APPENDIX I

CYPERACEAE

SUPPLEMENTARY KEY
CYPERACEAE

1a. Leaves 2 – 3 cm broad. Inflorescence capitate; glumes 10 – 13 mm long.

1b. Leaves narrower, or if broad the inflorescence not capitate. Inflorescence various; glumes 0.7 – 6.5 mm long.

2a. Perianth present, of 6 bristles divided to the base into numerous white hairs, long exserted particularly in fruits thus making the spikelets comose.

2b. Perianth absent or if present, of a few undivided scales or bristles not or rarely exserted (Scirpus asiaticus).

3a. Inflorescence pseudolateral because of the solitary stem-like erect bract appearing as though a continuation of the stem.

3b. Inflorescence distinctly terminal with 1 – several foliaceous or glumaceous bracts or bracts absent.

4a. Flowers unisexual; ovaries or nuts enclosed within a sac-like organ (utricle).

12. Manania

5. Eriophorum

6. Scirpus

14. Carex
4b. Flowers bisexual or unisexual; ovaries or nuts not enclosed within utricle.

5a. Inflorescence paniculate or spicate.

   Flowers all unisexual. Nuts usually borne on a well developed hypogynous disc.

5b. Inflorescence paniculate, umbellate, capitate or reduced to a solitary spikelet. Flowers almost all bisexual. Nuts not borne on a disc.

6a. Perianth present.

   7a. Perianth of only scales or of scales alternating with bristles.

6a. Perianth present.

   7a. Perianth of only scales or of scales alternating with bristles.

8a. Inflorescence capitate.

8b. Inflorescence paniculate.

9a. Leaves 25 - 120 cm long, glabrous. Perianth scales oblancoelate.

9b. Leaves 5 - 26 cm long, hairy. Perianth-scales subquadrate.

7b. Perianth of only bristles.
10a. Leaves all reduced to bladeless sheaths or the uppermost sometimes produced into a short blade. Inflorescence reduced to a solitary, rarely 2 - 6 spikelets (E. congesta).

10b. Leaves at least some with well developed blades. Inflorescence paniculate or umbellate, bearing few - many spikelets.

11a. Nuts beaked by the persistent style-base.


6a. Perianth absent.

12a. Inflorescence paniculate.

13a. Stems spongy. Leaves 4 - 7 mm broad.

13b. Stems not spongy. Leaves setaceous.

12b. Inflorescence umbellate, capitate or reduced to a solitary spikelet.

14a. Style-base persisting on the nut like a beak or a button.
15a. Leaves all reduced to bladeless sheaths. Inflorescence reduced to a solitary spikelet.

4. **Elaeocharris**

15b. Leaves at least some with well developed blades. Inflorescence umbellate or capitate, bearing few - many spikelets.

16a. Style-base persisting like a conspicuous beak; stigmas 2.

Nuts lenticular. 9. **Rhynchospora**

16b. Style-base persisting like a minute button; stigmas 3.

Nuts trigonous. 3. **Bulbostylis**

14b. Style-base not persisting.

17a. Stems branched.

6. **Scirpus**

17b. Stems not branched.

18a. Styles articulated with the ovary, usually swollen at the base, usually fimbriate.

2. **Fimbristyli**

18b. Styles continuous with the ovary, neither swollen at the base nor fimbriate.

1. **Cyperus**
1. CYPERUS L.

1a. Styles entire or 3-notched. Nuts with a stipe about as long as the main body, corky-thickened on the angles.  
   1. C. cephalotes

1b. Styles deeply cleft. Nuts sessile or shortly stipitate, not or rarely thickened on the angles.
   
   18. C. platystylis
   
   2b. Nut angles not thickened.


   4a. Inflorescence capitate; glumes spiral.  
   3. C. michelianus

   4b. Inflorescence capitate or umbellate; glumes distichous.

   5a. Inflorescence capitate of 1 - 5 glomerules; spikelets numerous, crowded, each maturing a solitary nut.

   6a. Spikes cylindrical, glistening white.  
   46. C. sesquiflorus var. subtricarpa

   Nuts black.

7a. Glumes closely red-dotted all along; keel with a cristate or erose-dentate wing in the upper half. 44. G. kyllingia

7b. Glumes not or sparsely brownish striolate or dotted; keel not winged, sometimes spinulose. 45. G. bravifolius

5b. Inflorescence umbellate or capitate; spikelets few - many, each maturing several nuts.

8a. Spikelets digitate; glumes 1 - 1.5 mm long, mucronate - aristate. Nuts ca 0.5 mm long. 31. G. rumilus

8b. Spikelets spicate; glumes muticous - mucromulate; glumes and nuts frequently larger.

9a. Styles, including the stigmas, about twice as long as the glumes.

10a. Nuts dorso-ventrally compressed, one of the surfaces thus facing the rhachilla. 30. G. stylosus
10b. Nuts laterally compressed, one of the angles thus facing the rhachilla.

32. *G. unicooides*

9b. Styles, including the stigmas, about as long as the glumes.

11a. Nuts linear-oblong with almost parallel sides.

12a. Umbels simple, evolute. Styles, including the stigmas, about as long as the nuts. Nuts sulcate with a median longitudinal depression on both sides.

