TAXONOMIC STUDY ON TWELVE SPECIES OF ROSACEAE FOUNDED IN WAINGMAW TOWNSHIP, KACHIN STATE

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Abstract

The research deals with taxonomic study on some member of rosaceous plants distributed in Waingmaw Township in Kachin State. The area lies between 25°22' and 25°44' North latitude and 97°12' and 97° 24' East longitude. The total area was 1883.17 sq km and the elevation ranges from 146 m to 1992 m above sea level. The member of rosaceous plants from Waingmaw Township were collected, preserved and identified from June 2017 to March 2019 in Department of Botany, University of Myitkyina. These species are *Chaenomeles speciosa* (Sweet) Nakai, *Neillia sinensis* Oliv., *Prunus cerasoides* D.Don., *Prunus mume* (Siebold) Siebold & Zucc., *Prunus persica* (L.) Batsch, *Pyrus pyrifolia* (Burm. f.) Nakai, *Rosa chinensis* Jacq, *Rosa clinophylla* Redout & Thory, *Rubus corchorifolius* L. f., *Rubus ellipticus* var. *obcordatus* Focke., *Rubus reflexus* Ker Gawl., *Rubus rosifolius* Sm. were included. Among them, *Chaenomeles speciosa* (Sweet) Nakai, *Neillia sinensis* Oliv, *Pyrus pyrifolia* (Burm. f.) Nakai, *Rosa chinensis* Jacq. and *Rubus reflexus* Ker Gawl. are not recorded in previous list of Myanmar. These species are very valuable for compilation of Flora of Myanmar.

Keywords : Taxonomic study, Rosaceae, Waingmaw Township, Kachin State

Introduction

The present research deals with the members Rosaceae growing Waingmaw Township in Kachin state. Rosaceae is a large family of perhaps 110 genera and 3100 species, widespread but best represented in the Northern Hemisphere, mainly in the temperate and arctic climate. The major genera in the world are *Rubus* (750 species), *Potentilla* (500), *Prunus* (430), *Crataegus* (240), *Cotoneaster* (230), *Sorbus* (230), *Rosa* (225), *Alchemilla* (220), *Spiraea* (100), *Pyrus* (60), *Malus* (55), *Geum* (40) and *Fragaria* (15). The members are herbs (*Alchemilla*, *Fragaria*), shrubs (*Rosa, Rubus*), trees (*Prunus*, *Malus, Pyrus*), rarely climbing (some species of *Rosa*), often with prickles and thorns (Gurcharan 2010). The family is worldwide but with maximum development in the temperate to sub-tropical region of the northern hemisphere. Rosaceae family is valued both for its genera of bush and tree fruits, edible fruit, medicinal useful and for many popular horticultural ornamentals (Heywood 2007).

The Rosaceae are distinctive in having usually stipulate leaves (often adnate to petiole) and an actinomorphic, generally pentamerous flower with hypanthium present, variable in gynoecial fusion, ovary position and fruit type. The family is very economically important as the source of many cultivated fruits including *Fragaria* (strawberry), *Malus* (apples), *Prunus* (almond apricot, cherry, peach, plum), *Pyrus* (pear), *Rubus* (blackberry, raspberry) (Simpson 2006).

Waingmaw Township is located east bank of Ayeyawaddy river. The total area of Waingmaw Township is 1883.17 square miles and established by 13 quarters, 3 towns and 170 village tracts within the township. It lies between 25°22'-25°44' North latitude and between 97°12'-97°24' East longitude. The elevation of Waingmaw is 146 m (481') to 1992 m (6534') above the sea level. If a good growth of forest vegetation anywhere in the world depends on three

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main factors such as optimal temperature, good rainfall and fertile soil. These three main factors are found in Waingmaw Township.

Rosaceae is mostly common in ornamental plants and some cultivated species for edible purpose were recorded in Myanmar. The resource of Rosaceae as wild is very attractive for recording as interesting species in Myanmar. The aim and objectives of this research is to identify and classify the members of Rosaceae distributed in Waingmaw Township, to record the taxonomic characters of various kinds of rosaceous plants, to contribute the floristic information of natural rosaceous plants resources and to ascertain the nomenclature of rosaceous plant resources distributed in Waingmaw Township.

Materials and Methods

The rosaceous plants were collected in Waingmaw Township during the years 2017 to 2019. All the collected specimens were recorded by digital images while flowering period. Precise locations of the specimens collections were recorded by using Global Positioning System (GPS) Map Navigator. Field notes were recorded by habitat types and peculiar plants characters. Then, the specimens were kept immediately into the plastic bags and carried to the lab to identify and classify systematically.

Identification of the specimens was carried out by referring the floras or manuals, and checklist of the particular region. The families of the collected specimens were determined by referring to literature of Hutchinson (1967) and Geesink (1981). Identification of genera and species were carried out by referring to the available literature such as Hooker (1897), Brandis (1907), Dassanayake (1981), Lingdi, L. & G. Cuizhi, L. Chaoluan, C. Alexander, B. Bartholomew and A.R. Brach. (2003), Volume-9, and Qi-ming and De-Lin (2008).

