

Seagrass Taxonomy

By

Dr. Roy L. Lehman

Texas A&M University - Corpus Christi

The International Code of Botanical Nomenclature

- Rules for the use of scientific names are maintained and updated periodically at meetings of botanists called *International Botanical Congress*.
- Updated rules are published after congress in each new edition of *The International Code of Botanical Nomenclature*.
- Now can be found online as a web site.

Background Information



Author Names

- Scientific names are often written with their author or authors, the individuals who are responsible for having given the plants their names
 - *Lotus corniculatus* L.
 - *Lotus heermanii* (Dur. & Hilg.) Greene
- Both cases the generic name is *Lotus*, a genus in the pea family.
- First specific epithet is an adjective that in Latin means “bearing a horn-like projection”.
- The second was named in honor of A L. Heermann, a 19th century plant collector.
- The name means Heermann’s lotus

Author Names

- The name or names of the authors follow the binomials
 - Surnames are often abbreviated
 - as **L.** for **Linnaeus**

Second Example

- The second example is a little more complicated.
- Originally named by two naturalists:
 - **E. M. Durand and**
 - **T. C. Hilgard**
 - **as *Hosackia heermannii*.**
- Several years later, E. L. Greene concluded that the genus *Hosackia* should be merged with *Lotus* and transferred the specific epithet, *heermannii* from *Hosackia* to *Lotus*.

Second Example

- Durand and Higard (the parenthetical authors) get credit for having published the epithet, *heermannii*.
- Greene (the combining author) gets credit for transferring the epithet *Lotus*, and publishing the combination.

Type Specimens

- Often specially curated in herbaria.
- Particularly important to a taxonomist who is attempting to determine the correct application of a name.
- If the taxon being named is a genus, the nomenclature type is a species, genus or family, respectively.
- Each genus has a type species, each family has a type genus, etc.
- The type of a genus or higher category is the type specimen of the type species.

Holotype

- **When a new species or infraspecific taxon is named, the botanist designates a particular specimen to serve as a permanent reference point for the name.**
- **Specimen is deposited in a particular herbarium where it may be consulted by other botanists.**
- **Is the tangible expression of the description and thus becomes the basis of comparison.**

Priority of Publication

- The nomenclature of taxonomic groups is based on priority of publication.
- The first correctly published name for a taxon.
- The date of publication, May 1, 1753, of Linnaeus' *Species Plantarum* is considered the earliest listing to which priority of publication applies for all vascular plants, some bryophytes, some algae, and some fungi.
- Very important when two or more names are discovered to apply to the same taxon.

Priority of Publication

- Priority has been limited in certain cases by the concept of *nomina conservanda* (conserved names).
- Used when a used name is actually predated by an obscure, largely unknown name.
- The more commonly used name may be conserved or retained as the valid name, but this takes special action of a Botanical Congress.
- The name with the earlier publication date becomes a rejected name.
- Consult the Code for a list of conserved and rejected names.

Synonyms

- **Alternate names for a plant.**

Illegitimate Names

- Certain names cannot be used because they do not conform to the rules of nomenclature.
- Called *illegitimate names*.
- It is against the rules to use a name that has already been validly published for a different kind of plant
 - = later homonyms

Principles of Nomenclature

- I. Botanical nomenclature is independent of zoological and bacteriological nomenclature.**
- II. The application of names of taxonomic groups is determined by means of nomenclature types.**
- III. The nomenclature of a taxonomic group is based upon priority of publication.**

Principles of Nomenclature

- IV. Each taxonomic group with a particular circumscription, position, and rank can bear only one correct name, the earliest that is in accordance with the Rules, except in specified cases.**
- V. Scientific names of taxonomic groups are treated as Latin regardless of their derivation.**
- VI. The Rules of nomenclature are retroactive unless expressly limited.**

Texas Seagrasses

■ Cymodoceaceae

- ***Halodule beaudettei* (C. den Hartog) C. den Hartog**
 - **Shoal Grass**
- ***Cymodocea filiformis* (F. Kützing) D. Correll**
 - **Manatee Grass**
 - **(=*Syringodium filiformis*)**

Texas Seagrasses - Family

- **Cymodoceaceae, *nomen conservandum***
- **International Code of Botanical Nomenclature**
 - **N. Taylor in North American Flora 17:31.**
 - **Date = 30 June 1909**
 - **Typus: *Cymodocea* K. D. Köenig (nom. Cons.)**

Halodule beaudettei

- Early colonizer of disturbed areas.
- Narrow, flat leaves 1.5 - 2 mm wide.



Texas Seagrasses

- *Halodule* S. Endlicher
 - *Halodule beaudettei* (C. den Hartog) C. den Hartog
 - **Synonyms are:**
 - **Sy = *Diplanthera beaudettei* C. den Hartog**
 - **Sy = *Halodule wrightii* P. Ascherson**
 - **Names are rejected for either of two reasons:**
 - They are illegitimate, i.e. contrary to the rules of the ICBN
 - Because of taxonomic judgment.

Texas Seagrasses - Genus

- *Halodule* S. Endlicher
 - *Halodule beaudettei* (C. den Hartog) C. den Hartog
 - **Diplanthera**
 - **This genus is an illegitimate name as it was predated by the earlier use of that name for an Acanthaceae and was replaced by the new name, *Halodule*, proposed by Endlicher.**

Texas Seagrasses

- *Halodule* S. Endlicher
 - *Halodule beaudettei* (C. den Hartog) C. den Hartog
 - Originally only two species were recognized:
 - *H. uninervis* found in the Indo-Pacific with **tridentate** leaves, and
 - *H. wrightii* found in the tropical Atlantic with **bidentate** leaves.
 - Later, a third species (*H. pinifolia*) with a **rounded denticulate** leaftip from I-P was recognized.

Texas Seagrasses

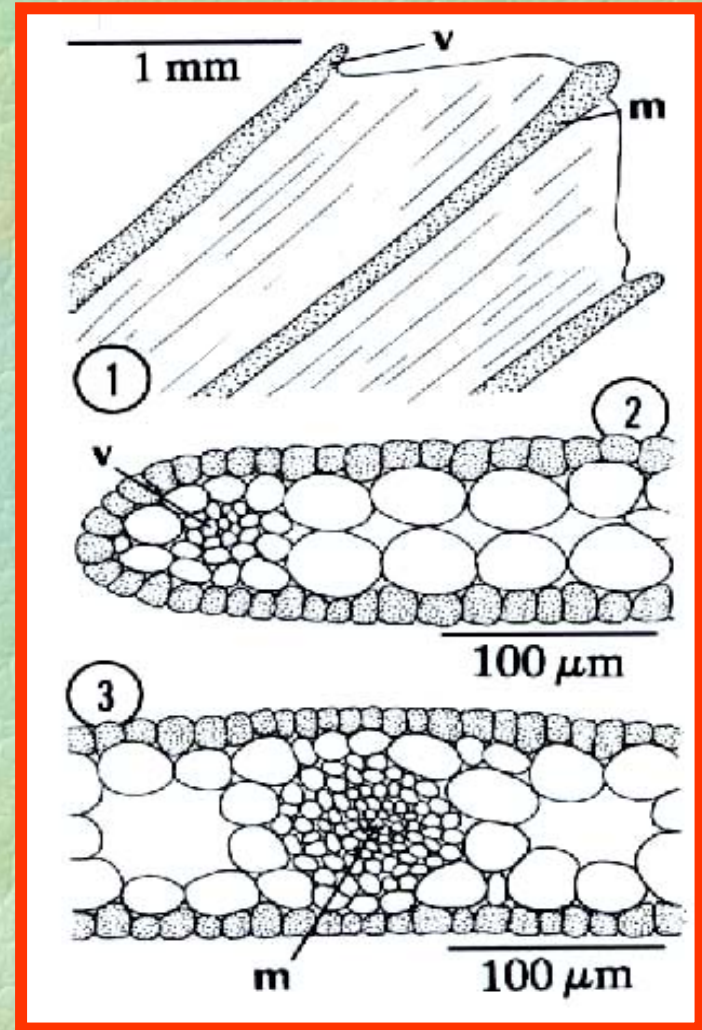
- **C. den Hartog (e-mail August 18, 2003)**
 - **While studying a collection of E. Yale Dawson from the Pacific coast of Central America, he discovered plants that had a tridentate leaf tip that was quite different from the bidentate leaf tip of *H. wrightii* from other material including the type.**
 - **Cuba (type), several Antillean Islands, Mauritana, Senegal, Angola and Keyna.**

Texas Seagrasses

- C. den Hartog (e-mail August 18, 2003)
 - **Leaftips of the Central American material differed strongly in the separate collection sites, so he originally distinguished two species:**
 - *H. beaudetteii* and
 - *H. dawsonii*
 - **After seeing additional material, it appeared that these populations were more or less the extremes of an entire series of tridentate leaftips and decided to merge these “species” under the name *H. beaudetteii*.**

Halodule beaudettei

1. Apex with midrib and marginal veins (tridentate).
2. Transverse section showing marginal vein.
3. Transverse section of central blade with midrib with air channels to each side.



