6. Results

6.1. Floral diversity of aquatic angiosperm plants

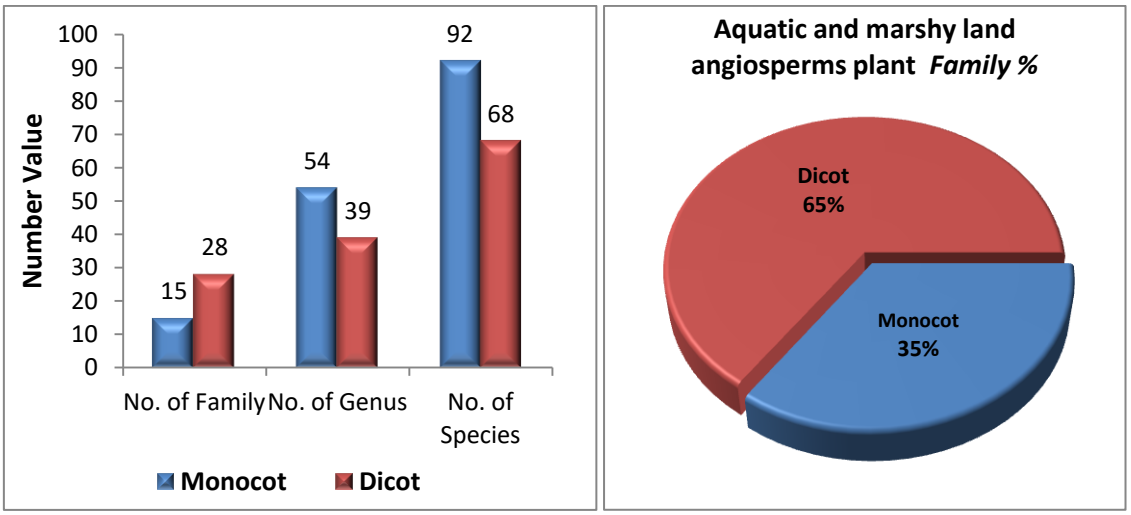
6.1.1. General enumeration of aquatic and marshy land angiosperms:

After a long survey during the 2008-2016 total of 160 angiosperm plant species recorded from the different aquatic zone of this district. Among these 92 plant species are monocot and 68 plant species are dicot. These 92 monocot plant species belong to 54 genera under the 15 families. Dicot 68 plant species are belonging to 39 genera under the 28 families. (Table 2, Graph-1-4)

Table 2: Showing total investigated **aquatic and marshy** land angiosperms under different families of the district Paschim Medinipur.

S.N.	Life forms	No. of Family	No. of Genus	No. of Species
1.	Monocotyledons	15	54	92
2.	Dicotyledones	28	39	68
Total		43	93	160

Graph- 1: Graphical representation total investigated **Aquatic and Marshy land angiosperms** under different families of the district Paschim Medinipur**.**



Graph-1 continued....

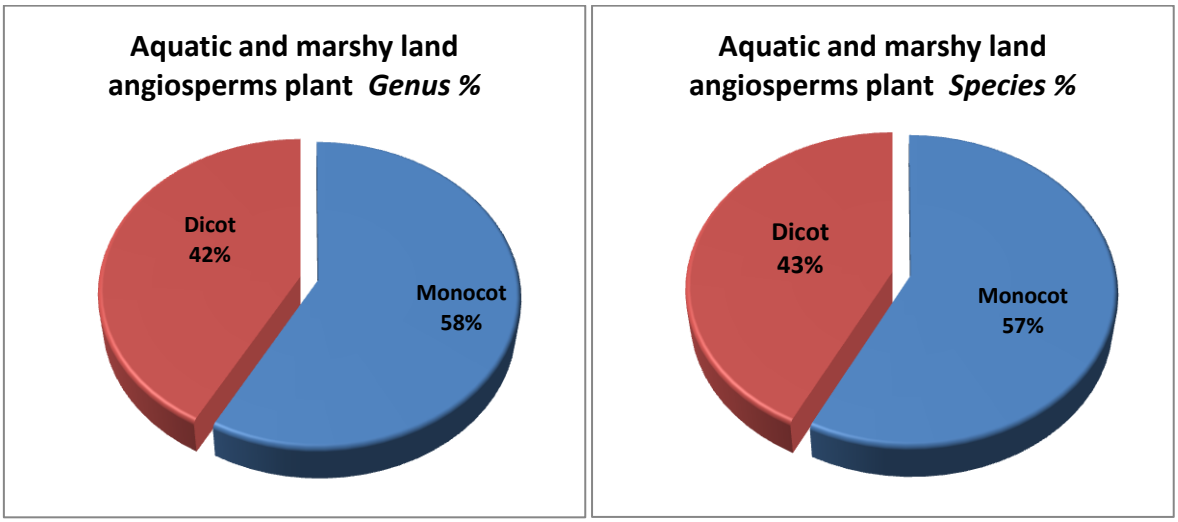
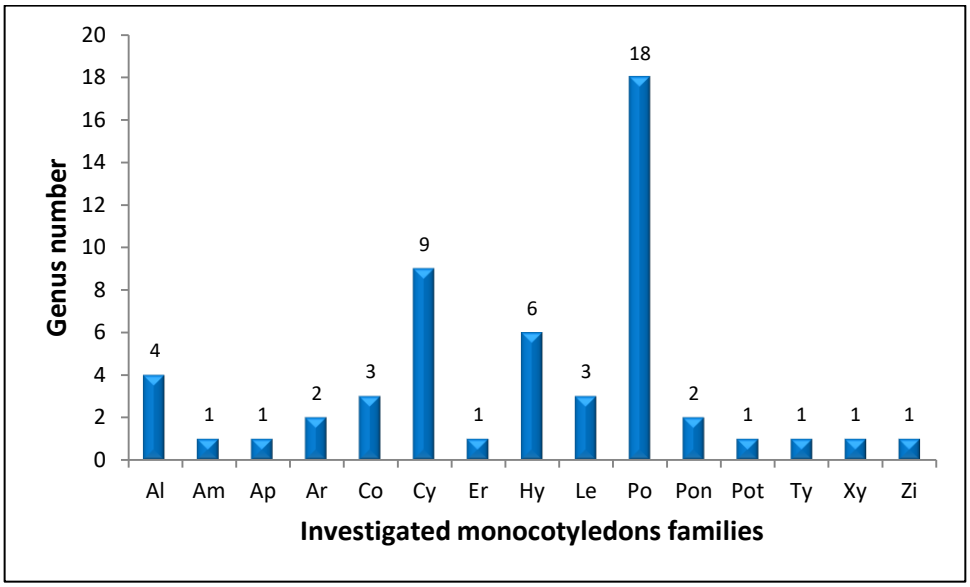


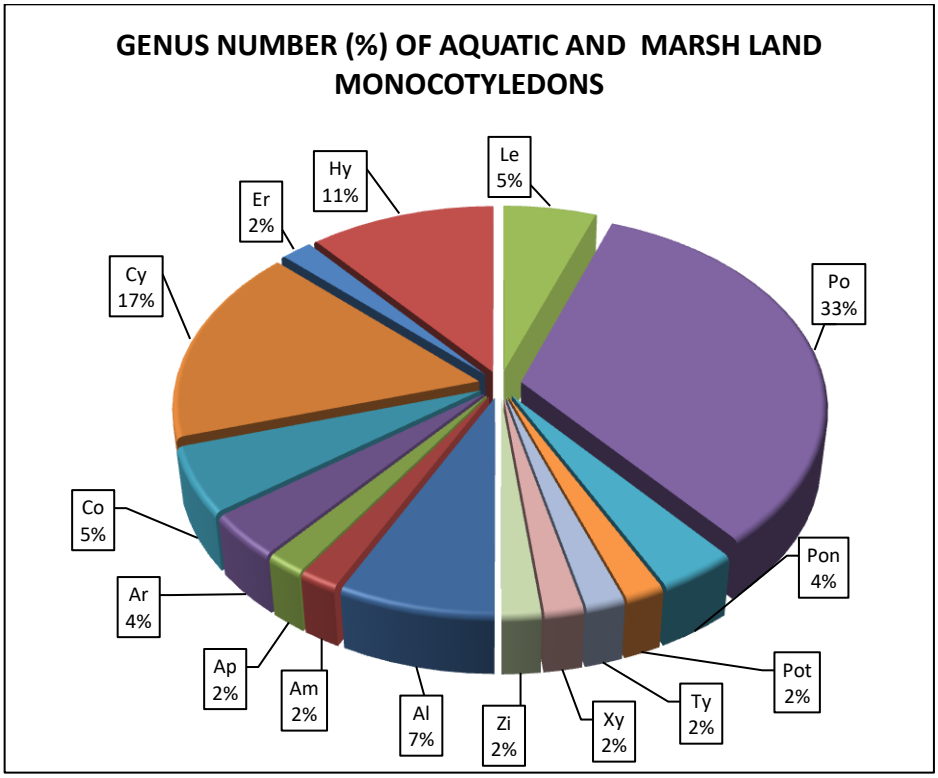
Table 3: Showing the total investigated **aquatic and marshy land monocotyledons** angiosperms under different families of the district Paschim Medinipur.

S.N.	Family Name	No. of genera	No. of species
1.	Alismataceae (Al)	4	5
2.	Amaryllidaceae (Am)	1	1
3.	Aponogetonaceae (Ap)	1	2
4.	Araceae (Ar)	2	2
5.	Commelinaceae (Co)	3	5
6.	Cyperaceae (Cy)	9	23
7.	Eriocaulaceae (Er)	1	4
8.	Hydrocharitacea (Hy)	6	10
9.	Lemnaceae (Le)	3	3
10.	Poaceae (Po)	18	28
11.	Pontederiaceae (Pon)	2	3
12.	Potamogetonaceae (Pot)	1	2
13.	Typhaceae (Ty)	1	2
14.	Xyridaceae (Xy)	1	1
15.	Zingiberaceae (Zi)	1	1
Total		**54**	**92**

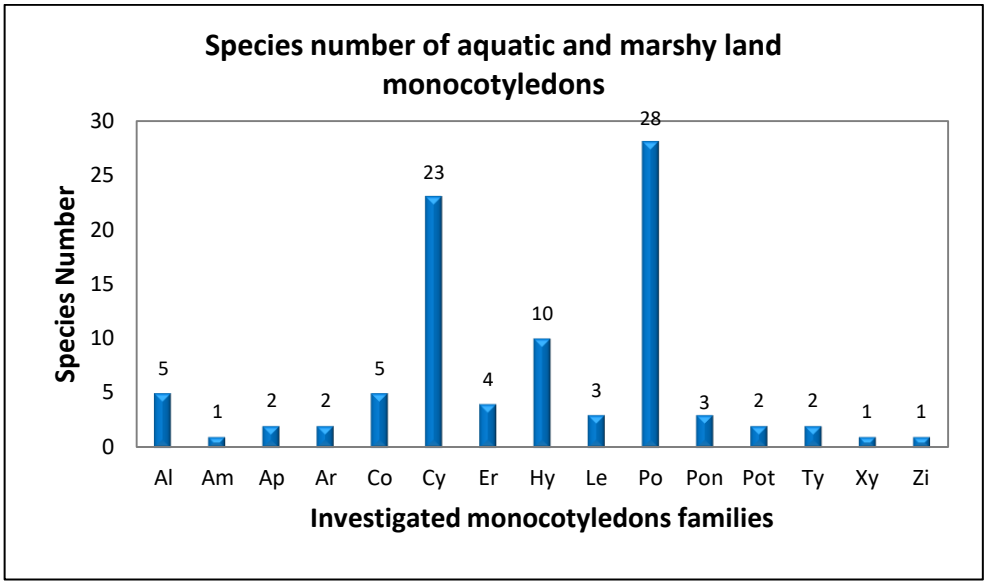
Graph-2: Graphical representation of **genus numbers** among aquatic and marshy land **monocotyledons** under different families of the district Paschim Medinipur.



Graph-3: Graphical representation of **genus numbers %** among aquatic and marshy land **monocotyledons** under different families of the district Paschim Medinipur.



Graph-4: Graphical representation of **species numbers** among Aquatic and Marshy land **monocotyledons** under different families of the district Paschim Medinipur.



Graph-5: Graphical representation of **species numbers %** among aquatic and marshy land **monocotyledons** under different families of the district Paschim Medinipur.

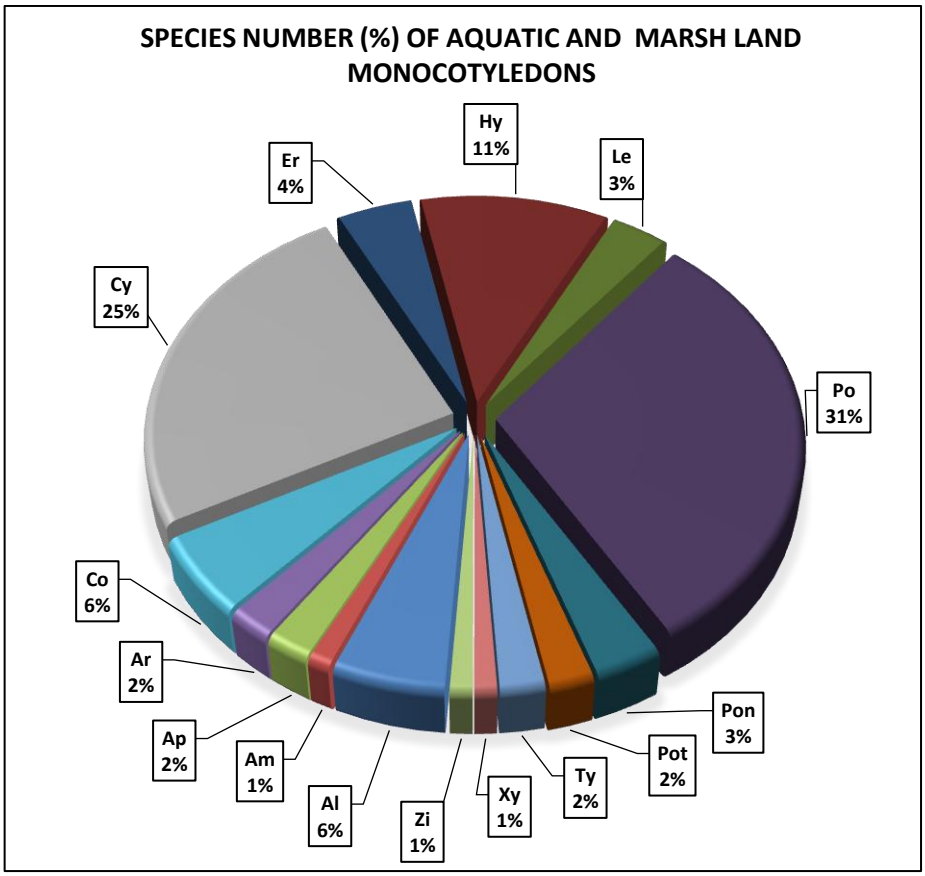
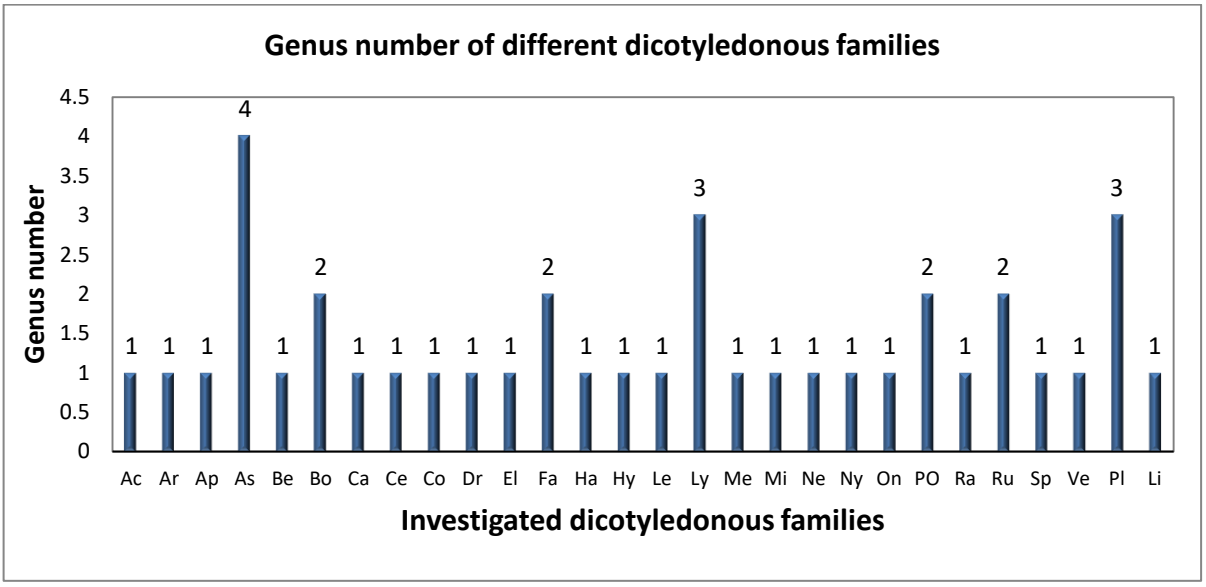


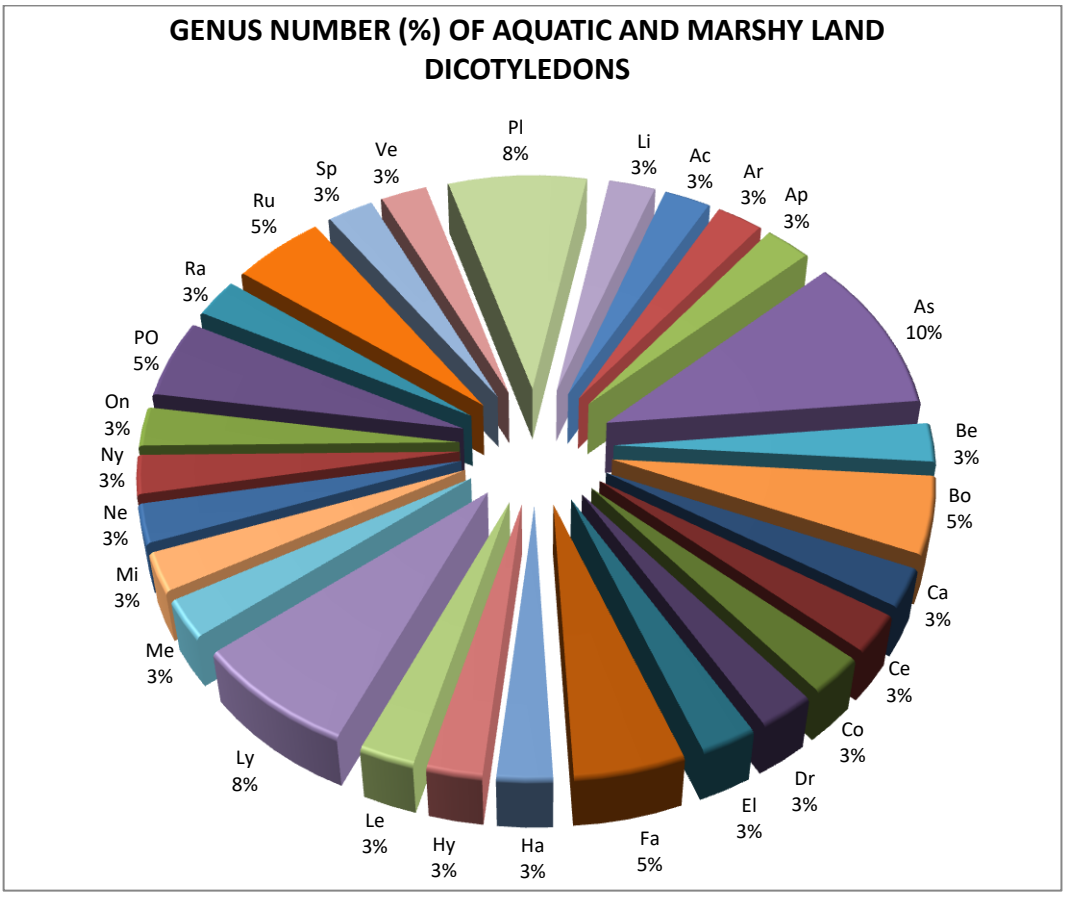
Table 4: Showing the total investigated aquatic and marshy land **dicotyledonous** angiosperms under different families of the district Paschim Medinipur.

S.N.	Family Name (Dicotyledonous)	No. of genera	No. of species	S.N.	Family Name (Dicotyledonous)	No. of genera	No. of species
1.	Acanthaceae (Ac)	1	3	**15.**	Lentibulariaceae (Le)	1	5
2.	Amaranthaceae (Ar)	1	3	**16.**	Lythraceae (Ly)	3	5
3.	Apiaceae (Ap)	1	1	**17.**	Menyanthaceae (Me)	1	2
4.	Asteraceae (As)	4	5	**18.**	Mimosaceae (Mi)	1	1
5.	Balsaminaceae (Be)	1	1	**19.**	Nelumboaceae (Ne)	1	1
6.	Boraginaceae (Bo)	2	3	**20.**	Nymphaeceae (Ny)	1	3
7.	Campanulaceae (Ca)	1	2	**21.**	Onagraceae (On)	1	4
8.	Ceratophyllaceae (Ce)	1	1	**22.**	Polygonaceae (PO)	2	3
9.	Convolvulaceae (Co)	1	2	**23.**	Ranunculaceae (Ra)	1	1
10.	Droseraceae (Dr)	1	1	**24.**	Rubiaceae (Ru)	2	4
11.	Elatinaceae (El)	1	1	**25.**	Sphenocleaceae (Sp)	1	1
12.	Fabaceae (Fa)	2	4	**26.**	Verbinaceae (Ve)	1	1
13.	Haloragaceae (Ha)	1	1	**27.**	Plantaginaceae (Pl)	3	5
14.	Hydroleaceae (Hy)	1	1	**28.**	Linderniaceae (Li)	1	3
Total						**39**	**68**

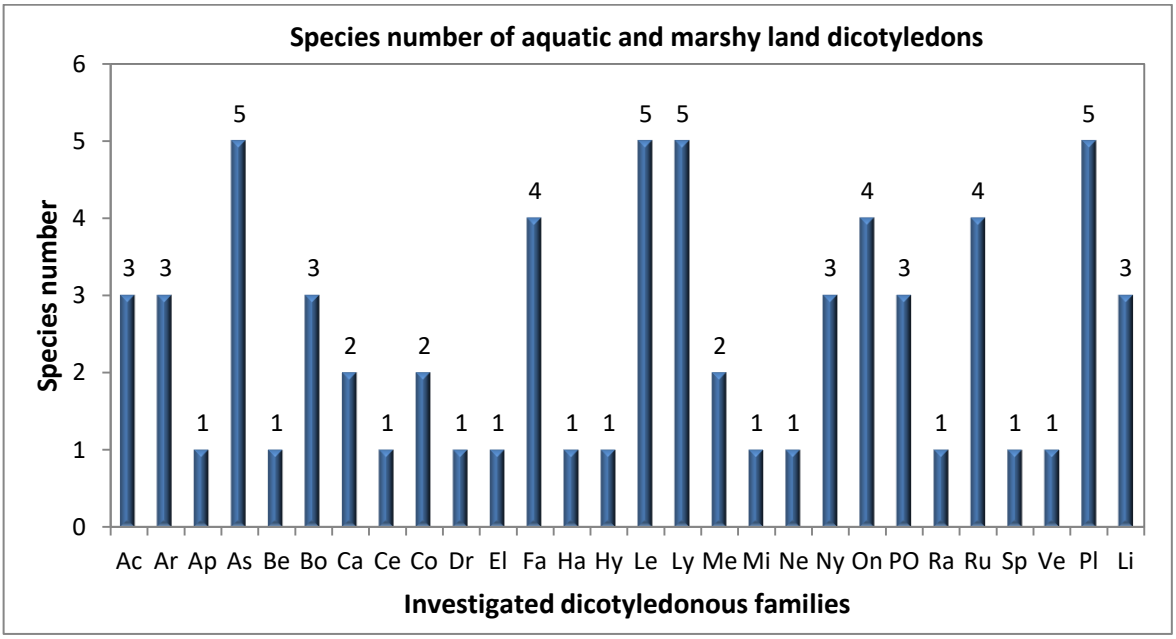
Graph-6: Graphical representation of **genus numbers** of aquatic and marshy land **dicotyledon** under different families of the district Paschim Medinipur.



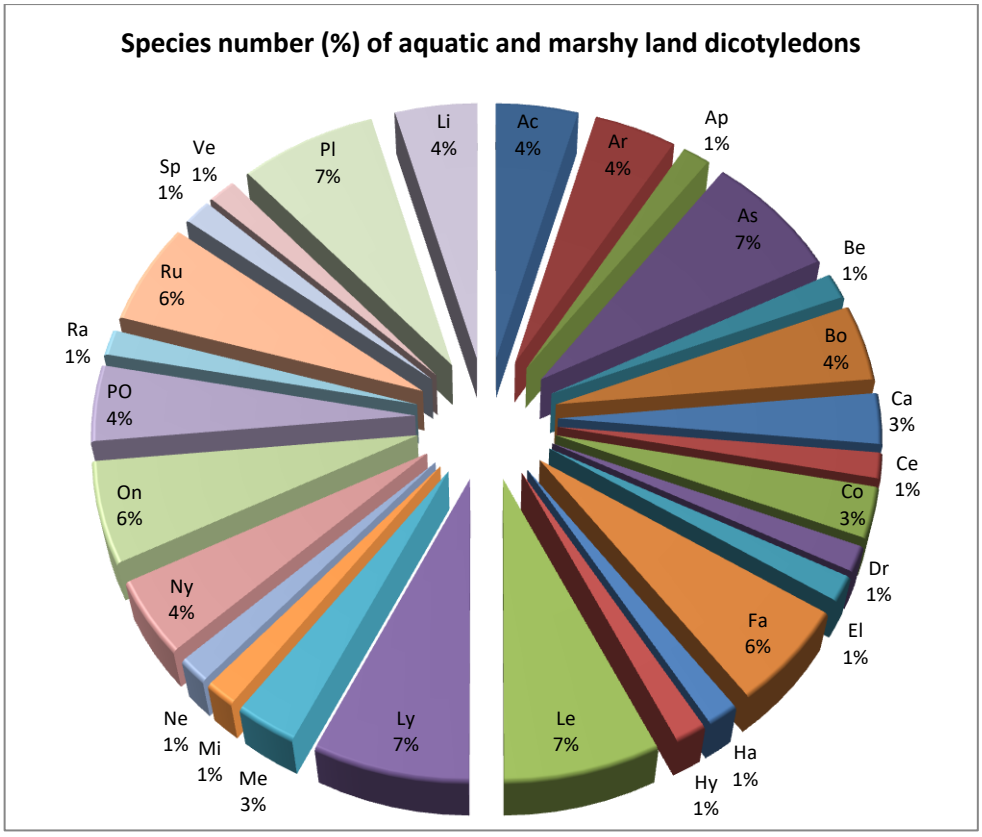
Graph-7: Graphical representation of **the genus numbers %** of aquatic and marshy land **dicotyledonous** under different families of the district Paschim Medinipur.



Graph-8: Graphical representation of **species number** of aquatic and marshy land **dicotyledons** of the district Paschim Medinipur.



Graph-9: Graphical representation of plant **species %** of aquatic and marshy land **dicotyledon** according to their families of the district Paschim Medinipur.



6.1.2. List of aquatic and marshy land **monocotyledon** plant species with their family name, those are collected from the study area (arranged in alphabetically).

Table 5: Showing monocotyledon plant species with their habitats and voucher numbers.

S.N.	**Plant Name (Monocotyledons)**	**Family name**	***Habitats**	**Voucher no. of Specimen**
1.	*Actinoscirpus grossus* (L.f.) Goetgh. & D.A. Simpson	Cyperaceae	EA	VU/DEBA/01
2.	*Alpinia aquatica* (Retz.) Roscoe	Zingiberaceae	EA	VUH/DEBA/136
3.	*Aponogeton crispus* Thunb.	Aponogetonaceae	SA	VUH/DEBA/137
4.	*Aponogeton natans* (L.) Engl. & K. Krause	Aponogetonaceae	RF	VU/DEBA/02
5.	*Arundo donax* L.	Poaceae	EA	VU/DEBA/098
6.	*Blyxa aubertii* Rich.	Hydrocharitaceae	SA	VU/DEBA/03
7.	*Blyxa echinosperma* (C.B. Clarke) Hook.f.	Hydrocharitaceae	SA	VU/DEBA/04
8.	*Blyxa japonica* (Miq.) Maxim. ex Asch. & Gürke	Hydrocharitaceae	SA	VU/DEBA/05
9.	*Blyxa octandra* (Roxb.) Planch. ex Thwaites	Hydrocharitaceae	SA	VU/DEBA/06

Table 5: continued….

S.N.	**Plant Name (Monocotyledons)**	**Family name**	***Habitats**	**Voucher no. of Specimen**
10.	*Brachiaria eruciformis* (Sm.) Griseb.	Poaceae	ML	VU/DEBA/099
11.	*Brachiaria mutica* (Forssk.) Stapf	Poaceae	EA	VU/DEBA/100
12.	*Brachiaria reptans* (L.) C.A. Gardner & C.E. Hubb.	Poaceae	ML	VU/DEBA/052
13.	*Butomopsis latifolia* (D. Don) Kunth	Alismataceae	EA	VU/DEBA/07
14.	*Caldesia parnassifolia* (L.) Parl.	Alismataceae	RF	VU/DEBA/054
15.	*Chloris barbata* Sw.	Poaceae	ML	VU/DEBA/08
16.	*Coix aquatica* Roxb.	Poaceae	EA	VUH/DEBA/138
17.	*Coix lacryma-jobi* L.	Poaceae	EA	VU/DEBA/09
18.	*Colocasia esculenta* (L.) Schott	Araceae	ML	VU/DEBA/101
19.	*Commelina benghalensis* L.	Commelinaceae	ML	VU/DEBA/038
20.	*Commelina diffusa* Burm.f.	Commelinaceae	ML	VU/DEBA/024
21.	*Crinum asiaticum* L.	Amaryllidaceae	EA	VU/DEBA/102
22.	*Cyanotis axillaris* (L.) D. Don ex Sweet	Commelinaceae	ML	VU/DEBA/023
23.	*Cyperus compactus* Retz.	Cyperaceae	EA	VU/DEBA/039
24.	*Cyperus compressus* L.	Cyperaceae	ML	VU/DEBA/040
25.	*Cyperus platystylis* R.Br.	Cyperaceae	EA	VU/ANUP/002
26.	*Cyperus difformis* L.	Cyperaceae	EA	VU/DEBA/042
27.	*Cyperus distans* L.f.	Cyperaceae	EA	VU/ANUP/001
28.	*Cyperus imbricatus* Retz.	Cyperaceae	EA	VU/ANUP/006
29.	*Cyperus iria* L.	Cyperaceae	ML	VU/DEBA/043
30.	*Cyperus michelianus* (L.) Delile	Cyperaceae	ML	VU/DEBA/044
31.	*Cyperus rotundus* L.	Cyperaceae	ML	VU/ANUP/003
32.	*Echinochloa colona* (L.) Link	Poaceae	ML	VU/DEBA/022
33.	*Echinochloa crus-galli* (L.) P. Beauv.	Poaceae	ML	VU/DEBA/045
34.	*Eichhornia crassipes* (Mart.) Solms	Pontederiaceae	FF	VU/DEBA/051
35.	*Eleocharis dulcis* (Burm.f.) Trin. ex Hensch.	Cyperaceae	EA	VU/DEBA/103
36.	*Eleocharis geniculate* (L.) Roem. & Schult.	Cyperaceae	EA	VUH/DEBA/139
37.	*Eleocharis spiralis* (Rottb.) Roem. & Schult.	Cyperaceae	EA	VUH/DEBA/140
38.	*Eriocaulon cinereum* R.Br.	Eriocaulaceae	EA	VU/DEBA/021
39.	*Eriocaulon setaceum* L.	Eriocaulaceae	SA	VU/DEBA/020
40.	*Eriocaulon truncatum* Buch. -Ham. ex Mart.	Eriocaulaceae	EA	VUH/DEBA/141
41.	*Eriocaulon xeranthemum* Mart.	Eriocaulaceae	EA	VUH/DEBA/142
42.	*Fimbristylis dichotoma* (L.) Vahl	Cyperaceae	EA	VU/DEBA/018
43.	*Fimbristylis littoralis* Gaudich.	Cyperaceae	EA	VU/DEBA/046
44.	*Fimbristylis quinquangularis* (Vahl) Kunth	Cyperaceae	ML	VUH/DEBA/143
45.	*Fuirena ciliaris* (L.) Roxb.	Cyperaceae	ML	VU/DEBA/019
46.	*Hemarthria compressa* (L.f.) R. Br.	Poaceae	ML	VU/DEBA/034
47.	*Hydrilla verticillata* (L.f.) Royle	Hydrocharitaceae	SA	VU/DEBA/025
48.	*Hygroryza aristata* (Retz.) Nees ex Wight & Arn.	Poaceae	RF	VU/DEBA/026
49.	*Isachne albens* Trin	Poaceae	ML	VUH/DEBA/144
50.	*Isachne globosa* (Thunb.) Kuntze	Poaceae	ML	VUH/DEBA/145

Table 5: continued….

S.N.	Plant Name (Monocotyledons)	Family name	*Habitats	Voucher no. of Specimen
51.	*Isachne miliacea* Roth	Poaceae	ML	VUH/DEBA/146
52.	*Ischaemum rugosum* Salisb.	Poaceae	ML	VUH/DEBA/147
53.	*Kyllinga brevifolia* Rottb.	Cyperaceae	ML	VU/DEBA/104
54.	*Kyllinga tenuifolia* Steud.	Cyperaceae	ML	VU/DEBA/105
55.	*Leersia hexandra* Sw.	Poaceae	ML	VU/DEBA/106
56.	*Lemna trisulca* L.	Lemnaceae	FF	VU/DEBA/107
57.	*Leptochloa chinensis* (L.) Nees	Poaceae	ML	VU/DEBA/108
58.	*Limnophyton obtusifolium* (L.) Miq.	Alismataceae	EA	VU/DEBA/033
59.	*Monochoria hastata* (L.) Solms	Pontederiaceae	EA	VU/DEBA/032
60.	*Monochoria vaginalis* (Burm.f.) C. Presl	Pontederiaceae	EA	VU/DEBA/030
61.	*Murdannia nudiflora* (L.) Brenan	Commelinaceae	ML	VU/DEBA/017
62.	*Murdannia spirata* (L.) G. Brückn.	Commelinaceae	ML	VU/DEBA/049
63.	*Najas graminea* Delile	Hydrocharitaceae	SA	VU/DEBA/109
64.	*Najas indica* (Willd.) Cham.	Hydrocharitaceae	SA	VU/DEBA/110
65.	*Nechamandra alternifolia* (Roxb. ex Wight) Thwaites	Hydrocharitaceae	SA	VU/DEBA/016
66.	*Oryza rufipogon* Griff.	Poaceae	EA	VU/DEBA/111
67.	*Oryza sativa* L.	Poaceae	EA	VU/DEBA/112
68.	*Ottelia alismoides* (L.) Pers.	Hydrocharitaceae	SA	VU/DEBA/031
69.	*Panicum paludosum* Roxb.	Poaceae	ML	VUH/DEBA/148
70.	*Panicum repens* L.	Poceae	ML	VU/DEBA/013
71.	*Paspalum distichum* L.	Poaceae	ML	VU/DEBA/015
72.	*Paspalum scrobiculatum* L.	Poaceae	ML	VU/DEBA/113
73.	*Phragmites karka* (Retz.) Trin. ex Steud.	Poaceae	ML	VUH/DEBA/149
74.	*Pistia stratiotes* L.	Araceae	FF	VU/DEBA/029
75.	*Potamogeton crispus* L.	Potamogetonacea	RF	VU/DEBA/050
76.	*Potamogeton nodosus* Poir.	Potamogetonacea	RF	VU/DEBA/114
77.	*Pycreus flavidus* (Retz.) T. Koyama	Cyperaceae	EA	VU/DEBA/035
78.	*Pycreus polystachyos* (Rottb.) P. Beauv.	Cyperaceae	EA	VU/ANUP/005
79.	*Saccharum spontaneum* L.	Poaceae	ML	VU/DEBA/115
80.	*Sacciolepis indica* (L.) Chase	Poaceae	EA	VUH/DEBA/150
81.	*Sacciolepis interrupta* (Willd.) Stapf	Poaceae	EA	VUH/DEBA/151
82.	*Sagittaria guayanensis* Kunth	Alismataceae	RF	VU/DEBA/028
83.	*Sagittaria sagittifolia* L.	Alismataceae	EA	VU/DEBA/010
84.	*Schoenoplectiella articulata* (L.) Lye	Cyperaceae	EA	VU/DEBA/012
85.	*Schoenoplectiella juncoides* (Roxb.) Lye	Cyperaceae	EA	VU/DEBA/037
86.	*Spirodela polyrrhiza* (L.) Schleid.	Lemnaceae	FF	VU/DEBA/116
87.	*Typha domingensis* Pers.	Typhaceae	EA	VU/DEBA/011
88.	*Typha elephantina* Roxb.	Typhaceae	EA	VUH/DEBA/152
89.	*Vallisneria spiralis* L.	Hydrocharitaceae	SA	VU/DEBA/027
90.	*Chrysopogon zizanioides* (L.) Roberty	Poaceae	ML	VU/DEBA/117
91.	*Wolffia globosa* (Roxb.) Hartog & Plas	Lemnaceae	FF	VU/DEBA/118
92.	*Xyris indica* L.	Xyridaceae	EA	VU/DEBA/053

*__ML__- Marshy land plants, **EA**- Emergent Anchored plants, **FF**- Free Floating plants, **RF**- Rooted with Floating Leaved plants, **SA**- Submerged Anchored plants.

6.1.3. List of **dicotyledon** plant species with their family name, those are collected from the study area (arranged in alphabetically).

Table 6: Show dicotyledons Plant list with their habitats and voucher number.

