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A Study on Usefulness of Some Woody Plants in Mon State

Eh Khu Hpaw¹, Win Win Nwe², Myo Hteik Aung²

Abstract

Woody plants of Mon State were studied at various field locations. A total of eighty-one species belonging to the seventy genera of thirty-two families were observed. The scientific name, vernacular name and family names of these hardwood species were mentioned. According to the heartwood hardness, hardwood species made for lumbers, house constructions, furniture, railway sleepers, boat building, sport equipments, pulpwood, fire-woods, commercial and industrial structures were classified and enumerated. The potential application for treatment of leprosy, blood diseases, anemia, snake bite, carminative, vomiting, toothache, diarrhea, bronchitis, tumors, fever, ulcers, dysentery, piles, urinary discharges, blood impurities, typhoid, asthma, haemorrhage, etc. using different parts of the studied species were presented. It is suggested that this hardwood tree species in the regions' forests need some forms of conservation to keep the forest biodiversity healthy and sustainable.

Keyword: Conservation, Medicinal application, Usefulness, Woody plants, Mon State.

Introduction

Mon State is approximately 4747.8 sq. miles and about 250 ft above sea level. A large part of Mon State as a whole is made up of high and low Yoma Mountain range stretching from north to south in the east. Mon State is typical of Tropical Monsoon Climate. Its whole area enjoys abundant rainfall during Southwest Monsoon. The coastal plain of Mon State is largely covered with paddy fields, salt producing fields, seasonal crop gardens, plantation of rubber, seasonal fruits, some animal farms, waste lands, small natural ponds and forest reserve. Forest products play important role in world economy. The wood is the most familiar and most important forest product. It is definitely superior to metals in several respects. The important diagnostic features of the commercial wood may be identified to some extent.

The present or absence and the nature and arrangement of pores, serves as a ready means of classifying woods. The outer region of the wood is of lighter colour is known as the sapwood and this alone is used for

1. Associate Professor, Department of Botany, University of Mawlamyine

2. Demonstrator, Department of Botany, University of Mawlamyine

conduction of water and salt solution. The cells of this region are alive and physiologically active. In old trees the central region of the secondary wood is filled up with tannin, oil, gums resins and other substances which are hard and durable. This region is known as the heartwood. The function of the heartwood is to give mechanical support to the stem. The heartwood usually takes good polish and is used for cabinet work, furniture and other high grade wood-work industries. Grains refer to their structural arrangement.

Materials and Methods

Lists of the Domestic Commercial Heartwood were investigated from Forest Department, Mawlamyine. Base on the information of all specimens in this work were collected since June 2005. The study area consists of ten townships, namely Belin, Kyeikhto, Thaton, Paung, Mawlamyine, Mudon, Thanbyu-zayet, Ye, Kyeik-mayaw and Chaungson. The specimens were collected seasonally. The vegetative and reproductive parts of the collected specimen were recorded and identified from fresh material. Identification was done according to J.D. Hooker (1889), George H.M. Lawrence (1963), C.A. Baker and R.C. Barkhuizen Vanden Brink JR. (1963) and W. John Kress (2003) and M.D. Dassanayake (1980). Photographs of the studied specimens were also taken.

Results

Table 1. Classified list of some woody plants of Mon State under study
(Classification according to Arthur Cronquist, 1981)

No.	Order	Family	Scientific Name.	Myanmar Name
1	Magnoliales	Magnoliaceae	<i>Michelia champaca</i> L.	Sagawa
2	Magnoliales	Magnoliaceae	<i>Michelia doltsopa</i> Buch.-Ham.	Saga-pyu
3	Magnoliales	Annonaceae	<i>Annona squamosa</i> L.	Awzar
4	Magnoliales	Myristicaceae	<i>Myristica fragrans</i> Houtt.	Sardeik-bo-thi
5	Lurales	Lauraceae	<i>Cinnamomum verum</i> Presl.	Thitkyabo
6	Lurales	Lauraceae	<i>Litsea polyantha</i> Juss.	Ondon
7	Urticales	Moraceae	<i>Artocarpus integer</i> Merr.	Sone-padat
8	Urticales	Moraceae	<i>Artocarpus chaplasha</i> Roxb.	Taung-peinne
9	Urticales	Moraceae	<i>Artocarpus heterophyllus</i> Lam.	Peinne
10	Urticales	Moraceae	<i>Ficus glomerata</i> Roxb.	Thapan
11	Casuarinales	Casuarinaceae	<i>Casuarina equisetifolia</i> Forst.	Pinle-kabwe
12	Dilleniales	Dilleniaceae	<i>Dillenia indica</i> L.	Thabyu
13	Theales	Dipterocarpaceae	<i>Anisoptera costata</i> Korth.	Kaban
14	Theales	Dipterocarpaceae	<i>Anisoptera scaphula</i> Pierre.	Kaunghmu
15	Theales	Dipterocarpaceae	<i>Dipterocarpus alatus</i> Roxb.	Kanyin-pyu
16	Theales	Dipterocarpaceae	<i>Dipterocarpus tuberculatus</i> Roxb.	In
17	Theales	Dipterocarpaceae	<i>Hopea odorata</i> Roxb.	Thingan
18	Theales	Dipterocarpaceae	<i>Parashorea stellata</i> Kurz.	Thingadu
19	Theales	Dipterocarpaceae	<i>Shorea obtusa</i> Wall.	Thit-yar
20	Theales	Dipterocarpaceae	<i>Shorea robusta</i> Gaertn.f.	Ingyin
21	Theales	Clusiaceae	<i>Calophyllum inophyllum</i> L.	Pone-nyet
22	Theales	Clusiaceae	<i>Garcinia mangostana</i> L.	Minguit
23	Theales	Clusiaceae	<i>Mesua ferrea</i> L.	Gangaw
24	Malvales	Bombacaceae	<i>Bombax ceiba</i> L.	Letpan
25	Malvales	Bombacaceae	<i>Bombax insigne</i> Wall.	Dedu
26	Malvales	Bombacaceae	<i>Durio zibethinus</i> Murray.	Duyin
27	Lecythidales	Lecythidaceae	<i>Barringtonia acutangula</i> Gaerth.	Kyi-ni