The nomenclatural data was referred to Index Kewensis by which the names and synonyms of plants up to the rank of species being confirmed. All of nomenclatural studies were finalized by referring to the web site of International Plant Names Index (www.ipni.org) and online Botanical Database of Tropicos Plants (www.tropicos.org). Myanmar names and their distribution were followed to the Checklist of Hundley & Chit Ko Ko (1987) and Kress *et al.* (2003).

The study species under the family were systematically arranged alphabetically. The dried specimens were mounted with a label of field data on a herbarium sheet. They were kept in the Herbarium of Botany Department, University of Myitkyina for references and other academic purposes.

Results

Altogether 12 species belonging to 6 genera of Rosaceae were resulted (Table 1). The morphological and taxonomic characteristics were described. The detailed characters of photographic records were stated in Figures 1 to 12.

Table 1 List of the species of Rosaceae distributed in Waingmaw Township

No.	Scientific Names	Common Names	Local Names	Specimens Location
1.	*Chaenomeles speciosa* (Sweet) Nakai	Quince	Chinsaw Ga, Ma Kwar	Lu Myan village, N Latt 25°23'42.455" and E Long 097° 54'19.775", Elevation 790 m
2.	*Neillia sinensis* Oliv.	Chinese neillia	Unknown	Lu Htaung village, N Latt 25° 22'20.464" and E Long 097° 54'12.666", Elevation 1356 m
3.	*Prunus cerasoides* D.Don	Byin-byimg, Chai-ri, Panni, Pannu	Cherry	La Jaung village, N Latt 25°23'41.001" and E Long 097° 55'10.877", Elevation 1250 m
4.	*Prunus mume* (Siebold) Siebold & Zucc	Sow Thistle, Plum	Maman	Kampaitee village, N Latt25°25'47.428" and ELong097°56'55.054", Elevation 1503 m
5.	*Prunus persica* (L.) Batsch	Me-man, Phai-zong, Shanzi	Peach	Kampaitee village, N Latt 25° 25'10.113" and E Long 097° 54'20.775", Elevation 1222 m
6.	*Pyrus pyrifolia* (Burm.f.) Nakai	Pear	Thit taw yaing	La Jaung village, N Latt 25° 23'42.008" and E Long 097° 54'17.878", Elevation 1265 m
7.	*Rosa chinensis* Jacq.	China Rose	Hnin si yaing	La Jaung village, N Latt 25° 25'49.721" and E Long 097° 55'17.355", Elevation 1205 m
8.	*Rosa clinophylla* Redout & Thory	Kahpalap, Myitkaing	Hnin si yaing	Madain village, N Latt 25° 22'10.101" and E Long 097° 32'24.111", Elevation 180 m
9.	*Rubus corchorifolius* L. f.	Kaiching	Unknown	Kampaitee village, N Latt 25° 24'38.899" and E Long 097° 06'57.321", Elevation 1995 m
10.	*Rubus ellipticus* var. *obcordatus* Focke.	Chaya, Lingsan, Shaga, Sumwe	Nga u su pin	Kampaitee village, N Latt 25° 25'27.340" and E Long 097° 54'47.410", Elevation 1270 m
11.	*Rubus reflexus* Ker Gawl.	Raspberry	Unknown	La Jaung village, N Latt 25° 25'41.001" and E Long 097° 55'10.877", Elevation 1250 m
12.	*Rubus rosifolius* Sm.	Raspberry	Namjawshalum	La Jaung village, N Latt 25° 22'57.587" and E Long 097° 44'11.395", Elevation 671 m

1.***Chaenomeles speciosa*** (Sweet) Nakai, J. Jap. Bot. 4:331.192. (Figure 1, A-F)

Cydonia speciosa Sweet, Hort. Suburb. Lond.113.1818.

Flowering period : November to February

Perennial deciduous shrubs, up to 2-5 m high. Leaves simple, alternates petiolate; stipules conspicuous, reniform, glabrous; blades oblong-elliptic, reniform at the base, slightly emerginate at the apex. Inflorescences axillary, solitary cyme. Flowers bisexual, dark pink; pedicels subsessile. Hypanthium campanulate. Sepals 5, reddish-green, fused. Petals 5, free, orbicular, caducuous. Stamens numerous; anthers dithecous. Carpels 5, fused, within the hypanthium, style 5, pentalocular, with many ovules on the axile placenta. Fruits pomiferous.

2. ***Neillia sinensis*** Oliv., Icon. Pl. 16:, pl. 1540. 1886. (Figure 1, G-L)

Flowering period : June to August

Perennial; climbing subshrubs, up to 2-3 m high. Leaves simple, hastate, alternate; stipules ovate, pubescent; petiolate, blades ovate, pubescent on veins lower surfaces. Inflorescences terminal, racemose. Flowers bisexual, white; pedicelate. Hypanthium campanulate. Sepals 5, lanceolate-ovate, alternate petals, pubescent. Petals 5, free, caducuous, white, ovate. Stamens numerous; anthers dithecous. Carpels 1, 2 ovules, pendulous placenta. Fruits follicular.

