

Taxonomic study on some hydrophytes found in Taung Tha Man Lake area

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Abstract

The study area is situated in Mandalay Region, Amarapura Township, Taung Tha Man Lake. It lies between 21° 54' to 22° 53' N latitude and 96° 53' to 96° 63' E longitude. Taung Tha Man Lake area is characterized by a rich diversity of angiosperms species. Present study deals with the identification of hydrophytic species and to know the morphological characters, scientific names, myanmar names, english names, flowering period and about their key points. All the data were collected during the years 2017-2018. A total 7 species belong to 7 genera and 7 families of hydrophytic species were reported.

Keywords : Taung Tha Man Lake area, seven species, taxonomic characters

Introduction

Taung Tha Man Lake is located in Amarapura Township in Mandalay Region. According to the physiological features, the Taung Tha Man Lake is a large floodplain transformed into a permanent lake by the construction of water control gates. Water flows into the lake through Yekyibauk Chaung and to a lesser extent from the Dokhtawady River. The famous U Bein Bridge spans across this lake.

The Taung Tha Man Lake area of Amarapura Township has been the reservoir of many natural resources of wild species wealth. From earlier time, the natural species near Taung Tha Man Lake have been used for various purposes for local people including animal fodder, fire-wood, economic, medicinal and vegetables.

Aquatic plants are adapted to living in aquatic environments. They are also referred to as hydrophyte or macrophytes. According to their relation to water and air, the hydrophytes are grouped into three categories. They are floating hydrophytes, emergent hydrophytes and submerged hydrophytes (<https://en.m.wikipedia.org>).

The natural vegetation in Taung Tha Man Lake area varies due to topography and kinds of soil. In addition, the floristics studies of this area had not been completed; there are many researchers who have been searching to natural plant resources and other knowledge.

The aims and objectives of present research works were to classify the hydrophytes species in Taung Tha Man Lake area, to observe the knowledge of the nature of hydrophytes species and to give the valuable information of reported species.

Materials and Methods

The specimens were collected during the flowering period. The fresh specimens were recorded with colour photographs to describe their habits, arrangement of leaves, position of inflorescences and nature of flowers. In order to identification and classification, the required floral parts were dissected and studied under dissecting microscope with the help of pointers and forceps. Firstly, to know the families by using the artificial key to the family written by Hutchinson (1967). The next step, its generic and species names are identified or keyed out. Identification of collected specimens by referring to Flora of British India (Hooker 1885), Flora of Java (Backer 1963) and Flora of Ceylon (Dassanayake 1980 - 2001). Then, the genera and species were also arranged by alphabetically. Myanmar names were received from Hundley and Chit Ko Ko (1987) and Kress *et al* (2003).

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Figure 1. Map of the Study Area

Results

List of collected species

In the present study, 7 species belong to 7 genera of 7 families under class Magnoliopsida (Dicotyledoneae) and Liliopsida (Monocotyledoneae) are shown in table.

Table 1. List of the collected species in the studied area

Division - Spermatophytes (Angiospermae)
 Subdivision - Magnoliophyta
 Class - Magnoliopsida (Dicotyledoneae)

Subclass	Order	Family	Scientific name
Caryophyllidae	Caryophyllales	Amaranthaceae	1. <i>Alternanthera philoxeroides</i> (Mart.) Griseb
Rosidae	Myrtales	Onagraceae	4. <i>Ludwigia adscendens</i> (L.) Hara.
	Apiales	Apiaceae	3. <i>Hydrocotyle umbellata</i> L.

Class - Liliopsida (Monocotyledoneae)

Subclass	Order	Family	Scientific name
Alismatidae	Hydrocharitales	Hydrocharitaceae	5. <i>Ottelia cordata</i> (Wall.) Dandy
Arecidae	Arales	Araceae	6. <i>Pistia striatiotes</i> L.
Commelinidae	Typhales	Tphaceae	7. <i>Typha angustigolia</i> L.
Liliidae	Liliales	Pontederiaceae	2. <i>Eichhornia crassipes</i> (Mart.) Solms-Laub.

1. *Alternanthera philoxeroides* (Mart.) Griseb.