No.	Order	Family	Scientific Name.	Myanmar Name
28	Lecythidales	Lecythidaceae	<i>Careya arborea</i> Roxb.	Bambwe
29	Violales	Flacourtiaceae	<i>Homalium tomentosum</i> Benth.	Myauk-chaw
30	Ebenales	Sapotaceae	<i>Mimusops elengi</i> L.	Khayay
31	Fabales	Mimosaceae	<i>Albizia lebbek</i> Benth.	Kokko
32	Fabales	Mimosaceae	<i>Albizia odoratissima</i> Benth.	Taung-magyi
33	Fabales	Mimosaceae	<i>Archidendron jiringa</i> Nielsen	Danyin
34	Fabales	Mimosaceae	<i>Xylia xylocarpa</i> Taub.	Pyinkado
35	Fabales	Caesalpiniaceae	<i>Cassia fistula</i> L.	Ngu
36	Fabales	Caesalpiniaceae	<i>Delonix regia</i> Raf.	Seinban
37	Fabales	Caesalpiniaceae	<i>Senna siamea</i> Irwin & Barneby	Mezali
38	Fabales	Caesalpiniaceae	<i>Tamarindus indica</i> L.	Magyi
39	Fabales	Fabaceae	<i>Erythrina variegata</i> L.	Kathit
40	Fabales	Fabaceae	<i>Pterocarpus macrocarpus</i> Kurz.	Padauk
41	Fabales	Fabaceae	<i>Dalbergia cultrata</i> Grah.	Yin-daik
42	Myrtales	Lythraceae	<i>Duabanga grandiflora</i> Walp.	Myauk-ngo
43	Myrtales	Lythraceae	<i>Lagerstroemia reginae</i> Roxb.	Pyinma
44	Myrtales	Myrtaceae	<i>Syzygium nervosum</i> DC.	Thabye chin
45	Myrtales	Myrtaceae	<i>Syzygium samarangense</i> Merr.	Thabyu-thabye
46	Myrtales	Myrtaceae	<i>Eucalyptus globulus</i> Labill.	Eu-ca-lit
47	Myrtales	Combretaceae	<i>Anogeissus accuminata</i> Wall.	Yon
48	Myrtales	Combretaceae	<i>Terminalia catappa</i> L.	Banda
49	Myrtales	Combretaceae	<i>Terminalia chebula</i> Retz.	Phan-kha
50	Myrtales	Combretaceae	<i>Terminalia tomentosa</i> Wight & Arn.	Tauk-kyant
51	Euphorbiales	Euphobiaceae	<i>Baccaurea sapida</i> Muell.Arg.	Kanaso
52	Euphorbiales	Euphobiaceae	<i>Hevea brasiliensis</i> Muell.Arg.	Kyetpaung
53	Rhamnales	Rhamnaceae	<i>Ziziphus jujuba</i> Lam.	Zi
54	Sapindales	Sapindaceae	<i>Nephelium lappaceum</i> L.	Kyet-mauk
55	Sapindales	Anacardiaceae	<i>Anacardium occidentale</i> L.	Thiho-thayet
56	Sapindales	Anacardiaceae	<i>Bouea burmanica</i> Griff.	Mayan
57	Sapindales	Anacardiaceae	<i>Mangifera indica</i> L.	Thayet
58	Sapindales	Anacardiaceae	<i>Swintonia floribunda</i> Griff.	Taung-thayet

No.	Order	Family	Scientific Name.	Myanmar Name
59	Sapindales	Meliaceae	<i>Azadirachta indica</i> A.Juss.	Tamar
60	Sapindales	Meliaceae	<i>Toona ciliata</i> M.Roemer.	Thit-kado
61	Sapindales	Meliaceae	<i>Sandoricum koetjape</i> Merr.	Thitto
62	Sapindales	Meliaceae	<i>Swietenia macrophylla</i> King.	Mahogani
63	Sapindales	Rutaceae	<i>Aegle marmelos</i> Correa.	Okshit
64	Sapindales	Rutaceae	<i>Citrus maxima</i> Merr.	Kywe-gaw
65	Geraniales	Oxalidaceae	<i>Averrhoa carambola</i> L.	Zaung-yar
66	Gentianales	Loganiaceae	<i>Fagraea fragrans</i> Roxb.	Anan
67	Gentianales	Loganiaceae	<i>Strychnos nux-vomica</i> L.	Kabaung
68	Gentianales	Apocynaceae	<i>Holarrhena pubescens</i> Wall.	Lettoke-gyi
69	Lamiales	Verbenaceae	<i>Gmelina arborea</i> Roxb.	Yemane
70	Lamiales	Verbenaceae	<i>Tectona grandis</i> L.	Kyun
71	Scrophulariales	Bignoniaceae	<i>Heterophragma adenophylla</i> Seem.	Phet-than
72	Scrophulariales	Bignoniaceae	<i>Dolichandrone spathacea</i> K.Schum.	Tha-kut
73	Scrophulariales	Bignoniaceae	<i>Oroxylum indicum</i> Kurz.	Kyaung-sha
74	Scrophulariales	Bignoniaceae	<i>Millingtonia hortensis</i> L.	Egayit
75	Rubiales	Rubiaceae	<i>Adina cordifolia</i> Hook.	Hnaw
76	Rubiales	Rubiaceae	<i>Mitragyna parvifolia</i> Korth.	Htein
77	Rubiales	Rubiaceae	<i>Mitragyna rotundifolia</i> Kuntze.	Binga
78	Arecales	Arecaceae	<i>Areca catechu</i> L.	Kunthi-pin
79	Arecales	Arecaceae	<i>Borassus flabellifer</i> L.	Htan
80	Arecales	Arecaceae	<i>Cocos nucifera</i> L.	Ohn
81	Arecales	Arecaceae	<i>Livistona speciosa</i> Kurz.	Taung-htan

Uses of the studied plants

1. *Michelia champaca* L. Myanmar Name - **Sagawa**. Family - **Magnoliaceae**. The tree is commonly cultivated for its fragrant flowers. The timber is very durable. It is used as furniture, house-building, moulding and decorative work. Beat chain are sometime made from its wood. The bark is used as a febrifuge. The flowers are marketed for their scent and in a cosmetic. An infusion of the unopened buds may be drunk for gonorrhoea.

2. *Michelia doltsopa* Buch.-Ham. Myanmar Name – **Saga-pyu**. Family – **Magnoliaceae**. The timber is probably good. It is used for minute structure. The flower bud is fanciful being connected with the scent. When the flowers are distilled they yield dark-green oil with an intensely sweet odour.