33. *G. sulcinus*

12b. Umbels compound, evolute or capitately contracted. Styles, including the stigmas, about twice as long as the nuts. Nuts not sulcate.

34. *G. polyptachyos*


14a. Spikelets oblong-lanceolate, 3 - 4 mm broad.

37. *G. lataspicatus* ✓

14b. Spikelets linear, ca 2 mm broad.

38. *G. subatramineus*
13b. Nuts not zonate.

15a. Stems erect. Leaves at the base only. Spikelets linear or narrowly lanceolate; glumes oblong-lanceolate, cinnamomeous or brownish black, not sulcate. 35. G. flavidus

15b. Stems erect or decumbent. Leaves at the base and a few upwards also. Spikelets oblong; glumes broadly ovate, reddish-green or brownish-black, sides usually sulcate. 36. G. sanguinalentus


16a. Rhachilla of the spikelets caducous, the spikelets thus falling off as a whole along with the persistent glumes; each spikelet maturing only 1 - 4 nuts (except G. compactus).

17a. Umbels compound or decompound; spikes globose.
18a. Spikelets linear-lanceolate, 6 - 12 mm long, each maturing 4 - 14 nuts; glumes muticous; keel not winged. 42. C. compactus

18b. Spikelets elliptic-oblong, 3 - 4 mm long, each maturing 1 - 2 nuts; glumes mucronate; keels spongy-winged. 43. G. pseudokyllingioides

17b. Umbels simple; spikes cylindrical.

19a. Rhizomes emitting stolons clothed with lanceolate scales. Spikelets maturing a solitary nut. 39. G. panicus

19b. Stolons absent. Spikelets maturing 1 - 4 nuts.

20a. Spikes long peduncled, exactly cylindrical with divaricate spikelets; glumes membranaceous. 40. G. cyperoides

20b. Spikes sessile or peduncled, somewhat obovoid-cylindrical, attenuated at the base with ascending spikelets; 41. G. cyperinus var. bengalensis

40. G. cyperoides
16b. Rhachilla of the spikelets persistent, the glumes acropetally caducous; each spikelet maturing 6 - many nuts (except G. iria).

21a. Annual herbs. Inflorescence capitate; glumes spiral. 

21b. Annual or perennial herbs. Inflorescence capitate or umbellate; glumes distichous.

22a. Annual herbs. Glumes long aristate, the arista about half as long as to equalling the main body.

22b. Annual or perennial herbs. Glumes muticous or mucronate.

23a. Inflorescence capitate.

24a. Spikelets 1 - 3.5 cm long, 3 - 6 mm broad; glumes 3 - 5 mm long. Stamens 3. Nuts less than half as long as the glumes.
25a. Spikelets strongly compressed; rhachilla ca 1 mm broad; stigmas ca 2 mm long.

25b. Spikelets compressed-quadrangular; rhachilla ca 0.2 mm broad; stigmas ca 0.3 mm long.

5. G. niveus

24b. Spikelets 0.3 - 1.5 cm long, 1 - 2 mm broad; glumes 0.6 - 2.3 mm long. Stamens 1 - 2. Nuts more than half as long as the glumes.

26a. Glumes linear-oblong, 2 - 2.3 mm long. Nuts ellipsoid, 1.3 - 1.5 mm long.

26b. Glumes obovate-orbicular, 0.6 - 0.8 mm long. Nuts obov-oid, 0.5 - 0.7 mm long.

4. G. leucocephalus

23b. Inflorescence umbellate with distinct rays.

25. G. difformis

27a. Spikelets in much elongated spikes, the rhachis several times longer than the spikelets.
28a. Glumes broadly obovoid or suborbicular, bright yellow. Filaments connate at the base in an annular ring. 19. G. *iria*

28b. Glumes linear-lanceolate or ovate-oblong, dirty yellowish-green or reddish-brown. Filaments free.

29a. Rhachis hispidulus.

29b. Rhachis glabrous.

30a. Spikes 1 - 2 cm broad. 9. G. *digitatus*

30b. Spikes ca 0.5 mm broad.

31a. Glumes distantly arranged, spreading so that the rhachilla is distinctly visible.

32a. Stolons present.

Inflorescence on maturity collapsing in a tassel; glumes 2.2 - 2.5 mm long, emarginate. Anthers ca 0.7 mm long, crest quadrate, red-papillose. 7. G. *mutana*

32b. Stolons absent. Inflorescence not collapsing;
7. £. elusincoides

31b. Glumes closely arranged, appressed or ascending so that the rhachilla is not visible.

33a. Umbels decompound or compound; spikes sessile and peduncled; spikelets distantly arranged and spreading so that the rhachis is distinctly visible; glumes 1.5 - 2 mm long. Anthers ca 1 mm long; styles, including the stigmas, ca 2.5 mm long. 10. £. exaltatus

33b. Umbels compound or simple; spikes sessile; spikelets closely arranged and ascending so that the rhachis is not visible; glumes 1 - 1.2 mm long. Anthers ca 0.3 mm long; styles, including the stigmas, ca 1 mm long. 11. £. imbricatus

27b. Spikelets digitate or very shortly spicate, the rhachis obscure or much shorter than to about as long as the spikelets.
34a. Spikelets digitate, 3 - 20 mm long.

