

## Ethnomedicinal plants used for gastro-intestinal diseases by *Adi* tribes of Dehang-Debang Biosphere Reserve in Arunachal Pradesh

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An ethno-medico-botanical survey was carried out in *Adi* dominated areas of Dehang-Debang Biosphere Reserve (DDBR) of Arunachal Pradesh during 2005-2007 to study the pattern of use, preparation, and dosage administration of drugs in treatment of various gastrointestinal diseases. A total of 44 plant species belonging to 31 families were recorded for the treatment of various gastrointestinal diseases. Among these, 25 plant species used as antidiarrhoeic and antidiarrhoeic, 9 species for stomachache, 6 species as stomachic, 4 species as carminative, 3 species as antiemetic, 2 species as anthelmintic, 1 species each as antifatulent and laxative.

**Keywords:** Dehang-Debang Biosphere Reserve, *Adi* tribe, Ethnomedicine, Gastrointestinal diseases, Arunachal Pradesh

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Herbal medicine have been in use since time immemorial and are still the mainstay mainly in the developing countries because of their better cultural acceptability, better compatibility with the human body and lesser side effects while the use of complementary and alternative medicine is increasing rapidly in developed countries<sup>1,2</sup>. Almost all the people are susceptible to digestive problems, regardless of gender, ethnic or socioeconomic backgrounds. Digestive disorders can cause various symptoms like difficulty in swallowing, stomachache, nausea, diarrhoea, dysentery, constipation, etc.<sup>3</sup>. Only 1,100 plants have so far been thoroughly examined for their medicinal properties in the world<sup>4</sup>. Out of the ca 17,500 flowering plant species found in India, over 1,600 are used in traditional medicinal system<sup>5</sup>. In Northeast India alone, 1,350 plant species are being used in ethnomedicinal preparations, 665 species as food plants and 899 species having miscellaneous uses<sup>6</sup>. About 500 species of medicinal plants which are important to sustenance of the tribal population have been recorded from the state of Arunachal Pradesh<sup>7</sup>. The climatic and ecological diversity of the state create a foundation for a very rich biological diversity with varied forest types from tropical to

alpine<sup>8</sup>. The state also has rich cultural heritage and tradition with 26 major tribes and 110 subtribes<sup>9</sup>. Due to sheer inaccessibility of the location and lack of exposure and interaction, these tribes lead a more or less isolated life that resulted in preserving their culture and tradition almost intact and they have their own ethos, *taboos*, practices and treatment of various ailments utilizing natural resources<sup>10</sup>.

Dehang-Debang Biosphere Reserve (DDBR) is located in the Northeastern part of Arunachal Pradesh with an area of 5,111.50 sq km comprising parts of 4 districts i.e. Dibang Valley, East Siang, West Siang and Upper Siang districts<sup>11</sup>. Mouling National Park (483 sq km) and Dibang Wildlife Sanctuary (4,194 sq km) also fall under the DDBR. It has ethnobiological importance with sparse inhabitants of different tribes like *Adis* (subtribes- *Ashings*, *Bokars*, *Boris*, *Minyongs*, *Palibos* and *Shimongs*), *Gallos*, *Khambas*, *Membas* and *Mishmis* and is the store house of traditional knowledge system. The ethnic communities of Arunachal Pradesh by and large depend on the wild forest resources to fulfill their day to day needs<sup>10,12-19</sup>. Of 85 wild edible plant species from DDBR, only 17 species have been documented as medicinal plants<sup>20</sup>. The paper deals with the medicinal plants used by *Adi* tribes of DDBR for the treatment of gastrointestinal problems.

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## Methodology

Extensive ethnobotanical survey was conducted in the fringe villages of DDBR dominated by *Adi* tribes composed of subtribes *Ashings*, *Karkos* and *Minyongs* during 2005-2007. *Adi* tribe is mostly found in Southwestern part of DDBR. Seven villages, Jido, Bomdo, Janbo, Jengging, Ramsingh, Moying, Ngaming were surveyed. Informal discussions were held with two categories of traditional healers, the socially recognized practitioners known as *Nyibu* (*Shamanian* priest) and common general practitioners. Modified semi structured questionnaires were used to interview the informants following standard methodology<sup>21,22</sup>. Voucher specimens were collected with the help of the informants from nearby forests, kitchen garden and *Jhum* land. Herbarium specimens were prepared, identified and were deposited in Forestry Herbarium at Northeastern Regional Institute of Science and Technology, Nirjuli, Arunachal Pradesh.

