

Taxonomic Characterization of Twelve Species of Angiosperms in Kunchaung Reserved Forest, Northern Shan State

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Abstract

The present paper deals with taxonomic study of Angiospermae in Kunchaung reserved forest which is located in Mabein Township, Northern Shan State, Upper Myanmar. Some species of Angiosperms were collected from June to October 2018. Kunchaung reserved forest is mostly covering with various flowering plants. Among them, 12 species belonging to 12 genera of 10 families were presented in accordance with taxonomic characters. These species were classified according to the habit of the plants, shape of leaves, types of inflorescences, parts of the flowers, types of fruits and shape of seeds. And then an artificial key to the species was constructed. Moreover preferential photographic figures concerning with these species were also presented. The research can contribute the valuable information of some species of flowering plants from Kunchaung reserved forest for future scientific research.

Key words : Angiosperms, Taxonomic characters, Kunchaung Research Forest, Identified, Classified

Introduction

Kunchaung reserved forest is located in Mabein Township of Northern Shan State. It is situated between 23°58' N. latitude and 96°32' E. longitude. It lies 159.72 m above the sea level. The total area of reserved forest is 175.55 sq km. Topographically, the study area is generally situated in lowland Shwe Le river valley region. But a little higher mountain ranges are found on the eastern, southern and northern parts of the townships.

The underlying rock types of the present area are meta-sedimentary, sedimentary rocks. The major soil types in this area are yellow brown soil and aluvial soil (San San Myint 1998).

The aims of this research are to identify and classify the plants of Angiosperms from Kunchaung reserved forest, to record the taxonomical characters of various kinds of plants, to contribute the floristic information of natural plant resources for future researchers.

Materials and Methods

The flowering plants were collected from Kunchaung reserved forest during June to October 2018. All the collected specimens were recorded by colour photograph while flowering and fruiting period. Field notes were made of precise location by using GPS. Collected specimens of flowering plants have to contain flowers, fruits and seeds because keys are constructed mainly on the basis of these characters. These specimens were kept immediately into plastic bags to identify and classify systematically. Firstly, the families of the specimens were determined using the key to the family of flowering plants of the world Hutchinson (1967) and recent accepted names of the families were referred to Simpson (2006).

All collected specimens are identified by the literature. Flora of British India (Hooker 1875), Flora of Java (Backer 1968), Flora of Ceylon (Dassanayake 1983). All the resulting specimens were systematically arranged into families according to the classification system of APG IV system (Byng 2016). Genera and species were

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also arranged by alphabetically. The artificial key to all the studied species had also been constructed.

Results

1. *Dillenia parviflora* Martelli. in Becc. Malaysia, 3. 158. 1886. (Figure 1)

Myanmar name : Zin byun

Family name : Dilleniaceae

Perennial, deciduous trees; stems and branches flowering with or before new leaves, terete, glabrous. Leaves simple, alternate; stipulate; petioles sheathing at the base; blades elliptic-oblong, acute at the base, serrate along the margin, rounded at the apex. Inflorescences fasciculate raceme, many-flowered. Flowers bisexual, actinomorphic, pentamerous hypogynous, yellow; pedicellate; bract oblong; ebracteolate. Sepals 5, free, ovate. Petals 5, free, oblong. Stamens numerous, free; filaments linear; anthers ditheous, basifixed, dehiscing by apical pore. Ovary superior, globose, unilocular with many ovules in the locule on the parietal placentae; style 5-8; stigma simple. Fruits baccate, globular, enclosing sepals. Seeds globoid.

2. *Xylia xylocarpa* var. *kerrii* (Crab & Hutch.) I. Nielsen in Adansonia 19(3): 344. 1980. (Figure 2)

Xylia kerrii Crab & Hutch., Kew. Bull, 357. 1909.

Myanmar name : Pyinkado

Family name : Mimosaceae

Perennial, deciduous arborescent trees; stems and branches terete, glabrous. Leaves bipinnate compound, paripinnate, alternate; stipule linear, caducous; petiolate; blade elliptic-oblong, rounded to cuneate at the base, entire along the margin, acuminate at the apex. Inflorescences axillary, pedunculate globose head, many-flowered. Flowers bisexual, actinomorphic, pentamerous, hypogynous, pale yellow, fragrant; sessile; ebracteate; ebracteolate. Calyx tubular, 5-lobed, lobes triangular. Corolla funnel-shaped, 5-lobed, lobes ovate oblong. Stamens 10, free; filaments filiform; anthers ditheous, basifixed, longitudinal dehiscent. Ovary superior, ovoid, unilocular with many ovules in the locule on the marginal placentae; style terminal; stigma simple. Pod oblong to oblanceolate, flat, dehiscent. Seeds oblong, compressed.

