

TAXONOMIC STUDY ON FIFTEEN SPECIES FROM MANSI TOWNSHIP BANMAW DISTRICT, KACHIN STATE

Seng Nan¹, Nu Nu Yee², Hnin Hnin Yu³

Abstract

The floristic study on Angiospermae from Mansi Township, Banmaw District, Kachin State have been undertaken. It lies between 24° 15' - 23° 45' N Latitude and 97° 45' - 96° 45' E Longitude. The total area is 2932 square kilometers. The plant specimens were collected and identified from October 2020 to February 2022. Among them, 15 species belong to 14 genera of 8 Families were presented. In this study, 7 species of 4 Families were under group of monocots, 6 species belonging 3 Families were under rosids and the other 2 species belonging 1 Family were under asterids. In these species, 4 species were trees, 5 species were herbs and 3 species were shrubs and other species were climber and epiphytic. The leaf types of 2 species were compound and 13 species were simple. *Smilax perfoliata* Lour., *Begonia lipingensis* Irmsch. and *Begonia palmata* D. Don. possessed unisexual flower and the others were bisexual flower. An artificial key to the studied species was also constructed. The economically valuable timber species are *Grewia laevigata* Vahl., *Kydia calycina* Roxb. The most valuable medicinal species are *Curcuma petiolata* Roxb., *Kaempferia galanga* L. These valuable species are needed to be conserved as the long-term programme for natural vegetation of Mansi Township, Banmaw District, Kachin State.

Keywords: Taxonomic, Angiospermae, Trees, Shrubs, Herbs

Introduction

The flowering plants contribute massively to the world's primary productivity and are regularly the most important component of global biodiversity. Not only do they provide the crops that feed us, as well as ornamentals, medicines, poisons, fibers, oils, tannins, beverages and stimulants, and herbs and spices but also constitute the main structure of our terrestrial ecosystem and afford habitats for countless animals (Heywood, 2007).

In the present research, all the species of plants were collected from Mansi Township. The study area is located Banmaw District in the Kachin state of Myanmar. It lies between 24° 15' - 23° 45' N Latitude and 97° 45' - 96° 45' E Longitude. The elevation of Mansi Township is about 450 m above sea level. The total area is 2932 square kilometer and established by 20 villages tracts in township. It has many mountain ranges running from north to south. Forest vegetation depends on three mains factors such as optimal temperature, good rainfall and fertile soil.

The natural vegetation in Mansi area varies due to climate, topography and kinds of soil. The various types of natural vegetation found in this area are evergreen forest, semievergreen forest, mountain forest, dry and moist mixed deciduous forest and swamp forest. In the lowland and foothills, bamboo and a few scattered trees are found. Most of Mansi Township is covered with forests. Natural vegetation of the township varies according to the elevation and climate of the area.

The aim and objectives of this research work are to study the flowering plants of Mansi Township, to identify and classify the taxonomical characters of wild plants, and to record the floristic information of plant resources.

Materials and Methods

The specimens were collected from Mansi Township from 2020 October to 2022 February. Field observation was made by using GPS (Global Positioning System). Locations of the study area were also noted. The images of inflorescences and flowers were recorded by taking

¹ Department of Botany, Banmaw University

² Curriculum Central Unit, Department of Education Research, Yangon

³ Department of Botany, University of Mandalay

photographs. Then these specimens were kept into the plastic bags. The morphological characters of collected specimens were recorded by using a dissecting microscope.

The taxonomic identification of collected plants were carried out by referring to Hooker (1875-1897), Backer and Brink (1963-1968), Dassanayake (2001-2003) and Hutchinson (1967). The family was systematically arranged according to APG IV (Angiosperm Phylogeny Group) system. The genera and species were also arranged alphabetically. Myanmar names were referred to Hundley and Chit Ko Ko (1987) and Kress *et al.* (2003). The valid names of species were checked in the website of international plant name index. The taxonomic descriptions were presented with their respective figures.

Results

List of collected species of flowering plant in Mansi Township were studied. The collected 15 species belong to 14 genera of 8 families. Arrangements of the Family for collected species are described in Table 1.

Table 1. List of the collected species from Mansi Township

Group	Order	Family	No.	Scientific name
Monocots	Liliales	Smilacaceae	1.	<i>Smilax perfoliata</i> Lour.
	Asparagales	Orchidaceae	2.	<i>Acampe papillosa</i> (Lindl.) Lindl.
			3.	<i>Dendrobium chrysotoxum</i> Lindl.
			4.	<i>Asparagus racemosus</i> Willd.
	Zingiberales	Zingiberaceae	5.	<i>Curcuma petiolata</i> Roxb.
			6.	<i>Globba orixensis</i> Roxb.
			7.	<i>Kaempferia galanga</i> L.
Rosids	Rosales	Rosaceae	8.	<i>Prunus cerasoides</i> D. Don.
			9.	<i>Rubus ellipticus</i> Sm.
	Cucurbitales	Bignoniaceae	10.	<i>Markhamia stipulata</i> (Wall.) Seem. ex. K. Shcum.
	Malvales	Malvaceae	11.	<i>Grewia laevigata</i> Vahl.
			12.	<i>Helicteres angustifolia</i> L.
Asterids	Lamiales	Begoniaceae	13.	<i>Kydia calycina</i> Roxb.
			14.	<i>Begonia lipingensis</i> Irmsch.
			15.	<i>Begonia palmata</i> D. Don.