3. *Annona squamosa* L. Myanmar Name - **Awzar**. Family – **Annonaceae**. It is moderately good fruits. The fermented fruits seem to be used to make a kind of cider. The seeds contain yellow non-drying oil and irritant poison which kills lice. Pulped leaves may be applied to the skin for itch, to fly-infected wounds. The young fruit can be substituted for the leaves in external use. The root is a drastic purgative, sometimes used for diarrhoea.

4. *Myristica fragrans* Houtt. Myanmar Name - **Zardeik-hpo**. Family - **Myristicaceae**. The fruit-wall is commonly used as a sweetmeat. Nutmegs have stimulant and carminative properties. In large doses they are toxic. The expressed and volatile oils have been used externally in chronic rheumatism.

5. *Cinnamomum verum* Presl. Myanmar Name - **Thitkyabo**. Family – **Lauraceae**. The timber is light to moderately heavy, usually straight-grained, even textured and weak. It is easily splits, cracks and stains. It is suitable only as low grade board wood. The quality of the bark varies with the situation. The thicker bark has the same taste and smell, but in a less delicate way and more oil is present. Cinnamon-leaf oil contains a larger per cent of eugenol than the bark oil. Eugenol makes useful in the perfume and flavouring-industries. It is one source of artificial vanilla. Root-oil contains camphor. Cinnamon seeds contain fat which formerly was made into costly candles such as are still used in churches. Cinnamon in liqueurs was an excellent cordial, good for the digestion. Cinnamon is used chiefly as a carminative or flavouring agent in astringent powders and tinctures. It is antiseptic and also used for colic and diarrhoea.

6. *Litsea polyantha* Juss. Myanmar Name – **Ondon**. Family – **Lauraceae**. The timber is fetid, but good for planks. It is light yellow with a touch of grey and easy to work. There is an irritant substance in the bark. The leaves have a cinnamon-like smell when bruised. There is oil in the seed, which is used medicinally.

7. *Artocarpus integer* Merr. Myanmar Name - **Sone-padat**. Family - **Moraceae**. It is growing wild and cultivated for fruits. The timber is good and durable with coarse grain, dark yellow to brown. It is used for house-

building and boat building. The bark can be used to make rope and the latex for the preparation of lime. Young leaves are used as vegetable. The seeds are eaten roasted or boiled. The fruit is laxative; but when unripe, astringent and indigestible. The juice extracted from the root is given for fever. The leaves are heated and applied to wounds.

8. *Artocarpus chaplasha* Roxb. Myanmar Name – **Taung-peinne.** Family- **Moraceae.** The timber is good and durable with coarse grain. It is valuable for house-building and boat building, furniture and many purposes.

9. *Artocarpus heterophyllus* Lam. Myanmar Name – **Peinne.** Family- **Moraceae.** The timber is medium hardwood. It is resistant to termite attack, fungal and bacterial decay. It is used for furniture, construction, turnery, masts, implements, musical instruments, cabinet-work and tool-handles. The fruit pulp and seeds are considered as a cooling and nutritious tonic. Heated leaves are placed on wounds. Mixed with vinegar the latex promotes healing of abscesses, snakebite and glandular swellings. The bark is made into poultice. The root is used as a remedy against skin disease and asthma and its extract is taken in cases of fever and diarrhoea.

10. *Ficus glomerata* Roxb. Myanmar Name – **Thapan.** Family – **Moraceae.** Sap of root given in diabetes, also the fresh juice of the ripe fruit is used as an adjunct to a metallic preparation which is given in the treatment of diabetes. Root is given in dysentery. Fruit used as astringent, given in stomachic, carminative, menorrhagia and haemoptysis. Milky juice is used in piles and diarrhoea. Bark is given as astringent to cattle when suffering from rinderpest.

11. *Casuarina equisetifolia* Forst. Myanmar Name – **Pinle - kabwe.** Family - **Casuarinaceae.** The timber is very hard, moderately durable in open air, reddish brown and splits much. It is used for paving-blocks, firewood and well situated for the purpose. The bark is used medicinally to arrest diarrhoea and dysentery. A powder of the bark is for pimples on the face. A decoction of the twigs is used as a lotion for swelling.

12. *Dillenia indica* L. Myanmar Name – **Thabyu.** Family – **Dilleniaceae.** The timber is red with white specks, close-grained and moderately hard. It is used for gun-stocks and helves, and in house- and ship-building. The fruits are enclosed fleshy sepals of an acid flavour. They are eaten as flavouring with curries and made into jam. The pulp of the fruit is used to wash the hair.

13. *Anisoptera costata* Korth. Myanmar Name – **Kaban.** Family – **Dipterocarpaceae.** The wood is soft and light to moderately hard and moderately heavy. Sapwood is whitish or very pale yellow. When drying dirty grey to brown. Heartwood is yellowish with rose-colour streaks and blotches. When seasoned the colour is pale yellow with reddish or light brown markings. When fresh, the odour is disagreeable. Not durable in contact with the ground. Subject to insect-attack and rots quickly when place in a wet place. It makes good to manufacture of cupboards and a temporary constructions.

14. *Anisoptera scaphula* Pierre. Myanmar Name – **Kaungmu.** Family – **Dipterocarpaceae.** The wood is soft and light to moderately hard and moderately heavy. Sapwood is whitish or very pale yellow. When drying dirty grey to brown. Heartwood is yellowish with rose-colour streaks and blotches. When seasoned the colour is pale yellow with reddish or light brown markings. Not durable in contact with the ground. Subject to insect-attack and rots quickly when place in a wet place. It makes good to manufacture of cupboards and a temporary constructions.

15. *Dipterocarpus alata* Roxb. Myanmar Name – **Kanyin-byu.** Family – **Dipterocarpaceae.** The timber is reddish-brown and moderately hard, not durable when exposed to the weather but undercover it lasts well and is used for cheap planking. It may be used for sleepers. The bark enters into decoctions taken for liver compliant and into lotions used hot for rheumatism.

16. *Dipterocarpus tuberculatus* Roxb. Myanmar Name – **In.** Family – **Dipterocarpaceae.** It is moderately hard to hard. The sap-wood is yellowish, heart-wood greyish or brownish red, after exposure to air greyish-red. Grains are generally fairly straight. The texture is coarse and rough. It is hard to saw. It is used for rolling-stock, sleeper. When used in a sheltered situation and should become one of the most important structure timbers but in the soil it is not very durable.