3. ***Prunus cerasoides*** D.Don, Prod. Fl. Nepal 239. 1825. (Figure 2. A-F)

Flowering period : November to February

Perennial; deciduous, tree, up to 12-15 m high. Leaves simple, fascicles, alternate; stipulate, caducuous; petiolate, gland two dots at the base; blades lanceolate, glabrous, acuminate at the apex. Inflorescences axillary, fascicles, cyme. Flowers bisexual, pale pink; pedicelate. Hypanthium campanulate. Sepals 5, triangular. Petals 5, free, obovate, pink, caducuous. Stamens numerous, filaments pink; anthers dithecous. Carpels 1, oblong, glabrous, one ovule, on the pendulous placenta. Fruits drupaceous.

4. ***Prunus mume*** (Siebold) Siebold & Zucc. Fl. Jap. 1:29.pl.11. 1836. (Figure 2, G-L)

Armeniaca nume Siebold, Verh. Batav. Genootsch. Kunst. 12(1):69. 1830.

Flowering period : January to March

Perennial small tree, deciduous, up to 3-5 m high. Leaves simple, alternate, petiolate; stipules caducuous; petiole with glands; blades ovate-oblong, serrate and red-gland along the margin, acuminate at the apex,. Inflorescences axillary, cymose, solitary or 2 in a fascicle. Flowers bisexual, white; pedicels sessile. Hypanthium campanulate. Sepals 5, oblong-ovate. Petals 5, free, white, orbicular. Stamens numerous, free; anthers dithecous. Carpels 1, densely sliky pubescent, 2 ovules, on the pendulous placenta. Fruits drupaceous.

5. ***Prunus persica*** (L.) Batsch, Beytr. Entw. Cewachsreich. 1:30.1801.(Figure 3, A-F)

Amygdalus persica L., Sp. Pl. 1: 472. 1753.

Flowering period : February to April

Perennial small tree, deciduous, up to 4-5 m high. Leaves simple, alternate, petiolate; stipules caducous; blades ovate-elliptic. Inflorescences terminal or axillary, solitary. Flowers bisexual, dark pink; pedicels stout. Hypanthium campanulate. Sepals 5, ovate-oblong. Petals 5, free, ovate-

orbicular, crenate along the margin. Stamens numerous, free; anthers dithecous. Carpels 1, densely pubescent, one-ovulate on the pendulous placenta. Fruits drupaceous.

6. ***Pyrus pyrifolia*** (Burm.f.)Nakai, Bot.Mag.Tokyo 40(479): 564.1926. (Figure 3, G-L)

Ficus pyrifolia Burm.f., Fl. Indica. 226.1768.

Flowering period : February to March

Perennial small tree, up to 5-7 m high. Leaves simple, alternate, stipulate; petiolate; blades ovate, reddish green at young. Inflorescences terminal or axillary, raceme umbellate. Flowers bisexual, white; pedicelate. Hypanthium urceolate. Sepals 5, triangular. Petals 5, free, caducous, white, broadly ovate. Stamens numerous; anthers dithecous. Carpels 5, fused, within the hypanthium; slightly pubescent, 2 ovulate on the basal placenta. Fruits pomeferous.

7. ***Rosa chinensis*** Jacq., Observ. Bot. 3:7, t.55. 1768. (Figure 4, A-F)

Flowering period : March to June

Perennial climbing shrubs, up to 1-2 m high. Leaves compound, imparipinnate; alternate; stipules adnate; petiolate; blades ovate. Inflorescences terminal, corymb. Flowers bisexual, pink; pedicelate. Sepals 5, ovate. Hypanthium ovoid. Petals numerous, free, obovate. Stamens numerous; anthers dithecous. Carpels many, free, within the hypanthium; unilocular, one-ovulate on the basal placenta. Fruits hip.

8. ***Rosa clinophylla*** Redout & Thory, Roses 1:43. 1837. (Figure 4, G-L)

Rosa involucrata Roxb. ex Lindl., Fl. Ind. 2:53. 1832.

Flowering period : February to May

Perennial erect shrubs, up to 2-3 m high. Leaves compound, imparipinnate; alternate, petiolate; stipules adnate, fimbriate; leaflets 3- to 7-paired; blades elliptic. Inflorescences terminal, cymose. Flowers bisexual, white; pedicels pubescent; involucra bracts ovate, fimbriate along the margin, pubescent. Hypanthium obovoid, densely pubescent. Sepals 5, ovate. Petals 5, free, broadly obovate, white, emerginate at the apex. Stamens numerous; anthers dithecous. Carpels many, free, within the hypanthium, densely silky pubescent, unilocular, one-ovulate on the basal placenta. Fruits hip.

9. ***Rubus corchorifolius*** L.f., Suppl. Pl. 263.1781. (Figure 5, A-F)

Flowering period : February to March

Perennial shrubs, up to 1-2 m high. Leaves simple, alternate; stipules adnate; petiolate; blades ovate, silky pubescent. Inflorescences axillary, solitary. Flowers bisexual, white; pedicels silky pubescent. Hypanthium campanulate. Sepals 5, ovate, pubescent. Petals 5, free, obovate. Stamens numerous; anthers dithecous. Carpels many, free; unilocular, 1-ovulate on the basal placenta, pubescent. Fruits aggregate.

