

Parabaena sagittata Miers ex Hook.f. et Thomson, Fl. Ind. 181. 1855; Chowdhery *et al.*, in Hajra *et al.*, Mat. Fl. Arun. Prad. 1: 102. 1996. [**Menispermaceae**].

Local Name: *Pumrol* (Adi); **Exsiccatus:** *Hui Tag 52HAU*: 2006, Ruksin; **Flowering & Fruiting:** May – November; ES: Cl/T/ST/Tm/R/W.

Ethnomedicinal uses: Milky sap of stem and leaf paste is applied to fresh cuts & wounds. Stem is cut into thin slices, sun-dried, powdered and is used in chest inflammation, skin allergy and throat infection.

Distribution: Very rare, often found in secondary and disturbed forests, associated with *Lantana* and *Eupatorium* species in Siang area (upto 1000 m).

Perilla frutescens (L.) Britton, Mem. Torrey Bot. Club 5: 277. 1894; Kanjilal *et al.*, Fl. Assam 3: 516. 1939. *Ocimum frutescens* L., Sp. Pl. 597. 1753, excl. syn. Rheed. *Melissa maxima* Ard., Animadv. Bot. Spec. Alt. 28., t.13. 1764. *Perilla ocymoides* L., Gen. Pl. ed. 6: 578. 1764, nom. illeg. *Perilla acuta* (Thunb.) Nakai in Bot. Mag., Tokyo 42: 474. 1928. [**Lamiaceae**].

Local Name: *Namdung* (Adi); **Exsiccatus:** *Hui Tag 1205HAU*: 2006, Balek; **Flowering & Fruiting:** September – November; ES: Cl/T/ST/Tm/C/W.

Ethnomedicinal uses: Powdered stem is mixed with lukewarm water and used in abdominal distension, morning sickness and threatened abortion; raw leaves are consumed to relieve chest oppression, nausea, vomiting, food poisoning from crabs and insects, and headache. Seeds are used in cough and asthma and also consumed as substitute to oil.

Distribution: Cultivated in agricultural field and sometime grow wild in degraded land in Siang, Kameng, Subansiri, Lohit and Tirap frontier region of Arunachal Pradesh (altitude range: 200 – 2500 m).

Persicaria hydropiper (L.) E. Spach, Hist. Nat. Veg. X: 536. 1841; *Polygonum hydropiper* L., Sp. Pl. 361. 1753; Kanjilal *et al.*, Fl. Assam 4: 21. 1940. [**Polygonaceae**].

Local Name: *Tamu* (Adi); **Exsiccatus:** *Hui Tag 842HAU*: 2006, Yagrung; **Flowering & Fruiting:** September – March; ES: H/T/ST/TmC/W.

Ethnomedicinal uses: The paste of about 10-15 kg of whole plants is used as fish poison in stream.

Distribution: Abundant in wasteland, abandoned pond, brackish water and paddy fields in upper reaches of Siang Valley, Lohit, Tirap, Kameng and Subansiri of Arunachal Pradesh (upto 2800 m).

Pothos scandens L., Sp. Pl. 968. 1753. *P. fallax* Schott. Prodr. 560. 1860. [**Araceae**].

Local Name: *Loma losil* (Adi); **Exsiccatus:** *Hui Tag 1321 HAU*: 2004, Balek; **Flowering & Fruiting:** February – July; ES: EH/T/ST/Tm/C/W

Ethnomedicinal uses: Paste of fleshy stem and leaves are used as ingredient in polyherbal formulation to fractured bone; also applied in fresh cuts & wounds as antiseptic.

Distribution: Epiphytic on tree trunks throughout tropical and subtropical Arunachal (upto 2000 m).

Pouzolzia bennettiana Weight, Icon. 6. t. 1978. 1853; Kanjilal *et al.*, Fl. Assam 4: 291. 1940; Chauhan *et al.*, in Hajra, Fl. Namdapha 294. 1996. [**Urticaceae**].

Local Name: *Oyik* (Adi); **Exsiccatus:** *Hui Tag 1309HAU*: 2005, Pasighat; **Flowering & Fruiting:** January – December. ES:EH/T/ST/Tm/C/W

Ethnomedicinal uses: The young tender leaves are cooked and consumed as vegetable to relieve indigestion, chest hotness and constipation. The paste of whole plant is used to relieve inflammation of skin due to burn

Distribution: Grow in disturbed patches, forest margin and on roadside throughout Arunachal Pradesh (upto 2300 m).

