

## Taxonomic Study on Some Species of Pwekawk Water Fall in Pyin Oo Lwin Township

Moe Nge Nge<sup>1</sup>, San San Aye<sup>2</sup>

### Abstract

The study area of Pwekawk Water Fall is located in Pyin-Oo-Lwin Township. It is situated between 96° 32' and 95° 34' E longitude and 22° 04' and 23° 04' North Latitude. The flowering plants from the floristic area were collected, identified and classified the year of 2019. The resulting species were systematically arranged according to the APG IV system (2016). All the species were systematically arranged and morphological characters were stated with colour photograph. Moreover, an artificial key to the studied species are also described.

Keywords: plant, identified, species

### Introduction

The selected area of Pwekawk Water Fall is located in Pyin Oo Lwin Township. It lied at the head of a shallow rally about 3506 ft above sea level. The natural vegetation of the area is the occurrence of medicinal herbs and other useful species. This is mixing of trees, shrubs, herbs and climbers or twinners. The people in the surrounding villages of the study area are cultivated many crops and vegetables alternately throughout the year.

Flora of Pwekawk Water Fall composed of trees that form a canopy. The density of the plant population, epiphytes, bryophytes, pteridophytes and herbaceous plants are abundantly found in the study area.

Floristic studies inform the plant resources of particular region with systematic information including key, description and their growth habitats. Angisperms resources are fundamentally important to life and survival of men for their major sources of food and substances.

The aims of this study area are to identify and classify the flowering plants from the study area, to describe the morphological characters of collect species and to contribute the floristic information of natural vegetation in Pwekawk Water Fall in Pyin Oo Lwin Township.

### Materials and Methods

The specimens were collected from Pwekawk Water Fall in Pyin Oo Lwin Township during the year 2019. All the collected specimens were systematically recorded. The morphological characters are noted in the inflorescences and recorded by digital camera. Then, these specimens were kept immediately into the plastic bags in order to identify and classify systematically. Field notes were made with the natural habit including flowers and its colour and plant location by using the GPS (Global Positioning System).

The taxonomic identification of collected plants were carried out by referring to Hooker (1879), Hutchinson (1959), Backer (1963-1968) and Dassanayake (1980-2001). The collected plants were studied and systematically arranged into families, according to the APG IV (Angiosperm Phylogeny Group) system (2016). The genera and species were also arranged in alphabetically. Myanmar names were referred to Hundley and Chit Ko Ko (1987) and Kress *et al.* (2003). Then, the artificial key to the studied species were also constructed.

The collected plants were pressed and dried according to plant collection methods of Lawrence (1951). After identification the dry specimens were mounted as a herbarium sheet with label of field data.

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<sup>1</sup> Lecturer, Dr., Department of Botany, Yadanabon University

<sup>2</sup> Lecturer, Dr., Department of Botany, Yadanabon University

## Results

### Artificial Key to the Species

1. Ovary inferior ----- 2
1. Ovary superior ----- 3
  2. Leaves opposite and decussate, leaf margin entire; flowers white; axile placentation----- *Wendlandia tinctoria*
  2. Leaves alternate, leaf margin crenate-serrate; flowers bright yellow; basal placentation----- *Tithonia diversifolia*
3. Plants woody; leaves stipulate; flowers yellow to pale red-----  
----- *Grewia latifolia*
3. Plants twining or climbers; leaves exstipulate; flowers pale purple or purple 4
  4. Leaflets-blades broadly ovate to orbicular leaf base shallowly cordate to truncate; flowers actinomorphic; stamens 5, unequal; *Argyreia laxiflora*
  4. Leaflets-blades elliptic or oblong, leaf base rounded; flowers zygomorphic; stamens 4, didynamous; -----  
----- *Thunbergia laurifolia*

#### 1. *Grewia latifolia* Mast. in Hook. f., Fl. Brit. Ind. 1. 392. 1879.

(Figure 1 A)