Family : Amaranthaceae
 English name : Alligator weed
 Myanmar name : Kanabaw
 Flowering period : June to November

Perennial, emergent herbs, ascending with creeping or floating rooting base; stems terete, fistular, slightly tumid at the nodes, rooting at the node. Leaves simple, opposite and

decussate, exstipulate, petiolate; leafblade oblong-lanceolate or elliptic-lanceolate, attenuate at the base, entire along the margin, acute at the apex. Inflorescences axillary, spike or head; peduncles long. Flowers silvery-white, bisexual, actinomorphic, hypogynous; bracts and bracteoles ovate-lanceolate. Perianth-segments 5, free, subequal, the outer two larger, the inner three-smaller. Stamens 10, 5 fertile alternating with 5 staminodes, inserted; filaments equal in length; anthers monotheous, oblong, dorsifixed, introrse, longitudinal dehiscence. Ovary superior, unilocular with solitary ovule in each locule, basal placentation; style very short; stigmas capitate. Fruits an indehiscent utricle, oblong, enclosed by persistent perianth and bracteoles, brownish-black, glabrous.

2. *Eichhornia crassipes* (Mart.) Solms-Laub.

Family	: Pontederiaceae
English name	: Water Hyacinth
Myanmar name	: Beda pin
Flowering period	: June to November

Perennial, floating herbs; stems very short, producing a cluster of many fibrous roots. Leaves simple, rosulate, exstipulate; petioles spongy, inflated; leafblade broadly ovate, cuneate at the base, entire, along the margin, minutely mucronate at the apex. Inflorescences terminal spike, with 8-15 flowers. Flowers purple or violet, bisexual, zygomorphic, hypogynous, bract broadly sheathing with translucent sides. Perianth-segments 6, in 2 series; tubes curved, glandular-hairy outside; posterior lobe ovate with bright yellow blotch at center and marked with distinct oblique veins; other lobes with deeper mauve median line. Stamens 6, in 2 series, unequal, free, adnate to the throat of perianth tube, inserted; filaments unequal in length; decurved, with numerous glandular hairs; anthers ditheous, dorsifixed, introrse, longitudinal dehiscence. Ovary superior, tricarpeal, syncarpous, trilocular with many ovules in each locule, axile placentation; style terminal, slightly curved, glandular-hairy; stigma bifid, densely hairy. Fruits not available in this study.

3. *Hydrocotyle umbellata* L.

Family	: Apiaceae
English name	: Dollarweed
Myanmar name	: Sae-myin-khwa
Flowering period	: March to October

Perennial, rooting emergent herbs. Leaves simple, alternate, arising from the creeping root stock, stipulate; petioles slender; leafblade orbicular, shallowly undulate along the margin. Inflorescences umbels with many flowers. Flowers white, bisexual, actinomorphic, epigynous; bract minute; pedicels slender. Sepals absent. Petals 5, ovate-lanceolate, imbricate. Stamens 5, alternate with the petals; filaments short, anther ditheous, introrse, basifixed. Ovary inferior, bicarpeal, unilocular with one ovule in each locule, pendulous placentation; style 2; stigma globose. Fruits schizocarps with two mericarps, orbicular to ellipsoid.

4. *Ludwigia adscendens* (L.) Hara.

Family	: Onagraceae
English name	: Water primrose
Myanmar name	: Ye-ka-nyunt
Flowering period	: June to October

Perennial, emergent herbs; stems terete, solid, with spongy respiratory roots at the nodes. Leaves simple, alternate, stipulate, petiolate; leafblade oblong-elliptic, cuneate at the base, entire along the margin, acute to obtuse at the apex. Inflorescences axillary, solitary

cyme. Flowers yellowish-white, bisexual, actinomorphic, epigynous; ebracteate; bracteolate. Sepals 5, free, obovate, slightly connate at the base. Petals 5, free, equal in length and size, obovate, entire at the margins. Stamens 10, free, inserted; filaments, unequal in length; anthers ditheous, dorsifixed, oblong, introrse, longitudinal dehiscence. Ovary inferior, pentalocular with many ovules in each locule, axile placentation; style stout; stigma discoid. Fruits capsule, linear-oblong, yellowish-brown.

