

Taxonomic Study on Some Species of Trees found in Yadanabon University Campus

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Abstract

The studied area is situated in Amarapura Township of Mandalay Region. The specimens were collected, identified and classified during November 2019 to January 2020. The research work consists of 10 species belonging to 10 genera of 6 families from Yadanabon University Campus. Detailed morphological characters were presented with relevant photographs. According to the resulting data, an artificial key to the species was constructed.

Keywords: Some species, taxonomic characters

Introduction

The present study deals with the taxonomic study on naturalized species of trees found in Yadanabon University Campus. The study area is located in the Amarapura Township, about 9.6 km far from Mandalay, in the east of O-bo village, in the West of Taung Tha Man village, in the South of cultivated field and to the North of Htantaw village. It is situated between North latitude $21^{\circ} 48'$ and $21^{\circ} 54'$ and East longitudes $96^{\circ} 6'$ and $96^{\circ} 12'$. The location map of the study area is as shown figure.1. The study area is a plain region situated about 6.2 m above the sea level. And then, the study area is situated near the Taung Tha Man Lake. The water body of the Taung Than Man Lake is drained by two major rivers of Dokhtawaddy and Ayeyarwaddy river. Thus, in study area, the different tree species are found due to sufficient water resources.

The aims and objectives of the present study are to know the process of identification, to understand detailed taxonomic characters of studied species, and to give the taxonomic information for future scientist researchers.

Materials and Methods

The flowering plants on Yadanabon University Campus area were collected from November 2019 to January 2020. Field notes were made by habitat types and detailed taxonomic plant description was noted. The families of the collected specimens were determined by using key to the families of Flowering Plants of the World (Hutchinson 1967). Identification of genera and species were carried out by referring to the available literature such as Flora of British India (Hooker 1875–1897), Flora of Java (Backer 1964–1968) and Flora of Ceylon (Dassanayake 1980–1999). Myanmar names were referred to Hundley and Chit Ko Ko (1987) and Kress *et al.* (2003). The collected specimens were identified and described their taxonomic descriptions with the

photographs. These are systematically arranged into families according to APG IV System (Byng *et al.* 2016). The generic and specific arrangement under families was described alphabetically. Moreover, an artificial key to the studied species were also constructed by using their different characters.

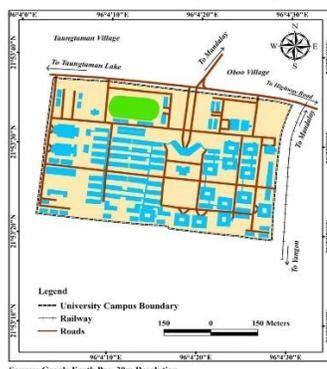


Figure 1. Location Map of Yadanabon University

Results

1. *Bauhinia purpurea* L., Sp. Pl. 1. 375. 1753. (Figure 2 A)

- Family name : Fabaceae
 Myanmar name : Swe-daw
 English names : Butterfly tree, Maha-hlega-ni, Orchid tree
 Flowering period : November to March

Perennial, shrubs to small trees. Leaves bifoliolate compound, alternate, stipulate, petiolate; leaflets suborbicular, green, glabrous above, sparsely pubescent beneath, cordate at the base, entire along the margin, rounded or acute at the apex. Inflorescences lateral and terminal racemes, few-flowered; peduncles long. Flowers pink, about 7.0 cm in diameter at anthesis, zygomorphic, bracteates, pedicellate, bracteolate. Calyx splitting spathaceous, pale green, striated, glabrous within, puberulous without. Petals 5, caesalpinaceous, obovate or oblanceolate, pink, glabrous, prominent veined. Stamens 10, 3 fertile and 7 sterile, exserted; filaments filiform, pink or red, glabrous; anthers versatile, oblong, ditheous, longitudinal dehiscence. Ovary superior, oblong, green, grey-tomentose, flattened, unilocular, with many-ovules in each locule on the marginal placentae; style slender, curved, greenish-white, grey-tomentose; stigma oblique. Pods linear, dehiscent, brown, glabrous, woody, flattened. Seeds orbicular, flat, brown, glabrous.