## Enumeration

All the plant species recorded during the study are enumerated herewith giving botanical names, family, vernacular names in inverted comma, place of collection, followed by the medicinal uses in details.

*Abroma augusta* L. (Sterculiaceae), *Yadukh*

Uses: Stem bark decoction is given orally twice a day as antidiarrhoeic and also used as antiemetic.

*Ageratum conizoides* L. (Asteraceae), *Yemmang*

Uses: Warm leaf infusion is given for 3 days as antidiarrhoeic and antidiarrhoeic.

*Allium sativum* L. (Liliaceae), *Jilap*

Uses: Seed infusion of *Zanthoxylum armatum* mixed with the *Allium sativum* bulb and little salt is taken twice a day in stomach bloating.

*Alpinia malaccensis* (N. Burr.) Rose (Zingiberaceae), *Pupere*

Uses: A piece of fresh rhizome is taken as antiemetic.

*Andrographis paniculata* (Burm. f) Wall. ex. Nees. (Acanthaceae), *Sirata*

Uses: Infusion of dry shoots soaked in water is given to infant once in a day to control irregular stool and also used as anthelmintic.

*Angiopteris evecta* (Forst) Hoffin; (Marratiaceae or Angiopteridaceae), *Taba* (Fig. 11)

Uses: Rhizome extract is taken once to twice a day as antidiarrhoeic and antidiarrhoeic; rhizome is also used as famine food.

*Aristolochia sp.* (Aristolochiaceae), *Rimom*

Uses: Root is warmed on fire and pounded; decoction prepared from powdered root in water is given 3 times a day as antidiarrhoeic and antidiarrhoeic.

*Begonia josephii* A. DC. (Begoniaceae), *Sisi baying* (Fig.12)

Uses: Decoction of freshly collected shoots and leaves is given 2-3 times a day for as antidiarrhoeic.

*Bryophyllum calycinum* Salish (Crassulaceae), *Nebinelum*

Uses: Hot infusion of leaves is taken twice a day as antidiarrhoeic.

*Calamus erectus* Roxb. (Arecaceae), *Tara*

Uses: Fresh seeds are taken in dyspepsia.

*Calamus rotang* L (Arecaceae), *Tara*

Uses: Tender shoots are taken as vegetables and as anthelmintic.

*Campylandra aurantiaca* Baker (Liliaceae), *Kekong kelong*

Uses: Rhizome decoction is administered as antidiarrhoeic, antidiarrhoeic, analgesic, antimalarial, antiarthritic, vermifugal, antipyretic and stomachic.

*Carica papaya* L. (Caricaceae), *Omri*

Uses: Root decoction is given in malarial attack, dysentery and in dog bite.

*Centella asiatica* L. (Apiaceae), *Kipum*

Uses: Fresh whole plant extract is taken twice/thrice a day as stomachic.

*Cinnamomum zeylanicum* Bl. (Lauraceae), *Hitipo:ri*

Uses: Dry stem bark is used as antiemetic and also used as condiment.

*Coffea bengalensis* Heyne ex. Roem. & Schult. (Rubiaceae), *Wansho*

Uses: Fresh young shoots are used in indigestion and stomachache.

*Coptis teeta* Wall. (Ranunculaceae), *Ringka* (Fig.2)

Uses: Infusion of dried rhizome soaked over night in water is taken as antidiarrhoeic, antidiarrhoeic, antipyretic and antimalarial.

*Curcuma caesia* Roxb. (Zingiberaceae), *Yakane Keloti* (Fig.1)

Uses: Fresh rhizome decoction is taken as antidiarrhoeic and to get relief from stomachache.

*Curcuma longa* L. (Zingiberaceae), *Keloti*

Uses: Warmed rhizome decoction is given during stomach bloating and indigestion.

*Dillenia indica* L. (Dilleniaceae), *Sampa* (Fig.3)

Uses: Fleshy calyx with little salt is taken as a remedy for stomachache.

*Diplazium esculentum* (Retz.) Sw. (Athyriaceae),

*Takang*

Uses: Boiled young fronds are taken with boiled rice as vegetables for laxative.

*Drymaria cordata* L. (Caryophyllaceae), *Tayi taor*

Uses: Fresh whole plant mixed with *Psidium guajava* fruit is taken in gastritis.