5. *Ottelia cordata* (Wall.) Dandy.

Family : Hydrocharitaceae
 English name : Duck-lettuce
 Myanmar name : Hin-nyant
 Flowering period : November to January

Annual, rooting submerged herbs. Leaves simple, radical, crowded dimorphic; petioles sheathing at the base, submerged leaves narrowly elliptic, floating leaves broadly lanceolate, cordate at the base, entire along the margin and acute at the apex. Inflorescences axillary, umbellate fascicles in staminate plant and solitary in pistillate ones; spathe ovate-oblong with longitudinal ribs, bifid at apex; male spathe with 10-25 male flowers; female spathe with only 1 female flower. Flowers white, unisexual, actinomorphic, epigynous. Sepals 3, oblongoid. Petals 3, obovate. Stamens 12, unequal; filaments slender, densely hairy; anthers ditheous, introrse, basifixed, longitudinal dehiscence; staminodes 3-8. Ovary inferior, oblong, unilocular, many ovules in each locule, parietal placentation; style 9-18, stigma bifid. Fruits capsule, oblong, irregularly dehiscence. Seeds reniform, smooth.

6. *Pistia stratiotes* L.

Family : Araceae
 English name : Water-lettuce
 Myanmar name : Ye-salat
 Flowering period : July to November

Perennial, floating herbs; stoloniferous, adventitious roots robust; stems very short, bearing a rosette of leaves. Leaves simple, densely rosulate, exstipulate, sessile; leafblade obovate to obovate-cuneate, cuneate at the base, entire and sometimes undulate at the margins, truncate at the apex. Inflorescences spadix, on lower surface of leaf-rosette. Flowers greenish-white to white, unisexual, actinomorphic, without a perianth; staminate flowers subtended by a membranous collar surrounding the middle portion of the spadix; pistillate flowers solitary, flask-shaped, on the lower part of the spadix. Stamens 4-5, syngenesious, appearing to terminate the spadix. Ovary superior, unilocular with many ovules in each locule, marginal placentation; style terminal, conical, thick; stigma discoid. Fruit not available in this study.

7. *Typha angustifolia* L.

Family : Typhaceae
 English name : Reed mace
 Myanmar name : Shin-mwe-lon; Paik swe
 Flowering period : June to February

Perennial, emergent herbs; stems erect, not tumid at the nodes. Leaves simple, opposite and distichous, sessile; leafsheath linear, sheathing at the base, entire along the margin, acute at the apex. Inflorescences terminal spikes, usually 2, superposed, many-flowered. Flowers greenish-yellow to reddish-brown, unisexual, actinomorphic, hypogynous, staminate spike above and pistillate beneath, bracteate, ebracteolate. Perianth represented by capillary hairs, at first green and finally pale green, persistent. Stamens 2-4, exserted, equal; filaments connate above the middle or near the base of anthers; anthers ditheous, linear,

basifixed, longitudinal dehiscence. Ovary superior, fusiform, unilocular with solitary ovule in each locule, pendulous placentation; style terminal, longer than the ovary; stigma flat. Fruits achene, oblanceolate, pale brown to brown, glabrous.