10. ***Rubus ellipticus*** var. ***obcordatus*** Focke, Biblioth. Bot. 17 (Heft 72(2)):199. 1911. (Jun 1911). (Figure 5, G-L)

Flowering period : January to April

Perennial erect shrubs, up to 2-3 m high. Leaves compound, trifoliolate, alternate; stipules adnate, pubescent; petioles densely brownish pubescent; blades obcordate, cordate at the apex,

densely brownish pubescent. Inflorescences terminal or axillary, paniculate cyme. Flowers bisexual, white; pedicellate. Hypanthium campanulate. Sepals 5, ovate, persistent. Petals 5, free, obovate. Stamens numerous, slightly curved; anthers dithecous, dorsifixed. Carpels many, free; unilocular, one-ovulate on the basal placenta. Fruits aggregate.

11. ***Rubus reflexus*** Ker. Gawl., Bot. Reg. 6:461. 1820 (Figure 6, A-F)

Flowering period : May to July

Perennials climbing scandent shrubs, up to 1-3 m high. Leaves simple, hastate, alternate; stipulate; petiolate; blades auriculate-oblong. Inflorescences terminal or axillary, paniculate cyme. Flowers bisexual, white; pedicellate, densely pubescent. Hypanthium obconical, densely rusty pubescent. Sepals 5, ovate, pubescent. Petals 5, free, antisepalous, obovate. Stamens numerous; anthers dithecous. Carpels many, unilocular, one-ovulate on the pendulous placenta. Fruits aggregate.

12. ***Rubus rosifolius*** Sm., Pl., Icon.Ined. 3: pl.60. 1791. (Figure 6, G-L)

Flowering period : February to April

Perennial shrubs; up to 1-3 m high. Leaves compound, imparipinnate; alternate; stipulate; petiolate; leaflets 2- to 4-paired; blades elliptic-ovate. Inflorescences terminal or axillary, cymose. Flowers bisexual, white; pedicellate, with gland hair. Hypanthium urceolate. Sepals 5, ovate. Petals 5, free, obovate. Stamens numerous, free; anthers dithecous. Carpels numerous, free, unilocular, one-ovulate on the pendulous placenta. Fruits aggregate.

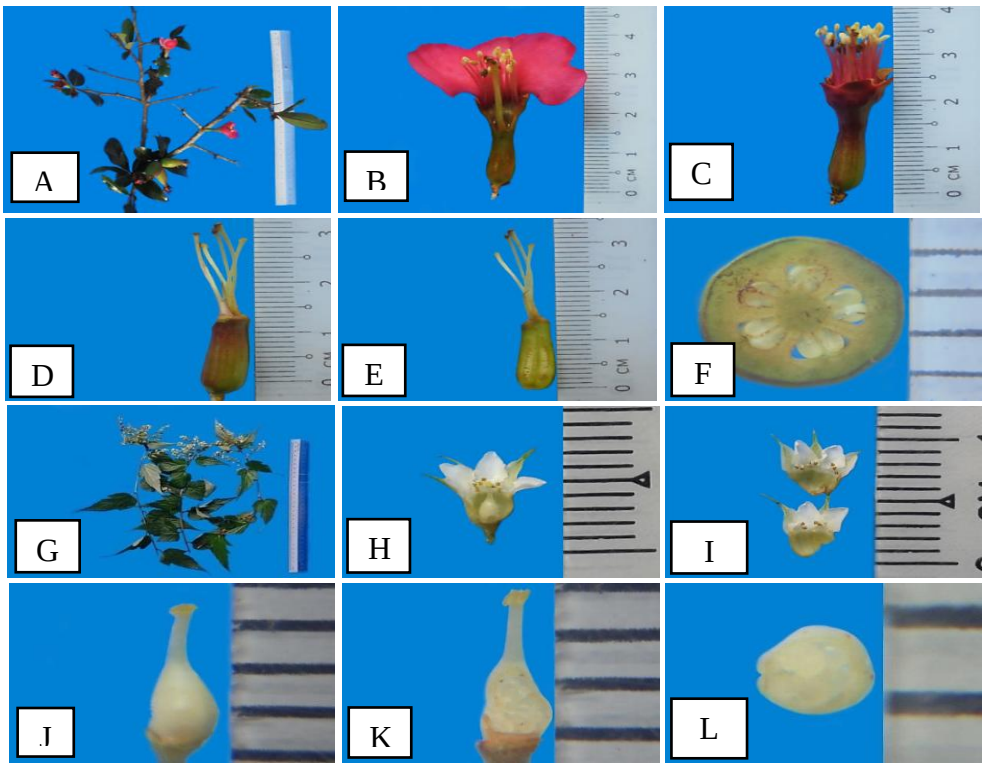


Figure 1 *Chaenomeles speciosa* (Sweet) Nakai, **A**.- Inflorescence, **B**.- L.S of flower, **C**.- Stamens **D**.- Pistal, **E**.- L.S of ovary, **F**.- T.S of ovary; ***Neillia sinensis*** **Oliv**.,**G**.- Inflorescence, **H**.- L.S of flower, **I**.- Stamens, **J**.- Pistal, **K**.- L.S of ovary, **L**.- T.S of ovary