2. *Butea monosperma* (Lam.) Taub., Pflanzenfam. 3:366. 1894. (Figure 2 B)

- Family name : Fabaceae
 Myanmar name : Pauk
 English name : Flame of the forest
 Flowering period : January to April

Perennial, trees. Leaves trifoliolate compound, alternate; stipulate, petiolate; leaflets broadly obovate, subcuneate at the apex, glabrous above densely silky-pubescent beneath. Inflorescences axillary or terminal, fasciculate-racemose; peduncles long, tomentose. Flowers bisexual, zygomorphic,

pentamerous, hypogynous, orange-red, about 5.0 cm in diameter at anthesis, showy; bracteate, bracteolate. Calyx campanulate, 5-lobed. Corolla papilionaceous, much exerted. Standard ovate, recurved, clawed, scarlet-orange; wings oblong; keels boat-shaped, beaked. Stamens 10, diadelphous, included, free filaments long; anthers ditheous, dorsifixed, uniform. Ovary superior, linear-oblong, long-stipitate, densely tomentose, unilocular, with 2-5 ovules on the marginal placentae; styles filiform, curved; stigma capitate. Pods oblong, strap-shaped, indehiscent, light brown. Seeds orbicular, pale brown.

3. *Erythrina variegata* L., in Stickman, Dis. Herb. Amboin 10. 1754. (Figure 2 C)

Family name : Fabaceae
Myanmar name : Kathit
English names : Coral tree, Indian Coral Tree
Flowering period : January to March

Perennial, erect armed trees. Leaves trifoliolate compound, alternate; stipulate; petiolate; leaflets broadly ovate to rhomboid, truncate or slightly cordate at the base, entire or shallowly lobed at the margin, acuminate at the apex, subcoriaceous, glabrous above, pubescent below. Inflorescences axillary or terminal racemes, many-flowered; peduncles long. Flowers bisexual, zygomorphic, pentamerous, hypogynous, red, about 3 cm in diameter at anthesis, showy; bracteate, pedicellate; bracteolate. Calyx obliquely spathaceous. Corolla papilionaceous, exerted; standard elliptic to oblanceolate, bright red, glabrous, recurved; wings oblique-oblong, glabrous; keels ovate. Stamens 10, diadelphous, much-exserted; free filaments filiform, unequal in length, red, glabrous; anthers oblong, uniform, dorsifixed, ditheous. Ovary superior, linear, greenish-red, densely-pubescent, unilocular, with few-ovuled in each locule on the marginal placentae; style filiform, red, glabrous, incurved; stigma capitate. Pods linear, indehiscent, turgid, constrict between the seeds, brown. Seeds oblong, purplish-red, glabrous.

4. *Gliricidia sepium* (Jacq.) Walp., Peper. 1:679.1842. (Figure 2 D)

Family name : Fabaceae
Myanmar name : Pe-cherry
English name : Flame of the forest
Flowering period : December to April

Perennial, deciduous trees. Leaves unipinnately compound, imparipinnate, alternate, stipulate; petiolate; leaflets 7 to 17, opposite, exstipellate, ovate or ovate-oblong, oblique at the base, entire along the margin, obtusely acuminate at the apex, glabrous on both surfaces. Inflorescences axillary or terminal racemes or panicles, many-flowered; peduncles long. Flowers bisexual, zygomorphic, pentamerous, hypogynous, pink, about 1 cm in diameter at anthesis, showy, bracteate, pedicellate, ebracteolate. Calyx campanulate, 5-lobed. Corolla much exerted; standard obovate, pink, below the middle with pale yellow blotch; wings oblong; keels beaked. Stamens 10, diadelphous, included, free; filaments long; anthers oblong, ditheous, dorsifixed, uniform. Ovary superior, monocarpellary, linear, long-stipitate, densely tomentose, unilocular, with few ovules in each locule on the marginal placentae; styles curved, glabrous; stigma capitate. Pods oblong, indehiscent.

5. *Senna siamea* (Lam.) Irwin & Barneby, Mem Ny. Bot. Gard. 35:98. 1982. (Figure 2 E)

Family name : Fabaceae
Myanmar names : Mezali, Taw mezali
English name : Siamese Cassia
Flowering period : June to November

Perennial, trees. Leaves unipinnately compound, paripinnate, alternate; stipulate, petiolate; leaflets 5 to 12-paired, opposite, oval-oblong, obtuse at the base, entire along the margin, obtuse with mucro at the apex. Inflorescences terminal, erect paniculate corymb with numerous flowers; peduncle long. Flowers bisexual, zygomorphic, pentamerous, hypogynous, bright yellow, about 2.0 cm in diameter at anthesis; bracteate. Sepals 5, orbicular, unequal, greenish yellow, concave. Petals 5, obovate, subequal, shortly clawed. Stamens 10, 7 fertile and 3 staminodes, free, exserted; filaments unequal, 2 longest, 5 median and 3 shortest, cylindrical; anthers curved, basifixed, dehiscence by apical pore. Ovary superior, linear, about 5.0 mm long, unilocular, with many ovules in each locule on the marginal placentae, pubescent; style filiform, incurved; stigma simple. Pods linear-oblong, dehiscent, laterally compressed, dark brown, tomentose. Seeds obovate, compressed, dark-brown.