17. *Hopea odorata* Roxb. Myanmar Name – **Thingan.** Family – **Dipterocarpaceae.** The timber is strong and durable. It is used in making boats, cart-wheels, oil and sugar-cane presses, paving blocks and sleepers, building, deck-planks and bridges. The oleo-sin or dammar runs from the wood is medicinal for application to sore and wound. This dammar is used as a varnish over paint.

18. *Parashorea stellata* Kurz. Myanmar Name – **Thingadu.** Family – **Dipterocarpaceae.** The timber is yellow. It is not durable in contact with ground. It may be used for internal parts of rolling-stock in the place of teak, but not in the exposed parts.

19. *Shorea obtusa* Wall. Myanmar Name – **Thit-yar.** Family- **Dipterocarpaceae.** The wood is very heavy, very dark red, with very distinct differences between sap-wood and heart-wood. Sap-wood is white or pal yellow and small in amount. Heart-wood is dark red of coarse texture and with straight or crooked grain. The wood is resistant to the white ant. It is suitable for very heavy construction work. The bark can be striped from the trunks in large sheets and used in the past furnished house wall.

20. *Shorea robusta* Gaertn. Myanmar Name – **Ingyin.** Family- **Dipterocarpaceae.** The wood is very heavy, very dark red, with very distinct differences between sap-wood and heart-wood. Sap-wood is white or pal yellow and small in amount. Heart-wood is dark red of coarse texture and with straight or crooked grain. The wood is resistant to the white ant. It is suitable for very heavy construction work. It is used for sleepers, house-building, planks and a great variety of other purpose. Spent bark is used for paper making. The seed is a famine food.

21. *Calophyllum inophyllum* L. Myanmar Name - **Pone-nyet.** Family – **Clusiaceae.** This timber does not warp in seasoning. It is not durable in contact with the ground. The tree branches low and short lengths of excellent hard, close-grained timber of a reddish-brown colour; it is greatly valued for the timbers of boats. It is useful for railway-sleepers, machinery and cabinet-work and hubs of cart-wheels. It takes a pretty polish; is very elastic and fairly durable. It is difficult to split, but not hard to work. In the ripe fruit the endosperm is bitter and full of oil. The oil is used for itch and eruptions of the skin and rheumatism. It is also used for soap-making and in dyeing.

22. *Garcinia mangostana* L. Myanmar Name – **Minguit.** Family- **Clusiaceae.** The dark red wood is heavy, coarse and very strong; when available it is used in carpentry. The snow-white pulp on the seed is delicious. The firm fruit-rind contains tannin. Dyers use it for dyeing black. The rind is used medicinally as an astringent and a decoction for dysentery. The decoction of the root is drunk for irregular menstruation. The ripe fruits are said to purge.

23. *Mesua ferrea* L. Myanmar Name – **Gangaw.** Family – **Clusiaceae.** The timber is very good and used as sleepers, building, bridge, piers, cart-axles, tool-handles. It is slightly tendency to crack and warp. The pounded kernels maybe used for poulticing wounds or the oil from the seeds may be applied. The flowers are often substituted in local medicine.

24. *Bombax ceiba* L. Myanmar Name – **Letpan.** Family- **Bombacaceae.** The timber is white, light in weight and not durable. It is made into objects of temporary use such as packing-cases, match-sticks, charcoal, and making fair quality of paper. The cotton remains a trade article for stuffing pillows, cushions. The seed yield oil and the cake is a good cattle-food. The gum is used for diarrhoea and dysentery. Roots are diuretic. The bark and juice of the roots are medicinal. Dried flowers are used for application to boils, sores and for itch.

25. *Bombax insigne* Wall. Myanmar Name – **Didok.** Family- **Bombacaceae.** The timber is white, light in weight and not durable. It is made into objects of temporary use such as packing-cases, match-sticks, charcoal, and making fair quality of paper. The cotton remains a trade article for stuffing pillows, cushions. The seed yield oil and the cake is a good cattle-food. The gum is used for diarrhoea and dysentery. Roots are diuretic. The bark and juice of the roots are medicinal. Dried flowers are used for application to boils, sores and for itch.

26. *Durio zibethinus* Murray. Myanmar Name – **Duyin.** Family – **Bombacaceae.** The timber is white, tending to be tinted red or brown towards the centre. It is coarse in structure and not durable, but can be used for various purposes. It can use for the inner parts of huts; if it touches the ground white ants soon find and destroy. The best durians are held to have a creamy, dark yellow, sweet aril. When durians are plentiful, make a conserve by boiling the aril with sugar. Seeds are eaten either boiled or roasted. The durian fruits are as tonic, the decoction of the root for fever. The leaves are used for medicinal bath for jaundice. The fruit walls are used externally for skin complaints. The ashes of the fruit-wall are used for making silk white.

27. *Barringtonia acutangula* Gaerth. Myanmar Name - **Kyi-ni.** Family- **Lecythidaceae.** Its bark is a fish-poison and a tan. Some fishermen use it for toughening fishing-lines. The timber is marketed in places where it is very plentiful. It is also locally marketable. The bark is used for poulticing. Very young leaves are eaten.

- 28. *Careya arborea* Roxb.** Myanmar Name – **Bambwe**. Family- **Lecythidaceae**. The heart-wood is dull red or claret-coloured, grained, moderately hard and very durable. It is useful for building, furniture, mouldings, turnery and a lasting well under water when employed for piles: It yields poor-paper pulp. The fruit is eaten by jungle-tribes. The barks are medicinally used for the astringent.
- 29. *Homalium tomentosum* Benth.** Myanmar Name-**Myauk-chaw**. Family- **Flacourtiaceae** It is excellent Lance-wood. The timber is good, fairly hard and heavy, light fawn coloured; rays fine and close; pores small and numerous; rings distinct; a compact, fine-grained wood, valued for building, sleepers.
- 30. *Mimusops elengi* L.** Myanmar Name – **Khayay**. Family- **Sapotaceae**. The timber is hard and heavy. The sap wood is pale red; the heart-wood is dark red, very fine grained and with a bitter taste. It is used as piles, shafts, axles, naves of wheels, cabinet-work and walking sticks. Cigarettes containing shredded leaves or sold for smoking to cure infections of nose and of the mouth, such as sprue and pyorrhoea.
- 31. *Albizia lebbek* Benth.** Myanmar Name – **Kokko**. Family – **Mimosaceae**. It is grow wild and cultivated as shade-tree. The shed leaves make green manure. The roots carry bacterial nodules freely. The timber is good. It is dark brown, streaked with lighter and darker streaks. It has been suggested as a substitute for teak It is very suitable for use as a veneer and for parquet flooring, cabinet, doors, wheel-work. The foliage is readily eaten by cattle and other animals. The powdered bark is boiled to spongy and ulcerated gums, dysentery and haemorrhoids. The seed oil is used for leprosy and the flowers for poulticing.
- 32. *Albizia odoratissima* Benth.** Myanmar Name – **Thit-magyi**. Family – **Mimosaceae**. The timber is dark brown, hard and close-grained. It is useful for many purposes, especially for wheels and furniture. It is good for barrels.
- 33. *Archidendron jiringa* Nielsen.** Myanmar Name – **Danyin**. Family – **Mimosaceae**. The timber is soft, reddish or white, shining with little or no heart wood and that not very distinct. It is a soft almost valueless wood only used for coffins and firewood. It splits when drying. The leaves are used for poulticing for skin complaint and for pains in the chest. The bark is also

