การศึกษาอนุกรมวิธานวิทยาของพืชน้ำกินแมลง วงศ์ Lentibulariaceae

Study on Taxonomy of Insectivorous Water Family Lentibulariaceae

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บทคัดย่อ

พืชน้ำกินแมลงในวงศ์ Lentibulariaceae มีเพียง 1 สกุลเท่านั้น คือ *Utricularia* L. การศึกษาในพืชกลุ่มนี้ยังมีน้อย ดังนั้นเพื่อศึกษาสัณฐานวิทยาของพืชสกุลนี้จึงได้ทำการสำรวจและเก็บตัวอย่างในพื้นที่ จ. สกลนคร อุดรธานี อุบลราชธานี ขอนแก่น พบว่ามีจำนวน 8 ชนิด แบ่งตามพื้นที่ที่เจริญเป็น 2 กลุ่มคือ กลุ่มพืชเจริญในที่ชื้นแฉะ ได้แก่ ดุสิดา (*U. delphinioides* Thor. ex Pell), สร้อยสุวรรณา (*U. bifida* L.), ทิพเกสร (*U. minutissima* Vahl.), หญ้าเข็ม (*U. caerulea* L.) และหญ้าฝอย (*U. hirta* klein) กลุ่มพืชที่ลอยน้ำ ได้แก่ สาหร่ายข้าวเหนียว (*U. aurea* L.) สาหร่ายกรอบแกรบ (*U. punctata* Wallich ex A. DC.) และ *U. exoleta* R.Br. ลักษณะสำคัญของพืชพวกนี้คือ มีถุงดักแมลงติดอยู่ที่ใบและลำต้น ลักษณะรูปทรงของถุงแบบรูปไข่ เกือบกลม คล้ายหอยโข่ง จำนวน ระยางค์ที่ปากถุงมี 1- จำนวนมาก ดอกมีสีม่วงเข้ม ม่วงอ่อน ม่วงสด ขาว ชมพู และเหลือง ดอกแบ่งเป็น 2 ส่วน ส่วนล่างมีลักษณะเป็นจะงอย ก้านช่อดอกแตกต่างกันตามฟองน้ำ ขน และสเกล ลักษณะต่าง ๆ เหล่านี้นำมาใช้ในการตรวจสอบเพื่อจำแนกชนิดโดยจัดทำเป็นรูปวิธาน (Key)

Abstract

Lentibulariaceae, a family of insectivorous water plant, has only 1 genus *Utricularia* L. In order to study the morphology of this genus, surveying and collecting has been undertaken in some provinces; SakonNakorn, UdonThani, UbonRachthani and Khon Kaen. There are 8 species and divided into two habitat types. The first is moistured terrestrial plant, namely *U. dephinioides* Thor. ex Pell., *U. bifida* L., *U. minutissima* Vahl., *U. coerulea* L., *U. hirta* Klein. The second group is an aquatic floating plant, namely *U. aurea* Lour., *U. punctata* Wallich ex A. DC., *U. exoleta* R.Br. The important characteristics are bladders which are attached on leaves and stolons, shapes are ovoid, nearly globose, look like an apple snail. A number of appendages at the mouth of bladders are 1- many. The colours of the flowers are dark purple, light purple, mauve, white, pink or yellow. Shapes of flowers are divided into two lips, the lower lips are spur. Peduncles are different with spongy floats, hairs and scales. These morphological characteristics are used to identify and classify the member in this family.