Phrynium pubinerve Blume, Enum. Pl. Javae 1: 38. 1827. *P. capitatum* Willd. in Sp. Pl. 1: 17. 1797 *nom. illeg.*; *Pontederia ovata* L., Sp. Pl. 288. 1753. *Phyllodes capitata* Kuntze in Revis. Gen. Pl. 2: 694. 1891. *P. rheedei* Suresh et Nicholson in Taxon 35: 355. 1886. [**Marantaceae**].

Local Name: *Ekam* (Adi); **Exsiccatus:** *Hui Tag 730 HAU*: 2006, Balek. **Flowering & Fruiting:** May – October; ES:H/T/ST/Tm/C/W

Ethnomedicinal uses: The paste of rhizome is used to relieve mental stress. The crushed seeds are taken during chest pain. Leaves are used in rituals, and for packing rice grains which is consumed during community festival.

Distribution: Fairly common in forest floor, near stream, shady places, damp area in Eastern Himalaya (altitude range: 200 – 2300 m).

Psidium guajava L., Sp. Pl. 470. 1753; Kanjilal *et al.*, Fl. Assam 2: 287. 1938; Chowdhery *et al.*, in Hajra *et al.*, Mat. Fl. Arun. Prad. 1: 473. 1996. [**Myrtaceae**].

Local Name: *Muduri* (Adi); **Exsiccatus:** *Hui Tag 1806HAU*: 2006, Bascota; **Flowering & Fruiting:** April – November; ES: Sr/T/ST/C/Cult.

Ethnomedicinal Uses: The extract or paste of tender leaves is consumed during diarrhea and dysentery. Fruits are consumed to relieve constipation.

Distribution: Cultivated in gardens for fruits upto 1800 m elevation.

Ricinus communis L., Sp. Pl. 1007. 1753; Kanjilal *et al.*, Fl. Assam 4: 221. 1940; Chauhan *et al.*, in Hajra, Fl. Namdapha 280. 1996. [**Euphorbiaceae**].

Local Name: *Aki rokmi* (Adi); **Exsiccatus:** *Hui Tag 659HAU*:2006, Balek; **Flowering & Fruiting:** March – November; ES: Sr/T/ST/Tm/C/W.

Ethnomedicinal uses: Leaf pastes is spread over joint and muscle to heal fractured bone, muscle ache, and joint pain. The warmed leaf is tied over injured legs of Chicken.

Distribution: In wasteland, forest margin and degraded land throughout India (upto 2500 m).

Sesamum indicum L. Sp. Pl. 2: 634. 1753, *nom. cons.* *S. orientale* (L.) DC., Pl. Rar. Jard. Geneve 16-19. 1825 *nom. ill.* [**Pedaliaceae**].

Local Name: *Namdung* (Adi); **Exsiccatus:** *Hui Tag 754HAU*: 2006, Balek; **Flowering & Fruiting:** April – October; ES: Sr/T/ST/Tm/C/Cult.

Ethnomedicinal Uses: Powdered seeds are cooked with vegetable and taken as substitute for oil. It is not recommended to take during religious ceremony and such taboos are maintained for at least 6 months from the date of ritual performance. Leaf extract is used to cure earache and skin burn. Leaves are cooked and consumed as vegetable.

Distribution: Commonly cultivated in jhum field as mixed crop in almost all tribal groups of Arunachal Pradesh. (upto 2600 m).

Solanum violaceum Ortega, Nov. Pl. Descr. Dec. 56. 1798. *S. indicum* L., Sp. Pl. 187. 1753 *auct. non.*; Kanjilal *et al.*, Fl. Assam 3: 369. 1939. [**Solanaceae**].

Local Name: *Kopi* (Adi); **Exsiccatus:** *Hui Tag 42HAU*: 2002, Mirku; **Flowering & Fruiting:** January – December; ES: H/T/ST/Tm/C/Cult.

Ethnomedicinal uses: Fruits are used for relieving gastritis pain, indigestion, high blood pressure, cough, toothache, and externally for skin ulcer.

Distribution: In secondary forests, dry thickets, wastelands, roadsides in study area. Commonly cultivated in jhumland, home garden for fruits (upto 2000 m).

Solanum viarum Dunal, A. L. P. P. de Candolle, Prodr. 13(1): 240. 1852. [**Solanaceae**].