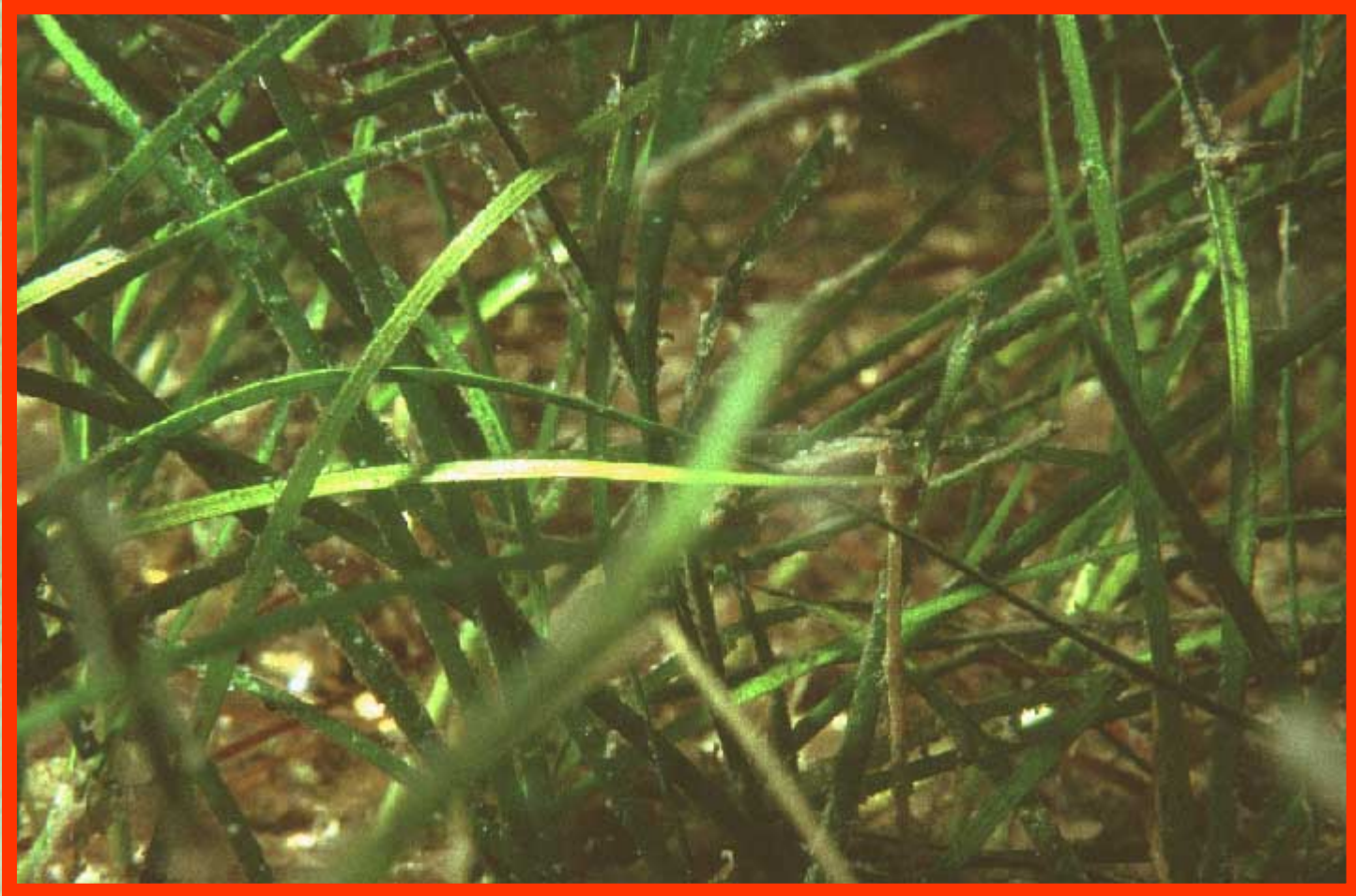
Texas Seagrasses

- C. den Hartog (e-mail August 18, 2003)
 - This **tridentate** species appears to be common along the coasts of the Gulf of Mexico and Florida up to North Carolina.
 - So far I (den Hartog) have not seen ANY specimen of *H. wrightii* from the USA.
 - As the bidentate tip character is used to describe *H. wrightii* of the type, then a different name must be used to describe the tridentate species from the Gulf of Mexico

- **The leaftip character seems to show some variation and it would be useful to investigate using DNA analysis.**
- **The estimated cost of a DNA analysis of all the Halodule species would be ~100k.**

H. wrightii
is not
Rightii!

Halodule beaudettei



Texas Seagrasses

- **Cymodocea** K. D. Köenig, *nomen conservandum*
- **International Code of Botanical Nomenclature**
 - K. D. Köenig in *Annals of Botany* (Köenig & Sims) 2:96.
 - Date = 1 June 1805
 - Typus: *C. aequorea* K. D. Köenig (nom. Cons.)

Texas Seagrasses

- **Hydrocharitaceae**
 - ***Halophila engelmannii* P. Asherson**
 - **Clover or Peanut Grass**
 - ***Thalassia testudinum* J. Blanks & D. Solander ex Koenig**
 - **Turtle Grass**

Texas Seagrasses

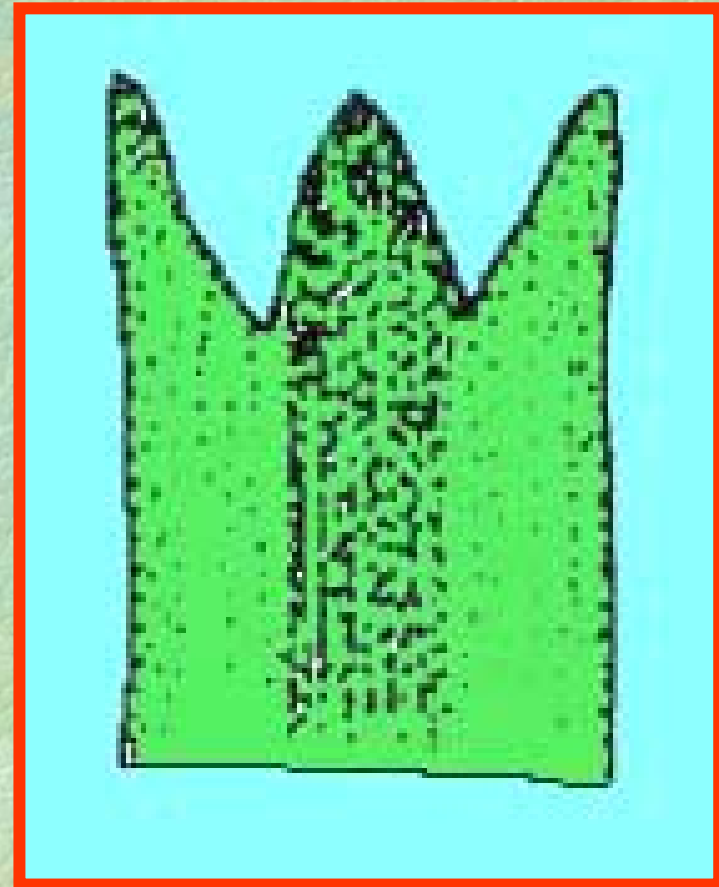
- Ruppiaaceae
 - *Ruppia maritima* C. Linneaus
 - Widgeon Grass

Key to the Genera

- 1. Leaves terete *Cymodocea*
- 1. Leaves flat 2
- 2. Leaves without a basal sheath; in whorls or pseudo-whorls;
 differentiated into a petiole and a blade *Halophila*
- 2. Leaves without a ligula; 0.5-1 cm wide;
 2 pericentral veins. *Thalassia*
- 2. Leaves with a basal sheath; not arranged in whorls 3
- 3. Leaf tip forms 3 point crown; two roots per node *Halodule*
- 3. Leaf tip tapers to a sharp point; one root per node *Ruppia*

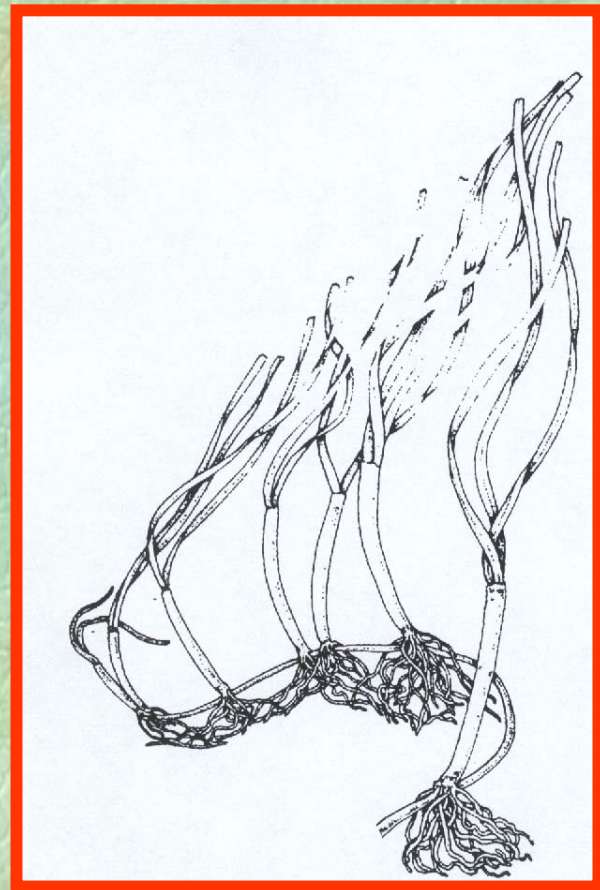
Halodule beaudettei

- Distinctly truncate and toothed (2 or 3) at apex of blade.
- Character useful in identification.