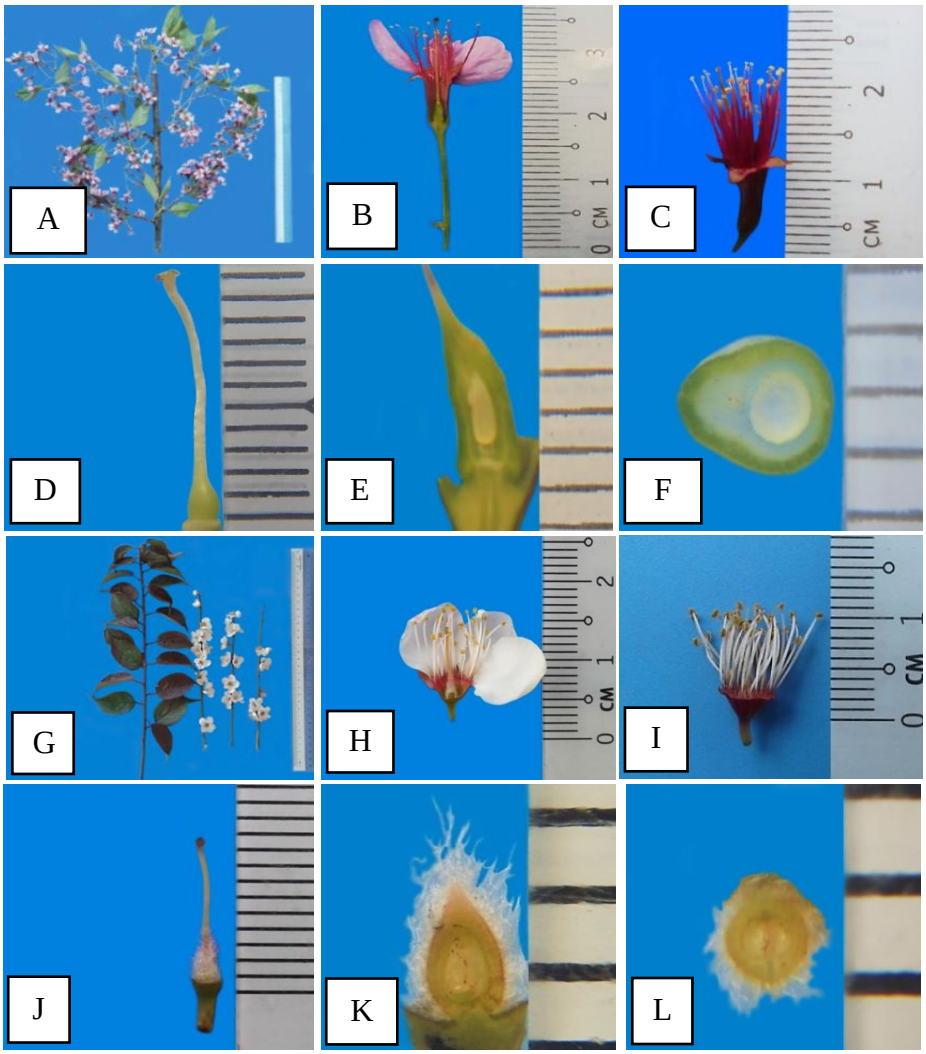
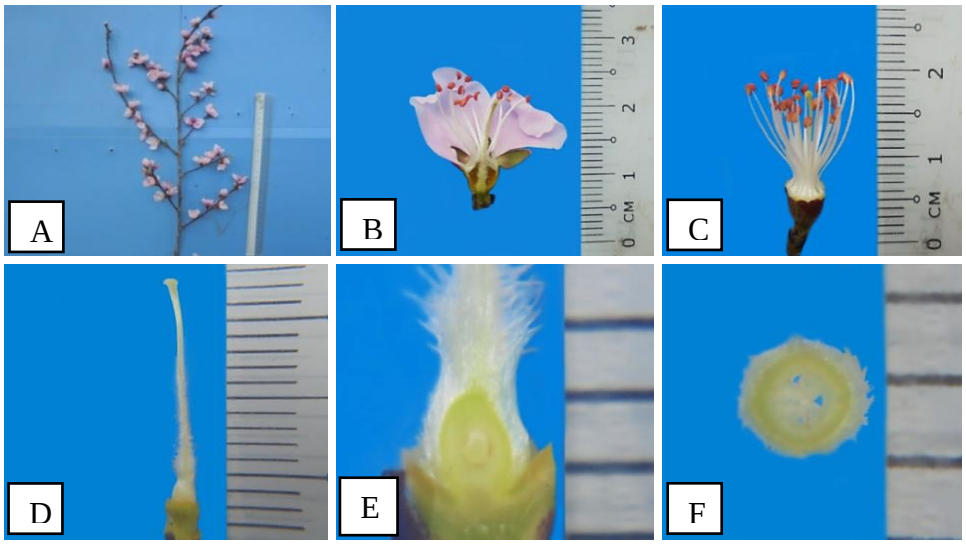


Figure 2 *Prunus cerasoides* D.Don, **A**.-Inflorescence, **B**.- L.S of flower, **C**.- Stamens, **D**.–Pistil, **E**.- L.S of ovary, **F**.- T.S of ovary; ***Prunus mume*** **(Siebold) Siebold & Zucc**., **G**.- Inflorescence, **H**.- L.S of flower, **I**.- Stamens, **J**.- Pistil, **K**.- L.S of ovary, **L**.- T.S of ovary



