

HIGH ALTITUDE MEDICINAL PLANTS OF TAWANG DISTRICT, ARUNACHAL PRADESH

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Abstract

The paper deals with the medicinal and ethnomedicinal studies of Tawang district, Arunachal Pradesh. The district is very rich with diverse forest, natural beauties and steep mountains. The inhabitants are *Monpa*. The minor flora is very rich with highly valuable medicinal plants and the local people use many medicinal plants for treatment of diseases specially in remote areas. This paper contains 50 medicinal plants including ethnomedicines used by both *Monpa* tribe.

Keywords: Ethnomedicines; *Monpa*; Arunachal Pradesh

INTRODUCTION

Arunachal Pradesh has altitudinal range from 150 to 7090 msl containing a mosaic valley and ridges with an assortment of agro-climatic conditions. The hills support growth of luxuriant forests which are home to myriad plants and animals making the state one of the richest Biodiversity in the country. The state contains 40 % of the floral and faunal species of India, many of which are endemic to the region. Apart from large number of timber species, there are 568 species of orchids, more than 500 species of medicinal plants, 300 species ferns, 81 species of bamboos, 18 species of canes and large number of our cultivated plants, and even plants of biological curiosities, such as parasites, saprophytes, etc. are found. Other important groups of plants are Rhododendrons, Hedychiums and oaks, etc. These rich forests are divided into six major types depending on altitudinal variation and climatic conditions (Kaul and Haridasan, 1987). They are 1) Tropical Evergreen Forests up to an elevation of 600 m; 2) Tropical Semi Evergreen Forests between 600-900 m altitude 3) Subtropical Forests between altitudes 900-1900 m; 4) Pine Forests between 1000-1800 m; 5) Temperate forests between 1800-3500 m and 6) Alpine forests above 3500 m.

There are 26 major tribe and 110 sub-tribe in the state and every tribe has their own traditional system of treatment using medicinal

plants available in the area. The traditional treatment system is still playing a vital role in all remote areas and some of the treatments are more effective than the modern treatment system.

MATERIALS AND METHODS

Study area

Tawang district occupies an area of 2,172 square kilometres (839 sq. mile). The district is roughly located around latitude 27°45' N and longitude 90°15' E at the western part of Arunachal Pradesh. The altitude ranges from 6,000 feet (1,829 m) to 22,000 feet (6,706 m), and inhabitants are local tribal people living scatteredly from temperate to sub alpine areas. The district was carved out of the West Kameng district, which adjoins Tibet in the north, Bhutan in the South and West, and West Kameng in the South and East.

In winter, the Sub-alpine and alpine zones of the district frequently experiences heavy snowfall. Tawang district is recognized as store house of many valuable medicinal plants such as *Taxus baccata*, *Illicium griffithii*, *Swertia chirayita*, *Panax sikkimensis/ bipinnatifidus*, *Aconitum ferox*, *A. hookeri*, *A. heterophyllum*, *Rubia manjitha* etc. which are naturally occurring in the district.

The inhabitant of this district is the *Monpa* tribe and they are quite well knowledge and experienced in using the medicinal plants for

treatment of various ailments in traditional ways. The Tibetan Medicine system based on herbal plants is very popular among them and there are some hospitals of Tibetan medicine in the district. All the medicinal plants used for treatment of diseases either in traditional system or Tibetan system are collected from the wild habitat only. Such medicinal plants are rarely cultivated by the local people particularly by Monks and Nuns. However, many valuable medicinal plants like *Swertia chirayita*, *Illicium griffithii*, *Rubia corfiolia* and *Aconitums* are traded in large quantities collected in clandestinely from the forest for which many plants are led to under threats. If this practice is allowed to continue then many valuable medicinal plants will become 'Rare, Endangered and Threatened' in near future.

The forest type of the district is mainly composed of temperate mixed forest in the lower belt and temperate coniferous forest in the upper, mixed with patches of Bamboos and Rhododendrons. In higher altitude above 3500 m Sub-alpine and Alpine Forests are found. Common species includes *Rhododendrons*, *Primula*, *Asters*, *Saussurea*, *Swertia*, *Pedicularis*, *Fragaria*, *Rodiola* etc. Common trees species found in the district are *Abies densa*, *Abies spectabilis*, *Cupressus torulosa*, *Tsuga dumosa*, *Taxus baccata*, *Pinus roxburghii*, *Pinus wallichiana* and *Juniperus recurva*.