1. *Smilax perfoliata* Lour., Fl. Coohinch. 2:622. 1790. (Figure 1)

Flowering period : March to May

Perennial monoecious vines; stems and branches terete, stout, retrorsely spines, green, glabrous. Leaves simple, alternate, exstipulate; blades orbicular or ovate-cordate. Inflorescences axillary, umbellate cymes. Flowers unisexual, staminate flowers, greenish-yellow; pedicels terete. Perianth segments 6, in two series. Stamens 6, exserted; anthers ditheous. Pistillate flowers, pale green. Perianth segments 6, in two series. Staminate present. Carpel 3, united; ovary superior; styles filiform, glabrous. Fruits berry.

Specimen examined: Kachin State, Mansi Township, In Ba Pa villages; 24° 02' N, 97° 36' E, Elevation 347m; 16 April 2021; Seng Nan, collection no. 7.

2. *Acampe papillosa* (Lindl.) Lindl. Fol. Orch. Acampe; 2. 1853. (Figure 2)

Saccolabium papillosum Lindl. Sp. Pl. 222. 1833.

Flowering period : October to January

Monopodial epiphytes. Leaves simple, alternate and distichous, entire margins, tips; leafy at anthesis. Inflorescences axillary corymbose, 10-to 15-flowered. Flowers bisexual, yellow with reddish- brown spots, fragrant; dorsal sepals oblong; the lateral sepals falcately oblong; the labellum not distinctly 3-lobed, white with purple spots, glabrous; anthercaps sub-globose; Pollinia 2. Fruits capsular.

Specimen examined: Kachin State, Mansi Township, Madang yang villages; 24° 25' N, 97° 12' E, Elevation 210 m; 16 December 2020; Seng Nan, collection no. 3.

3. *Dendrobium chrysotoxum* Lindl., Edward's Bot. Reg. 33: ad pl. 19. 1847. (Figure 3)

Flowering period : May to July

Sympodial epiphytes. Pseudobulbs one jointed, fusiform. Leaves simple, alternate, oblong lanceolate. Inflorescences terminal raceme, many-flowered. Flowers bisexual, yellow; floral bracts triangular; dorsal sepal ovate-oblong; lateral sepals oblong-obtuse, brightly yellow; lateral petals bright yellow; labellum orbicular, deeply yellow blotches on the lip; anthercaps oblongoid; Pollinia 4. Fruits capsular.

Specimen examined: Kachin State, Mansi Township, Au Ra Bum; 24° 01' N, 97° 23' E, Elevation 420 m; 20 July 2021; Seng Nan, collection no. 8.

4. *Asparagus racemosus* Willd., Sp. Pl. ed 4.2: 152. 1799. (Figure 4)

Flowering period : November to January

Perennial rhizomatous scandent shrubs. Leaves simple, spirally arranged, reduced to scales. Flowers bisexual, greenish-yellow or white; ebracteolate. Tepals 6, slightly connate at the base, oblong, deflexed after anthesis. Stamens 6; anthers ditheous. Carpels 3; ovary superior; style short; stigma trifold. Fruits baccate.

Specimen examined: Kachin State, Mansi Township, In Ba Pa villages; 24° 02' N, 97° 36' E, Elevation 347m; 5 December 2021; Seng Nan, collection no. 5.

5. *Curcuma petiolata* Roxb., Fl. Ind. 1: 36. 1820. (Figure 5)

Flowering period : June to August

Perennial rhizomatous herbs. Leaves simple, alternate and distichous, exstipulate; blades broadly lanceolate. Flowers bisexual, yellow. Calyx infundibuliform, 3-lobed, white. Corolla infundibuliform, 3-lobed, yellow, glabrous. Fertile stamen 1; anthers ditheous; staminodes 2, oblanceolate; labellum ovate, pale yellow with dark yellow blotch at the base. Carpels 3, united; ovary inferior; style terminal; stigma bilobed. Fruits capsular.

Specimen examined: Kachin State, Mansi Township, La Jawng; 24° 08' N, 97° 23' 02.53" E, Elevation 350 m; 12 July 2022; Seng Nan, collection no. 12

6. *Globba orixensis* Roxb., Asiat. Res. 11: 3358, pl. 6. 1810. (Figure 6)

Flowering period : June to October

Perennial rhizomatous herbs. Leaves simple, alternate and distichous, exstipulate; blades elliptic-lanceolate. Inflorescences terminal lax panicles, cauline. Flowers bisexual, reddish orange. Calyx infundibuliform, 3-lobed. Corolla infundibuliform, 3-lobed. Fertile stamen 1. Carpels 3, united; ovary inferior; style filiform; stigma turbinate. Fruits capsular.

Specimen examined: Kachin State, Mansi Township, La Jawng; 24° 08' N, 97° 23' 02.53" E, Elevation 350 m; 12 July 2022; Seng Nan, collection no. 13.