6. *Terminalia catappa* L., Syst, Nut. ed. 12, 2 : 674 (err. 638). 1767. (Figure 3 A)

Family name : Combretaceae
Myanmar name : Banda
English name : Indian-almond
Flowering period : February to May

Perennial, tree. Leaves simple, alternate, clustered at the ends of branches, exstipulate; petiolate; blades obovate, subcordate at the base, entire along the margin, rounded or shortly acuminate at the apex, glabrous above, pubescent beneath. Inflorescences axillary, long spikes, peduncles long. Flowers unisexual or bisexual, actinomorphic, pentamerous, epigynous, creamy-white, 3.0-4.0 mm in diameter at anthesis, staminate flowers in the upper ones, bisexual in the lower portion, apetalous. Calyx campanulate 5-lobed. Stamens 10 in 2 rows, adnate on the calyx tube, exserted; filaments filiform; anthers dithecous, globoid. Ovary inferior, ellipsoid, unilocular with one ovule on the pendulous placentae; style filiform; stigma simple. Fruits drupe, ellipsoid, indehiscent, surrounded by a thick layer of juicy flesh. Seeds ellipsoid, yellow.

7. *Mangifera indica* L., Sp. Pl. 200. 1753. (Figure 3 B)

Family name : Anacardiaceae
Myanmar name : Thayet
English name : Mango
Flowering period : January to May

Perennial, tree. Leaves simple, alternate, exstipulate, often crowded at the top of the branchlets; petiolate; blades oblong-lanceolate, acute at the base, entire along the margin and often undulate, acuminate at the apex. Inflorescences terminal or axillary, many-flowered panicles. Flowers light yellow, bracteate, mostly unisexual, sometimes bisexual, actinomorphic, pentamerous, pedicellate, ebracteolate, about 0.6 mm in diameter at anthesis. Sepals 5, free, imbricate, ovate-oblong. Petals 5, free, imbricate, ovate-oblong, white, afterwards purple. Stamens

5, one fertile and 4 staminodes; filaments subulate, white; anthers bicelled, dorsifixed, longitudinally dehiscent, ovoid, purple. Ovary superior, monocarpellary, unilocular, with one ovule in each locule on the parietal placentae, ovoid, green, glabrous; style subulate; stigma slightly widened. Fruits drupe, subgloboid to oblong-lanceolate, green to yellow, fleshy-juicy.

8. *Melia azedarach* L., Sp. Pl.1:384–385.1753. (Figure 3 C)

Family name : Meliaceae
Myanmar names : Pan-tama; Thinbaw-pan-tama
English names : Bread tree; Persian lilac
Flowering period : September to November

Perennial, deciduous small trees. Leaves biipinnately compound, imparipinnate, alternate, exstipulate; petiolate; leaflets 3-to-7 paired, opposite, oblong-lanceolate, acute at the base, entire to variously serrate along the margin, acuminate at the apex, glabrous on both surfaces. Inflorescences axillary, thyrses, many-flowered; peduncles long, pubescent. Flowers bisexual, actinomorphic, pentamerous, hypogynous, purplish blue, about 1.5 cm in diameter at anthesis; pedicellate. Calyx campanulate, 5-lobed. Petals 5, free, oblong, recurves, hairy without. Stamens 10, monadelphous; staminal tubes cylindrical, 4-fid lobes, purple; anthers ditheous, basifixed, dehiscing longitudinally. Carpels 6, fused; ovary superior, ovoid, 6 locular with 2 superposed ovules in each locule on the axile placentae; style long; stigma capitate. Drupes globoid, yellowish-brown when ripe, glabrous. Seeds oblong, lateral compressed, smooth, brown, turgid, constrict between the seeds, brown.