used for pains in the chest and to make a gargle for tooth-ache. Ashes of old leaves are applied for itch. The seed act as a diuretic.

34. *Xylia xylocarpa* Taub. Myanmar Name – **Pyinkado**. Family – **Mimosaceae**. The timber is very valuable. The wood is dark reddish-brown, very hard, difficult to saw and somewhat liable to crack in seasoning. It is used for sleepers, house-posts, bridges, ship-building, and road pavement.

35. *Cassia fistula* L. Myanmar Name – **Ngu**. Family – **Caesalpiniaceae**. The timber is good, the heart-wood is very hard and very heavy, grey to brick-red in color, darkling on exposure, difficult to work and apt to split but when finished may be given the appearance of mahogany. It is last longer in the ground than teak. It is used for posts, carts, agriculture implements etc. The plant is planted in gardens. The tree is beautiful when flowering. The pulp is used for constipation. The root bark is very good lotion for wounds and ulceration. The leaves are used for treating herpes and are given to buffaloes for medicine.

36. *Delonix regia* Raf. Myanmar Name – **Seinban**. Family – **Caesalpiniaceae**. The timber is fair. It is hard and durable, not to split. The dark heart wood resists moisture and insects. It is used for rough posts and supports for flooring and bridges. The bark is febrifuge. The dye substance quercetin, is in the flowers.

37. *Senna siamea* Irwin & Barneby. Myanmar Name - **Mezali**. Family Name – **Caesalpiniaceae**. The sap-wood, is a large proportion, is soft, white and useless except as firewood. The heart-wood is dirty blackish olive, durable, hard and fairly heavy. It is used for building, mallets, shelves and walking-sticks, bridges, furniture. The tree is often planted as a shade-tree. By growing fast, it may be useful for fuel. The heart-wood is laxative. The root is used to charm away intestinal worms and to prevent convulsions in children. The flowers may be eaten in curries.

38. *Tamarindus indica* L. Myanmar Name – **Magyi**. Family – **Caesalpiniaceae**. The hard-wood is very hard. It is substituted for mahogany. It is used for tool-handle, agricultural implements and other objects kept under cover. The flowers, leaves are eaten in curries as a vegetable. The seeds are eaten after boiled or fried. The bark is used for laxative also serves in lotions and poultices for sores, ulcers, boils and caterpillar rash. The pulps are astringent. It contains tartaric acid. It is excellent cleaning material for metal.

39. *Erythrina variegata* L. Myanmar Name – **Kathit**. Family – **Fabaceae**. The timber is white and soft and of little use but it can be used for packing-cases, minute structure, fence (the more prickly the better). It is rasped and pounded into a face-powder. The bark is used for curing tooth-ache, dysentery. The leaves and the roots are considered to be a febrifuge. The decorations of the leaves are treated for cough and asthma. The pounded raw seeds are used for poultices.

40. *Pterocarpus macrocarpus* Kurz. Myanmar Name – **Padauk**. Family – **Fabaceae**. It make an excellent road-side tree. The timber is moderately hard, moderately heavy, yellow to red, fragrant with rose-like odour. The durability of all classed is good. Sap-wood is a very pale yellow and useless but small in amount in large trees. It is the best for various kinds of furniture. White ants rarely attack it.

41. *Dalbergia cultrata* Grah. Myanmar Name - **Yin-daik**. Family – **Fabaceae**. The timber is valuable. It is used for furniture.

42. *Duabanga grandiflora* Walp. Myanmar Name – **Myaukngo**. Family- **Lythraceae**. The timber is grey, with lighter yellowish streaks, easily worked, being moderately soft; it takes a good finish and polish; it is not durable when placed in exposed positions, but lasts well under cover, or when contact with water. It is used for boxes, house- and boat-building, etc. The wood is also used for house-beams.

43. *Lagerstroemia reginae* Roxb. Myanmar Name – **Pyinma**. Family- **Lythraceae**. It grows wild and cultivated for the beauty of its violet flowers. It yields valuable timber, very durable under water and resistant insect attack. The colour is light red darker when exposure. The grain is fine and straight. It is used for house-building, ship-building, boats, carts, floor-boards, for rolling-stock and sleeper. The decoction of the bark is used for abdominal pains; infusion is taken to stop diarrhoea.

44. *Syzygium nervosum* DC. Myanmar Name - **Thabye-chin**. Family - **Myrtaceae**. The timber is moderately good. It is used for building and for agriculture implements, and minute structure.

45. *Syzygium samarangense* Merr. & Perry. Myanmar Name – **Thabyu-thabye**. Family - **Myrtaceae**. The wood is reddish and hard. It grows to dimensions large enough for construction purposes. An infusion of leaves is given for fever. The fruit is eaten fresh or cooked with sugar. The seed may be used for diarrhoea and dysentery.

46. *Eucalyptus globulus* Labill. Myanmar Name - **Eu-ca-lit**. Family - **Myrtaceae**. It is presence of tannins and essential oils. The essential oil are of therapeutic value. The oil appears to be better tolerated by the skin. It is probably the powerful antiseptic, used as stimulant antiseptic gargle and treatment of asthma and bronchitis. It is largely used as mosquito and vermin repellent and also used in perfumery. Eucalyptus is traditional aboriginal remedy for infection and fevers. It is a strong expectorant, suitable for chest infection, including bronchitis and pneumonia. The oil obtained from the leaves is used in the treatment of throat and nose disorders, malaria and various cold afflictions. It is stimulant, antiseptic, and aromatic.