S.N.	Plant Name (Dicotyledons)	Family name	*Habitats	Voucher no. of Specimen
1.	*Aeschynomene aspera* L.	Fabaceae	EA	VU/DEBA/097
2.	*Aeschynomene indica* L.	Fabaceae	EA	VU/DEBA/096
3.	*Alternanthera ficoidea* (L.) Sm.	Amaranthaceae	ML	VU/DEBA/095
4.	*Alternanthera philoxeroides* (Mart.) Griseb.	Amaranthaceae	EA	VU/DEBA/094
5.	*Alternanthera sessilis* (L.) R.Br. ex DC.	Amaranthaceae	ML	VU/DEBA/092
6.	*Ammannia auriculata* Willd.	Lythraceae	ML	VUH/DEBA/153
7.	*Ammannia baccifera* L.	Lythraceae	ML	VU/DEBA/093
8.	*Bacopa monnieri* (L.) Wettst.	Plantaginaceae	ML	VU/DEBA/091
9.	*Bergia capensis* L.	Elatinaceae	ML	VUH/DEBA/154
10.	*Centella asiatica* (L.) Urb.	Apiaceae	ML	VU/DEBA/089
11.	*Ceratophyllum demersum* L.	Ceratophyllaceae	SA	VU/DEBA/119
12.	*Coldenia procumbens* L.	Boraginaceae	ML	VU/DEBA/090
13.	*Dentella repens* (L.) J.R.Forst. & G.Forst.	Rubiaceae	ML	VU/DEBA/088
14.	*Dopatrium junceum* (Roxb.) Buch.-Ham. ex Benth.	Plantaginaceae	EA	VU/DEBA/086
15.	*Drosera burmanni* Vahl	Droseraceae	ML	VU/DEBA/120
16.	*Eclipta prostrata* (L.) L.	Asteraceae	ML	VU/DEBA/055
17.	*Enhydra fluctuans* Lour	Asteraceae	EA	VU/DEBA/121
18.	*Grangea maderaspatana* (L.) Poir.	Asteraceae	ML	VU/DEBA/056
19.	*Heliotropium indicum* L.	Boraginaceae	ML	VU/DEBA/057
20.	*Heliotropium ovalifolium* Forssk.	Boraginaceae	ML	VU/DEBA/058
21.	*Hydrocera triflora* (L.) Wight & Arn.	Balsaminaceae	ML	VU/DEBA/122
22.	*Hydrolea zeylanica* (L.) Vahl	Hydroleaceae	EA	VU/DEBA/123
23.	*Hygrophila difformis* (L. f.) Blume	Acanthaceae	EA	VU/DEBA/059
24.	*Hygrophila polysperma* (Roxb.) T. Anderson	Acanthaceae	EA	VU/DEBA/124
25.	*Hygrophila auriculata* (Schumach.) Heine	Acanthaceae	EA	VU/DEBA/060
26.	*Ipomoea aquatica* Forssk.	Convolvulaceae	RF	VU/DEBA/125
27.	*Ipomoea fistulosa* Mart. ex Choisy	Convolvulaceae	EA	VU/DEBA/126
28.	*Limnophila heterophylla* (Roxb.) Benth.	Plantaginaceae	RF	VU/DEBA/061
29.	*Limnophila indica* (L.) Druce	Plantaginaceae	RF	VU/DEBA/062
30.	*Limnophila sessiliflora* (Vahl) Blume	Plantaginaceae	RF	VU/DEBA/063
31.	*Lindernia antipoda* (L.) Alston	Linderniaceae	ML	VU/DEBA/064
32.	*Lindernia ciliata* (Colsm.) Pennell	Linderniaceae	ML	VU/DEBA/127
33.	*Lindernia crustacea* (L.) F.Muell.	Linderniaceae	ML	VU/DEBA/065
34.	*Lobelia alsinoides* Lam.	Campanulaceae	ML	VUH/DEBA/155
35.	*Lobelia zeylanica* L.	Campanulaceae	ML	VUH/DEBA/156
36.	*Ludwigia adscendens* (L.) H.Hara	Onagraceae	EA	VU/DEBA/066
37.	*Ludwigia octovalvis* (Jacq.) P.H.Raven	Onagraceae	EA	VU/DEBA/067
38.	*Ludwigia perennis* L.	Onagraceae	EA	VU/DEBA/068
39.	*Ludwigia prostrata* Roxb.	Onagraceae	EA	VUH/DEBA/157
40.	*Myriophyllum indicum* Willd.	Haloragaceae	RF	VU/DEBA/069
41.	*Nelumbo nucifera* Gaertn.	Nelumbonaceae	RF	VU/DEBA/128
42.	*Neptunia oleracea* Lour.	Mimosaceae	RF	VU/DEBA/070

Table 6: cont.…

S.N.	Plant Name (Dicotyledons)	Family name	*Habitats	Voucher no. of Specimen
43.	*Nymphaea nouchali* Burm. f.	Nymphaeceae	RF	VU/DEBA/071
44.	*Nymphaea pubescens* Willd.	Nymphaeceae	RF	VU/DEBA/073
45.	*Nymphaea rubra* Roxb. ex Andrews	Nymphaeceae	RF	VU/DEBA/072
46.	*Nymphoides hydrophylla* (Lour.) Kuntze	Menyanthaceae	RF	VU/DEBA/129
47.	*Nymphoides indica* (L.) Kuntze	Menyanthaceae	RF	VU/DEBA/130
48.	*Oldenlandia brachypoda* DC.	Rubiaceae	ML	VUH/DEBA/158
49.	*Oldenlandia corymbosa* L.	Rubiaceae	ML	VU/DEBA/074
50.	*Oldenlandia diffusa* (Willd.) Roxb.	Rubiaceae	ML	VU/DEBA/075
51.	*Phyla nodiflora* (L.) Greene	Verbinaceae	ML	VU/DEBA/077
52.	*Persicaria orientalis* (L.) Spach	Polygonaceae	EA	VU/DEBA/078
53.	*Persicaria hydropiper* (L.) Delarbre	Polygonaceae	EA	VU/DEBA/079
54.	*Polygonum plebeium* R.Br.	Polygonaceae	MW	VU/DEBA/080
55.	*Ranunculus sceleratus* L.	Ranunculaceae	EA	VU/DEBA/081
56.	*Rotala densiflora* (Roth) Koehne	Lythraceae	EA	VU/DEBA/131
57.	*Sesbania bispinosa* (Jacq.) W.Wight	Leguminosae	EA	VU/DEBA/132
58.	*Sesbania javanica* Miq.	Leguminosae	EA	VUH/DEBA/159
59.	*Sphaeranthus africanus* L.	Compositae	ML	VU/DEBA/133
60.	*Sphaeranthus indicus* L.	Compositae	ML	VUH/DEBA/160
61.	*Sphenoclea zeylanica* Gaertn.	Sphenocleaceae	EA	VU/DEBA/082
62.	*Trapa natans* L.	Lythraceae	SA	VU/DEBA/083
63.	*Trapa natans* var. *bispinosa* (Roxb.) Makino	Lythraceae	SA	VU/DEBA/084
64.	*Utricularia aurea* Lour.	Lentibulariaceae	SA	VU/DEBA/085
65.	*Utricularia bifida* L.	Lentibulariaceae	ML	VU/DEBA/134
66.	*Utricularia caerulea* L.	Lentibulariaceae	EA	VU/DEBA/135
67.	*Utricularia gibba* L.	Lentibulariaceae	SA	VUH/DEBA/161
68.	*Utricularia stellaris* L.f.	Lentibulariaceae	SA	VU/DEBA/087

*__ML__- Marshy land plants, **EA**- Emergent Anchored plants, **FF**- Free Floating plants, **RF**- Rooted with Floating Leaved plants, **SA**- Submerged Anchored plants.

6.1.4. Growth forms:

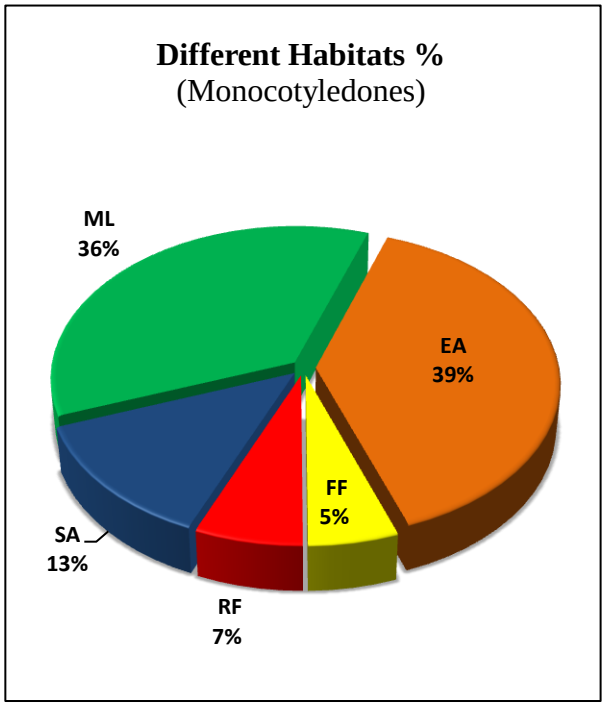
After proper documentation of all plants is classified based on their habitat. Plants are classified into five major growth forms such as *Free-Floating plants*, *Rooted with Floating Leaved plants*, *Submerged Anchored plants*, *Emergent Anchored plants*, *Marshy land plants*. (Table 7-8, Graph 10-11)

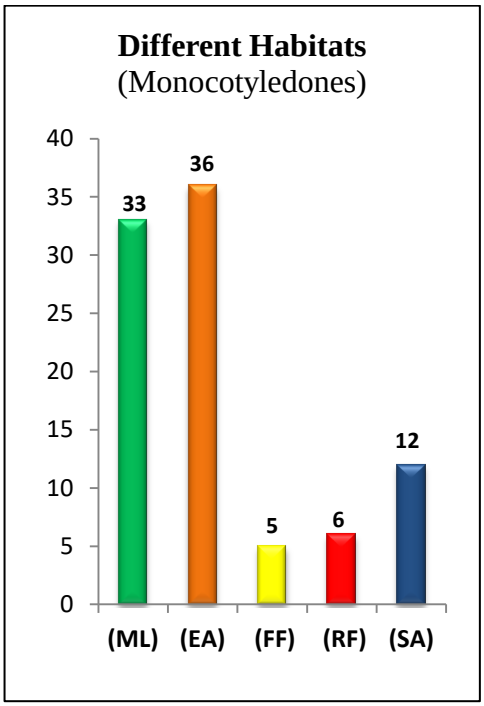
6.1.4.1. Growth forms of monocot:

Table-7: Total investigated **habitats** (Life forms) of aquatic and marshy land **monocotyledons** Angiosperms under different families of the district Paschim Medinipur.

S. N.	Habitats (Monocotyledons)	No. of species
1.	Marshy land plants (ML)	33
2.	Emergent Anchored plants (EA)	36
3.	Free Floating plants (FF)	5
4.	Rooted with Floating Leaved plants (RF)	6
5.	Submerged Anchored plants (SA)	12
Total		**92**

Graph-10: Shows graphical representation of different aquatic and marshy monocotyledons habitats under different families of the district Paschim Medinipur.





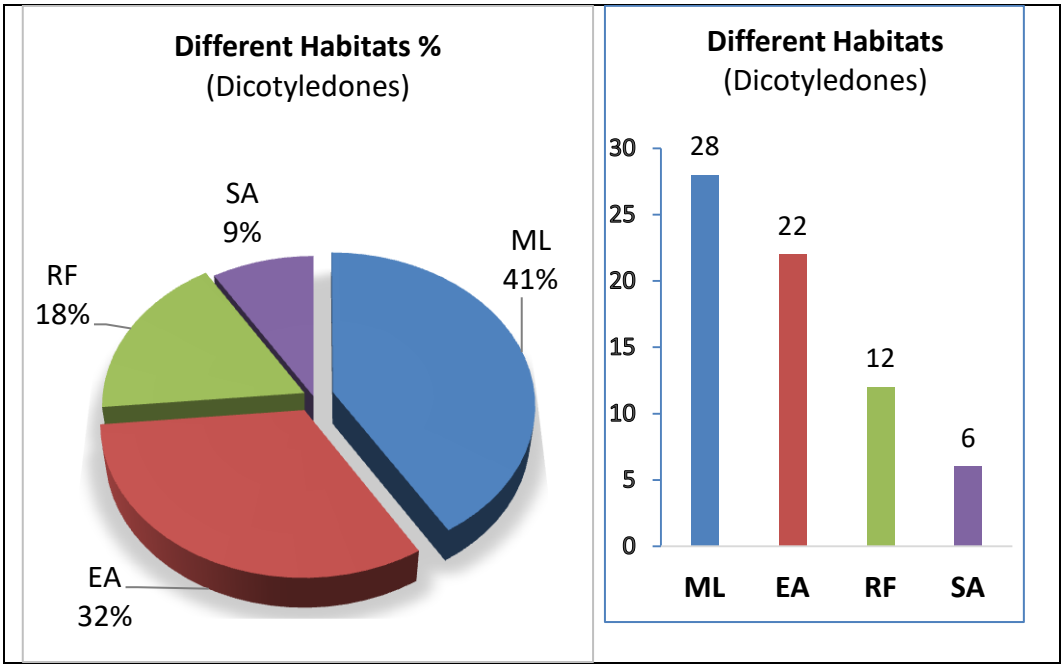
ML- Marshy land plants, **EA**- Emergent Anchored plants, **FF**- Free Floating plants, **RF**- Rooted with Floating Leaved plants, **SA**- Submerged Anchored plants.

6.1.4.2. Growth forms of diocot:

Table 8: Total investigated **habitats** (Life forms) of aquatic and marshy land **dicotyledons** angiosperms under different families of the district Paschim Medinipur.

S. N.	Habitats (Life forms)	No. of species
1.	Marshy land plants (ML)	28
2.	Emergent Anchored plants (EA)	22
3.	Rooted with Floating Leaved plants (RF)	12
4.	Submerged Anchored plants (SA)	6
Total		**68**

Graph-11: Shows graphical representation of different aquatic and marshy land dicotyledons habitats (Life forms) under different families of the district Paschim Medinipur.



ML- Marshy land plants, **EA**- Emergent Anchored plants, **RF**- Rooted with Floating Leaved plants, **SA**- Submerged Anchored plants.

6.1.5. Quantitative analysis of aquatic angiosperm plants:

After a quantitative survey of all species, the highest density was measured among monocot in *Spirodela polyrrhiza* followed by *Lemna trisulca*, *Wolffia globosa*, *Pistia stratiotes*, *Kyllinga brevifolia* and *Kyllinga tenuifolia*. On the contrary, the lowest density was measured among monocot *Alpinia aquatica* followed by *Arundo donax*, *Blyxa japonica*, *Blyxa echinosperma*, *Crinum asiaticum*, *Sagittaria sagittifolia* and *Caldesia parnassifolia*. In dicot highest density was measured in *Grangea maderaspatana* followed by *Hygrophila difformis*, *Nymphaea nouchali*, and *Nymphaea pubescens*. On the contrary, the lowest density was measured among dicot in *Bergia capensis* followed by *Ammannia auriculata*. However, the highest monocot frequency has been measured in *Sacciolepis interrupta*, *Leersia hexandra*, and *Spirodela polyrrhiza*. The lowest frequency value of monocot measured in *Blyxa echinosperma* followed by *Phragmites karka* and *Potamogeton crispus*. Among dicot, the highest frequency values were measured in *Nymphaea pubescens* and *Grangea maderaspatana*. Lowest frequency value measured in *Alternanthera ficoidea*, *Ceratophyllum demersum*, and *Drosera burmannii*. (Table 9-43)

6.1.5.1. Quantitative survey of Monocot

Table 9**:** Showing the **Density, Frequency (%)** and **Abundance** of aquatic and wetland Monocotyledons plant species are recorded from the selected area**.**

S.N.	Plant Name (Monocotyledons)	Density	Frequency (%)	Abundance
1.	*Actinoscirpus grossus*	3.83333	50	11.924
2.	*Alpinia aquatica*	0.21667	10	3.17667
3.	*Aponogeton crispus*	0.75667	15	6.85
4.	*Aponogeton natans*	1.26667	20	6.58
5.	*Arundo donax*	0.41667	15	3.97333
6.	*Blyxa aubertii*	1.71667	20	15.29
7.	*Blyxa echinosperma*	0.38333	5	5.58333
8.	*Blyxa japonica*	0.36667	10	7.11333
9.	*Blyxa octandra*	1.1	15	12.12333
10.	*Brachiaria eruciformis*	1.16667	20	5.96667

Table 9: Continued...

S.N.	Plant Name (Monocotyledons)	Density	Frequency (%)	Abundance
11.	*Brachiaria mutica*	1.46667	35	5.66533
12.	*Brachiaria reptans*	0.98667	30	5.96
13.	*Butomopsis latifolia*	0.33333	15	5.44
14.	*Caldesia parnassifolia*	0.2	15	3.44667
15.	*Chloris barbata*	1.25	20	6.65
16.	*Coix aquatica*	1.28889	25	5.51333
17.	*Coix lacryma-jobi*	0.46111	28.34	6.16333
18.	*Colocasia esculenta*	1.6	40	5.21333
19.	*Commelina benghalensis*	0.75556	25	10.93333
20.	*Commelina diffusa*	1.72778	15	7.311
21.	*Crinum asiaticum*	0.51667	15	7.16667
22.	*Cyanotis axillaris*	1.31667	16.67	8.5
23.	*Cyperus compactus*	0.41667	25	5.67
24.	*Cyperus compressus*	1.83333	25	11.75667
25.	*Cyperus platystylis*	2.93333	25	11.38667
26.	*Cyperus difformis*	5.06667	40	10.82333
27.	*Cyperus distans*	3.4	20	16.62667
28.	*Cyperus imbricatus*	0.65	10	3.86667
29.	*Cyperus iria*	0.88333	15	5.589
30.	*Cyperus michelianus*	0.71667	10	6.63333
31.	*Cyperus rotundus*	2.81667	30	10
32.	*Echinochloa colona*	1.25	26.67	5.45
33.	*Echinochloa crus-galli*	1.8	36.67	4.94467
34.	*Eichhornia crassipes*	8.01667	60	14.37867
35.	*Eleocharis dulcis*	8.21667	45	19.03733
36.	*Eleocharis geniculate*	3.48333	20	17.31667
37.	*Eleocharis spiralis*	1.26667	30	10.66667
38.	*Eriocaulon cinereum*	2.06667	20	11.23333
39.	*Eriocaulon setaceum*	1.11667	16.67	9.9
40.	*Eriocaulon truncatum*	0.66667	20	4.589
41.	*Eriocaulon xeranthemum*	1.18333	23.34	4.96667
42.	*Fimbristylis dichotoma*	1.45	35	4.67767
43.	*Fimbristylis littoralis*	2.45	43.34	6.06833
44.	*Fimbristylis quinquangularis*	0.65	20	4.59333
45.	*Fuirena ciliaris*	0.86667	20	6.02567
46.	*Hemarthria compressa*	4.41667	15	22.75
47.	*Hydrilla verticillata*	3.38333	15	22
48.	*Hygroryza aristata*	1.91667	10	3
49.	*Isachne albens*	1.55	25	9.55567
50.	*Isachne globosa*	0.81667	15	16
51.	*Isachne miliacea*	0.25	6.67	5
52.	*Ischaemum rugosum*	1.2	10	7.44467
53.	*Kyllinga brevifolia*	11.5	20	17.04167

Table 9: Continued...

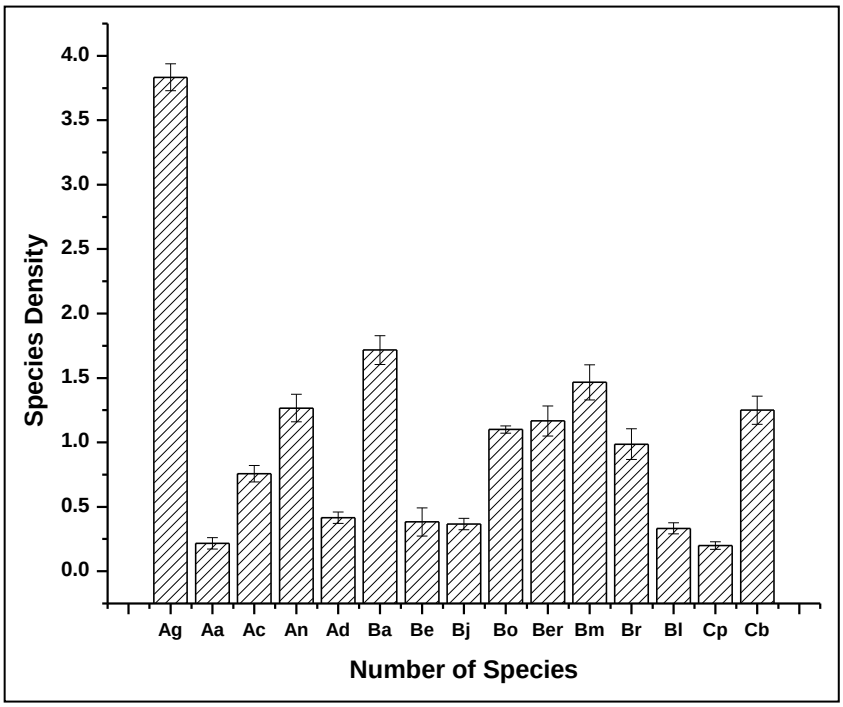
S.N.	Plant Name (Monocotyledons)	Density	Frequency (%)	Abundance
54.	*Kyllinga tenuifolia*	11.35	65	18.78567
55.	*Leersia hexandra*	0.86667	70	16.33333
56.	*Lemna trisulca*	16.01667	10	26.58333
57.	*Leptochloa chinensis*	1.01667	60	6.848
58.	*Limnophyton obtusifolium*	0.21667	15	3.53333
59.	*Monochoria hastata*	4.38333	10	11.165
60.	*Monochoria vaginalis*	2.51667	45	5.79567
61.	*Murdannia nudiflora*	2.55	45	4.976
62.	*Murdannia spirata*	2.11667	35	7.41
63.	*Najas graminea*	4.4	65	8.03333
64.	*Najas indica*	1.23333	15	10.58333
65.	*Nechamandra alternifolia*	2.15	20	13.47
66.	*Oryza rufipogon*	4.55	35	4.7
67.	*Oryza sativa*	1.15	26.67	7.85
68.	*Ottelia alismoides*	4.38333	60	5.95567
69.	*Panicum paludosum*	1.61667	25	7.64167
70.	*Panicum repens*	2.68333	40	15.4
71.	*Paspalum distichum*	1.61667	16.67	5.28667
72.	*Paspalum scrobiculatum*	0.53333	10	6.26
73.	*Phragmites karka*	0.4	6.67	34.764
74.	*Pistia stratiotes*	11.73667	18.5	5.43333
75.	*Potamogeton crispus*	0.4333	6.67	5.79567
76.	*Potamogeton nodosus*	0.56667	15	4.976
77.	*Pycreus flavidus*	0.5	6.67	7.41
78.	*Pycreus polystachyos*	0.6	10	8.03333
79.	*Saccharum spontaneum*	1.1	20	10.58333
80.	*Sacciolepis indica*	0.98333	20	13.47
81.	*Sacciolepis interrupta*	6.43333	78.33	4.7
82.	*Sagittaria guayanensis*	1.41667	35	7.85
83.	*Sagittaria sagittifolia*	0.16667	10	5.95567
84.	*Schoenoplectiella articulata*	6.13333	65	7.64167
85.	*Schoenoplectiella juncoides*	1.51667	26.67	15.4
86.	*Spirodela polyrrhiza*	16.63333	65	5.28667
87.	*Typha domingensis*	0.61667	15	6.26
88.	*Typha elephantina*	0.48333	15	34.764
89.	*Vallisneria spiralis*	0.61667	16.67	5.43333
90.	*Chrysopogon zizanioides*	0.4	15	4.500
91.	*Wolffia globosa*	15.75	20	100.000
92.	*Xyris indica*	1.31667	25	6.750

Aquatic and Marshy land **Monocotyledons** plant species **Density** (Table 10-15, Graph 12-17), **Frequency %** (Table 16-21, Graph 18-23) and **Abundance** (Table 22-27, Graph 24-29) of the district Paschim Medinipur

Table 10: Aquatic and Marshy land **Monocotyledons** plant species **Density** of the district Paschim Medinipur (Species no. **1-15** and species arranged in alphabetically)**.**

S.N.	Plant Names	Mean (Y)	Sd(yEr±)	se(yEr±)	Min(Y)	Max(Y)	Range
1.	*Actinoscirpus grossus*	3.83333	0.90738	0.10387	4.8	6.5	1.7
2.	*Alpinia aquatica*	0.21667	0.07638	0.0441	0.15	0.3	0.15
3.	*Aponogeton crispus*	0.75667	0.11015	0.0636	0.65	0.87	0.22
4.	*Aponogeton natans*	1.26667	0.30551	0.10638	1	1.6	0.6
5.	*Arundo donax*	0.41667	0.07638	0.0441	0.35	0.5	0.15
6.	*Blyxa aubertii*	1.71667	0.24664	0.1124	1.55	2	0.45
7.	*Blyxa echinosperma*	0.38333	0.1893	0.10929	0.25	0.6	0.35
8.	*Blyxa japonica*	0.36667	0.07638	0.0441	0.3	0.45	0.15
9.	*Blyxa octandra*	1.1	0.05	0.02887	1.05	1.15	0.1
10.	*Brachiaria eruciformis*	1.16667	0.30551	0.11638	0.9	1.5	0.6
11.	*Brachiaria mutica*	1.46667	0.23629	0.13642	1.2	1.65	0.45
12.	*Brachiaria reptans*	0.98667	0.20744	0.11977	0.8	1.21	0.41
13.	*Butomopsis latifolia*	0.33333	0.07638	0.0441	0.25	0.4	0.15
14.	*Caldesia parnassifolia*	0.2	0.05	0.02887	0.15	0.25	0.1
15.	*Chloris barbata*	1.25	0.32787	0.1093	0.95	1.6	0.65

Graph-12: Shows graphical representation of plant species **Density** of aquatic and marshy land **Monocotyledons** (1-15) of the district Paschim Medinipur.

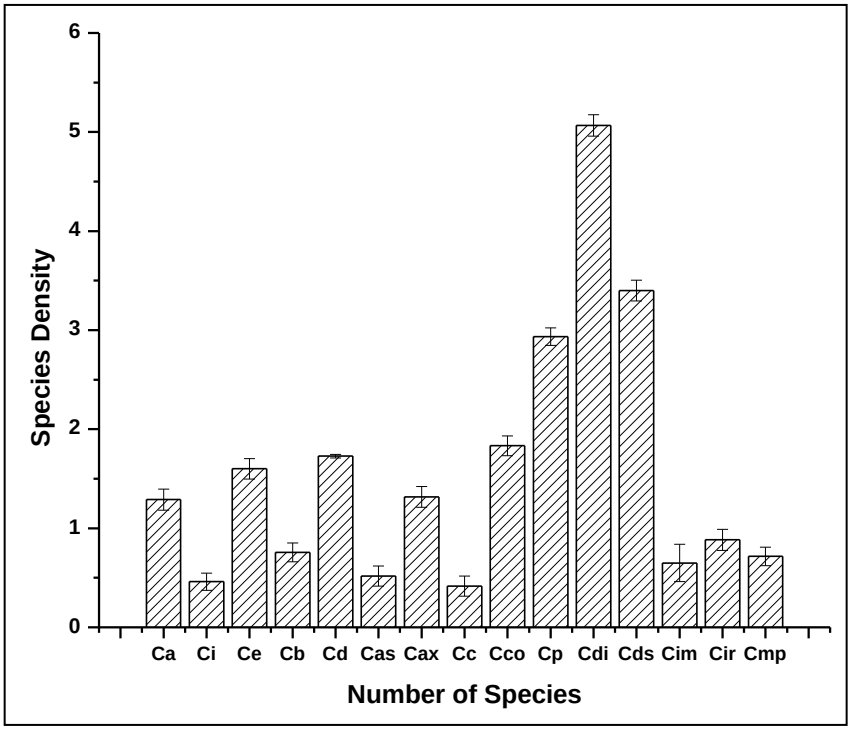


Ag-*Actinoscirpus grossus*, **Aa**-*Alpinia aquatica*, **Ac**-*Aponogeton crispus*, **An**-*Aponogeton natans*, **Ad**-*Arundo donax*, **Ba**-*Blyxa aubertii*, **Be**-*Blyxa echinosperma*, **Bj**-*Blyxa japonica*, **Bo**-*Blyxa octandra*, **Ber**-*Brachiaria eruciformis*, **Bm**-*Brachiaria mutica*, **Br**-*Brachiaria reptans*, **Bl**-*Butomopsis latifolia*, **Cp**-*Caldesia parnassifolia*, **Cb**- *Chloris barbata*

Table 11: Aquatic and Marshy land **Monocotyledons** plant species **Density** of the district Paschim Medinipur (Species no. **16-30** and species arranged in alphabetically)**.**

S.N.	Plant Names	Mean (Y)	Sd(yEr±)	se(yEr±)	Min(Y)	Max(Y)	Range
16.	*Coix aquatica*	1.28889	0.53029	0.10616	0.95	1.9	0.95
17.	*Coix lacryma-jobi*	0.46111	0.15123	0.08731	0.3	0.6	0.3
18.	*Colocasia esculenta*	1.6	0.45826	0.10458	1.1	2	0.9
19.	*Commelina benghalensis*	0.75556	0.25019	0.09444	0.5	1	0.5
20.	*Commelina diffusa*	1.72778	0.46973	0.01712	1.2	2.1	0.9
21.	*Crinum asiaticum*	0.51667	0.17559	0.10138	0.35	0.7	0.35
22.	*Cyanotis axillaris*	1.31667	0.47522	0.10437	0.85	1.8	0.95
23.	*Cyperus compactus*	0.41667	0.17559	0.10138	0.25	0.6	0.35
24.	*Cyperus compressus*	1.83333	0.20817	0.10019	1.6	2	0.4
25.	*Cyperus platystylis*	2.93333	0.15275	0.08819	2.8	3.1	0.3
26.	*Cyperus difformis*	5.06667	1.00167	0.10831	4.1	6.1	2
27.	*Cyperus distans*	3.4	0.52915	0.10551	3	4	1
28.	*Cyperus imbricatus*	0.65	0.32787	0.1893	0.35	1	0.65
29.	*Cyperus iria*	0.88333	0.20207	0.10667	0.7	1.1	0.4
30.	*Cyperus michelianus*	0.71667	0.16073	0.0928	0.6	0.9	0.3

Graph-13: Shows graphical representation of plant species **Density** of aquatic and marshy land **Monocotyledons** (**16-30**) of the district Paschim Medinipur.

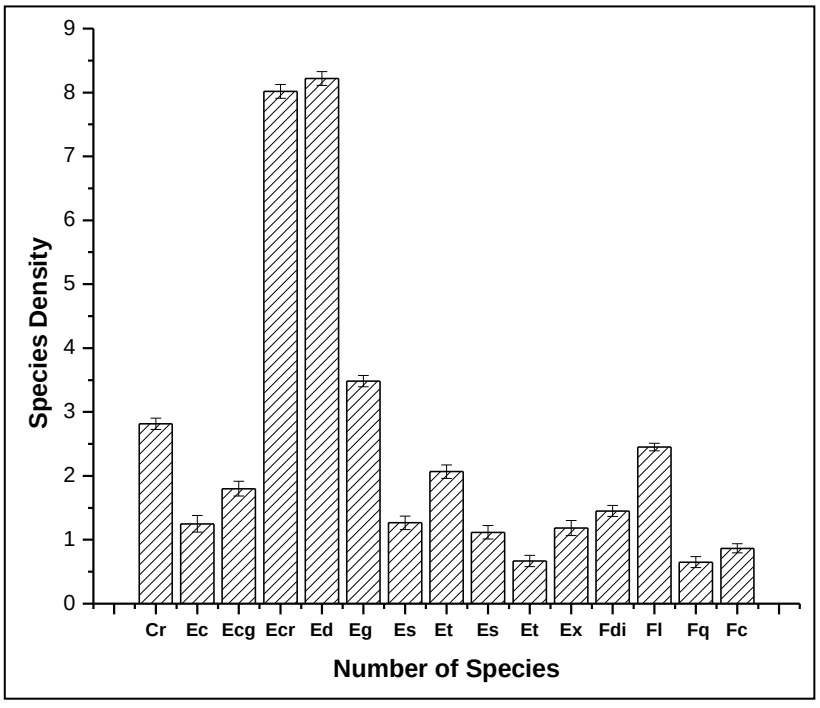


Ca-*Coix aquatica*, **Ci-***Coix lacryma-jobi*, **Ce-***Colocasia esculenta*, **Cb-***Commelina benghalensis***,** **Cd-***Commelina diffusa*, **Cas-***Crinum asiaticum*, **Cax-***Cyanotis axillaris*, **Cc-***Cyperus compactus*, **Cco-***Cyperus compressus*, **Cp-***Cyperus platystylis*, **Cdi-***Cyperus difformis*, **Cds-***Cyperus distans*, **Cim-***Cyperus imbricatus*, **Cir-***Cyperus iria*, **Cmp-***Cyperus michelianus*

Table 12: Aquatic and Marshy land **Monocotyledons** plant species **Density** of the district Paschim Medinipur (Species no. **31-45** and species arranged in alphabetically)**.**

S.N.	Plant Names	Mean (Y)	Sd(yEr±)	se(yEr±)	Min(Y)	Max(Y)	Range
31.	*Cyperus rotundus*	2.81667	0.50083	0.08916	2.25	3.2	0.95
32.	*Echinochloa colona*	1.25	0.22913	0.13229	1.05	1.5	0.45
33.	*Echinochloa crus-galli*	1.8	0.2	0.11547	1.6	2	0.4
34.	*Eichhornia crassipes*	8.01667	0.50083	0.10916	7.5	8.5	1
35.	*Eleocharis dulcis*	8.21667	0.25658	0.10814	8	8.5	0.5
36.	*Eleocharis geniculate*	3.48333	0.50083	0.08916	3	4	1
37.	*Eleocharis spiralis*	1.26667	0.30551	0.10638	1	1.6	0.6
38.	*Eriocaulon cinereum*	2.06667	0.30551	0.10638	1.8	2.4	0.6
39.	*Eriocaulon setaceum*	1.11667	0.35473	0.1048	0.8	1.5	0.7
40.	*Eriocaulon truncatum*	0.66667	0.15275	0.08819	0.5	0.8	0.3
41.	*Eriocaulon xeranthemum*	1.18333	0.20207	0.11667	1	1.4	0.4
42.	*Fimbristylis dichotoma*	1.45	0.15	0.0866	1.3	1.6	0.3
43.	*Fimbristylis littoralis*	2.45	0.45	0.05981	2	2.9	0.9
44.	*Fimbristylis quinquangularis*	0.65	0.15	0.0866	0.5	0.8	0.3
45.	*Fuirena ciliaris*	0.86667	0.12583	0.07265	0.75	1	0.25

Graph-14: Shows graphical representation of plant species **Density** of Aquatic and Marshy land **Monocotyledons** angiosperms (**30-45**) of the district Paschim Medinipur.

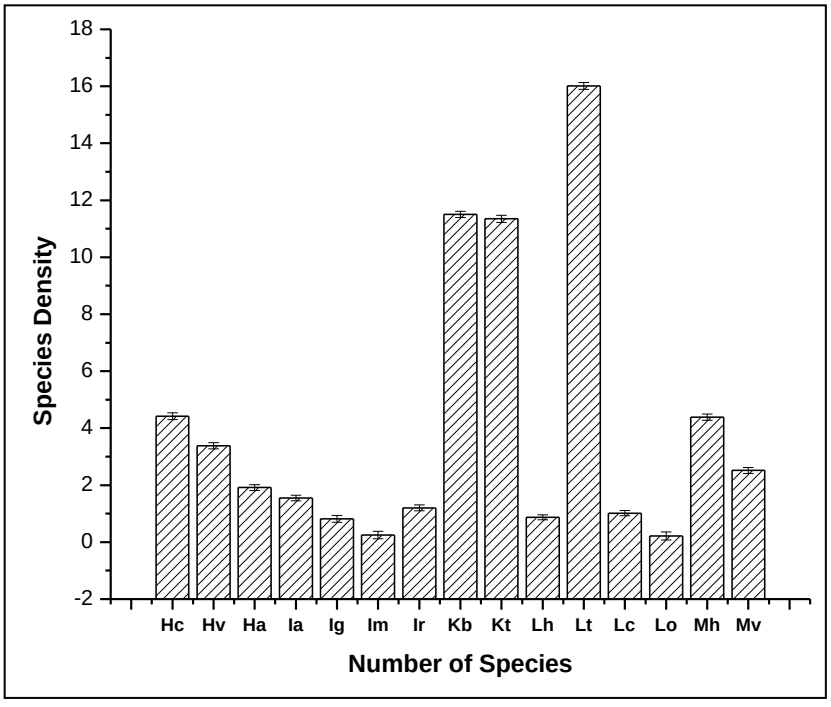


Cr-*Cyperus rotundus***, Ec-***Echinochloa colona***, Ecg-***Echinochloa crus-galli***, Ecr-***Eichhornia crassipes***, Ed-** *Eleocharis dulcis***, Eg-** *Eleocharis geniculate***, Es-** *Eleocharis spiralis***, Et-** *Eriocaulon truncatum***, Ex-***Eriocaulon xeranthemum***, Fdi-***Fimbristylis dichotoma***, Fl-***Fimbristylis littoralis***, Fq-***Fimbristylis quinquangularis***, Fc-***Fuirena ciliaris*

Table 13: Aquatic and Marshy land **Monocotyledons** plant species **Density** of the district Paschim Medinipur (Species no. **46-60** and species arranged in alphabetically).

S.N.	Plant Names	Mean (Y)	Sd(yEr±)	se(yEr±)	Min(Y)	Max(Y)	Range
46.	*Hemarthria compressa*	4.41667	0.52042	0.12046	4	5	1
47.	*Hydrilla verticillata*	3.38333	0.53929	0.11136	3	4	1
48.	*Hygroryza aristata*	1.91667	0.30139	0.10401	1.6	2.2	0.6
49.	*Isachne albens*	1.55	0.31225	0.10028	1.3	1.9	0.6
50.	*Isachne globosa*	0.81667	0.20207	0.11667	0.6	1	0.4
51.	*Isachne miliacea*	0.25	0.05	0.12887	0.2	0.3	0.1
52.	*Ischaemum rugosum*	1.2	0.26458	0.10275	1	1.5	0.5
53.	*Kyllinga brevifolia*	11.5	1.4	0.10829	10.1	12.9	2.8
54.	*Kyllinga tenuifolia*	11.35	0.73655	0.12525	10.7	12.15	1.45
55.	*Leersia hexandra*	0.86667	0.15275	0.08819	0.7	1	0.3
56.	*Lemna trisulca*	16.01667	0.90046	0.11988	15.1	16.9	1.8
57.	*Leptochloa chinensis*	1.01667	0.16073	0.0928	0.9	1.2	0.3
58.	*Limnophyton obtusifolium*	0.21667	0.07638	0.1441	0.15	0.3	0.15
59.	*Monochoria hastata*	4.38333	0.53929	0.11136	4	5	1
60.	*Monochoria vaginalis*	2.51667	0.45369	0.10194	2.1	3	0.9

Graph-15: Shows graphical representation of plant species **Density** of aquatic and marshy land **Monocotyledons (46-60)** of the district Paschim Medinipur.

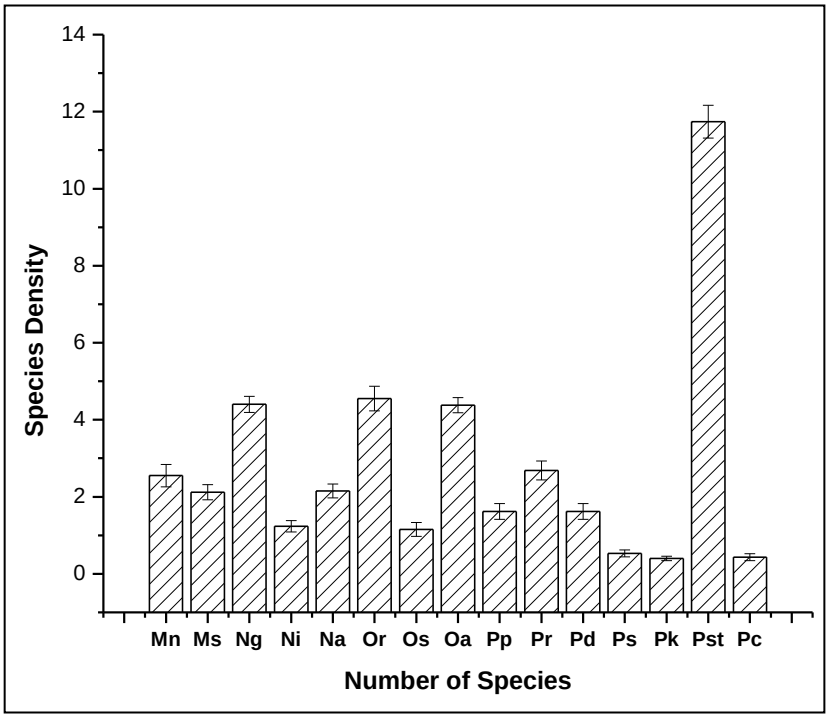


Hc-*Hemarthria compressa***, Hv-** *Hydrilla verticillata***, Ha-***Hygroryza aristata***, Ia-***Isachne albens***, Ig-***Isachne globosa***, Im-***Isachne miliacea***, Ir-***Ischaemum rugosum***, Kb-***Kyllinga brevifolia***, Kt-***Kyllinga tenuifolia***, Lh-***Leersia hexandra***, Lt-***Lemna trisulca***, Lc-***Leptochloa chinensis***, Lo-***Limnophyton obtusifolium***, Mh-***Monochoria hastata***, Mv-***Monochoria vaginalis*

Table 14: Aquatic and Marshy land **Monocotyledons** plant species **Density** of the district Paschim Medinipur (Species no. **61-75** and species arranged in alphabetically).

S.N.	Plant Names	Mean (Y)	Sd(yEr±)	se(yEr±)	Min(Y)	Max(Y)	Range
61.	*Murdannia nudiflora*	2.55	0.50744	0.29297	2	3	1
62.	*Murdannia spirata*	2.11667	0.34034	0.1965	1.85	2.5	0.65
63.	*Najas graminea*	4.4	0.36056	0.20817	4	4.7	0.7
64.	*Najas indica*	1.23333	0.25166	0.1453	1	1.5	0.5
65.	*Nechamandra alternifolia*	2.15	0.31225	0.18028	1.9	2.5	0.6
66.	*Oryza rufipogon*	4.55	0.55	0.31754	4	5.1	1.1
67.	*Oryza sativa*	1.15	0.31225	0.18028	0.9	1.5	0.6
68.	*Ottelia alismoides*	4.38333	0.34034	0.1965	4	4.65	0.65
69.	*Panicum paludosum*	1.61667	0.35473	0.2048	1.3	2	0.7
70.	*Panicum repens*	2.68333	0.42525	0.24552	2.2	3	0.8
71.	*Paspalum distichum*	1.61667	0.35473	0.2048	1.3	2	0.7
72.	*Paspalum scrobiculatum*	0.53333	0.15275	0.08819	0.4	0.7	0.3
73.	*Phragmites karka*	0.4	0.1	0.05774	0.3	0.5	0.2
74.	*Pistia stratiotes*	11.73667	1.43075	0.82604	10.11	12.8	2.69
75.	*Potamogeton crispus*	0.43333	0.15275	0.08819	0.3	0.6	0.3

Graph-16: Shows graphical representation of plant species **Density** of Aquatic and Marshy land **Monocotyledons (61-75)** of the district Paschim Medinipur.

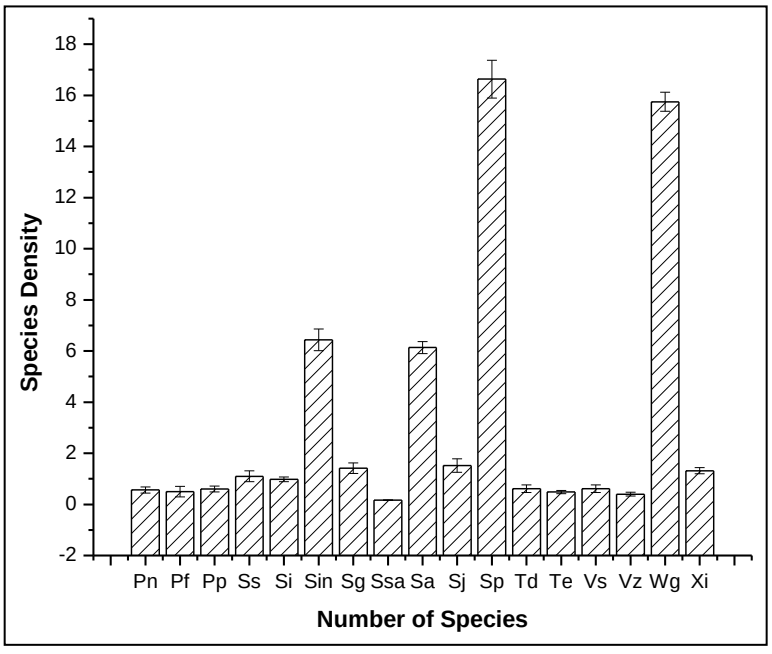


Mn-*Murdannia nudiflora*, **Ms**-*Murdannia spirata*, **Ng**-*Najas graminea*, **Ni**-*Najas indica*, **Na**-*Nechamandra alternifolia*, **Or**- *Oryza rufipogon*,**Os**- *Oryza sativa*, **Pp**- *Panicum paludosum*, **Pr**-*Panicum repens*, **Pd**-*Paspalum distichum*, **Ps**-*Paspalum scrobiculatum*, **Pk**- *Phragmites karka*, **Pst**-*Pistia stratiotes*, **Pc**-*Potamogeton crispus*

Table 15: Shows Aquatic and Marshy land **Monocotyledons** plant species **Density** of the district Paschim Medinipur (Species no. **76-92** and species arranged in alphabetically).