7. *Kaempferia galanga* L., Sp. Pl. 1: 3. 1753. (Figure 7)

Flowering period : June to November

Prostrate herbs. Leaves simple, opposite and decussate; blades suborbicular to broadly elliptic. Inflorescences radical, terminal dense spike. Flowers bisexual, white with lilac and brownish spot center. Calyx tubular, white. Corolla infundibuliform, white, brownish spot at the tips. Fertile stamen 1; anthers ditheous. Carpels 3, united; ovary inferior; style filiform; stigma subglobose. Fruits not available.

Specimen examined: Kachin State, Mansi Township, La Jawng; 24° 08' N, 97° 23' 02.53" E, Elevation 350 m; 27 July 2022; Seng Nan, collection no. 14.

8. *Prunus cerasoides* Buch-Han. ex D. Don., Prod. Fl. Nepal 239. 1825. (Figure 8)

Flowering period : December to February

Perennial tree. Leaves simple, alternate; blades lanceolate. Inflorescences terminal and axillary, cymes, 3-flowered. Flowers bisexual, dark pink. Calyx campanulate, 5-lobed. Petals 5, obovate. Stamens numerous, in 2 rows, exserted; anthers ditheous. Carpel 1; ovary inferior; styles simple, nearly as long as stamens; stigma simple. Fruits drupe ellipsoid.

Specimen examined: Kachin State, Mansi Township, Gat Rawn villages; 24° 16' N, 97° 47' E, Elevation 450 m; 6 January 2021; Seng Nan, collection no. 4.

9. *Rubus ellipticus* Sm., Cycl. 30: Rubus no. 16. 1819. (Figure 9)

Flowering period : December to February

Perennial shrubs, prickles, hooked. Leaves pinnately trifoliolate compound, alternate; leaflets 3, orbicular. Inflorescences terminal and axillary corymbose panicles, many-flowered. Flowers bisexual, white. Calyx campanulate, 5-lobed. Petals 5, obovate. Stamens numerous, exserted; anthers ditheous. Carpels numerous; ovary inferior; styles numerous, filiform; stigmas simple. Fruits aggregate.

Specimen examined: Kachin State, Mansi Township, In Ba Pa villages; 24° 02' N, 97° 36' E, Elevation 347m; 10 January 2021; Seng Nan, collection no. 5.

10. *Markhamia stipulata* (Wall.) Seem. ex. K. Schum. Nat. Pflanzw. 4.(3b): 242. 1895. (Figure 10)

Spathodea stipulata Wall., Pl. Asiat. Rar. 3: 20. 1832

Flowering period : November to April

Perennial trees. Leaves imparipinnately compound, opposite, exstipulate; leaflets 4- to 8- pairs, elliptic to elliptic ovate. Inflorescences terminal, racemes, 4- to 10- flowered. Flower bisexual, pale yellow; ebracteolate. Calyx closed at anthesis, laterally divided to base, brown-

yellow. Corolla infundibuliform, 5-lobed. Stamens 4, didynamous, inserted; anther dithecal. Carpels 2, united; ovary superior; style curved; stigma 2-lipped. Fruits capsule.

Specimen examined: Kachin State, Mansi Township, Au Ra Bum; 24° 01' N, 97° 23' E, Elevation 420 m; 17 January 2021; Seng Nan, collection no. 6.

11. *Grewia laevigata* Vahl. Symb. Bot. 1:34. 1791. (Figure 11)

Flowering period : September to November

Perennial trees. Leaves simple, alternate; leaf blades oblong-lanceolate. Inflorescences axillary, racemes. Flower bisexual, yellowish green. Sepals 5, linear - lanceolate, yellowish white. Petals 5, oblong, pale green. Stamens numerous, exserted; anther monothealous. Carpels 2, united; ovary superior; styles cylindrical; stigma peltate. Fruits drupe.

Specimen examined: Kachin State, Mansi Township, Jan Mai villages; 24° 27' N, 97° 19' E, Elevation 380 m; 30 October 2020; Seng Nan, collection no. 2.

12. *Helicteres angustifolia* L., Sp. Pl. 2:963-964. 1753. (Figure 12)

Flowering period : June to August

Perennial shrubs, covered with indumentum of stellate hairs. Leaves simple, alternate, distichous; blades oblong-lanceolate. Inflorescences axillary, cymes, 2- to many-flowered. Flowers bisexual, purple. Calyx bell-shaped, 5-lobed, yellowish green. Petals 5, obovate, pale purple. Stamens 10; anthers dithecal. Carpels 5, united; ovary superior; styles 5-branched; stigma globoid. Fruits follicles.

Specimen examined: Kachin State, Mansi Township, Sa Done Bum; 23° 09' N, 96° 38' E, Elevation 316 m; 12 August 2022; Seng Nan, collection no. 15.

13. *Kydia calycina* Roxb., Pl. cor 3: 11, pl. 215, 1819. (Figure 13)

Flowering period : September to November

Perennial trees. Leaves simple, alternate; leaf blades orbicular-cordate. Inflorescences axillary or terminal, many flowered. Flowers bisexual, pink with reddish center. Calyx shallowly cup-shaped, 5-lobed, triangular, nearly as long as epicalyx. Petals 5; pink with reddish center. Stamens numerous, monadelphous, exserted; anther monothealous. Carpels 4; ovary superior; styles cylindric; stigma peltate, branches 3. Fruits capsular.