47. *Anogeissus acuminata* Wall. Myanmar Name - **Yon**. Family - **Combretaceae**. The timber is moderately hard. It warps and cracks in seasoning and it is not durable. It is suitable for mouldings, planking, and general purposes. It is considerably stronger than teak, but also much heavier. The leaves have a valuable bleaching action.

48. *Terminalia catappa* L. Myanmar Name - **Banda**. Family - **Combretaceae**. The timber is good. It is reddish and having a crossed curled twisted grain, is elastic. It is easy to work and seasons well but is rather variable. It is interesting that the resemblance between this tree and *Calophyllum inophyllum*. The barks contain tannin, which is used as an astringent in dysentery. The leaves are applied to rheumatic joints and used for dysentery. The embryo is edible. The oil is medicinal equally with almond oil.

49. *Terminalia chebula* Retz. Myanmar Name - **Phan-kha**. Family - **Combretaceae**. The wood is fairly durable, good timber and is used for furniture, carts, agricultural implements and house-building. The fruits are used for dye and making ink. The fruit purge when unripe but are astringent when ripe.

50. *Terminalia tomentosa* Wight&Arn. Myanmar Name - **Tauk-kyant**. Family - **Combretaceae**. The timber is brown with dark streaks and very hard. It is used for beams inside house, tool-handles and other purposes.

51. *Baccaurea sapida* Muell.Arg. Myanmar Name - **Kanaso**. Family - **Euphorbiaceae**. The tree is growing wild and cultivated for fruits. The timber is soft and splits. It is used to built house and boats and to make furniture. The bark employed to relives eye inflammation.

52. *Hevea brasiliensis* Muell.Arg. Myanmar Name – **Kyet-paung**. Family – **Euphorbiaceae**. The seeds are oily. The oil is used in paints and varnishes. The cake may be fed to animals. The wood serves as a fuel or may be converted into charcoal.

53. *Ziziphus jujuba* Lam. Myanmar Name – **Zi**. Family – **Rhamnaceae**. The timber is reddish, fine-textured, hard and durable. It is used for turnery, household utensils and implements and in small objects. It furnishes good charcoal and excellent fuel. The fruit is held to purify the blood and to aid a weak digestion. The bark and seeds are given as a remedy for diarrhoea and the root in the form of a decoction for fever. The powdered root and a poultice of the leaves are used on wounds. The decoction of the bark and leaves is an effective astringent in dysentery and diarrhoea and is used in the bowel troubles of every kind. The bark is looked upon as a tonic for the digestion. Poultice of the bark may be applied for stomach-ache. Fever patients may be washed with a lotion made from the leaves with froths.

54. *Nephelium lappaceum* L. Myanmar Name – **Kyet-mauk**. Family – **Sapindaceae**. The timber is hard and heavy, red to reddish-white or some what brown. Split in drying but useful for many purposes. The decoction of the roots is treating for fever. The leaves are used for poulticing, the bark as an astringent.

55. *Anacardium occidentale* L. Myanmar Name - **Thiho-thayet**. Family – **Anacardiaceae**. The wood sap can be used as a protection for posts against termites; It is sometimes put on fishing-lines to protect them also. The timber is rarely available because the tree is wanted for its fruit. It is valuable, being soft to moderately hard, light to reddish-brown. The saps of the plant darken on exposure to air. By using this reaction it can be used in making-ink. The very young leaves are eaten raw with rice as flavouring. The pear-like pedicel is eaten as a fruit. It can be eaten raw, but is a little tart. The fruit-shell serves as a cosmetic. Oil extracted from the pericarp medicinally for itch and used for cracks on the feet. A gum from the tree is insoluble in water and carries some of the poisonous sap and antiseptic. The paste of the old leaves applied to skin affections and burns. The decoction of the bark is given for diarrhoea. The root is purgative. The swollen fruit stalks are taken to arrest vomiting.

56. *Bouea burmanica* Griff. Myanmar Name – **Mayan**. Family- **Anacardiaceae**. The timber is good, dark brown colour. It is sinks in water.

Sometime used for house-posts, as it is durable. The fruit is acid but good for cooking and generally eaten usually when half-ripe.

57. *Mangifera indica* L. Myanmar Name – **Thayet.** Family- **Anacardiaceae.** The timber is scarcely durable. The colour of wood is grey or in older trees dark brown with black streaks and hard. It used for planking, doors, window frames, packing-cases. The bark is able to dye cotton, silk and wool. It is used astringent and used in hot lotion for rheumatism and leucorrhoea. The solution of gum obtain from the bark is used for dysentery. Mango flowers are sometime used medicinally to cure diarrhoea. Very young, purple-brown leaves are eaten with rice.

58. *Swintonia floribunda* Griff. Myanmar Name – **Taung-thayet.** Family – **Anacardiaceae.** The timber is greyish-white, soft and even grained, fairly hard. It does not split in drying. It is useful for matches.

59. *Azadirachta indica* A. Juss. Myanmar Name- **Tama.** Family - **Meliaceae.** It grows wild and cultivated for shade. The timber is good and durable. It is not attacked by insect. The heart-wood darkens on exposure. It is useful for cart-making, agricultural implements, furniture, being a sacred wood and making idols. Pressed leaves may be used in libraries to keep away book-mites and other insects. The leaves are used as green manure and can be fed to cattle. The flower can be eaten in food. The root-bark, bark and young fruits are tonic and anti-periodic. The oil, seeds and leaves are a local stimulant, insecticide, antiseptic and to treat leprosy. The flowers are stimulant, tonic and stomachic, and the gum is demulcent and tonic. The oil is used as lamp oil and making soap.

60. *Toona ciliata* M. Roemer. Myanmar Name – **Thit-kado.** Family – **Meliaceae.** The wood is red and prettily marked; it is easy to work. The timber is universally used for all kinds of furniture, planks, boxes, musical instruments. It is resemble to mahogany but much lighter in weight. When kept in dry it is very durable. Flowers and seeds are used for dyeing. The bark is used for astringent, dysentery, poultices to wound.

61. *Sandoricum koetjape* Merr. Myanmar Name - **Thitto.** Family – **Meliaceae.** The timber is red moderately hard, close-grained and takes beautiful polish. It is also used for carts, boats, house-building, light framing, cabinet-work, house-posts, and minute structure. The decoction of leaves are given for diarrhoea, pulped leaves are applied to the skin for itch.