35a. Many of the spikelets pedicelled. 23. C. multispicatus
35b. Spikelets all sessile.

36a. Glumes mucronate.

37a. Leaves 1.5 - 4 mm broad.
Bracts shorter than to scarcely equalling the umbel. 29. C. haapan
37b. Leaves 7 - 20 mm broad.
Lower bracts much exceeding the umbel. 24. C. diffusus

36b. Glumes muticous.

38a. Spikelets numerous together. Nuts equalling the glumes. 25. C. difformis
38b. Spikelets 2 - 15 together. Nuts much shorter than the glumes.

39a. Bracts lower exceeding the umbel. Nuts oblong-ellipsoid, 1/2 - 3/5 as long as the glumes.
40a. Glumes ca 1 mm long, tips incurved.

40b. Glumes 1.5 - 2 mm long, tips erect or excurved.

26. G. pulcherrimus

27. G. illitensis

39b. Bracts all shorter than the umbel. Nuts broadly obovoid or subglobose.

41a. Mature spikelets with ascending and appressed glumes, the rhachilla thus not visible. Anther crest setose. Mature nuts yellowish, 0.35 - 0.5 mm long.

29. G. haapan

41b. Mature spikelets with widely spreading glumes, the rhachilla thus distinctly visible. Anther crest smooth. Mature nuts marble white, 0.25 - 0.3 mm long.

28. G. temuispica

34b. Spikelets shortly spicate, 6 - 60 mm long.

42a. Umbels simple; glumes mucronate. Stigmas ca 1/6 as long as the styles.

22. G. compressus
42b. Umbels simple or compound; glumes muticous or mucronulate. Stigmas as long as to longer than the styles.

43a. Rhachis hispidulous; glumes scabrid on the keel.

43b. Rhachis glabrous; glumes smooth.

44a. Stems stout, 4 - 8 mm thick in the middle, cylindric in the lower half, trigonous at the top. Leaves absent or solitary. Umbels compound to decompound.

45a. Bracts all shorter than the umbel.

45b. Bracts lower much exceeding the umbel.

44b. Stems slender or stout, 1 - 5 mm thick in the middle, trigonous or triquetrous throughout. Leaves two to several. Umbels simple to supradecompound.
46a. Spikelets acicular, ca 1 mm broad; glumes 1.5 - 2 mm long. Nuts ca 3/4 as long as the glume. 6. G. distans

46b. Spikelets compressed, 1.5 - 3 mm broad; glumes 3 - 4.5 mm long. Nuts less than half as long as the glumes.

47a. Stolons present. Spikelets strongly compressed; glumes deep reddish-brown. 12. G. rotundus

47b. Stolons absent. Glumes yellowish or if brownish, the spikelets compressed-quadrangular.

48a. Leaves scarcely 1/3 as long as the stem, 1.5 - 2.5 mm broad. Bracts shorter than the umbel. 13. G. macer

48b. Leaves more than half as long as the stem. Bracts equalling to exceeding the umbel.

49a. Rhachilla green; glumes 4 - 4.5 mm long, stramineus, ferrugineous dotted. Nuts ellipsoid-oblong. 16. G. thomsonii

49b. Rhachilla black; glumes 3 - 4 mm long, uniformly stramineus or fulvous. Nuts obovoid. 17. G. temuliculmis
2. **FIMBRISTYLIS** Vahl

1a. Nuts linear with almost parallel sides.

2a. Leaves present. Glumes aristate.

2b. Leaves absent. Glumes muticus.

1b. Nuts obovoid or suborbicular.


4a. Stems bearing 1 - 3 spikelets.


6a. Stems terete. Spikelets more or less obliquely placed on the stem, broadly ovoid, 3 - 5 mm thick, ferrugineous. Anthers 1.5 - 2 mm long. Nuts with 3 - 5 transverse ridges.

6b. Stems quadrangular. Spikelets vertically placed on the stem, ovoid-oblong or lanceolate, 2 - 3.5 mm thick, stramineus or brown tinged. Anthers 0.7 - 1.2 mm long. Nuts with 5 - 8 transverse ridges.
5b. Nuts smooth or vertically trabeculate.

7a. Leaves present. Styles fimbriate.

8a. Nuts trabeculate. 5. E. dichotoma

8b. Nuts smooth.

9a. Spikelets 4 - 8 mm long,
3 - 4.5 mm thick, stramineous or red-tinged; glumes
2.5 - 3.3 mm long. Anthers
0.5 - 0.7 mm long; styles
1.2 - 1.5 mm long. 8. E. schoenoides

9b. Spikelets 7 - 20 mm long,
3.5 - 6 mm thick, brown;
glumes 5 - 6 mm long.
Anthers 1.5 - 2.5 mm long;
styles 2.5 - 4 mm long. 9. E. tristachya

7b. Leaves absent. Styles not fimbriate.

23. E. globulosa

4b. Stems bearing 4 - numerous spikelets.