Specimen examined: Kachin State, Mansi Township, Jan Mai villages; 24° 27' N, 97° 19' E, Elevation 334 m; 30 October 2020; Seng Nan, collection no. 1.

14. *Begonia lipingensis* Irmsch., Mitt. Inst. Allg. Bot. Ham-burg 6: 353. 1927. (Figure 14)

Flowering Period : September to December

Perennial rhizomatous herbs. Leaves simple, alternate; blades broadly ovate. Inflorescences axillary dichotomous cymes, few-flowered. Flowers unisexual, pink. Male flower: tepals 4, pink. Female flowers: tepals 6, pink. Stamens numerous, monadelphous; anthers dithecal. Carpels 2, united; ovary inferior; styles fused at base; stigmas many-branched. Fruits capsular.

Specimen examined: Kachin State, Mansi Township, La Jawng; 24° 08' N, 97° 23' 02.53" E, Elevation 350 m; 16 December 2021; Seng Nan, collection no. 11.

15. *Begonia palmata* D. Don, Prodr. Fl. Nepal. 223. 1825. (Figure 15)

Flowering Period : September to December

Perennial rhizomatous herbs. Leaves simple, alternate; blades asymmetrical ovate. Inflorescences axillary dichotomous cymes, few-flowered. Flowers unisexual, pinkish white. Male flowers: perianth 4, white to pink. Female flowers: perianth 5, pink. Stamens numerous, shortly monadelphous; anthers dithecal. Carpels 3, united; ovary inferior; styles fused at base; stigmas 2- branched. Fruits capsular.

Specimen examined: Kachin State, Mansi Township, La Jawng; 24° 08' N, 97° 23' 02.53" E, Elevation 350 m; 13 September 2021; Seng Nan, collection no 9.

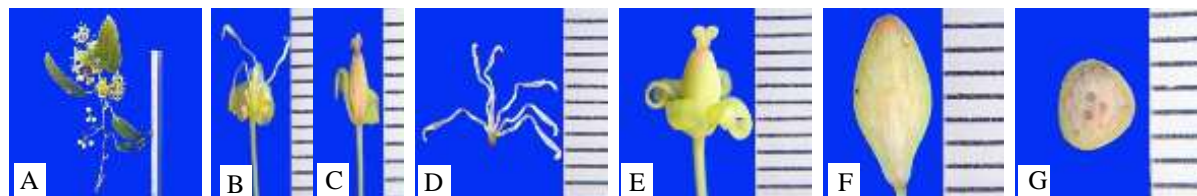


Figure 1. *Smilax perfoliata* Lour.

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|-----------------------|-------------------------|-----------------|
| A. Inflorescence | C. L.S of Female Flower | E. L.S of ovary |
| B. L.S of Male Flower | D. Stamens | F. L.S of ovary |
| G. T.S of ovary | | |

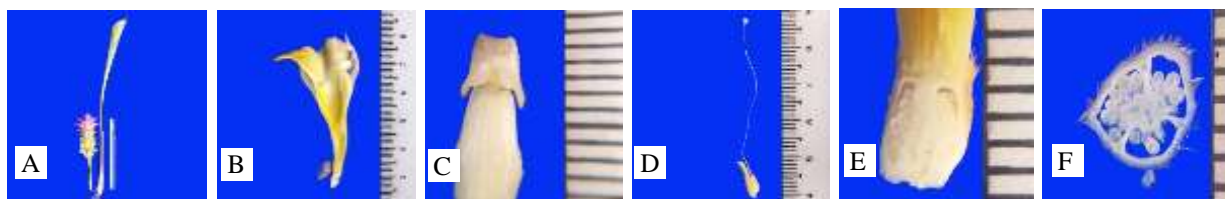


Figure 2. *Acampe papillosa* (Lindl.) Lindl.

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|------------------|-------------|-----------------|
| A. Inflorescence | C. Pollinia | E. L.S of ovary |
| B. L.S of Flower | D. Pistil | F. T.S of ovary |

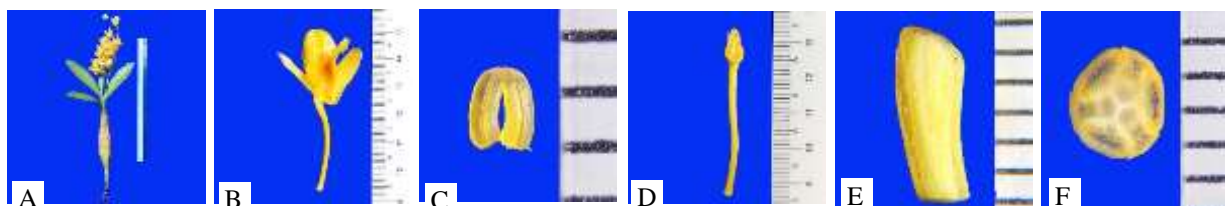


Figure 3. *Dendrobium chrysotoxum* Lindl.