9. *Muntingia calabura* L., Sp. Pl.509.1753. (Figure 3 D)

Family name : Muntingiaceae
Myanmar name : Hnget-thagya
English names : Strawberry-tree; Jamaica Cherry
Flowering period : throughout the year

Perennial, shrubs or trees. Leaves simple, alternate; stipulate; petiolate; blades oblong-lanceolate, obliquely subcordate at the base, serrate along the margin, acuminate at the apex, chartaceous, softly pubescent beneath. Inflorescences supra-axillary, solitary cymes. Flowers bisexual, actinomorphic, pentamerous, hypogynous, white, about 1.5 cm in diameter at anthesis; pedicellate. Sepals 5, slightly connate at the base, lanceolate, green, densely pubescent. Petals 5, white, suborbicular, white, shortly clawed. Stamens numerous; filament filiform, connate at the base; anthers ditheous, ovoid, dorsifixed. Ovary superior, ellipsoid or subglobose, hairy, pentalocular with many ovules in each locule on the axile placentae; style absent; stigma 5-lobed, glabrous. Fruit berry, subglobular, with persistent stigma, pulpy juicy, sweet. Seeds numerous, minute.

10. *Moringa oleifera* Lam., Enc. 1: 398. 1785. (Figure 3 E)

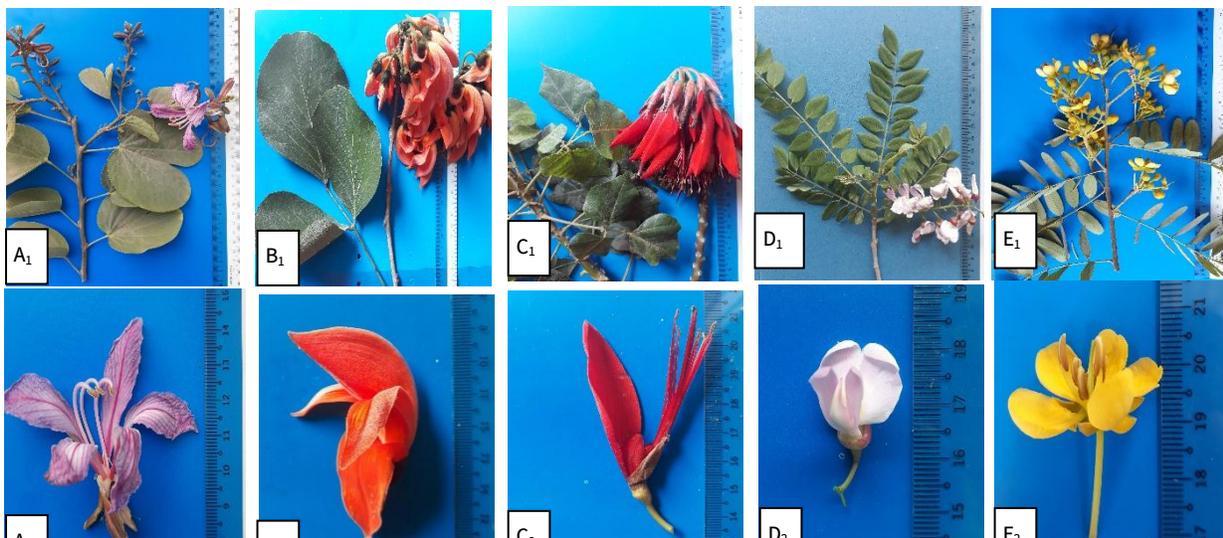
Family name : Moringaceae
Myanmar name : Dan-da-lon
English names : Horse Radish; Drum stick
Flowering period : January to July

Perennial tree. Leaves tripinnately compound, alternate, often densely crowded at the ends of branchlets; petioles swollen at the base; leaflets 3-9 paired opposite, ovate or ovate oblong,

cuneate at the base, entire along the margin, obtuse or acute at the apex, pubescent while young, glabrescent. Inflorescences axillary panicles; peduncles long. Flowers bisexual, zygomorphic, pentamerous, hypogynous, white, about 2.5 cm in diameter at anthesis, fragrant. Sepals 5, ovate-oblong. Petals 5, obovate-oblong, reflexed hairy at the base. Stamens 10, 5 fertile and 5 staminodes, free, hairy at the base; filaments filiform, alternating with stamens. Ovary superior, linear-oblong, hairy at the base, unilocular, with numerous ovules on the parietal placentae; style filiform; stigma simple. Fruits capsule, pendulous, acuminate, longitudinally ridged. Seeds compressed, 3-winged.