Materials

The materials used for the studies are GPS, camera, notebook, pen, herbarium sheets, herbarium wooden presser, ropes, polythene bags, secateurs, dao, etc.

Survey

Extensive field tours were undertaken to Tawang Gompa, Geshingla, Lumla, Shakti, Mukto, Zemithang, PTSO, Mirba and Jang areas of Tawang district for survey and documentation of medicinal and ethnomedicinal plants, used by the *Monpa* tribe in the district. Consultations were made with the Buddhist Lamas, Gaon

Buras and traditional healers of concerned villages. Utilization of the ethnomedicinal plants in modern treatment systems were studied with their commercial prospects. All information were noted in the notebook. Digital image of each plants were taken for further study and live plants were collected for herbarium preparation. Detail information of the plant with their local names, parts used and applications were recorded accordingly. GPS locations of the visited areas were recorded. Other plants of lower groups like fungi, algae and lichens were also recorded, photographed and collected. Field survey including regeneration, propagation and habitat studies were carried out during all the seasons of the year.

ENUMERATION

1. *Aconitum hookeri* Stapf [Ranunculaceae]
A biennial erect herb up to 20 cm high, puberulous. Leaves acutely toothed.
Local name: Bong-Nga-Kar-Po/ Man-Chen-Tsan-Duk
Part used : Tuber
Uses : Antidote for snake and scorpion bite
2. *Aconitum ferox* Wall.ex Ser [Ranunculaceae]
Tall herbs, 1-2 m with palmately 5-lobed leaves, dull blue flowers in erect spikes and hairy follicles
Local name: Shaga-Manshing
Part used : Tuber
Uses : Nasal catarrh, tonsillitis, sore throat, gastritis, debility and fever of inflammatory origin. Also as sedative and diaphoretic, relieving pain and rheumatism
3. *Aconitum heterophyllum* Wall.ex Royle [Ranunculaceae]
Herb up to 30-120 cm tall; leaves ovoid dentate; flowers large, greenish purple with stripes in lax spiked clusters; fruits erect follicles.
Local Name: Bong-Nga-Kar-Po/ Man-Chen-Tsan-Duk
Part used : Rhizome

Uses : Antidote for snake and scorpion bite, Treats infectious fever and intestinal disorder

4. *Acorus calamus* L. [Acoraceae].

Rhizomatous perennial herb; flowers small, dense and whitish in colour; fruits pulpy; seeds numerous

Part used : Rhizome

Uses : Improve speech, memory

5. *Allium hookeri* Thwaites. [Amaryllidaceae]

A bulbous perennial herb; bulbs cylindrical, clustered

Local name: Lam

Part used : Whole plant

Uses : Stomachic, skin diseases and bone fracture

6. *Aristolochia griffithii* Hook.f. & Thomson ex Duch. [Aristolochiaceae]

Woody twiner or climber; leaves ovate, acute or shortly acuminate

Local name: Baribama

Part used : Roots

Uses : Blood purifier and purgative

7. *Artemisia vulgaris* L. [Asteraceae]

Tall herbaceous perennial plant up to 1-2 m tall with woody roots

Local Name: Atung karmo

Part used : Roots

Uses : Tonic, antispasmodic, anthelmintic, asthmatic and stomach pain

8. *Berberis aristata* DC. [Berberidaceae]

Thorny shrub, cut stems yellow; flowers yellow; leaves toothed, prickly, arranged radically

Part used : Root, basal stem, flowers and berries

Uses : Bitter tonic for intermittent fever, bark for eye lotion, yields alkaloid berberin and is a dye

9. *Bergenia ciliata* (Haw.) Sternb.

[Saxifragaceae]

Perennial herbs with stout rootstocks. Leaves broadly obovate, rounded at base and apex.

Local name: Bra-Mento

Part used : Roots

Uses : Cures fever, diarrhea and cough, heals wounds. Dissolves kidney and gall bladder stones

10. *Bergenia stracheyi* Hook.f. Thomson

[Saxifragaceae]

Perennial herbs up to 20 cm tall with thick rhizome

Local name: Bragen

Part used : Leaves

Uses : Rheumatism

11. *Carum carvi* L. [Apiaceae]

Perennial herbs up to 60 cm tall; stem branched, bristly, glabrous, hollow, joints with septa

Local name: Go-Nyod

Part used : Fruits

Uses : Stomachache, carminative. Used in eye ailments, loss of appetite and hypertension

12. *Cordiceps sinensis* (Berk) Sacc.