S.N.	Plant Names	Mean (Y)	Sd(yEr±)	se(yEr±)	Min(Y)	Max(Y)	Range
76.	*Potamogeton nodosus*	0.56667	0.20817	0.12019	0.4	0.8	0.4
77.	*Pycreus flavidus*	0.5	0.35	0.20207	0.25	0.9	0.65
78.	*Pycreus polystachyos*	0.6	0.2	0.11547	0.4	0.8	0.4
79.	*Saccharum spontaneum*	1.1	0.36056	0.20817	0.8	1.5	0.7
80.	*Sacciolepis indica*	0.98333	0.16073	0.0928	0.8	1.1	0.3
81.	*Sacciolepis interrupta*	6.43333	0.73711	0.42557	5.6	7	1.4
82.	*Sagittaria guayanensis*	1.41667	0.35473	0.2048	1.1	1.8	0.7
83.	*Sagittaria sagittifolia*	0.16667	0.02082	0.01202	0.15	0.19	0.04
84.	*Schoenoplectiella articulata*	6.13333	0.40415	0.23333	5.7	6.5	0.8
85.	*Schoenoplectiella juncoides*	1.51667	0.45369	0.26194	1.1	2	0.9
86.	*Spirodela polyrrhiza*	16.63333	1.2741	0.7356	15.8	18.1	2.3
87.	*Typha domingensis*	0.61667	0.25658	0.14814	0.4	0.9	0.5
88.	*Typha elephantina*	0.48333	0.10408	0.06009	0.4	0.6	0.2
89.	*Vallisneria spiralis*	0.61667	0.25658	0.14814	0.4	0.9	0.5
90.	*Chrysopogon zizanioides*	0.4	0.13229	0.07638	0.25	0.5	0.25
91.	*Wolffia globosa*	15.75	0.65383	0.37749	15	16.2	1.2
92.	*Xyris indica*	1.31667	0.20207	0.11667	1.1	1.5	0.4

Graph-17: Shows graphical representation of **Monocotyledons** plant species **Density** of Aquatic and Marshy land angiosperms **(76-92)** of the district Paschim Medinipur.

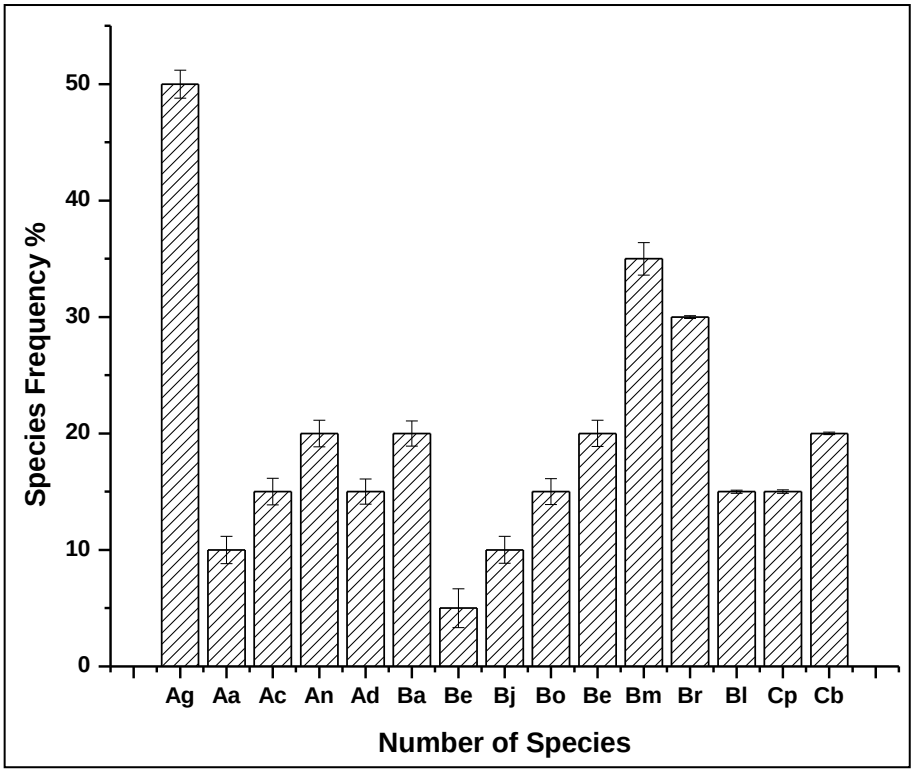


Pn-*Potamogeton nodosus***, Pf-***Pycreus flavidus***, Pp-***Pycreus polystachyos***, Ss-** *Saccharum spontaneum***, Si-***Sacciolepis indica***, Sin-***Sacciolepis interrupta***, Sg-***Sagittaria guayanensis***, Ssa-***Sagittaria sagittifolia***, Sa-***Schoenoplectiella articulata***, Sj-***Schoenoplectiella juncoides***, Sp-***Spirodela polyrrhiza***, Td-** *Typha domingensis***, Te-** *Typha elephantina***, Vs-***Vallisneria spiralis***, Vz-** *Chrysopogon zizanioides***, Wg-** *Wolffia globosa***, Xi-***Xyris indica*

Table 16: Showing the **Frequency %** of Aquatic and Marshy land Monocotyledons plant species in the district Paschim Medinipur (Species no. **1-15** and species are arranged in alphabetically)**.**

S.N.	Plant Names	Mean (Y)	Sd(yEr±)	se(yEr±)	Min(Y)	Max(Y)	Range
1.	*Actinoscirpus grossus*	50	10.40	6.00	40	60	20
2.	*Alpinia aquatica*	10	5	2.88	5	15	10
3.	*Aponogeton crispus*	15	7.63	4.40	10	25	15
4.	*Aponogeton natans*	20	7.63	4.40	15	30	15
5.	*Arundo donax*	15	5	2.88	10	20	10
6.	*Blyxa aubertii*	20	5	2.88	15	25	10
7.	*Blyxa echinosperma*	5	2.88	1.66	5	10	5
8.	*Blyxa japonica*	10	5	2.88	5	15	10
9.	*Blyxa octandra*	15	5	2.88	10	20	10
10.	*Brachiaria eruciformis*	20	5	2.88	15	25	10
11.	*Brachiaria mutica*	35	7.63	4.40	30	45	15
12.	*Brachiaria reptans*	30	10	5.77	20	40	20
13.	*Butomopsis latifolia*	15	10	5.77	5	25	20
14.	*Caldesia parnassifolia*	15	10	5.77	5	25	20
15.	*Chloris barbata*	20	7.63	4.40	15	30	15

Graph-18: Shows graphical representation of plant species **Frequency %** of Aquatic and Marshy land Monocotyledons **(1-15)** of the district Paschim Medinipur.

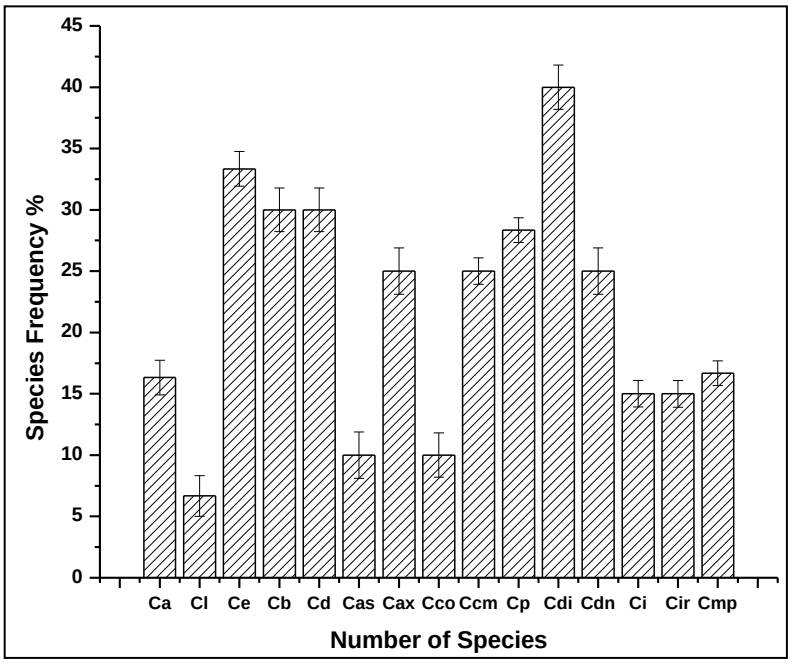


Ag-*Actinoscirpus grossus*, **Aa-***Alpinia aquatica*, **Ac-***Aponogeton crispus*, **An-***Aponogeton natans*, **Ad-***Arundo donax*, **Ba-***Blyxa aubertii*, **Be-***Blyxa echinosperma*, **Bj-***Blyxa japonica*, **Bo-***Blyxa octandra*, **Ber-***Brachiaria eruciformis*, **Bm-***Brachiaria mutica*, **Br-***Brachiaria reptans*, **Bl-***Butomopsis latifolia*, **Cp-***Caldesia parnassifolia*, **Cb-** *Chloris barbata*

Table 17: Shows the **Frequency %** of Aquatic and Marshy land **Monocotyledons** plant species in the district Paschim Medinipur (Species no. **16-30** and species are arranged in alphabetically).

S.N.	Plant Names	Mean (Y)	Sd(yEr±)	se(yEr±)	Min(Y)	Max(Y)	Range
16.	*Coix aquatica*	16.33	7.63763	1.40959	10	25	15
17.	*Coix lacryma-jobi*	6.67	2.88675	1.66667	5	10	5
18.	*Colocasia esculenta*	33.34	7.63763	1.40959	25	40	15
19.	*Commelina benghalensis*	30	10	1.7735	20	40	20
20.	*Commelina diffusa*	30	10	1.7735	20	40	20
21.	*Crinum asiaticum*	10	5	1.88675	5	15	10
22.	*Cyanotis axillaris*	25	5	1.88675	20	30	10
23.	*Cyperus compactus*	10	5	1.80675	5	15	10
24.	*Cyperus compressus*	25	5	1.08675	20	30	10
25.	*Cyperus platystylis*	28.34	10.40833	1.00925	20	40	20
26.	*Cyperus difformis*	40	5	1.80075	35	45	10
27.	*Cyperus distans*	25	5	1.88675	20	30	10
28.	*Cyperus imbricatus*	15	5	1.08075	10	20	10
29.	*Cyperus iria*	15	5	1.08675	10	20	10
30.	*Cyperus michelianus*	16.67	7.63763	1.00959	10	25	15

Graph-19: Shows graphical representation of plant species **frequency %** of Aquatic and Marshy land Monocotyledons **(16-30)** of the district Paschim Medinipur.

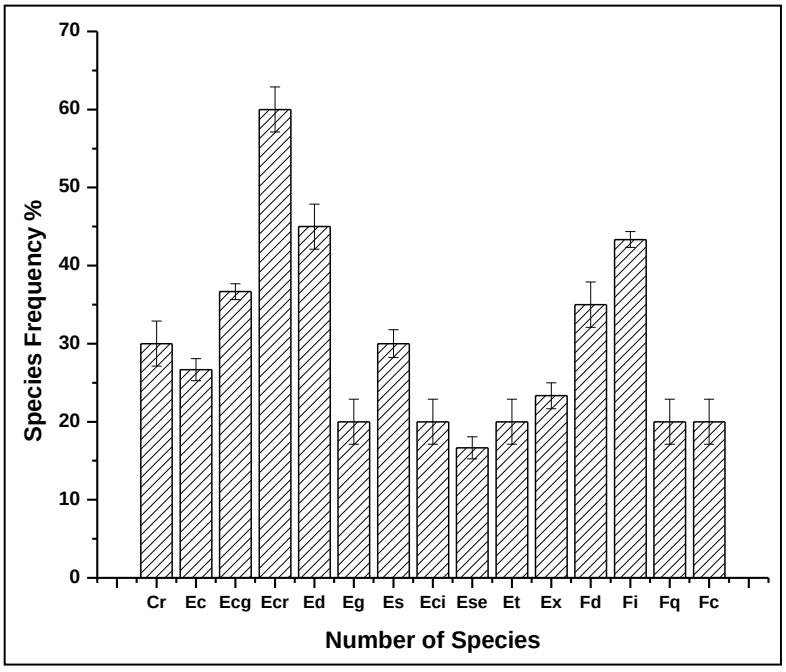


Ca-*Coix aquatica*, **Cl**-*Coix lacryma-jobi*, **Ce**-*Colocasia esculenta*, **Cb**-*Commelina benghalensis*, **Cd**-*Commelina diffusa*, **Cas**-*Crinum asiaticum*, **Cax**-*Cyanotis axillaris*, **Cco**-*Cyperus compactus*,**Ccm**-*Cyperus compressus*, **Cp**-*Cyperus platystylis*, **Cdi**-*Cyperus difformis*, **Cdn**-*Cyperus distans*, **Ci**-*Cyperus imbricatus*, **Cir**-*Cyperus iria*, **Cmp**-*Cyperus michelianus.*

Table 18: Shows the **frequency %** of Aquatic and Marshy Monocotyledons Plant species in the district Paschim Medinipur (Species no. **31-45** and species are arranged in alphabetically).

S. N.	Plant Names	Mean (Y)	Sd(yEr±)	se(yEr±)	Min(Y)	Max(Y)	Range
31.	*Cyperus rotundus*	30	5	2.88675	25	35	10
32.	*Echinochloa colona*	26.67	7.63	4.40959	20	35	15
33.	*Echinochloa crus-galli*	36.67	7.63	4.40959	30	45	15
34.	*Eichhornia crassipes*	60	5	2.88675	55	65	10
35.	*Eleocharis dulcis*	45	5	2.88675	40	50	10
36.	*Eleocharis geniculate*	20	5	2.88675	15	25	10
37.	*Eleocharis spiralis*	30	10	5.7735	20	40	20
38.	*Eriocaulon cinereum*	20	5	2.88675	15	25	10
39.	*Eriocaulon setaceum*	16.67	7.63	4.40959	10	25	15
40.	*Eriocaulon truncatum*	20	5	2.88675	15	25	10
41.	*Eriocaulon xeranthemum*	23.34	2.88	1.66667	20	25	5
42.	*Fimbristylis dichotoma*	35	5	2.88675	30	40	10
43.	*Fimbristylis littoralis*	43.34	10.4	6.00925	35	55	20
44.	*Fimbristylis quinquangularis*	20	5	2.88675	15	25	10
45.	*Fuirena ciliaris*	20	5	2.88675	15	25	10

Graph-20: Shows graphical representation of plant species **frequency %** of Aquatic and Marshy land **Monocotyledons (31-45)** of the district Paschim Medinipur.

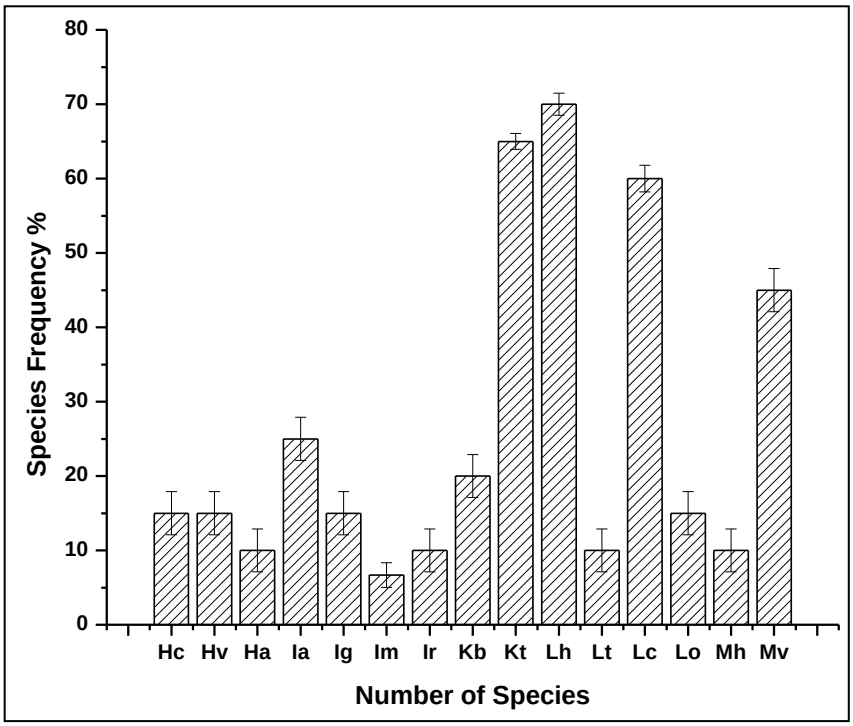


Cr-*Cyperus rotundus***, Ec-***Echinochloa colona***, Ecg-***Echinochloa crus-galli***, Ecr-***Eichhornia crassipes***, Ed-***Eleocharis dulcis***, Eg-** *Eleocharis geniculate***, Es-** *Eleocharis spiralis***, Eci-***Eriocaulon cinereum* **, Ese-***Eriocaulon setaceum***, Et-***Eriocaulon truncatum***, Ex-***Eriocaulon xeranthemum***, Fd-***Fimbristylis dichotoma***, Fl-***Fimbristylis littoralis***, Fq-***Fimbristylis quinquangularis***, Fc-***Fuirena ciliaris*

Table 19: Shows the **frequency %** of Aquatic and Marshy land **Monocotyledons** plant species in the district Paschim Medinipur (Species no. 46-60 and species are arranged in alphabetically).

S.N.	Plant Names	Mean (Y)	Sd(yEr±)	se(yEr±)	Min(Y)	Max(Y)	Range
46.	*Hemarthria compressa*	15	5	2.88675	10	20	10
47.	*Hydrilla verticillata*	15	5	2.88675	10	20	10
48.	*Hygroryza aristata*	10	5	2.88675	5	15	10
49.	*Isachne albens*	25	5	2.88675	20	30	10
50.	*Isachne globosa*	15	5	2.88675	10	20	10
51.	*Isachne miliacea*	6.67	2.89	1.66667	5	10	5
52.	*Ischaemum rugosum*	10	5	2.88675	5	15	10
53.	*Kyllinga brevifolia*	20	5	2.88675	15	25	10
54.	*Kyllinga tenuifolia*	65	10	5.7735	55	75	20
55.	*Leersia hexandra*	70	10	5.7735	60	80	20
56.	*Lemna trisulca*	10	5	2.88675	5	15	10
57.	*Leptochloa chinensis*	60	10	5.7735	50	70	20
58.	*Limnophyton obtusifolium*	15	5	2.88675	10	20	10
59.	*Monochoria hastata*	10	5	2.88675	5	15	10
60.	*Monochoria vaginalis*	45	5	2.88675	40	50	10

Graph-21: Shows graphical representation of Plant species **frequency %** of Aquatic and Marshy land Monocotyledons **(46-60)** of the district Paschim Medinipur.

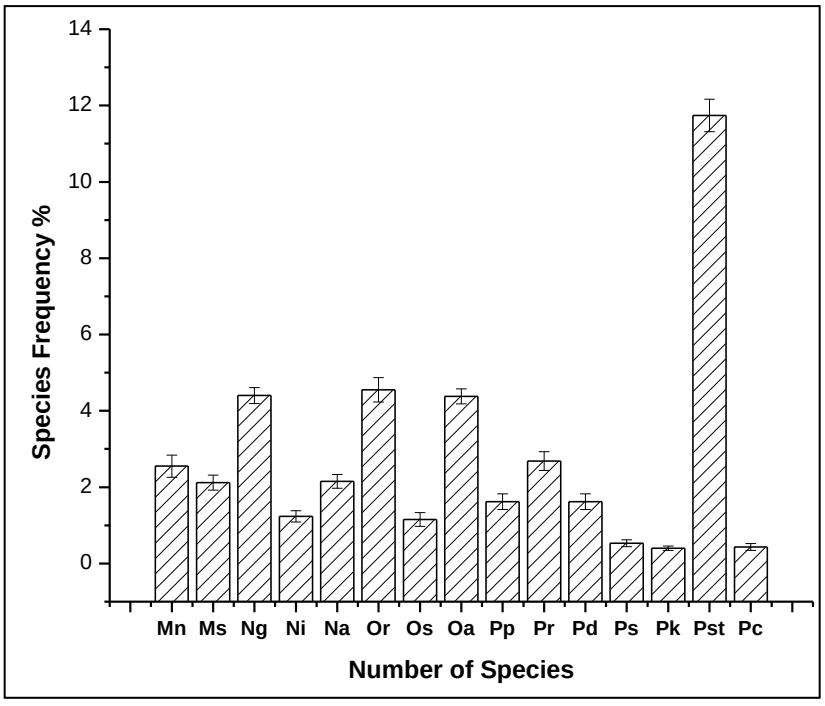


Hc-*Hemarthria compressa***, Hv-** *Hydrilla verticillata***, Ha-***Hygroryza aristata***, Ia-***Isachne albens***, Ig-***Isachne globosa***, Im-***Isachne miliacea***, Ir-***Ischaemum rugosum***, Kb-***Kyllinga brevifolia***, Kt-***Kyllinga tenuifolia***, Lh-***Leersia hexandra***, Lt-***Lemna trisulca***, Lc-***Leptochloa chinensis***, Lo-***Limnophyton obtusifolium***, Mh-***Monochoria hastata***, Mv-***Monochoria vaginalis*

Table 20: Shows the **Frequency %** of Aquatic and Marshy land **Monocotyledons** plant species in the district Paschim Medinipur (Species no. **61-75** and species are arranged in alphabetically).

S.N.	Plant Names	Mean (Y)	Sd(yEr±)	se(yEr±)	Min(Y)	Max(Y)	Range
61.	*Murdannia nudiflora*	45	5	2.88675	40	50	10
62.	*Murdannia spirata*	35	5	2.88675	30	40	10
63.	*Najas graminea*	65	5	2.88675	60	70	10
64.	*Najas indica*	15	5	2.88675	10	20	10
65.	*Nechamandra alternifolia*	20	5	2.88675	15	25	10
66.	*Oryza rufipogon*	35	5	2.88675	30	40	10
67.	*Oryza sativa*	26.67	2.88675	1.66667	25	30	5
68.	*Ottelia alismoides*	60	5	2.88675	55	65	10
69.	*Panicum paludosum*	25	5	2.88675	20	30	10
70.	*Panicum repens*	40	5	2.88675	35	45	10
71.	*Paspalum distichum*	16.67	7.63763	4.40959	10	25	15
72.	*Paspalum scrobiculatum*	10	5	2.88675	5	15	10
73.	*Phragmites karka*	6.67	2.88675	1.66667	5	10	5
74.	*Pistia stratiotes*	18.5	23.33452	1.65	2	35	33
75.	*Potamogeton crispus*	6.67	2.88675	1.66667	5	10	5

Graph-22: Graphical representation of plant species **frequency %** of Aquatic and Marshy land Monocotyledons **(61-75)** of the district Paschim Medinipur.

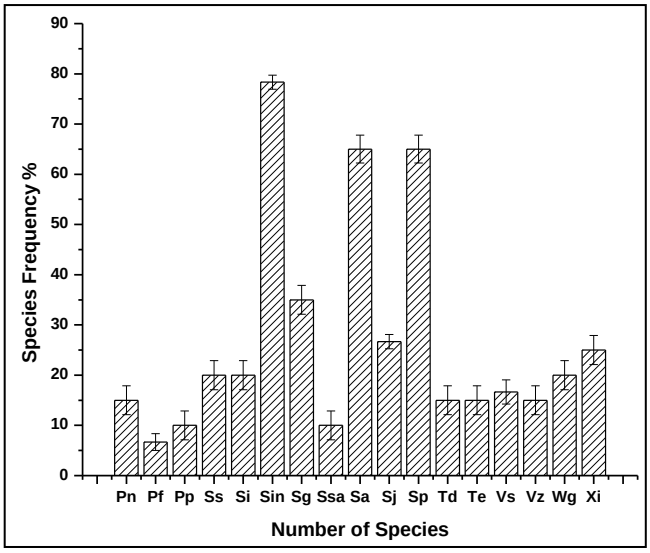


Mn-*Murdannia nudiflora*, **Ms**-*Murdannia spirata*, **Ng**-*Najas graminea*, **Ni**-*Najas indica*, **Na**-*Nechamandra alternifolia*, **Or**- *Oryza rufipogon*, **Os**- *Oryza sativa*, **Pp**- *Panicum paludosum*, **Pr**- *Panicum repens*, **Pd**-*Paspalum distichum*, **Ps**-*Paspalum scrobiculatum*, **Pk**-*Phragmites karka*, **Psd**-*Pistia stratiotes*, **Pc**-*Potamogeton crispus*

Table 21: Shows the **Frequency %** of Aquatic and Marshy land **Monocotyledons** plant species in the district Paschim Medinipur (Species no. **76-92** and species are arranged in alphabetically).

S.N.	Plant Names	Mean (Y)	Sd(yEr±)	se(yEr±)	Min(Y)	Max(Y)	Range
76.	*Potamogeton nodosus*	15	5	2.88675	10	20	10
77.	*Pycreus flavidus*	6.667	2.88675	1.66667	5	10	5
78.	*Pycreus polystachyos*	10	5	2.88675	5	15	10
79.	*Saccharum spontaneum*	20	5	2.88675	15	25	10
80.	*Sacciolepis indica*	20	5	2.88675	15	25	10
81.	*Sacciolepis interrupta*	78.334	7.63763	4.40959	70	85	15
82.	*Sagittaria guayanensis*	35	5	2.88675	30	40	10
83.	*Sagittaria sagittifolia*	10	5	2.88675	5	15	10
84.	*Schoenoplectiella articulata*	65	10	5.7735	55	75	20
85.	*Schoenoplectiella juncoides*	26.667	7.63763	4.40959	20	35	15
86.	*Spirodela polyrrhiza*	65	10	5.7735	55	75	20
87.	*Typha domingensis*	15	5	2.88675	10	20	10
88.	*Typha elephantina*	15	5	2.88675	10	20	10
89.	*Vallisneria spiralis*	16.667	7.63763	4.40959	10	25	15
90.	*Chrysopogon zizanioides*	15	5	2.88675	10	20	10
91.	*Wolffia globosa*	20	5	2.88675	15	25	10
92.	*Xyris indica*	25	5	2.88675	20	30	10

Graph-23: Graphical representation of plant species **frequency %** of Aquatic and Marshy land Monocotyledons **(76-92**) of the district Paschim Medinipur.

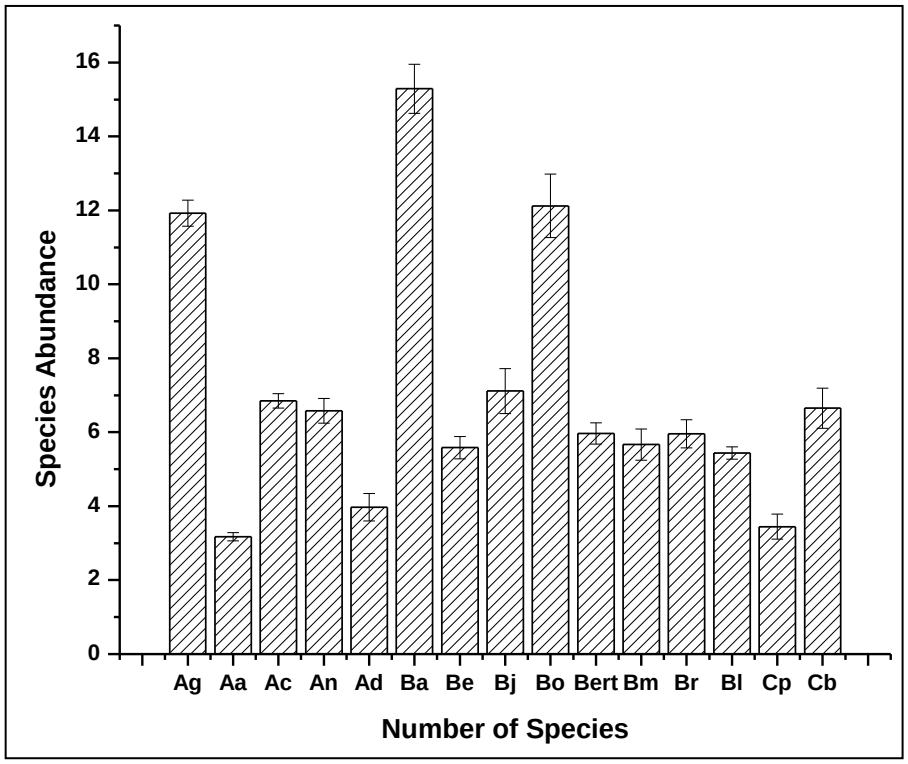


Pn-*Potamogeton nodosus*, **Pf**-*Pycreus flavidus*, **Pp**-*Pycreus polystachyos*, **Ss**- *Saccharum spontaneum*, **Si**-*Sacciolepis indica*, **Sin**-*Sacciolepis interrupta*, **Sg**-*Sagittaria guayanensis*, **Ssa**-*Sagittaria sagittifolia*, **Sa**-*Schoenoplectiella articulata*, **Sj**-*Schoenoplectiella juncoides*, **Sp**-*Spirodela polyrrhiza*, **Td**- *Typha domingensis*, **Te**- *Typha elephantina*, **Vs**-*Vallisneria spiralis*, **Vz**- *Chrysopogon zizanioides*, **Wg**-*Wolffia globosa*, **Xi**-*Xyris indica*.

Table 22: Shows the **Abundance** of Aquatic and Marshy land **Monocotyledons** plant species in the district Paschim Medinipur (Species no. **1-15** and species are arranged in alphabetically).

S.N.	Plant Names	Mean (Y)	Sd(yEr±)	se(yEr±)	Min(Y)	Max(Y)	Range
1.	*Actinoscirpus grossus*	11.924	0.61752	0.35652	11.272	12.5	1.228
2.	*Alpinia aquatica*	3.17667	0.1914	0.1105	3	3.38	0.38
3.	*Aponogeton crispus*	6.85	0.34176	0.19732	6.53	7.21	0.68
4.	*Aponogeton natans*	6.58	0.58026	0.33501	5.96	7.11	1.15
5.	*Arundo donax*	3.97333	0.64655	0.37329	3.5	4.71	1.21
6.	*Blyxa aubertii*	15.29	1.15052	0.66425	14	16.21	2.21
7.	*Blyxa echinosperma*	5.58333	0.52042	0.30046	5	6	1
8.	*Blyxa japonica*	7.11333	1.05458	0.60886	6.12	8.22	2.1
9.	*Blyxa octandra*	12.12333	1.4938	0.86244	10.5	13.44	2.94
10.	*Brachiaria eruciformis*	5.96667	0.50332	0.29059	5.5	6.5	1
11.	*Brachiaria mutica*	5.66533	0.72748	0.42001	5.166	6.5	1.334
12.	*Brachiaria reptans*	5.96	0.65795	0.37987	5.21	6.44	1.23
13.	*Butomopsis latifolia*	5.44	0.28513	0.16462	5.15	5.72	0.57
14.	*Caldesia parnassifolia*	3.44667	0.58586	0.33825	3	4.11	1.11
15.	*Chloris barbata*	6.65	0.94398	0.54501	5.9	7.71	1.81

Graph-24: Graphical representation of plant species **Abundance** of Aquatic and Marshy land Monocotyledons **(1-15)** of the district Paschim Medinipur.

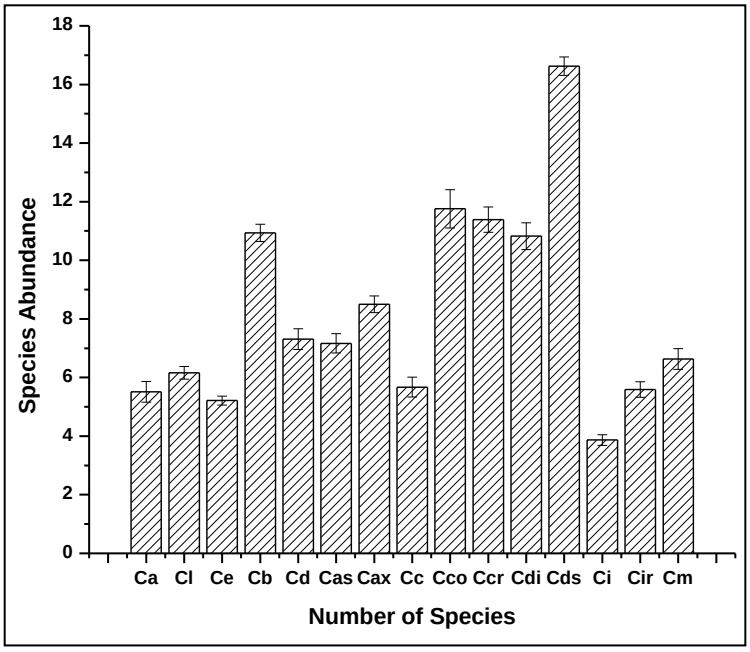


Ag-*Actinoscirpus grossus*, **Aa-** *Alpinia aqutica*, **Ac-***Aponogeton crispus*, **An-***Aponogeton natans*, **Ad-** *Arundo donax*, **Ba-***Blyxa aubertii*, **Be-***Blyxa aubertii* var. *echinosperma*, **Bj-***Blyxa japonica*, **Bo-***Blyxa octandra*, **Ber-***Brachiaria eruciformis*, **Bm-***Brachiaria mutica*, **Br-***Brachiaria reptans*, **Bl-***Butomopsis latifolia*, **Cp-***Caldesia parnassifolia*, **Cb-** *Chloris barbata*

Table23: Shows the **Abundance** of Aquatic and Marshy land Monocotyledons Plant species in the district Paschim Medinipur (Species no. **16-30** and species are arranged in alphabetically)**.**

S.N.	Plant Names	Mean (Y)	Sd(yEr±)	se(yEr±)	Min(Y)	Max(Y)	Range
16.	*Coix aquatica*	5.51333	0.61849	0.35709	5	6.2	1.2
17.	*Coix lacryma-jobi*	6.16333	0.37287	0.21528	5.9	6.59	0.69
18.	*Colocasia esculenta*	5.21333	0.25794	0.14892	5	5.5	0.5
19.	*Commelina benghalensis*	10.93333	0.51316	0.29627	10.5	11.5	1
20.	*Commelina diffusa*	7.311	0.61144	0.35302	6.833	8	1.167
21.	*Crinum asiaticum*	7.16667	0.56862	0.3283	6.7	7.8	1.1
22.	*Cyanotis axillaris*	8.5	0.5	0.28868	8	9	1
23.	*Cyperus compactus*	5.67	0.58796	0.33946	5	6.1	1.1
24.	*Cyperus compressus*	11.75667	1.13694	0.65641	10.77	13	2.23
25.	*Cyperus platystylis*	11.38667	0.74333	0.42916	10.56	12	1.44
26.	*Cyperus difformis*	10.82333	0.78653	0.4541	10.25	11.72	1.47
27.	*Cyperus distans*	16.62667	0.54602	0.31524	16	17	1
28.	*Cyperus imbricatus*	3.86667	0.32146	0.18559	3.5	4.1	0.6
29.	*Cyperus iria*	5.589	0.45504	0.26272	5.1	6	0.9
30.	*Cyperus michelianus*	6.63333	0.61101	0.35277	6.1	7.3	1.2

Graph-25: Graphical representation of plant species **Abundance** of Aquatic and Marshy land **Monocotyledons (16-30)** of the district Paschim Medinipur.

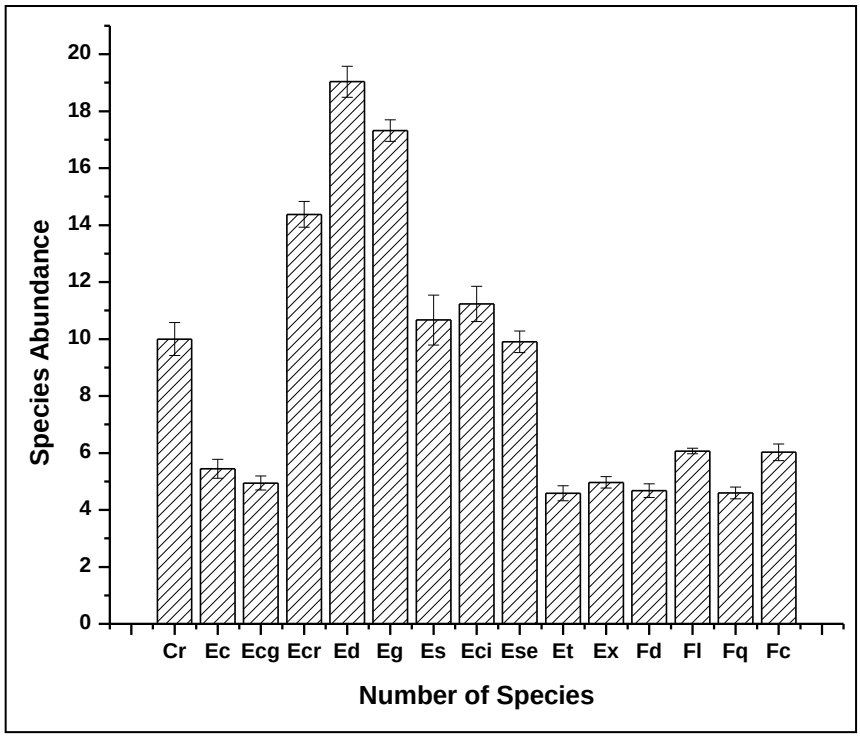


Ca-*Coix aquatica*, **Cl-***Coix lacryma-jobi*, **Ce-***Colocasia esculenta*, **Cb-***Commelina benghalensis***, Cd-***Commelina diffusa*, **Cas-***Crinum asiaticum*, **Cax-***Cyanotis axillaris*, **Cc-***Cyperus compactus*, **Cco-***Cyperus compressus*, **Ccr-***Cyperus platystylis*, **Cdi-***Cyperus difformis*, **Cds-***Cyperus distans*, **Ci-***Cyperus imbricatus*, **Cir-***Cyperus iria*, **Cm-***Cyperus michelianus.*

Table 24: Shows the **Abundance** of Aquatic and Marshy land Monocotyledons plant species in the district Paschim Medinipur (Species no. **31-45** and species are arranged in alphabetically).

S.N.	Plant Names	Mean (Y)	Sd(yEr±)	se(yEr±)	Min(Y)	Max(Y)	Range
31.	*Cyperus rotundus*	10	1	0.57735	9	11	2
32.	*Echinochloa colona*	5.45	0.57663	0.33292	5	6.1	1.1
33.	*Echinochloa crus-galli*	4.94467	0.41974	0.24234	4.5	5.334	0.834
34.	*Eichhornia crassipes*	14.37867	0.78241	0.45172	13.5	15	1.5
35.	*Eleocharis dulcis*	19.03733	0.94455	0.54534	18.112	20	1.888
36.	*Eleocharis geniculate*	17.31667	0.65256	0.37676	16.7	18	1.3
37.	*Eleocharis spiralis*	10.66667	1.52753	0.88192	9	12	3
38.	*Eriocaulon cinereum*	11.23333	1.07858	0.62272	10	12	2
39.	*Eriocaulon setaceum*	9.9	0.65574	0.37859	9.2	10.5	1.3
40.	*Eriocaulon truncatum*	4.589	0.45504	0.26272	4.1	5	0.9
41.	*Eriocaulon xeranthemum*	4.96667	0.35119	0.20276	4.6	5.3	0.7
42.	*Fimbristylis dichotoma*	4.67767	0.42201	0.24365	4.2	5	0.8
43.	*Fimbristylis littoralis*	6.06833	0.16736	0.09662	5.88	6.2	0.32
44.	*Fimbristylis quinquangularis*	4.59333	0.35726	0.20626	4.33	5	0.67
45.	*Fuirena ciliaris*	6.02567	0.5025	0.29012	5.667	6.6	0.933

Graph-26: Graphical representation of Plant species **Abundance** of Aquatic and Marshy land Monocotyledons **(31-45)** of the District Paschim Medinipur.