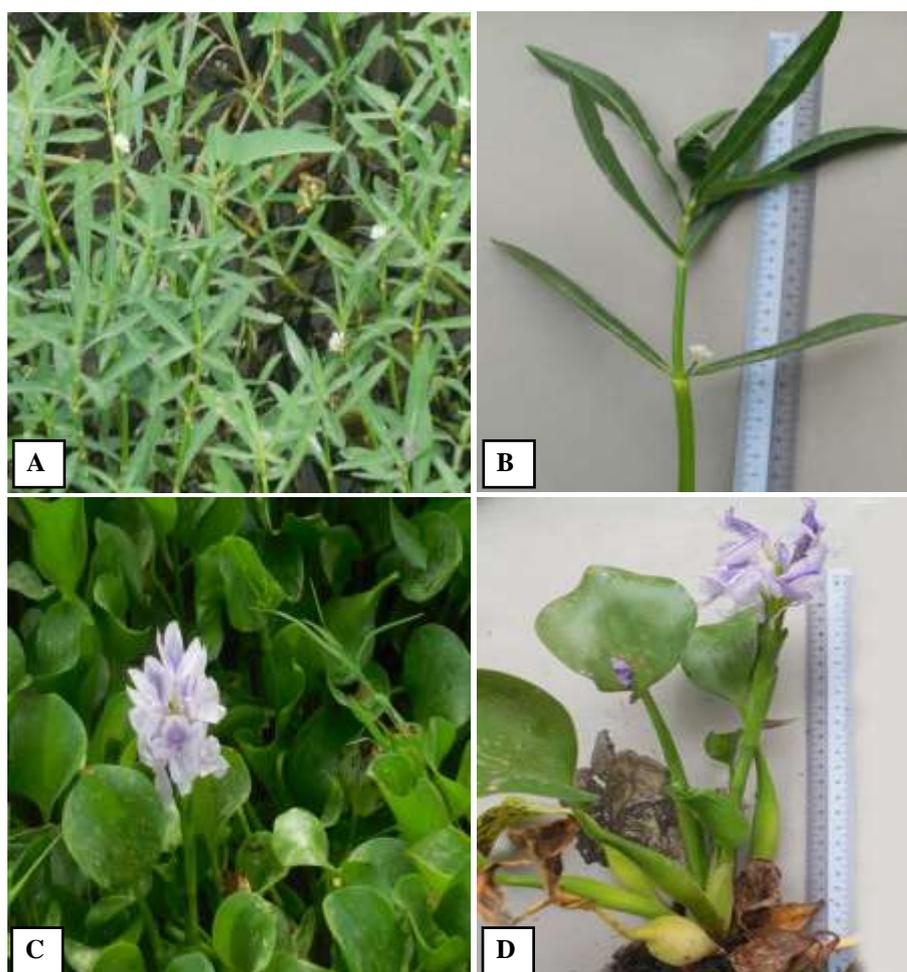


Figure 2. A. Habit of *Alternanthera philoxeroides* (Mart.) Griseb.
B. Inflorescence of *Alternanthera philoxeroides* (Mart.) Griseb.
C. Habit of *Eichhornia crassipes* (Mart.) Solms-Laub.
D. Inflorescence of *Eichhornia crassipes* (Mart.) Solms-Laub.

