

PRELIMINARY OBSERVATION ON FLORAL DIVERSITY OF MENCHUKHA, WEST SIANG DISTRICT, ARUNACHAL PRADESH.

L. R. Bhuyan, Yapi Pangu & N. Tam
Systematic Botany Division,
State Forest Research Institute,
Van Vihar, Itanagar.
email: lrbsb2008@gmail.com

Abstract

Menchukha, the most northern Sub-Division of West Siang district bordering China is a beautiful valley surrounded by pine forest and thorny bushes and snow capped mountains. The river Yargyap chu flows through the valley of Menchukha which keeps the valley fertile and humid with pleasant cool climate. The forests in the main area are secondary forests with riverine grass lands but surrounding hills are covered by sub-tropical to temperate forests species. Menchukha is mostly inhabited by Memba, Ramo, Bokar, Pailibo with a few Tagin populations. The people also depends on the forests for their livelihood and use lots of plants in their day to day life as medicine, rituals, food, fodder and fuel etc. The study deals with the diversity of plants of Menchukha and its surroundings along with their local names and their uses by different tribes. This paper consists of 124 species found in Menchukha area out of which 53 species are ethnobotanically used by the Memba (M), Ramo (R), and Tagin (T) tribes inhabited in Menchukha.

INTRODUCTION:

Arunachal Pradesh, the largest state of North East India is known for its rich biodiversity and is recognized as one of the "Biodiversity Hotspot" in the world. It lies between the latitude 26°28' N to 29°30' N and longitude 91°30' E to 97°30' E. Owing to the altitudinal variations ranging from 150 m. to 7500 m and agro climatic variations, the state has a very rich and diverse flora and fauna. The state has an area of 83,743 Km² (2.54 % of the geographical area of the Indian Union.) out of this 68,757 sq. km. is covered by forests. The forest types which are generally seen in Arunachal Pradesh are (1) Tropical Semi evergreen, (2) Tropical wet Evergreen, (3) Sub Tropical Forests, (4) Pine Forests, (5) Temperate Forests and (6) Alpine Forests (Kaul & Haridasan, 1987). The flora contains many rare, endangered and endemic plants including 4117 species of

Angiosperm, including 568 species of Orchids, 450 species of Medicinal plants, 73 species of Bamboo, 18 species of Cane and 34 species of Gymnosperms. The fauna includes 200 mammals, 131 fishes, 79 reptiles, 27 amphibia, 71 species of mollusca, 16 species, of annelid, over 850 birds and large number of insects in Arunachal Pradesh. However, further exploration might yield interesting data.

MENCHUKHA, THE STUDY AREA...

Menchukha is situated at an elevation of 1900 to 3600 msl of West Siang district of Arunachal Pradesh. It falls between latitude from N 28° 35' 42.3" and N 28° 35' 58.3"; longitude from E 094° 08' 39.2" and E 094° 07' 57.2". Menchukha is bordered by Upper Siang district in the northeast, Upper Subansiri district in southwest, and the northwestern

side is bordered by China. The name *Men-chu-kha* means medicinal water of snow where *men* is medicine, *chu* is water and *kha* is snow though *kha* also means mouth. The local population is primarily Memba, a Tibeto- mongloid ethnic group. Another populated tribe is Ramo tribe, said to be a sub-tribe of Adi tribe. All the tribes are culturally very rich with their own traditions. They celebrate Losar, Solung and Si- Dony festivals with colourful manner. Festivals that are celebrated by the Memba tribe are Losar and Choskar.

Study was carried out at lower part (elevation 1500 msl) and upper part of Menchukha (elevation 3600 msl.) and nearby villages viz. Dorjeeling, Dechangthang village, near Hanuman camp, and Yorko, Segong, Yarlung along the construction site of border roads towards China.

THE FORESTS:

The forest types seen in the area are sub-tropical to temperate forests. Below the Menchukha, sub tropical forests with pine forests are seen. The pine species are *Pinus roxburghii* and *Pinus wallichiana*. The people used the timber of these pine species for construction and livelihood. Other plant species like *Atingia excelsa*, *Alnus nepalensis*, *Rubus*, *Mallotus*, different species of, *Acer*, *Begonia*, *Magnolia*, grasses are seen. In nearby areas of Menchukha town, the species like *Rhododendron*, *Primula*, *Gaultheria*, *Euphorbia*, *Pedicularis*, *Acmella*, *Meconopsis*, bamboos like *Arundinaria racemosa*, *Chimonobambusa callosa*, *Sinarundinaria hirsuta* are seen. Upper ridges is very rich with all high altitude plants like *Berberis aristata*, *Daphne papyracea*, *Primulas*, *Rhododendrons*, *Gaultheria*, *Pedicularis*, *Taxus baccata*, *Rheum nobile*, *Rubia manjith* etc. (Ref. enumeration below).

MATERIALS AND METHODS:

Materials:

The materials used during the tour for the studies are GPS, camera, notebook, pen, herbarium sheets, herbarium wooden presser, ropes, polythene bags, secateurs, dao, tree pruner, alcohol, formalin etc.

Methods:

Extensive exploration trips were carried out in the Menchukha valley of West Siang district of Arunachal Pradesh. Three tours were undertaken during the month of January, April and November in the year 2009 to 2015. With the help of local guide Shri Gebu Sona and Shri Kerma Sona we met some of the senior citizens of Memba tribes Shri P.W. Sona (ex- Minister), Shri Tashi Dorsom (Teacher), Shri Sange Sona and Smti Rimjim Drema Sona, Shri K.L. Mosing, ASM, Menchukha Township and documented information about some of the ethnobotanical plants used by the Memba tribe of Menchukha with vernacular names, parts used and its ethnobotanical uses. After that we met Shri Maling Koje (ex- ZPM) and recorded some information on ethnobotanical plants used by the Ramo tribe. After that, we along with the guide went to nearby areas and villages and surveyed various plants and listed in the field note book.

Specimens were collected for herbarium and documented properly. GPS locations of the visited areas were recorded. Other plants of lower groups like fungi, algae and lichens were also recorded, collected and photographed. The plants either flowers or fruits were collected for APF Herbarium with proper documentation in the field note book.