Artificial Key to the Species

- 1. Plants armed----- 3. *Erythrina variegata*
- 1. Plants unarmed-----
- 2
- 2. Leaves compound-----
- 2. Leaves simple-----
- 3
- 3. Flowers epigynous-----6. *Terminalia catappa*
- 3. Flowers hypogynous-----
- 4
- 4. Leaves exstipulate; fruits drupe----- 7. *Mangifera indica*
- 4. Leaves stipulate; fruits berry----- 9. *Muntingia calabura*
- 5. Flowers zygomorphic-----
- 6
- 5. Flowers actinomorphic----- 8. *Melia azedarach*
- 6. Placentation parietal; fruits capsule----- 10. *Moringa olerifera*
- 6. Placentation marginal; fruits pod-----7
- 7. Flowers bright yellow; anthers opening by apical pores----- 5. *Senna siamea*
- 7. Flowers not bright yellow; anthers opening by longitudinal slits-----8
- 8. Corolla caesalpinaceous; anthers versatile; stigma oblique--1. *Bauhinia purpurea*
- 8. Corolla papilionaceous; anthers dorsifixed; stigma capitate-----9
- 9. Leaves unipinnately compound; flowers about 1.0 cm in diameter-----
- 4. *Gliricidia sepium*
- 9. Leaves trifoliolate compound; flowers about 5.0 cm in diameter-----
- 2. *Butea monosperma*