[Ophiocordycipitaceae]

A fungus closely related to mushroom

Local name : Yartsa Gombu

Part used : Whole plant

Use : Anti-aging

13. *Corydalis cashmeriana* Royle.

[Papaveraceae]

A rhizomatous herb up to 20 cm with flower 2-lipped and blue colour

Local name : Trahm-Sheng

Part used : Leaves and flower

Uses : Wounds

4. *Crawfordia speciosa* Wall [Gentianaceae]

Climbing herb with blue-purple, bell shaped flower borne in stalked clusters of 1-3 flowers.

Local name: Arkadamasisi

Part used : Flower and roots

Uses : Wounds

15. *Embelia ribes* Burm.f. [Primulaceae]

A climber with hanging branches. Fruits globose green, red when ripe
Part used : Fruits
Uses : Astringent, anthelmintic against tape worm, chest and skin diseases

16. *Fritillaria cirrhosa* D.Don. [Liliaceae]

Small herbs with garlic like tubers and brown specked bell like flowers
Part used : Corms/ tubers.
Uses : For diseases like tuberculosis, Asthma, Bronchitis, etc.

17. *Gaultheria fragrantissima* Wall. [Ericaceae]

Shrub with triangular stem prominent bud scale, rough leaves, cream coloured flowers arranged in one sided racemes, and bluish purple berries
Part used : Leaves and branches.
Uses : Fruits edible, leaves yield winter green oil, used for rheumatism, muscular pain and as antiseptic. Also said to be stimulant and carminative

18. *Halenia elliptica* D.Don [Gentianaceae]

Herbs with opposite, small leaves and purple tinged flowers with spurs
Part used : Roots
Uses : As a substitute and adulterant in place of *Swertia chiraita*

19. *Hedychium spicatum* Buch.-Ham [Zingiberaceae]

Perennial herbs grows upto 1 m; flowers fragrant, white and orange colour, appearing in a dense spike
Local name: Blenga
Part used : Roots
Uses : Dysentery, chest pain, cough and cold

20. *Heracleum candidans* Wall. ex DC. [Apiaceae]

A plant grows upto 40-200 cm tall with cylindrical root stout; stem solitary, branched
Local name: Tru-Kar
Part used : Fruits and seeds

Uses : Treats inflammation and pain due to vulnerable fever, haemorrhage and abdominal cramps due to intestinal worms, leprosy, aphrodisiac and nerve tonic. Also treats leucoderma and psoriasis. Seeds suppress heart disorder

21. *Holarrhena pubescens* Wall. ex G.Don [Apocynaceae]

Perennial herbs, flowers bright yellow capsule ovoid
Part used : Whole plant.
Uses : Astringent. The plant also show some anti HIV/ Cancer activity

22. *Houttuynia cordata* Thunb. [Saururaceae]

Creeping herb with fleshy stem and heart shaped leaf
Local name: Momarengpa
Parts used : Whole plant
Uses : Stomachache, diarrhea and piles

23. *Illicium griffithii* Hook.f.& Thoms. [Illiciaceae]

A medium sized conical shaped tree with star shaped fruits. Leaves bright green
Local name: Lishi
Part used : Fruits
Uses : Carminative, appetiser and spice

24. *Inula racemosa* Hook. Syn. *I. royleana* C. B. Clarke [Asteraceae]

A small aromatic herb
Local name: Poshkar, Manou
Part used : Roots
Uses : Anthelmintic, antiseptic, diuretic and expectorant

25. *Iris clarkei* Baker ex Hook.f. [Iridaceae]

A perennial rhizomatous herbs with linear, lanceolate leaves. Flowers bluish to deep purple colour
Local name: Karpo Chiito
Part used : Flower, leaves, stem and roots
Uses : Muscle pain