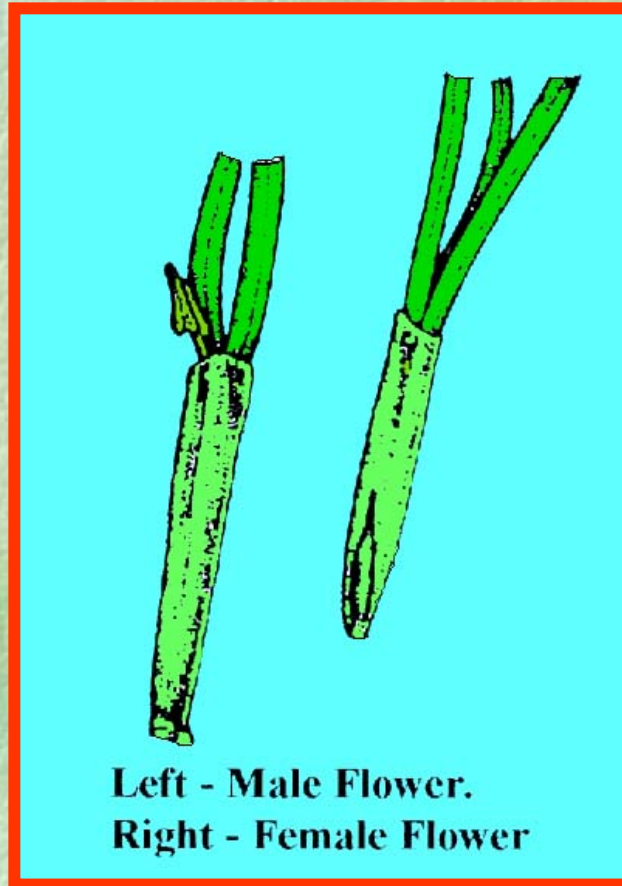


Halodule beaudettei

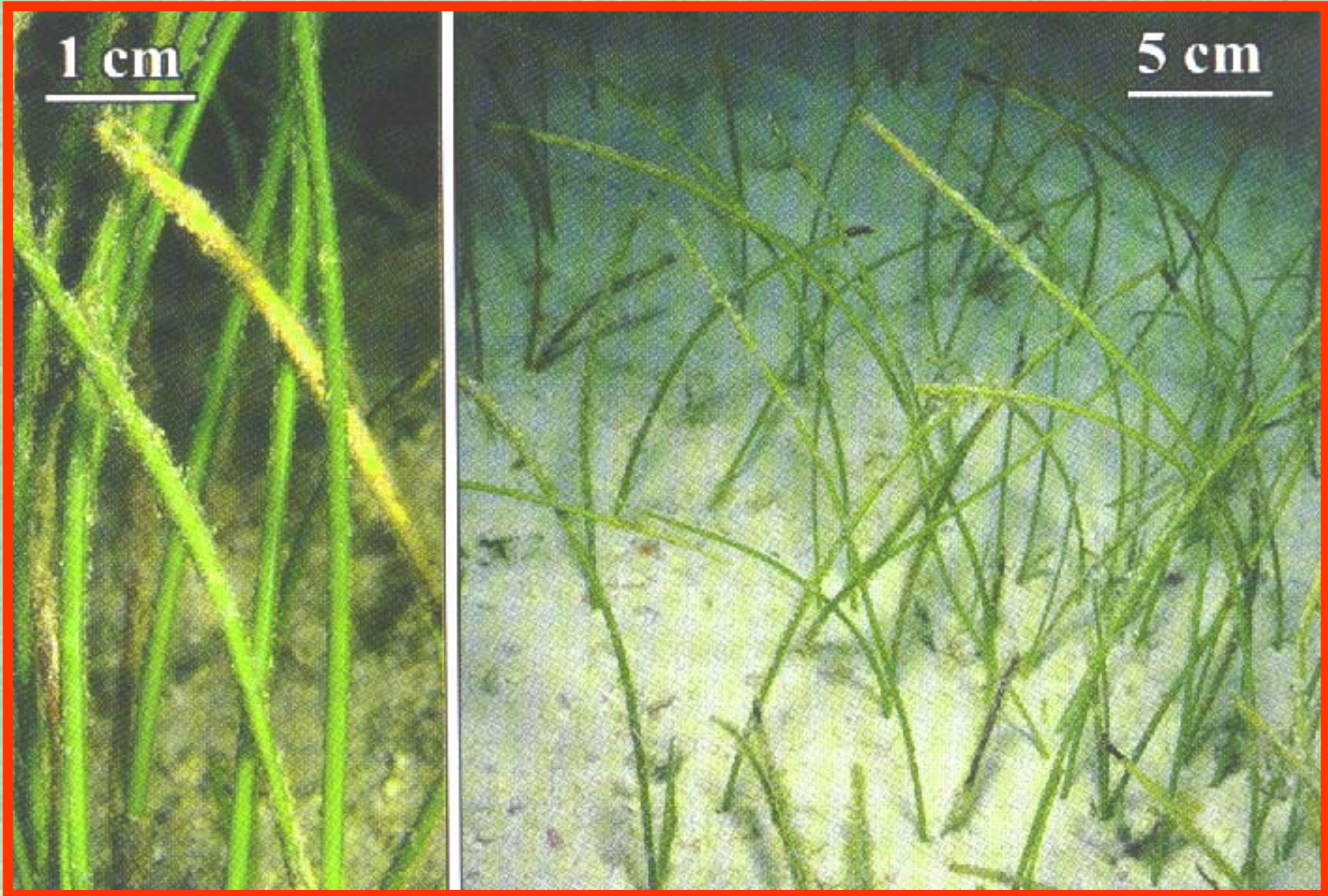
- Herbaceous, short, erect stems bear 1 - 4 leaves.
- Creeping rhizome has one or more unbranched roots.



Halodule beaudettei

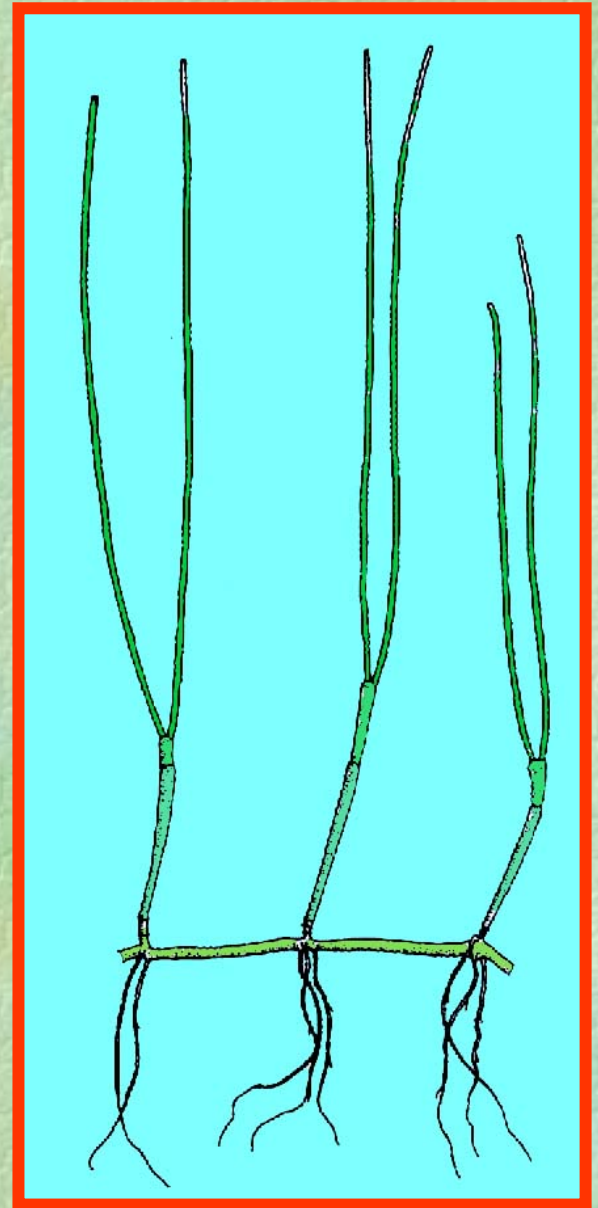


Cymodocea filiforme



Cymodocea filiforme

- (= *Syringodium filiforme*)
- Long (10 - 30 cm), terete leaves with blunt apices.
- Clusters of two or three.
- Roots occur at nodes usually in numbers of three.