3. *Osbeckia rostrata* D. Don, Prod. Fl. Nap. 221. 1825. (Figure 3)

Myanmar name : Sae oboke

Family name : Melastomaceae

Perennial, erect shrubs; stems solid, quadrangular, densely strigose. Leaves simple, opposite; exstipulate; petiolate; blades broadly lanceolate, obtuse at the base, entire along the margin, acuminate at the apex. Inflorescence terminal, corymbs. Flowers bisexual actinomorphic, tetramerous, epigynous, pale purple, showy; sessile; bracts ovate; ebracteolate. Calyx campanulate, deeply 9-lobed. Petals 4, free, obovate-orbicular. Stamens 8, 1 series epipetalous; filaments dilated; anthers ditheous, basifixed, dehiscing by apical pores. Ovary inferior, tetralocular, numerous ovules in each locule on the axile placentae; bristles on the apex of the ovary; style curved, terminal; stigma capitate. Fruits baccate, ovoid, with scattered stellate bristles. Seeds ovoid, minute.

4. *Gardenia coronaria* Buch. Ham. in Syme's Embassy to Ava, 3. ed. 2. 307. t. 22. 1800. (Figure 4)

Myanmar name : Yin gat gyi

Family name : Rubiaceae

Perennial trees, stems terete, solid with brownish-grey or brownish bark, glabrous; branches terete, stout. Leaves simple, opposite and decussate; stipules intra petiolar, ovate; petiolate; blades ovate oblong or broadly oblong, acute at the base, slightly wavy along the margin, acuminate at the apex. Flowers bisexual, actinomorphic, pentamerous, hypogynous, yellow, showy, fragrant; pedicellate; ebracteate; ebracteolate. Calyx cup-shaped, 5-lobed, lobes lanceolate. Corolla funnel-shaped, 5-lobed, lobes ovate. Stamens 5, free, epipetalous; filament filiform; anthers ditheous, basifixed, longitudinal dehiscing. Ovary inferior, oblongoid, unilocular with numerous 2-serrate ovule, on the parietal placentae; style terminal; stigma clavate. Fruits drupaceous, ellipsoid, 5-ribbed. Seeds smooth.

5. *Gardenia erythroclada* Kurz, Journ. As. Soc. Beng. 12. 1872. (Figure 5)

Myanmar name : Hmanni

Family name : Rubiaceae

Perennial, trees; stems and branches terete, stout with curious brick red color. Leaves simple, opposite and decussate; stipule ovate; petiolate; blades broadly ovate, cuneate at the base, entire along the margin, obtuse at the apex. Inflorescences axillary, cymose. Flowers bisexual, actinomorphic, pentamerous, epigynous, green; pedicellate; ebracteate; ebracteolate. Calyx shallowly campanulate, 5-lobed, lobes rounded. Petals 5, free, ovoid. Stamens 5, free, adnate to the corolla; filament short; anthers ditheous, basifixed, longitudinal dehiscing. Ovary inferior, oblongoid, bilocular with one ovule in each locule on the axile placentae; style terminal; stigma clavate. Fruits drupaceous, ellipsoid. Seeds small.

6. *Mussaenda incana* Wall. in Roxb., Hort. Beng. 1814. (Figure 6)

Myanmar name : Pwint tu ywet tu

Family name : Rubiaceae

Perennial, erect, climbing shrubs; stems and branches terete, woody, stout, pubescent. Leaves simple, opposite and decussate; stipules triangular; petiolate blades broadly ovate, acute at the base, entire along the margin and ciliate, acute at the apex. Inflorescences terminal, dichasial cymes. Flowers bisexual, actinomorphic, pentamerous, epigynous, orange; pedicel very short; bracts lanceolate; ebracteolate. Calyx salverform, 5 lobed; lobes lanceolate. Corolla salverform, 5-lobed; lobes ovate. Stamens 5, free, epipetalous; filaments short; anthers ditheous, basifixed, longitudinal dehiscing; ovary inferior, ovoid, bilocular with many ovules in each locules, on the axile placentae; style filiform; stigma bifid. Fruits baccate, obovoid. Seeds minute.