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|------------------|-----------|-----------------|
| A. Inflorescence | C. Stamen | E. L.S of ovary |
| B. L.S of Flower | D. Pistil | F. T.S of ovary |

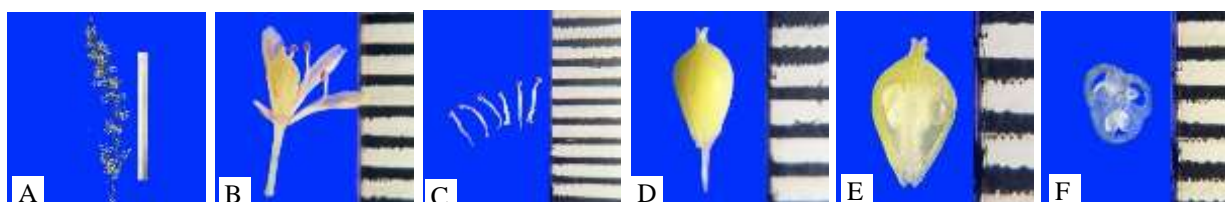


Figure 4. *Asparagus racemosus* Willd.

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|------------------|-----------|-----------------|
| A. Inflorescence | C. Stamen | E. L.S of ovary |
| B. L.S of Flower | D. Pistil | F. T.S of ovary |

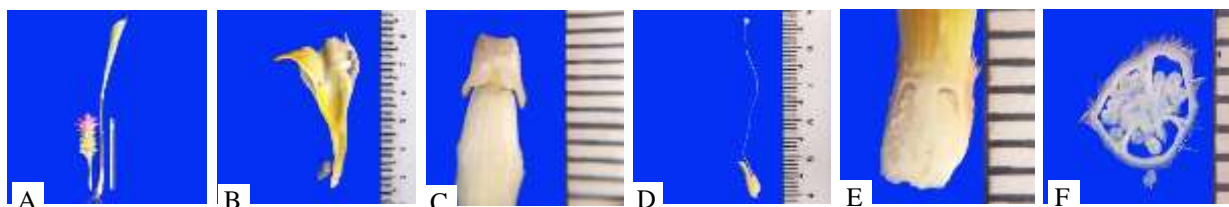


Figure 5. *Curcuma petiolata* Roxb.

A. Inflorescence
B. L.S of Flower

C. Stamen
D. Pistil

E. L.S of ovary
F. T.S of ovary

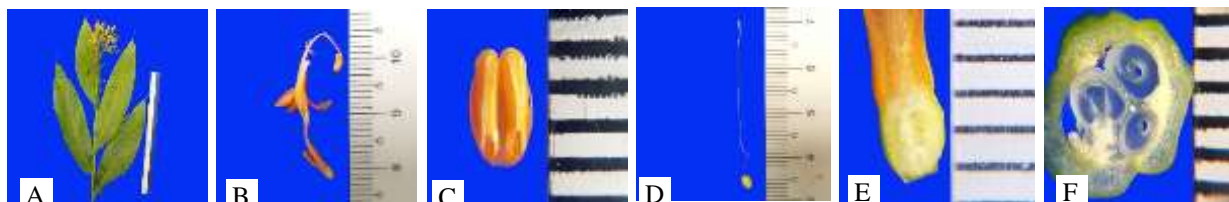


Figure 6. *Globba orixenis* Roxb.

A. Inflorescence
B. L.S of Flower

C. Stamen
D. Pistil

E. L.S of ovary
F. T.S of ovary

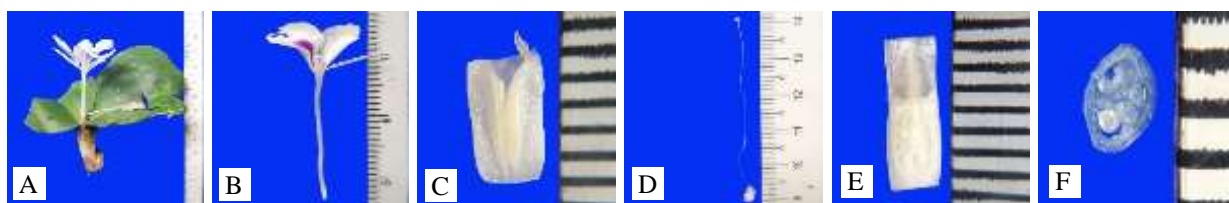


Figure 7. *Kaempferia galanga* L.

A. Inflorescence
B. L.S of Flower

C. Stamen
D. Pistil

E. L.S of ovary
F. T.S of ovary

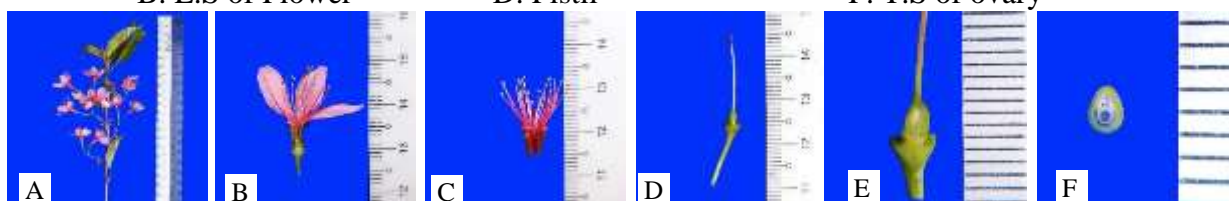


Figure 8. *Prunus cerasoides* D. Don.