Cymodocea filiforme



Cymodocea filiforme



Reproductive Thallus

Cymodocea filiforme



Female Flower

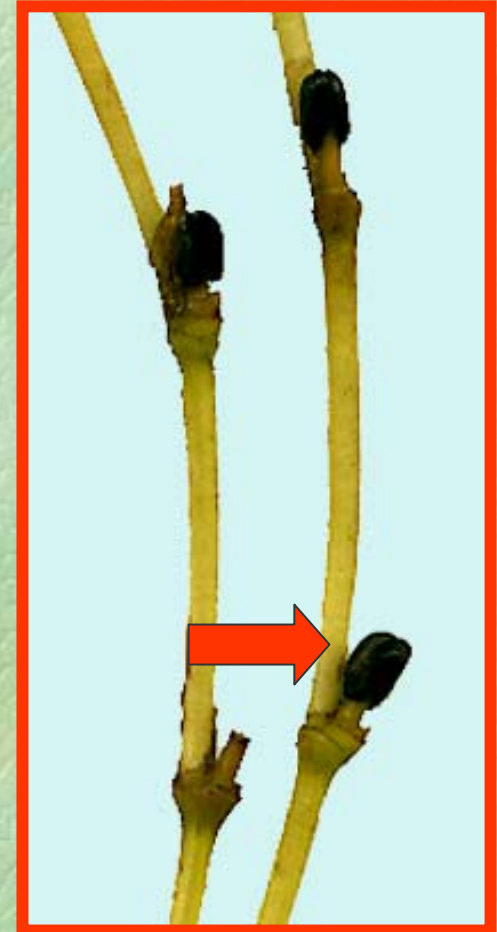


Male Flower

Cymodocea filiforme



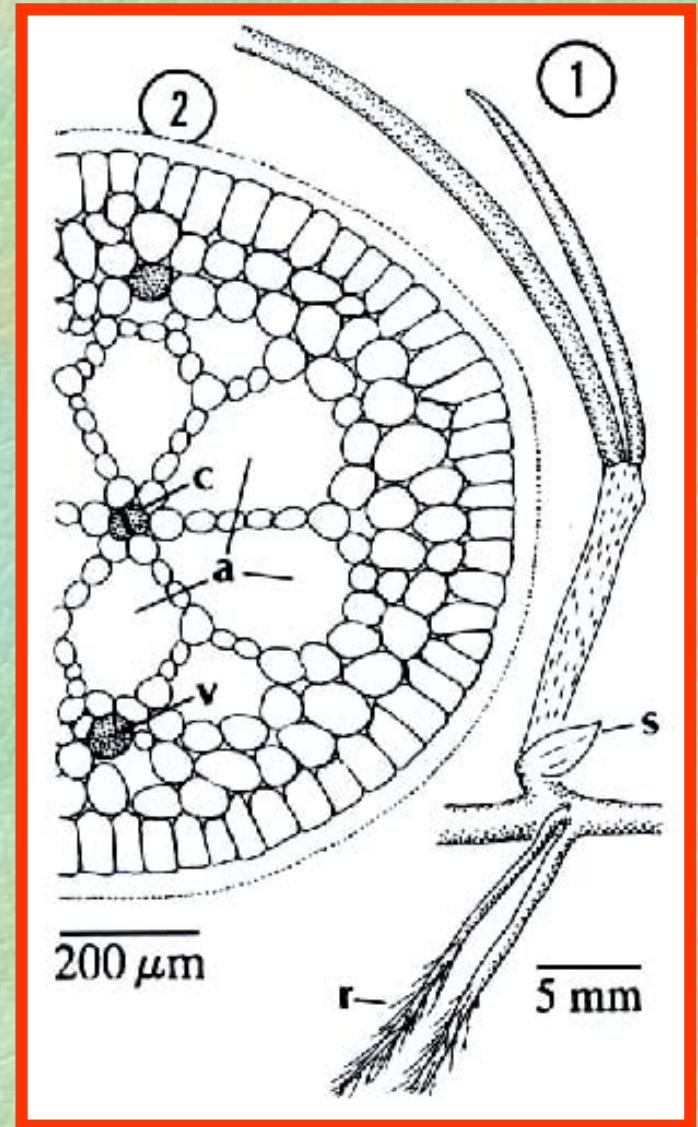
Female Flower



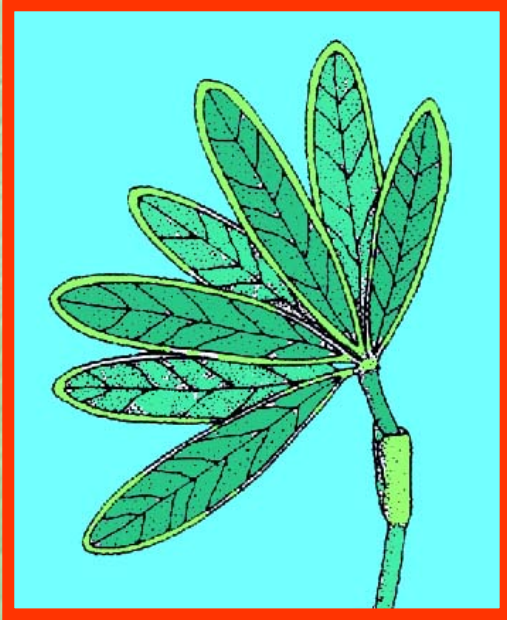
Male Flower

Cymodocea filiforme

1. Habit showing leaf scale, roots descending immediately below blades and fine rootlets.
2. Transverse section of blade with two central vascular bundles, six central air channels and two lateral vascular bundles.



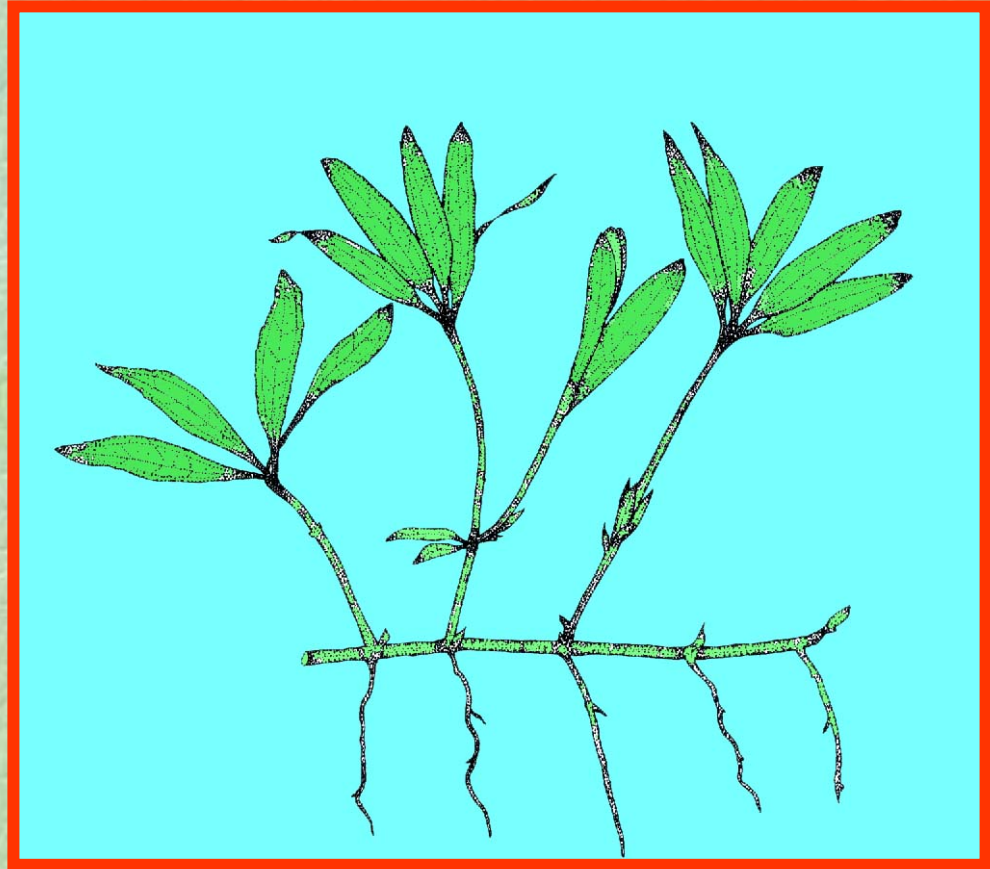
Halophila engelmannii



- **Clover or Peanut Grass**
- **Dioecious plant with thin, fragile, creeping rhizomes having one root at each node.**
- **Leaves attached to erect lateral shoots and are pseudo-whorled.**