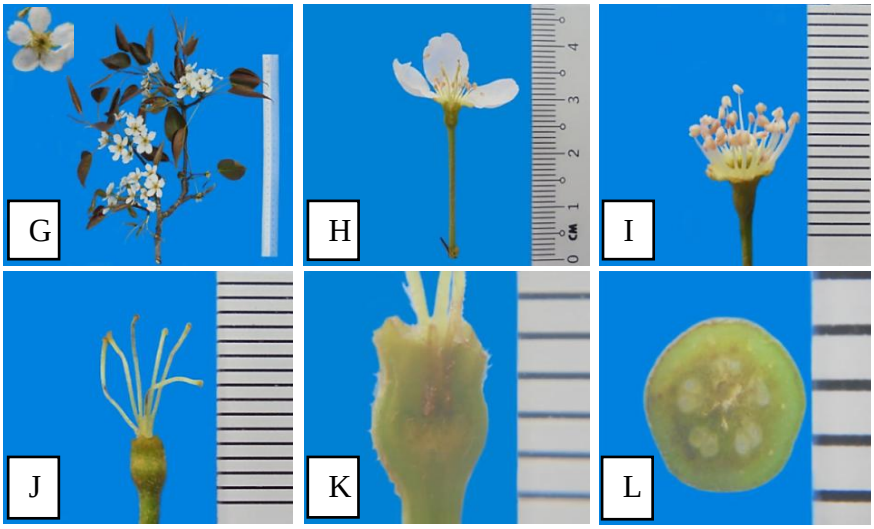


Figure 3 *Prunus persica* (L.) Batsch, **A**.- Inflorescence, **B**. -L.S of flower, **C**. Stamens **D**.- Pistil, **E**.- L.S of ovary; **F**.- T.S of ovary; ***Pyrus pyrifolia* (Burm.f.) Nak** **G**.- Inflorescence, **H**. -L.S of flower, **I**.- Stamens, **J**.- Pistil, **K**.- L.S of ovary, **L**.- T.S of ovary

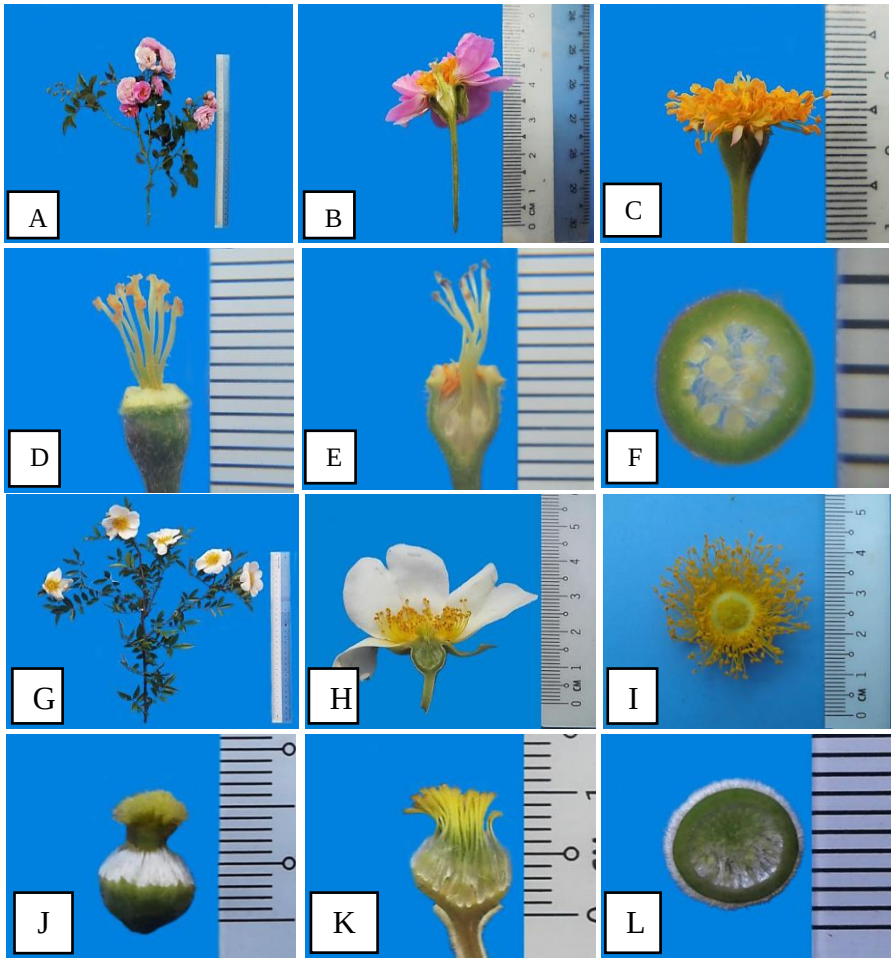


Figure 4 *Rosa chinensis* Jacq., **A**.- Inflorescence, **B**.- L.S of flower, **C**.- Stamens, **D**.Pistil, **E**.- L.S of hypanthium, **F**.- T.S of hypanthium, showing ovaries; ***Rosa clinophylla* Redout & Thory, G**.- Inflorescence, **H**.- L.S of flower, **I**.- Stamens, **J**.- Pistil, **K**.- L.S of hypanthium, **L**.- T.S of hypanthium showing ovaries