*Eryngium foetidum* L. (Apiaceae), *Ori*

Uses: Leaf is taken as chutney (condiments) believed to be appetizer. Paste from stems and a leaf is applied together on forehead as a remedy for headache.

*Garcinia pedunculata* Roxb. ex. Buch. (Clusiaceae), *Tabing*

Uses: Cold water infusion of dry pericarp is taken as antidiarrhoeic, antidyenteric, in dyspepsia and in flatulence.

*Hedygium sp* (Zingiberaceae), *Ali tang*(Fig. 10)

Uses: Ripened fruits are taken as constipating agent.

*Hedyotis scandens* Roxb. (Rubiaceae), *Piyak kili/Bangkadsing* (Fig.4)

Uses: Root decoction is taken in gastric trouble and gallstone.

*Houttuynia cordata* Thunb. (Saururaceae), *Roram* (Fig.5)

Uses: Extract of tender shoot is given for stomachache. Warmed leaves are packed in banana leaf for snuff or massage to get relief from sinusitis.

*Lagerstroemia macrocarpa* Wt. (Lythraceae), *Ajar* (Fig.8)

Uses: Decoction of stem bark is given twice a day as antidyenteric.

*Melastoma malabathricum* L. (Melastomaceae), *Ke-chi-Yaying*

Uses: Fresh leaf extract is used as antidyenteric. Leaves are used as vulnery; roots & leaves are used as mouth wash for toothache.

*Mikania macrantha* H.B.K. (Asteraceae), *Japani lota*

Uses: Fresh leaf extracts along with *Mentha piperita* leaf extract is administered as antidyenteric & antidiarrhoeic.

*Morus laevigata* Wall. ex Brandis. (Moraceae), *Eyum*

Uses: A portion of wood after removal of the bark is powdered; powder decoction is taken twice a day as anthelmintic. The latex is used as vulnery.

*Musa sepium* L. (Musaceae), *Kolung* (Fig.8)

Uses: Boiled fruit is given once/twice daily to stop loose motion.

*Oxalis corniculata* L (Oxalidaceae), *Phakep*

Uses: Whole plant is taken as vegetable, as antidyenteric and to relieve intoxication from wine.

*Paederia foetida* L (Rubiaceae), *Yepetare* (Fig.6)

Uses: Boiled leaves and twigs are taken with rice as vegetable in indigestion, dysentery and diarrhoea.

*Physalis minima* L. (Solanaceae), *Bodopati*

Uses: Fruit extract is administered for gastric problem. Ripe fruits are taken fresh.

*Portulaca oleracea* L. (Portulacaceae), *Gubar oying*

Uses: Stem and leaves are taken as vegetable with boiled rice as stomachic.

*Psidium guajava* L. (Myrtaceae), *Mudurang*

Uses: Decoction of fresh tender leaves is taken for treating dysentery and diarrhoea.

*Rhus semialata* Murr. (Anacardiaceae), *Tangmo* (Fig.7)

Uses: Fruit decoction is given in stomach disorder of children.

*Solanum spirale* Roxb. (Solanaceae), *Bangko kopi* (Fig.9)

Uses: Warm decoction of fruits is used in stomachache and also taken as vegetable, chutney, and salad.

*Sonchus sp* (Asteraceae), *Ogen*

Uses: Boiled leaves are taken for curing flatulence and body pain.

*Tacca integrifolia* Kar-Gawl (Taccaceae), *Tagoon*

Uses: Cold root decoction along with salt is used for dysentery and diarrhoea.

*Trichosanthes cordata* Roxb. (Cucurbitaceae), *Dongkyong riyong*

Uses: Root decoction is used for dysentery and diarrhoea; ripen fruits are edible.

*Zanthoxylum armatum* DC. (Rutaceae), *Onger*

Uses: Tender leaves are used as vegetable. Infusion of seeds mixed with *Allium sativum* and little salt is prescribed in case of stomach bloating.

*Zingiber officinale* Rosc. (Zingiberaceae), *Kakir*

Uses: Warmed rhizome decoction is given to get relief from post natal stomach pain and stomachache.

## Results and discussion

The ethno-medico-botanical investigation reveals that the *Adi* communities of DDBR are totally dependant on the plant resources to cure their stomach disorders and have rich knowledge on herbal medicine. Leaves and fruits are found as the most widely used plant parts (11 species) followed by stem (9 species), root (8 species), whole plant (4 species), bark (2 species), fronds (1 species) and flower (1 species). Most of the plants are taken orally in the form of decoction, infusion or extract for curing stomach disorders. To improve palatability, additives are used sometimes. The extract of *Mikania*





Fig.1 *Curcuma caesia* Roxb.