26. *Juniperus squamata* Buch.Ham ex D.Don [Cupressaceae]
Evergreen small to medium sized tree upto 12 m high with brownish bark. Cones berry like
Local name: Shukpa
Part used : Leaves/ Needles.
Uses : Kidney problem and swelling
27. *Lilium nepalense* D.Don [Liliaceae].
Herbs grows upto 1 m high, bulbs stoloniferous; flowers few, often solitary, pendant, pale green with a purple throat
Local name: Whan
Part used : Roots
Uses : Gastritis and stomachic
28. *Meconopsis grandis* Prain [Papaveraceae]
A perennial herb grows up to 1 m. Flower large, deep sky blue, shallowly cup-shaped with 4 petals
Local name: Chhalachhusar
Part used : Leaves
Uses : Sexually transmitted diseases
29. *Meconopsis paniculata* (D.Don) Prain [Papaveraceae]
A deciduous short lived perennial herb, up to 1-2.5 m, with stout rootstock; leaves lanceolate, pinnately lobed
Local name: Chhalachhusar
Part used : Leaves
Uses : Sexually transmitted diseases
30. *Nardostachys jatamansi* (D.Don) DC. [Caprifoliaceae]
Erect herb with thick tuberous spindle shape root
Local name: Jatamansi
Part used : Rhizome
Uses : Tonic, stimulent, diuretic, hair oil
31. *Paris polyphylla* Sm. [Melanthiaceae]
A perennial rhizomatous herb, stem erect up to 45 cm high, leaves in whorls, flowers yellow, solitary. Fruits capsule with numerous scarlet seeds
Part used: Rhizomes
- Uses : Anthelmintic, tonic, fever, diarrhoea, wounds and insect bite
32. *Panax pseudoginseng* Wallich. [Araliaceae]
Perennial herbs up to 50 cm tall. Leaves palmately compound. Rootstock short, with 2-5 fleshy roots, fusiform
Local name: Gin sheng/ Mar-Pril-Go-Nag
Parts used : Rhizomes and leaves
Uses : Restorative tonic, increases physical strength, antidepression, fatigue and promote mental alertness
33. *Panax sikkimensis* R.N.Banerjee [Araliaceae]
Herbs with a single whorl of palmate peduncled leaves, umbelled fruit which are small, bright Red. Roots swollen
Local name: Ginsheng
Part used : Rhizomes
Uses : Around tonic, used against depression and fatigue. Promotes mental alertness and wellbeing. General debility, carminative, tonic, expectorant
34. *Picrorhiza kurroa* Royle ex Benth . [Plantaginaceae]
A perennial herb with fleshy root
Local name: Kutki
Part used : Roots
Uses : Bitter tonic, dropsy, liver and spleen disease, anaemia
35. *Pinus wallichiana* A.B. Jackson [Pinaceae]
A coniferous evergreen tree grows up to 50 m tall, distinguished by its clusters of long cylindrical hanging cones and needle-like blue-green leaves
Local name: Chhu-gon-shing
Part used : Leaves and cones
Uses : Rituals and resins
36. *Plantago major* L. [Plantaginaceae]
A herbaceous perennial herb with a rosette of leaves. Flowers small, greenish-brown with purple stamens
Local name: Tsashing

Part used : Whole plant
Uses : Wounds and inflammations

37. *Podophyllum hexandrum* Royle
[Podophyllaceae]

Herbs with two broad leaves, pink flowers and drooping bright red fruits

Part used : Rhizomes

Uses : Rhizomes purgative, vermifuge and yields an alkaloid for treating some form of cancer, fruits edible

38. *Prunella vulgaris* L. [Lamiaceae]

It grows up to 30 to 40 cm; leaves lance-shaped, with serrated edges and reddish tips; flowers tubular, upper lip forms purplish hood, while lower lip has 3 lobes and is white in color

Part used : Whole plant

Uses : Sore throat, anxiety and depression

39. *Rhododendron arboreum* Smith. [Ericaceae]

An evergreen shrub or small tree to 20 m with bright red flowers

Local name: Woodongmento

Part used : Flower

Uses : Dysentery and diarrhea

40. *Rheum emodi* L. [Polygonaceae]

Stout herbs with radical and cauline ovoid leaves, flowers pink, fruits pinkish winged

Local name: Chu-Tsa

Part used : Rhizomes and roots

Uses : Laxative, tonic and purgative. Heals ulcer and treats indigestion and flatulence

41. *Rubia manjistha* L. [Rubiaceae]

Stragglers with prickly quadrangular stems with 4 long prickly petioled leaves at each node, yellowish flowers and purplish fruits

Local name: Tzod

Part used : Roots and old stems.