Myanmar name : Unknown

English name : Unknown

Flowering period : September to November

Perennial trees, up to 5.0 m high; stems and branches terete, stellate-pubescent. Leaves simple, alternate; stipules linear-subulate, 2.0-2.5 mm long, stellate hairy; petioles slender, 0.5-1.0 cm long, pubescent; blades ovate-oblong, 7.0-9.0 cm long and 5.0-6.0 cm wide, yellowish green, subcoriaceous, glabrescent above, stellate-hairy beneath, truncate at the base, serrulate along the margin, acuminate at the apex. Inflorescences terminal or axillary, paniculate cymes, many-flowered; peduncle slender, 4.0-6.0 cm long. Flowers bisexual, actinomorphic, hypogynous, pentamerous, yellow to pale red, 1.0 cm in diameter at anthesis; bracts lanceolate, 1.0 mm long; pedicels slender, 1.0-1.5 mm long, stellate-pubescent. Sepals 5, free, oblong, 2.0-4.0 cm long, pale brown within, creamy without, pubescent. Petals 5, free, spatulate oblong, 5.0-5.5 mm long, yellow to pale red, glabrous. Stamens numerous, free; filaments filiform, very short, glabrous; anthers dithecal, basifixed, dehiscent by longitudinal slits, oblong, yellow. Carpels two, united; ovary superior, 2-to 4-locular, 1-to 2-ovules in each locules on the axile placentae, ovoid; style slender; stigma minute lobed. Fruits drupaceous, ovoid.

#### 2. *Wendlandia longustina* Wall. & G. Don, Gen. Hist. 3. 518. 1834.

(Figure 1 B)

Myanmar name : Unknown

English name : Unknown

Flowering period : September to November

Perennial small tree, up to 10.0 m high; stems and branches terete, pubescent. Leaves simple, opposite and decussate; stipules interpetiolar, 2.0-3.0 mm long, green, pubescent; petiole terete, 1.0-2.0 cm long, green, pubescent; blades elliptic lanceolate, 7.0-13.0 cm long and 3.0-3.5 cm wide, green, glabrous on both surfaces, obtuse at the base, entire along the margin, acuminate at the apex. Inflorescences terminal panicles, many-flowered; peduncles terete, 4.0-6.5 cm long, green, pubescent. Flowers bisexual, actinomorphic, epigynous, pentamerous, white, 3.0-4.0 mm in diameter at anthesis; bracts minute, pedicels sessile. Sepals 5, free, 1.0-1.5 mm long and 1.0 mm wide, green, pubescent. Corolla infundibuliform, 5-lobed; tube slender, 3.0-4.0 mm

long and 1.0-2.0 mm wide, white, glabrous; lobes obovate, 1.0-1.5 mm long, glabrous. Stamens 5, exserted, epipetalous, adnate to the base of corolla tube; filaments slender, 0.9- 1.0 cm long, twice as long as the corolla tube, white, glabrous; anthers dithecous, dorsifixed, dehiscent by longitudinal slit, ovoid, 0.4-0.5 mm long, dark purple, glabrous. Carpels two, united; ovary inferior, bilocular with numerous ovules in each locule on the axile placentae, globose, 1.0-2.0 mm long, glabrous; style terminal, 3.0-4.0 mm long, white, glabrous; stigma bifid. Fruits capsular, globose.

**3. *Argyreia laxiflora*** Prain., Journ. As. Soc. Beng. 63. 92. 1894.

(Figure 1 C)

Myanmar name : Unknown  
 English name : Unknown  
 Flowering period : September to November

Annual, twinning herbs, woody at the base; stems tereta, densely sericeous tomentose. Leaves simple, alternate, exstipulate; petioles 2.0-14.0 cm long, white due to densely sericeous tomentose; blades, broadly ovate to orbicular, 7.0-15.0 cm long and 7.5-15.5 cm wide, coriaceous whitish green above, paler beneath, silky tomentose on both surfaces, more densely so beneath, shallowly cordate to truncate at the base, entire along the margin, short mucro at the apex. Inflorescences axillary, corymbiform cymes of few to many flowers; peduncles 7.0-15.0 cm long, densely white tomentose. Flowers bisexual, actinomorphic, hypogynous, pentamerous, pale purple, 2.0-3.0 cm in diameters at anthesis; bracts obovate to spatulate, 6.0-8.0 mm long and 4.5-5.5 mm wide, green, densely white tomentose without, glabrous within; pedicels 1.0-4.0 mm long, densely silky tomentose. Sepals unequal, 6.0-7.0 mm long, red within in fruit, densely white tomentose without. Corolla broadly infundibuliform, 1.0-2.0 cm long; tubes 6.0-7.0 mm long, white, glabrous; lobes ovate, 8.0-10.0 mm long, pale purple, densely silky tomentose. Stamens 5, unequal, free exserted; filaments slender, 0.6-1.5 cm long, white; anthers ovoid to oblongoid, 2.0-3.0 mm long, pale purple. Carpels two, united; ovary superior, globose, bilocular with one or two ovules on the axile placentation; style slender; stigma 2, globose. Fruits capsule, depressed globose.