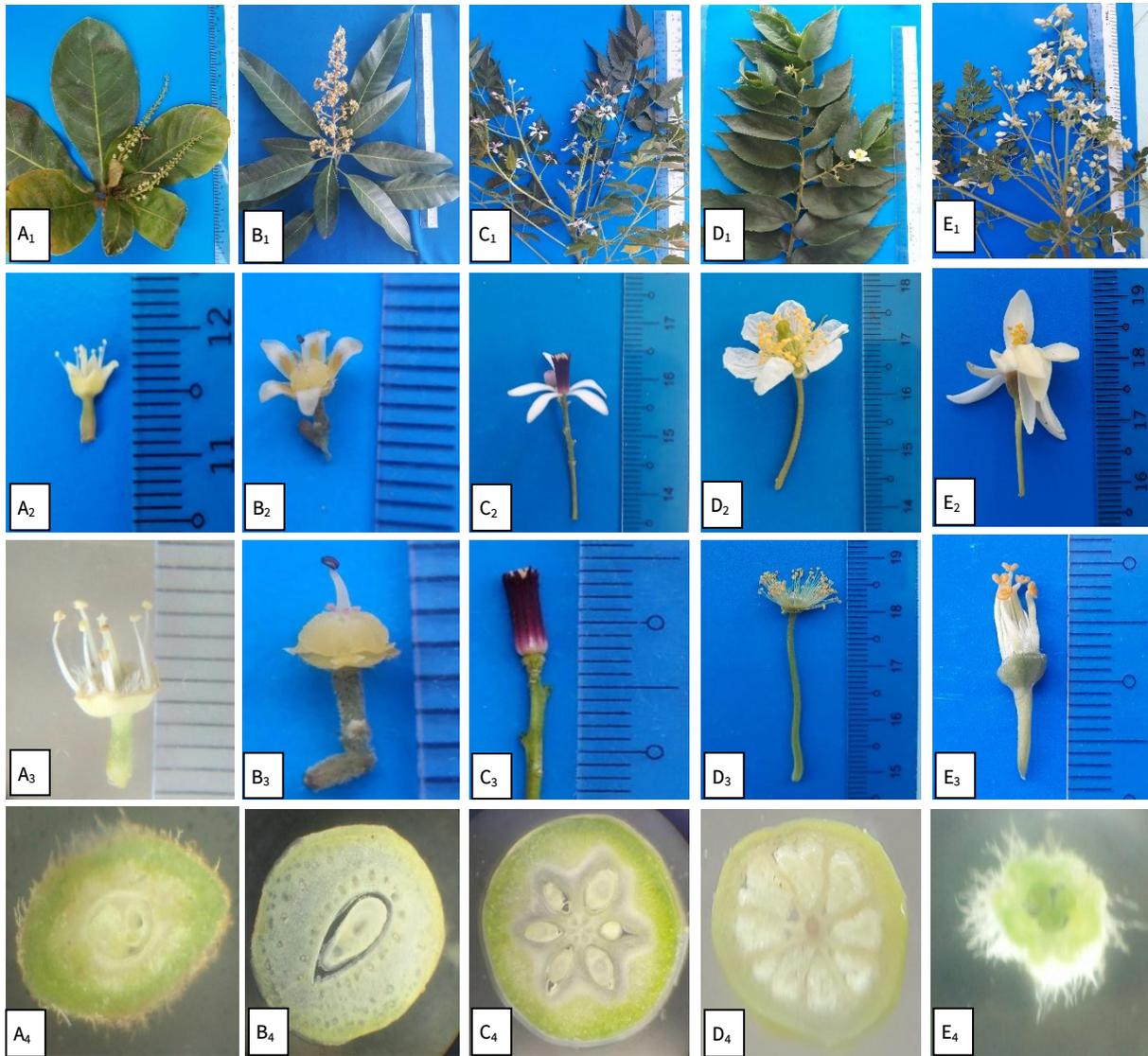


Figure 3. A. *Terminalia catappa* L.

A₁. Inflorescences and branch A₂. Flower A₃. Androecium & Gynoecium

A₄. C.S of Ovary

B. *Mangifera indica* L.

B₁. Inflorescences and branch B₂. Flower B₃. Androecium & Gynoecium

B₄. C.S of Ovary

C. *Melia azedarach* L.

C₁. Inflorescences and branch C₂. Flower C₃. Androecium & Gynoecium

C₄. C.S of Ovary

D. *Muntingia calabura* L.

D₁. Inflorescences and branch D₂. Flower D₃. Androecium & Gynoecium

D₄. C.S of Ovary

E. *Moringa olerifera* Lam.

E₁. Inflorescences and branch E₂. Flower E₃. Androecium & Gynoecium

E₄. C.S of Ovary

Discussion and Conclusion

In the present study, 10 species belonging to 10 genera and 6 families of plants were undertaken. During the present survey and collection of species, a total number of 10 species are observed for eudicots species in Yadanabon University Campus. The order Fabales, Myrtales, Sapindales, Malvales and Brassicales are found in present study. The members of families such as Fabaceae, Combretaceae, Anacardiaceae, Meliaceae, Muntingiaceae and Moringaceae are found in the studied area.

There are 5 species of Fabaceae are observed in studied area. For leaf types of studied species in Fabaceae, bifoliolate compound type of leaves are found in the species of *Bauhinia purpurea* L., trifoliolate compound type of leaves is occurred in two species and unipinnately compound type of leaves is two species. The stamens of 3 species are all fertile while the rest species are not all fertile. The fixation of anthers is basifixed in *Senna siamea* (Lam.) Irwin & Barneby and dorsifixed in 3 species. The versatile anther is found in *Bauhinia purpurea* L.

For Combretaceae, Kress *et al.* (2003) reported that 6 genera and 49 species were distributed in Myanmar. In the present study, the leaf of *Terminalia catappa* L. is simple with clustered at the ends of branches, long spikes with bisexual in the lower upper ones and drupaceous fruits.

In the study area, the species *Mangifera indica* L. of Anacardiaceae is recorded. The species *Mangifera indica* L. was abundantly found in the studied area. This species can be recognized by mostly unisexual flowers and sometimes bisexual. Number of stamens are 5, 1 fertile and 4 staminodes and parietal placentation.

In the present study, 1 species belongs to 1 genera of Meliaceae. *Melia azedarach* L. is bipinnately compound leaves, dark violet staminal tubes and globoid drupes.

The species *Muntingia calabura* L. of family Muntingiaceae was occurred in the study area. The species can be recognized by solitary cymes, white flowers and berry fruits. For Moringaceae, Kress *et al.* (2003) stated that one genus occurs in Myanmar. Only one genus occurs in the study area. This species is tripinnately compound, white fragrant flowers and pendulous capsules.

According to the resulting data, 3 species are simple leaves and compound leaves are found in 7 species. In this research, the flower of one species is epigynous and hypogynous flowers are found in 9 species. Actinomorphic flowers are found in 4 species and zygomorphic flowers are found in 6 species. The fruits types of 5 species are pod, 3 species are drupaceous, 1 species is berry and 1 species is capsule.

Recently, Aye Mya San (2015) had studied A Palynological study of some trees from Yadanabon University Campus and Kyi Hlaing Oo (2018) investigated on Taxonomic study on some herbs and shrubs species in dicotyledons of Yadanabon University Campus. In the present research work, 10 species of trees found in Yadanabon University Campus had been reported.

In conclusion, all of identified species are found to be naturalized species. These natural plant resources will also be useful for further researchers. Therefore, it is hoped that the maintenance of study area diversity can also be conserved if the natural resources of these regions are used systematically.

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