7. *Holarrhena pubescens* (Buch-Ham). Wall. ex. G.Don, Gen. Sysb. 4:78. 1837. (Figure 7)

Nerium antidysentericum L. Sp. Pl. 209. 1753.

Myanmar name : Lettok gyi

Family name : Apocynaceae

Perennial, small tree, milk juicy; stems and branches terete; barks rough and corky. Leaves simple, opposite and decussate; exstipulate; petiolate; blades oblong-ovate, rounded at the base, slightly wavy along the margin, acuminate at the apex. Inflorescence axillary or terminal corymbose cymes. Flowers bisexual, actinomorphic, pentamerous, hypogynous, creamy-white, fragrant. Calyx campanulate, 5-lobed, lobes ovate. Corolla infundibuliform, 5-lobed, lobes ovate. Stamens 5, free, epipetalous; filaments filiform; anthers ditheous, basifixed, longitudinal dehiscing. Ovary superior, oblong-ovoid, bilocular with many ovules in each locule, on the parietal placentae; style filiform; stigma fusiform. Fruits capsular, cylindrical, with small and long white spots. Seeds linear-oblong.

8. *Blinkworthia lycioides* Choisy. in Men. Soc. Phys. Genev. 6. 430. 1833. (Figure 8)

Myanmar name : Pan khaung long

Family name : Convolvulaceae

Perennial, ascending twiner; stems terete, stout, densely silky strigose. Leaf simple, alternate; exstipulate; petiolate; blades oblong, lanceolate or elliptic oblong, rounded at the base, entire along the margin, obtuse to acute and mucronulate at the apex. Flowers axillary and solitary cymes, bisexual, actinomorphic, pentamerous, hypogynous, greenish white; pedicellate; ebracteate; bracteoles oblong-ovate. Sepals 5, subequal, ovate-oblong. Corolla tubular campanulate, 5-lobed; lobes reflexed. Stamens 5, free inserted, adnate to the corolla tube; filaments filiform; anthers ditheous, basifixed, longitudinal dehiscing. Ovary superior, globose, bilocular with two ovules in each locule on the axile placentae; style terminal; stigma 2, globose. Fruits baccate, globose, brown when ripe. Seeds flattened, black.

9. *Martynia annua* L. Sp. Pl. 1. p. 618. 1753. (Figure 9)

Myanmar name : Say galon, Galon letthae

Family name : Pedaliaceae

Annual, erect fleshy herbs; stems and branches fistular, terete, with viscid patent-glandular hairy. Leaves simple, opposite and decussate; exstipulate; petiolate; blade ovate-orbicular, cordate at the base, exsculptate-dentate along the margin, acute at the apex. Inflorescences axillary raceme. Flowers bisexual, zygomorphic, pentamerous, hypogynous, pale purplish; pedicellate; bracts oblanceolate; bracteoles elliptic. Sepals 5, free, elliptic. Corolla funnel form, 5-lobed, viscid pubescent within and without, much widened above, with yellow and purple dots within the anterior side. Stamens 2 fertile, 3 sterile, free; filaments filiform; anthers ditheous, dorsifixed, longitudinal dehiscing. Disk annular, shortly hairy. Ovary superior, ovoid, bilocular with one ovule in each locule on the parietal placentae; style terminal; stigma bifid. Fruits drupaceous, ovoid, with a short upturned beak. Seeds oblong.

10. *Heterophragma adenophyllum* Seem. ex. Benth. & Hook.f., Gen. 2. 1047. (Figure 10)

Myanmar name : Phet than

Family name : Bignoniaceae

Perennial, large tree; stems and branches terete, woody, stellate pubescent; barks brownish gray. Leaves unipinnately compound, imparipinnate; alternate; exstipulate; petiolate; blades elliptic-ovate, rounded at the base, entire along the margin, acuminate at the apex. Inflorescences paniculate dichasial cyme. Flowers

bisexual, zygomorphic, pentamerous, hypogynous, yellowish-white; pedicellate; bracts lanceolate; ebracteolate. Calyx campanulate 5-lobed; lobes ovate. Corolla funnel-shaped, unequal, 5-lobed; lobes rounded. Stamens 4, didynamous filaments filiform; anthers ditheous, basifixed, longitudinal dehiscing. Staminode linear. Ovary superior, oblongoid, bilocular with many ovules in the locule on the axile placentae; style filiform; stigma bifid. Fruits capsular, linear, pendulous, twisted. Seeds compressed, membranous, wing.