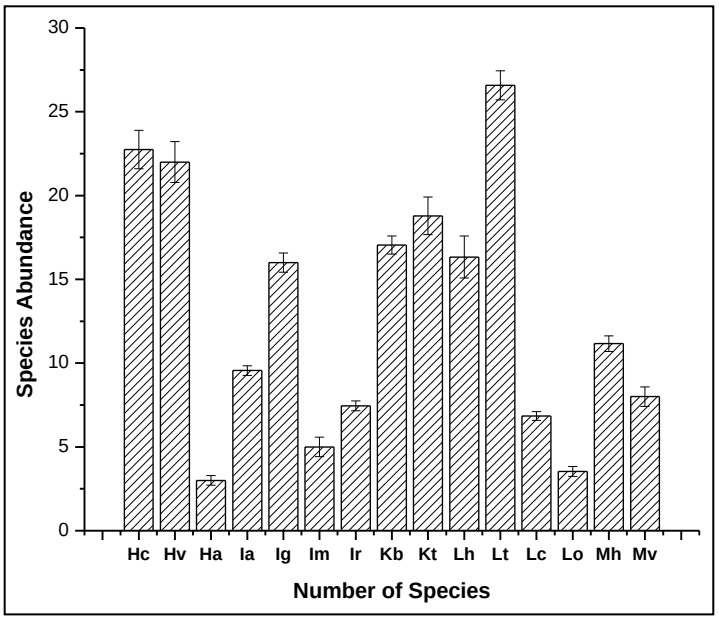


Cr-*Cyperus rotundus*, **Ec**-*Echinochloa colona*, **Ecg**-*Echinochloa crus-galli*, **Ecr**-*Eichhornia crassipes*, **Ed**-*Eleocharis dulcis*, **Eg**- *Eleocharis geniculate*, **Es**- *Eleocharis spiralis*, **Eci**-*Eriocaulon cinereum* , **Ese**-*Eriocaulon setaceum*, **Et**-*Eriocaulon truncatum*, **Ex**-*Eriocaulon xeranthemum*, **Fd**-*Fimbristylis dichotoma*, **Fl**-*Fimbristylis littoralis*, **Fq**-*Fimbristylis quinquangularis*, **Fc**-*Fuirena ciliaris*

Table 25: Shows the **Abundance** of Aquatic and Marshy land **Monocotyledons** plant species in the district Paschim Medinipur (Species no. **46-60** and species are arranged in alphabetically).

S.N.	Plant Names	Mean (Y)	Sd(yEr±)	se(yEr±)	Min(Y)	Max(Y)	Range
46.	*Hemarthria compressa*	22.75	1.98431	1.14564	21.25	25	3.75
47.	*Hydrilla verticillata*	22	2.64575	1.52753	20	25	5
48.	*Hygroryza aristata*	3	0.5	0.28868	2.5	3.5	1
49.	*Isachne albens*	9.55567	0.50921	0.29399	9	10	1
50.	*Isachne globosa*	16	1	0.57735	15	17	2
51.	*Isachne miliacea*	5	1	0.57735	4	6	2
52.	*Ischaemum rugosum*	7.44467	0.5091	0.29393	7	8	1
53.	*Kyllinga brevifolia*	17.04167	0.93819	0.54167	16.125	18	1.875
54.	*Kyllinga tenuifolia*	18.78567	1.94443	1.12262	17.357	21	3.643
55.	*Leersia hexandra*	16.33333	3.21455	1.85592	14	20	6
56.	*Lemna trisulca*	26.58333	1.50693	0.87003	25	28	3
57.	*Leptochloa chinensis*	6.848	0.45735	0.26405	6.334	7.21	0.876
58.	*Limnophyton obtusifolium*	3.53333	0.50332	0.29059	3	4	1
59.	*Monochoria hastata*	11.165	0.81343	0.46964	10.375	12	1.625
60.	*Monochoria vaginalis*	8	1	0.57735	7	9	2

Graph-27: Graphical representation of plant species **Abundance** of Aquatic and Marshy land land Monocotyledons **(46-60)** of the district Paschim Medinipur.

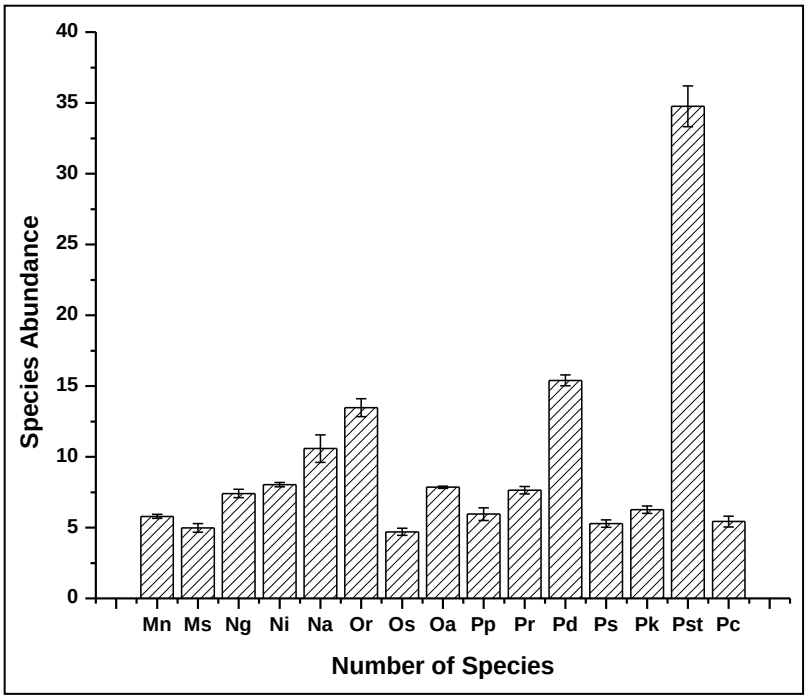


Hc-*Hemarthria compressa***, Hv-** *Hydrilla verticillata***, Ha-***Hygroryza aristata***, Ia-***Isachne albens***, Ig-***Isachne globosa***, Im-***Isachne miliacea***, Ir-***Ischaemum rugosum***, Kb-***Kyllinga brevifolia***, Kt-***Kyllinga tenuifolia***, Lh-***Leersia hexandra***, Lt-***Lemna trisulca***, Lc-***Leptochloa chinensis***, Lo-***Limnophyton obtusifolium***, Mh-***Monochoria hastata***, Mv-***Monochoria vaginalis*

Table 26: Shows the **Abundance** of Aquatic and Marshy land **Monocotyledons** plant species in the district Paschim Medinipur (Species no. **61-75** and species are arranged in alphabetically)**.**

S.N.	Plant Names	Mean (Y)	Sd(yEr±)	se(yEr±)	Min(Y)	Max(Y)	Range
61.	*Murdannia nudiflora*	5.79567	0.26221	0.15139	5.5	6	0.5
62.	*Murdannia spirata*	4.976	0.5364	0.30969	4.428	5.5	1.072
63.	*Najas graminea*	7.41	0.52374	0.30238	7	8	1
64.	*Najas indica*	8.03333	0.25166	0.1453	7.8	8.3	0.5
65.	*Nechamandra alternifolia*	10.58333	1.67506	0.9671	9.1	12.4	3.3
66.	*Oryza rufipogon*	13.47	1.11054	0.64117	12.38	14.6	2.22
67.	*Oryza sativa*	4.7	0.43589	0.25166	4.2	5	0.8
68.	*Ottelia alismoides*	7.85	0.13229	0.07638	7.75	8	0.25
69.	*Panicum paludosum*	5.95567	0.76746	0.44309	5.167	6.7	1.533
70.	*Panicum repens*	7.64167	0.45848	0.26471	7.125	8	0.875
71.	*Paspalum distichum*	15.4	0.65574	0.37859	14.7	16	1.3
72.	*Paspalum scrobiculatum*	5.28667	0.46318	0.26742	4.9	5.8	0.9
73.	*Phragmites karka*	6.26	0.4613	0.26633	5.9	6.78	0.88
74.	*Pistia stratiotes*	34.764	4.21772	2.4351	30.37	38.78	8.41
75.	*Potamogeton crispus*	5.43333	0.66583	0.38442	5	6.2	1.2

Graph-28: Graphical representation of plant species **Abundance** of Aquatic and Marshy land Monocotyledons **(61-75)** of the district Paschim Medinipur.

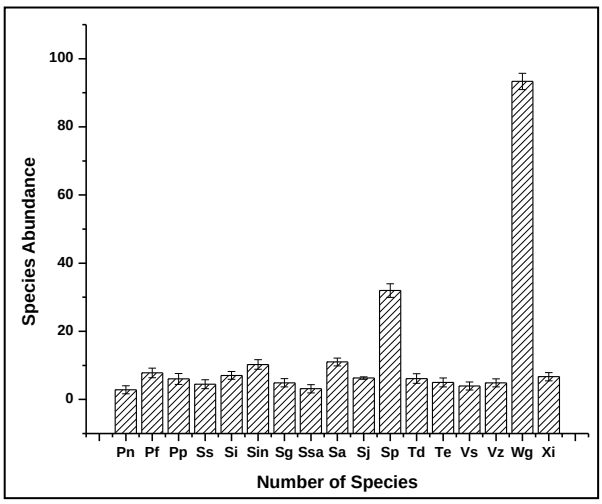


Mn-*Murdannia nudiflora*, **Ms**-*Murdannia spirata*, **Ng**-*Najas graminea*, **Ni**-*Najas indica*, **Na**-*Nechamandra alternifolia*, **Or**- *Oryza rufipogon*, **Os**- *Oryza sativa* , **Oa**-*Ottelia alismoides,* **Pp**- *Panicum paludosum*, **Pr**-*Panicum repens*, **Pd**-*Paspalum distichum*, **Ps**-*Paspalum scrobiculatum*, **Pk**-*Phragmites karka*, **Pst**-*Pistia stratiotes*, **Pc**-*Potamogeton crispus*.

Table 27: Shows the **Abundance** of Aquatic and Marshy land Monocotyledons plant species in the district Paschim Medinipur (Species no. **76-92** and species are arranged in alphabetically)**.**

S.N.	Plant Names	Mean (Y)	Sd(yEr±)	se(yEr±)	Min(Y)	Max(Y)	Range
76.	*Potamogeton nodosus*	2.84667	0.27154	0.15677	2.56	3.1	0.54
77.	*Pycreus flavidus*	7.8	0.72111	0.41633	7	8.4	1.4
78.	*Pycreus polystachyos*	6.03333	1.0504	0.60645	5	7.1	2.1
79.	*Saccharum spontaneum*	4.46667	0.50332	0.29059	4	5	1
80.	*Sacciolepis indica*	7.03333	0.25166	0.1453	6.8	7.3	0.5
81.	*Sacciolepis interrupta*	10.257	0.7162	0.4135	9.571	11	1.429
82.	*Sagittaria guayanensis*	4.9	0.36056	0.20817	4.5	5.2	0.7
83.	*Sagittaria sagittifolia*	3.14333	0.35726	0.20626	2.88	3.55	0.67
84.	*Schoenoplectiella articulata*	11.01067	0.25617	0.1479	10.76	11.272	0.512
85.	*Schoenoplectiella juncoides*	6.30667	0.6214	0.35876	5.8	7	1.2
86.	*Spirodela polyrrhiza*	31.96967	1.70639	0.98518	30	33	3
87.	*Typha domingensis*	6.13333	0.70946	0.40961	5.5	6.9	1.4
88.	*Typha elephantina*	5	0.5	0.28868	4.5	5.5	1
89.	*Vallisneria spiralis*	3.95567	0.26925	0.15545	3.667	4.2	0.533
90.	*Chrysopogon zizanioides*	4.86667	0.32146	0.18559	4.5	5.1	0.6
91.	*Wolffia globosa*	93.33333	5.85947	3.38296	89	100	11
92.	*Xyris indica*	6.68333	0.35473	0.2048	6.3	7	0.7

Graph-29: Graphical representation of plant species **Abundance** of Aquatic and Marshy land Monocotyledons **(76-92)** of the district Paschim Medinipur.



Pn-*Potamogeton nodosus*, **Pf**-*Pycreus flavidus*, **Pp**-*Pycreus polystachyos*, **Ss**- *Saccharum spontaneum*, **Si**-*Sacciolepis indica*, **Sin**-*Sacciolepis interrupta*, **Sg**-*Sagittaria guayanensis*, **Ssa**-*Sagittaria sagittifolia*, **Sa**-*Schoenoplectiella articulata*, **Sj**-*Schoenoplectiella juncoides*, **Sp**-*Spirodela polyrrhiza*, **Td**- *Typha domingensis*,**Te**- *Typha elephantina*, **Vs**-*Vallisneria spiralis*, **Vz**- *Chrysopogon zizanioides*, **Wg**- *Wolffia globosa*, **Xi**-*Xyris indica*

6.1.5.2. Quantitative survey of Dicot:

Table 28: Showing the **Density, Frequency (%) and** Abundance of aquatic and marshy land **Dicotyledons** plant species are recorded from the selected area.

S.N.	Plant Name (Dicotyledons)	Density	Frequency (%)	Abundance
1.	*Aeschynomene aspera*	0.400	15	2.670
2.	*Aeschynomene indica*	0.250	15	1.667
3.	*Alternanthera ficoidea*	0.550	10	5.500
4.	*Alternanthera philoxeroides*	1.200	20	6.000
5.	*Alternanthera sessilis*	1.450	25	7.250
6.	*Ammannia auriculata*	0.150	5	3.000
7.	*Ammannia baccifera*	0.600	15	4.000
8.	*Bacopa monnieri*	0.850	20	4.250
9.	*Bergia capensis*	0.100	5	2.000
10.	*Centella asiatica*	1.600	30	8.000
11.	*Ceratophyllum demersum*	0.550	10	5.500
12.	*Coldenia procumbens*	1.100	30	3.670
13.	*Dentella repens*	3.450	40	8.625
14.	*Dopatrium junceum*	0.450	15	3.000
15.	*Drosera burmannii*	1.250	10	12.500
16.	*Eclipta prostrata*	1.400	40	3.500
17.	*Enhydra fluctuans*	1.550	15	10.334
18.	*Grangea maderaspatana*	7.550	60	12.583
19.	*Heliotropium indicum*	0.850	20	4.250
20.	*Heliotropium ovalifolium*	1.950	35	5.571
21.	*Hydrocera triflora*	0.750	10	7.500
22.	*Hydrolea zeylanica*	1.450	35	4.600
23.	*Hygrophila difformis*	7.050	55	11.667
24.	*Hygrophila polysperma*	0.400	10	5.000
25.	*Hygrophila auriculata*	1.000	20	5.000
26.	*Ipomoea aquatica*	1.850	40	4.000
27.	*Ipomoea fistulosa*	0.200	5	4.000
28.	*Limnophila heterophylla*	1.450	20	7.250
29.	*Limnophila indica*	0.950	20	4.750
30.	*Limnophila sessiliflora*	4.550	10	18.20
31.	*Lindernia antipoda*	2.900	15	19.334
32.	*Lindernia ciliata*	5.550	30	18.500
33.	*Lindernia crustacea*	4.000	25	16.000
34.	*Lobelia alisnoides*	0.450	10	4.500
35.	*Lobelia zeylanica*	0.450	15	3.000
36.	*Ludwigia adscendens*	3.350	55	6.090
37.	*Ludwigia octovalvis*	1.200	20	4.800
38.	*Ludwigia perennis*	2.050	50	4.100
39.	*Ludwigia prostrata*	0.150	10	1.500
40.	*Myriophyllum indicum*	2.470	35	10.21

Table 28: continued...

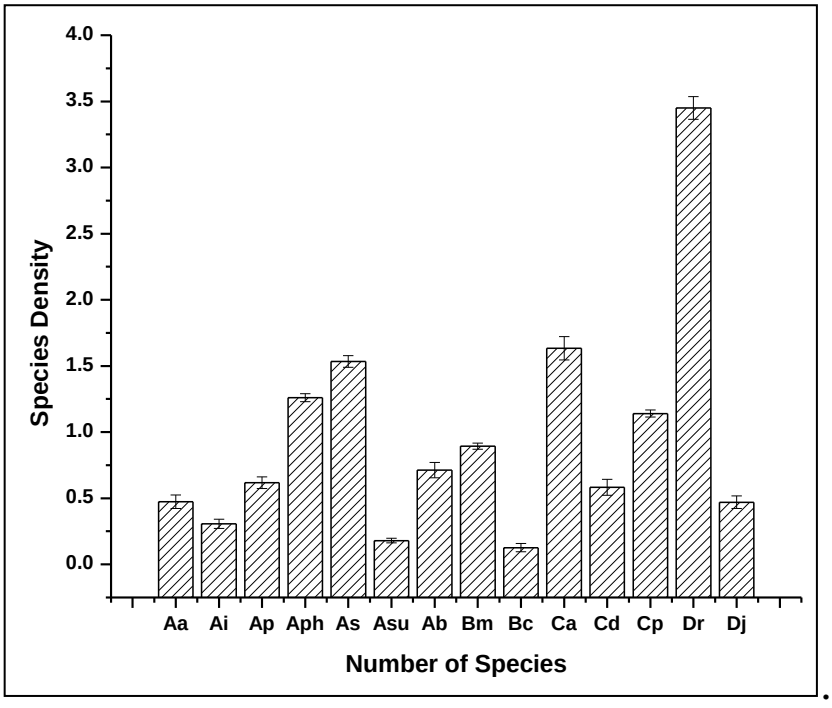
S.N.	Plant Name (Monocotyledons)	Density	Frequency (%)	Abundance
41.	*Nelumbo nucifera*	0.650	15	4.334
42.	*Neptunia oleracea*	3.850	40	9.625
43.	*Nymphaea nouchali*	5.500	55	7.334
44.	*Nymphaea pubescens*	5.150	60	8.583
45.	*Nymphaea rubra*	4.821	50	6.834
46.	*Nymphoides hydrophylla*	3.050	50	6.334
47.	*Nymphoides indica*	1.550	15	10.334
48.	*Oldenlandia brachypoda*	0.300	5	6.000
49.	*Oldenlandia corymbosa*	3.650	35	10.420
50.	*Oldenlandia diffusa*	0.850	10	8.500
51.	*Phyla nodiflora*	2.400	35	6.857
52.	*Persicaria orientalis*	2.850	20	14.250
53.	*Persicaria hydropiper*	3.900	40	9.750
54.	*Polygonum plebeium*	3.050	25	12.200
55.	*Ranunculus sceleratus*	0.500	5	4.000
56.	*Rotala densiflora*	3.200	55	5.818
57.	*Sesbania bispinosa*	0.550	10	8.500
58.	*Sesbania javanica*	0.400	10	2.500
59.	*Sphaeranthus africanus*	0.350	5	7.000
60.	*Sphaeranthus indicus*	1.150	20	5.750
61.	*Sphenoclea zeylanica*	2.050	35	5.857
62.	*Trapa natans*	0.500	5	4.000
63.	*Trapa natans* var. *bispinosa*	0.400	10	4.000
64.	*Utricularia aurea*	2.550	30	8.500
65.	*Utricularia bifida*	0.400	10	2.500
66.	*Utricularia caerulea*	0.550	15	3.667
67.	*Utricularia gibba*	0.350	5	7.000
68.	*Utricularia stellaris*	1.800	55	3.272

Aquatic and Marshy land **Dicotyledons** plant species **Density** (Table 29-33, Graph 30-35), **Frequency** % (Table 34-38, Graph 35-39) and **Abundance** (Table 39-43, Graph 40-44) of the district Paschim Medinipur

Table 29: Aquatic and Marshy land **Dicotyledons** plant species **Density** of the district Paschim Medinipur (Species no. **1-14** and species are arranged in alphabetically).

S.N.	Plant Names	Mean (Y)	Sd(yEr±)	Se(yEr±)	Min(Y)	Max(Y)	Range
1.	*Aeschynomene aspera*	0.47333	0.08737	0.05044	0.4	0.57	0.17
2.	*Aeschynomene indica*	0.30667	0.06028	0.0348	0.25	0.37	0.12
3.	*Alternanthera ficoidea*	0.61667	0.07638	0.0441	0.55	0.7	0.15
4.	*Alternanthera philoxeroides*	1.26	0.05292	0.03055	1.2	1.3	0.1
5.	*Alternanthera sessilis*	1.53333	0.07638	0.0441	1.45	1.6	0.15
6.	*Ammannia auriculata*	0.18	0.03	0.01732	0.15	0.21	0.06
7.	*Ammannia baccifera*	0.71333	0.10017	0.05783	0.6	0.79	0.19
8.	*Bacopa monnieri*	0.89333	0.04041	0.02333	0.85	0.93	0.08
9.	*Bergia capensis*	0.12667	0.05508	0.0318	0.09	0.19	0.1
10.	*Centella asiatica*	1.63333	0.15275	0.08819	1.5	1.8	0.3
11.	*Ceratophyllum demersum*	0.58333	0.10408	0.06009	0.5	0.7	0.2
12.	*Coldenia procumbens*	1.14	0.04583	0.02646	1.1	1.19	0.09
13.	*Dentella repens*	3.45	0.15	0.0866	3.3	3.6	0.3
14.	*Dopatrium junceum*	0.47	0.08185	0.04726	0.4	0.56	0.16

Graph-30: Graphical representation of plant species **density** of Aquatic and Marshy land Dicotyledons **(1-14)** of the district Paschim Medinipur.

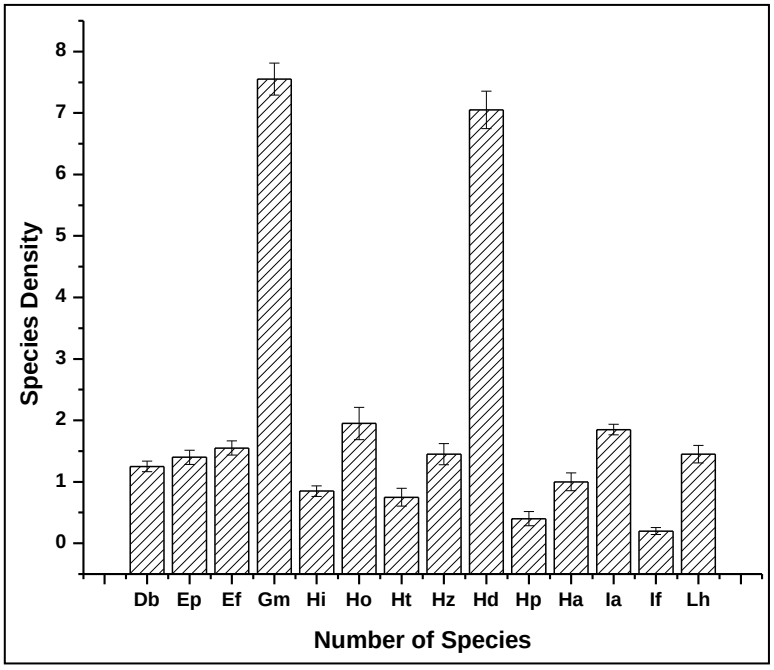


Aa-*Aeschynomene aspera*, **Ai-***Aeschynomene indica*, **Ap**- *Alternanthera ficoidea*, **Aph-***Alternanthera philoxeroides*, **As-***Alternanthera sessilis*, **Aau-***Ammannia auriculata*, **Ab-***Ammannia baccifera*, **Bm-***Bacopa monnieri*, **Bc-***Bergia capensis*, **Ca-***Centella asiatica*, **Cd-***Ceratophyllum demersum*, **Cp-***Coldenia procumbens*, **Dr-***Dentella repens*, **Dj-***Dopatrium junceum*

Table 30: Shows **Density** of Aquatic and Marshy land **Dicotyledons** plant species the district Paschim Medinipur (Species no. **14-28** and species are arranged in alphabetically).

S.N.	Plant Names	Mean (Y)	Sd(yEr±)	Se(yEr±)	Min(Y)	Max(Y)	Range
15.	*Drosera burmannii*	1.25	0.15	0.0866	1.1	1.4	0.3
16.	*Eclipta prostrata*	1.4	0.2	0.11547	1.2	1.6	0.4
17.	*Enhydra fluctuans*	1.55	0.2	0.11547	1.35	1.75	0.4
18.	*Grangea maderaspatana*	7.55	0.45	0.25981	7.1	8	0.9
19.	*Heliotropium indicum*	0.85	0.15	0.0866	0.7	1	0.3
20.	*Heliotropium ovalifolium*	1.95	0.8	0.46188	1.15	2.75	1.6
21.	*Hydrocera triflora*	0.75	0.25	0.14434	0.5	1	0.5
22.	*Hydrolea zeylanica*	1.45	0.3	0.17321	1.15	1.75	0.6
23.	*Hygrophila difformis*	7.05	0.7	0.40415	6.35	7.75	1.4
24.	*Hygrophila polysperma*	0.4	0.2	0.11547	0.2	0.6	0.4
25.	*Hygrophila auriculata*	1	0.25	0.14434	0.75	1.25	0.5
26.	*Ipomoea aquatica*	1.85	0.15	0.0866	1.7	2	0.3
27.	*Ipomoea fistulosa*	0.2	0.1	0.05774	0.1	0.3	0.2
28.	*Limnophila heterophylla*	1.45	0.25	0.14434	1.2	1.7	0.5

Graph-31: Graphical representation of plant species **Density** of Aquatic and Marshy land Dicotyledons **(15-28)** of the district Paschim Medinipur.

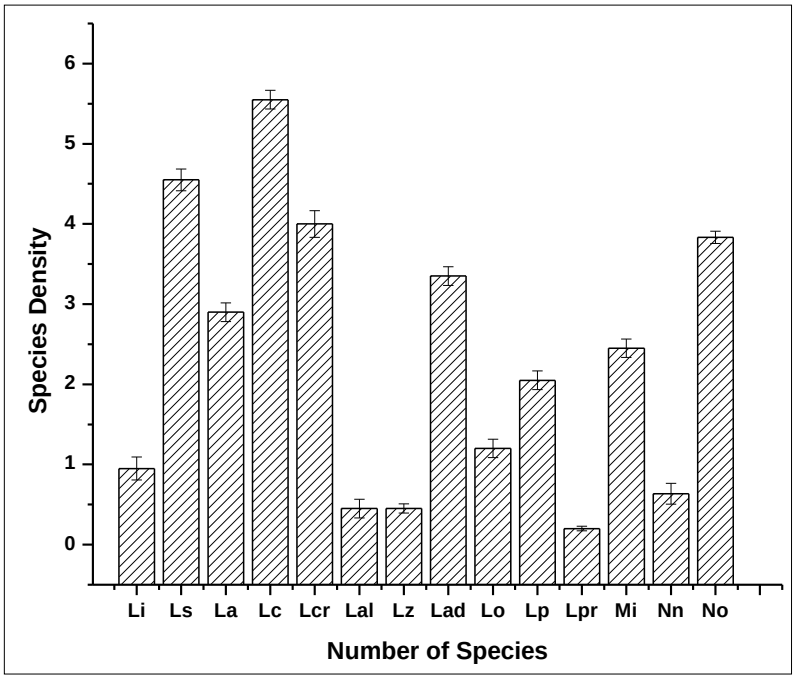


Db-*Drosera burmannii*, **Ep**-*Eclipta prostrata*, **Ef**-*Enhydra fluctuans*, **Gm**-*Grangea maderaspatana*, **Hi**-*Heliotropium indicum*, **Ho**-*Heliotropium ovalifolium*, **Ht**-*Hydrocera triflora*, **Hz**-*Hydrolea zeylanica*, **Hd**-*Hygrophila difformis*, **Hp**-*Hygrophila polysperma*, **Ha**- *Hygrophila auriculata*, **Ia**-*Ipomoea aquatica*, **If**-*Ipomoea fistulosa*, **Lh**-*Limnophila heterophylla*

Table 31: Showing **Density** of Aquatic and Marshy land **Dicotyledons** plant species the district Paschim Medinipur (Species no. **29-42** and species are arranged in alphabetical).

S.N.	Plant Names	Mean (Y)	Sd(yEr±)	Se(yEr±)	Min(Y)	Max(Y)	Range
29.	*Limnophila indica*	0.95	0.25	0.14434	0.7	1.2	0.5
30.	*Limnophila sessiliflora*	4.55	1.1	0.13509	3.45	5.65	2.2
31.	*Lindernia antipoda*	2.9	0.6	0.11641	2.3	3.5	1.2
32.	*Lindernia ciliata*	5.55	0.55	0.11754	5	6.1	1.1
33.	*Lindernia crustacea*	4	1.5	0.16603	2.5	5.5	3
34.	*Lobelia alisnoides*	0.45	0.2	0.11547	0.25	0.65	0.4
35.	*Lobelia zeylanica*	0.45	0.1	0.05774	0.35	0.55	0.2
36.	*Ludwigia adscendens*	3.35	0.2	0.11547	3.15	3.55	0.4
37.	*Ludwigia octovalvis*	1.2	0.3	0.11321	0.9	1.5	0.6
38.	*Ludwigia perennis*	2.05	0.2	0.11547	1.85	2.25	0.4
39.	*Ludwigia prostrata*	0.2	0.05	0.02887	0.15	0.25	0.1
40.	*Myriophyllum indicum*	2.45	0.20075	0.1159	2.24	2.64	0.4
41.	*Nelumbo nucifera*	0.63333	0.22546	0.13017	0.4	0.85	0.45
42.	*Neptunia oleracea*	3.83333	0.82513	0.07639	3	4.65	1.65

Graph-32: Graphical representation of plant species **Density** of Aquatic and Marshy land Dicotyledons **(29-42)** of the district Paschim Medinipur.

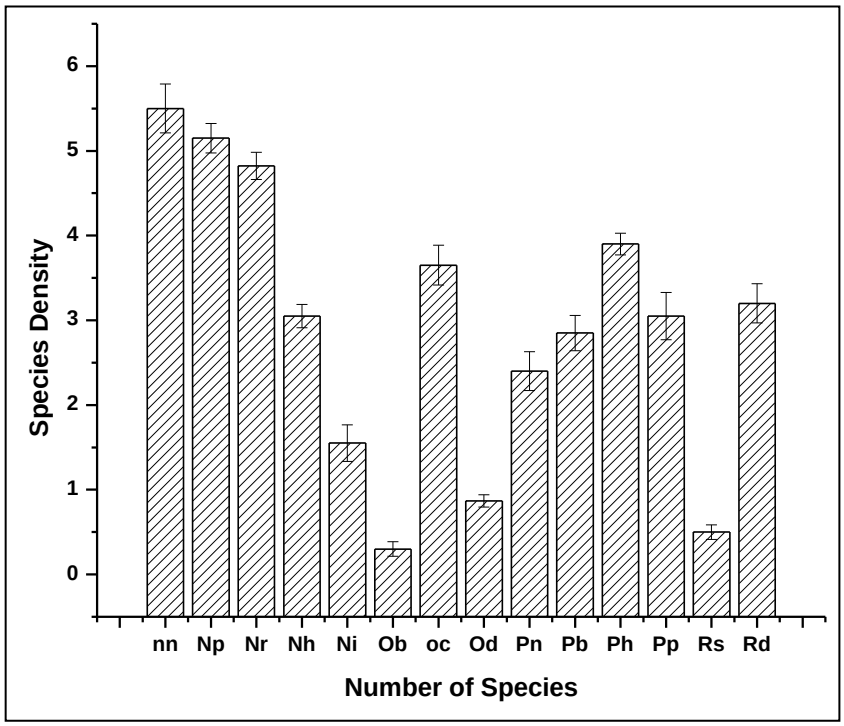


Li-*Limnophila indica,* **Ls**-*Limnophila sessiliflora,* **La**-*Lindernia antipoda,* **Lc**-*Lindernia ciliata,* **Lcr**-*Lindernia crustacea,* **Lal**- *Lobelia alisnoides,* **Lz**-*Lobelia zeylanica,* **Lad**-*Ludwigia adscendens,* **Lo**-*Ludwigia octovalvis,* **Lp**-*Ludwigia perennis,* **Lpr**-*Ludwigia prostrata,* **Mi**-*Myriophyllum indicum,* **Nn**-*Nelumbo nucifera,* **No**-*Neptunia oleracea*

Table 32: Showing the **Density** of Aquatic and Marshy land **Dicotyledons** plant species the district Paschim Medinipur (Species no. **43-56** and species are arranged in alphabetically).

S.N.	Plant Names	Mean (Y)	Sd(yEr±)	Se(yEr±)	Min(Y)	Max(Y)	Range
43.	*Nymphaea nouchali*	5.5	0.5	0.28868	5	6	1
44.	*Nymphaea pubescens*	5.15	0.3	0.17321	4.85	5.45	0.6
45.	*Nymphaea rubra*	4.821	0.971	0.56061	3.85	5.792	1.942
46.	*Nymphoides hydrophylla*	3.05	0.24	0.13856	2.81	3.29	0.48
47.	*Nymphoides indica*	1.55	0.55	0.31754	1	2.1	1.1
48.	*Oldenlandia brachypoda*	0.3	0.15	0.0866	0.15	0.45	0.3
49.	*Oldenlandia corymbosa*	3.65	1.1	0.63509	2.55	4.75	2.2
50.	*Oldenlandia diffusa*	0.86667	0.12583	0.07265	0.75	1	0.25
51.	*Phyla nodiflora*	2.4	0.4	0.23094	2	2.8	0.8
52.	*Persicaria orientalis*	2.85	0.36	0.20785	2.49	3.21	0.72
53.	*Persicaria hydropiper*	3.9	0.22	0.12702	3.68	4.12	0.44
54.	*Polygonum plebeium*	3.05	1	0.57735	2.05	4.05	2
55.	*Ranunculus sceleratus*	0.5	0.15	0.0866	0.35	0.65	0.3
56.	*Rotala densiflora*	3.2	0.92	0.53116	2.28	4.12	1.84

Graph-33: Graphical representation of plant species **Density** of Aquatic and Marshy land Dicotyledons **(43-56)** of the district Paschim Medinipur.

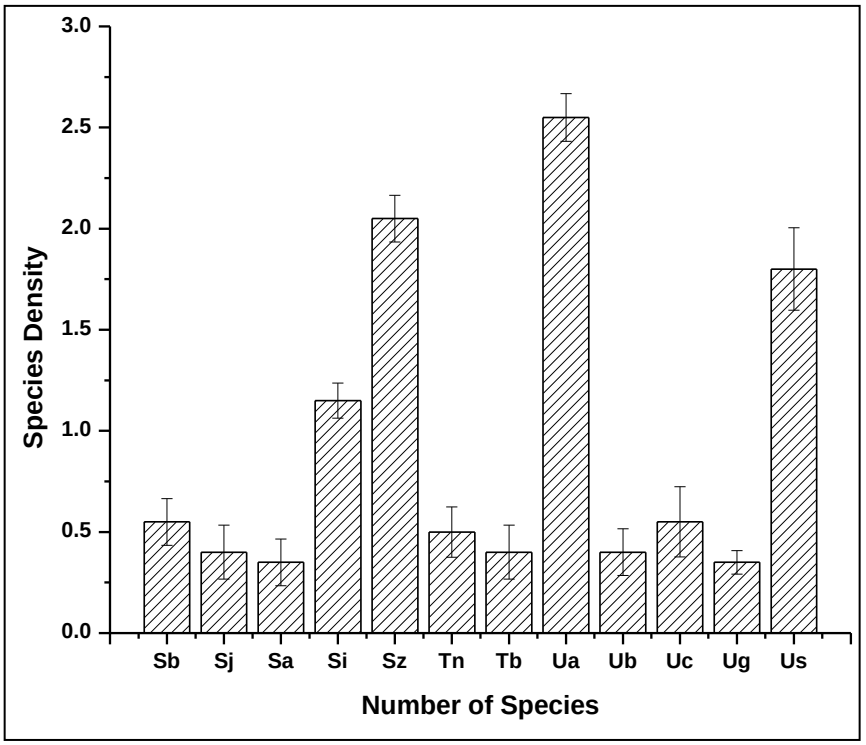


Nn-*Nymphaea nouchali*, **Np**-*Nymphaea pubescens*, **Nr**-*Nymphaea rubra*, **Nh**-*Nymphoides hydrophylla*, **Ni**-*Nymphoides indica*, **Ob**-*Oldenlandia brachypoda*, **Oc**-*Oldenlandia corymbosa*, **Od**-*Oldenlandia diffusa*, **Pn**-*Phyla nodiflora*, **Pb**- *Persicaria orientalis*, **Ph**- *Persicaria hydropiper*, **Pp**-*Polygonum plebeium*, **Rs**-*Ranunculus sceleratus*, **Rd**-*Rotala densiflora*

Table 33: Aquatic and Marshy land Dicotyledons plant species **Density** of the district Paschim Medinipur (Species no. **57-68** and species are arranged in alphabetically).

S.N.	Plant Names	Mean (Y)	Sd(yEr±)	Se(yEr±)	Min(Y)	Max(Y)	Range
57.	*Sesbania bispinosa*	0.55	0.2	0.11547	0.35	0.75	0.4
58.	*Sesbania javanica*	0.4	0.3	0.17321	0.1	0.7	0.6
59.	*Sphaeranthus africanus*	0.35	0.2	0.11547	0.15	0.55	0.4
60.	*Sphaeranthus indicus*	1.15	0.15	0.0866	1	1.3	0.3
61.	*Sphenoclea zeylanica*	2.05	0.2	0.11547	1.85	2.25	0.4
62.	*Trapa natans*	0.5	0.25	0.14434	0.25	0.75	0.5
63.	*Trapa natans* var. *bispinosa*	0.4	0.3	0.17321	0.1	0.7	0.6
64.	*Utricularia aurea*	2.55	0.55	0.31754	2	3.1	1.1
65.	*Utricularia bifida*	0.4	0.2	0.11547	0.2	0.6	0.4
66.	*Utricularia caerulea*	0.55	0.3	0.17321	0.25	0.85	0.6
67.	*Utricularia gibba*	0.35	0.1	0.05774	0.25	0.45	0.2
68.	*Utricularia stellaris*	1.8	0.7	0.40415	1.1	2.5	1.4

Graph-34: Graphical representation of plant species **Density** of Aquatic and Marshy land Dicotyledons **(57-68)** of the district Paschim Medinipur.

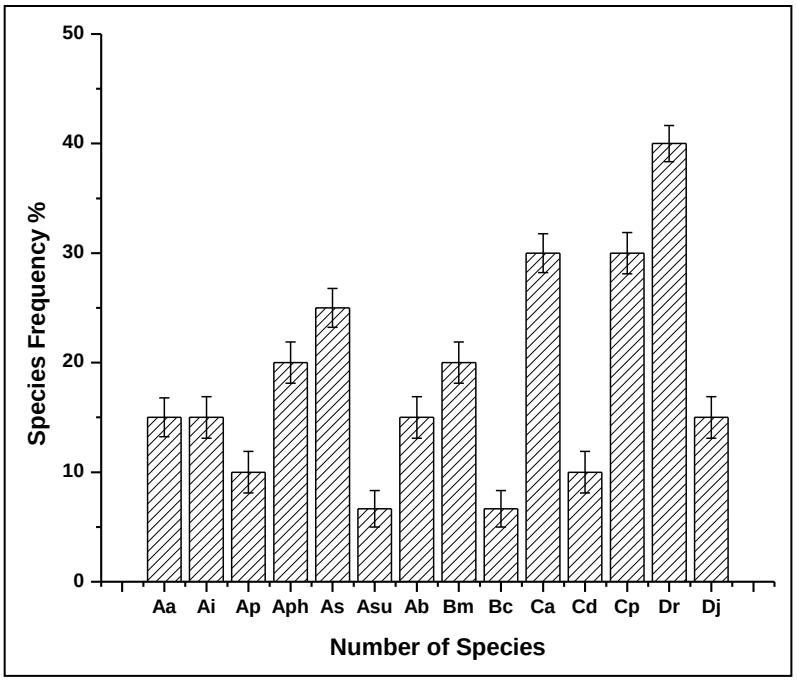


Sb-*Sesbania bispinosa*, **Sj**-*Sesbania javanica*, **Sa**-*Sphaeranthus africanus*, **Si**-*Sphaeranthus indicus*, **Sz**-*Sphenoclea zeylanica*, **Tn**-*Trapa natans*, **Tb**-*Trapa natans* var. *bispinosa*, **Ua**-*Utricularia aurea*, **Ub**-*Utricularia bifida*, **Uc**-*Utricularia caerulea*, **Ug**-*Utricularia gibba*, **Us**-*Utricularia stellaris*

Table 34: Aquatic and Marshy land **Dicotyledons** plant species **Frequency (%)** of the district Paschim Medinipur (Species no. **1-14** and species are arranged in alphabetically).

S.N.	Plant Names	Mean(Y)	Sd(yEr±)	Se(yEr±)	Min(Y)	Max(Y)	Range
1.	*Aeschynomene aspera*	15	10	5.7735	5	25	20
2.	*Aeschynomene indica*	15	5	2.88675	10	20	10
3.	*Alternanthera ficoidea*	10	5	2.88675	5	15	10
4.	*Alternanthera philoxeroides*	20	5	2.88675	15	25	10
5.	*Alternanthera sessilis*	25	10	5.7735	15	35	20
6.	*Ammannia auriculata*	6.66667	2.88675	1.66667	5	10	5
7.	*Ammannia baccifera*	15	5	2.88675	10	20	10
8.	*Bacopa monnieri*	20	5	2.88675	15	25	10
9.	*Bergia capensis*	6.66667	2.88675	1.66667	5	10	5
10.	*Centella asiatica*	30	10	5.7735	20	40	20
11.	*Ceratophyllum demersum*	10	5	2.88675	5	15	10
12.	*Coldenia procumbens*	30	5	2.88675	25	35	10
13.	*Dentella repens*	40	15	8.66025	25	55	30
14.	*Dopatrium junceum*	15	5	2.88675	10	20	10

Graph-35: Graphical representation of plant species **Frequency (%)** of Aquatic and Marshy land Dicotyledons **(1-14)** of the district Paschim Medinipur.