ENUMERATION:

I. HERBS

1. *Acmella paniculata* (Wall. ex DC) R.K. Jansen
syn. *Spilanthes paniculata* Wall. ex DC.
Family: Asteraceae
An annual fleshy herb, erect; floral heads yellow.
Local name : Marsha (M)
Part used : Leaves and fruits
Uses : Vegetable and tonsillites.
2. *Aconitum ferox* Wall. ex Ser.
Family: Ranunculaceae
Small tuberous herb with attractive bluish flowers.
Local name : Omo (R)
Part used : Roots
Uses : Arrow poisoning, analgesic.
3. *Acorus calamus* L. Family : Acoraceae

- Rhizomatous semi aquatic herb with elongated thick leaves. Rhizomes scented.
- Local name : Sutta (M)
Part used : Rhizome
Uses : Used to cure stomach and abdominal pain. Rhizome edible.
4. *Allium hookeri* Thwaites
Family: Amaryllidaceae
A bulbous perennial herb with a thick, fleshy roots and a cluster of thin bulbs.
Local name : Kochong (M), Talap (R)
Part used : Whole plant specially tuber
Uses : Vegetable, stomachic.
5. *Amomum subulatum* Roxb.
Family: Zingiberaceae
Perennial bush with sheathed stems reaching 10- 12 feet in height; leaves long, dark green; flowers white with blue stripes and yellow borders; rhizome tuberous.
Local name : Taeli (R)
Part used : Pods
Uses : Ritual, spice. Also used during burial of dead bodies.
6. *Anaphalis busua* (Buch. - Ham.) DC.
Family: Asteraceae
Short lived, erect perennial herb upto 1-4 ft tall; leaves linear- lanceolate.
Local name : Parashing (M)
Part used : Inflorescence
Uses : For making fire.
7. *Anaphalis triplinervis* (Sims) Sims ex C.B.Clarke
Family: Asteraceae
An erect herb; stem entirely cottony or woolly; leaves elliptic, densely velvety; flowers head borne in clusters of more than 15; florets yellow, appearing in the central disk, surrounded by papery, shining-white bracts.
8. *Anemone obtusiloba* D. Don
Family : Ranunculaceae
Perennial herb with short rhizomatous rootstock. Basal leaves hairy, rounded in outline, deeply trilobed. Flowers small, white.
9. *Anemone rupestris* Wallich ex Hook. f. & Thomson.
Family : Ranunculaceae
A perennial tufted hairy herbs; leaves whorled, crowded at base; flowers erect, white.
10. *Begonia aborensis* Dunn.
Family : Begoniaceae
Herbs with reddish hairy rhizome and soft hairy stem. Leaves very large, white striated and stinging hairs, leaf stalk long, fleshy and reddish below, obliquely ovate to cordate but sometimes variegated. Flowers pinkish, rosy or whitish. Fruits globose, reddish hairy.
11. *Begonia burkillii* Dunn.
Family: Begoniaceae
A small glabrous herb with prostrate rhizome. Leaves obliquely cordate- ovate, sometimes variegated and blackish blotched. Male flowers appear first on a long peduncle and female flowers later on a comparatively short peduncle, solitary on slender scapes. Fruits rhomboids, acute at both ends.
12. *Begonia rubella* Buch.-Ham. ex D. Don.
Family: Begoniaceae
Soft, fleshy herbaceous plant up to 40 cm high. Leaves triangular long pointed, cordate or ovate. Flowers pink on leafless branched cluster. Fruits winged, unequal, glabrous.
13. *Bergenia ciliata* (Haw.) Sternd.
Family: Saxifragaceae
A clump-forming, rhizomatous evergreen perennial herb with spirally arranged rosette leaves.
Local name : Shirguri/ Donchinger (M)
Part used : Rhizome
Uses : Loose motion.
14. *Cardiocrinum giganteum* (Wall.) Makino
Family: Liliaceae
A large bulbous perennial herb; leaves heart-shaped and trumpet-shaped; flowers white marked with purple within the mouth.
15. *Carex baccans* Nees
Family: Cyperaceae
Perennial herbs with short rhizome, 2-6 ft high. Leaves scattered on the stem. Inflorescence paniculate-fasciculate, spikelets numerous, reddish; Utricles sub-globose, red.

16. *Centella asiatica* (L.) Urb.
Family: Apiaceae
A small creeping perennial herb with rounded leaves, roots at the nodes.
17. *Cirsium verutum* (D. Don) Spreng.
Family: Asteraceae
Perennial herb having feathered hairs to their achenes; stem erect and prickly leaves, with a characteristic enlarged base of the flower which is commonly spiny; flowers purple known for their effusive flower heads.
18. *Crawfordia speciosa* C.B. Clarke
Family: Gentianaceae
Climbing herbs, stem grayish. Leaves opposite, elliptic, long pointed, 5-8 cm. Flowers axillary in clusters of 1-3, bluish purple, drooping, corolla tubular, bell shaped, 5 lobed.
19. *Coptis teeta* Wall. Family: Ranunculaceae
A annual herb with elongated segmented leaves and rhizomatous roots. Flowers round umbel in long spike, greenish.
Local Name : Membeh (R)
Part use : Roots
Uses : Malaria fever, stomach pain, all round tonic.
20. *Drymaria cordata* (L.) Willd. ex Schult
Family: Caryophyllaceae
Prostrate herb with dichotomous branching; leaves broadly ovate, almost round, with heart-shaped base; flowers tiny borne in cymes at branch ends or in leaf axils.
Local Name : Chudumbha (M)
Part use : Leaves
Uses : Vegetable and as analgesic.
21. *Epaltes australis* Less
Family: Asteraceae
Herb, glabrous; stems prostrate to ascending, sparsely branched; leaves spatulate to obovate or cuneate, obtuse, crenate or broadly toothed, tapering into a slender petiole.
22. *Euphorbia wallichii* Hook.f.
Family: Euphorbiaceae
An erect perennial herb with several leafy stems, up to 60 cm; leaves green with white mid-rib, alternate, exude milky. Flower-heads yellow, several in more or less flat-topped cluster, each with 3-4 large rounded, golden yellow bracts each with kidney shaped glands.
23. *Fragaria nubicola* (Lindl.ex Hook.f.) Lacaita
Family: Rosaceae
Perennial herb with trifoliate leaves; flowers white with round, red berry.
Local name : Sissi (M)
Part used : Fruits
Uses : Fruits edible.
24. *Galinsoga parviflora* Cav.
Family: Asteraceae
It is a fast growing annual herb with opposite stalked leaves, toothed at the margins. Flowers are in small heads. The central disc florets are yellow and tubular.
25. *Gentiana pedicellata* (D. Don) Wall.
Family: Gentianaceae
A small much branched herbs; leaves opposite, sometimes in a basal rosette, ovate-lanceolate, 0.10-1.5 cm long, 0.8- 1 cm wide ; flowers pale to deep blue, trumpet- shaped at the end of terminal and lateral branches.
26. *Gnaphalium affine* D. Don
Family: Asteraceae
Biennial herb; leaves oblong, grey or white felted; stems several and often tufted; flower heads globular, bright glistening yellow, in dense rounded solitary or branched clusters, borne on erect woolly stems with woolly haired leaves.
27. *Hemiphragma heterophyllum* Wallich
Family: Plantaginaceae
A creeping hairy herbaceous plant often carpeting the ground in forests and shrubberies. Leaves of two forms, those on main stems opposite, short stalked, rounded heart shaped, toothed, those on branches linear pointed numerous, tufted, stem spreading. Fruits shining red globular berry like.