11. *Barleria cristata* L., Sp. Pl. 636. 1753. (Figure 11)

Myanmar name : Pyo ma naing

Family name : Acanthaceae

Perennial, herbs; stems and branches quadrangular, grooved an opposite sites. Leaves simple, opposite and decussate; exstipulate; petiolate; blades ovate or elliptic oblong, cuneate or attenuate at the base, entire along the margin, acute at the apex. Inflorescences axillary or terminal spikes, few-flowered in each axil. Flowers bisexual, zygomorphic, pentamerous, hypogynous, pale purple; sessile; bracts linear; bractoles linear lanceolate. Calyx deeply 4 partite, opposite in pairs, unequal, lobes ovate lanceolate. Corolla infundibuliform, 5-lobed, lobes ovate, glandular hairy. Stamens 2, free, filaments filiform; anthers ditheous dorsifixed, longitudinal dehiscing. Ovary superior, ellipsoid, bilocular with 2 ovules in each locule on the axile placentae; style terminal, filiform; stigma capitate. Fruits capsular, ellipsoid, beaked. Seeds orbicular, compressed.

12. *Tectona grandis* L.f. Suppl. 151. 1781. (Figure 12)

Myanmar name : Kyun

Family name : Lamiaceae

Perennial, large deciduous trees; branches quadrangular, stellate tomentose. Leaves simple, opposite and decussate; exstipulate; petiolate; blades ovate, cuneate at the base, entire along the margin, acuminate at the apex. Inflorescences terminal, large panicle dichasial cyme. Flowers bisexual, actinomorphic, pentamerous, hypogynous, white; pedicellate; bracts linear; bracteoles oblong linear. Calyx campanulate, 5-lobed, lobed ovate oblong, persistent. Corolla funnel-shaped, 5-lobed, lobes ovate. Stamens 5, free adnate near the corolla base; filaments filiform; anthers ditheous, basifixed, longitudinal dehiscing. Ovary superior, ovate, pentalocular with one ovule in each locule on the axile placentae; style linear, short; stigma shortly bifid. Fruits drupaceous, globoid, completely enveloped by the enlarge fruiting calyx. Seeds oblong.

An Artificial Key to the Species

1. Leaf compound ----- 2
1. Leaf simple ----- 3
 2. Inflorescences paniculate dichasial cyme ----- 10. *Heterophragma adenophyllum*
 2. Inflorescences pedunculate globose head ----- 2. *Xylia xylocarpa*
3. Placentation parietal ----- 4
3. Placentation axile ----- 7
 4. Fruits drupaceous ----- 5
 4. Fruits capsular or baccate ----- 6
5. Plants annual erect fleshy herbs; with viscid patent glandular ----- 9. *Martynia annua*
5. Plants perennial trees; without viscid patent glandular ----- 4. *Gardenia coronaria*
 6. Plants with milk juicy; leaves opposite and decussate ----- 7. *Holarrhena pubescens*
 6. Plants without milk juicy; leaves alternate ----- 1. *Dillenia parviflora*
7. Flowers hypogynous ----- 8
7. Flowers epigynous ----- 10
 8. Flowers zygomorphic; stamens 2 ----- 11. *Barleria cristata*
 8. Flowers actinomorphic; stamens 5 ----- 9
9. Stems and branches terete; leaf base rounded ----- 8. *Blikworthia lycioides*
9. Stems and branches quadrangular; leaf base cuneate ----- 12. *Tectona grandis*
 10. Blades broadly lanceolate; tetramerous flowers ----- 3. *Osbeckia rostrata*
 10. Blades broadly ovate; pentamerous flowers ----- 11
11. Leaf apex obtuse; flowers green ----- 5. *Gardenia erythroclada*
11. Leaf apex acute; flowers orange ----- 6. *Mussaenda incana*



Figure 1. *Dillenia parviflora*
Martelli.



Figure 2. *Xylia xylocarpa*
var. *kerrii* (Crab &
Hutch.) I. Nielsen



Figure 3. *Osbeckia rostrata*
D. Don



Figure 4. *Gardenia coronaria*
Buch.-Ham.