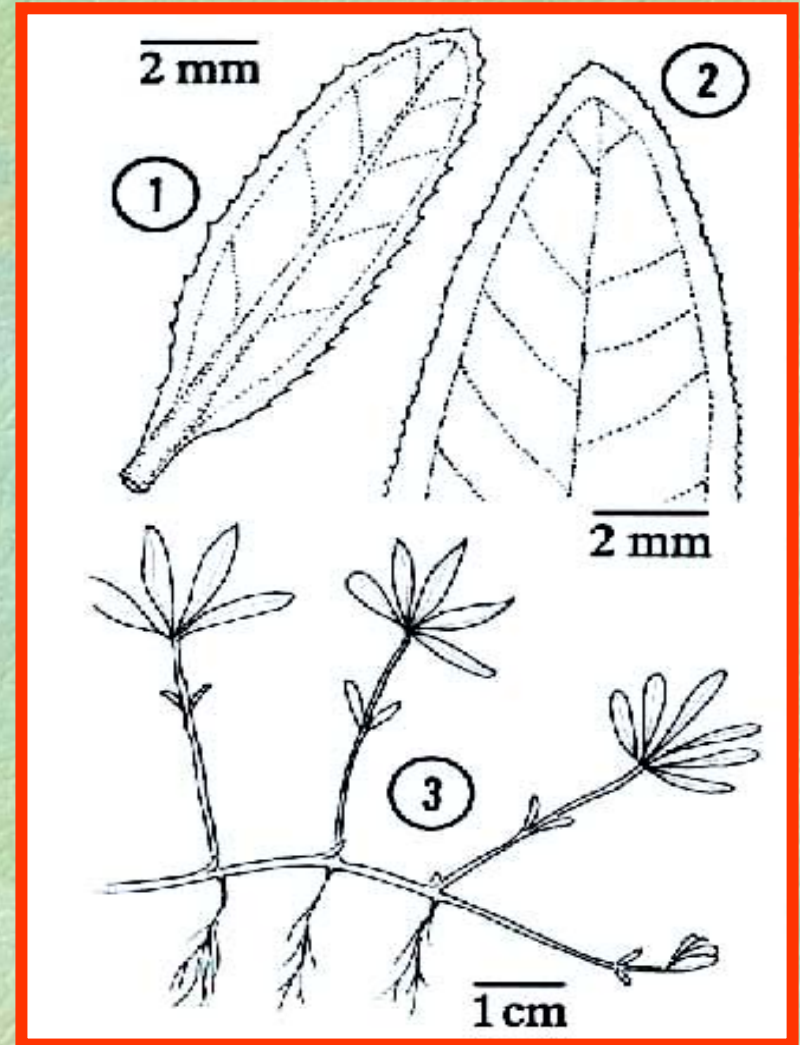
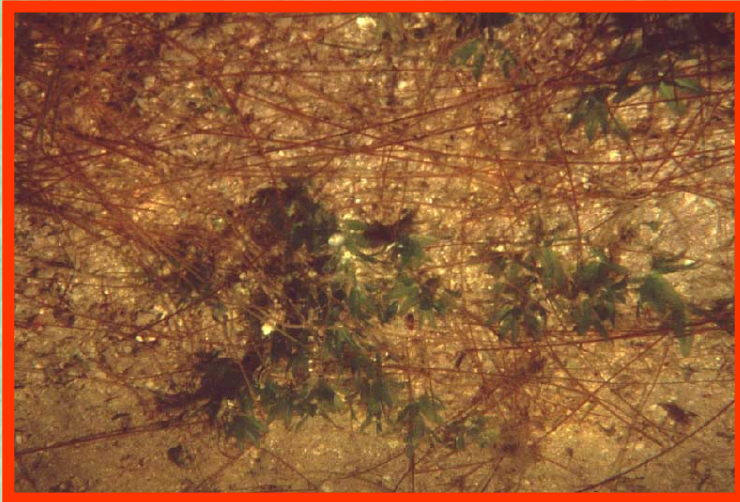
Halophila engelmannii

- **Family**
Hydrocharitaceae
- **Leaf-blade shape is oblong with an obtuse apex, a cuneate base with a finely serrated leaf margin.**
- **Rooted in the surface oxic zone.**



Halophila engelmannii

1. Young leaf with marginal teeth.
2. Mature leaf with fine marginal teeth.
3. Habit of Plant.

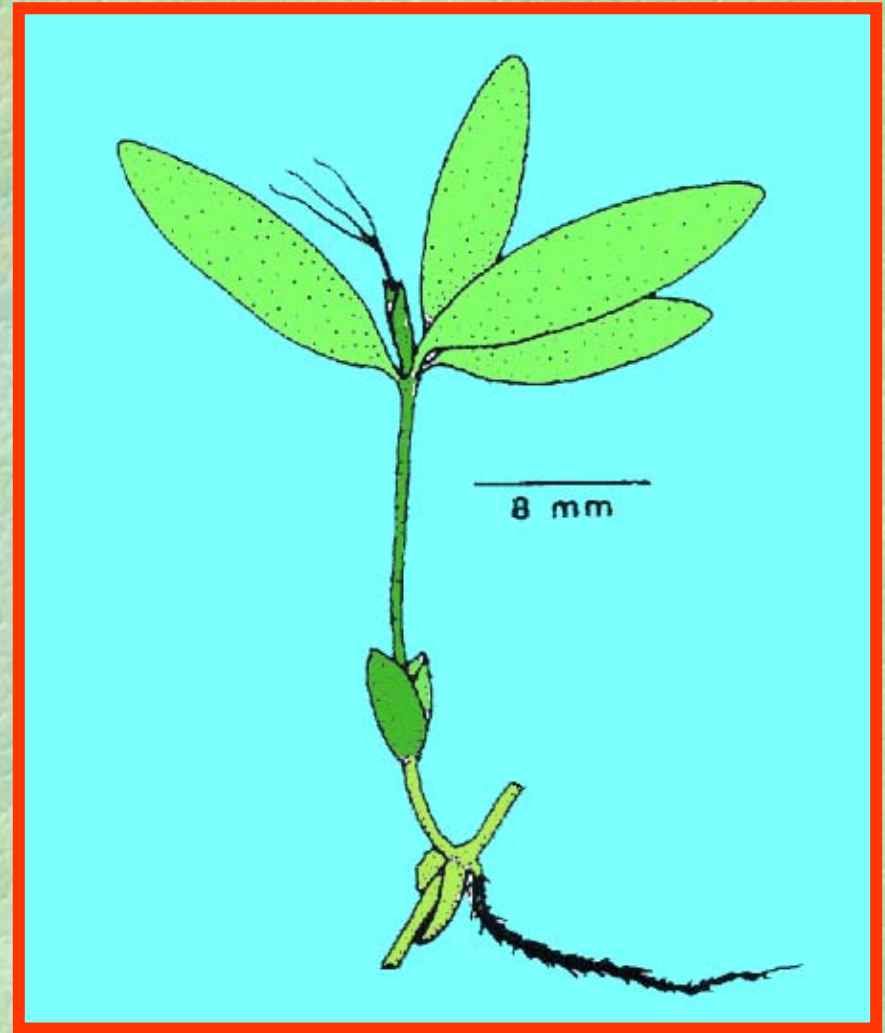


Halophila engelmannii



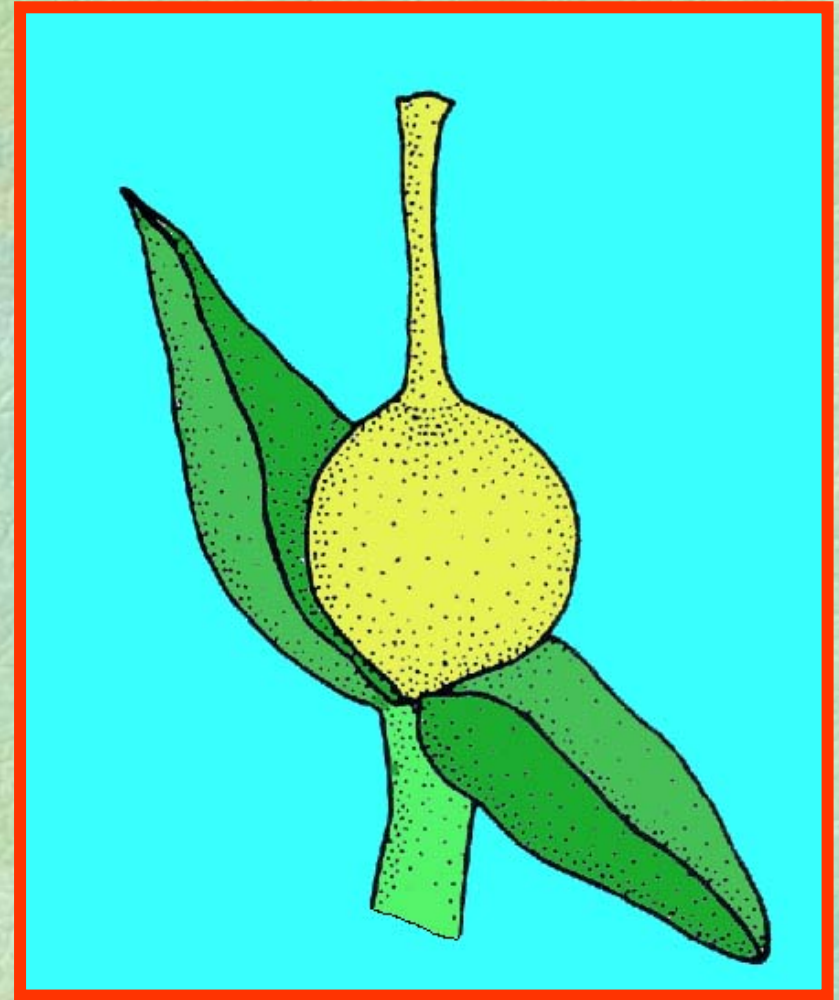
Halophila engelmannii

- Male Flower
- Found singly on a pedicel 4-10 mm long.
- Sepals are broadly elliptical and reflexed when mature.
- Anthers
 - bilocular
 - 4 mm in length
 - Produce yellow pollen grains in fine filaments.