10a. Leaves absent. Spikelets subglobose;
glumes broadly scarios-margined, its midrib ending below the tip. 23. E. globulosa
10b. Leaves present or absent. Spikelets linear-lanceolate, ellipsoid or ovoid - oblong; glumes narrowly scarious - margined, its midrib reaching the tip or produced beyond it.

11a. Glumes all aristate; arista ca as long as the main body. Style base with long pendent hairs.

11b. Glumes all acute or mucronate or only the lower 2 - 4 aristate. Style-base glabrous or with short spreading hairs.

12a. Glumes 1.2 - 1.5 mm long. Nuts 0.5 - 0.7 mm long.


13b. Leaves absent, or if present, not ligulate. Nuts smooth.

14a. Leaves 1 - 2 mm broad, glabrous.

14b. Leaves 0.5 - 1 mm broad, usually hairy.

11. *E. aquarrosa*

3. *E. bigumbellata*

12. *E. griffithii*

13. *E. asativalis*
12b. Glumes 2 - 4.2 mm long. Nuts 0.7 - 1.5 mm long.

15a. Spikelets almost all in clusters of 2 - 6, sometimes a few solitary, linear-lanceolate, scarcely broader than their pedicel. 10. P. hookeriana

15b. Spikelets all solitary or sometimes a few rather clustered, ellipsoid or ovoid-oblong, several times broader than their pedicel.

16a. Leaves ligulate.

17a. Perennial herbs. Rhizomes slender, long creeping. 4. P. stolonifera

17b. Annual or perennial herbs. Rhizomes, if present, woody, short.

18a. Surface cells of the nut arranged in 5 - 10 vertical rows on each face. 6. P. dichotoma

18b. Surface cells of the nut arranged in 12 - 24 vertical rows on each face.
19a. Spikelets 3 - 4 mm thick; 
glumes several-nerved. Nuts 
suborbicular, on 0.3 - 0.5 
mm long stipe.

19b. Spikelets 2 - 2.5 mm thick; 
glumes 3-nerved. Nuts ovoid, 
on 0.1 - 0.15 mm long stipe.

16b. Leaves not ligulate.


20a. Inflorescence capitate with many, 
 sessile, stellately spreading spike-
lets; rhachilla of the spikelets 
caducous, glumes persistent, the 
spikelets thus falling off as a 
whole.

20b. Inflorescence umbellate with dist-
inct rays or reduced to a solitary 
spikelet, or if capitate, only 
with 2 - 5 spikelets; rhachilla of 
the spikelets persistent, glumes 
aeropetally caducous.

21a. Leaves present.

22a. Stems bearing 1 - 3 spike-
elets. Nuts 2 - 3 mm long.
22b. Stems bearing 1 - numerous spikelets.
Nuts 0.4 - 1.5 mm long.

22a. Annual herbs, 2 - 6 cm high. Leaves strongly falcate in one direction.
Glumes hairy. 29. *P. fimbriatylodea*

23b. Annual or perennial herbs, 10 - 100 cm high. Leaves straight or sometimes irregularly curved.
Glumes glabrous.

24a. Leaves equitant, laterally flattened. 22. *P. miliacae*

24b. Leaves not equitant, dorso - ventrally flattened.

25a. Glumes at least the lower ones of most of the spikelets distichous.

26a. Spikelets all in clusters of 2 - 4 or sometimes a few solitary; glumes 3.5 - 5 mm long, acute. 30. *P. nigrobrunnea*

26b. Glumes all solitary or sometimes a few in clusters of 2 - 3; glumes 3 - 4 mm long, mucronulate. 31. *P. eragrostis*
25b. Glumes all spiral.

27a. Spikelets all in clusters or sometimes a few solitary. 21. *F. falcata*

27b. Spikelets all solitary.

28a. Cauline leaves with well developed blades.

29a. Glumes ca 1.3 mm long. 19. *F. tenax* var. *oxylepis*

29b. Glumes 2 - 4.5 mm long.

30a. Leaves ligulate.

31a. Stems strongly compressed.
Glumes 2 - 2.5 mm long, 3-nerved. 17. *F. complanata*

31b. Stems not compressed. Glumes 3 - 4 mm long, 5 - 9-nerved. 18. *F. thomsonii*

30b. Leaves not ligulate. 20. *F. nierotii*

28b. Cauline leaves, at least the upper one, reduced to bladeless sheaths.
32a. Nuts verruculose.  
32b. Nuts smooth.  

21b. Leaves absent.

33a. Umbels simple or compound, bearing  
  2 - 15 spikelets; spikelets subglobose; glumes broadly scarious-margined, its midrib ending below the tip.  

23. E. globulosa

33b. Umbels decomound or supradecompond, bearing 10 - numerous spikelets; spikelets ellipsoid; glumes narrowly scarious-margined, its midrib reaching the tip or produced beyond it.

34a. Nuts densely verruculose, surface cells in 4 - 6 vertical rows on each face.  

24. E. quinquangularis

34b. Nuts smooth or sparsely verruculose, surface cells in 9 - 12 vertical rows on each face.

35a. Spikelets ca 6 mm long, ca 3 mm thick; glumes scarcely keeled. Nuts smooth.  