28. *Homalomena aromatica* (Spreng.) Schott
Family: Araceae
A perennial rhizomatous aromatic herb with long white fibrous roots from the rhizome. Stem short, converted to rhizome continuously. Leaves cordate with distinct veins/ sagittate on long petiole, base sheathed. Flowers pale greenish yellow in spadix,
Local name : Uenge (M), Tabengerik (R)
Part used : Rhizome
Uses : Rhizome edible. Stomachic and good for dysentery. An aromatic oil is extracted from the rhizome.
29. *Houttuynia cordata* Thunberg
Family: Saururaceae
A perennial stoloniferous creeping herb. Leaves broadly ovate to cordate with a special fragrance. Flowers in dense terminal white.
Local name : Lorum (M)
Part used : Leaves/ whole plant
Uses : Stomachic, digestion and as vegetable.
30. *Juncus thomsonii* Buchenau
Family: Juncaceae
Small herbs with hollow stem, 15-20 cm high. Leaves cylindrical, hollow, sheathing at base. Flowers in solitary terminal heads, whitish or brown, subtended by brown bract. Capsules brown, glossy.
31. *Juncus himalensis* Klotzsch
Family: Juncaceae
Small herbs 40-50 cm high. Leaves cylindrical, hollow, channeled above, 20-30 cm. Flowers in dark brown clusters subtended by longer leafy bract, inflorescence branched, brownish. Capsules dark brown.
32. *Lycopodium clavatum* L
Family: Lycopodiaceae.
Stem elongated procumbent, dichotomous; leaves rigid, linear, acute, pointed, scattered on the main branch but usually imbricate.
Local name : Chusingdrom (M)
Part used : Stems.
Uses : Ornamental. As medicine in chest pain.
33. *Lycopodium divaricatum* Wall. ex Hook. & Grev.
Family: Lycopodiaceae
Stem elongated procumbent, branched dichotomously, spreading, slender; leaves thin, linear, acute, pointed, scattered on the main branch but usually imbricate.
Local name : Chusingdrom (M)
Part used : Stems.
Uses : Decorative purposes.
34. *Meconopsis napaulensis* DC.
Family: Papaveraceae
Herbs up to 2 m tall. Stem reddish brown, hairy; Leaves lanceolate 30-50 cm long, deeply lobed, lobes usually segmented, covered with reddish bristly hairs; flowers purplish blue born on robust long stalked, petals 4, rounded, in drooping cymes; fruits capsule.
35. *Ophiocordyceps sinensis* (Berk) G.H.Sung, J.M.Sung, Hywel Jones & Spatafora Syn. *Cordyceps sinensis* (Berk) Sacc.
Family: Ophiocordycipitaceae
It is a fungus that parasitizes larvae of ghost moths and processes a fruiting body valued as herbal remedy.
Local name : Yarth- gumb (M)
Part used : Whole plant
Uses : Vitality, aphrodisiac.
36. *Oxalis corniculata* L. Family: Oxalidaceae
Creeping herb; roots fibrous, branching, sometimes with a taproot; leaves small, slightly ovate; flowers yellow growing in cluster; fruit cylindrical, capsule.
Local name : Kurum (M), Kubungatchu (R)
Part used : Whole plant
Uses : Edible as chutni.
37. *Paris polyphylla* Sm. Family: Melanthiaceae.
A perennial rhizomatous erect herb; leaves whorled of 6-12, oblong - lanceolate or elliptic. Flowers occur single at the end of branches,

- yellowish or green. Flowers hermaphrodite. Fruits capsule, globose with scarlet seeds.
 Local name : Jamba (M), Pipogongyek (R)
 Part used : Rhizome
 Uses : Boils and ulcers. It has a wide use in Ayurvedic and Chinese medicine.
38. *Pedicularis gracilis* Wall. ex Benth.
 Family: Orobanchaceae
 An annual herb with many branches, 40-60 cm high; stem prostrate, pubescent. Leaves whorled, segmented in lobes, oblong - lanceolate; flowers in a axillary raceme, pink.
39. *Persicaria wallichii* Greuter & Burdet syn. *Polygonum polystachyun* Wall. ex. Meisn.
 Family: Polygonaceae.
 A perennial herbs up to 1-2 m high. Leaves oblong - lanceolate, long pointed, 10-20 cm long.
40. *Picrorhiza kurroa* Royle ex Benth
 Family: Plantaginaceae
 Small stemless herbs. Leaves coarsely toothed, narrowed to a winged stalk. Flowers small, purplish blue borne in cylindrical spike.
 Local name : Diberinka (R)
 Part used : Roots
 Uses : Use with *Coptis teeta* for stomachic, joint pain, diarrhea, loose motion.
41. *Plantago major* L. Family: Plantaginaceae
 Perennial herb; leaves oval shaped with an acute apex and a smooth margin; flowers small, greenish-brown.
 Local name : Sabenari(R), Sebenyari (T)
 Part used : Leaves
 Uses : Cuts and wound and as vegetable.
42. *Polygonum affine* D. Don syn. *Persicaria affinis* (D. Don) Ronse Decr. *Polygonum donianum* Spreng. Family: Polygonaceae
 An evergreen perennial herb with a mat-forming habit. Rhizomes horizontal. Branches densely tufted, terete, herbaceous, glabrous. Leaves shortly petiolate; oblanceolate or lanceolate. Inflorescence terminal, spicate, erect, dense, large.
43. *Polygonum milletii* (H. Lev.) H. Lev. syn. *Bistorta milletii* Lev.
 Family: Polygonaceae
 Spreading mat forming herbs grown in open areas/ slopes in temperate zones. Stem up to 50 cm high with stout rootstock. Leaves oblong, narrowed to winged leaf stalk below. Flowers in broad rounded head, crimson.
44. *Polygonum molle* D. Don syn. *Aconogonum molle* (D. Don) H. Hara
 Family: Polygonaceae.
 A tall erect, robust, perennial herb up to 2-3 m high. Stem and branches silky hairy. Leaves softly hairy, silky white beneath, elliptic-lanceolate. Flowers in a large terminal, pubescent paniculate spike, numerous tiny white. Fruits ovoid, bluish black.
45. *Potentilla coriandrifolia* G. Don.
 Family: Rosaceae
 Perennial herbs with several stems and stout rootstock. Leaves cut into small linear ovate leaflets. Flowers white, central part reddish yellow. Fruit purplish when ripe.
46. *Potentilla fulgens* Diels
 Family: Rosaceae
 A perennial suberect hairy herb with woody rootstock. Leaves with 5 obovate leaflets. Flowers yellow in dichotomous panicles. Achenes globose, pubescent.
47. *Potentilla saundersiana* Royle.
 Family: Rosaceae
 A small perennial herb, leaves palmately foliated, leaflets 3-5, linear-oblong, silky beneath. Flowers in few corymbose panicle, yellow, panicle reddish.
48. *Pouzolzia bennettiana* Wight
 Family: Urticaceae
 A prostrate herb, stem pubescent. Leaves elliptic - ovate to lanceolate or long acuminate, membranous. Flowers in axillary clusters,