**4. *Thunbergia laurifolia*** Lindl., Gard. Chron 260. 1856. (Figure 1 D)

Myanmar name : Nwe nyo  
 English name : Unknown  
 Flowering period : October to January

Annual large climbers; stems and branches terete, velutinous. Leaves simple, opposite and decussate, exstipulate; petioles 1.0-3.0 cm long; blades elliptic or oblong, 7.0-12.0 cm long and 2.0-3.0 cm wide, velutinous on both surfaces, rounded at the base, entire along the margin, acuminate at the apex. Inflorescences axillary racemes. Flowers bisexual, zygomorphic, hypogynous, pentamerous, purple, 4.0 cm in diameter at anthesis; bracteoles large, more or less obliquely oblong, 2.5-3.5 cm long, cream-coloured with reddish-brown, glabrescent. Calyx short, 8-9 toothed, yellow, contorted glabrous. Corolla 5-lobed, contorted, campanulate; tube 2.0-3.0 cm long; lobes subequal, 3.5-4.0 cm long. Stamens 4, didynamous; filaments flattened, 2.5 cm long; anthers dithecous, dorsifixed, longitudinally dehiscent, oblong, yellow, spurred. Carpels two, united; ovary superior, bilocular with two ovules in each locule on the axile placentae, ovoid, 4.5 mm long; style filiform, 3.0-3.5 cm long, glabrescent; stigma trifid. Fruit capsule, ovoid.

**5. *Tithonia diversifolia*** (Hemsl.) A. Gray., Proc. Amer. Acad. Arts 19: 5.

1883. (Figure 1 E)

*Mirasolia diversifolia* Hemsl., Bot. Centr. Amer. 2: 168, t. 47. 1881.

Myanmar name : Nay kya yaing  
 English name : Unknown  
 Flowering period : November to January

Perennial suffruticose herbs, large and shrubby, up to 2.0 m high; stems terete, erect, slightly groove, sparsely pubescent. Leaves simple, alternate, pseudostipule, caducous; petioles broadly winged almost to the base, 3.0-8.0 cm long, green, pubescent; blade 3-to 5-lobed, upper leaves ovate, deltoid or lanceolate, 4.0-10.0 cm long and 2.0-5.5 cm wide; lobes elliptic with a sharply acuminate tip, hispidulous on the upper surface, pubescent and glandular beneath, cuneate at the base, crenate-serrate along the margins sharply acuminate at the apex. Capitula solitary to several, 1.5-2.0 cm long, 6.0-9.0 cm in diameter at anthesis; peduncles long, terete, 7.0-12.0 cm long, green, fistular, slightly pubescent; involucre broadly campanulate, 1.5-2.0 cm long and 2.0-3.5 cm wide, imbricate, green, outer phyllaries ovate to oblong, indurate at the base, recurved at the upper, inner phyllaries oblong, 1.3-1.8 cm long and 0.3-0.4 cm wide, membranous; receptacle conical, paleaceous, palea oblong, 2.0-3.0 mm long, concave, membranous, persistent. Ray florets female, 10- to 14 per capitulum, zygomorphic, ligules oblong with 2 or 3 lobes, 3.0-4.0 cm long and 0.5-1.0 cm wide, bright yellow, basal tube 1.0-2.0 mm long. Disc florets numerous, tubular with 5-lobes, yellow, corolla tube cylindrical, 3.0-4.0 mm long, lobes deltoid, about 1.0 mm long. Stamens 5, exserted; anthers sagittate base, ovate apical process; ovary inferior, unilocular with one ovule in the locule on the basal placentae; style exserted, stylar arms linear appendage, divericate. Achenes conical, 4.8-5.0 mm long and 1.0-1.5 mm wide, dark brown, pappose. Pappus persistent.

#### Discussion

The present research with the taxonomic some members of the flowering plants growing in Pwekawk Water Fall, Pyin Oo Lwin Township. The members of families such as Malvaceae, Rubiaceae, Convolvulaceae, Acanthaceae and Asteraceae.

Locationally, the studied area is situated altitude about 3506 ft above sea level. Study area has favorable conditions for plant of temperate zone. The climate is one of the major factors for the growth of natural vegetation, however, the nature of topography slope gradient, precipitation and types of soil also influence the growth of vegetation.

The natural vegetation of this area consists of various herbs, shrubs and small trees. Among the studied species, most of the plants are found as wild plants. The natural species has been used to various purposes for local people include fire-wood and vegetables.

According to the climatic condition, *Wendlandia tinctoria*, *Argyreia laxiflora* and *Tithonia diversifolia* are very dominant plants in the study area. *Greweia latifolia* can only be found at the study area the size of this plant is very large like tree and rare.

In the study area, *Wendlandia tinctoria* in Rubiaceae are found to be common species. The family can be easily distinguished from other families by its distinct characters is stipulate, opposite or whorled leaves, ovary inferior and bicarpellary.