25. E. filifolia

35b. Spikelets 3 - 4 mm long, ca 2 mm thick; glumes strongly keeled. Nuts smooth or slightly verruculose.  

26. E. salbundia
3. **BULBOSTYLIS** Kunth

1a. Inflorescence capitate, bearing 10 - 25 spikelets.
1b. Inflorescence umbellate, bearing 2 - many spikelets or reduced to a solitary spikelet.

4. **BLEOCHARIS** R. Br.

1a. Stems somewhat stout, 2 - 10 mm thick.
   Spikelets about as thick as the stems, subcylindrical; glumes coriaceous, 4 - 6.5 mm long.
2a. Stems terete, transversely septate.
   Nuts smooth.
2b. Stems terete or angled, not septate.
   Nuts trabeculate or cancellate.
3a. Stems triquetrous. Nuts constricted at the apex forming a neck below the style-base.
3b. Stems terete or subtrigonous below the spikelet. Nuts gradually narrowed towards the apex, not forming a neck.

1. *E. barbata*
2. *E. dense*
1. *E. dulcis*
2. *E. acutangula*
3. *E. laxiflora*
lb. Stems slender, 0.2 - 1.5 mm thick.
Spikelets markedly thicker than the stems, void-oblong; glumes membranaceous, 1 - 4.5 mm long.

4a. Stems tetraquetrous.
4b. Stems terete or subterete.

5a. Stigmas 2.

6a. Spikelets 5 - 20 mm long.
Nuts 1.2 - 1.7 mm long;
style-base oblong-conic,
1.2 - 1.5 mm long.

6b. Spikelets 3 - 5 mm long.
Nuts ca 0.5 mm long;
style-base like a minute button, scarcely 0.05 mm long.

5b. Stigmas 3.

7a. Spikelets bearing only 1 - 4 nuts. Nuts cuneate.

7b. Spikelets bearing several to many nuts. Nuts smooth or obscurely reticulate.
8a. Perianth-bristles 4. Nuts 1.2 - 1.7 mm long; style base oblong - conic, 1.2 - 1.5 mm long. 4. *E. palustris*

8b. Perianth-bristles 6 - 7. Nuts 0.7 - 1.2 mm long; style-base ovoid, ca 0.3 mm long.

9a. Plants usually showing viviparous germination. Glumes 3 - 3.3 mm long. 8. *E. subvivipara*

9b. Plants not showing viviparous germination. Glumes 1.5 - 2 mm long. 9. *E. congesta*

5. **ERIOPHORUM** L.

Only Assam species ...

6. **SCIRPUS** L.

1a. Aquatic, usually submerged, floating herbs. Stems capillary, fasciculately branched. Leaves scattered all along the stem, filiform. 1. *S. fluitans*

1b. Marsh- or dry-land, not or half-submerged herbs. Stems capillary to stout, unbranched. Leaves all basal or if scattered, broad, or absent.
2a. Inflorescence capitate or reduced to a solitary spikelet; glumes aristate, the arista ca as long as or even longer than the main body.

2b. Inflorescence umbellate or if capitate or reduced to a solitary spikelet, the glumes acute or mucronate.

3a. Inflorescence pseudolateral because the solitary stem-like erect bract appearing as though a continuation of the stem.

4a. Inflorescence umbellate.

4b. Inflorescence capitate or reduced to a solitary spikelet.

5a. Stems ca 1/4 as long as the bracts.

5b. Stems ca as long as or longer than the bracts.

6a. Perianth present.

7a. Stems terete.

7b. Stems triquetrous to almost 3-winged.

6b. Perianth absent.

2. S. squarrosum

5. S. unipilis

6. S. articulatus

7. S. junecoides

8. S. mucronatus
8a. Glumes acute.
8b. Glumes mucronate.

9a. Herbs ca 5 cm high. Inflorescence capitate bearing 2 - 5 spikelets or reduced to a solitary spikelet.

9b. Herbs 30 - 200 cm high. Inflorescence umbellate or capitate bearing 2 - numerous spikelets or reduced to a solitary spikelet.

10a. Leaves present or absent. Bracts glumaceous.
10b. Leaves always present. Bracts foliaceous.

11a. Glumes 5.5 - 7 mm long, aristate; arista 1.5 - 2 mm long.
11b. Glumes 1.5 - 3 mm long, acute or mucronulate.

12a. Leaves clustered at the base. Spikelets all solitary.
12b. Leaves scattered all along the stem. Spikelets all or most in clusters of 2 - 15.
13a. Spikelets some solitary and others in clusters of 2 - 4. Perianth-bristles 3 - 5-times longer than the nut.

13b. Spikelets all in clusters of 4 - 15. Perianth-bristles ca as long as the nut or absent.

3. *S. asiaticus*

4. *S. ternatamia*


1a. Annual herbs, 1 - 4 dm high. Clusters of spikelets usually congested at the tips; glumes 1.5 - 1.7 mm long. Perianth-scales with its claw ca as long as its blade.

1b. Perennial herbs, 3 - 11 dm high. Clusters of spikelets scattered all along the branches. Perianth-scales with short claws.