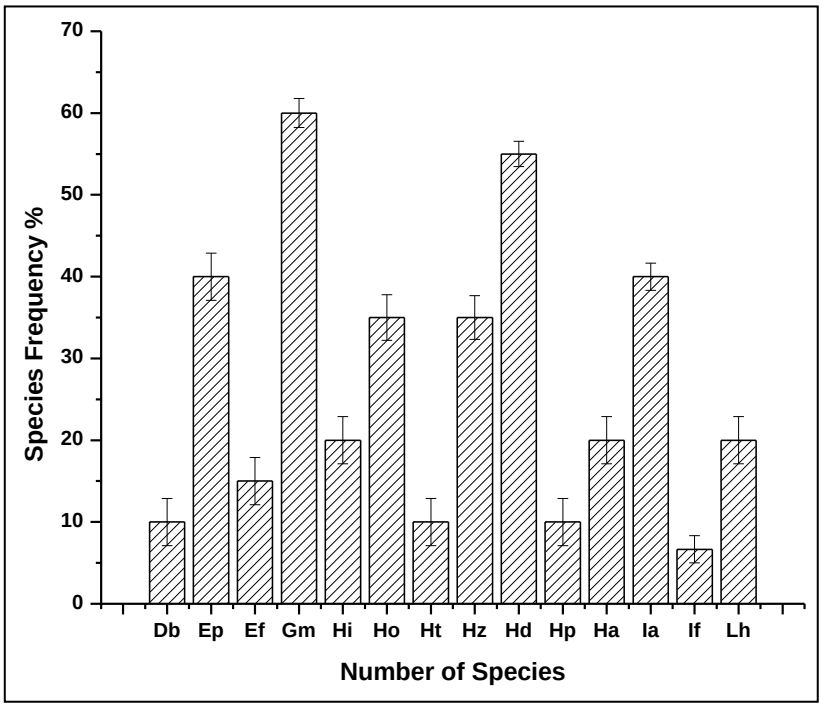


Aa-*Aeschynomene aspera*, **Ai**-*Aeschynomene indica*, **Ap**- *Alternanthera ficoidea*, **Aph**-*Alternanthera philoxeroides*, **As**-*Alternanthera sessilis*, **Aau**-*Ammannia auriculata*, **Ab**-*Ammannia baccifera*, **Bm**-*Bacopa monnieri*, **Bc**-*Bergia capensis*, **Ca**-*Centella asiatica*, **Cd**-*Ceratophyllum demersum*, **Cp**-*Coldenia procumbens*, **Dr**-*Dentella repens*, **Dj**-*Dopatrium junceum*.

Table 35: Aquatic and Marshy land Dicotyledons plant species **Frequency (%)** of the district Paschim Medinipur (Species no. **15-28** and species are arranged in alphabetically).

S.N.	Plant Names	Mean (Y)	Sd(yEr±)	Se(yEr±)	Min(Y)	Max(Y)	Range
15.	*Drosera burmannii*	10	5	2.88675	5	15	10
16.	*Eclipta prostrata*	40	5	2.88675	35	45	10
17.	*Enhydra fluctuans*	15	5	2.88675	10	20	10
18.	*Grangea maderaspatana*	60	10	5.7735	50	70	20
19.	*Heliotropium indicum*	20	5	2.88675	15	25	10
20.	*Heliotropium ovalifolium*	35	10	5.7735	25	45	20
21.	*Hydrocera triflora*	10	5	2.88675	5	15	10
22.	*Hydrolea zeylanica*	35	15	8.66025	20	50	30
23.	*Hygrophila difformis*	55	20	11.54701	35	75	40
24.	*Hygrophila polysperma*	10	5	2.88675	5	15	10
25.	*Hygrophila auriculata*	20	5	2.88675	15	25	10
26.	*Ipomoea aquatica*	40	15	8.66025	25	55	30
27.	*Ipomoea fistulosa*	6.66667	2.88675	1.66667	5	10	5
28.	*Limnophila heterophylla*	20	5	2.88675	15	25	10

Graph-36: Graphical representation of plant species **Frequency (%)** of Aquatic and Marshy Dicotyledons **(15-28)** of the district Paschim Medinipur.

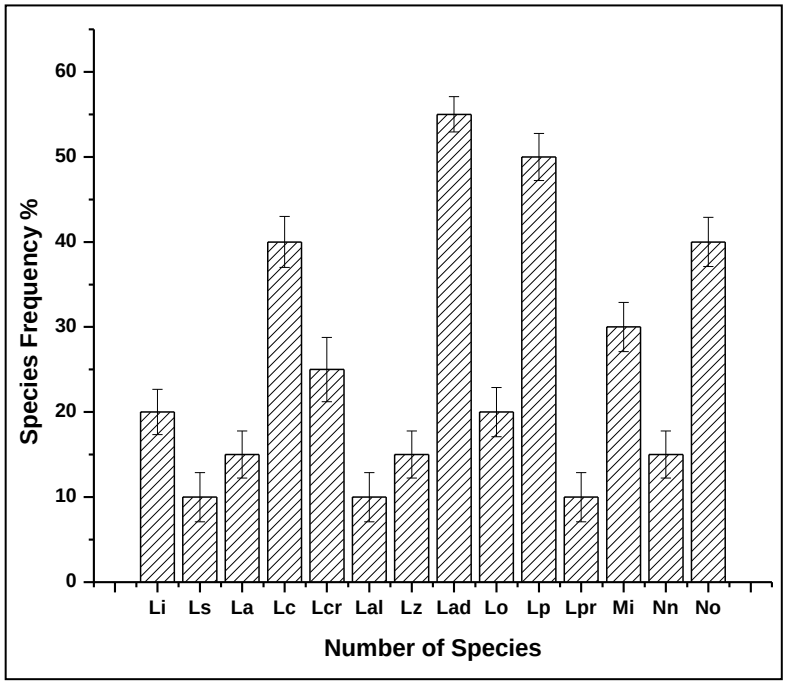


Db-*Drosera burmannii*, **Ep**-*Eclipta prostrata*, **Ef**-*Enhydra fluctuans*, **Gm**-*Grangea maderaspatana*, **Hi**-*Heliotropium indicum*, **Ho**-*Heliotropium ovalifolium*, **Ht**-*Hydrocera triflora*, **Hz**-*Hydrolea zeylanica*, **Hd**-*Hygrophila difformis*, **Hp**-*Hygrophila polysperma*, **Ha**-*Hygrophila auriculata*, **Ia**-*Ipomoea aquatica*, **If**-*Ipomoea fistulosa*, **Lh**-*Limnophila heterophylla*.

Table 36: Aquatic and Marshy land **Dicotyledons** plant species **Frequency (%)** of the district Paschim Medinipur (Species no. **29-42** and species are arranged in alphabetically).

S.N.	Plant Names	Mean (Y)	Sd(yEr±)	Se(yEr±)	Min(Y)	Max(Y)	Range
29.	*Limnophila indica*	20	15	8.66025	5	35	30
30.	*Limnophila sessiliflora*	10	5	2.88675	5	15	10
31.	*Lindernia antipoda*	15	10	5.7735	5	25	20
32.	*Lindernia ciliata*	40	8.66025	5	30	45	15
33.	*Lindernia crustacea*	25	10	5.7735	15	35	20
34.	*Lobelia alisnoides*	10	5	2.88675	5	15	10
35.	*Lobelia zeylanica*	15	10	5.7735	5	25	20
36.	*Ludwigia adscendens*	55	10	5.7735	45	65	20
37.	*Ludwigia octovalvis*	20	5	2.88675	15	25	10
38.	*Ludwigia perennis*	50	10	5.7735	40	60	20
39.	*Ludwigia prostrata*	10	5	2.88675	5	15	10
40.	*Myriophyllum indicum*	30	5	2.88675	25	35	10
41.	*Nelumbo nucifera*	15	10	5.7735	5	25	20
42.	*Neptunia oleracea*	40	5	2.88675	35	45	10

Graph-37: Graphical representation of plant species **Frequency (%)** of Aquatic and Marshy land Dicotyledons **(29-42)** of the district Paschim Medinipur.

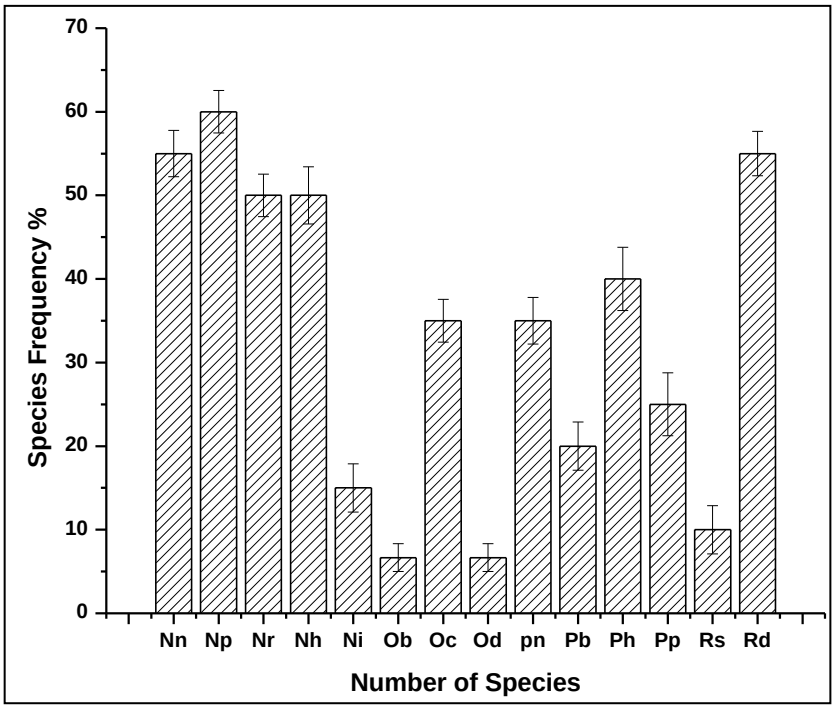


Li-*Limnophila indica*, **Ls**-*Limnophila sessiliflora*, **La**-*Lindernia antipoda*, **Lc**-*Lindernia ciliata*, **Lcr**-*Lindernia crustacea*, **Lal**- *Lobelia alisnoide*, **Lz**-*Lobelia zeylanica*, **Lad**-*Ludwigia adscendens*, **Lo**-*Ludwigia octovalvis*, **Lp**-*Ludwigia perennis*, **Lpr**-*Ludwigia prostrata*, **Mi**-*Myriophyllum indicum*, **Nn**-*Nelumbo nucifera*, **No**-*Neptunia oleracea*

Table 37: Aquatic and Marshy land **Dicotyledons** plant species **Frequency (%)** of the district Paschim Medinipur (Species no. **43-56** and species are arranged in alphabetically)**.**

S.N.	Plant Names	Mean (Y)	Sd(yEr±)	Se(yEr±)	Min(Y)	Max(Y)	Range
43.	*Nymphaea nouchali*	55	10	5.7735	45	65	20
44.	*Nymphaea pubescens*	60	20	11.54701	40	80	40
45.	*Nymphaea rubra*	50	20	11.54701	30	70	40
46.	*Nymphoides hydrophylla*	50	25	14.43376	25	75	50
47.	*Nymphoides indica*	15	5	2.88675	10	20	10
48.	*Oldenlandia brachypoda*	6.66667	2.88675	1.66667	5	10	5
49.	*Oldenlandia corymbosa*	35	20	11.54701	15	55	40
50.	*Oldenlandia diffusa*	6.66667	2.88675	1.66667	5	10	5
51.	*Phyla nodiflora*	35	10	5.7735	25	45	20
52.	*Persicaria orientalis*	20	5	2.88675	15	25	10
53.	*Persicaria hydropiper*	40	10	5.7735	30	50	20
54.	*Polygonum plebeium*	25	10	5.7735	15	35	20
55.	*Ranunculus sceleratus*	10	5	2.88675	5	15	10
56.	*Rotala densiflora*	55	15	8.66025	40	70	30

Graph-38: Graphical representation of plant species **Frequency (%)** of Aquatic and Marshy land Dicotyledons **(43-56)** of the district Paschim Medinipur.

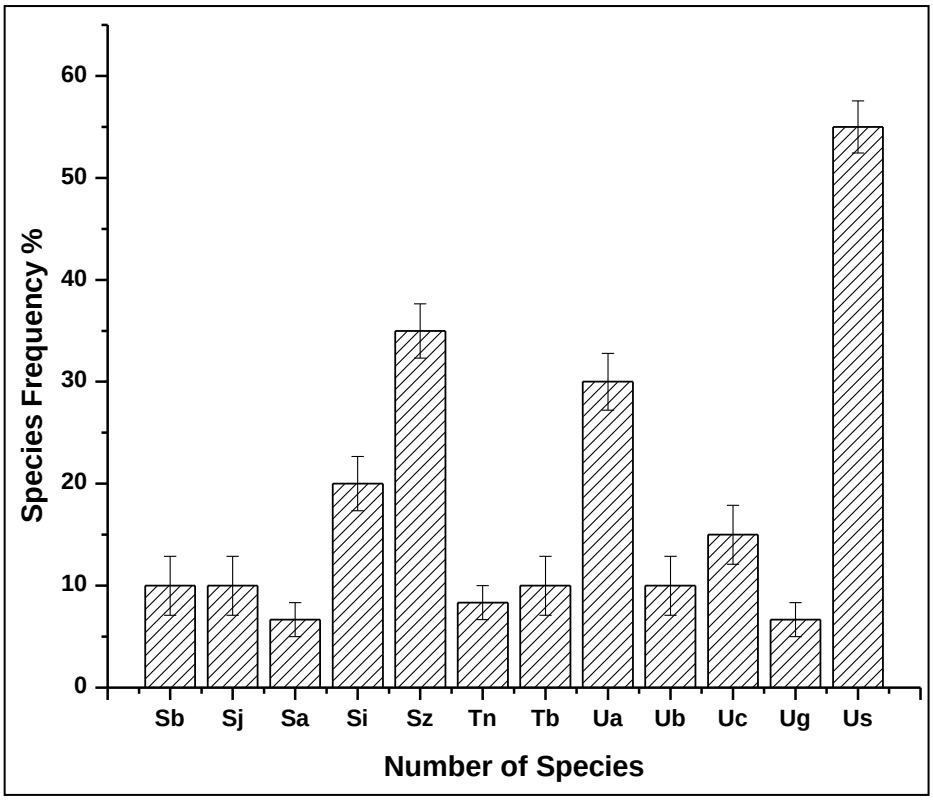


Nn-*Nymphaea nouchali*, **Np**-*Nymphaea pubescens*, **Nr**-*Nymphaea rubra*, **Nh**-*Nymphoides hydrophylla*, **Ni**-*Nymphoides indica*, **Ob**-*Oldenlandia brachypoda*, **Oc**-*Oldenlandia corymbosa*, **Od**-*Oldenlandia diffusa*,**Pn**-*Phyla nodiflora*, **Pb**- *Persicaria orientalis*, **Ph**-*Persicaria hydropiper*, **Pp**-*Polygonum plebeium*, **Rs**-*Ranunculus sceleratus*, **Rd**-*Rotala densiflora*.

Table 38: Aquatic and Marshy land **Dicotyledons** plant species **Frequency (%)** of the district Paschim Medinipur (Species no. **57-68** and species are arranged in alphabetically).

S.N.	Plant Names	Mean(Y)	Sd(yEr±)	Se(yEr±)	Min(Y)	Max(Y)	Range
57.	*Sesbania bispinosa*	10	5	2.88675	5	15	10
58.	*Sesbania javanica*	10	5	2.88675	5	15	10
59.	*Sphaeranthus africanus*	6.67	2.88675	1.66667	5	10	5
60.	*Sphaeranthus indicus*	20	15	8.66025	5	35	30
61.	*Sphenoclea zeylanica*	35	15	8.66025	20	50	30
62.	*Trapa natans*	8.34	2.88675	1.66667	5	10	5
63.	*Trapa natans* var. *bispinosa*	10	5	2.88675	5	15	10
64.	*Utriculari aaurea*	30	10	5.7735	20	40	20
65.	*Utricularia bifida*	10	5	2.88675	5	15	10
66.	*Utricularia caerulea*	15	5	2.88675	10	20	10
67.	*Utricularia gibba*	6.67	2.88675	1.66667	5	10	5
68.	*Utricularia stellaris*	55	20	11.54701	35	75	40

Graph-39: Graphical representation of plant species **Frequency (%)** of Aquatic and Marshy land Dicotyledons **(57-68)** of the district Paschim Medinipur.

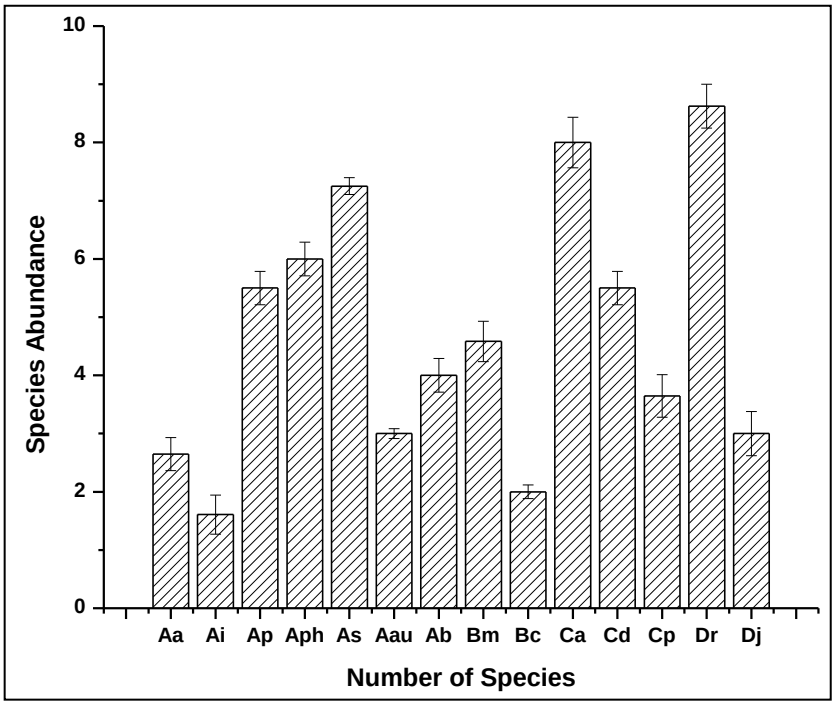


Sb-*Sesbania bispinosa*, **Sj**-*Sesbania javanica*, **Sa**-*Sphaeranthus africanus*, **Si**-*Sphaeranthus indicus*, **Sz**-*Sphenoclea zeylanica*, **Tn**-*Trapa natans*, **Tb**-*Trapa natans* var. *bispinosa*, **Ua**-*Utricularia aurea*, **Ub**-*Utricularia bifida*, **Uc**-*Utricularia caerulea*, **Ug**-*Utricularia gibba*, **Us**-*Utricularia stellaris*

Table 39: Aquatic and Marshy land **Dicotyledons** plant species **Abundance** of the district Paschim Medinipur (Species no. **1-14** and species are arranged in alphabetically).

S.N.	Plant Names	Mean (Y)	Sd(yEr±)	Se(yEr±)	Min(Y)	Max(Y)	Range
1.	*Aeschynomene aspera*	2.64667	0.83524	0.48223	1.8	3.47	1.67
2.	*Aeschynomeneindica*	1.609	0.58217	0.33612	1	2.16	1.16
3.	*Alternanthera ficoidea*	5.5	0.5	0.28868	5	6	1
4.	*Alternanthera philoxeroides*	6	0.5	0.28868	5.5	6.5	1
5.	*Alternanthera sessilis*	7.25	0.25	0.14434	7	7.5	0.5
6.	*Ammannia auriculata*	3	0.15	0.0866	2.85	3.15	0.3
7.	*Ammannia baccifera*	4	0.5	0.28868	3.5	4.5	1
8.	*Bacopa monnieri*	4.58333	0.94516	0.54569	3.85	5.65	1.8
9.	*Bergia capensis*	2	0.2	0.11547	1.8	2.2	0.4
10.	*Centella asiatica*	8	0.75	0.43301	7.25	8.75	1.5
11.	*Ceratophyllum demersum*	5.5	0.5	0.28868	5	6	1
12.	*Coldenia procumbens*	3.64667	0.63532	0.3668	3	4.27	1.27
13.	*Dentella repens*	8.625	1	0.57735	7.625	9.625	2
14.	*Dopatrium junceum*	3	1	0.57735	2	4	2

Graph-40: Graphical representation of plant species **Abundance** of Aquatic and Marshy land Dicotyledons **(1-14)** of the district Paschim Medinipur.

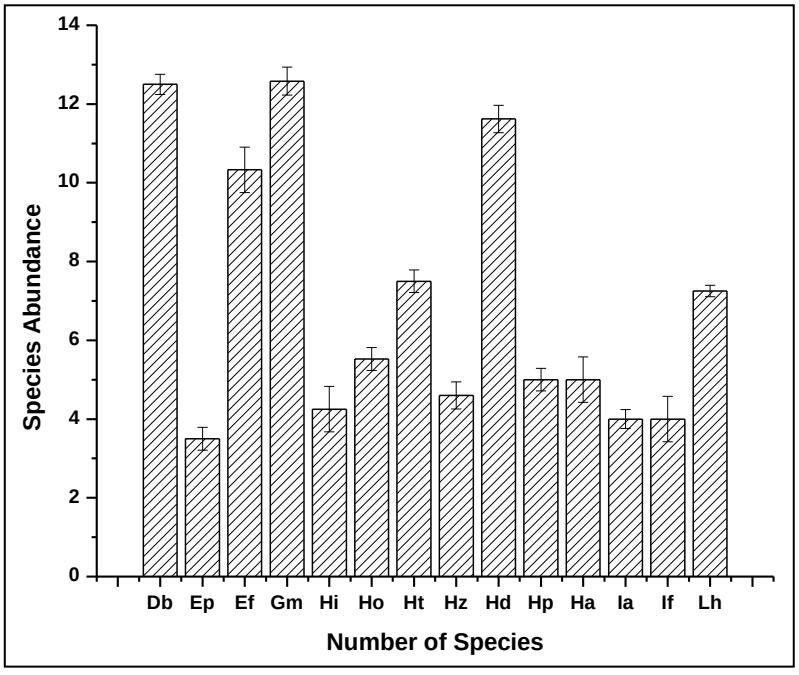


Aa-*Aeschynomene aspera*, **Ai**-*Aeschynomene indica*, **Ap**- *Alternanthera ficoidea*, **Aph**-*Alternanthera philoxeroides*, **As**-*Alternanthera sessilis*, **Aau**-*Ammannia auriculata*, **Ab**-*Ammannia baccifera*, **Bm**-*Bacopa monnieri*, **Bc**-*Bergia capensis*, **Ca**-*Centella asiatica*, **Cd**-*Ceratophyllum demersum*, **Cp**-*Coldenia procumbens*, **Dr**-*Dentella repens*, **Dj**-*Dopatrium junceum*

Table 40: Aquatic and Marshy land **Dicotyledons** plant species **Abundance** of the district Paschim Medinipur (Species no. **15-28** and species are arranged in alphabetically).

S.N.	Plant Names	Mean (Y)	Sd(yEr±)	Se(yEr±)	Min(Y)	Max(Y)	Range
15.	*Drosera burmannii*	12.5	2	1.1547	10.5	14.5	4
16.	*Eclipta prostrata*	3.5	0.5	0.28868	3	4	1
17.	*Enhydra fluctuans*	10.33133	1	0.57735	9.33	11.33	2
18.	*Grangea maderaspatana*	12.581	2	1.1547	10.58	14.58	4
19.	*Heliotropium indicum*	4.25	1	0.57735	3.25	5.25	2
20.	*Heliotropium ovalifolium*	5.52367	0.50168	0.28964	5	6	1
21.	*Hydrocera triflora*	7.5	0.5	0.28868	7	8	1
22.	*Hydrolea zeylanica*	4.6	0.6	0.34641	4	5.2	1.2
23.	*Hygrophila difformis*	11.62233	0.60125	0.34713	11	12.2	1.2
24.	*Hygrophila polysperma*	5	0.5	0.28868	4.5	5.5	1
25.	*Hygrophila auriculata*	5	1	0.57735	4	6	2
26.	*Ipomoea aquatica*	4	0.42	0.24249	3.58	4.42	0.84
27.	*Ipomoea fistulosa*	4	1	0.57735	3	5	2
28.	*Limnophila heterophylla*	7.25	0.25	0.14434	7	7.5	0.5

Graph-41: Graphical representation of plant species **Abundance** of Aquatic and Marshy land Dicotyledons **(14-28)** of the district Paschim Medinipur.

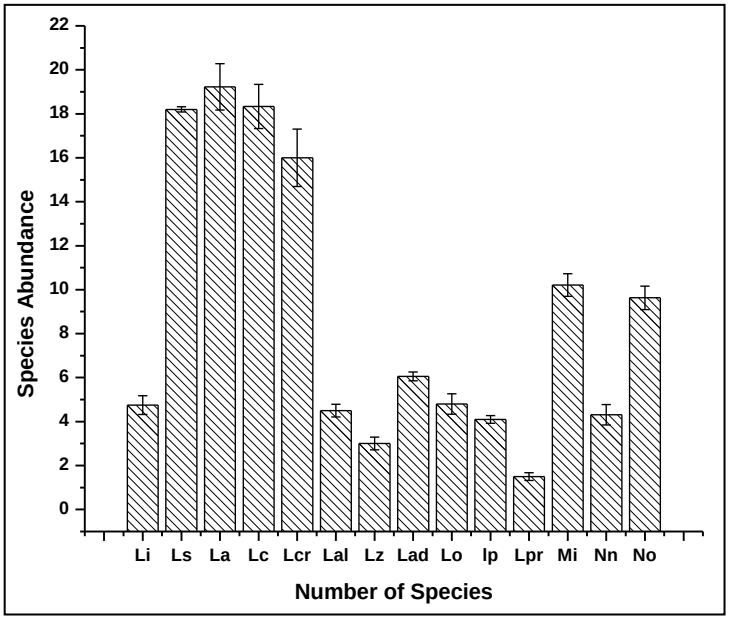


Db-*Drosera burmannii*, **Ep**-*Eclipta prostrata*, **Ef**-*Enhydra fluctuans*, **Gm**-*Grangea maderaspatana*, **Hi**-*Heliotropium indicum*, **Ho**-*Heliotropium ovalifolium*, **Ht**-*Hydrocera triflora*, **Hz**-*Hydrolea zeylanica*, **Hd**-*Hygrophila difformis*, **Hp**-*Hygrophila polysperma*, **Ha**-*Hygrophila auriculata*, **Ia**-*Ipomoea aquatica*, **If**-*Ipomoea fistulosa*, **Lh**-*Limnophila heterophylla*

Table 41: Aquatic and Marshy land Dicotyledons Plant species **Abundance** of the district Paschim Medinipur (Species no. **29-42** and species are arranged in alphabetically).

S.N.	Plant Names	Mean (Y)	Sd(yEr±)	Se(yEr±)	Min(Y)	Max(Y)	Range
29.	*Limnophila indica*	4.75	0.75	0.43301	4	5.5	1.5
30.	*Limnophila sessiliflora*	18.2	0.2	0.11547	18	18.4	0.4
31.	*Lindernia antipoda*	19.22267	2.16914	1.25236	17	21.334	4.334
32.	*Lindernia ciliata*	18.33333	2.25462	1.30171	16	20.5	4.5
33.	*Lindernia crustacea*	16	4	2.3094	12	20	8
34.	*Lobelia alisnoides*	4.5	0.5	0.28868	4	5	1
35.	*Lobelia zeylanica*	3	0.5	0.28868	2.5	3.5	1
36.	*Ludwigia adscendens*	6.06	0.34598	0.19975	5.7	6.39	0.69
37.	*Ludwigia octovalvis*	4.8	0.8	0.46188	4	5.6	1.6
38.	*Ludwigia perennis*	4.1	0.3	0.17321	3.8	4.4	0.6
39.	*Ludwigia prostrata*	1.5	0.3	0.17321	1.2	1.8	0.6
40.	*Myriophyllum indicum*	10.21	0.9	0.51962	9.31	11.11	1.8
41.	*Nelumbo nucifera*	4.31467	0.80517	0.46487	3.5	5.11	1.61
42.	*Neptunia oleracea*	9.62833	0.93	0.53694	8.7	10.56	1.86

Graph-42: Graphical representation of plant species **Abundance** of Aquatic and Marshy land Dicotyledons **(29-42)** of the district Paschim Medinipur.

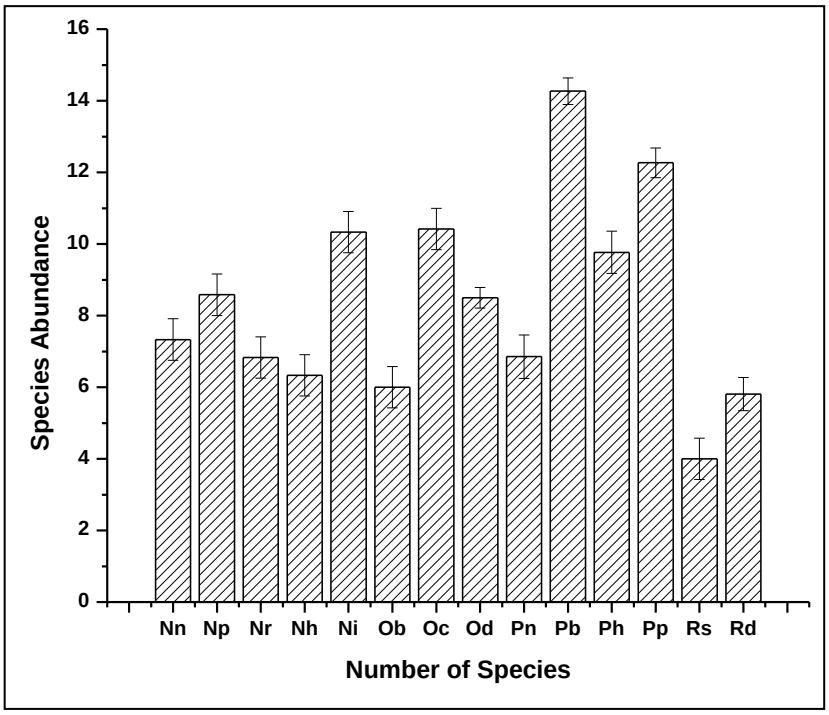


Li-*Limnophila indica*, **Ls**-*Limnophila sessiliflora*, **La**-*Lindernia antipoda*, **Lc**-*Lindernia ciliata*, **Lcr**-*Lindernia crustacea*, **Lal**- *Lobelia alisnoides*, **Lz**-*Lobelia zeylanica*, **Lad**-*Ludwigia adscendens*, **Lo**-*Ludwigia octovalvis*, **Lp**-*Ludwigia perennis*, **Lpr**-*Ludwigia prostrata*, **Mi**-*Myriophyllum indicum*, **Nn**-*Nelumbo nucifera*, **No**-*Neptunia oleracea*

Table 42: Aquatic and Marshy land **Dicotyledons** plant species **Abundance** of the district Paschim Medinipur (Species no. **43-56** and species are arranged in alphabetically).

S.N.	Plant Names	Mean (Y)	Sd(yEr±)	Se(yEr±)	Min(Y)	Max(Y)	Range
43.	*Nymphaea nouchali*	7.33133	1	0.57735	6.33	8.33	2
44.	*Nymphaea pubescens*	8.581	1	0.57735	7.58	9.58	2
45.	*Nymphaea rubra*	6.83133	1	0.57735	5.83	7.83	2
46.	*Nymphoides hydrophylla*	6.33133	1	0.57735	5.33	7.33	2
47.	*Nymphoides indica*	10.33133	1	0.57735	9.33	11.33	2
48.	*Oldenlandia brachypoda*	6	1	0.57735	5	7	2
49.	*Oldenlandia corymbosa*	10.42	1	0.57735	9.42	11.42	2
50.	*Oldenlandia diffusa*	8.5	0.5	0.28868	8	9	1
51.	*Phyla nodiflora*	6.85233	1.05001	0.60622	5.8	7.9	2.1
52.	*Persicaria orientalis*	14.26667	2.02505	1.16916	12.25	16.3	4.05
53.	*Persicaria hydropiper*	9.76667	1.0251	0.59184	8.75	10.8	2.05
54.	*Polygonum plebeium*	12.26667	2.10079	1.21289	10.2	14.4	4.2
55.	*Ranunculus sceleratus*	4	1	0.57735	3	5	2
56.	*Rotala densiflora*	5.806	0.80007	0.46192	5	6.6	1.6

Graph-43: Graphical representation of plant species **Abundance** of Aquatic and Marshy land Dicotyledons **(43-56)** of the district Paschim Medinipur.

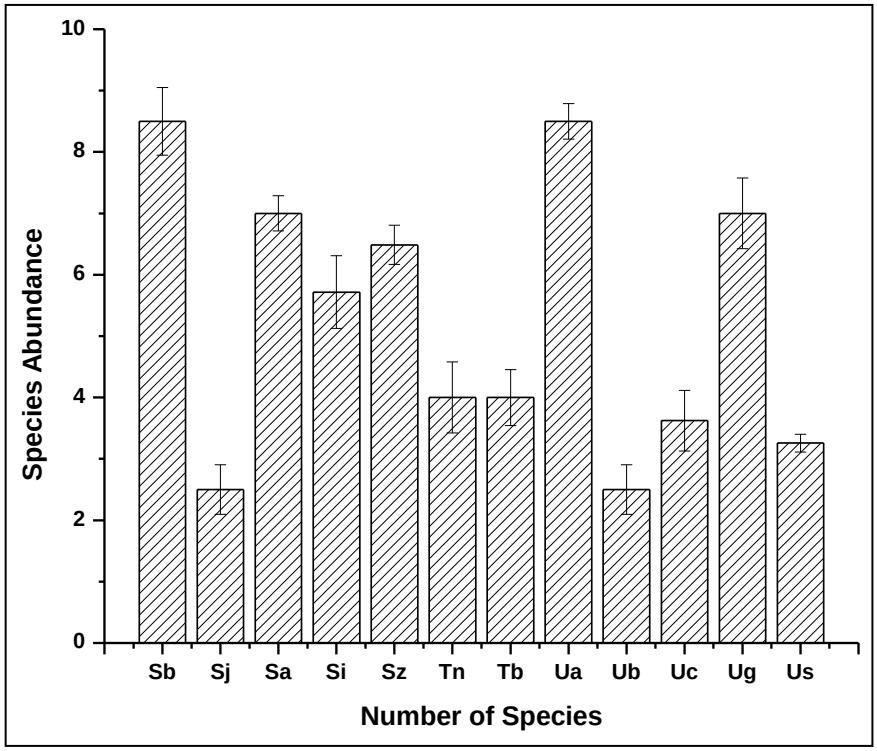


Nn-*Nymphaea nouchali*, **Np**-*Nymphaea pubescens*, **Nr**-*Nymphaea rubra*, **Nh**-*Nymphoides hydrophylla*, **Ni**-*Nymphoides indica*, **Ob**-*Oldenlandia brachypoda*, **Oc**-*Oldenlandia corymbosa*, **Od**-*Oldenlandia diffusa*, **Pn**-*Phyla nodiflora*, **Pb**- *Persicaria orientalis*, **Ph**- *Persicaria hydropiper*, **Pp**-*Polygonum plebeium*, **Rs**-*Ranunculus sceleratus*, **Rd**-*Rotala densiflora*

Table 43: Aquatic and marshy land **Dicotyledons** plant species **Abundance** of the district Paschim Medinipur (Species no. **57-68** and species are arranged in alphabetically).

S.N.	Plant Names	Mean (Y)	Sd(yEr±)	Se(yEr±)	Min(Y)	Max(Y)	Range
57.	*Sesbania bispinosa*	8.5	0.50744	0.55056	8	9	1
58.	*Sesbania javanica*	2.5	0.34034	0.40415	2	3	1
59.	*Sphaeranthus africanus*	7	0.36056	0.28868	6.5	7.5	1
60.	*Sphaeranthus indicus*	5.71667	0.25166	0.59302	5	6.4	1.4
61.	*Sphenoclea zeylanica*	6.48567	0.31225	0.31959	5.9	6.9	1
62.	*Trapa natans*	4	0.55	0.57735	3	5	2
63.	*Trapa natans* var. *bispinosa*	4	0.31225	0.4547	3.5	4.5	1
64.	*Utricularia aurea*	8.5	0.34034	0.28868	7.2	9.8	2.6
65.	*Utricularia bifida*	2.5	0.35473	0.40415	1.9	3.1	1.2
66.	*Utricularia caerulea*	3.62233	0.42525	0.49318	2.9	4.3	1.4
67.	*Utricularia gibba*	7	0.35473	0.57735	6.8	7.2	4
68.	*Utricularia stellaris*	3.25733	0.15275	0.14452	2.9	3.5	0.6

Graph-44: Graphical representation of plant species **Abundance** of aquatic and marshy land Dicotyledons **(57-68)** of the district Paschim Medinipur.



Sb-*Sesbania bispinosa*, **Sj**-*Sesbania javanica*, **Sa**-*Sphaeranthus africanus*, **Si**-*Sphaeranthus indicus*, **Sz**-*Sphenoclea zeylanica*, **Tn**-*Trapa natans*, **Tb**-*Trapa natans* var. *bispinosa*, **Ua**-*Utricularia aurea*, **Ub**-*Utricularia bifida*, **Uc**-*Utricularia caerulea*, **Ug**-*Utricularia gibba*, **Us**-*Utricularia stellaris*

6.2. Plant descriptions with keys to species.

6.2.1. Monocotyledonous plant descriptions with their flowering, fruiting, ecological notes and collection sites.

ALISMATACEAE: 4 genera, 5 species

Limnophyton obtusifolium (L.) Miq.: Figure 6.

Plants hold with milky latex. Leaves erect; petioles up 1.5 m long, leaf blades ovate to sagittate or triangular, 5-25 (-35) cm long, 4-15 (-20) cm wide, glandular, with stellate hairs; lobes spreading, tapering, many nerved. Scapes 1-3 m long, stout, angled. Inflorescences with 2-7 whorls of flowers; the lowest whorls with up to 15 flowers, sometimes branched and bearing female or bisexual flowers; upper whorls mostly with male flowers. Petals white, obovate, larger than the sepals. Stamens 6. Carpels 10-30, crowded a relatively small receptacle; style ventral, forming short beak. Nutlets reticulately ribbed and swollen, ± 4 mm long, with 2 lateral gas-filled chambers.

Figure 6. *Limnophyton obtusifolium*: **a,** mature leaf (6 cm); **b,** inflorescence (6 cm); **c,** fruits (1.5 cm); **d,** nutlet viewed from the back and side (2 mm); **e,** plant in the field with inflorescence (inset); **g,** stem and root; **f,** stem with leaf joint in the field.

Flowering and Fruiting: April to October.

Field Collections: Manikpur, Palsa at Kharagpur; Baliberia at Nayagram; Ashari at Debra.

Ecological Notes: Annual or perennial, plants are common in freshwater pools, ditches, canals, ponds and other stagnant water.

Sagittaria: 2 species

Key to species

1. Sepals in fruit reflexed; pedicels in fruit erect, ascending or spreading, not thickened; petals entirely white, without a purple blotch at the base ***S. sagittifolia***

1. Sepals in fruit appressed or spreading never reflexed; pedicels *in* fruit recurved and thickened; petals white, with a purple blotch at the base ***S. guayanensis***

Sagittaria guayanensis Kunth: Figure 7.

Stolons are absent. Mature leaves differentiated into petiole and blade; petioles flexible up to 50 cm long; the blades floating, heart-shaped, 1.5-8 cm long, nearly as long as wide, obtuse or acute at the tips; the lobes 1-3 cm long with obtuse or acute tips; emergent leaves never develop. Scapes erect or floating, up to 45 cm long are bearing 3-5 whorls of flowers. Bract is somewhat united at the base, 6-20 mm long, 3-8 mm wide. Flowers are usually bisexual or male or rarely female. Pedicels of the bisexual or female flowers, 1.5-4 cm long, thickened and recurved in fruit, of male flowers 2- 6.5 cm long, filiform and deciduous. Sepals are triangular, 1-1.5 cm long, appressed in bisexual flowers. Petals are white usually with a purple blotch at the base, as long as or longer than the sepals. Stamens are 6-9 in bisexual flowers, 9-12 in male flowers. Aggregate fruit shape in globose, 1.2-1.5 cm in diameter. Nutlets flattened and winged, 2.7-4.5 mm long, 1. 8-3.5 mm wide, the wings jagged or toothed to sometimes almost spiny.

Flowering and Fruiting: June to October.

Ecological Notes: Annual or perhaps sometimes perennial. Found in shallow water in tanks and at the edges of ditches and canals in slowly flowing water.

Field Collections: Kechenda at Jhargram; Kakrajhor at Binpur; Dhaneswarpur at Pingla; Changual at kharagpur; Bhadutala at Midnapore sadar.