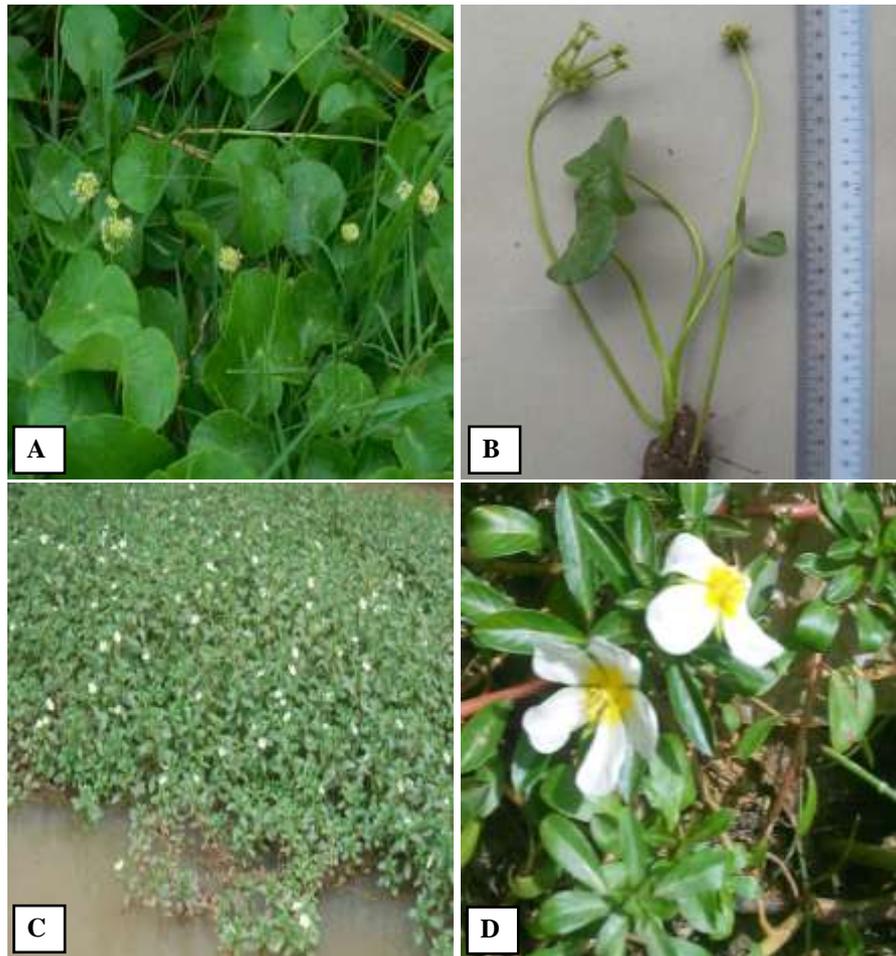


Figure 3. A. Habit of *Hydrocotyle umbellata* L.
B. Inflorescence of *Hydrocotyle umbellata* L.
C. Habit of *Ludwigia adscendens* (L.) Hara.
D. Inflorescence of *Ludwigia adscendens* (L.) Hara.