2. *F. umbellata*

8. *LIPOCARPHA* R. Br.

1a. Capitulas white. Styles about half or more as long as the nut. Nuts about half as long as the glumes.

1b. Capitulas reddish-brown. Styles very short. Nuts about as long as the glumes.
9. **RHYMCHOSPORA** Vahl

1a. Leaves clustered at the base. Spikelets in a single, terminal head.  
    4. *R. rubra*

1b. Leaves scattered all along the stem. Spikelets in elongated racemes or panicles.

2a. Leaves setaceous, 0.5 - 1 mm broad.  
    Perianth-bristles absent.  
    3. *R. gracillima*

2b. Leaves linear, 2 - 20 mm broad.  
    Perianth-bristles present.

3a. Nut-apex suddenly contracted into a neck.  
    6. *R. hookeri*

3b. Nut-apex gradually narrowed, not forming a neck.

4a. Leaves 8 - 20 mm broad.  
    5. *R. corymbosa*

4b. Leaves 2 - 3 mm broad.

5a. Perianth-bristles shorter than the nut. Nuts ca as broad as long.  
    1. *R. rugose*

5b. Perianth-bristles as long as or longer than the nut. Nuts about 1/2 as long as broad.  
    2. *R. griffithii*

10. **MACHAIRINA** Vahl

Only Assam species ...  
    *M. rubiginosa*

Only Assam species ...

12. MAPANIA Aubl.

Only Assam species ...

13. SCLERIA Berg.

1a. Inflorescence spiciform; spikelets in clusters.

2a. Leaves 1 - 5 cm long. Clusters of spikelets subtended by foliaceous bracts; female glumes tridentate. 14. S. caricina

2b. Leaves 7 - 17 cm long. Clusters of spikelets subtended by glumaceous bracts; female glumes entire. 10. S. persicifolia

1b. Inflorescence paniculate, of a terminal and usually also of lateral partial panicles; spikelets solitary or in clusters.

3a. Middle leaves and lower bracts clustered in groups of 3 - 5 forming pseudo-whorls. Hypogynous-disc cyathiform, ca half as long as to almost equalling the nut; shallowly 3-lobed; lobes denticulate. 1. S. sumatrensis
3b. Leaves and bracts all somewhat evenly distributed, not clustered. Hypogynous disc not as above.

4a. Hypogynous-disc many-toothed.
4b. Hypogynous-disc 3-lobed or entire.

5a. Glumes beset with long patent hairs.

5b. Glumes glabrous or puberulus.


7a. Partial panicles copious, dense, corymbiform.

7b. Partial panicles very loose, with almost spiciform branches.

8a. Inflorescence consisting of a solitary terminal panicle; bracts all glumaceous; spikelets solitary.
8b. Inflorescence consisting of a terminal and usually also of 1 - several lateral partial panicles; bracts at least the lower foliaceous; spikelets in clusters of 2 - 4.

9a. Hypogynous disc-lobes hemi-spherical, broadly rounded at the top.
10a. Nuts depressed-globose, broader than long.
10b. Nuts ovoid or globose, ca as long as or longer than broad.

9b. Hypogynous disc-lobes ovate-lanceolate, acute, mucronulate or notched.
12b. Nut-beaks white.

13a. Stigmas ca 2 mm long. Nuts sub-globose; disc-lobes ca 1/2 as long as nuts, acute or notched.
13b. Stigmas ca 5 mm long. Nuts ovoid; disc-lobes ca 1/3 as long as nuts, mucronate.

6. S. oblata
7. S. terrestris
8. S. biflora
9. S. parvula
10. S. levis
11. S. clarkeana
14. CAREX L.

1a. Spikelets solitary, terminating the stem.

2a. Leaves longer than the stem, 2 - 8 mm broad. Utricles 4.5 - 5.5 mm long.

2b. Leaves shorter or longer than the stem, 0.4 - 1 mm broad. Utricles 2 - 3 mm long.

3a. Spikelets 7 - 10 mm long. Utricles ca 2 mm long.

3b. Spikelets 15 - 20 mm long. Utricles ca 3 mm long.

1b. Spikelets 2 - numerous on the stem.

4a. Inflorescence spicate; terminal spikelet male at the top and the base, female in the middle. Stigmas persistent.

4b. Inflorescence various; terminal spikelet wholly male or male at the base or top only. Stigmas deciduous or persistent.

5a. Spikelets sessile, oblong, ovoid or subglobose; cladophylls absent. Stigmas 2.

6a. Spikelets androgynous i.e. male at the top and female at the base.
7a. Utricles 1.9 - 2.2 mm long, scarcely beaked.

7b. Utricles 3 - 4.5 mm long, distinctly beaked.

8a. Leaves 1.5 - 3 mm broad. Styles uniformly slender. Utricles several-nerved.

8b. Leaves 3 - 6 mm broad. Styles swollen at the base. Utricles nerveless.

6b. Spikelets gynaeandrous i.e. male at the base and female at the top.

9a. Bracts all glumaceous. Spikelets 2 - 4. Utricle-mouth subentire


5b. Spikelets, at least the lower ones, peduncled, of varied shapes; cladophylls present. Stigmas 2 - 3.