- whitish or creamy white, fruits costate, winged.
 Local name : Oyk (Ramo & Adi)
 Part used : Twigs/tender leaves, sometimes whole plant.
 Uses : Vegetable, chutni, good for digestion and constipation.
49. *Primula dickieana* Watt.
 Family: Primulaceae
 Perennial herbs, leaves elliptic-obovate to oblanceolate; flowers purple colour.
50. *Primula elizabethiae* Ludlow ex W.W. Smith
 Family: Primulaceae
 Perennial herbs with 2- 5 cm long, stock bulb like formed by overlapping petiole and basal bud scales; leaves forming a rosette; flowers yellow.
51. *Primula kingii* Watt.
 Family: Primulaceae
 Perennial herbs with few oblong bud scales at base; leaves elliptic-lanceolate to lanceolate; flowers wine red.
52. *Primula tsariensis* var *porrecta* W. W. Smith
 Family: Primulaceae
 Perennial herb. Flowers violet to dark purple.
53. *Primula valentiniana* Hand.-Mazz.
 Family: Primulaceae
 Perennial herb; leaves erect, obovate; flowers spreading to pendent, open bell-shaped, almost without a distinct tube, bright red with darker veining and eye, one to six in umbels on slender stems.
54. *Ranunculus diffusus* DC.
 Family: Ranunculaceae
 A perennial, soft hairy herb. Leaves cordate - orbicular, 3 lobed with long stalk. Flowers solitary, axillary in a long stalked, yellow.
55. *Rheum nobile* Hook.f. & Thomson
 Family: Polygonaceae
 A robust, distinctive looking plant for pale cream coloured, conical, rounded bladder like, drooping and overlapping leafy bracts. Stem stout, erect; leaves leathery, wedge-shaped or rounded base changing gradually upward to a cream coloured bracts. Flowers small, green in clusters.
 Local name : Lagangshopay (M)
 Part used : Rhizomes, leaves, stem.
 Uses : Rhizomes are used in dysentery and piles; leaves in cuts and wound, leaves and stem as vegetable.
56. *Rubia manjith* Roxb.ex Fleming. syn. *R. cordifolia* L. Family: Rubiaceae
 Perennial climbing herb with rough greenish brown, whorled, ovate - lanceolate leaves. Stem rough, brown, angled. Flowers reddish brown in panicle. Fruits globose, yellow turning purple when ripe.
 Local name : Chey (M), Tamin (R).
 Part used : Roots, stems, fruits and leaves.
 Uses : A red colour dye is extracted from the stem. Several uses are there in Ayurvedic medicine including Liv 52 and Septilin.
57. *Senecio scandens* Buch.- Ham. ex D. Don
 Family: Asteraceae
 Perennial herb, scandent, rhizomatous climbing in forests and thickets, on shrubs, over rocks, on buildings, by streams, mountain slopes. Stems elongated, much branched, pubescent or glabrous, leaves ovate-lanceolate to narrowly triangular, upper leaves smaller, lanceolate or linear-lanceolate, apically attenuate. Flowers yellow.
58. *Sinopodophyllum hexandrum* (Royle) T.S. Ying syn. *Podophyllum hexandrum* Royle.
 Family: Podophyllaceae
 Perennial herb, erect, glabrous, succulent; leaves 2 or 3 orbicular- reniform, palmate, bilobed; flowers solitary, cup shaped; berries oblong- ovoid, orange or red.
 Local name : Bashushu (M)
 Part used : Fruits
 Uses : Fruits edible.

59. *Solanum aculeatissimum* Jacq. syn. *Solanum khasianum* C.B. Clarke Family: Solanaceae
A prickly, annual herb, sometimes grows up to 2 m high as undershrub. Stem aculeate, hairy. Leaves ovate, sinuate or pinnatifid, hairy and spiny beneath. Fruits globose green with white patch, yellow when ripe.
Local name : Sebe Banka (R)
Part used : Seeds
Uses : Toothache.
60. *Solanum nigrum* L. Family: Solanaceae
An annual soft fleshy herb up to 1 m high. Leaves ovate-lanceolate or oblong-ovate. Flowers in long peduncle, white. Fruits globose green, black when ripe.
Local name : Horr/Hili (R)
Part used : Leaves
Uses : Used for hypertension and as vegetable.
61. *Smilax ferox* Wall. ex Kunth
Family: Smilacaceae
Vines climbing. Stem branched, terete, woody, usually sparsely prickly; tendrils only occasionally developed on old stem or branches. Leaf blade abaxially often glaucous, oblong to oblong-lanceolate, papery to leathery. Inflorescence borne in axil of young leaf, of 1 umbel.
- II. SHRUBS**
62. *Ardisia macrophylla* Reinw. ex Blume.
Family : Myrsinaceae
Forest undershrubs. Leaves narrow, lanceolate, margin crisp, glabrous. Flowers pink in axillary, terminal long paniced umbel. Fruits bright glossy red.
Local name : Kubsangdeb (M)
Part used : Fruits
Uses : Fruits edible. Source of vitamin C. The Nepalees use roots in food poison, leaves in cuts and wound, barks for blood purification and fruits in eye conjunctivitis.
NB: During our visit, we saw only 2-3 dried leaves on the branches. Fruits were over-ripened.
63. *Artemisia nilagirica* (C.B. Clarke) Pamp.
Family: Asteraceae
Shrub up to 2 m high, erect, hairy; leaves pinnately lobed, gray beneath; flower small, yellow or dark red. Whole plant has a pungent smell.
Local name : Khamsangsing (M), Helling (R)
Part used : Leaves & Whole plants
Uses : Agarbatti, antibiotic. Mema tribes used leaf ash dissolving in water, filtered and used as soap. Leaves also directly used to wash hands. Ritually used as dhoop. Ramo tribes as a broom to sweep the whole house after burial of dead bodies.
64. *Berberis aristata* D.C. Family: Berberidaceae
Small profusely branched thorny shrubs with spiny leaves, bright yellow axillary flower.
Local name : Dehtsherma (M), Sermapabu (R)
Part used : Bark & branches
Uses : Barks peel off, squished and juice is use as eye drops. Ritually used as broom to sweep/clean the house after construction of new house to keep the evil spirit away.
65. *Berberis wallichiana* DC.
Family: Berberidaceae
Evergreen prickly shrub up to 3 m high. Leaves large, oblong-lanceolate, with spiny teeth. Flowers in axillary fascicles, yellow. Fruits red, turning black when ripe.
It is also used as like as *Berberis aristata*.