คำสำคัญ: พืชกินแมลง, พืชน้ำวงศ์ Lentibulariaceae

Keyword: Insectivorous, Lentibulariaceae

* *ผู้ช่วยศาสตราจารย์ ภาควิชาชีววิทยา คณะวิทยาศาสตร์ มหาวิทยาลัยขอนแก่น*

Introduction

Utricularia L., a genus of Lentibulariaceae, has about 200 species around the world, including both aquatic and m oist terrestrial plants. Taxonomic revision of *Utricularia* L. (Lentibulariaceae) in Thailand was reported 19 species and 1 variety (Maxwell, 1985). Rootless plants with finely dissected leaves bearing insectivorous bladders (traps). The stem is modified and functions as roots, stems, leaves and more uniquely bladders for capturing insects (Taylor, 1989). The bladders at the base of leaf are certainly found in all species. Bladders are globose or ovoid body with a mouth positioned variously on the stalk. In addition of the various shapes, stalks and mouth position, bladders have a great variety of external appendages in the oral area. The bladder is not the only special feature. Another important feature is the flower which is always racemose, short to relatively quite long with multi-cellular hairs always present on the inflorescence of *U. hirta* Klein. Scale (sterile bracts) presents in most species on the peduncle below the lowermost flower, calyx is always variously two lobed, corolla is bilabiate, without an obvious tube, the upper lip is usually smaller and less complex than the lower, the colour is mostly shades of yellow or violet, but red, blue, white, brown and various combinations of these colours occur. Stamens are two in number and are adnated to the base of corolla, filaments wide curved (Henry, 1967). Identification of this species are based on both reproductive and vegetative morphology.

Objectives

To study morphology, habitat and special dominant characteristic of bladders of *Utricularia* L. and using them for species identification and classification.

Material and Method

To survey and collect of *Utricularia* L. in some provinces areas of Khon Kaen, Skonnakorn, Udonthani and Ubonrachthani, a photo samples were taken under the natural field condition and specimens collected for further investigation. Identification and classification were performed in the Biology laboratory, Faculty of Science, Khon Kaen University. The morphological characteristics of each species were studied using stereomicroscope for drawing, taking photos and detail description of accessories organ and plant parts. Drying of *Utricularia* L. were proposed for herbarium specimens.

Results

Utricularia L. from fields were identified and classified to 2 groups and 8 species. The **first group, moist terrestrial plant,** has five member species, *U. delphinioides* Thor. ex Pell., *U. bifida* L., *U. minutissima* Vahl., *U. coerulea* L. and *U. hirta* Klein., they were found in the same habitat, open wet area in a natural grassland. They are always found in association with each others. They have green, spathulate leaves with bladders, could not be seen by naked eyes. Bladders are both on leaves and stolons. Flowers of these species occurred during October to January. **The other, aquatic floating plant,** has three member species. *U. aurea* lour., *U. punctata* Wallich ex A. DC., *U. exoleta* R.Br. (*U. gibba* L.) are aquatic floating plants. They have submerged leaves with large bladders which able to be naked seen by eyes.

Racemose inflorescences of these species occur during September to January. These florets have special characters, calyx are divided to two lobes, corolla devided to two lobes, upper lips and lower lips with short or long spur.

They are distributed by seeds that are produced in October to January.

***U. delphinioides* Thor. ex Pell.**

Annual plants. Rhizoid numerous from the base of peduncle, filiform-shaped. Stolon numerous, filiform, branched. Leaves green, spathulate. Bladders numerous on the stolons and leaves, nearly globose and stalked. The mouth of a bladder with two long, capillary recurved appendages. Inflorescences pedunculate, erect, branched, 5-32 cm. long, scales fews, similar to the bracts, on a distance peduncle, florets numerous, short pedicels, bracts 3, basifixed, calyx lobes persistent, subequal, corolla dark purple, fragrant, lower lip with spur. Stamens two, pistil 1, superior ovary. Fruits capsule. (Fig 1)

***U. bifida* L.**

Annual plant. Rhizoids numerous, filiform-shaped. Stolon filiform, branched. Leaves from the stolon nodes, green, spathulate. Bladders are not numerous, occuring on stolons and leaves, globose like apple snails, stalked, bladder mouth with two shortly recurved appendages. Inflorescence pedunculate 5-25 cm. long, erect, branched, scales few, similar to the bracts, on a distance peduncle, florets 2-10, pedicels 0.5-0.7 cm. long, bracts 3, basifixed, ovate apex acute, calyx lobes persistemt, subequal, broadly ovate, corolla bright yellow, lower lip with spur, stamens 2, pistil 1, ovary superior, Fruits capsule (Fig 2)