Local Name: *Kopi Tang* (Adi); **Exsiccatus:** *Hui Tag 652HAU*: 2006, Pasighat Town; **Flowering & Fruiting:** January – December; ES: H/T/ST/Tm/C/W.

Ethnomedicinal uses: The fleshy part of raw fruit is used to relieve toothache. Fruits are roasted and eaten during diarrhea. Fruit paste mixed with Ginger is taken as salad.

Distribution: Grow in wasteland, forest margin and degraded forests of temperate and tropical Arunachal Pradesh (upto 2800 m).

Stemona tuberosa Loureiro, Fl. Cochinch. 404. 1790. Chauhan *et al.*, Hajra, Fl. Namdapha 330. 1996. *Roxburghia gloriosoides* Jones in Roxb., Corom Pl. 1: 26.t. 32. 1795. [**Stemonaceae**].

Local Name: *Tassomagyo* (Adi); **Exsiccatus:** *Hui Tag 732HAU*: 2005, Yagrun forest; **Flowering & Fruiting:** May – July; ES: Thr/T/ST/Tm/R/W.

Ethnomedicinal uses: Leaf paste is used for resetting fractured bone of hands and legs. The sun-dried tubers are roasted and consumed to relieve diarrhoea and stomach pain. Fresh paste of tuber is applied in joint pain (rheumatism).

Distribution: In degraded forests of Arunachal Pradesh (upto 2000 m).

Tinospora cordifolia (Willd) Hook.f. et Thomson in Fl. Ind. 184. 1855. *Menispermum cordifolium* Willd in Sp. Pl. 4: 826. 1806; Kanjilal *et al.*, Fl. Assam 1: 54. 1922; Chowdhery *et al.*, in Hajra *et al.*, Mat. Fl. Arun. Prad. 1: 106. 1996. [**Menispermaceae**].

Local Name: *Egyum* (Adi); **Exsiccatus:** *Hui Tag 360HAU*: 2006, Siang Valley); **Flowering & Fruiting:** April – August; ES: Cl/T/ST/Tm/R/W.

Ethnomedicinal uses: Aerial stem is cut into thin slices, sun-dried, pounded to powder and administered during cough, debility, fever, urine trouble, joint inflammation and liver complaint. It is also used during dysentery, diarrhoea, and abnormal heart palpitation.

Distribution: Large, deciduous, climbing to the canopy and common upto 2000 m from camp towards Mebo and upper part of Siang.

Spilanthes oleracea L. Syst. Nat., ed. 12. 2: 534. 1767. *Spilanthus acmella* Murr. Syst. Veg. ed. 13: 610. 1774. *Spilanthes acmella* var. *oleracea* (Jacq.) Baker in Mart. Fl. Bras. (Martius) 6, pt. 3: 233. 1884; Kanjilal *et al.*, Fl. Assam 3; 118. 1939. *Acemella oleracea* (L.) R.K Jansen, Syst. Bot. Monogr. 8: 65. 1985. [**Asteraceae**].

Local Name: *Marsang* (Adi); **Exsiccatus:** *Hui Tag 578HAU*: 2006, Mirku; **Flowering & Fruiting:** January – December; ES: H/T/ST/Tm/C/Cult.

Ethnomedicinal Uses: Paste of leaves and flower buds are applied on swelling gum to prevent bleeding. Adi women use the paste of whole plant to nullify unwanted pregnancy. It is also consumed as salad and taken during chronic constipation.

Distribution: Very common in marshy land, roadside, near ponds and ditches of both middle and low elevation areas (upto 1800 m) of Arunachal Pradesh.

Stephania glandulifera Miers, Contrib. Bot. 3: 220. 1871; Chowdhery *et al.*, in Hajra *et al.*, Mat. Fl. Arun. Prad. 1: 105. 1996. *S. rotunda* auct. Non Lour.: Hook.f. et Thomson in Hook.f., Fl. Brit. Ind. 1: 103. 1872; Kanjilal *et al.*, Fl. Assam 1: 52. 1922. [**Menispermaceae**].

Local Name: *Gapik tarreng* (Adi); **Exsiccatus:** *Hui Tag 08HAU*: 2002, Saing Valley; **Flowering & Fruiting:** April – May; ES: Cl/T/ST/Tm/R/W.