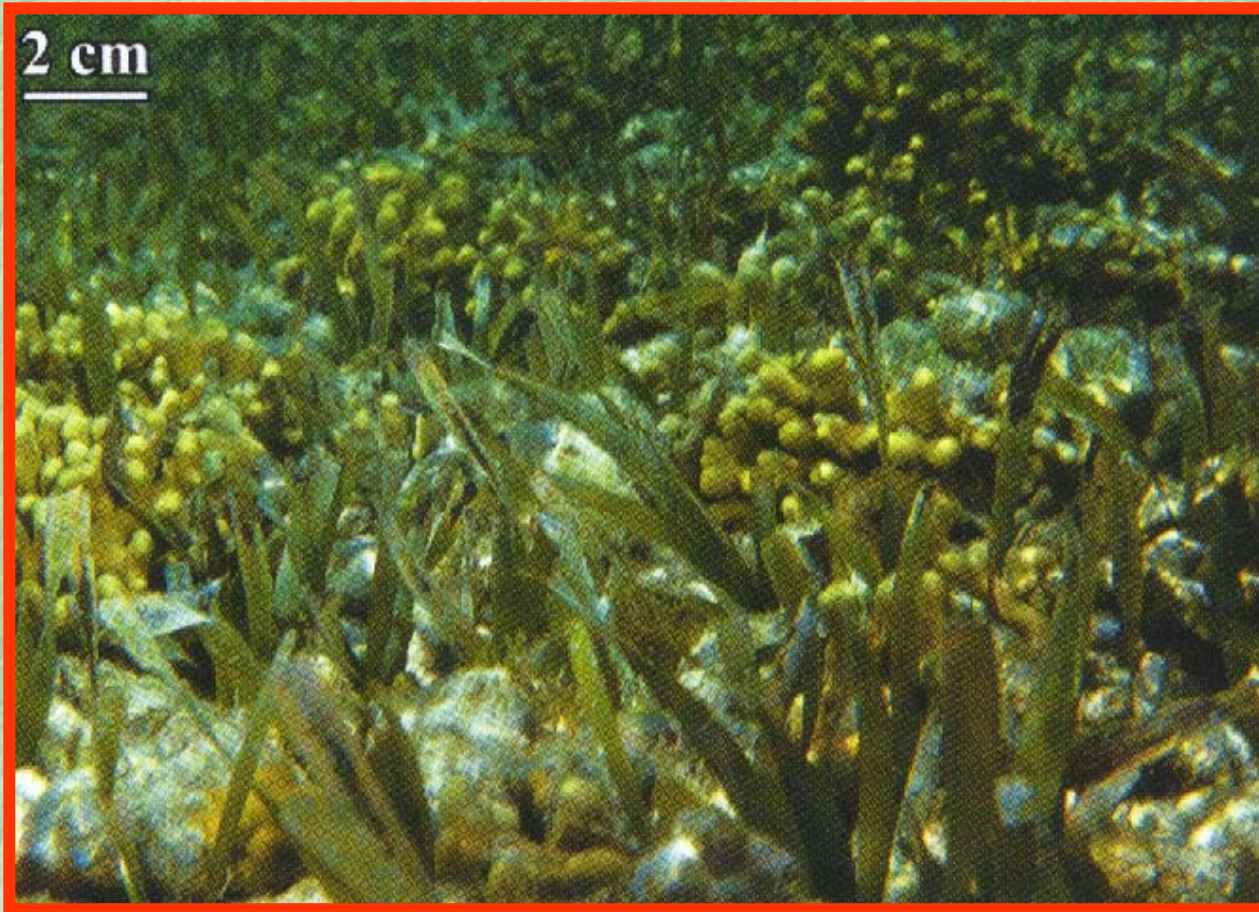


Halophila engelmannii

- Small, beaked fruit resemble the spherical air-filled vesicles of *Sargassum* in size, shape and floating ability.
- There are between one and 20 seeds per fruit.