***U. minutissima* Vahl.**

Annual small plants. Rhizoids few. Stolons few, capillary, few branching. Leaves few from the peduncle base and the stolons, capillary, green, spathulate. Bladders numerous on stolons and leaves, neary globose and stalked, the appendages of bladder mouth numerous, straight, the outer appendages. Long the inner appendages short. Inflorescences pedunculate 5-20 cm. long, erect, branched, scales few, similar to the bracts, on a distance peduncle, 2-15 florets, pedicel shorts, bracts 3-4, basifixed, subequal, narrowly ovate with apex acute, calyx lobes persistent, subequal, corolla violet, mauve or white, lower lip with spur, stamens 2, pistil 1, ovary superior. Fruits capsule (Fig 3)

***U. coerulea* L.**

Annual small plants. Rhizoids few, capillary, branched. Stolons few, capillary, branched. Leaves few, near the base of peduncle base, capillary, green, spathulate. Bladders numerous on stolons and leaves, ovoid and stalked, single appendage, the mouth and appendage covered with numerous needle-liked structure with globose shapes at the terminal ends. Inflorescences pedunculate 5-20 cm. long, erect, branched, scales numerous similar to the bracts, on a distance peduncel, florets 2-15, pedicels short, bracts 3-4, attached just a middle, ovate with superior and inferior apex acute, calyx lobes persistent, unequal, outer papillose, corolla white, pink or pale violet with yellow at the base of lower lip, upper lip constricted near the middle, lower lip with spur, stamens 2, pistil 1, ovary superior. Fruits capsule (Fig 4)

***U. hirta* Klein ex Link**

Annual small plants. Rhizoids numerous, capillary, branched. Stolons few, capillary, few branching. Leaves few from the stolons, capillary, green, spathalate. Bladders numerous, ovoid and long stalked with several, short, straight appendages on the mouth, sometimes appendages seem to divided to two groups on the edges. Inflorescences pedunculate 4-12 cm. long, covered with densely hairs, erect, branched, scales few, similar to the bracts, on a distance peduncle, florets 1-5, pedicels short, bracts 3, equal, basifixed, narrowly ovate, apex acute, outer with densely hairs, calyx lobes persisitent, subequal, outer with densely hairs, corolla violet, mauve or white, upper lip with 2- lobed swelling, at the end of each swelling has 2 clotted yellow, lower lip with long spur and hairs, stamens 2, pistil 1, ovary superior. Fruits capsule (Fig 5)

***U. aurea* Lour.**

Perennial floating plants. Rhizoids absent or few at the base of peduncle, capillary, branched. Stolons few, filiform, branched. Leaves very numerous, filiform, branched. Bladders numerous, oblong-

ovoid, stalked, without appendage at the mouth, surface numerous, short, straight hairs of more of less the same size. Inflorescence pedunculate 10-24 cm. long, erect, emergent, unbranched, scales absent, sometime at the base of peduncle has 3-5 lanceolate shaped spongy floats 5-7 cm long with small scales, florets 2-6, pedicels 0.3-1.5 cm. long, erect, bract 1, basifixed, broadly ovate with apex nearly rounded, calyx lobes persistent, subequal, corolla bright yellow with reddish-brown nerves, upper lip broadly ovate with apex rounded, lower lip broadly ovate with spur, apex rounded or emarginate, stamens 2, pistil 1, ovary superior. Fruits capsule (Fig 6)

***U. punctata* Wallich. ex. A. DC.**

Annual or perennial plants. Rhizoids. absent. Stolons filiform, up to 2 cm long, terete, much zigzag branched. Leaves very numerous, filiform, divided into many fine capillary segments. Bladders few on the leaves, and often absent from many leaves, apple snails shaped, stalked. The mouth of a bladder with two long and two short capillary appendages. Inflorescences pedunculate, emergent, 6-10 cm long, erect, sometime at the base of peduncle has two spindle shaped spongy floats 5-6 em long with small scales. Scales present on peduncle and similar to the bracts. Florets 4-10, pedicels filiform 0.6-1 cm long, erect, bract 1, calyx lobes persistent, subequal, broadly ovate or suborbicular, corolla light purple and sometime with a yellow blot at the base of the lower lip, upper lip broadly ovate, lower lip orbicular, stamens 2, pistil 1, ovary superior. Fruits capsule. (Fig 7)