66. *Cassiope fastigiata* (Wall.) D. Don
Family: Ericaceae
A small branched tufted shrubs; leaves thick lance-like; flowers white, like bells with shoot outward curving petals.
67. *Clethra delavayi* Franch.
Family: Clethraceae
Shrubs upto 1-8 m tall, deciduous; leaves lanceolate or oblanceolate; flowers white or reddish pink to dark purple.
68. *Clematis tongluensis* (Bruhl) Tamura
Family: Ranunculaceae
Evergreen shrub, very vigorous large deciduous climber; leaves trifoliolate; flowers single, pure white, usually 1 per axil.
69. *Cotoneaster acuminatus* Wall. ex Lindl.
Family: Rosaceae
A deciduous shrub up to 4 m high. Leaves ovate to lanceolate, pubescent beneath, young twigs densely clothed with bristly hairs. Flowers pinkish white, solitary or flat topped clusters, stalk bristly hairy; fruit berries, orange-red.
Local name : Jursing (M)
Part used : Fruits.
Uses : The Memba people extracted edible oil from the seeds and used for cooking.
70. *Daphne papyracea* Wall. ex G. Don.
Family: Thymelaeaceae
Evergreen shrub, growing upto 2 m tall; flowers white, stalkless, borne in clusters of 4-9 at the end of branches.
Local name : Sukh (M)
Part used : Bark
Uses : Paper making. The Buddhist people prepare a paper from the stem bark of the plant by a traditional method which is used for religious purposes.
71. *Elaeagnus parvifolia* Wall. ex Royle
Family: Elaeagnaceae.
A perennial woody deciduous straggling shrub; leaves oblong to oblong-lanceolate, silvery white beneath. Fruits ovate shaped, green turning bright red when ripe.
Local name : Mirik tenga (Adi)
Uses : Fruits edible, very sour.
72. *Embelia ribes* Burm.f. Family: Myrsinaceae
Climbing shrubs, leaves bright green, trifoliolate; fruits globose green, red when ripe.
Local name : Rokne pebang (R). Bai Vidang in Sanskrit.
Part used : Fruits
Uses : Edible. In ISM, it is used as antiseptic, tonic, chest and skin diseases.
73. *Enkianthus deflexus* (Griff.) C.K. Schneid.
Family: Ericaceae
It is a deciduous large shrub or small tree up to 6 m tall commonly known as Himalayan red bells. Leaves oval, bright with felted underside which turn orange and red in autumn. Flowers in clusters, small, bell shaped on long hanging stalks.
74. *Gaultheria fragrantissima* Wall.
Family: Ericaceae
A robust stout evergreen shrub about 4 m high. Branches trigonous. Leaves lanceolate to oval, acute, 5- 10 cm long, 2-5 cm wide, green smooth above, bristly rough beneath, margin dentate. Flowers in axillary spike like clusters, greenish yellow or whitish, globular, scented. Fruits globose, dark violet blue, fleshy.
Local name : Shakshin (M)
Part used : Fruits and bark
Uses : Fruits edible. Ritually used as Dhoop (scent)
75. *Gaultheria griffithiana* Wight.
Family: Ericaceae
A stout shrub up to 4 m high, stem reddish. Leaves 10- 15 cm long and 4-6 cm wide, oblong elliptic, tips long pointed, margins finely dentate. Flowers raceme, clusters 5-8 cm, bell shaped, light green or whitish. Fruits black, fleshy.
Local name : Oggru /Losh (M)
Part used : Bark
Uses : Like sandal wood ritually used as Dhoop.
76. *Hypericum uralum* Buch.-Ham. ex D. Don
Family: Hypericaceae
Shrub upto 0.3-2 m tall; branches arching, often frondose. Leaves with flat petiole, lanceolate or sometimes ovate. Flowers deep yellow.

77. *Juniperus squamata* Buch.-Ham. ex D. Don
Family: Cupressaceae
Coniferous evergreen shrub reaching 2-10 m high, with flaky brown bark, and a prostrate to irregularly conical crown. Leaves broad needle like. Cones berry like, globose to ovoid, glossy black contain one seed.
78. *Prinsepia utilis* Royle Family : Rosaceae
Deciduous shrub. Flowers white. Fruits purplish brown to blackish purple.
Part used : Fruits.
Uses : Fruits eaten by birds (wild dove).
79. *Rhododendron forrestii* Balf. f. ex Diels-dwarf Rhododendron Family:Ericaceae
Dwarf scandent shrubs. Leaves obovate to orbicular. Flowers tubular, scarlet red or red.
80. *Rhododendron keysii* Nuttall
Family : Ericaceae
Erect shrubs, evergreen, upto 1-4 m tall; leaves leathery, lanceolate-elliptic or lanceolate-oblong; flowers pendulous, tubular, orange or salmon pink to deep red colour.
81. *Rhododendron lepidotum* Wall. ex G. Don
Family: Ericaceae
Shrub growing to about a meter tall. Narrow lance-shaped leaves are densely covered with fleshy scales. Flowers pink or purple, borne in clusters of 2 to 4, on slender stalks.
82. *Rosa brunonii* Lindl.
Family: Rosaceae
Shrubs 2-3m high, evergreen climber to 5 m; leaves compound, elliptic to oblong- lanceolate, toothed; flowers clusters at the end of the branches, white; stamens yellow, numerous.
83. *Rosa sericea* Wall. ex Lindl.
Family: Rosaceae
Erect shrubs up to 2 m tall; leaves ovate or obovate; flowers white.
84. *Rubus biflorus* Buch. - Ham. ex. Sm.
Family: Rosaceae
Deciduous suckering shrubs up to 3 m high with erect, prickly, silvery-white young stem. Leaves pinnate, white beneath. Flowers in axillary panicles, pinkish white. Fruits yellow fleshy.
85. *Rubus ellipticus* Smith
Family: Rosaceae
A prickly scandent large shrub up to 4 m high. Stem spiny, recurved, covered with white bristles; leaves tri-foliolate, leaflets elliptic or obovate, dentate, green above, grey woolly beneath, leaf stalk with long bristle. Flowers in a hairy branched clusters, axillary, white. Fruits globose, yellow, soft and sweet when ripe.
Local name : Ikmin Taayin (R), Jillying (Apatani).
Part used : Fruits.
Uses : Fruits edible, sweet.
86. *Rubus splendidissimus* H. Hara
Family: Rosaceae
Perennial straggling hairy shrubs up to 3 m high; leaves pinnately tri-foliolate, elliptic oblong, long pointed, dentate, silvery white beneath with prominent parallel nerves. Flowers in a hairy terminal clusters, white. Fruits berry, scarlet red.
Local name : Thalsisi (M)
Part used : Fruits
Uses : Fruits edible
87. *Spiraea japonica* L. f. Family: Rosaceae
Deciduous shrub; leaves ovate, toothed margin; flowers numerous, pink in corymbs.
88. *Vaccinium dunalianum* Wight
Family: Ericaceae
An evergreen erect shrub with angular leafy branches. Leaves oblong - lanceolate, long pointed apex, with recurved margins. Flowers in axillary cluster, pinkish with light green cover. Fruits berry, globose, green turning black when ripe.