A. Inflorescence
B. L.S of Flower

C. Stamen
D. Pistil

E. L.S of ovary
F. T.S of ovary

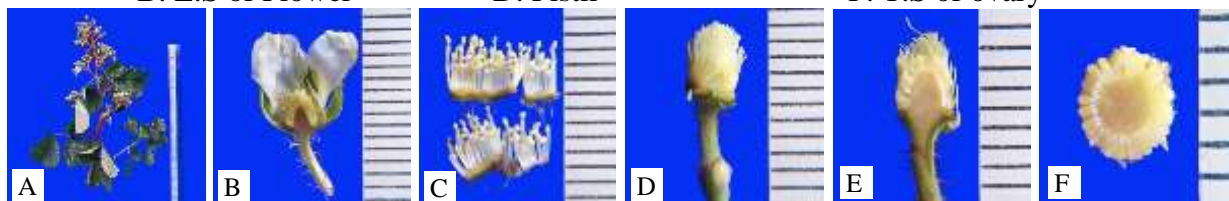


Figure 9. *Rubus ellipticus* Smith.

A. Inflorescence
B. L.S of Flower

C. Stamen
D. Pistil

E. L.S of ovary
F. T.S of ovary

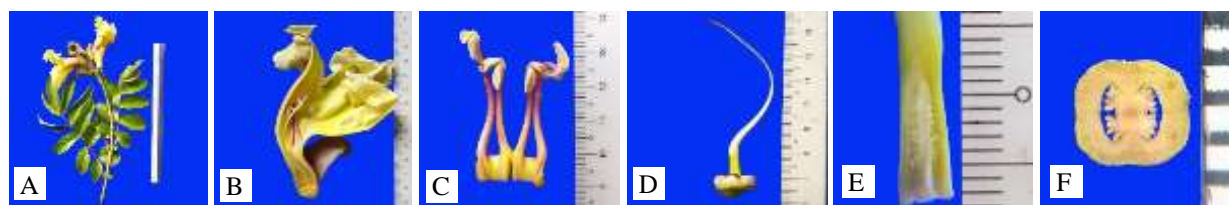


Figure 10. *Markhamia stipulata* (Wall.) Seem.

A. Inflorescence
B. L.S of Flower

C. Stamen
D. Pistil

E. L.S of ovary
F. T.S of ovary

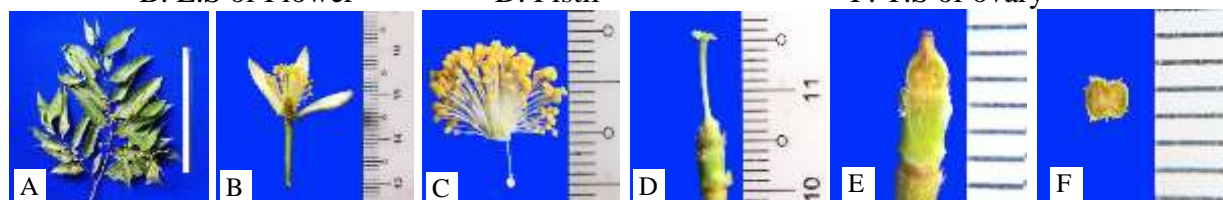


Figure 11. *Grewia laevigata* Vahl.

A. Inflorescence
B. L.S of Flower

C. Stamen
D. Pistil

E. L.S of ovary
F. T.S of ovary

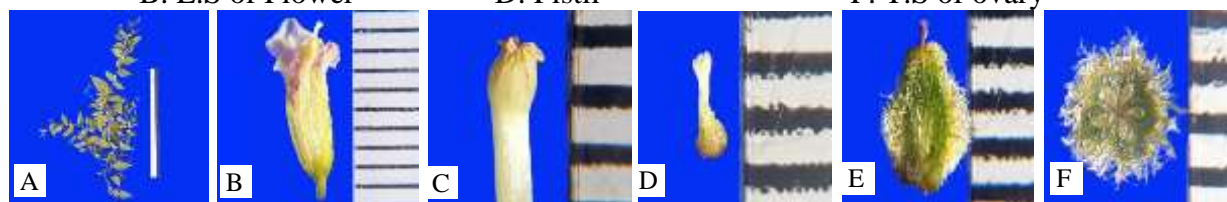


Figure 12. *Helicteres angustifolia* L.

A. Inflorescence
B. L.S of Flower

C. Stamen
D. Pistil

E. L.S of ovary
F. T.S of ovary

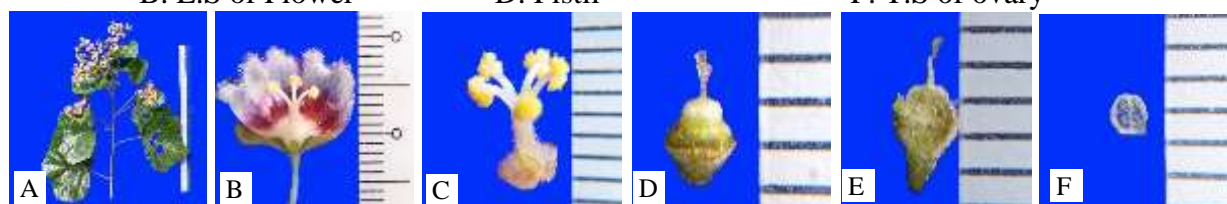


Figure 13. *Kydia calycina* Roxb.