***U. exoleta* R.Br.**

Small perennial floating plants. Rhizoids absent. Stolons few, branched. Leaves filiform, numerous, dichotomously branched, bladders few, oblong, ovoid, stalked, appendages at the mouth have 2 kinds, long-branched appendage occurring in a pair, short appendages occurring in clusters at the base of the long ones. Inflorecences pedunculate 2-5 cm. long, filiform, erect, unbranched, emergent, scales absent or present 1-2 similar to the bract, floret 1-4, pedicels 0.3-1.5 cm. long, bracts basifixed, semicircular with apex rounded, calyx lobes persistent subequal rounded at apex, corolla bright yellow with reddish-brown nerves, upper lip broadly ovate, lower lip with spur, stamens 2, pistil 1, ovary superior. Fruits capsule. (Fig 8)

Key to species

1 Aquatic floating plants
  2 plant with spongy floats
    3 stem zigzag branched.....*U. punctata*
      33 stem no zigzag branched.....*U. aurea*
    22 plant no spongy floats.....*U. exoleta*
11 Terrestrial plants
  2 plant with hairs on peduncle.....*U. hirta*
  22 plant with no hairs on peduncle
    3 bladders with 2 appendages
      4 corolla yellow.....*U. bifida*
      44 corolla dark violet.....*U. delphinioides*
    33 bladders with 1-numerous appendages
    5 bladders with 1 appendage.....*U. coerulea*
    55 bladders with numerous appendages.... *U. minutissima*

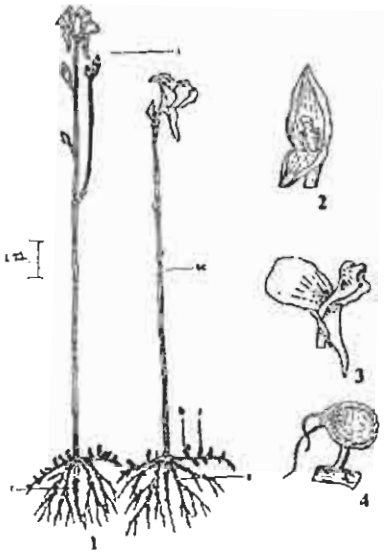

Fig. 1 The characteristics of Utricularia delphinioides Thor. ex Pell. (ดุสิตา)
1. plant with rhizoids (r), stolons (s), leaves (l), bladders (b), scale (sc), inflorescence (i)
2. calyx, stamens, pistil
3. floret with two-lipped
4. bladder
5. natural plants
6. spathulate leaves multiplied 2.55
7. bladder multiplied 13.34

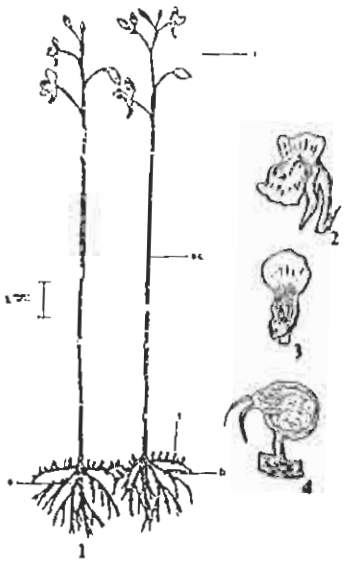

Fig. 2 The characteristics of Utricularia bifida L. (สร้อยสุวรรณา)
1. plant with stolons (s), leaves (l), bladders (b), scale (sc) inflorescence (i)
2,3. florets, calyx, corolla, stamens, pistil
4. bladder
5. natural plants
6. bladders multiplied 13.34