III. TREE

89. *Abies densa* Griffith. Family : Pinaceae
A tall slender pyramidal tree with a broad flattened crown up to 50 m high . Leaves flattened, 2-4 cm long, green above, pale beneath with incurved margins, twigs brownish. Cones blue when young, brown at maturity.

90. *Acer acuminatum* Wall. ex Don. syn. *A. caudatum* G. Nicholson Family : Sapindaceae
Tall tree, 20-25 m high. Leaves 5 lobed, apex pointed, margins sharply dentate, cordate at base, petiole pink. Flowers in terminal clusters, greenish yellow. Fruits winged, diverging at an acute angle, pink.
Local name : Longdingpaya/Soblela (M)
Part used : Leaves
Uses : Local tea.
91. *Altingia excelsa* Noronha
Family: Altingiaceae
Evergreen tree upto 20 m tall. Wood bark smooth, gray and red. Young trees are very elegant with a dense crown and pyramidal shape, the crown later becoming more rounded. Unisexual flowers. Male and female flowers separately on the tree itself.
92. *Alnus nepalensis* D. Don
Family: Betulaceae
It is a large deciduous alder with silver-gray bark up to 30 m high and 60 cm in dia. Leaves elliptic to ovate with rounded or shortly pointed tip. Flowers catkins, with the male and female flowers separate but produced on the same tree. Wood soft and light, and easily worked.
93. *Carpinus viminea* Wall. ex Lindl.
Family: Betulaceae
Tree up to 15 m high with dark gray bark. Branches drooping, branchlets brown. Leaves ovate- lanceolate, long cuspidate, serrated. Flowers in pendulous terminal spike, bracts ribbed, glossy, ciliated. Fruits nut, ribbed with winged bracts.
94. *Cupressus torulosa* D. Don.
Family: Cupressaceae
A broadly pyramidal evergreen tree up to 30 m high; branches drooping; leaves scale like, 2-6 mm long, arranged in opposite decussate pairs; cones globose or ovoid with 4-14 scales arranged in opposite decussate pairs.
95. *Illicium griffithii* Hook.f. & Thomson
Family: Illiaceae
Medium sized evergreen tree. Flowers creamy white. Fruits aggregate of follicles arranged in a star shaped with 8-9 carpels of single seed.
Local name : Lishi (M)
Part used : Fruits
Uses : The fruit is carminative, improves appetite and use as spice.
96. *Juniperus recurva* Buch.-Ham. ex D.Don
Family: Cupressaceae
A small sized tree, 6-20 m high, trunk upto 2 m dia. and broadly conical to rounded crown. Leaves needle like, 5-10 mm long. Cones berry-like, globose to ovoid, glossy blue-black, contain one seed.
Local name : Shukpshing(M)
Part used : Whole plant
Uses : Rituals. It is burnt during worships for incense, insect repellent.
97. *Litsea cubeba* (Lour.) Pers.
Family: Lauraceae
A evergreen medium sized tree, 5-10 m high, branches sometimes drooping. Leaves membranous, lanceolate, dark green above, pale beneath, mid rib light purple beneath. Flowers umbels, unisexual, solitary or in corymbs, creamy or yellowish; fruits globose, green turning dark brown or black when ripe.
Local name : Nya (M), Roli (R), Taer (Adi), Santetero (Apatani).
Part used : Leaves and seeds.
Uses : Religious/ritual. Leaves used as a taste maker in tea and vegetables. Seeds used as chutni and spice.
98. *Lyonia ovalifolia* (Wall.) Drude
Family Ericaceae.
A small deciduous tree up to 12 m high. The leaves are spirally arranged, ovate, 8-10 cm, and the inflorescences grow in the leaf axils. Flowers white, sometimes red, numerous, flask shaped with 5 recurved lobes, finely hairy. Fruits capsule, glabrous.

99. *Magnolia champaca* (L.) Baill. ex Pierre syn.
Michelia champaca L. Family: Magnoliaceae
Large evergreen tree up to 25-30 m high. Stem whitish; leaves bright green above, glaucous beneath, ovate lanceolate. Flowers solitary, creamy white, scented. Fruits cone like, white speckled, fruits red.
Local name : Singyongpopin (M) Serjo (R), Titasopa (Assam)
Part used : Flowers and bark
Uses : Flowers used as decorative and fragrance, digestive, stomach ache. Bark for fever and cough.
100. *Magnolia doltsopa* (Buch.-Ham. ex DC.) Figlar.
Family: Magnoliaceae
Evergreen tree; leaves elliptic, oblong- elliptic or narrow elliptic; flowers white, scented.
101. *Persea odoratissima* (Nees) Kosterm.
Family: Lauraceae
Tree upto 16 m tall; leaves smooth, leathery, lance like to oblong-oblancoleolate to elliptic-oblong; flowers yellow; fruits purple when riped.
Local name : Tulin (R)
Part used : Fruits
Uses : Chutni.
102. *Pieris formosa* (Wall.) D. Don
Family : Ericaceae
An evergreen small tree, 4 - 6 m high. Leaves lanceolate, dark green, about 12 X 5 cm, glabrous, acuminate at apex, attenuate at base, petiole 0.5-1 cm. Inflorescence terminal, paniced raceme, in dense spike like clusters, creamy or greenish white, 8-12 cm. Fruits capsule, globular.
103. *Pinus wallichiana* A.B. Jacks.
Family: Pinaceae
It is a dense evergreen tree upto 50 m, symmetric and pyramidal in shape; leaves needle-like, blue green; cones long cylindrical, hanging in cluster.
Local name : Gorjensing (M)
Uses : Timber.
104. *Pinus roxburghii* Sarg.
Family: Pinaceae
Evergreen tree, erect, round- headed with one or more trunk; leaves needle- like, in fascicles of three, slender; bark red- brown; cones ovoid conic.
Local name : Gorjensing (M)
Uses : Timber
105. *Rhododendron arboreum* Sm.
Family: Ericaceae
Medium sized tree, flower white.
Local name : Kharsingmedo (M), Toling (R)
Part used : Flower
Uses : As a source of vitamin- C. Flower used as vegetable.
106. *Rhododendron barbatum* Wall. ex G. Don-
Giant Blood Rhododendron
Family: Ericaceae
Small trees up to 1.5-8 m tall; Leaves oblong to obovate-oblong. Inflorescence densely umbellate. Flower, deep red to blood-red.
107. *Rhododendron neriiflorum* Franchet
Family: Ericaceae
Medium sized tree upto 1-3 m tall; leaves oblong to obovate. Inflorescence umbellate, flowers tubular-campanulate, fleshy, crimson or bright red.
Local name : Tammedo (M)
Part used : Flowers.
Uses : As a source of vitamin- C. Flower used as vegetable.
108. *Rhododendron thomsonii* Hook.f.
Family: Ericaceae
Small trees up to 5 m high. Leaves orbicular, rounded or shallow heart shaped, glossy. Inflorescence dense flowered; flowers deep blood red, bell-shape.
109. *Salix tetrasperma* Roxb.
Family: Salicaceae
A medium sized tree; bark rough with deep, vertical fissures; leaves lance-like, or ovate-lance-like, 8-15 cm long, with minutely and regularly toothed margins. It flowers after leafing.