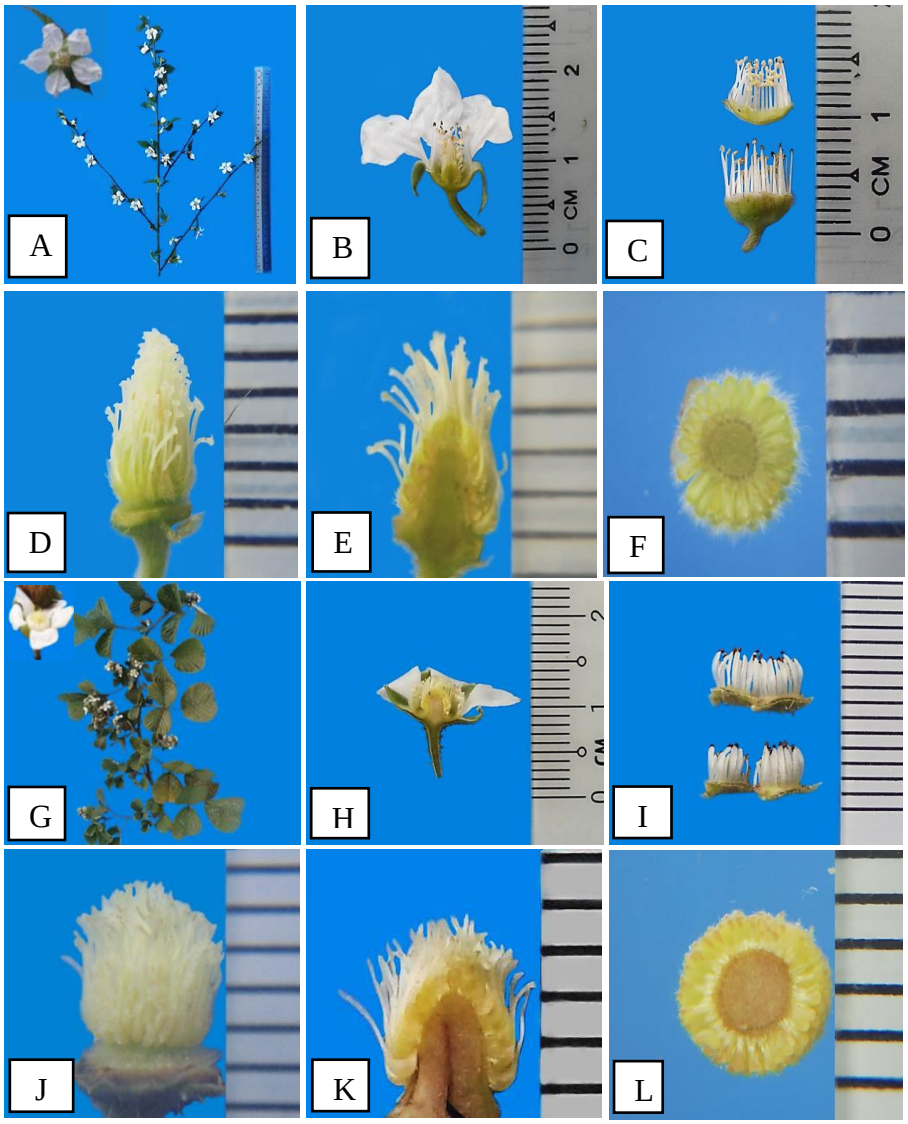
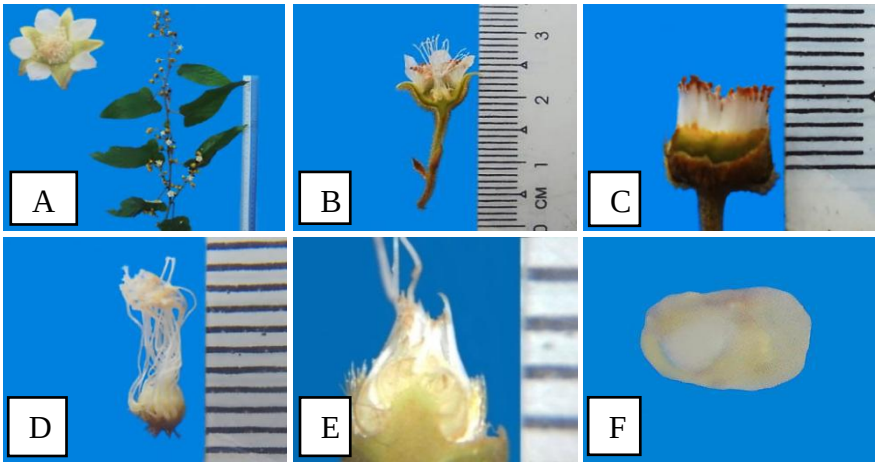


Figure 5 *Rubus corchorifolius* L.f., **A**.- Inflorescence, **B**.- L.S of flower, **C**.- Stamens, **D**.- Pistil, **E**.- L.S of ovaries on thalamus, **F**.- T.S of ovaries on thalamus; ***Rubus ellipticus* var. *obcordatus* Focke, G**.- Inflorescence, **H**.- L.S of flower, **I**.Stamens, **J**.- Pistil, **K**.- L.S of ovaries on thalamus, **L**.- T.S of ovary attaching on thalamus