A. Inflorescence
B. L.S of Flower

C. Stamen
D. Pistil

E. L.S of ovary
F. T.S of ovary

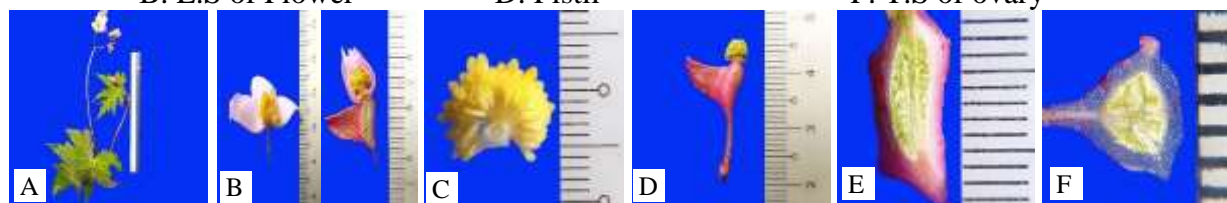


Figure 14. *Begonia lipingensis* Irmscher.

A. Inflorescence
B. L.S of Flower

C. Stamen
D. Pistil

E. L.S of ovary
F. T.S of ovary

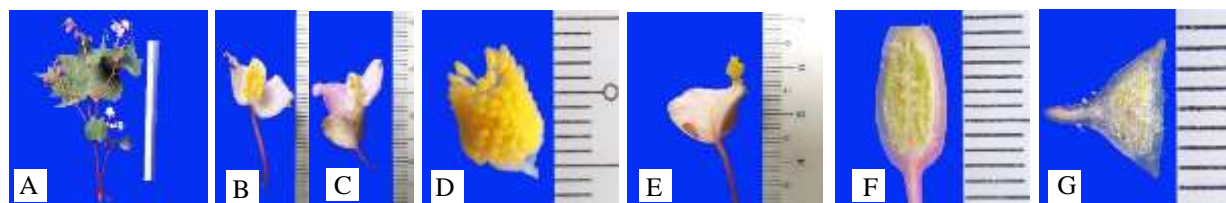


Figure 15. *Begonia palmata* D. Don

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|-----------------------|-------------------------|-----------------|
| A. Inflorescence | C. L.S of Female Flower | E. Pistil |
| B. L.S of Male Flower | D. Stamens | F. L.S of ovary |
| G. T.S of ovary | | |

An Artificial Key to the Studied Species

1. Plants monocotyledonous ----- 2
1. Plants dicotyledonous ----- 8
 2. Epiphytes or vines ----- 3
 2. Shrubs or herbs ----- 5
3. Flower unisexual, pollinia abscent; ovary superior ----- 1. *Smilax perfoliata*
3. Flower bisexual, pollinia present; ovary inferior ----- 4
 4. Plants monopodial; pseudobulbs absent, pollinia 2 ----- 2. *Acampe papillosa*
 4. Plants sympodial; pseudobulbs present, pollinia 4 ----- 3. *Dendrobium chrysotoxum*
5. Leaves opposite, stipulate ----- 7. *Kaempferia galanga*
5. Leaves alternate or spirally arranged ----- 6
 6. Stems with spines; Flower actinomorphic; ovaries superior ----- 4. *Asparagus racemosus*
 6. Stems without spines; Flower zygomorphic; ovaries inferior ----- 7
7. Labellum pale yellow with dark yellow blotch at the base; placentation axile ----- 5. *Curcuma petiolate*
7. Labellum orange with a central brownish red spot; placentation parietal ----- 6. *Globba orixensis*
8. Plants trees ----- 9
8. Plants herbs or shrubs ----- 12
9. Leaves arranged opposite, exstipulate; flower zygomorphic ----- 10. *Markhamis stipulata*
9. Leaves arranged alternate, stipulate; flower actinomorphic ----- 10
 10. Anther ditheous; ovary inferior; basal placentation ----- 8. *Prunus cerasoides*
 10. Anther monotheous; ovary superior; axile placentation ----- 11

11. Epicalyx present, flower pink with reddish center, ovary bicarpellary, anther dorsifixed -----
----- 13. *Kydia calycina*
11. Epicalyx absent, flower yellowish white, ovary tetracarpellary, anther basifixed -----
----- 11. *Grewia laevigata*
12. Prickles present; leaves compound; flower white ----- 9. *Rubus ellipticus*
12. Prickles abscent; leaves simple; flower purple or pink ----- 13
13. Flowers bisexual, zygomorphic; ovaries superior ----- 12. *Helicteres angustifolia*
13. Flowers unisexual, actinomorphic; ovaries inferior ----- 14
14. Ovary bicarpellary; stigma more than 4 branches -----
----- 14. *Begonia lipingensis*
14. Ovary tricarpeal; stigma less than 3 branches -----
----- 15. *Begonia palmata*

Discussion and Conclusion

The some angiospermae of Mansi Township area were taxonomically studied. As the result 15 species belonging to 14 generas of 8 families have been found in Mansi area.