62. *Swietenia macrophylla* King. Myanmar Name – **Mahogani.** Family – **Meliaceae.** The timber is known as valuable and durable. They are important for constructed building, furniture, cabinet-work, tool-handles. The bark may serve as an antipyretic, tonic and astringent.

63. *Aegle marmelos* Correa. Myanmar Name – **Okshit.** Family – **Rutaceae.** The timber is yellowish white or greyish white, hard and with strong aromatic scent when fresh. It serves well for making turnery, but not for long subject it wraps and twists in seasoning and cracks. It is used for small objects such as tool-handles, minute structure. The juices of leaves are used for catarrh and fever.

64. *Citrus maxima* Merr. Myanmar Name - **Kwe-gaw.** Family- **Rutaceae.** The timber is white to yellow, moderately heavy, hard and close-grained. It may be used for tool-handles. Valuable fruit-tree. The oil of the peel is very difficult to express, and appear to have no extra-ordinary merit. But the oil of the leaves has a fine odour. The oil of the seeds of an inferior race is extracted and used for lighting opium pipes. A very fragrant perfume may be got from the flowers. The leaves are boiled to make a lotion, used hot on painful places, swellings and on ulcers.

65. *Averrhoa carambola* L. Myanmar Name - **Zaung-yar.** Family – **Oxalidaceae.** The wood is white, turning reddish, moderately hard and close-grained. The flowers are pleasantly acid and are used in salad and considered to have a vermifuge action. The fruits are best eaten stewed with sugar as it is sour, but some forms are sweet enough for dessert. The fruit is very good for tarts. It can be made into jams. Crushed leaves or shoots are used for chicken-pox, ringworm and headache. A decoction of leaves and fruit is given to arrest vomiting. A conserve of the fruit is given as a corrective after a drinking-bout, also used for biliousness and diarrhoea. Juice of the fruit, prepared as a syrup is given as a cooling drink in fevers. The acid juice may be used for cleaning metal surfaces.

66. *Fagraea fragrans* Roxb. Myanmar Name – **Anan.** Family – **Loganiaceae.** The wood is very hard. It is pale yellow with a purplish tint, very heavy, very wet, and durable and has a distinctly acid odour when first cut. It is liable to split. It is not difficult to work. It is used for house-building, bridges, barrels etc. A decoction of leaves and twigs is drunk for dysentery. The decoction of the bark is taken for malaria.

67. *Strychnos nux-vomica* L. Myanmar Name – **Ka-baung-ye-kyi**. Family – **Loganiaceae**. The timber is hard and white ants do not eat it. The seeds are used in stomachic, rheumatic, arthritis and paralysis. The bark is used as tonic and febrifuge. The leaves are used in the treatment of skin disease.
68. *Holarrhena pubescens* Wall. Myanmar Name - **Let-htoke-gyi**. Family – **Apocynaceae**. The timber has a very fine even grain; is light in colour; easy to work and useful for small objects. Its bark is used for dysentery and added in a general to astringents and aromatic medicines.
69. *Gmelina arborea* Roxb. Myanmar Name – **Yemane**. Family – **Verbenaceae**. The timber is good durable under water and has many uses. It supplies mine-timbers. The decoction of the root is given for gonorrhoea and catarrh of the bladder. It is bitter tonic, stomachic and laxative. Young leaves may be used instead of the root.
70. *Tectona grandis* L. Myanmar Name – **Kyun**. Family-**Verbenaceae**. The excellent wood, durable, badly decay. Its smell when fresh is pleasant. It was not immune to the attacks of insects and white ants. It is used in ship-building, furniture, building, and furniture, deck-planking of boats and for a few other special uses. The wood is used in medicine. Taken internally it acts as a vermifuge. It is prescribed for malaria and stomach-ache and for skin complaints and fever. The past of the wood is most effective for allaying inflammation of the skin. The leaves serve as wrappers.
71. *Heterophragma adenophylla* Seem. Myanmar Name-**Phet-than**. Family-**Bignoniaceae**. The timber is good. It does not split and is excellent for cabinet-making. It is hard, tough, elastic, orange-yellow in colour with darker streaks and very suitable for furniture and cabinets work, mouldings.
72. *Dolichandrone spathacea* K.Schum. Myanmar Name – **Thekut**. Family – **Bignoniaceae**. The wood is grey and light. For its lightness the fishermen are used for floats for nets. It is made into wooden shoes and may purpose. The leaves are used for mouth-wash for thrush.
73. *Oroxylum indicum* Kurz. Myanmar Name - **Kyaung-sha**. Family Name- **Bignoniaceae**. Timber is of little value, soft and without durability when exposed to the weather, though apparently it is not insects which destroy it. The young shoots may be eaten after cooking. The flowers, fruits and barks are also eaten. The bitter bark of the roots is employed for intestinal complaints; astringent and tonic properties are ascribed to it and regarded as antirheumatic, antidyseric and diaphoretic. The decoction is

recommended for gastric vertigo. The decoction of the leaves may drink for stomach-ache. The same decoction is much employed externally as a hot formation in cholera, fever, childbirth and rheumatic swellings. The hot leaves are applied upon an enlarged spleen and to the cheek for tooth-ache. It is largely used for diarrhoea and dysentery. The seeds serve as cattle-medicine. Tanning and dyeing can be done with the pods and bark.

74. *Millingtonia hortensis* L. Myanmar Name - **Egayit**. Family- **Bignoniaceae**. The wood is soft, yellowish-white and can be used for furniture. The leaves are used for hypertension, flowering shoots for dizziness, roots and barks for eye disease and drunkenness.

75. *Adina cordifolia* Hook. Myanmar Name - **Hnaw**. Family- **Rubiaceae**. It is substitute for teak as in the internal parts of railway carriages. It is also used for furniture, cement-barrels and particularly for turnery. It is excellent for purposes where it is not exposed to heat.

76. *Mitragyna parvifolia* Korth. Myanmar Name - **Htein**. Family - **Rubiaceae**. The timber is yellow. The timber is used for many purpose such as minute structure, paper making etc. The leaves have a bitter taste.

77. *Mitragyna rotundifolia* Kuntze. Myanmar Name - **Binga**. Family- **Rubiaceae**. The yellow timber is used for constructions, furniture and many purposes.