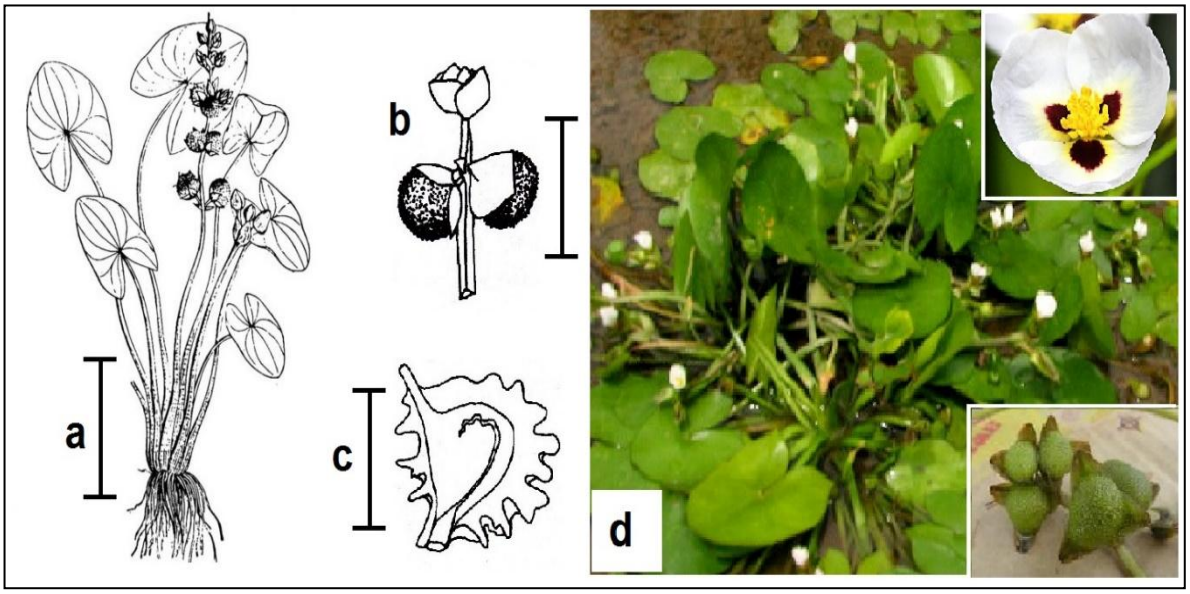


Figure 7. *Sagittaria guayanensis*: **a,** flowering plant (4 cm); **b,** fruiting heads (1 cm); **c,** seed (1 mm); **d,** plant with flower (inset up) and fruiting head (inset down).

Sagittaria sagittifolia L.: Figure 8.

Vernacular name: Chhota Kut

Stolons developing corms or tubers. Mature leaves differentiated into petiole and blade; petioles erect (20-) 50-80 (-120) cm long; the blades emergent, sagittate, 3-25 mm long, 0.4-6 cm wide, acute at the tips, the lobes always divergent with acute apices. Scapes erect, 30-100 cm tall, bearing 2-10 whorls of flowers, usually simple. Bracts somewhat united at the base, 3-15 mm long. Flowers usually unisexual. Pedicels of the female flowers 0.5-1.5 cm long, erect or spreading and not thickened in fruit; pedicels of male flowers longer, filiform and deciduous. Sepals triangular to ovate, 4-9 mm long, reflexed in fruit. Petals white, without a

purple blotch at the base, 10-15 mm long, 14-20 mm wide, ± twice as long as the petals. Stamens numerous; filaments glabrous, 1-2 mm long, yellow, anthers yellow. Aggregate fruit shape in globose, 1-2 cm in diameter. Nutlets flattened, obovate, 4-5.5 mm long, 2.5-3.5 (-5) mm wide, the faces unadorned; the apical beak erect, 0.2-0.8 mm long.

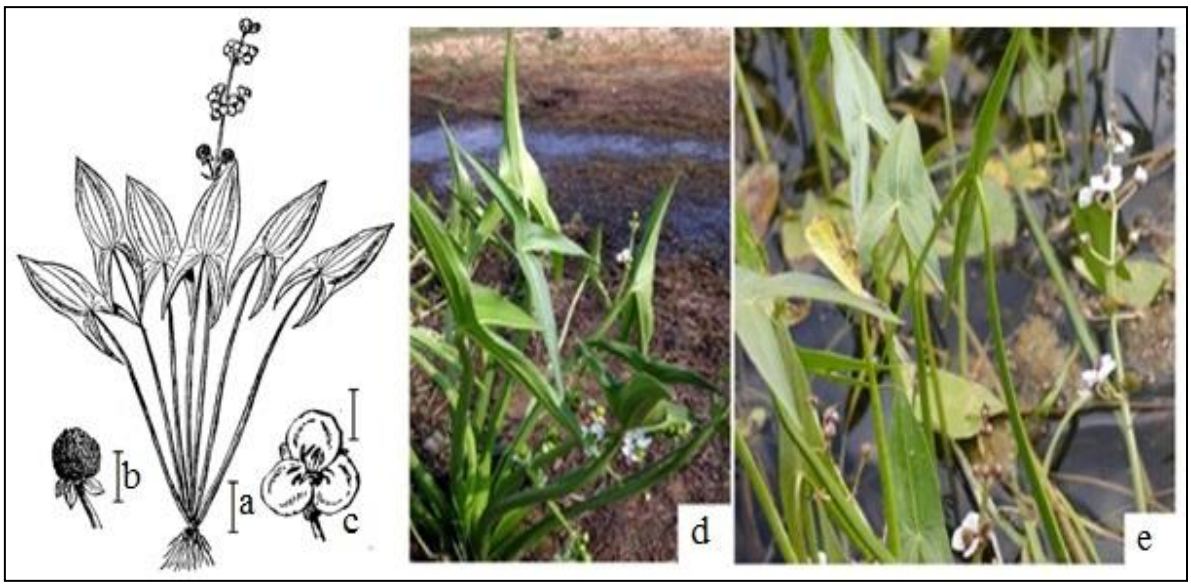


Figure 8. *Sagittaria sagittifolia*: **a,** whole plant with inflorescence (8cm); **b,** fruiting head (1cm); **c,** flower (1mm); **d,** whole flowering plant in the field; **e,** plant shoot with inflorescence in water field.

Flowering and Fruiting: November to March.

Ecological Notes: Perennial, common in rice fields and ditches.

Field Collections: Kansai River, Mohanpur; Bakultala near Daspur; Hatibari at Gopiballavpur.

Caldesia parnassifolia (L.) Parl.: Figure 9.

Petioles up to 25 (-50) cm long; leaf blades submerged or floating, leathery, elliptical to suborbicular or reniform, (2-) 5-8 (-12) cm long, (2-) 4-8 (-18) cm wide, with 11-15 (-17) veins, the transverse secondary veins 0.3-0.5 mm apart, connecting the main veins at ±60, base cuneate to cordate with rounded lobes. Bracts oblong-lanceolate up to 1 cm long. Scapes

30-100 cm long; panicle compound orrarely simple; pedicels 1.5-4 cm long. Flowers in whorls of 3 sometimes proliferating. Sepals ovate, 3.5-4.5 mm long, erect or spreading in fruit. Petals ovate-lanceolate and 4-6 mm long. Nutlets 5-8, ellipsoid, weakly flattened, 2-4 mm long, 1.5-2.5 mm wide, dorsally 3- to 5- ribbed, the ribs smooth; style sub-terminal persistent forming an awn in fruit.

Flowering and Fruiting: July to January

Ecological Notes: Perennial or sometimes annual, usually in permanent shallow water, particularly along the margin, lakes, on river banks and in swamps.

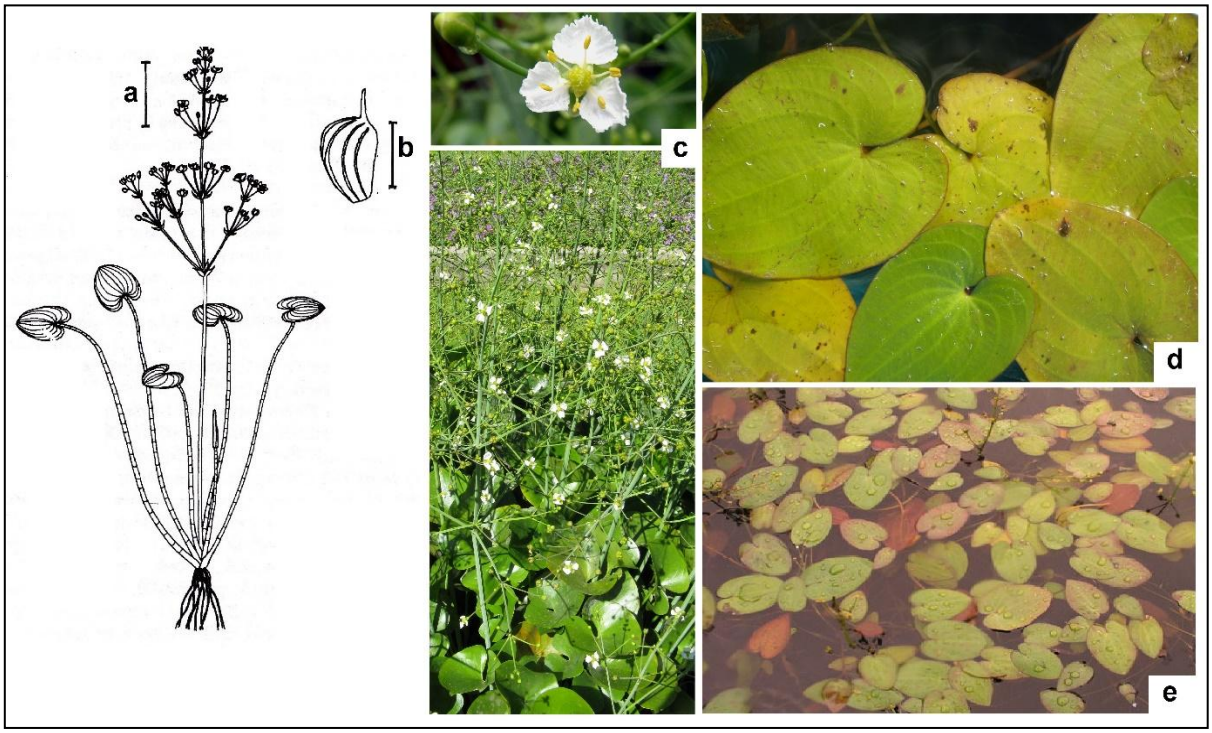


Figure 9. *Caldesia parnassifolia:* **a,** flowering plant (1cm); **b,** nutlet (1 mm); **c,** flowering shoots; **d,** plant inflorescence with flower (inset up); **d,** floating leaves; **e,** floating plant with inflorescence at field.

Field Collections: Manikpur at Kharagpur, Turka at Mohanpur, Antla at Debra Balichak at Malighati at Debra, Kharika at Sabong and Homgarh at Gorbeta.

Butomopsis latifolia (D. Don) Kunth: Figure 10.

Leaves radical, erect; petioles up to 20 cm or more long; leaf blades lanceolate to oblanceolate, 3-12 (-15) cm long, 1.5-3.5 (-5) cm wide, cuneate at base, acute or obtuse at apex, tipped by a hard blunt mucro; Inflorescence borne above the leaves, of 1 or 2 whorls. Petals white, deliquescent. Stamens ± 9, all fertile. Carpels 4-9, united at the base. Fruit 9-12 mm long exceeding the sepals, seeds horseshoe-shaped, less than 0.5 mm long, minutely warted.

Flowering and Fruiting: November to March

Ecological Notes: Common in the wet places and rice fields. Annual, in shallow water, in marshes and in seasonally inundated places.

Field Collections: Kechenda at Jhargram, Saria at Gopiballavpur.

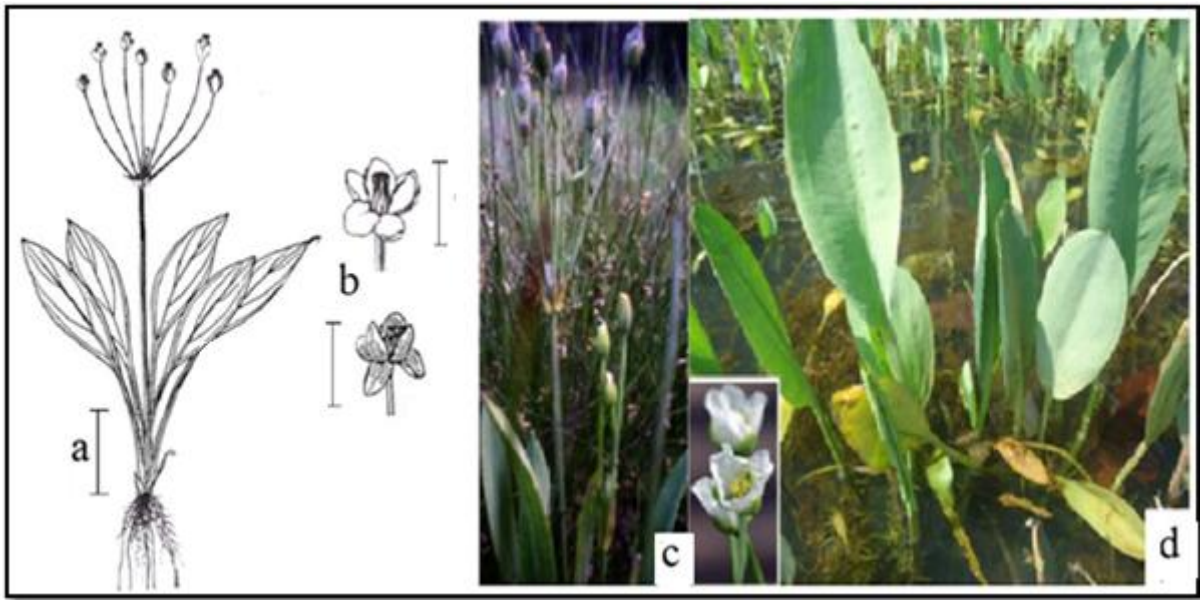


Figure 10. *Butomopsis latifolia*: **a,** flowering plant (2 cm); **b,** flower (4 mm); **c,** flowering plant; **d,** plant in field with flower (inside).

AMARYLLIDACEAE: 1 genus, 1 species

Crinum asiaticum L.: Figure 11.

Vernacular name: Bara Kansur

Herbs with tunicated, bulbous rootstocks with fusiform, stoloniferous base; bulbs up to 10 cm in diameter. Leaves basal, linear, thick and fleshy, inrolled, 30-60 cm or more long, 3-6 cm wide, with an obscurely scabrid margin. Inflorescence an umbel sub tended by a thick involucre which splits into 2 spathes. Flowers 6-12, erect at anthesis. Bracts up to 8 cm long. Perianth inserted above the ovary, tubular at base, divided into 6 segments above, without a corona, showy, white tinged with red, the tube 6-13 cm long, the lobes ± 8 cm long. Stamens 6, inserted at the mouth of the tube opposite the segments; filaments free to the base, bright red or purple, two-thirds to three-quarters as long as the perianth lobes; anthers versatile, ± 1.3 cm long. Ovary inferior, sessile or sub-sessile, 3-locular; fruit a capsule with irregular dehiscence; ovules few. Styles purple. Capsules up to ± 5 cm in diameter.

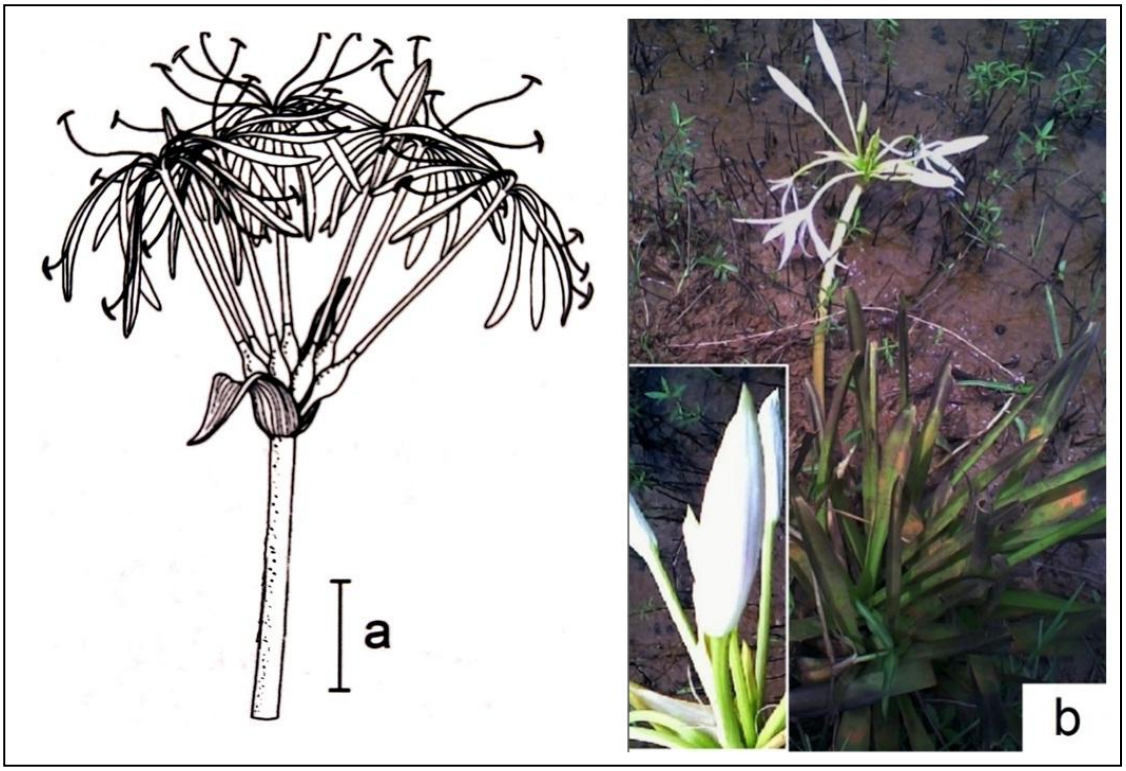


Figure 11. *Crinum asiaticum*: **a,** flowering shoot (3 cm); **b,** whole plant with inflorescence in field.

Flowering and Fruiting: April to November.

Ecological Notes: Mostly is a garden escape and along the bank of ponds, Jheels or roadside ditches.

Field Collections: Lutunia at Sabong, Rohini at Sankrile, Baliberia at Nayagram, Daspur at Ghatal, Anandapur at Keshpur, Hoomgorh at Gorhbeta and Sonakonia at Dantan, Sankowa at Kharagpur-II.

APONOGETONACEAE: 1 genus, 2 species

Aponogeton: 2 species

Key to species

1. Follicles with 2 seeds, up to 12 (-18) mm long, up to 5 (-7) mm wide, smooth or with irregular excrescences, with a short terminal beak; seeds with a simple coat ***A. crispus***

1. Follicles with ± 8 seeds, up to 4 mm long, up to 2.25 mm wide, smooth, with a very long (up to 1 mm) terminal beak; seeds with a double coat ***A. natans***

Aponogeton crispus Thunb.: Figure 12.

Vernacular name: Ghenchu

Tuber obovoid, up to 5 cm in diameter. Submerged leaves petiolate; petioles 10-35 cm long; blades linear to narrowly ovate, 10-25 cm long, 0.8-4.2 cm wide, usually more than two and a half times as long as wide, flexible, base and tip cuneate or rounded, margins undulate, midrib wide with 2-4 parallel veins on each side. Floating leaves occasionally absent; blades lanceo-late to ovate, up to 20 cm long, up to 5 cm wide, base rounded or cordate, tip rounded or cuneate, midrib wide, with 7-11 secondary veins, Inflorescence a single spike, up to 13 cm long; spathe caducous, up to 25 mm long. Flowers bisexual, turned in all directions. Perianth segments 2, petal-like, white, pink or pale violet, up to 2.25 mm long, up to 1.75 mm wide. Filaments white; anthers violet. Ovaries 3; follicles 2-seeded, up to 12 (-18) mm long, up to 5 (-7) mm wide (± twice as long as wide), smooth or with irregular excrescences, with a short

terminal beak. Seeds with a simple coat; germinating embryo cylindrical, at most two times as long as thick, with a wide, longitudinal groove.

Flowering and Fruiting: July to January.

Ecological Notes: Perennial, in permanent and temporary water in ponds, tanks and lakes, common to all the ponds, pools, jheels and roadside ditches.

Field Collections: Hatihalka and Khalsuli at Midnapore Sadar, Basantapur at Debra, Dujipur at Pingla, Asuiand Sumitrapurat Gopiballavpur.

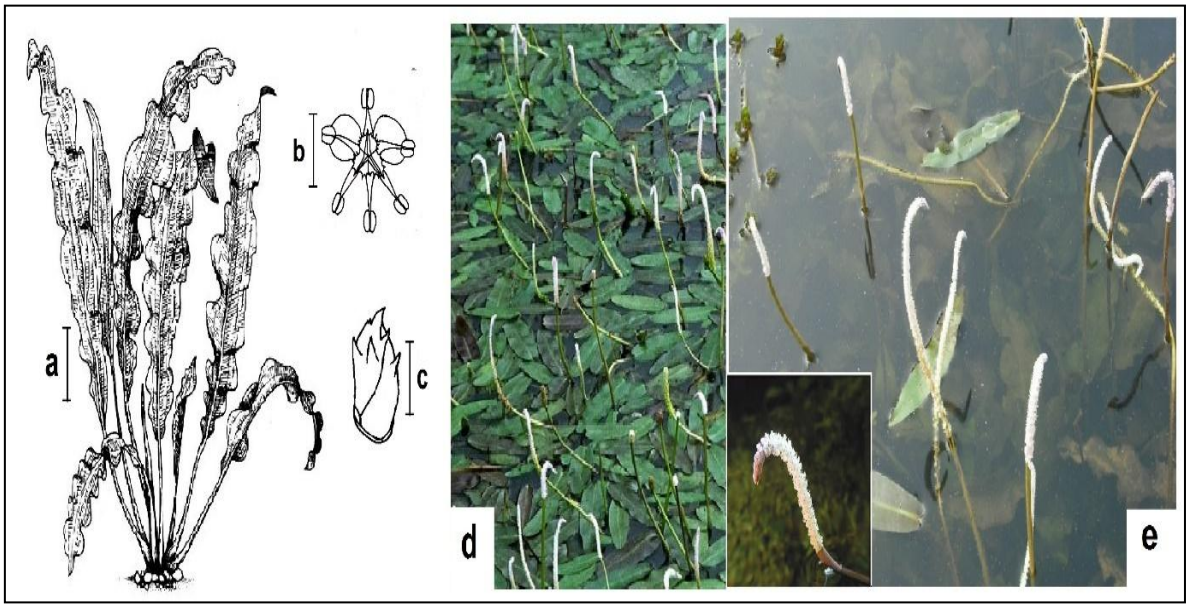


Figure 12. *Aponogeton crispus*: **a,** plant (5 cm); **b,** flower (2 mm); **c,** fruit (2 mm); **d,** plant with inflorescence in water; **e,** inflorescence with flower during anthesis (inset).

Aponogeton natans (L.) Engl. & K.: Figure 13.

Vernacular name: Ghenchu

Tuber is up to 2 cm in diameter. Submerged leaves peliolate; petioles up to ± 5 cm long; blades are lanceolate, up to 6.5 cm long, up to 1.5 cm wide, at base and tip cuneate, midrib wide with 2-3 parallel veins on each side. Floating leaves are up to 11.5 cm long and 3 cm wide, at base cordate, at tip cuneate, with 5 or 7 secondary veins. Inflorescence a single spike, up to 7 cm long, elongating in fruit; spathe caducous, up to 15 mm long. Flowers bisexual,

turned in all directions. Perianth segments 2, petal-like, white, pink or purple, spathulate, 1.5—2 mm long, 0.5-1 mm wide. Filaments are white; anthers yellow. Ovaries 3, follicles with ±8 seeds, up to 4 mm long, up to 2.25 mm wide, with a very long terminal beak (up to I mm). Seeds formed with a double coat.

Flowering and Fruiting: July to January.

Ecological Notes: Perennial, gregarious in the village ponds, pools and roadside ditches. Mostly in temporary ponds, rice fields marshes.

Field Collections: Belar and Asti at Pingla, Chatinasol at Nayagram, Dasagram at sabong.

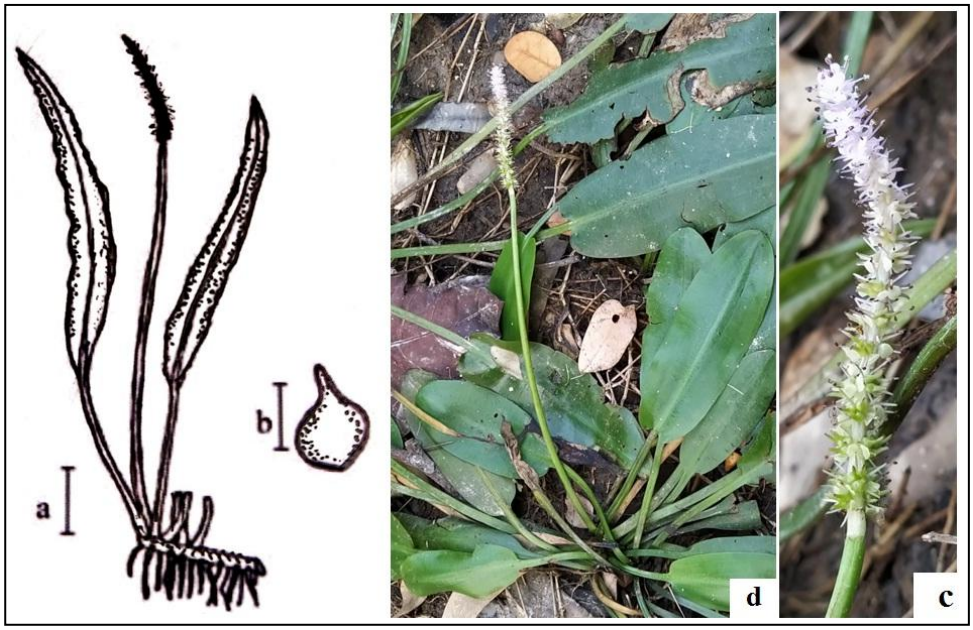


Figure 13. *Aponogeton natans*: **a,** plant (6cm); **b**, fruit (7mm); **c**, inflorescence; **d**, plant in field.

ARACEAE: 2 genera, 2 species

Colocasia esculenta (L.) Schott: Figure 14

Vernacular name: Kachu

Rhizomes tuberous, starch-filled, sometimes developing. Stems thick, up to 1m high. Petioles up to 1(-2)m long; blades peltate for 3 cm or more, ovate with a cordate base to sagittate in outline, up to 40 cm long and 30 cm wide. Inflorescences shorter than the petioles. Spathes ovate-lanceolate, constricted below the middle, up to 35 cm long, green below, bright yellow to orange above. Spadix up to 20 cm long; female flowers on the lower 2.5-4 cm, sterile for 1-1.5 cm and male for 3-4 cm, with an apical appendix 2-4 cm long (absent in some cultivated races). Perianth absent. Stamens united into a peltate mass (synandrium). Ovary 1-locular; ovules numerous, with parietal placentation; style short. Berries oblong to obconic, enclosed in the persistent tube of the spathe.

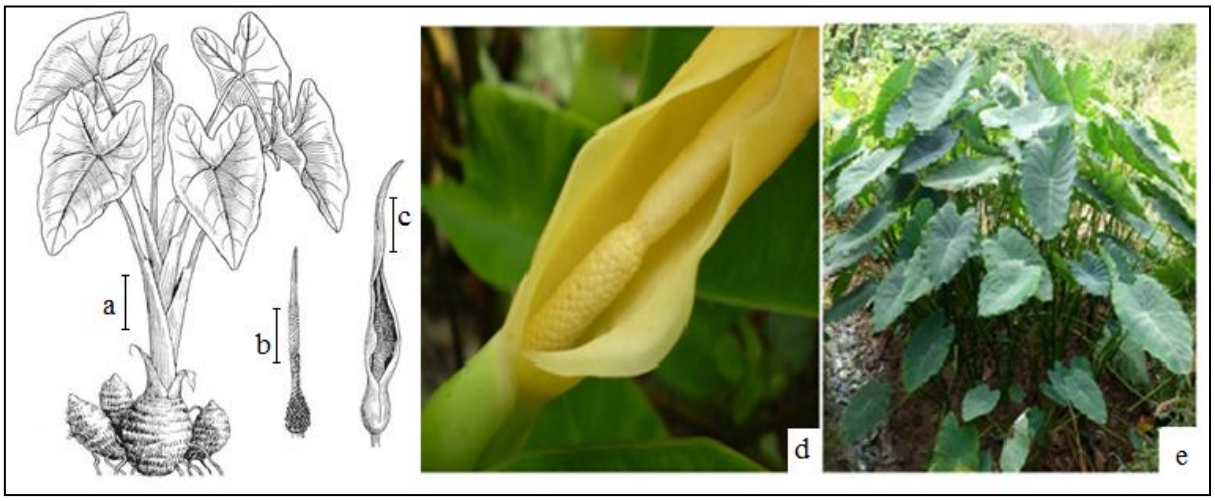


Figure 14. *Colocasia esculenta*: **a,** habit (20 cm); **b,** spadix without spathe (2cm); **c,** spathe and spadix (4 cm); **d,** spathe and spadix; **e,** habit in field.

Flowering and Fruiting: May to September.

Ecological Notes: Perennial, gregariously grow on the roadsides waste lands, canal sides or moist waste places; prefer damps soils or almost aquatic habitat.

Field Collections: Adasimla, Kharika, Laro, Jhikuria and Bonai at Sabong; Kalitala, Naya, Maligram at Pingla; Panchkhuri and Panchami at Keshpur, Narma, Gama, Bhadrakali at Narayangarh.

Pistia stratiotes L.: Figure 15.

Vernacular name: Khundipana or Takapana

Stoloniferous, free-floating rosettes with numerous roots. Leaves subsessile, obovate to ovate-cuneate, up to15 cm long and 5 cm wide, with (3-) 5-9 (-12) parallel veins, densely pubescent on both surfaces. Inflorescences axillary, shortly stalked, much shorter than the leaves. Spathe (0.7-) 2-4 cm long, greenish- yellow, hairy, convolute at the base, spreading above, with a white ciliolate margin, constricted between the female and male parts. Spadix shorter than and partly adnate to the spathe at the base, with 1 female flower below and 2-8 male flowers above. Flowers unisexual, perianth absent, the males with 2 united stamens. Ovary flask-shaped, 1-locular. Berries many seeded, green, crowned by the persistent stigma.

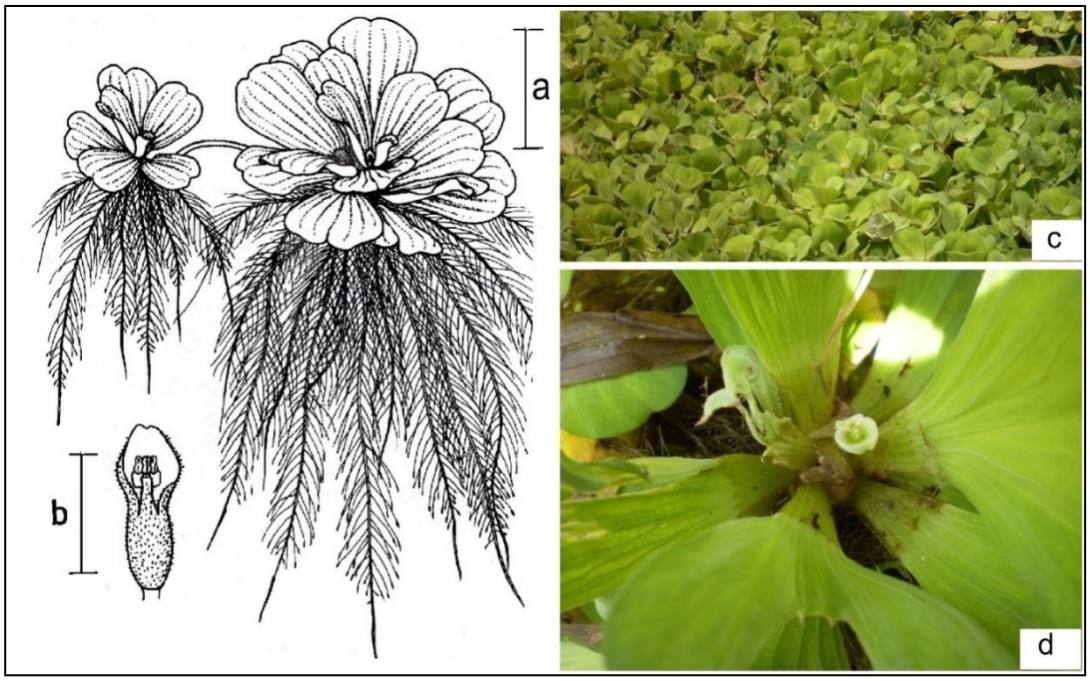


Figure 15. *Pistia stratiotes*: **a,** floating rosettes (4 cm); **b,** spathe (4 mm); **c,** floating rosettes in aquatic field; **d,** spathe.

Flowering and Fruiting: May to October.

Field Collections: Manikpur at Kharagpur, Turka at Mohanpur, Antla at Debra Balichak at Malighati at Debra, Kharika at Sabong, Homgarh at Gorbeta.

COMMELINACEAE: 3 genera, 5 species

Commelina: 2 species

Key to species

1. Spathe-like bracts sessile or nearly so ***C. benghalensis***

1. Spathe-like bracts with peduncles at least 1 cm long ***C. diffusa***

***Commelina benghalensis* L.:** Figure 16

Vernacular name: Kanchira

Creeping, glabrous or pubescent herb, rooting at the basal nodes. Leaves ovate or elliptic-ovate, sub-acute to rounded apex, sheath pubescent and margin oblong ciliate. Spathe 1-3 together at the tips or branches, pubescent, turbinate, margin connate. Capsule pyriform. Seeds 5, oblong, closely pitted.

Flowering and Fruiting: July to January.

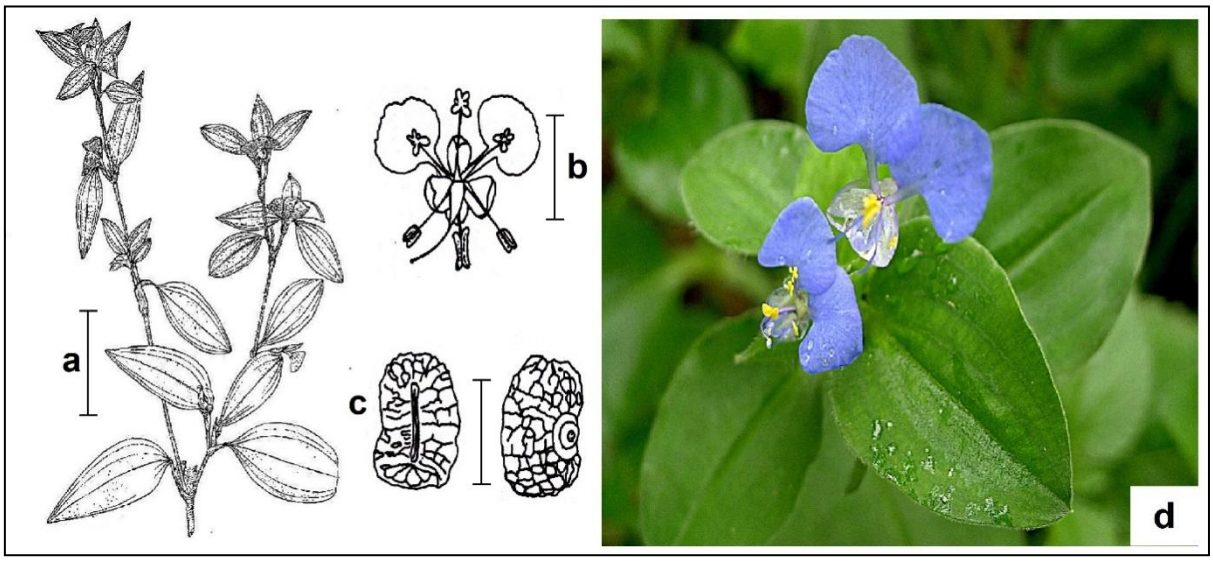


Figure 16. *Commelina benghalensis*: **a,** flowering shoot (2 cm); **b,** flower (2 mm); **c,** seed in different view with operculam (1 mm); **d,** flowering shoot in field.

Field Collections: Common in everywhere in selected district.

Ecological Notes: Perennial or sometime annual, gregariously grow on the village roadsides, garden edges, waste places, low lands and dampy areas.

Commelina diffusa Burm. f.: Figure 17.

Creeping herb, rooting at the lower nodes. Leaves sessile, glabrous or sparsely puberulosus, lanceolate, acute, leaf sheath glabrous, margin ciliate. Spathe glabrous or sparsely pubescent, ovate or ovate-lanceolate. Cymes usually 1-3 flowered. Flowers blue. Capsule broadly oblong, acuminate or apiculate. Seeds 5, oblong, cylindric, reticulate, brown.

Flowering and Fruiting: November to May.

Ecological Notes: Diffusely grow on the marshy and shady waste places of the villages or road side bushes.

Field Collections: Common in everywhere in selected district.

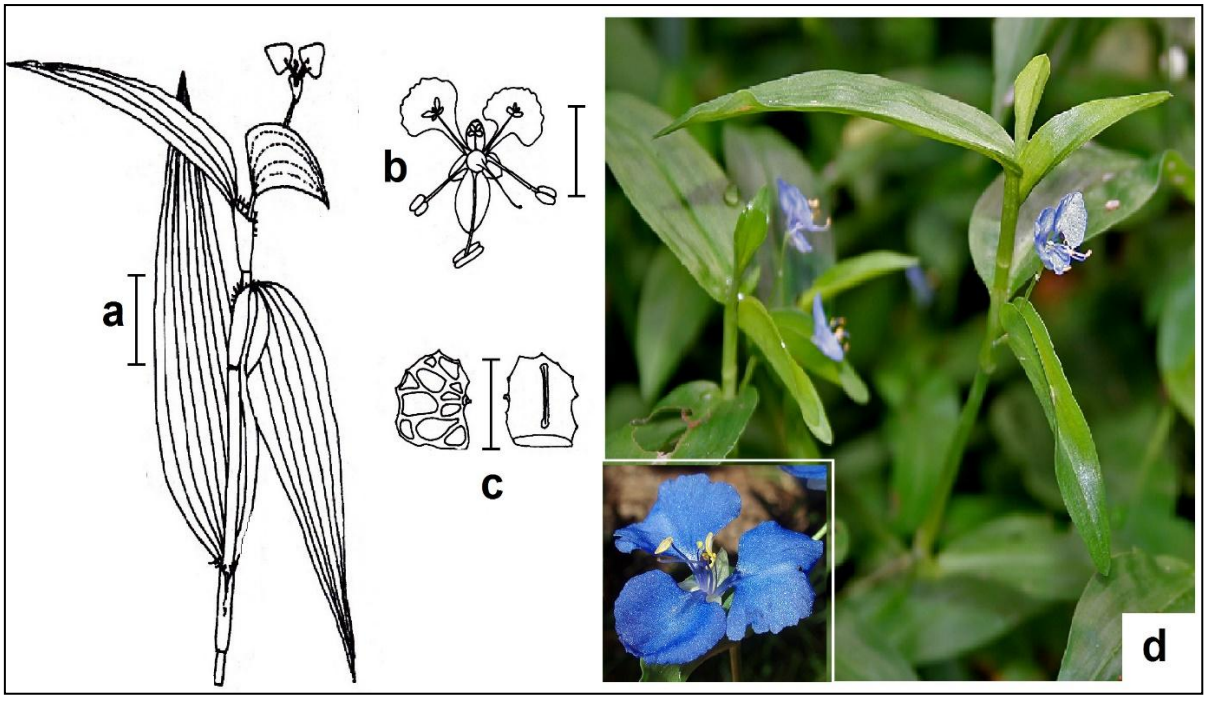


Figure 17. *Commelina diffusa*: **a,** flowering shoot (2 cm); **b,** flower (2 mm); **c,** seed in different view with hilum (1 mm); **d,** flowering shoot in field with flower at anthesis (inset).

Cyanotis axillaris (L.) D. Don ex Sweet: Figure 18.

Stem creeping, ascending or erect, 15-45 cm long. Leaf sheaths inflated, glabrous or somewhat hairy, margin ciliate; blades sessile, slightly succulent, linear-lanceolate, 4-15 (20) cm long, 0.3-1.2 cm wide, tip acuminate. Inflorescence a dense cyme with 3-6 flower, embedded in the hollow axil of a swollen leaf sheath. Flowers exerted only at anthesis. Petals

3, all alike, long-clawed, blue, pink or purple. Fertile stamens 6; filaments densely hairy above the middle. Ovary 3-locular, glabrous; style filiform, glabrous swollen at tip. Capsule acute. Seed sub-cylindrical, 1.4-2.4 mm long, deeply pitted.

Flowering and Fruiting: June to November.

Ecological Notes: Annual or occasionally perennial. Rarely found on the marshy places, on the roadside ditches or thickets.

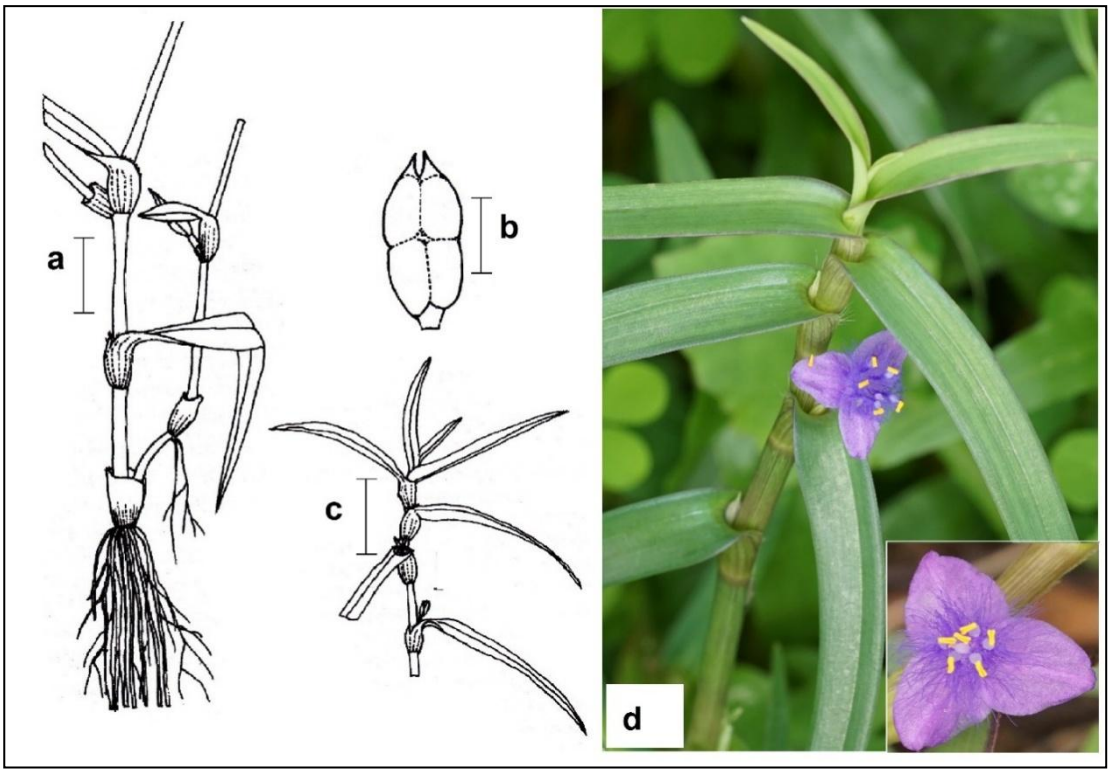


Figure 18. *Cyanotis axillaris*: **a,** base of shoot (1 cm); **b,** flowering shoot (1 cm); **c,** capsule valve (2 mm); **d,** flowering shoot in field with flower at anthesis.