110. *Sorbus insignis* (Hook.f.) Hedl.
Family: Rosaceae
Trees, rarely shrubs, to 10-15 m tall. Leaves oblong or oblong-lanceolate. Inflorescence 10-5 cm in diam, densely flowered; rachis and pedicels sparsely pubescent, with large lenticels; bracts linear-subulate. Flowers dull white.
111. *Sorbus cuspidata* (Spach) Hedlund
Family: Rosaceae
Medium sized trees, 10-15 m high, branchlets stout; leaves elliptic, white woolly when young, remains woolly beneath later, 15-20 cm X 5-8 cm, dentate; flowers in densely woolly clusters, creamy white; fruits globose, orange red.
112. *Sorbus wallichii* (Hook.f.) T.T. Yu
Family: Rosaceae
Deciduous tree, growing up to 12 m. It is often found smaller, and can also grow on other plants as an epiphyte. Leaves compound with leathery, linear-oblong, pointed leaflets. Flowers white, borne in flat-topped compound clusters up to 7.5 cm across. Fruits ovoid with the sepals still carried on top.
113. *Taxus baccata* L.
Family: Taxaceae
Medium sized evergreen coniferous tree upto 30 m tall. Leaves thin, flat, dark green arranged spirally on the stem but twisted at the base to appear in two horizontal ranks on all except for erect lead shoots. It is dioecious, with the male and female cone on separate plants. The seed cones are modified, each cone containing a single seed.
Local name : Tashing (M).
Part used : Leaves
Uses : Anticancer drugs.
114. *Tsuga dumosa* (D.Don) Eichler
Family: Pinaceae
Evergreen tree upto 20-25 m high; leaves linear, obtuse or rounded and are arranged spirally on the stem; bark greyish brown, fissured; branches oblique or horizontal; crown pyramidal. Male cones globose, solitary and axillary, green-yellow anthers without air sac. Female cones round-ovate, solitary and terminal, slightly down curved, with many spiral scales and 2 ovules inside each scale. Seeds with thin wing in upper parts, 9 mm long, ovate, brown.
115. *Zanthoxylum armatum* DC.
Family: Rutaceae
An evergreen prickly small tree, about 4-5 m high. Stem grey or dark. Leaves 5-9 leaflets, pinnate or lanceolate, dark green, dentate. Flowers axillary, small, yellow in short branched lateral clusters. Fruits globose, red with 2 carpels, aromatic, seeds black.
Local name : Yeram/Yurma (M)
Part used : Fruits
Uses : Spice
116. *Zanthoxylum oxyphyllum* Edgew.
Family: Rutaceae
Scandent small tree with numerous hooked spines on stem, branches and leaf stalk, 3-4 m high. Leaf contains 3-11 leaflets, ovate lanceolate. Flowers in terminal clusters, paniced umbels, yellow or lilac. Fruits tubercled, 2-4 follicles.

IV. BAMBOOS/GRASSES

Family: Poaceae

117. *Arundinaria racemosa* Munro syn. *Yushania racemosa* (Munro) R.B. Majumdar
Small loosely clumped shrubby gregarious bamboo with long rhizome. Culms about 4 m high, yellow, internode 10-15 cm; culm sheath 4-6 cm long, 2.5 cm broad at base, attenuated above. Blade 1-1.5 long, auricle bristly, ligule 2mm.
Part used : Culms.
Uses : Broom for cleaning roof, fencing, rope. Shoots edible.
118. *Chimonobambusa callosa* (Munro) Nakai.
A medium sized thorny amphipodial bamboo. Culms erect, 4-10 m high, 1.25 to 2.5 cm in dia, grayish green, nodes with soft brown hairy, and raised a ring with thick, short conical spines. Internodes 15-25 cm long. Culm sheath

- longer than internodes, attenuated above, hairy, blade. Leaves dark green, 20-20 cm long, 17-30 mm wide. Auricle short, ligule 2 mm.
- Local name : Dusi (M)
Part used : Shoots and culm
Uses : Shoots edible, use for fencing.
119. *Hackelochloa granularis* (L.) Kuntze syn. *Mnesithea granularis* (L.) de Koning & Sosef
Medium sized grass, culms up to 1 m high, terrete below, compressed above, hirsute with turbiculate based hairy. Leaves lanceolate, base cordate or amplexicaul. Spikelets globose, dark white.
120. *Imperata cylindrica* (L.) Raeuschel.
A perennial grass with creeping rhizome and rootstock; stem variable from 1 ft to 2 m tall, fistular at base, nodes hairy. Leaves long upto 1.5 m, narrowed towards base, pubescent, finely dentate, ligule silky. Panicle cylindric, pedicels swollen at tips, whitish hairy, spikelets lanceolate.
121. *Neyraudia reynaudiana* (Kunth) Keng ex Hitchc. syn. *Arundo reynaudiana* Kunth
A reed like perennial grass, 3-4 m high. Culms sympodial, thick, smooth, greenish. Leaf blade about 60 cm long, narrow, sheaths woolly, ligule frimbriate. Inflorescence in a long panicle, nodded, silvery off-white colour.
122. *Themeda triandra* Forssk.
A reed like small perennial grass, 1-2 m high. Culms erect, rounded or compressed, reddish, leafy and branching from base. Leaf blade about 20-30 cm long, linear, narrow, sheaths light reddish, ciliated. Inflorescence in leafy panicle, drooping, nodded, dark brown or reddish brown, lower branches solitary, the lower bare for some distance, flowered branches crowded towards the summit, racemes spiciform.
123. *Yushania hirsuta* (Munro) R. B. Majumdar syn. *Sinarundinaria hirsuta* (Munro) C.S. Chao & Ren.
Shrubby tufted bamboo. Culms about 2 m high, grayish green, internode 12-15 cm long, culm sheaths 10-15 cm long, 2.5 cm broad, papery, hairy, rounded at top, blade acuminate, recurved, auricle long ciliated, ligule narrow, pubescent.
Local name : Sanyo (M).
Part used : Culms.
Uses : Broom for cleaning roof, fencing, rope. Shoots edible.
124. *Yushania pantlingii* (Gamble) R. B. Majumdar syn. *Sinarundinaria pantlingii* (Gamble) C.S. Chao & Renvoize.
An erect, caespitose shrubby bamboo. Culms about 4-6 m long, 1.5 cm dia, internodes 12-15 cm, thin walled, nodes prominent, soft hairy; culm sheath 16-22 x 3.5-9 cm, striate, straw coloured, stiffly hairy outer side, attenuated; blade 9 cm long, erect, ciliated, auricle rounded, ligule 2 mm, ciliated. Leaves 10-11 x 1 cm, lanceolate, petiole short, attenuated.
Local name : Nyungb (M)
Part used : Culms.
Uses : Roofing, fencing, furniture, rope. Shoots edible.