10a. Inflorescence paniculate-fasciculate, with 2 - numerous spikelets in the axils of all or at least the lower bracts; spikelets all androgynous or when numerous, sometimes mixed with a
few wholly male or female ones (except *C. alopecuroides* where terminal spikelet male or gynaecandrous).

11a. Spikelets 5 - 6, terminal male or gynaecandrous, laterals female.

11b. Spikelets 2 - numerous, all androgynous or if numerous, sometimes mixed with a few wholly male or female ones.

12a. Stigmas 2. Utricles and nuts lenticular.

13a. Stigmas not or scarcely exserted from the utricles. Utricles scabrid upwards along the margins only.

13b. Stigmas long exserted from the utricles. Utricles hispidulous.

14a. Female glumes all acute, 2.3 - 2.7 mm long. Styles including the stigmas ca 5.5 mm long.

14b. Female glumes lower awned or mucronate, upper acute. Styles including the stigmas ca 8 mm long.

15a. Leaves evenly distributed throughout the stem, lower reduced to bladeless sheaths, upper gradually with well developed blades. 26. G. insignis

15b. Leaves with fully developed blades clustered at the base, sometimes one or two leaves upwards on the stem also.

16a. Spikelets in each bract axil 1 - 3 only.

17a. Leaves shorter than the stem. 1. G. oligostachya

17b. Leaves longer than the stem. 2. G. repanda

16b. Spikelets in most of the axils several - numerous.

18a. Plants 1 - 2 dm tall.

Inflorescence of a terminal panicle only or sometimes also with an additional partial panicle. 3. G. parriziana
18b. Plants usually exceeding 2 dm. Inflorescence of three or more partial panicles or several fascicles.

19a. Female glumes prominently awned, lower with their awn ca as long as or even longer than their main body.

20a. Spikelets 2 - 4 cm long. Utricles throughout hairy. 27. *G. daltonii*

20b. Spikelets 0.2 - 1.2 cm long. Utricles glabrous or hispidulous only along the beak-margins.

21a. Female glumes stramineus, reddish-brown dotted and striolate. 4. *G. indica*

21b. Female glumes uniformly fuscous. 5. *G. distracta*

19b. Female glumes acute - mucronate.

22a. Spikelets all or almost all 2 - 6 cm long.

23a. Utricles throughout villous. 12. *G. composita*

23b. Utricles glabrous or scaberulous only along beak-margins.
24a. Utricles broadly obovoid or sub-globose, mature bright red.  
11. G. baccana
24b. Utricles ellipsoid or narrowly obovoid, mature pale yellowish-green or brownish.

25a. Peduncles solitary in a bract axil; 
    male part of the spikelets 3 - 25 
    mm long, conspicuously narrower and 
    distinct from the female part.  
13. G. apiculata
25b. Peduncles 1 - 4 in a bract axil. 
    Male part of the spikelets 2 - 3 
    mm long, as thick as and indistinct 
    from the female part.  
29. G. polycephala

22b. Spikelets all or almost all 0.3 - 1.5 cm long.

26a. Female glumes whitish-stramineus.

27a. Peduncles solitary in a bract axil, 
    each with several to numerous spikelets.  
6. G. stramentitits
27b. Peduncles 1 - 4 in a bract axil, 
    each with only 1 - 3 spikelets.  
39. G. polycephala

26b. Female glumes reddish-brown or stramineus with reddish-brown dots and 
    streaks.

28a. Utricles throughout villous.  
8. G. vesiculosa
28b. Utricles glabrous or scaberulous 
    only along beak-margins.
29a. Peduncles 1 - 4 in a bract axil, each with only 1 - 3 spikelets.

30a. Peduncles all bearing only a solitary spikelet; glumes castaneous.

30b. Peduncles lower bearing 2 - 3 spikelets; glumes glossy stramineus or brown-tinged.

29b. Peduncles 1 - 2 in a bract axil, almost all with several to numerous spikelets.

31a. Lowest partial panicles almost reduced to a solitary spikelet.
Utricles almost nerveless or faintly 1 - 2-nerved on each face. 7. G. ecostata

31b. Lowest partial panicle well developed, with several to numerous spikelets.
Utricles conspicuously several-nerved on each face.

32a. Female glumes all mucronate or mucromulate, stramineus, reddish-brown dotted and striolate. Styles swollen at the base. Utricles slightly to strongly inflated, 1.2 - 1.7 mm broad. 9. G. cruciata

29a. Peduncles 1 - 4 in a bract axil, each with only 1 - 3 spikelets.

30a. Peduncles all bearing only a solitary spikelet; glumes castaneous. 28. G. muniporensis

30b. Peduncles lower bearing 2 - 3 spikelets; glumes glossy stramineus or brown-tinged. 29. G. polycaphala

29b. Peduncles 1 - 2 in a bract axil, almost all with several to numerous spikelets.

31a. Lowest partial panicles almost reduced to a solitary spikelet. Utricles almost nerveless or faintly 1 - 2-nerved on each face. 7. G. ecostata

31b. Lowest partial panicle well developed, with several to numerous spikelets. Utricles conspicuously several-nerved on each face.