Fig.2 *Coptis teeta* Wall.



Fig.3 *Dillenia indica*



Fig.4 *H. scandens* Roxb.

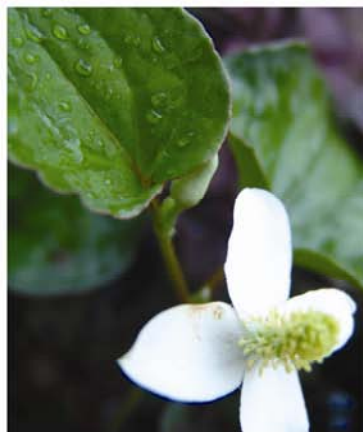


Fig.5 *Houttuynia cordata* Thunb.



Fig.6 *Paederia foetida* Linn.



Fig.7 *Rhus semialata* Murr.



Fig.8 *Lagerstroemia macrocarpa* Wt.



Fig.9 *Solanum spirale* Roxb.



Fig.10 *Hedychium* sp



Fig.11 *Angiopteris evecta* (Forst) Hoffin



Fig.12 *Begonia josephii* A. DC.

*macrantha* is given with *Mentha piperita* to reduce bitterness. Some restrictions are imposed while taking certain types of medicines by *Ashing sub-tribe* of Janbo village. Patients are not allowed to take country beer (*Apong*), *Capsicum* sp, *Solanum melongena* and *Cucurbita pepo* during treatment for diarrhoea. It has been observed that 25 species of the total reported plants are being mostly used as antidiarrhoeic and antidiarrhoeic, followed by 9 species used in stomachache, 6 as stomachic, 4 as carminative, 3 as antiemetic, 2 as anthelmintic, 1 species each as antifatulent, laxative, constipating agent, and in post natal abdominal pain.

One of the most commonly used medicinal plants in DDBR among *Adi* tribe is *Campylandra aurantiaca* (locally known as *Kekong kelong*). It has been used for curing dysentery, diarrhoea, stomachache, gastritis, malaria and common fever. Tribal people used to preserve the dry root of this species for future use. Another most commonly used medicinal plant *Coptis teeta*, an endemic to Arunachal Pradesh is used as anthelmintic, antimalarial, vulnerary, antidiarrhoeic, backache, antipyretic, etc. Most of these plants are harvested from the wild. Some progressive farmers have started plantation of medicinal plants in their kitchen gardens. The plant species used by *Khamti* and *Adi* tribes are found almost similar<sup>13</sup>. However, they differ in the pattern of utilization. *Coptis teeta*, *Drymaria cordata*, *Houttuynia cordata*, *Paedaria foetida* and *Zanthoxylum armatum* are some of the species reported for stomach disorders<sup>20</sup>. *Lagerstroemia macrocarpa*, *Melastoma malabothricum*, *Mikania macrantha* and *Trichosanthes cordata* which are reported in the study are also used by tribals of Mizoram for curing dysentery<sup>24</sup>. Incidentally, the use of *Mikania macrantha*, *Psidium guajava*, *Paedaria foetida* has also been reported from Bangladesh for the treatment of digestive disorders though the formulation and parts used are different<sup>25</sup>. Use of 40 plant species by *Apatani tribes* of Arunachal Pradesh for gastrointestinal disorders also reported<sup>14,26-28</sup>. However, variation in the species used in different regions may be due to the variation in floristic composition and availability of species for selection. Minor differences in the plants used and the mode of preparation of drugs for curing the same disease were also noted. It is also noted that same plant species may have

curative property for unrelated diseases and their therapeutic value can be assessed only through a thorough pharmaceutical investigation.

### Conclusion

Herbal medicine and traditional practitioners play an important role in the healthcare system in the DDBR region since the villages are located in inaccessible area and the large part of population does not access to western medicine system. The recovery of the knowledge and practices associated with these plant resources may be an important strategy linked to the conservation of biodiversity. Management plan with pragmatic approach may be useful for the bettering of the quality of life of poor rural communities dwelling in the fringe villages. As the wild resources are the main source of nutrients and medicine for remote dwellers, these could be domesticated for self-sustenance through settled cultivation. There is an urgent need for documentation of Traditional Knowledge related to the intangible cultural heritage regarding traditional plant uses.

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