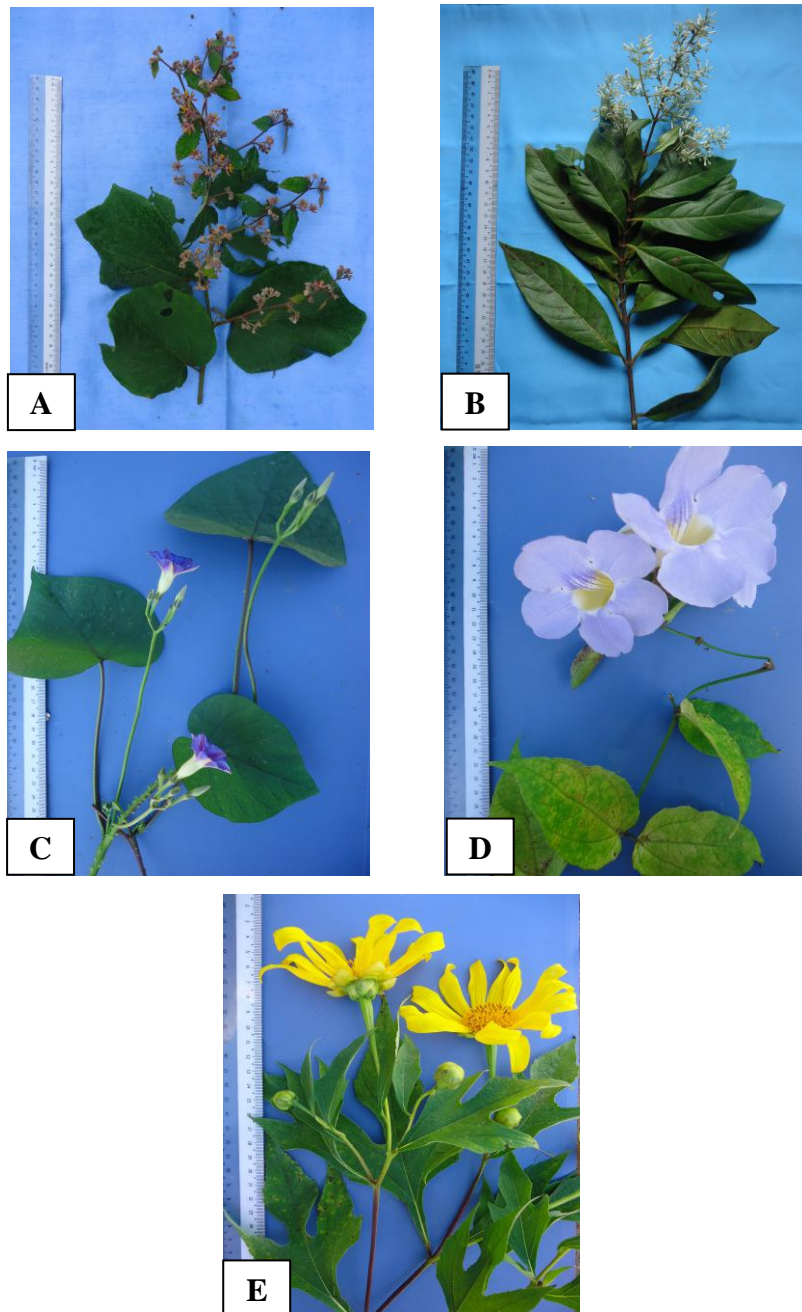


Figure 1. A. *Grewia latifolia* Mast. B. *Wendlandia longustina* Wall.  
C. *Argyreia laxiflora* Prain. D. *Thunbergia laurifolia* Lindl.  
E. *Tithonia diversifolia* (Hemsl.) A. Gray

The species of *Argyreia laxiflora* in Convolvulaceae were recorded in the study area. The species were conspicuous mid-petaline bands with corolla, bilobed stigma, milky latex present and exerted stamens.

In the present work, the species *Tithonia diversifolia* Asteraceae were abundantly occurred in study area. This species have involucre bracts present, single seeded fruits and inferior ovary.

In the present research, the species *Thunbergia laurifolia* Acanthaceae were rarely occurred in studied area. This have large bracteoles, the present of bilabiate corolla and bilocular ovary.

In conclusion, five species belonging to five families are presented and all are wild plants of the studied area. It is hope that the present research work is part of the information with Pwekawk Water Fall and that can be used in advanced studied such as medicinal plants, biodiversity and economic botany.

#### Acknowledgements

I would like to express my thanks to Dr Htar Lwin, Professor, Department of Botany, Yadanabon University, for her permission to carry out this research work.

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