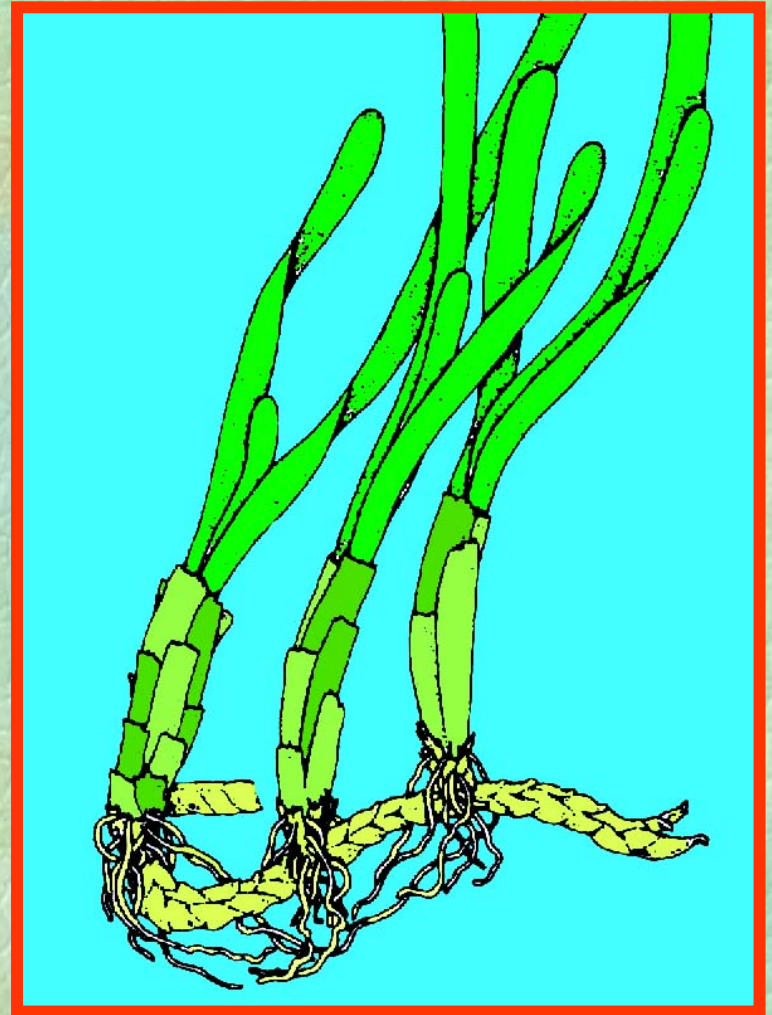
Thalassia testudinum



- **Family Hydrocharitaceae**
- **Turtle Grass**

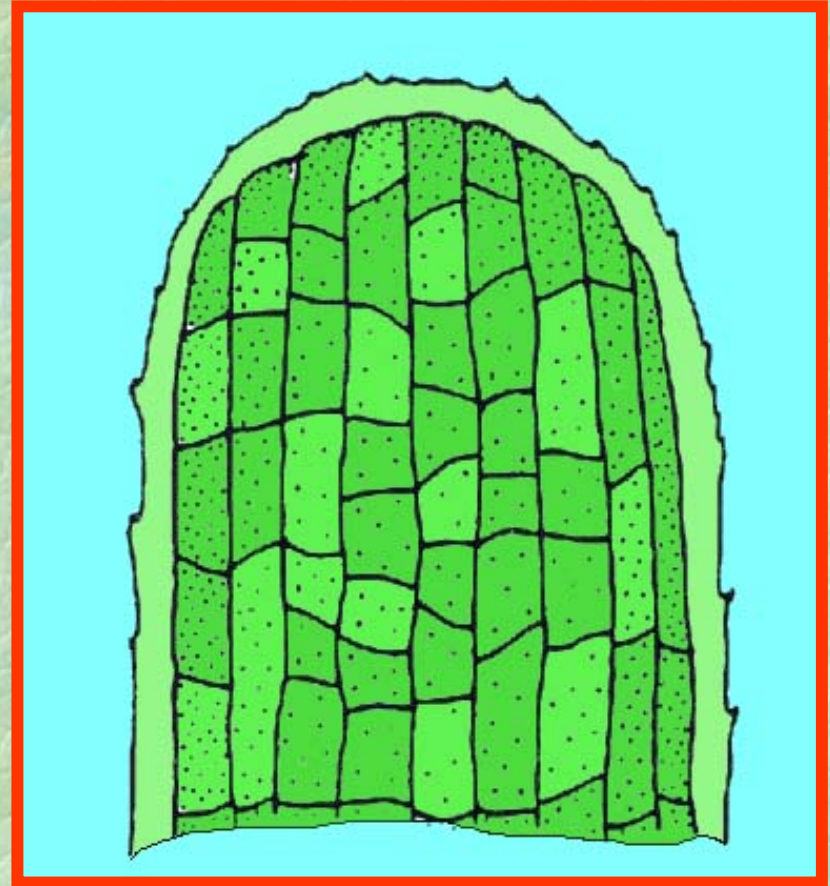
Thalassia testudinum

- Has erect shoots that produce a cluster of three to seven broad leaves.
- Leaves develop from a basal meristem.
- Leaves have sheaths.
- Rhizomes buried from 3 to 15 cm.



Thalassia testudinum

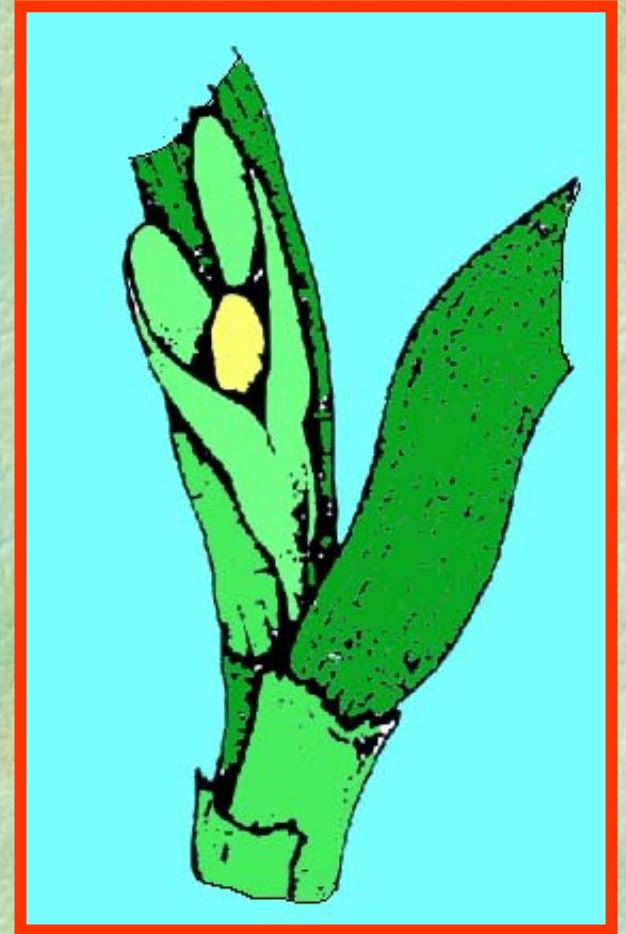
- Blade apex with parallel veins.
- Depth range extends from 50 to 150 cm.
- Can withstand the anoxic conditions of deeper substrates.
- May grow and survive for >10 years for an individual shoot.



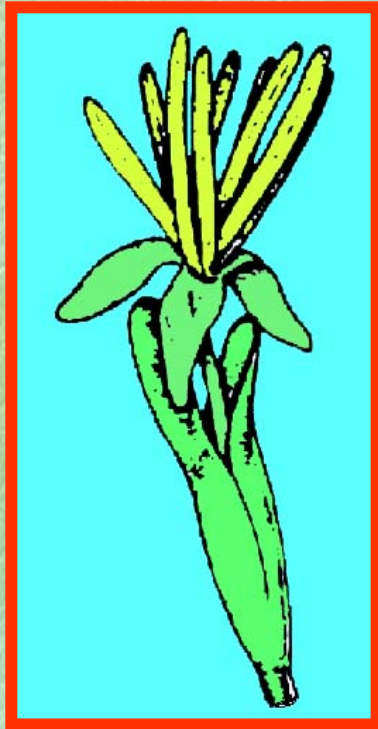
Thalassia testudinum



- Female flower
- Sessile (almost)



Thalassia testudinum



- Male flower
- Flowers have a long base (pedicel).



Thalassia testudinum



Flower

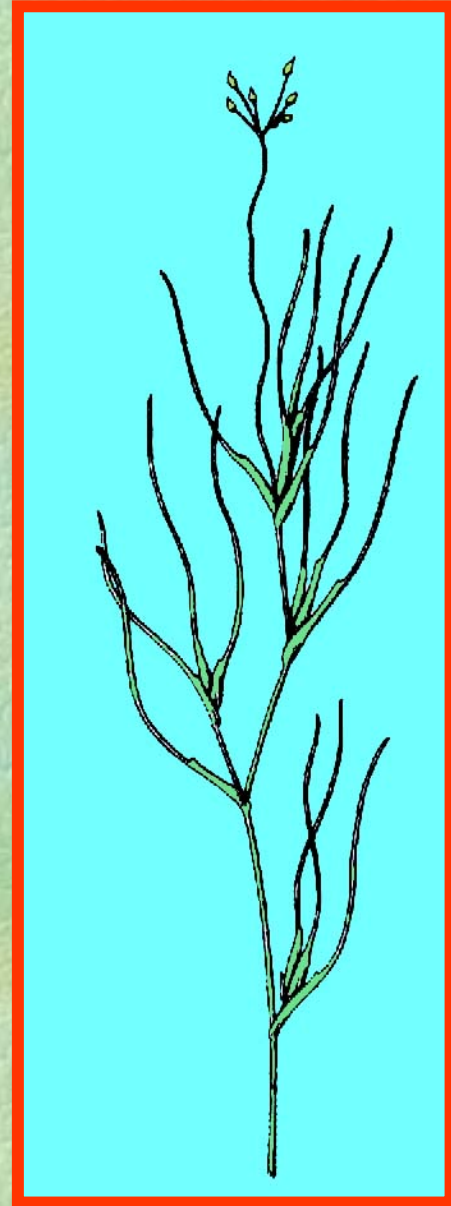
Ruppia maritima

- Family Ruppiaceae
- Widgeon Grass
- Not a true seagrass.
- FW angiosperm that is capable of growth and reproduction in saline environments.



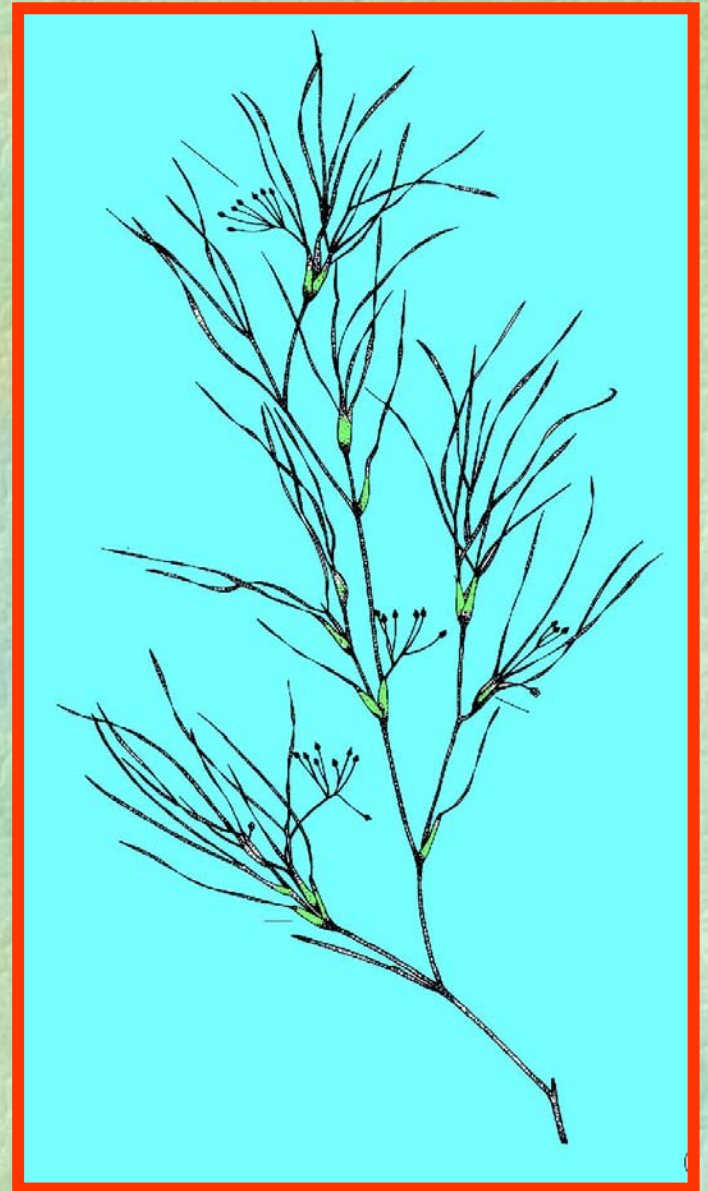
Ruppia maritima

- Stalk is absent.
- Narrow (1-1.5 mm wide) pointed leaves rise from an upright rhizome located above the substratum.
- Flowering is common, however, vegetative reproduction/growth is also common.