CONCLUSION:

A total number of 124 plants representing 91 genera belonging to 50 families have been documented with their usage of 53 plants by the Memba, Ramo and Tagin tribes of Menchukha. Out of these 124 species, herbs-61 species, shrubs-27 species, trees-28 species, and 8 species of grasses and bamboos have been reported.

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PLATE-I



Abies densa



Anemone rupestris



Anemone obtusiloba



Berberis aristata



Gaultheria fragrantissima



Acmella paniculata



Daphne papyraceae



Rhizomes of *Paris polyphylla*



Juniperus recurva



Chimonobambusa callosa



Embelia ribes



Anaphalis busua

PLATE-II



Hemiphragma heterophyllum



Enkianthus deflexus



Sorbus cuspidata



Fragaria nubicola



Lycopodium clavatum



Gentiana pedicellata



Elaeagnus parvifolia



Berberis wallichiana



Epaltes australis



Rosa sericea



Euphorbia wallichii



Euphorbia wallichii

PLATE-III



Rhododendron thomsonii



Rhododendron forrestii



Rhododendron lepidotum



Rhododendron barbatum



Primula elizabethiae



Primula valentiniana



Primula kingii



Primula dickieana



Primula tsariensis var porrecta



Rubus biflorus



Persicaria wallichii



Smilax ferox

PLATE-IV



Zanthoxylum armatum



Potentilla saundersiana



Rubia manjith



Meconopsis napaulensis



Potentilla fulgens



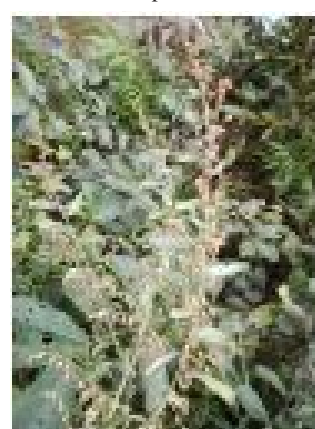
Prinsepia utilis



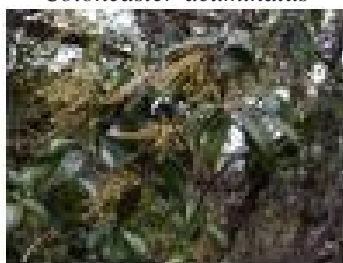
Cotoneaster acuminatus



Ardisia macrophylla



Artemisia nilagirica



Pieris formosa



Rubus splendidissimus



Taxus baccata

PLATE-V



Acer acuminatum



Plantago major



Juniperus squamata



Yushania pantlingii



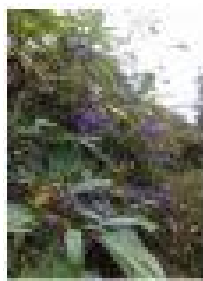
Yushania hirsuta



Arundinaria racemosa



Polygonum milletii



Crawfordia speciosa



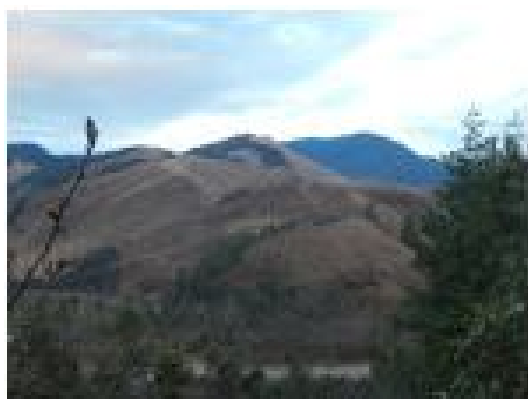
Zanthoxylum oxyphyllum



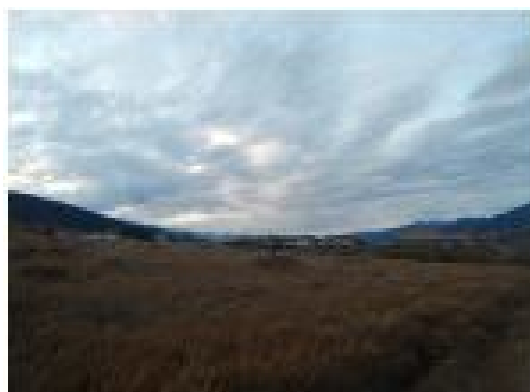
Border road construction towards China



End point of border road towards China.



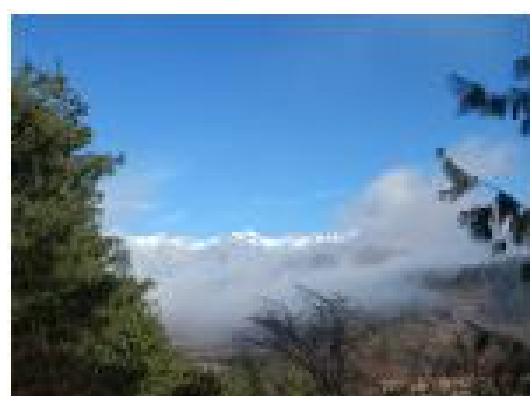
Dried hills during winter season



Dried grasslands during winter season



Pine Forests with dry grasslands



Snow capped mountains near Menchukha during morning hours.