Uses : Rheumatism, gall and spleen diseases and vermifuge

42. *Rubus ellipticus* Smith [Rosaceae]

A large shrub with stout stem grows up to 4.5 m; leaves trifoliate, elliptic or obovate and toothed with long bristles

Local name: Comrep

Part used : Roots

Uses : Cold and cough

43. *Rubus paniculatus* Smith [Rosaceae]

A climber with a large ovate-heart-shaped, finely toothed leaves; flowers white, at the end of branches

Local name: Comrep

Part used : Roots

Uses : Cold and cough

44. *Satyrium nepalense* D. Don. [Orchidaceae]

Terrestrial herbs, up to 30 cm tall. Leaves ovate or elliptic-lanceolate, acute or sub-acuminate. Flowers spike, pink or white colour

Part used : Tubers

Uses : Fever

45. *Swertia chirayita* (Roxb.) Buch.-Ham. ex C.B. Clarke [Gentianaceae]

Herbs with opposite triple veined leaves, bluish tinged flowers and erect small capsules

Local name: Wang La/ Tikta

Part used : Whole plant

Uses : Stomachache, tonic and laxative. Treat chronic fever, anaemia, bronchial asthma and liver disorders

46. *Swertia hookeri* C.B. Clarke [Gentianaceae]

Annual or perennial herbs up to 25-80 cm tall single, erect stem

Local name: Wang La

Part used : Whole plant

Uses : Malaria, purgative and laxative

47. *Taxus baccata* L. [Taxaceae]

Trees with distichous, leaves which are green beneath in slender nearly forked branches, and red fruits, male plants with yellowish minute cones

Local name: Te-sheng, Himalayan yew.

Part used : Leaves

Uses : Recently become important due to the presence of Taxol in leaves. Taxol is used as an anticancer drug

48. *Valeriana hardwickii* Wall. [Caprifoliaceae]
A perennial herb up to 30-160 cm tall with tiny, pale pink flower borne in domed cluster at the end of branches
Part used : Leaves and rhizomes
Uses : Skin diseases, high blood pressure

49. *Valeriana jatamansi* Jones [Caprifoliaceae]
A small herbs, up to 50 cm high. Stem short, leaves caudate, basal leaves persistent
Local name: Loong Poes
Part used : Roots
Uses : Treatment of lysteria

50. *Viscum articulatum* Burm.f. [Santalaceae]
A semi-parasitic shrub; branches flat with pendulous tufts; flowers minute, stalkless, and in stalkless, 3-flowered spikes
Local name: Nyasheng jormu
Part used : Roots, leaves and stems
Uses : Bone fracture, swelling of nerves

RESULTS AND DISCUSSION

A total number of 50 medicinal and ethnomedicinal plants representing 42 genera belonging to 33 families are recorded from the study area and the plants were collected, pressed and processed for herbarium for further study. Due to heavy rainfall and snowfall during the tour, many species could not be documented. Further extension work will definitely help us to carry out study of ethnobotanical plants used by the tribes.

An in-depth study, survey and documentation of all such medicinal plants used in Traditional and Tibetan system of medicine in the district is in need for conservation and sustainable utilization and expansion of commercial cultivation of such highly traded medicinal plants, which will help in uplifting the rural economy of the local people.

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REFERENCES

- Hajra, P.K., 1996.** Materials for the Flora of Arunachal Pradesh, BSI, Howrah.
- Haridasan, K., Bhuyan, L.R., Sarmah, A., Bisht, N.S., 2003.** Medicinal plants sector in Arunachal Pradesh- An overview. Indian Forester. 129(1), 37-47.
- Haridasan, K., Sarmah, A., Bhuyan, L.R., Hegde, S.N., Ahlawat, S.P., 2003.** Field Manual for Propagation and Plantation of Medicinal Plants. SFRI Information Bulletin No. 16, State Forest Research Institute, Itanagar.
- Kaul, R.N., Haridasan, K., 1987.** Forest types of Arunachal Pradesh- A preliminary study. Journal of Economic and Taxonomic Botany. 9(2), 389-397.
- Kirtikar, K.R., Basu, B.D., 1918.** Indian Medicinal Plants, Vol I-IV. International Book Distributors, Dehradun and Periodical Expert Book Agency, Delhi.
- Sinha, G.N., 2008.** Forests and Forestry in Arunachal Pradesh. State Forest Research Institute, Itanagar.
- Sivarajan, V.V., Balachandrsn, I., 1994.** Ayurvedic drugs and their plant sources. Mohan Primlani for Oxford & IBH Publishing Co. Pvt. Ltd., New Delhi.

Photo Plate- I



Houttuynia cordata



Illicium griffithii



Rubia manjistha



Taxus baccata



Gaultheria fragrantissima



Panax pseudoginseng



Picrorhiza kurroa



Swertia chirayita



Meconopsis paniculata

Photo Plate- II



Meconopsis grandis



Satyrium nepalense



Swertia hookeri



Bergenia ciliata



Aconitum hookeri



Artemisia vulgaris