In the present research, 2 species belonging to 2 genera of the family Orchidaceae are recorded. Orchidaceae differs from other families by its terrestrial or epiphytic, alternate and distichous leaves, lateral or terminal bracteate raceme or spike with zygomorphic flowers and capsule. These findings are in agreement with the characters stated by Heywood (2007), Simpson (2006) and Wu *et al.* (2008). Epiphytic plants were found on the trees and on rocks at the steep sided of valleys such as *Acampe papillosa* (Lindl.) Lindl. and *Dendrobium chrysotoxum* Lindl.

In the present study, totally 3 species belonging to 3 genera from the family Zingiberaceae are recorded. All the studied species are herbaceous with rhizomes. Most of these species are commonly found in moist and shady of the hill sides and used in medicines. *Curcuma petiolata* Roxb. is commonly and abundantly distributed at the elevation of about 1100 meters above sea level. These findings are in agreement with the statements presented by Dassanayake (1980-2001), Heywood (2007), Qi-ming and De-lin (2009) and Singh (2010).

The family Rosaceae is composed of about 100 genera and 3000 species nearly cosmopolitan in distribution but most common in temperate and subtropical parts of the Northern Hemisphere (Cronquist, 1981). 2 species belonging 2 genera were found in the study area. These findings are in agreement with the characters stated by Wu *et al.* (2008) and Qi-ming and De-lin (2009). The species *Prunus cerasoides* Buch-Han. ex D. Don., and *Rubus ellipticus* (Wall.) Seem. ex K. Shcum. have been abundantly found in the everygreen forest.

The present study, family Malvaceae is composed of 50 genera and over 1000 species in cosmopolitan (Heywood 1978). 3 species belonging to 3 genera are recorded. Among them 2 speceis are woody trees and the rest are shrubs. *Grewia laevigata* Vahl. and *Kydia calycina* Roxb. are grown on the slope of the study area.

The morphological characteristics of all species were observed. Among the studied species, 4 species were trees, 5 species were herbs and 3 species were shrubs and other species were climber and epiphytic. In the studied species, the leaf types of 2 species were compound leaves and other species were simple leaves. The opposite leaves can be observed in the member of the Family of Bignoniaceae and the remaining species possess alternate leaves.

In the present studies, 3 species are unisexual flowers. *Smilax perfoliata* Lour., *Begonia lipingensis* Irmsch., *Begonia palmata* D. Don. possess unisexual flowers and the remaining species

are bisexual flowers. These findings are in agreement with those stated by Hooker (1875-1897), Dassanayake (1980-2001), Wu *et al* (2008) and Heywood (2007).

In Mansi Township, the valuable medicinal species are *Curcuma petiolata* Roxb., *Kaempferia galanga* L. Some orchid species are less commonly found. These species are being gradually lost due to logging, cutting and the impact of local dwellers. Therefore, the valuable medicinal species, economically timber species and orchid species should be conserved as the long-term programme of natural vegetation of Mansi Township, Banmaw Distirct in Kachin State.

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References

- Backer, C. A. and R. C. B. V. D. Brick. 1964-1968. flora of Java Vol. 1 to 3. Rijksherbarium, Leyden, N.V.P. Noordhoof.
- Byng, J. W., M. W. Chase, M. J. M. Christenhusz & M. F. Fay. 2016. An update of the Angiosperm Phylogeny Group classification for the orders and families of flowering plants: APG IV. Botanical Journal of the Linnean Society, 181: 1-20.
- Cronquist A, 1981. A Integrated System of Classification of Flowering Plants, Columbia University Press, New York
- Dassanayake, M. D. 1980-2001. A revised handbook to the flora of Ceylon, Vol. 1 to 14. University of Peradeniya, Department of Agriculture, Peradeniya, Sri Lanka.
- Heywood, V. H. 1978. Flowering plants of the families of the world. Jolly & Barber Ltd., Oxford University Press, London.
- Heywood, V. H. 2007. Flowering plants of the families of the world. Firefly Books; Ontario, Canada.
- Hooker, J. D. 1875-1897. The flora of British India, Vol. 1 to 7 L. Reeve & Co, 5 Henrietta Street, Covent Garden, London.
- Hundley, H. G. and Chit Ko Ko 1987. List of trees, shrubs, herbs and principal climbers, etc. fourth revised edition Shwe Daw Oo Press, Mayangon, Rangoon, Burma.
- Hutchinson, J. 1967. Key to the families of flowering plants of the World. Claredon Press Oxford, London.
- Kress, W, A. John, R. DeFilipps, E. Farr and Daw Yin Yin Kyi. 2003. A Checklist of the trees, shrubs, herbs and climbers of Myanmar. Department of Systematic Biology-Botany. National Museum of Natural History, Washington DC. USA.
- Singh, G. 2010. Plant systematics. An integrated approach, Third edition. University of Delhi, India.
- Simpson, M.G. 2006. Plant Systematic, Elsevier Academic Press, Printed in Canada.
- Wu. C. Y., P. H. Raven and D. Y. Hong. 1994-2013. Flora of China. Science Press (Beijing) & Missouri Botanical Garden Press (St. Louis).
- Qi-ming, H.U. and W.U. De-lin. 2009. Flora of Hong Kong. Vol 3, Hong Kong Herbarium South China Botanical Garden, Chinese Academy of Sciences.