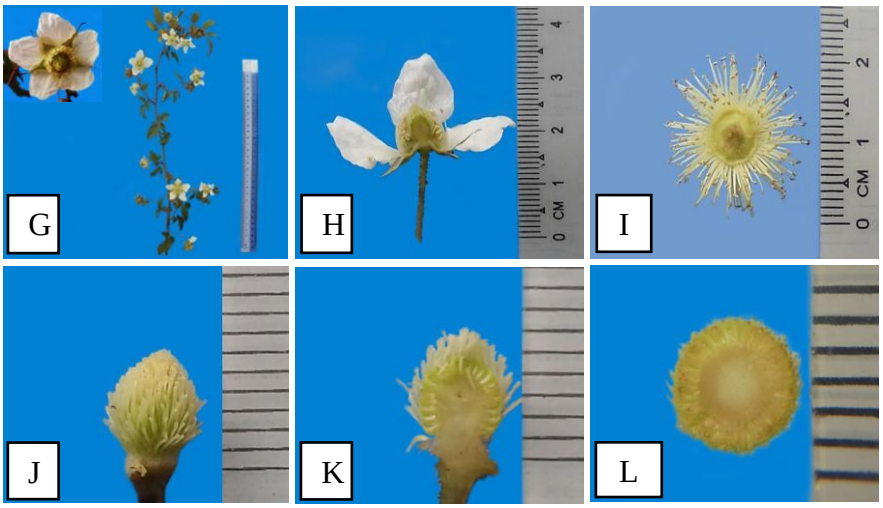


Figure 6 *Rubus reflexus* Ker Gawl., **A**.- Inflorescence, **B**.- L.S of flower, **C**.- Stamens, **D**.- Pistil, **E**.- L.S of ovaries on thalamus, **F**.- T.S of ovaries on thalamus; ***Rubus rosifolius*** **Sm., G**.- Inflorescence, **H**.- L.S of flower, **I**.- Stamens, **J**.- Pistil, **K**.- L.S of ovaries on thalamus, **L**.- T.S of ovaries on thalamus

Discussion and Conclusion

The present research deals with the taxonomic study on some member of rosaceous plants growing in Waingmaw Township is located in east bank of Ayeyarwaddy river. It has been found that the totally 12 species belonging to 6 genera of Rosaceae were distributed in study area.

The growing habits of the rosaceous plants vary in the studied area. The 4 species such as *Prunus cerasoides* D.Don, *Prunus mume* (Siebold) Siebold & Zucc., *Prunus persica* (L.) Batsch, and *Pyrus pyrifolia* (Burm.f.) Nakai were growing as tree, other species such as *Chaenomeles speciosa* (Sweet) Nakai, *Rosa clinophylla* Redout & Thory., *Rubus corchorifolius* L.f., *Rubus ellipticus* var. *obcordatus*, were growing shrub and *Neillia sinensis* Oliv. Icon, *Rosa chinensis* Jacq., *Rubus reflexus* Ker. Gawl., and *Rubus rosifolius* Sm. were growing climbing shrub.

All species were bisexual, actinomorphic, pentamerous, perigynous flowers with hypanthium. The leaves aestivation types of some rosaceous plants were simple and imparipinnate compounds. The inflorescences type of rosaceous plants were axillary cymose, terminal racemose, terminal cymose and terminal paniculate cymose. The various colour of flower such as pink and white were found in some member of rosaceous plants. The types of rosaceous fruits were varying such as aggregate, drupe, follicles, hip and pome.

Chaenomeles speciosa (Sweet) Nakai, *Pyrus pyrifolia* (Burm.f.) Nakai, *Rosa chinensis* Jacq., and *Rosa clinophylla* Redout & Thory., carpels were within the hypanthium, *Neillia sinensis* Oliv. Icon, *Prunus cerasoides* D.Don, *Prunus mume* (Siebold) Siebold & Zucc. and *Prunus persica* (L.) Batsch were one carpel and connate to on cupular receptacle and *Rubus corchorifolius* L.f., *Rubus ellipticus* var. *obcordatus*, *Rubus reflexus* Ker. Gawl. and *Rubus rosifolius* Sm. carpels were free and adnate to inner surface of cupular receptacle.

Qi-ming and De-lin, (2008) mentioned that the fruits of *Prunus mume, Prunus persica, Rubus reflexus* and *Pyrus pyrifolia* are edible. The plants of medicinal value were *Prunus mume,*

Prunus persica, *Rosa chinensis*, *Rubus reflexus* and *Rubus rosifolius* and *Prunus mume* and *Rosa chinensis* were the ornamental plants.

Among them, *Chaenomeles speciosa* (Sweet) Nakai, *Neillia sinensis* Oliv. Icon., *Pyrus pyrifolia* (Burm.f.) Nakai., *Rosa chinensis* Jacq., *Rubus reflexus* Ker. Gawl. and *Rubus rosifolius* Sm. are not recorded in previous list of Myanmar. These species are very valuable for compilation of Flora of Myanmar.

In the research work, many valuable species not only can be recorded but also various forest products can be found. Taxonomy was essential in theoretical and applied biology. Nevertheless, these natural plants resources will also be applied for future researchers. Therefore, the threatened and endangered species were needed to conserve. It was hope that this research work of floristic study on angiosperms of Waingmaw Township in Kachin state will provide valuable taxonomic information, affinities and distribution of plants for further researchers.

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