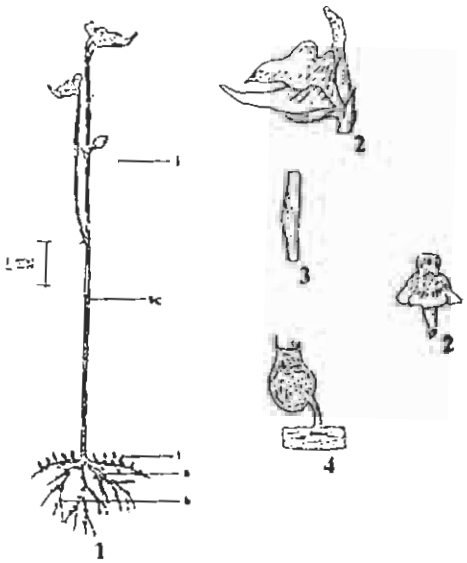

Fig. 3 The characteristics of Utricularia minutissima Vahl. (ทิพเกสร)
1. plant with stolons (s), leaves (l), bladders (b), scale (sc) inflorescence (i)
2. calyx, collora, bract
3. scale
4. bladder
5. natural plant
6 floret shape multiplied 2.55
7 bladder multiplied 11.43

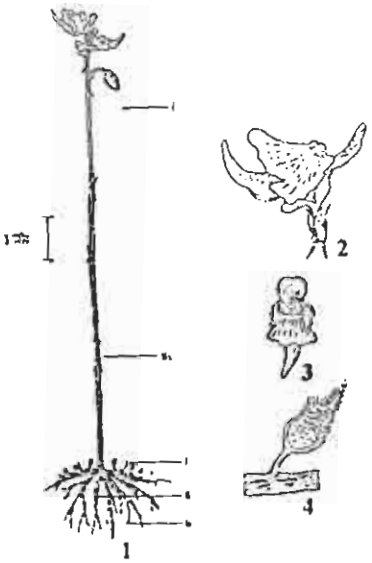

Fig. 4 The characteristics of Utricularia coerulea L. (หญ้าเข็ม)
1. plant with stolons (s), leaves (l), bladders (b), scale (sc) inflorescence (i)
2. floret, bract
3. floret
4. bladder
5. natural plants
6. Infrorescence
7. floret multiplied 2.55
8. bladder multiplied 11.43

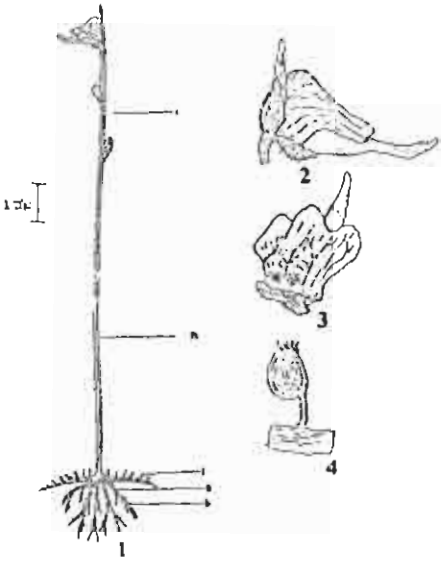

Fig. 5 The characteristics of Utricularia hirta Klein. (หญ้าฝอย)
1. plant with stolons (s), leaves (l), bladders (b); hairy peduncle (h), inflorescence (i)
2. calyx with hair and corolla
3. floret
4. bladder
5. natural plants
6. floret multiplied 2.55
7. leaves (l) and bladders (b) multiplied 11.43

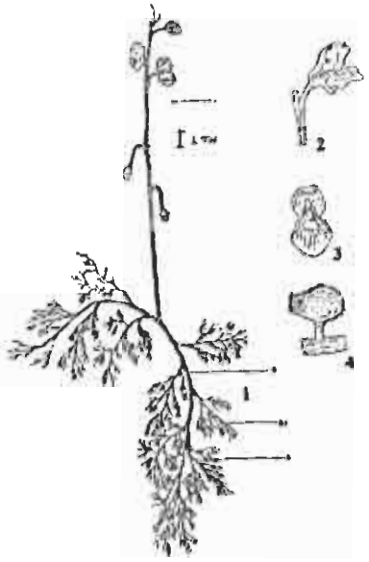

Fig. 6 The characteristics of Utricularia aurea Lour. (สาหร่ายข้าวเหนียว)
1. plant with stolons (s), submerged leaves (sl), bladders (b), inflorescence (i)
2. floret with bract, calyx, corolla
3. floret with corolla, stamens, pistil
4. bladder
5. natural plants
6. bladders multiplied 3.3