Field Collections: Common in everywhere in selected district.

Murdannia: 2 species

Key to species

1. Blades of lower leaves linear; seeds with furrows and pits, 2 in each locule, one borne above the other ***M. nudiflora***

1. Blades of lower leaves ovate to oblong; seeds almost smooth, 4-6 in each locule, born in 2 rows ***M. spirata***

Murdannia nudiflora (L.) Brenan: Figure 19.

Annual, branched decumbent herbs; rooting from the lower nodes. Leaves glabrous, linear or linear-lanceolate. Inflorescence scorpioid cyme. Ovary 2-celled with two ovuled. Capsule 2 seeded brown rugose.

Flowering and Fruiting: March to November.

Ecological Notes: Common on the moist, shady places and also as a weed on gardens.

Field Collections: Common in everywhere in selected district.

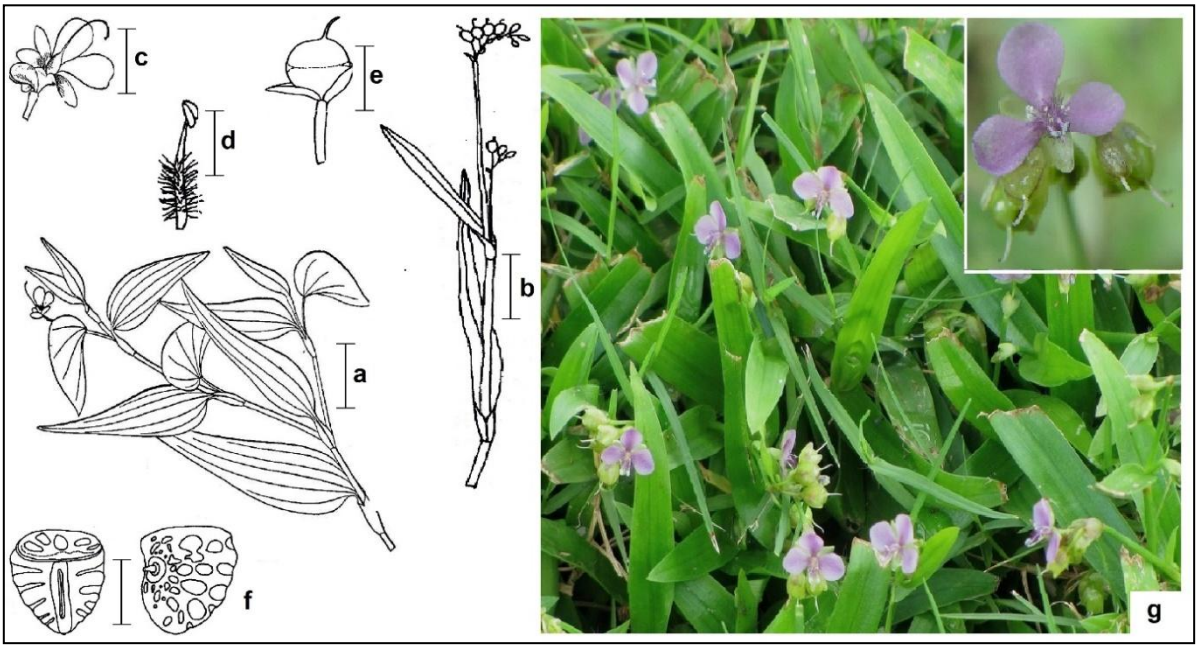


Figure 19. *Murdannia nudiflora*: **a,** flowering shoot (2 cm); **b,** fruiting shoot (1 cm); **c,** flower (5 mm); **d,** stamen (1 mm); **e,** fruit (2 mm); **f,** seed with hilum view (0.5 mm); **g,** flowering shoot in field with flower at anthesis (inset).

Murdannia spirata (L.) G. Brückn.: Figure 20.

Branched, procumbent herbs. Leaves sessile, oblong almost rounded, glabrous. Inflorescence terminal panicle. Flowers bluish-violet, bracts minute, persistant. Capsule oblong, trigonous, mucronate, 3-celled. Seeds 4 in each cell.

Flowering and Fruiting: July to December.

Ecological Notes: Occasionally on the shady waste places and village thickets or roadside canals.

Field Collections: Common in everywhere in selected district.

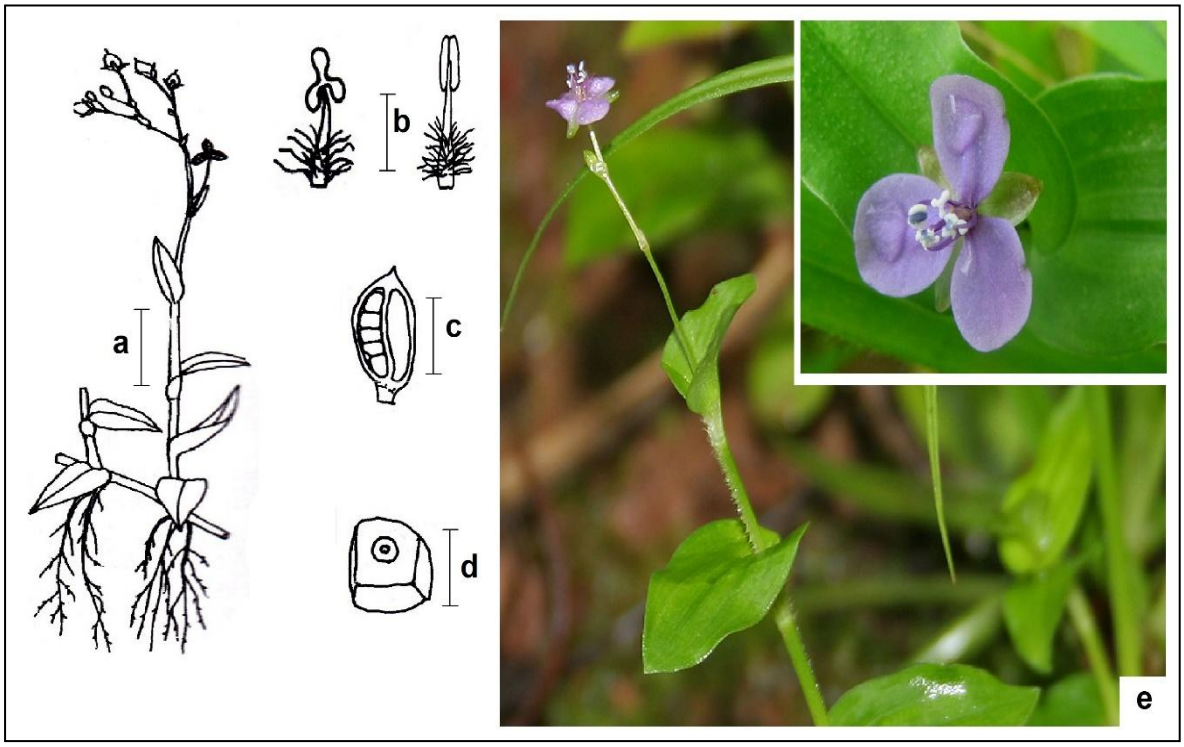


Figure 20. *Murdannia spirata*: **a,** flowering shoot (1 cm); **b,** staminode and stamen (2 mm); **c,** capsule valve with seed in place (2 mm); **d,** seed (0.5 mm); **e,** flowering shoot with flower at anthesis in field.

CYPERACEAE: 9 genera, 23 species

Cyperus: 9 species

Key to species

1. Spikelets in spikes with each at some distance from one another upon a more or less elongate rachis); inflorescence of 1 or more spikes stalked, but sometimes the peduncles are only 2-5 mm long.

2. Plants annual with minute root systems;

3. Glumes nearly as wide as long, obtuse at the apex, hardly imbricating at maturiry; nuts much long as glumes; glumes 3-or 5 nerved, with a flattened keel; rachis glabrous; spikelets erect to spreading, rarely reflexed, 1.5-2 mm wide ***C. iria***

3. Glumes much longer than wide, acute at the apex, nuts much shorter than glumes; glumes 2.5-5 mm long, with a straight, spikelet not squarrose ***C. compressus***

2. Plants perennial with woody rhizomes, slender stolen or stem-bases swollen and corm like

4. Plants with slender stolons; lower involucral bracts shorter than or scarcely longer than the inflorescence; plants mostly not developing fruits ***C. rotundus***

4. Plants without stolons; culm base swollen or hard-ened or culms arising from woody rhizomes; Spikelets not more than 1 mm wide; glumes close rather remote on zigzag rachilla ***C. distans***

1. Spikelets arranged digitately or stellately in clusters (spikelets at practically the same level upon a much-shortened rachis); spikelets arranged in stalked clusters

5. Plants annual with minute root system

6. Spikelets in almost spherical clusters; nut about as long as the subtendin glume ***C. diffiormis***

6. Spikelets never in spherical clusters; nut much shorter than the subtending glume ***C. michelianus***

5. Plants perennial with a woody rhizome or slender stolons or stem base swollen

7. Nuts 0.5-0.6 mm long, ± 0.4 mm wide, without thickened angles, uniformly reddish-brown; spikelets with 6-16 flowers ***C. imbricatus***

7. Nuts 1.8-2 mm long, 0.8-1 mm wide, with corky or spongy thickrned angles, the sides shining grayish- brown to blackish with pale whitish to yellowish angles; spikelets with 16-60 flowers ***C. platystylis***

Cyperus compressus L.: Figure 21.

Vernacular name: Chuncha

Erect, annual, glabrous herb; roots fibrous; stem tufted, trigonous. Leaves shorter or sometime longer than the stem, acuminate. Umbel simple, often with a sessile head at the centre or sometime reduced to only a sessile head.

Flowering and Fruiting: Throughout the year mainly July to November.

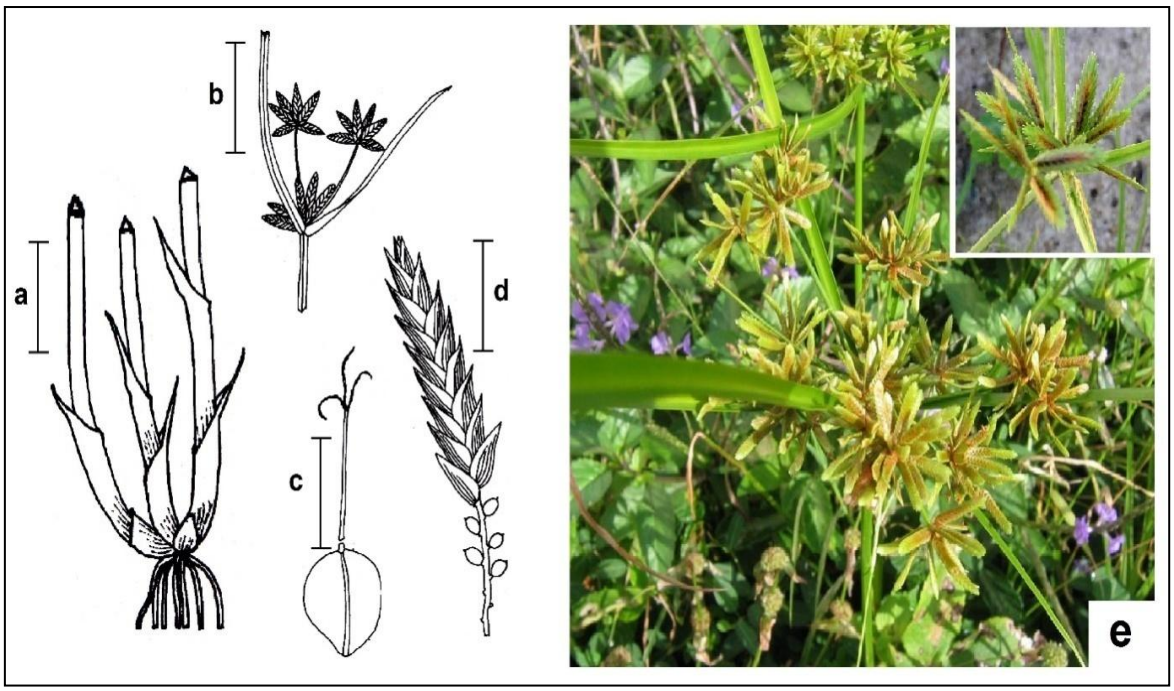


Figure 21. *Cyperus compressus*: **a,** base of shoot (5 mm); **b,** inflorescence (1cm); **c,** nut and glume (0.5mm); **d,** spikelet (3mm); **e,** flowering shoot in the field.

Ecological Notes: Commonly found on the paddy fields, water courses and along the road sides.

Field Collections: Common in everywhere in selected district

Cyperus platystylis R. Br.: Figure 22.

Vernacular name: Gola Methi

Rhizome either very short, culms solitary or 2 or 3 together, smooth or scabrous along the angles towerds the tip. Leaves as long as or longer than the culm; sheaths bladeless below, strongly keeled brownish to purple; blades flat or slightly plicate, septate, nodulose, leathery, gradually acuminate, grayish-green or glaucous above; margins and midrib very scabrous. Involucral bracts 4-12, unequal, the longer ones overtopping thre inflorescence, up to 80 cm long. Inflorescence compound, depressed- corymbose or or semiglobose, often with very numerous spikelets; 10-17 primary rays, widely spreading, often slightly upcurved, secondary rays spreading, tertiary rays when present very short. Spikelets digitately arranged in clusters of 2-8, widely spreading, ovate to linear-lanceolate, flattened, 5-20 mm long, 2.5-3 mm wide, densely 15 to 60 flowered, straw-coloured and stained with rusty brown; rachilla straight, persistent, without wings. Glumes closely appressed to the rachilla, ovate to broadly ovate, obtuse, mucronulate. Stamens 3; connective appendage bristly. Style flattened, slightly shorter than the nut, ciliate, 3-cleft. Nuts unequally 3-sided, dorsoventrally flattened, with corkly or spongy thickened angles, ellipsoid apiculate, the sides shining grayish-brown to blackish with pale whitish to yellowish angles.

Flowering and Fruiting: Almost throughout the year.

Ecological Notes: Common in the wet places especially in the embankment of ponds, pools, ditches and other marshes.

Field Collections: Common in everywhere in selected district.

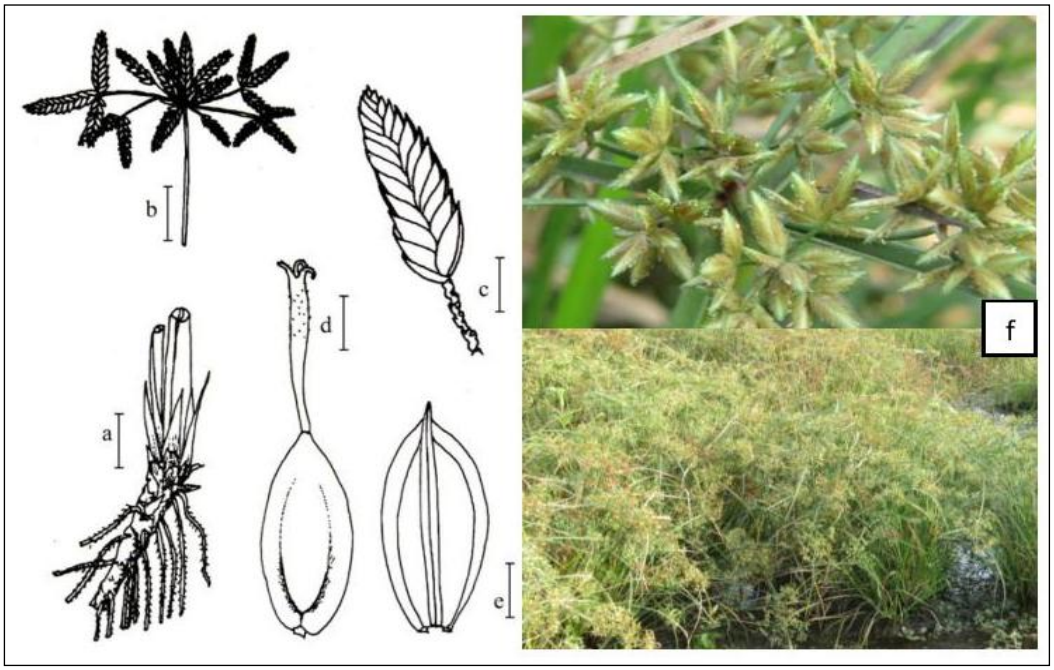


Figure 22. *Cyperus platystylis*: **a,** base of shoot (1cm); **b,** part of inflorescence (1cm), **c,** mature spikelet (2mm); **d,** Nut (0.5mm); **e,** glume (0.5mm); **f,** flowering shoot in the field.

Cyperus difformis L.: Figure 23.

Vernacular name: Behuaghass

Annual, tufted herb; roots filiform. Leaves few, much shorter than the stem, acuminate. Umbel compound or contracted into a head; rays 3-8; bracts 2-3, leaflike. Spikelets many, brown, 10-many flowered; rachilla slender, winged. Glumes closely imbricate; obovate, concave, apex rounded, margin broadly hyaline. Nut long, triangular, obovate-elliptic and minutely apiculate.

Flowering and Fruiting: November to January.

Ecological Notes: Gregariously grow on the margins of the pools, ponds, ditches, marshes and in the paddy fields.

Field Collections: Jakpur and Radhamohanpur near railway canals.

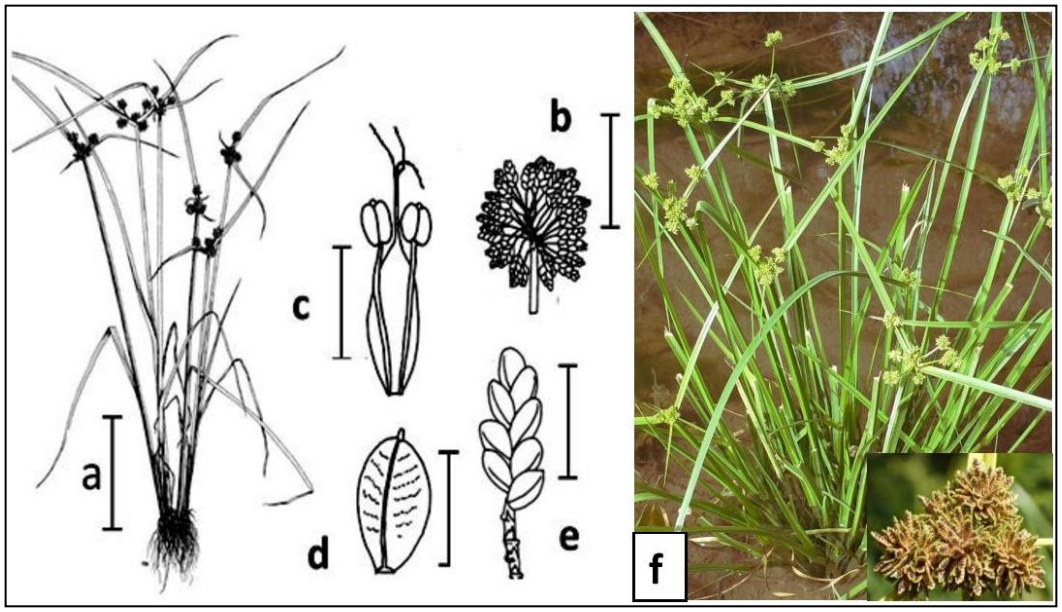


Figure 23. *Cyperus difformis:* **a**, flowering shoot (2 cm); **b**, cluster of spikelets in L.S.(4mm); **c**, flower (0.2mm); **d**, nut (0.3mm); **e**, flowering shoot in the field.

Cyperus distans L.f.: Figure 24.

Short, knotty rhizome. Solitary culms or few together in row, rather slender, 3-sided, 20-60 (-100) cm tall, 2-3 (-5) mm wide. Leaves shorter than or about as long as the culm; seaths 5-20cm long, light brown to purplish; blades weakly plicate, 5-30cm long, 4-6 (-10) mm wide, acuminate; margins scabrous towards tip. Involucral bracts 4-6, unequal, the lower 2 or 3 overtopping the inflorescence, 20-40 (-60) cm long. Inflorescence paniculate, corymbose; primary rays 5-12, very unequal, up to 18 cm long; spikes 2-4 cm long, with 8-20 spikelets, stamens 3. Nuts 3-sided, oblong to oblong-ellipsoid, 0.5-1 mm long, 0.2-0.5mm wide, apiculate, smooth with a metallic shine, yellowish maturing dark brown.

Flowering and Fruiting: August to November

Ecological Notes: Commonly found in moist waste lands.

Field Collections: Gopinathpur and Jhangia at Pingla, Jambini, Silda, Purunia at Dantan, Bishnupur at Sobong, Goura at Ghatal, Roskundu at Gowaltore.

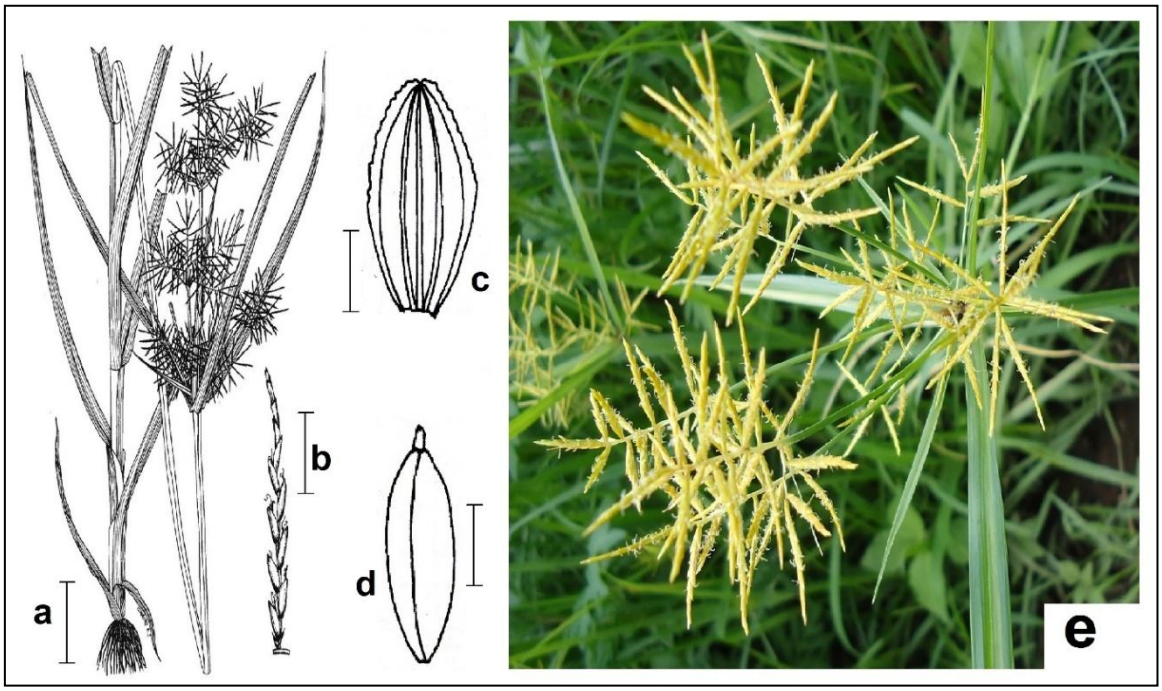


Figure 24. *Cyperus distans*: **a,** whole plant (3 cm), **b,** spikelet (3mm); **c,** glume (0.5mm); **d,** nut (0.3mm); **e,** plant inflorescence in field.

Cyperus imbricatus Retz.: Figure 25.

Vernacular name: Berethi

Erect herb. Rhizome small; stem erect, trigonous above, terete below. Leaves margin spinoselyserulate, umbel simple or compound. Spikelets densely arranged, dull yellowish green or brownish wings. Glumes densely imbricate. Nut elliptic ovoid, trigonous, slightly compressed.

Flowering and Fruiting: June to October.

Ecological Notes: Common on the margins of the ponds, ditches and marshes.

Field Collections: Chilkigarh at Jamboni, Malighati at Debra, Eligang at Keshpur.

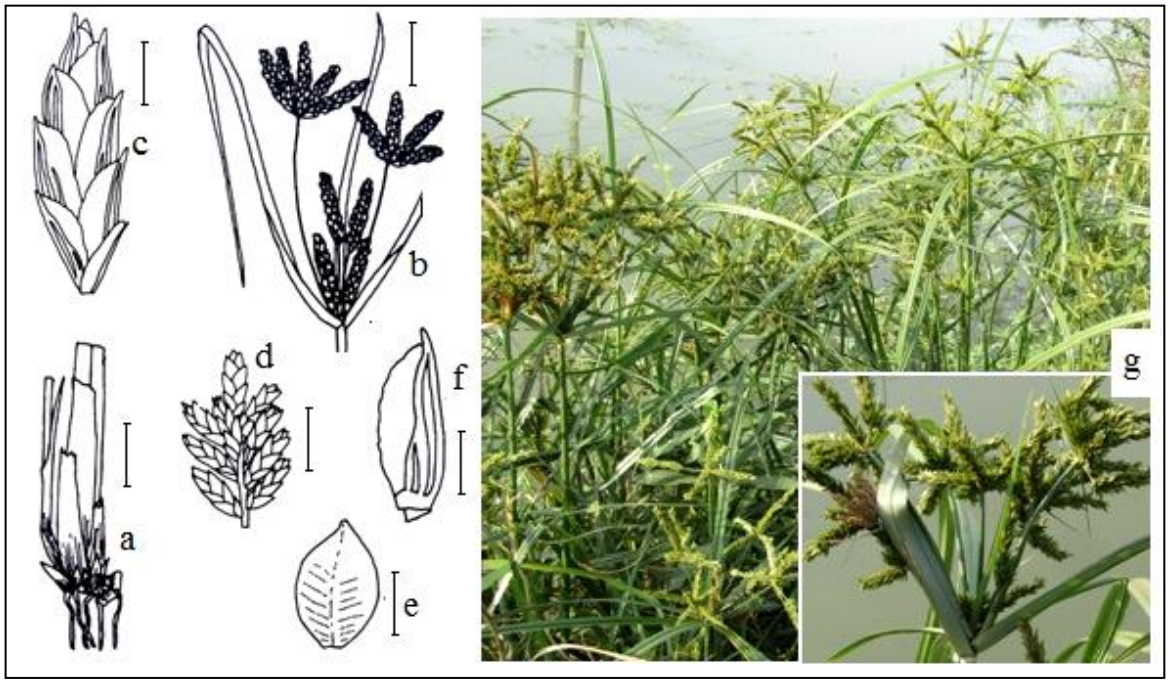


Figure 25. *Cyperus imbricatus*: **a,** base of shoot (2 cm); **b,** part of inflorescence (2 cm); **c,** spikelet (0.5mm); **d,** upper part of spike (2mm); **e,** nut (1mm); **f,** glume (0.5mm); **g,** plant inflorescence in field.

Cyperus iria L.: Figure 26.

Vernacular name: Bara Chuncha

Erect, annual herb. Roots fibrous; stem erect, triquetrous. Umbel decompound of many primary rays bearing fascicled umbellous of many interrupted spikes of 5-20 spikelets, compressed 6-flowered, greenish brown. Glumes loosely or scarcely imbricate, 3-5 nerved. Obovate, apex sub-rounded, mucronate. Nut brown, ovate triquetrous, apex mucronate.

Flowering and Fruiting: Almost throughout the year; mainly August to December.

Ecological Notes: Common in the paddy fields, marshes and along the margins of the ditches and ponds.

Field Collections: Common in everywhere.

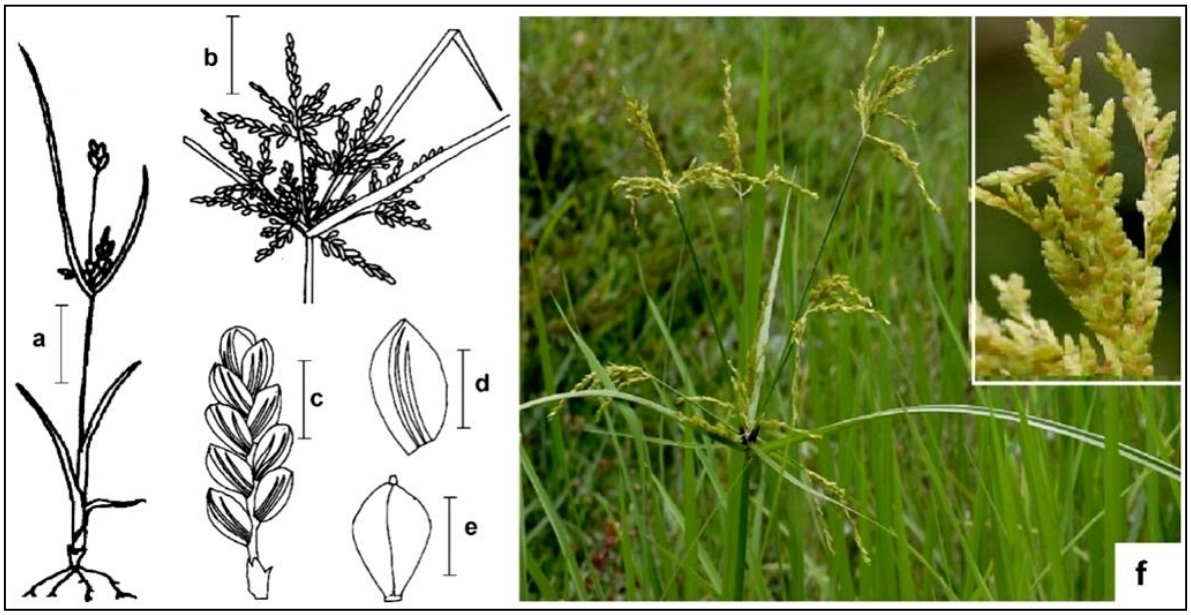


Figure 26. *Cyperus iria*: **a,** whole plant (1 mm); **b,** inflorescence (1cm); **c,** spikelet (1mm); **d,** glume (0.5mm); **e,** nut (0.5mm); **f,** flowering shoot in the field.

Cyperus michelianus (L.) Delile: Figure 27.

Densely tufted, diffuse to erect glabrous annual herb; stem trigonous. Leaves broad. Bracts 3-9 leaf like. Spikelets many to terminal compact heads. Glumes ovate lanceolate, cuspidate, sides hyaline. Nuts punctulate, ellipsoid, planoconvex or trigonous apiculate.

Flowering and Fruiting: Almost throughout the year.

Ecological Notes: Common on the embankment of ponds, pools ditches, water courses and also in the paddy fields; associated with other sedges and grasses.

Field collections: Common in everywhere.

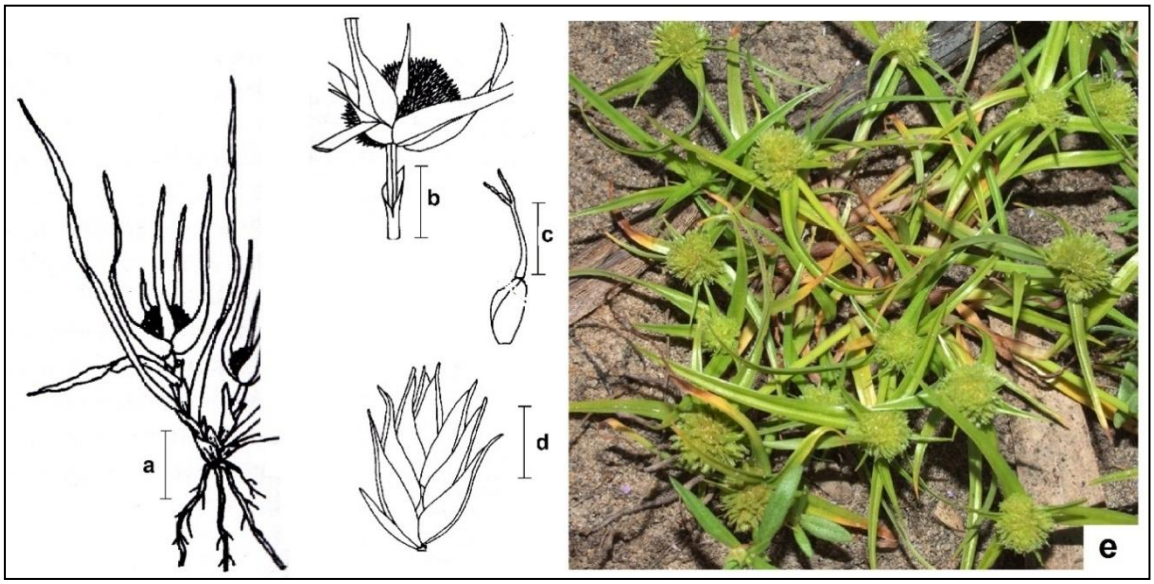


Figure 27. *Cyperus michelianus*: **a,** whole plant (1 cm), **b,** inflorescence (2 mm); **c,** ovary (0.5 mm); **d,** spikelet (1 mm); **e**, flowering shoot in the field.

Cyperus rotundus L.: Figure 28.

Perennial herb. Stolons slender, elongated, bearing elliptic or sub-globose, small to large tubers; stem erect, triquetrous. Leaves flat, 1-nerved, acuminate. Umbel simple or compound; bracts usually 3. Spikes straw coloured to reddish brown, 10-50 flowered, compressed; rachilla with hyaline wings. Glumes densely imbricate, usually 3 pr 5 nerved, obtuse, minutely apiculate at the apex, margin hyaline. Nut greenish black, ellipsoid or elliptic obovoid, trigonous, minutely apiculate.

Flowering and Fruiting: June to October.

Ecological Notes: Common to everywhere, on the roadsides, embankments of ponds, jheels, lakes and ditches; prefer dampy, humus soils and open grassy lands. .

Field Collections: Common in everywhere.

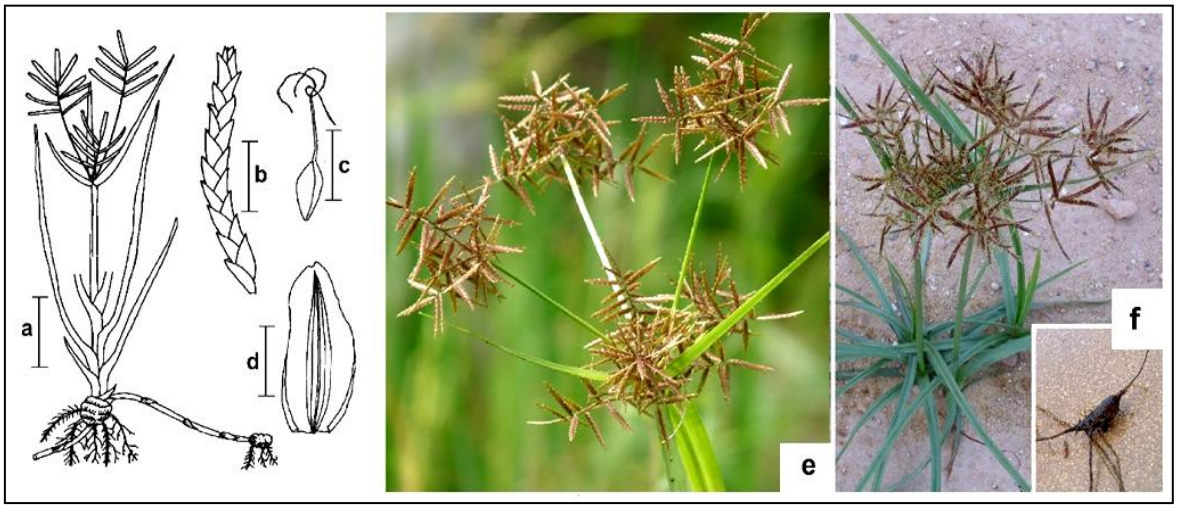


Figure 28. *Cyperus rotundus*: **a,** whole plant (1 cm); **b,** spikelet (1 mm**)**; **c,** ovary (0.5 mm); **d,** glume (0.5mm); **e,** inflorescence; **f,** whole plant with tubers (inside) in field**.**

Cyperus compactus Retz.: Figure 29.

Rhizomes short, corm-like. Culms solitary or a few together, (10-) 30-100 (-180) cm tall, 3-6 mm thick, obtusely 3-sided or terete, rather soft. Leaf sheaths cylindrical, purple brown; blades slighdy longer or shorter than the culm, 5-9 (-12) mm wide, channelled, glaucous green. Involucral bracts 3-5 (-8), upright or spreading, the lower ones much overtopping the inflorescence, the longest 60-100 cm long. Inflorescence of compound panicles. Spikes nearly globose, 8-20 (-40) mm in diameter, bearing many (up to 80) stellately spreading spikelets, the rachis not more than 4 mm long. Spikelets jointed at base, narrowly lanceolate to linear-subulate, subterete, 5-15 mm long, 0.8-1.5 mm wide, 3- to 8- (-14)-flowered; rachilla jointed above the prophyll. Glumes linear-lanceolate to linear-oblong, obtuse or subobtuse, 3-4.5 mm long, 1-1.5 mm wide, pale brown and often tinged with reddish-brown, 5- to 7-nerved; keel greenish. Style 0.5-1 mm long; stigmas 1.2-1.5 mm long. Nuts linear- oblong, sometimes slightly curved, 3-sided, 1.5-2 mm long, 0.4-0.5 mm wide, minutely puncticulate.

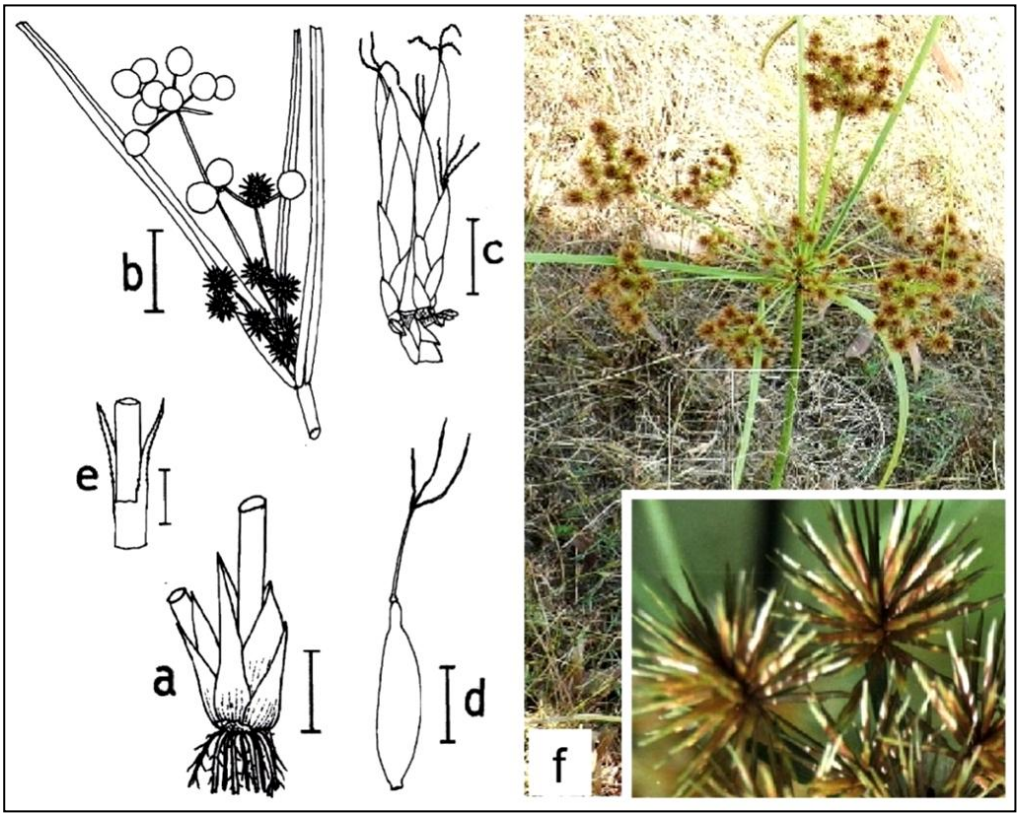


Figure 29. *Cyperns compactus*: **a,** base of shoot (2 cm); **b,** part of inflorescence (1 cm); **c,** two spikelets (1 mm); **d,** nut (0.5 mm); **e,** base of ray (1 mm); **f,** plant in field with inflorescence (inset).

Flowering and Fruiting: thought the year.

Ecological Notes: Perennial, in shallow water, in seasonally flooded places, swamps, wet rice fields, marshes, ditches, river banks, often gregarious and forming stands.

Field Collections: Jhilinga at Kharagpur, Tutranga at Narayangarh, common in other places.