Ethnomedicinal uses: Powdered tuber is consumed during malarial fever, skin inflammation, liver complain, stomach-ache and general body pain; mixed with leaf powder of *Plumbago rosea* and consumed during general debility. Fresh leaf extracts are taken to relieve high heart beat, and use as cardiac-tonic.

Distribution: Common in secondary forests under dense canopy coverage in tropical and temperate zone (upto 3500 m); often cultivated near backyard; in Siang and entire NE India.

Zanthoxylum pseudoxyphyllum C.R. Babu in Bull.Bot.,Surv.India 16: 66.1974. 1977. [Rutaceae].

Local Name: *Ombeng* (Adi); **Exsiccatus:** *Hui Tag HAU667*: 2006, Yagrung; **Flowering & Fruiting:** April – June; ES: Sr/T/ST/Tm/R/W.

Ethnomedicinal uses: Bark of stem or branches are used as tooth brush to prevent infection. The powders of seeds are used as fish poison in small streams.

Distribution: Tropical and Sub-tropical parts (upto 1300m) of Arunachal Pradesh.

Zanthoxylum rhetsa (Roxburgh) DC., Prodr. 1: 728. 1824. *Fagara rhetsa* Roxb., Fl.Ind. 1: 438. 1820. *Tipalia limonella* Dennst in Schluss., Hort. Malab. 31. 1818, *nom. nud.* *Zanthoxylum limonella* (Dennst.) Alston in Trime, Handab. Fl. Ceylon suppl.6: 37. 1931, *nom. Illegit.* *Fagora budrunga* Roxb., Fl. Ind. ed. 1: 437. 1820. *Zanthoxylum budrunga* (Roxb) DC., Prodr. 1: 728. 1824. *Z.budrunga* (Roxb.) DC. var. *rhetsa* (Roxb.) Haines, Bot.Bihar Orissa 1: 165, 1921. [Rutaceae].

Local Name: *Onger* (Adi); **Exsiccatus:** *Hui Tag 668HAU*: 2006, Niglok; **Flower:** March – June; **Fruit:** September – November; ES: Tr/T/ST/Tm/R/W.

Ethnomedicinal uses: The crushed or powdered seeds are use as fish poison in small streams; leaves are highly aromatic and consume as vegetable; powdered seeds are taken as spice along with rice.

Distribution: Very rare in forest floor and secondary forests in tropical to temperate areas (300 – 2400 m) of Arunachal Pradesh.

DISCUSSION AND CONCLUSION

The survey of ethnomedicinal plants revealed that the *Adis* of East Siang District are rich in oral lore and traditional knowledge related to the use of herbal medicines. The pristine forest with magnificent floral wealth coupled with rich cultural heritage amongst the tribes has added to such uses. Their strong age-old cultural knowledge has saved many rare elements of flora and fauna with medicinal and cultural value. Of the recorded 41 ethnomedicinal plants put to different use in treating various ailments of animal and human, 3 species of plants namely, *Alstonia scholaris*, *Cyclosorus parasiticus*, and *Dendrocnide sinuata* are widely used in both human and animal healthcare system and the rest are used in treating various human ailments. Since the area located at tropical belt, epidemic and malarial fever are the common ailments witnessed in the far flung rural area. Fishing is one of the most important occupations of the *Adis* of East Siang. They usually go for traditional method of fishing by using fish poisoning plants such as bark of *Aesculus assamica*, whole plant of *Persicaria hydropiper* and fruits of *Zanthoxylum rhetsa*. Since, the region is located in tropical belt which is prone to malarial fever, the *Adi* folk adopt certain indigenous techniques to cure malaria and fever of the locality. They used mostly the plants such as powdered stem bark of *Alstonia scholaris*, tuberous dried roots powder of *Coptis teeta*, and root powder of *Dendrocnide sinuata* as potent anti-malarial crude drug. It has been observed that there are a wide variety of plants for every day common ailments and diseases among the *Adis*. Most importantly, the WHO has recommended good collection and good harvesting practices of the medicinal plants which include correct systematic identification of the plants. Hence, detail taxonomic revision on each of the medicinal plants available in the region is the need of the hour. Such systematic approach could lessen wrong identification of the plants by traders and pharmaceutical industries which often lead to the drug adulteration. It would also help in preserving local culture and nomenclature of plants. It is recommended to undertake detailed ethnobotanical studies of the whole of Arunachal region in cross cultural approach including as many tribes as possible to bring about reliable taxonomic information on ethnomedicinal plants.

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