78. *Areca catechu* L. Myanmar Name - **Kunthi-pin**. Family Name - **Areaceae**. The outer wood of the stem is hard. The whole trunk may be used as a fishing-stake. When split and used as flooring inside the house. The seed are chewed in ripe and unripe state. The decoction of half rotted husks is for dysentery. The decoction of the roots is given for dysentery, diuretic and abdominal complaints. The pulp of the root is treated of painting round the eyes, vermifuge for children. The decoction of the leaves is used as a hot bath for children with diarrhoea. A cigar made by rolling together the leaf with leaves of *Mimusops elengi* is smoked for ulceration of the nose. The nuts are sometime used for dyeing cotton. The refuse of boiling nuts is used for varnishing wood and applying to wound. Betel palm is also used as elephant's medicines. The husks of the nuts are used as fuel and brown cardboard has been made from it. A row of plant and wire twisted round them to make a fence.

79. *Borassus flabellifer* L. Myanmar Name - **Htan**. Family - **Areaceae**. The palm ends its life by supplying timber. The outer part of the trunk is

exceedingly hard but the hard part is only a few inches thick. The male tree is harder and stringer than the female. Walking-sticks, rulers, umbrella-handles are made from the wood. The male petiole is diuretic and used as a vermifuge. Fibre from long stalks may be made from the finer fibre and scrubbing-brushes from the lower ends of the leaf-stalks. The palm-leaf are cut into rectangular slips and threaded into books. Leaves are also used for making fans, thatching, mat-making, hats, buckets, baskets, and green manure. The roots are diuretic action.

80. *Cocos nucifera* L. Myanmar Name – **Ohn.** Family- **Arecaceae.** The trunks are used in various places in house-construction. The split trunk was made flooring. High-grade oil is used for cooking or in manufacture of margarine etc. and lower grades is processed into best soap, detergents, hair oil, shampoos, paints, varnished etc. The young immature nuts are used medicinally in dysentery as an astringent. They are prescribe in external application for haemorrhoids, ulceration of the bone and ulcerative colitis and internally for a fever called untimely or unlucky fever. The carbon dioxide of the immature nut makes it pleasanter to drink. It is to be the right drink to take against poisoning and in choleric attacks and diuretic, it may lead to the carrying away of irritant substances in the blood. The older the nut the more diuretic, it is on account of the increase of salt, if much be drunk, it may even cause some inflammation in the urinary tracts. The ash of a coconut shell is prescribed in application for swellings, pain in the stomach and rheumatism; it enters also into a gargle. The coconut toddy is boiled down into brown sugar and it can be made palm wine, vinegar and spirit. The roots are astringent and may be used for dysentery and other intestinal complaints. The decoction of pulped roots is used in small-pox, syphilis, gonorrhoea and rheumatism. The flowers also appear to be astringent.

81. *Livistona speciosa* Kurz. Myanmar Name – **Taung-htan.** Family- **Areaceae.** The wood is hard and is used in various ways such as flooring, canes, spear-shafts and bows. The leaves are much used for thatch, mat, and hats.

Discussion

In the present investigation, including 81 plant species belonging to the 70 genera of 32 families were studied. Forest Department classified hard wood according to their heartwood hardness. *Xylia xylocarpua* (Pyinkado), *Pterocarpus macrocarpus* (Padauk), *Hopea odorata* (Thingun), *Shorea*

obtusata (Thityar) and *Shorea robusta* (Ingyin) are belonging to the Group I. *Dipterocarpus alatus* (Kanyin), *Albizia lebbek* (Kokko), *Michelia champaca* (Sagawa), *Adina cordifolia* (Hnaw), *Gmelina arborea* (Yamane), *Dalbergia cultrata* (Yindaik), *Fagraea fragrans* (Anan) and *Dipterocarpus tuberculatus* (In) are belonging to the Group II. *Anisoptera scaphula* (Kaungmu), *Mangifera* spp. (Taw-thayet), *Artocarpus chaplasha* (Taung-peinne), *Terminalia tomentosa* (Tauk-kyant), *Lagerstroemia reginae* (Pyinma), *Terminalia chebula* (Phan-kha), *Anogeissus acuminata* (Yone), *Syzygium* spp. (Thabye) are belonging to the Group III. *Bombax ceiba* (Letpan), *Duabanga grandiflora* (Myauk-nyo), *Sandoricum koetjape* (Thitto) are belonging to the Group IV. *Homalium tomentosum* (Myauk-chaw), *Litsea polyantha* (Ohn-don) are belonging to the Group V. *Xylia xylocarpa* (Pyinkado), *Pterocarpus macrocarpus* (Padauk), *Shorea obtusata* (Thityar), *Shorea robusta* (Ingyin), *Dipterocarpus alatus* (Kanyin), *Albizia lebbek* (Kokko), *Gmelina arborea* (Yamane), *Dalbergia cultrata* (Yindaik), *Fagraea fragrans* (Anan), *Mangifera* spp. (Taw-thayet), *Terminalia tomentosa* (Tauk-kyant) are export heartwood. Agriculture is most important in the economy of the Township. Rice is the chief crop in the plain area. Rubber plantation is mainly in Kyeik-to, Mudon, Thanbyu-zayat and Ye. Seasonal fruits such as *Durio zibethinus* (Duyin), *Garcinia mangostana* (Minguit), *Nephelium lappaceum* (Kyetmauk), *Citrus maxima* (Kwe-gaw) are cultivated widely in Mawlamyine, Mudon, Thanbyu-zayet, Ye and Kyeik-to Township. *Myristica fragrans* (Sardek-bo-thi) cultivated garden located in Thaton Township. *Borassus flabellifer* (Htan), *Cassia fistula* (Ngu), *Delonix regia* (Seinban), *Careya arborea* (Banbwe), *Terminalia catappa* (Banda), *Barringtonia acutangula* (Kyi-ni) are not included in the list of Forest Department but also used as furniture, house construction and equipments. *Mangifera indica* (Thayet), *Artocarpus heterophyllus* (Pinnie), *Durio zibethinus* (Duyin) are not only used in edible fruits but the timber is also used for furniture.

Conclusion

In Mon Sate, Tropical rain forest is characterised by the presence of large number of giant evergreen tree species. There are under growth of smaller trees, shrubs, herbs, canes and bamboo. Most of the woody plants are not only used for constructions but also have medicinal value. Thus, it is

necessary to protect not only each species but plant diversity also need for conservation.

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