Figure 5. *Gardenia erythroclada*
Kurz



Figure 6. *Mussaenda incana*
Wall.



Figure 7. *Holarrhena pubescens*
(Buch.-Ham) Wall. ex
G. Don.



Figure 8. *Blinkworthia lycioides*
Choisy.



Figure 9. *Martynia annua* L.



Figure 10. *Heterophragma*
adenophyllum Seem. ex
Benth. & Hook.f.



Figure 11. *Barleria cristata*
L.



Figure 12. *Tectona grandis*
L.

Discussion and Conclusion

The present paper deals with the Angiosperm in Kunchaung reserved forest. In this study 12 species belonging to 12 genera of 10 families from angiosperm have been identified and described. The distribution of plant is not only woody but also dominated by herbs and shrubs. As a result, 7 tree species are found as deciduous plants and only one species as twiner in two shrubs species and other rest species are herbs. As the result, *Xylia xylocarpa* and *Heterophragma adenophyllum* are compound leaves and other rest species are simple leaves. *Dillenia parviflora* and *Heterophragma adenophyllum* are alternate and other rest species are opposite and decussate leaves. *Barleria cristata*, *Heterophragma adenophyllum* and *Martynia annua* are zygomorphic flowers and other rests species are actinomorphic flowers. *Osbeckia rostrata* is tetramerous and other rests are pentamerous flowers. *Mussaenda incana*, *Gardenia erythroclada*, *Gardenia coronaria* and *Osbeckia rostrata* are inferior ovary and others are superior ovary. *Xylia xylocarpa* is pod, *Dillenia parviflora*, *Mussaenda incana*, *Blinkworthia lycioides* and *Osbeckia rostrata* are baccate, *Holarrhena pubescens*, *Barleria cristata* and *Heterophragma adenophyllum* are capsular and *Martynia annua*, *Tectona grandis*, *Gardenia coronaria* and *Gardenia erythroclada* are drupaceous.

In Acanthaceae *Barleria cristata* can be recognized by its zygomorphic flowers. The distinct characters of the species is glandular, bracts and bracteolate; corolla infundibuliform unequal and stamens. In Lamiaceae, *Tectona grandis* can be easily recognized from other species present of quadrangular branches, inflorescences with large panicle dichasial cyme and drupaceous fruits with completely enveloped by the enlarge fruiting calyx.

Two species of family Rubiaceae are recorded in the study area *Gardenia coronaria*, *Gardenia erythroclada* and *Mussaenda incana* can be easily recognized from other species by its simple leaves, opposite and decussate and epigynous flowers.

In Apocynaceae, *Holarrhena pubescence* is differ from other species by its presence milk juicy. In Melastomaceae, *Osbeckia rostrata* is easily distinguished from other species by its stems, quadrangular, tetramerous flower. In Convolvulaceae, *Blinkworthia lycioides* is differ from other species by its ascending twiner, stems and branches terete, solitary cymes.

In Dilleniaceae, *Dillenia parviflora* can be distinguished from other by its deciduous trees, stems and branches flowering with or before new leaves, fruits baccate and enclosing sepals. In Fabaceae, *Xylia xylocarpa* can be easily distinguished from other species by its inflorescences pedunculate globose head, pod oblong, flat, dehiscent.

Kunchaung reserved forest was covered with a luxuriant growth of most mixed deciduous forests. Various tree species found and they were not only considered for their economic status but also stand as essential ecological value for rural people of the study area.

During the field trip in this area, it has been noticed that some of wood species had become rare due to deforestation and human activities. The people who stay near in this forest are cutting the plants for fuel wood and thus cause the destroying of natural plant resources and some plant can be disappeared from this studied area. Fire wood cutting should be restricted and substitute with other alterative way. So, the area

is needed to conserve the plants from extraction for its greening and longevity. All of the dwellers new in the reserved forests are needed to educate for mountain and its vicinity.

Acknowledgements

I am grateful to Dr Maung Maung, Principal and Dr Maw Maw Khin, Professor and Head of Department of Botany, Myingyan Degree College for their kind suggestion and encouragement. We are also very thankful to Professor Dr Khin Thet Kyaw, Head of the Department of Botany, Yadanabon University, for her encouragement for providing the departmental facilities during our research work.

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