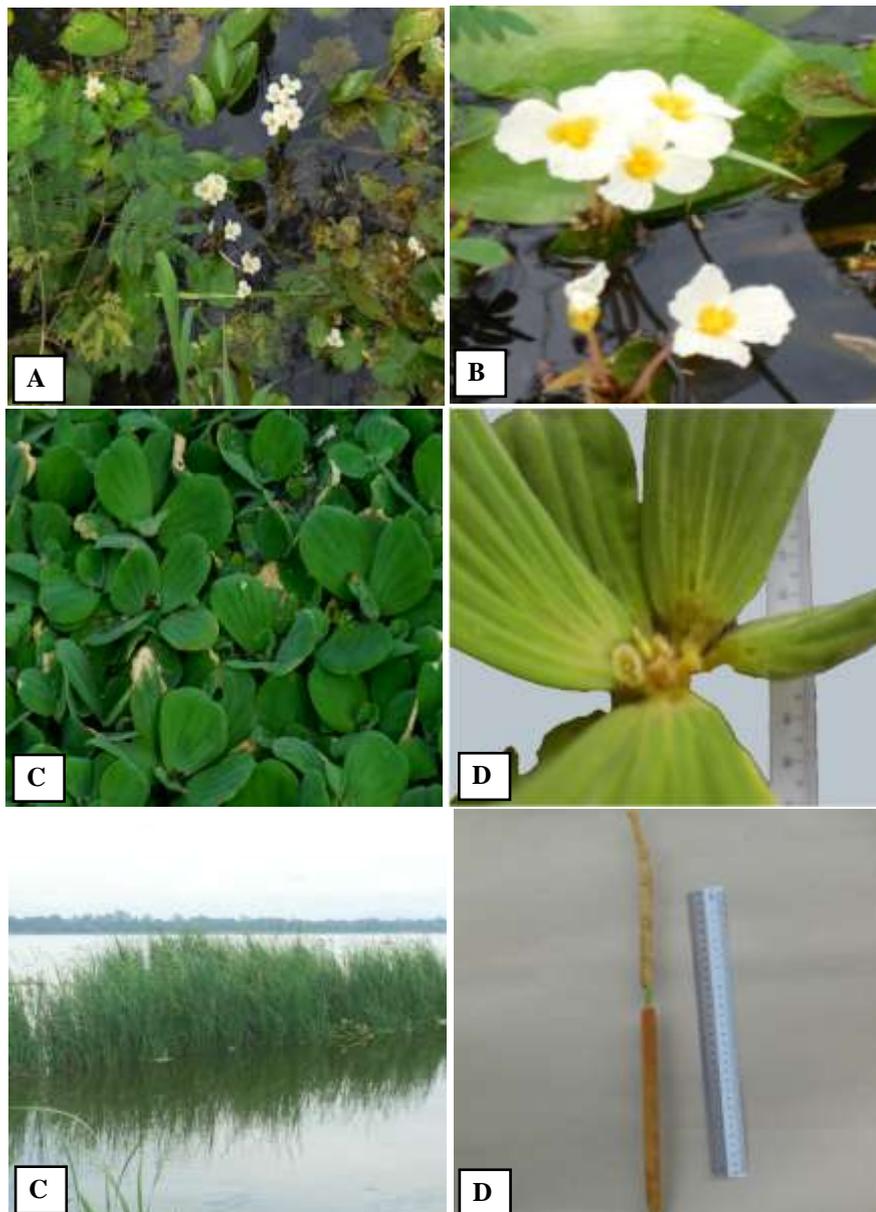


Figure 4. A. Habit of *Ottelia cordata* (Wall.) Dandy.
 B. Inflorescence of *Ottelia cordata* (Wall.) Dandy.
 C. Habit of *Pistia stratiotes* L.
 D. Inflorescence of *Pistia stratiotes* L.
 E. Habit of *Typha angustifolia* L.
 F. Inflorescence of *Typha angustifolia* L.

Discussion and Conclusion

The present study deals with the seven species growing in Taung Tha Man Lake area, Amarapura Township, Mandalay Region. All the studied were growing in wild. The species of *Alternanthera philoxeroides* (Mart.) Griseb, *Hydrocotyl umbellata* L. and *Ludwigia adscendens* (L.) Hara. under dicotyledoneae and the species of *Eichhornia crassipes* (Mart.) Solms-Laub., *Pistia stratiotes* L., *Ottelia cordata* (Wall.) Dandy. and *Typha angustifolia* L. under Monocotyledoneae. There are more members of Monocotyledoneae than Dicotyledoneae in the population of hydrophytes in the present study.

In the present research, floating hydrophytes are *Eichhornia crassipes* (Mart.) Solms-Laub. and *Pistia stratiotes* L. They are always in contact with water and air, but not with soil. Emergent hydrophytes the so called “amphibious plants” grow in shallow water and extent their shoots well above the surfaces. They are *Alternanthera philoxeroides* (Mart.) Griseb, *Hydrocotyl umbellata* L., *Ludwigia adscendens* (L.) Hara. and *Typha angustifolia* L. Submerged hydrophytes is *Ottelia cordata* (Wall.) Dandy. This plants is rooted to the substratum and their leaves are floating on the water surface.

In the present study, the arrangement of the leaves is either alternate as in *Hydrocotyle umbellata* L. and *Ludwigia adscendens* (L.) Hara. or opposite and distichous as in *Typha angustifolia* L. or bearing a rosulate leaves as in *Eichhornia crassipes* (Mart.) Solms-Laub. and *Pistia stratiotes* L. or radical and crowded found in *Ottelia cordata* (Wall.) Dandy. The inflorescences are variable. Spike or head are found in *Alternanthera philoxeroides* (Mart.) Griseb, *Eichhornia crassipes* (Mart.) Solms-Laub. and *Typha angustifolia* L.; umbel in *Hydrocotyle umbellata* L. and *Ottelia cordata* (Wall.) Dandy.; solitary cyme in *Ludwigia adscendens* (L.) Hara.; spadix in *Pistia stratiotes* L. The flowers are mostly actinomorphic in six species while the resting species of *Eichhornia crassipes* (Mart.) Solms-Laub. is zygomorphic. Placentation type shows little variation. In *Hydrocotyle umbellata* L. and *Typha angustifolia* L. are pendulous placentation; in *Eichhornia crassipes* (Mart.) Solms-Laub. and *Ludwigia adscendens* (L.) Hara. are showed in axile placentation; in *Alternanthera philoxeroides* (Mart.) Griseb is basal placentation; in *Pistia stratiotes* L. is found in marginal placentation while the resting species is found in pariental placentation.

The study area are very important for the conservation of water, soil, natural environment and animal life resources but those of unreserved conditions have changed Taung Tha Man Lake area.

In conclusion, 7 species belonging to 7 genera of 7 families are presented and most are wild plants. It is believed that they can be used in advanced studies such as the conservation of water, soil, natural environment and animal life resources.

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