32a. Female glumes all mucronate or mucromulate, stramineus, reddish-brown dotted and striolate. Styles swollen at the base. Utricles slightly to strongly inflated, 1.2 - 1.7 mm broad. 9. G. cruciata
32b. Female glumes almost all acute, a few sometimes micromulate, uniformly reddish-brown. Styles uniformly slender. Utricles not or scarcely inflated, 0.5 - 0.8 mm broad. 10. G. filicina

10b. Inflorescence racemose, with a solitary spikelet in the axil of each bract, androgynous, gynaecandrous or wholly male or female.

33a. Leaves evenly distributed throughout the stem, lower reduced to bladeless sheaths, upper gradually with well developed blades.

34a. Leaves abruptly narrowed into a long acumen. 32. G. ligulata

34b. Leaves gradually acuminate. 33. G. habacarna

33b. Leaves with fully developed blades clustered at the base, sometimes one or two leaves upwards on the stem also.

35a. Spikelets all androgynous.

36a. Inflorescence of 1 - 4 spikelets; spikelets subsessile, 1 - 2 cm long. Stigmas 3. 31. G. speciosa
36b. Inflorescence of 4 - several spikelets; spikelets lower at least long peduncled, often longer.

37a. Utricles throughout hairy.

38a. Utricles broadly obovoid or subglobose, 1.7 - 2 mm long.
38b. Utricles ellipsoid, 4.2 - 5.5 mm long.

37b. Utricles glabrous or scaberulous only along the beak-margins.


35b. Spikelets terminal wholly male or gynaeandrous, laterals androgynous, gynaeandrous or wholly male or female.

40a. Spikelets upper 3 - 4 gynaeandrous, remaining the/laterals female.
40b. Spikelets terminal wholly male or gynaeandrous, the laterals wholly male or female, or androgynous with only male apices.
41a. Spikelets upper 2-3 wholly male.

42a. Utricles glabrous or puberulus.
Muts long beaked; beak-tips with a nodular swelling. 34. G. fuscifrutatus

42b. Utricles villous. Muts scarcely apiculate, not beaked. 35. G. fadia

41b. Spikelets terminal wholly male or gynaecandrous, laterals all female or androgynous with short male apices.


44a. Robust herbs, 3-10 dm high.
Leaves 4-8 mm broad. Spikelets 4-7 cm long. Utricles long beaked; beaks 1.2-1.7 mm long. 41. G. nemostachya

44b. Dwarf herbs, 0.8-3 dm high.
Leaves 1.5-3 mm broad. Spikelets 1-3 cm long. Utricles short beaked; beaks ca 0.5 mm long.

45a. Leaves shorter than to exceeding the stem. Styles swollen at the base. Utricles several-nerved. 36. G. royceana
45b. Leaves exceeding the stem. Styles uniformly slender. Utricles nerveless.


46a. Stigmas 2. Utricles and nuts lenticular.

47a. Female spikelets all sessile or subsessile, erect. Styles including the stigmas, long exserted, 7 - 8 mm long.

47b. Female spikelets at least the lower, long peduncled, spreading or cernuous. Styles, including the stigmas, scarcely exserted, 2.5 - 3 mm long.

48a. Female glumes at awn base abruptly truncate or cordate.

49a. Low herbs, 1.5 - 2 dm high. Spikelets 2 - 4, 1.3 - 2.5 cm long.

21. *G. praerlonga* var *angustior*
49b. Low or tall herbs, 2 - 12 dm high. Spikelets 4 - 6, all or some at least 3.5 cm or more long.

22. G. phacota

48b. Female glumes at awn-base gradually acute or obtuse.

50a. Female glumes (excluding the awns) ca 1.5 mm long. Utricles inflated; beak bidentulate.
Nuts ovoid, 0.8 - 1 mm broad.

23. G. prescottiana

50b. Female glumes (excluding the awn) 2.8 - 3.3 mm long. Utricles scarcely inflated; beak entire.
Nuts suborbicular, 1.4 - 1.7 mm broad.

24. G. pruinosa


51a. Utricles long beaked; beaks about as long as the utricle body.

52a. Leaves longer than the stem.
Female glumes aristate.

30. G. deapona

52b. Leaves shorter than the stem.
Female glumes acute or mucromulate.

53b. Styles uniformly slender. Utricle mouth not or scarcely oblique.

38. *C. finitima* var. *attenuata*

39. *C. jachiana*

51a. Utricles short beaked; beaks half or less as long as the utricle body.

54a. Utricles ferrugineous-papillose.

54b. Utricles smooth.

55a. Stem-angles for the most part winged. Spikelets fastigiate.

Utricles yellowish-green.

42. *C. alopecuroides*

55b. Stem-angles acute or obtuse.

Spikelets lower distant upper gradually approximate. Utricles fuscous-olivaceous.

56a. Female glumes 1.8 - 2.5 mm long, distinctly awned or mucranate, stramineus. Styles swollen at the base.

43. *C. oedorrhapha*

56b. Female glumes 3.3 - 4.5 mm long, long acuminate, stramineus, reddish-brown flushed on sides. Styles uniformly slender.

44. *C. olivacea*