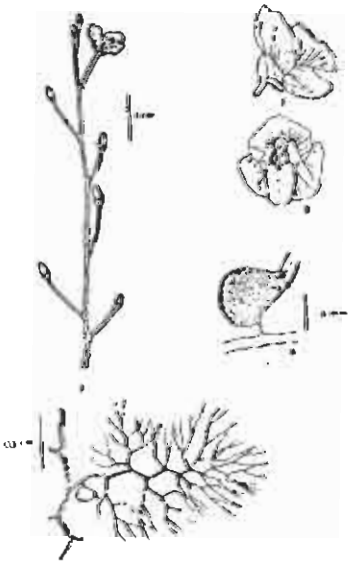

Fig. 7 The characteristics of Utricularia punctata Wallich ex A. DC.
1 Inflorescence (i) and submerged leaves (sl)
2, 3 florets with calyx, corolla
4 . bladder (b)
5. natural plants
6. inflorescence
7. bladder multiplied 11.55

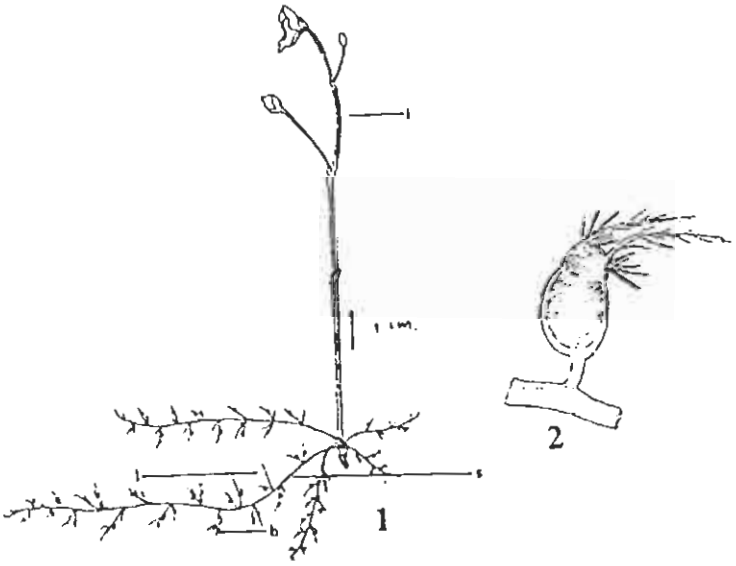

Fig. 8 The characteristics of Utricularia exoleta R.Br.
1. plants with stolons (s), leaves (l), bladders (b), inflorescence (i)
2. bladder
3. natural plants
4. stolons (s), leaves (l), bladders (b) multiplied 9.53

Conclusion and Discussion

All of these studied species have no roots, however, rhizoids occur in the moist terrestrial group. Aquatic floating plants have no rhizoids, they are not essential for attachment and absorption, because plants are in water. Stems are filiform or capillary stolons, branched or unbranched. Leaves are divided to two groups, first, a terrestrial wet places group has green spathulate leaves, second, aquatic floating plant has submerged leaves with brown filiform leaves and numerous branching. Because of these plants are insectivorous water plants so that bladder is a very important characteristic, because they have different shapes, characters, number of appendages on the mouth which are known to contributed capture insects into the bladder of the group grows in wet place, the bladder are rather small, which can be seen using a stereomicroscope, aquatic floating group has bladders, which can be seen by naked eye . Hairs on peduncle, outer of scales, bracts, calyx only has in U. hirta Klein. Inflorescences have different numbers of florets and exact lower lip with spur incurring different shape of florets, characteristic of scales almost are likely in shape but attachment majority are basifixed, but U. coerulea L. is attached just a middle of scales. Corollas are violet, mauve, white or yellow. The morphology and characteristics of the bladder are useful for identification and classification.

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