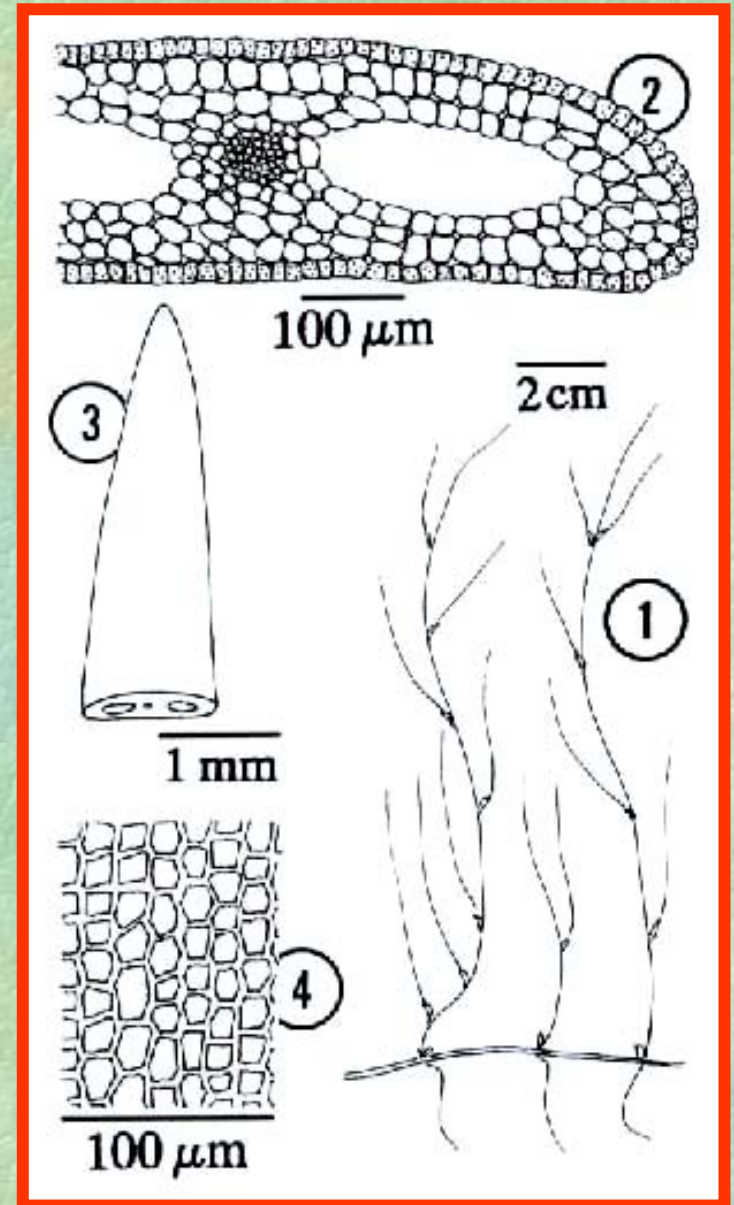
Ruppia maritima

- Leaves are coarse, firm and flattened.
- The stolon is commonly branched, extending vertically and appears as a stalk.
- Roots occur as one per node.

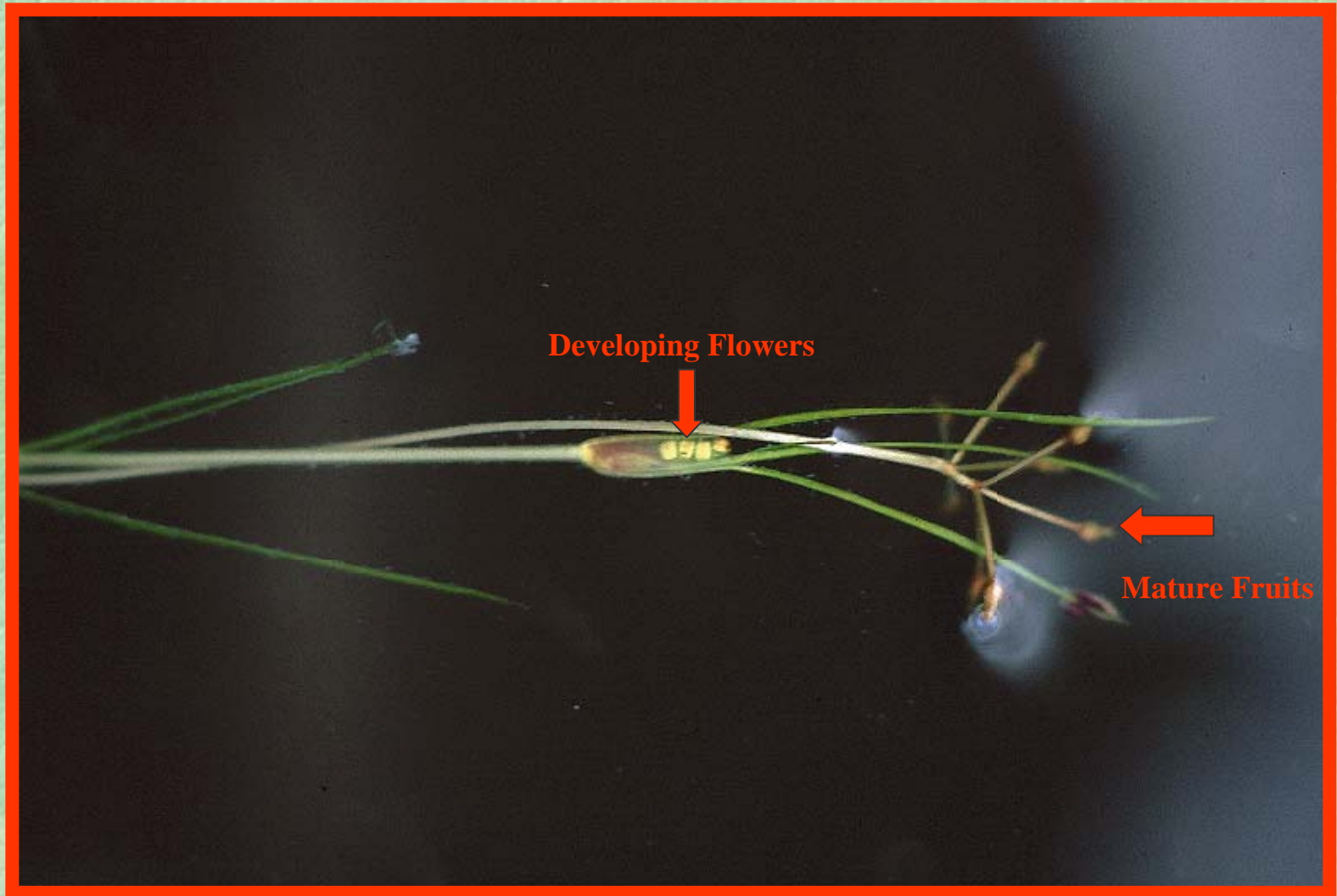


Ruppia maritima

1. Habit
2. Transverse section of blade with one central vascular bundle and two parallel air channels.
3. Smoothly pointed leaf blade.
4. Leaf surface cell arrangement.



Ruppia maritima



Ruppia maritima



© Dr. Roy L. Lehman

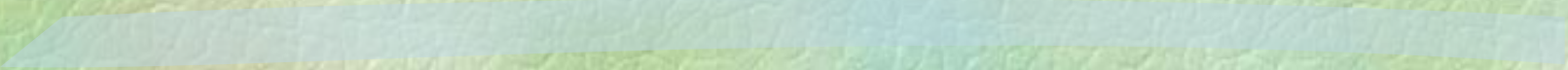
Ruppia

1. Produces copious flowering pedicels with numerous seed clusters (+ 1 m).
2. Leaf tip tapers to a single point.
3. Rhizomes are zigzagged from above and green or yellow in color.
4. One root per node.
5. Extensive above ground branches.

Halodule

1. Flowers rarely seen.
2. Leaf tip is a three point crown.
3. Rhizomes straight and white in color.
4. Two roots per node.
5. Only vertical shoots.

Seagrass Taxonomy



By

Dr. Roy L. Lehman

Texas A&M University - Corpus Christi