***Eleocharis*:** 3 Species

Key to species

1. Spikelets cylindrical tapered above; glumes thick and leathery; perennials
   2. Culms hollow, septate; glumes with distinct keels ***E. dulcis***
   2. Culms solid, continuous within, not septate; glumes without keels or keels obscure ***E. spiralis***
1. Spikelets ovoid to globose; glumes membranous; annuals ***E. geniculate***

Eleocharis dulcis (Burm.f.) Trin. ex Hensch.: Figure 30.

Vernacular name: Chenchjca

Stolons present, often terminating in tubers; tubers brown to blackish, ± 1 cm in diameter (in cultivated races up to 5cm in diameter). Culms tufted, erect, 40-100 (-200) cm tall, (1-) 3-7 (-10) mm in diameter, terete, hollow but with transverse septa (seen by squashing the stem), deep green, somewhat, shiny. Sheaths obliquely obtuse, purplish. Spikelet cylindrical to oblong-elongate, 15-60 mm long, 2-6 mm in diameter, not wider than the culm, whitish to pale straw coloured. Glumes thick and slightly leathery, elliptical to oblong-obovate, (2-) 5-7 mm long, 5-7 mm long, 1.7-4 mm wide, grayish-green to straw-colored, many nerved, margins narrowly hyaline, rounded at apex, distinctly keeled; keel green. Perianth bristles 6-8, subequal, as long as or up to twice as long as the nut. Styles 7-8 mm long, 2- or 3-cleft; style base elongate- conical, flattened, 2-2.5 mm long, almost as wide as the nut. Nuts obovoid, biconvex with obtuse edges, 1.5-2.2 mm long, 1.3-1.8 mm wide, smooth, yellow or greyish-brown, shiny.

Flowering and Fruiting: July to October.

Ecological Notes: Everywhere in the ditches, embankments of ponds, canals sides and common on the paddy fields, Perennial.

Field Collections: Dujipur at Pingla, Hosnabad at Medinipur sadar, Shyamchak at Debra.

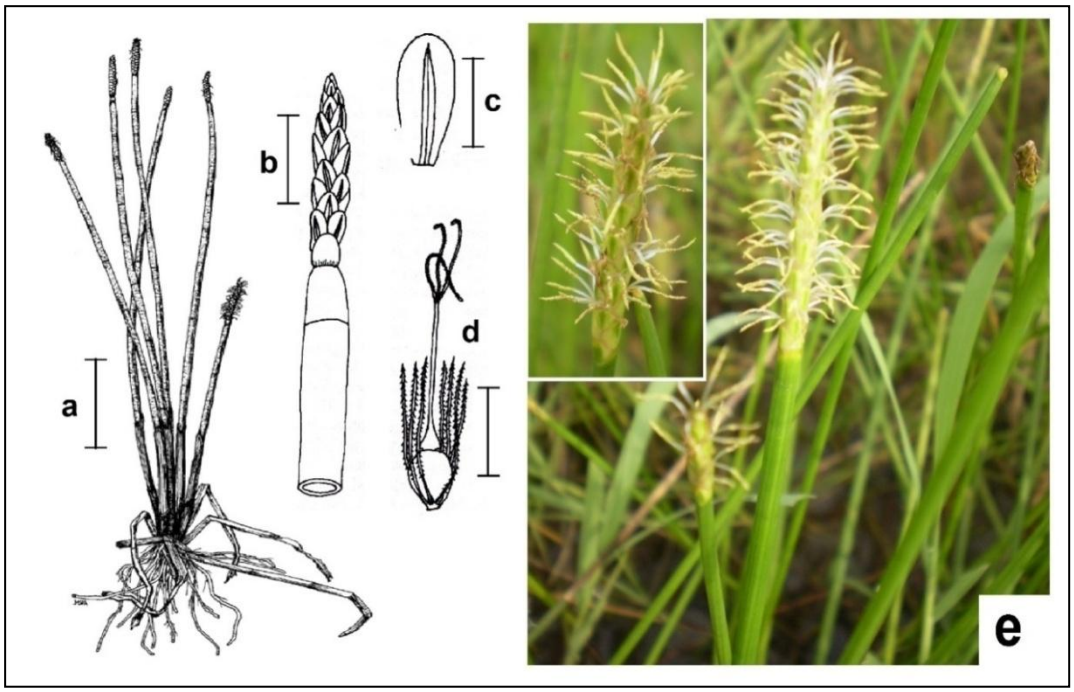


Figure 30. *Eleocharis dulcis*: **a,** habit (4 cm); **b,** spikelet (3 mm); **c,** glume (2 mm); **d,** fruit (1 mm); **e,** flowering culms with inflorescence.

Eleocharis geniculate (L.) Roem. & Schult.: Figure 31.

Culms densely tufted, slender but rather rigid, (-7) 12-25 (-40) cm tall, 0.2-0.4 (-1) mm in diameter. Sheaths herbaceous, obliquely acute or attenuate, green often tinged with red-brown below. Spikelet olobose to ovoid, very obtuse, (2-) 3-4 (-8) mm long, 2-4 mm in diameter, much wider than the culm, usually rusty brown. Glumes membranous, the lower sterile and covering the fertile glumes in young ovoid to suborbicular, 1.8-2 mm long. 1.3-1.6 mm wide, greyish below, pale brown to straw coloured above, the sides sometimes tinged with purple, nerveless, very obtuse at apex, indistinctly keeled; keel green. Perianth bristles smooth, rusty to purplish grey, 6-10, equal, up to 1.5 mm long, slightly longer than the nut. Styles 1.5-1.7 mm long. 2-cleft; style base depressed-conical, whitish, spongy, not as wide as the nut. Nuts broadly obovoid, biconvex or sometimes 3-sided, 0.8-1 mm long, 0.6-0.8 mm in diameter, suddenly contracted to a rounded apex, maturing shiny blackish-purple.

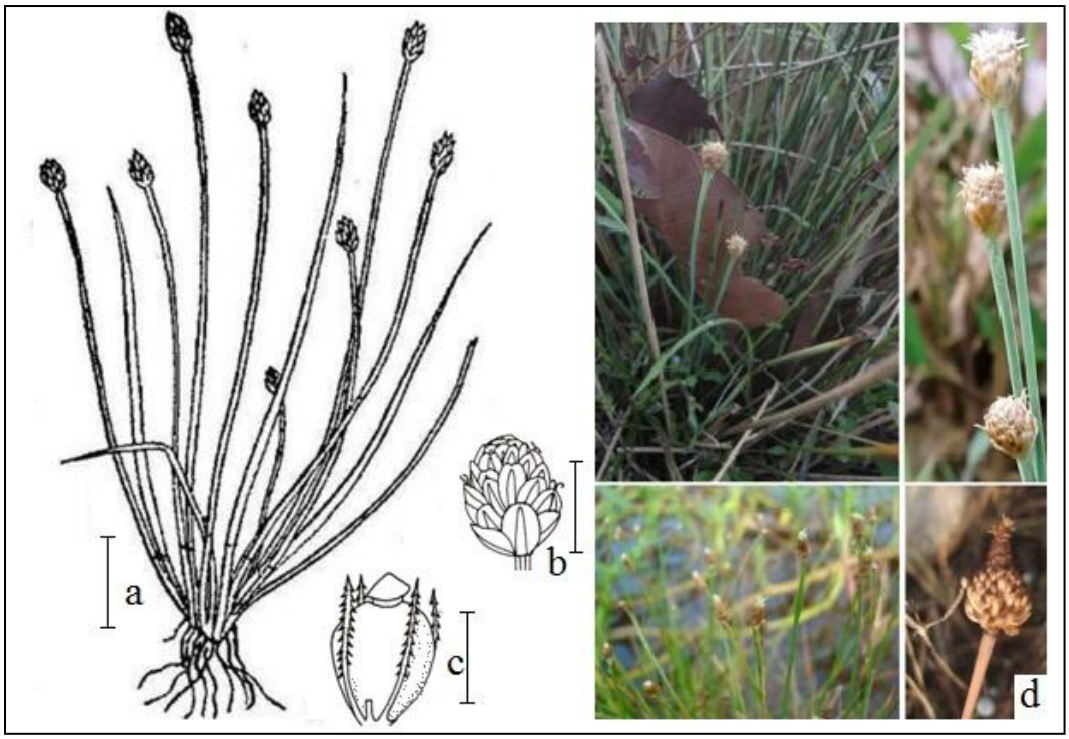


Figure. 31. *Eleocharis geniculate*: **a,** habit (4 cm); **b,** spikelet (1 mm); **c,** fruit (1 mm); **d,** plants with spikelet in field.

Flowering and Fruiting: December to February.

Ecological Notes: Annual. Generally, grow in the paddy-fields, low lands dampy places or on clay soils.Often growing in clumps, gregarious in shallow watcr, particularly common in fallow rice fields.

Field Collections: Kehcenda at Jhargram, Kalikadihi at Pingla, Akalposh at Debra, Gowaltore at Chandrakona.

Eleocharis spiralis (Rottb.) Roem. & Schult.: Figure 32.

Rhizomes short with creeping stolons. Culms densely tufted, erect, rather robust, 25-60 (-70) cm tail, 2-4 mm in diameter, deep green, smooth, shiny, apieaily 5-sided. Sheaths 2 or 3, pale green becoming purple-red above, obliquely attenuate with a bristle-like appendage 2-4 mm long. Spikelet cylindrical to oblong-elongate, 15-40 mm long, 3-6 mm in diameter. Glumes

rather firm, suborbicular to broadly obovate, very closely packed (the exposed portion broader than long), 2.8-4 mm long, 2-3.8 mm wide, purphsh becoming yellowish below apex, weakly many- nerved, margin narrow and hyaline, obtuse at apex, obscurely keeled. Perianth bristles delicate, 4-6, sube- quai, from much shorter than to about as long as the nut. Styles ± 1.7 mm long, (2-) or 5-cleft; style base pyramidal, confluent, not as long and wide as the nut. Nuts biconvex (the margins not ribbed), obovoid to oval, 1.5-1.8 mm long, 1.2-1.4 mm in diameter, glossy, straw-coloured but becoming deep brown later, longitudinally striate with 17-20 rows of cells, without neck and apical annulus or annulus indistinct.

Flowering and Fruiting: June to October.

Ecological Notes: Perennial, gregarious in shallow water, particularly common in rice fields and along irrigation canals. Commonly grow on the dampy area, along the water courses and on the paddy fields.

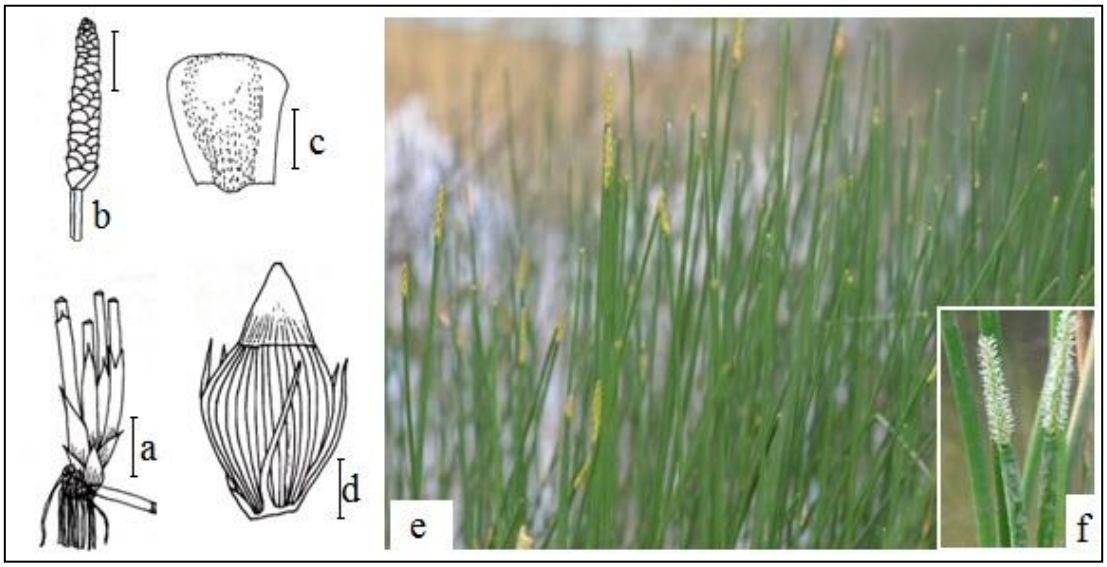


Figure 32. *Eleocharis spiralis*: **a,** base of plant (1 cm); **b,** spikelet (4 mm); **c,** glume (1 mm); **d,** fruit (0.5 mm); **e, f,** plant in field with spikelet.

Field Collections: Radhamohanpur, Khirai, Laxmibari and Jalchak at Pingla; Ashari at Debra; Khakurda, Kalibagicha and Handalghat at Narayangarh.

***Fimbristylis*:** 3 species

Key to species

1. Stigmas 2, style flat, usually hairy; nut biconvex or plano-convex; glumes spiral never in 2 rows ***F. dichotoma***

1. Stigmas 3, rarely in some flowers 2, style 3 angled, usually glabrous; nut 3 sided or 3 angled; glumes in 2 rows or spiral

2. Spikelets ovoid-globular to almost globular, 1.5—3 mm wide; culms 4-sided, below the inflorescence flattened with 2 sharp edges; leaf sheaths bilaterally flattened with a sharp dorsal edge; keel on fertile glumes ending just below the apex ***F. littoralis***

2. Spikeiets ovoid, 1.2-1.7 mm wide; culms acutely 5-angled, below the inflorescence becoming almost 5-winged; leaf sheaths cylindrical with rounded dorsal side; keel on all glumes extending beyond the apex as a small mucro ***F. miliacea***

Fimbristylis dichotoma (L.) Vahl: Figure 33.

Rhizomes very short and woody or absent. Culms tufted, 3-angular, flattened below the inflorescence, (5-) 10-75 (-100) cm long, 1-2.5 mm broad, smooth few hairs. Leaf sheaths loose, membranous brown spotted, persisting but not splitting; ligule fewfringes of short hairs; blades flat or sometimes. (3-) 10-30 (-50) cm long, (1-) 2-5 mm wide, or sparsely pubescent, scabrid at the top, abruptly acuminate at apex, involucral bracts 2—5, is not overtopping the inflorescence, the longest up to 10 cm long. Inflorescence, corymbose, simple or compound, loose or dense; primary rays 3-5 (-10), secondary rays 3-5. Spikelets solitary or in clusters of to oblong-ovoid, terete, acute, drab, brown (3-) 5-10 (-20) mm long, (2-) 2.5-3 (-5) mm wide. Glumes chartaceous, very broadly ovate to oblong-ovate, obtuse, (1.5-) 2-3 (-4.5) mm long, glabrous, sides without nerves or obscurely nerved, brown margins hyaline, often mucronulate; keel flattened. Obscure, green, 3-nerved. Stamens 1-3. Styles flat, 2-cleft, 0.8-1.5 mm long, hairy above, base swollen. Nuts biconvex, obovoid to broadly obovoid, 0.7-1.2 mm long, 0.6-1 mm broad, with 5-13 longitudinal rows of horizontal cells (appearing as pits) on either face, glistening white to straw-coloured or rarely brown, stipe

obdeltoid, 0.1-0.2 mm long and wide.

Flowering and Fruiting: June to November.

Ecological Notes: Perennial or rarely annual, common and gregariously grow on the embankment of water courses, and paddy-fields, prefer moist situations, very widespread common species.

Field Collections: Common in everywhere.

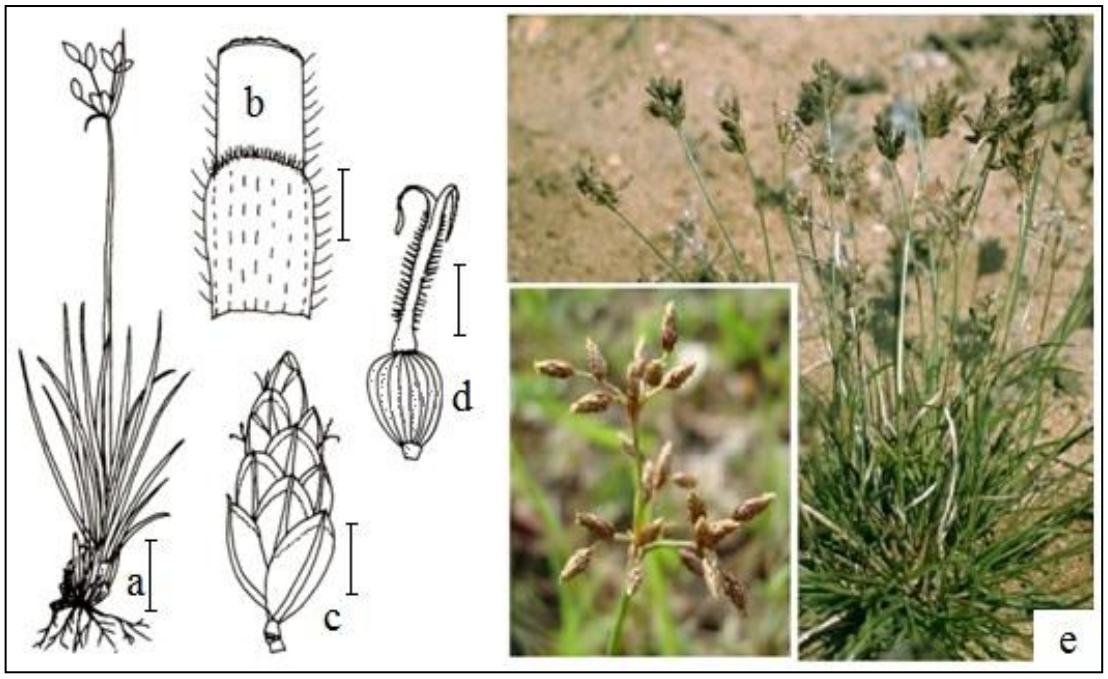


Figure 33. *Fimbristylis dichotoma*: **a,** whole plant (1 cm); **b,** ligule (2 mm); **c,** spikelet (1 mm); **d,** fruit (0.5 mm); **e,** flowering plant with spikelets (inset) in field.

Fimbristylis littoralis Gaudich.: Figure 34.

Culms arising from the axils of bladed leaves, densely tufted, erect, 10-60 (-100) cm tall, 1-3 mm thick below, flattened, 4-sided with 2 sharp edges, smooth, clothed at base with 2 or 3 bladeless sheaths. Basal leaves (or leaves of sterile shoots) with sheaths 2-10 cm long, the ventral side splitting as the culm glows; ligule absent; blades equitant, bilaterally flattened, 10-50 cm long, 1-4 mm wide, soft, as long as or exceeding the culm, narrowed to an acute tip. Culm leaves reduced to blade-less sheaths; sheaths laterally flattened with a sharp dorsal edge, brownish, the orifice obliquely truncate, hyaline on the margin, gradually tapering

above to bristle-like elongation up to 10 mm long, the uppermost sheath (3-) 6-12 (-18) cm long, the lowest scale-like. Involucral bracts 2-4, rigid, bristle-like, not overtopping the inflorescence. Inflorescence compound. Spikelet's ovoid-globular to globular, (1.5-) 2-3 (-5) mm long, 1.5-3 mm in diameter, rusty brown, densely many flowered. Glumes broadly ovate, 1-1.3 mm long, 0.6-0.8 mm wide, boat-shaped, obtuse at apex, membranous, reddish-brown, the sides with white hyaline margins and without nerves; keel 1- or 3-nerved, ending below the apex (on fertile glumes). Stamens 1. Styles 3-cleft, 0.5-0.7 mm long, glabrous; style base pyramidal. Nuts 3-sidcd, obovoid to broadly obovoid, 0.6-0.8 mm long, 0.4-0.5 mm wide, cream-yellow, the surface sparsely warty particularly on the ridges.

Flowering and Fruiting: June-October.

Ecological Notes: Annual, biennial or perhaps sometimes perennial. Found in wet places, at the edges of drying pools, in rice fields, streams and at the edges of pools.

Field Collections: Common in everywhere.

Figure 34. *Fimbristylis littoralis*: **a,** base of plant (1 cm); **b,** small inflorescence (1 cm); **c,** spikelet (1 mm); **d,** fruit (0.25 mm); **e,** inflorescence; **f,** flowering plant with spikelets in field.

Fimbristylis quinquangularis (Vahl) Kunth: Figure 35.

Rhizomes very short, roots fibrous. Culms arising from the axils of bladed leaves, densely tufted, erect, (-5) 15-70 cmtall. 1.5-2.7 mm thick below, acutely (4-) 5 angled, smooth, clothed at base with 2-4 sheaths. Basal leaves (or leaves of sterile shoots) with sheaths 1-7 cm long, the ventral side splitting as the culm grows; ligule absent; blades dorsoventrally flattened, 8-30 cm long, 1.5-3 mm wide, soft, as long as or exceeding the culm. Culm leaves reduced to bladeless sheaths; sheaths subterete pale green to straw-coloured, the ventral side hyaline and pale, yellowish-brown, the orifice obliquely truncate, hyaline the lowest scale-like. Involucral bracts 3-5, rigid, bristle-like, much shorter than the inflorescence. Inflorescence compound. Spikelets ovoid, 2-5 mm long. 1-1.7 mm in diameter, rusty brown, densely 20 to 40 flowered. Glumes ovate, 1-1.8 mm long. 0.8-1 mm wide, boat-shaped, rounded or micronate, membranous, yellow or rusty brown, the sides pale brown and without nerves, keel 1- or 3 nerved stamens 1 (2). Styles 3-sided, 0.5-0.7 mm long glabrous, 3cleft, style base pyramidal. Nuts 3-sided, obovoid, (0.4-) 0.6-0.8 mm long, 0.4-0.5 mm wide, cream-yellow, the surface warty.

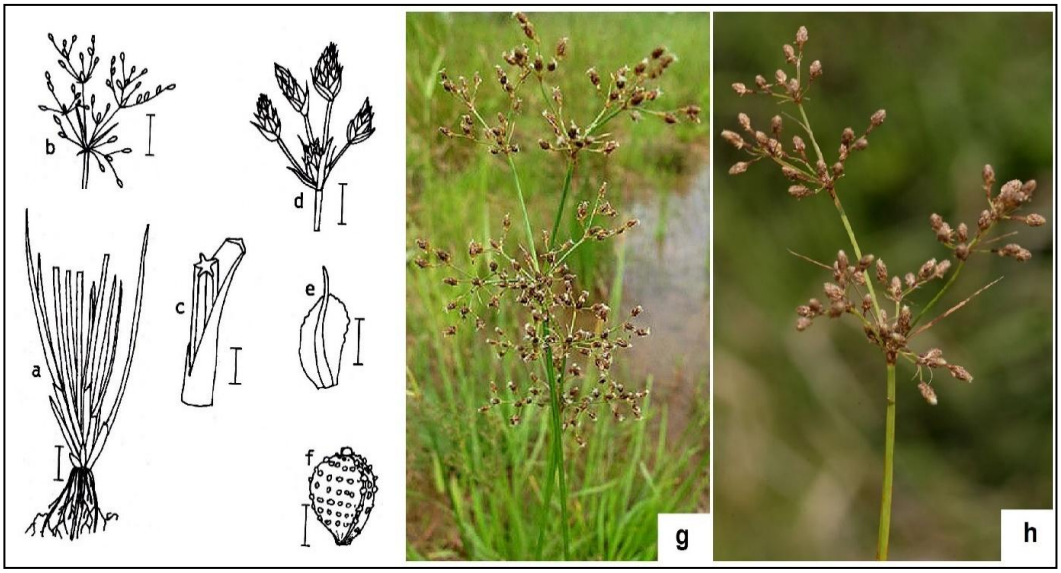


Figure 35. *Fimbristylis quinquangularis*: **a,** base of plant (1 cm); **b,** small inflorescence (1 cm); **c,** culm emerging from sheath (2 mm); **d,** spikelets (2 mm); **e,** glumes (0.5 mm); **f,** nut (0.25 mm); **g,** shoot with inflorescence; **h,** small inflorescence in field.

Flowering and Fruiting: Almost throughout the year.

Ecological Notes: Annual or biennial. Found in wet places, marshes, at the edges of drying pools, in rice fields, along railway tracks and roads.

Field Collections: Common in everywhere.

Fuirena ciliaris (L.) Roxb.: Figure 36.

Vernacular name: Band Kola**.**

Culms slender, tufted, 3- or 5-sided just below the inflorescence, obtuse-angled, striate, hairy at least (5-) 10-50 (-75) cm tall, 1-2 mm wide. Leaf pubescent; ligules short, 1-2 mm long, membranes leaf blades flaccid, flat, 2-8 (-20) cm long, 3-8 mm wide, profusely hairy or at least ciliate on the margins, with 3 or 5 (7) prominent nerves, light green, inflorescence of 1-3, terminal clusters of spikelets, with and pubescent peduncles in the upper axils; cluster± globose, 1—2 cm in diameter, with 3-10 spikelets. Spikelete ovate or ellipsoidal, 4-12 mm long, 3-4 mm in diameter, grayish-green. Glumes obovate to oblong- 1.5-2.5 mm long, excluding a 1-1.5 mm long hairy throughout. Perianth bristles 3, sometimes, scaberulous to almost smooth, as long as than the nut; perianth scales 3, distinctly stalked, subquadrate, up to 1.2 mm long, ± 0.2 mm cordate or hastate at the base, with 3 minute at the distinctly thickened apex (central tooth the longest), glabrous or minutely hairy at the apex. Nuts subsharply 3-angled, obovoid or ellipsoid, 0.7-1 mm long, 0.5-0.8 mm wide, the sides shiny but wrinkled, yellow to dark brown.

Flowering and Fruiting: October to January.

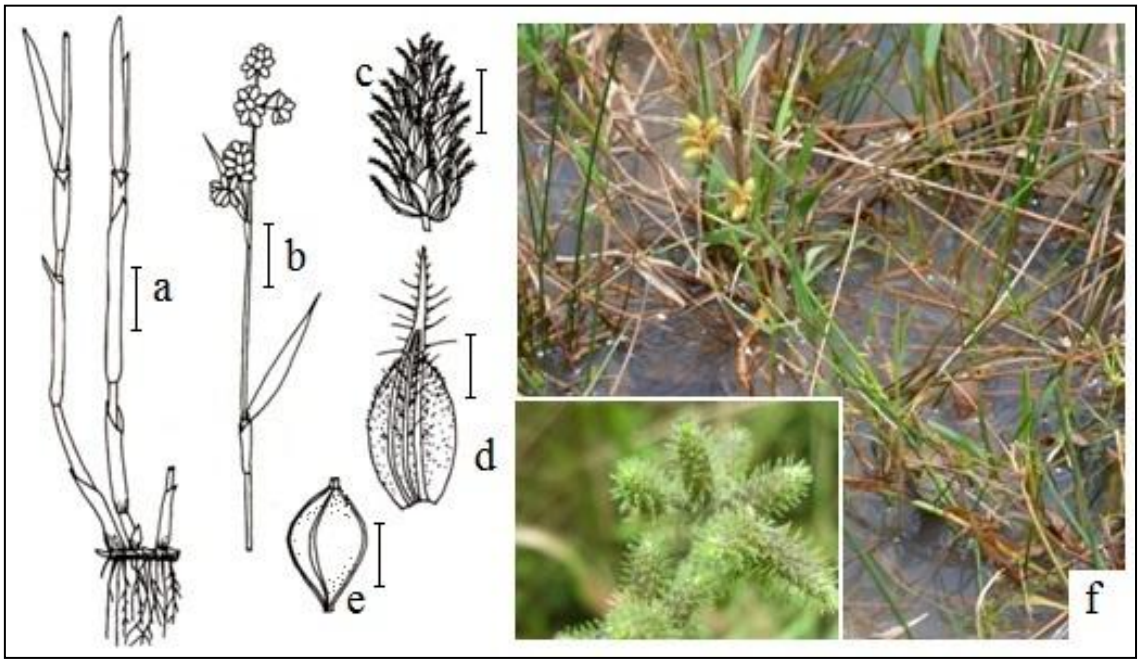


Figure 36. *Fuirena ciliaris*: **a,** base of the plant (2 cm); **b,** inflorescence with hairs omitted (2 cm); **c,** spikelet (2 mm); **d,** glume (0.5 mm); **e,** nut (0.5 mm); **f,**plant in fieldwith inflorescence.

Ecological Notes: Annual. Forming small clumps or tufts in open wet or swampy places, river banks, roadside ditches, margins of ponds and in rice fields.

Field Collections: Kehcenda at Jhargram, Kalikadihi at Pingla, Akalposh at Debra, Gowaltore at Chandrakona.

***Kyllinga*:** 2 species

Key to species

1. Rhizomes corm-like, erect; culms densely tufted; inflorescence usually of 3 heads; spikelets not more than 2 mm long; third and fourth glumes not more than 2 mm long, without a cusp ***K. tenuifolia***
1. Rhizomes elongate, creeping; culms solitary or in a single row along the rhizome; inflorescence usually of 1 head; spikelets 3 mm or more long; third and fourth glumes 2.5 mm or more long, with a straight or curved cusp ***K. brevifolia***

Kyllinga brevifolia Rottb.: Figure 37.

Rhizomes stoloniferous (long, creeping and near the surface), 1-3 mm in diameter, clothed with brown scales, Culms solitary or in a single row, 3-50 (-90) cm tall, (0.5-) 1-1.5 mm thick. Leaf sheaths membranous, brown to purple, the lower ones almost bladeless, blades well-developed on upper leaves, flat, shorter than or as long as the culms, 1-3(-5) mm wide. Involucral bracts 3 or 4(-6), the lowest usually erect or spreading, the remainder usually spreading or some reflexed, 3-10 (-20) cm long. Inflorescence a single head (rarely of 2 or 3 heads); head globose or broadly ovoid-globose. 5-10 mm in diameter, pale green becoming straw-coloured at maturity. Spikelets lanceolate-oblong to elliptical, 2-4 mm long, 1 mm wide. Glumes ovate-elliptical, membranous, 5- or 7-nerved. Cuspidate at apex; first and second glumes up to 1 mm long, remaining glumes 2.5-4 mm long; keel projecting beyond the glume apex into a straight or curved cusp, smooth or sparsely spiny towards the tip. Stamens 0.5-0.8 mm wide, brownish.

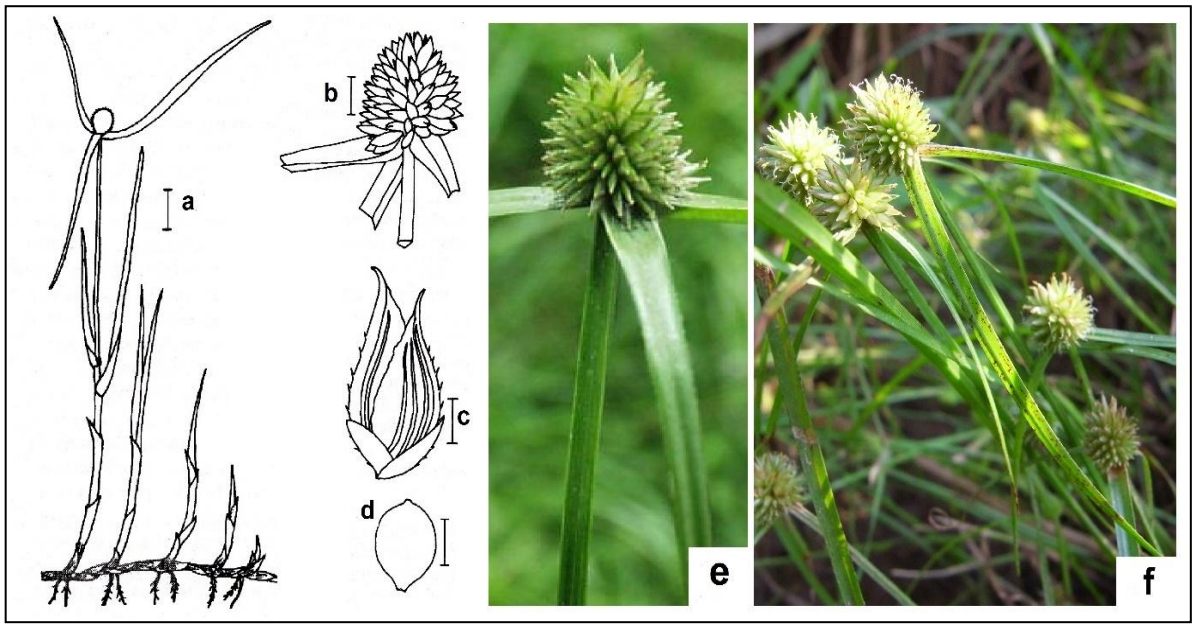


Figure 37. *Kyllinga brevifolia*: **a,** whole plant (1cm); **b,** inflorescence (2 mm); **c,** spikelet (0.5 mm); **d,** nut (0.3 mm); **e,** inflorescence; **f,** plant parts in field.

Flowering and Fruiting: throughout the year

Field Collections: Common in everywhere.

Ecological Notes: Perennial. Found along streams and rivers, at the edge of pools, in marshy irrigated land and frequent in and around rice fields.

Kyllinga tenuifolia Steud.: Figure 38

Rhizomes short, erect, without stolons. Culms densely tufted slender but bulb or corm-like at base, (3-) 5-15(-45) cm tall, 0.5-1, mm thick. Leaf sheaths stout, light brown, blades well-developed, linear, flat to plicate, shorter than the culms, 1-2 (-3) mm wide. Involucral bracts spreading, becoming reflexed at maturity, the lowest up to 10 cm long. Inflorescence of usually 3 (rarely 1,4 or 5), sessile spikes, central spike central spike globose to ovoid-globose, 4-9 mm long, ±5 mm in diameter (the lateral ones somewhat smaller), pale green to grayish white. Spikelets oblong to lanceolate-oblong. 1.7-2 mm long, 0.6 mm wide. Glumes ovate-oblong, 1.7-2 mm long, 0.6 mm wide. Glumes ovate-oblong to lanceolate oblong. Hyaline, first and second glumes, 1 or 3 nerved, 0.3-0.5 mm long, remaining glumes 5 or 7 nerved, 1-2 mm long, cuspidate at apex, keel not or hardly extending beyond the glume apex, without a cusp at most submucronulate, smooth, stamens 2. Nuts oblong, 1-1.5 mm long, 0.5 mm wide, brownish.

Flowering and Fruiting: Throughout the year

Ecological Notes: Perennial, common in marshy places particularly at the margins of tanks and streams but it is also found in wet or damp grassy places.

Field Collections: Jhilinga at Kharagpur, Tutranga at Narayangarh, also common in other places.

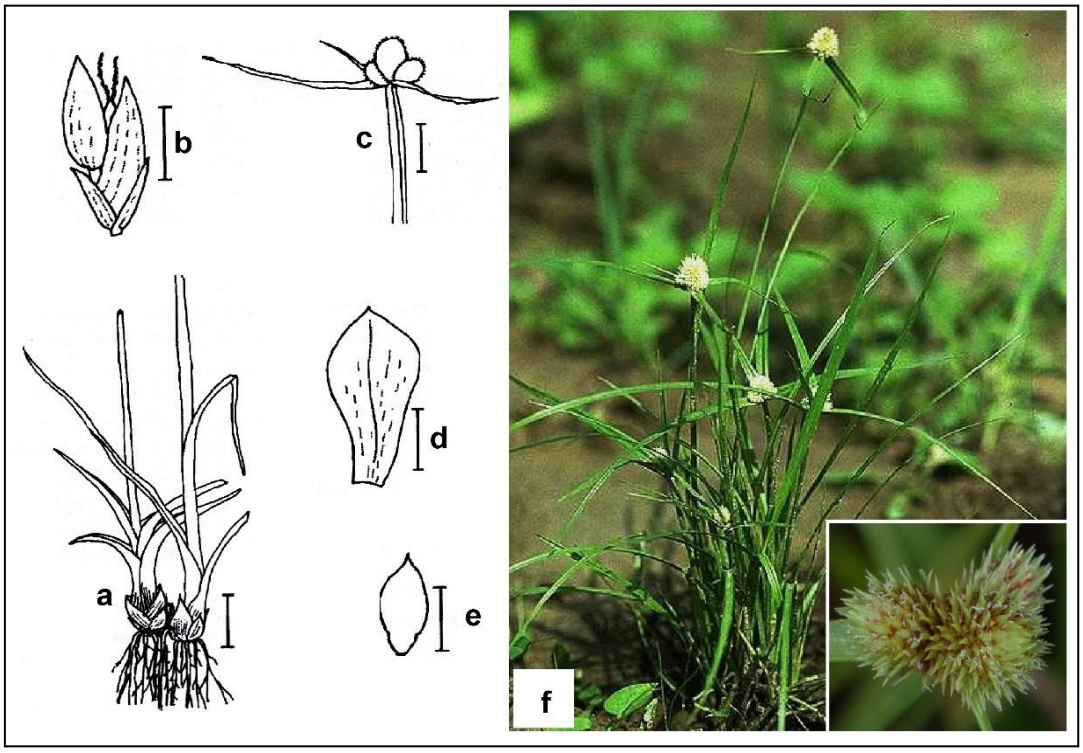


Figure 38. *Kyllinga tenuifolia*: **a,** base of shoot (1 cm); **b,** spikelet (1 mm); **c,** inflorescence (1 cm); **d,** fertile glume (1 mm); **e,** nut (1 mm); **f,** plant in field with inflorescence (inset).

Pycreus: 2 species

Key to species

1. Nuts narrowly oblong, at least twice as long as wide ***P. polystachyos***

1. Nuts ellipsoid or obovoid to orbicular, less than one and a half times as long as wide ***P. flavidus***

Pycreus flavidus (Retz.) T.: Figure 39.

Rhizomes inconspicuous, roots yellow. Culms densely tufted, smooth, (5-) 8-80 cm tall, 1-1.5 mm thick, obtusely 3-angled. Leaves few, shorter than the culm; sheaths elongated, tinged with reddish-brown; blades channelled, grooved or folded, rigid, often needle-like, up to 15 cm long, 1-2 (-3) mm wide, gradually acuminate. Involucral bracts 2-4, the lower 2 overtopping the inflorescence, the longest up to 25 cm long. Inflorescence simple or partly compound, open or rarely contracted into a single cluster of spikelets; primary rays 1-6, up to

7 cm long. Spikes ovoid to broadly ovoid, up to 2.5 cm long, pale or fuscous, with (5-) 10-15 (-40) spikelets. Spikelets spreading, linear or linear-oblong, parallel-sided, strongly flattened, 5-10 (-30) mm long, 1-2 (-3) mm wide, with 20-40 (-60) flowers, reddish-brown to purplish-brown; rachilla straight, persistent, wingless, 4-angled. Glumes oblong-ovate, 1.5-2.5 mm long, 1-1.5 mm wide, membranous, reddish to purplish or black, the sides nerveless, hyaline margin whitish but very narrow and only towards the tip, the tip obtuse; keel distinct, green, 3 nerved, stamens always 2. Style slightly shorter than the nut stigmas 2, longer than the obovoid (0.4-) 0.8-1.2 mm long stipitate, apiculate, maturing dark brown, minutely puncticulate, with isodiametric epidermal cells.

Flowering and Fruiting: July to September.

Ecological Notes: Annual or occasionally perennial in permanently wet habitats. In open, wet places, swamps, marshes, margins of pools and ditches, in rice fields and other irrigated areas.

Field Collections: Jhangia at Pingla, Vamuya at Sabong, Shyamsundarpur at Gopiballavpur.

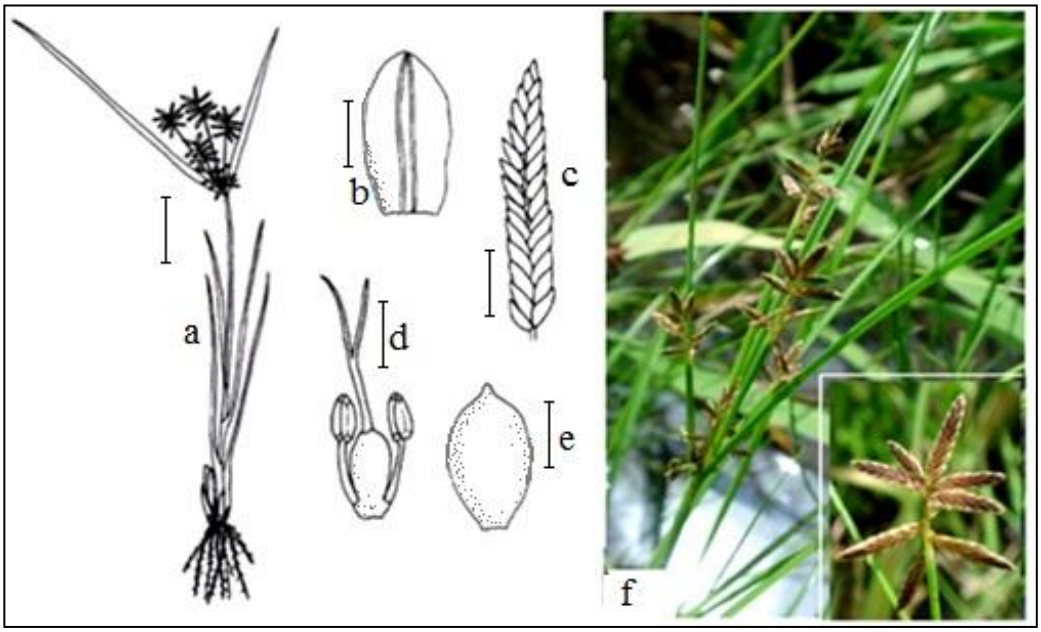


Figure 39. *Pycreus flavidus*: **a,** whole plant (2 cm); **b,** glume (0.5 mm); **c,** spikelet (2 mm); **d,** flower (0.5 mm); **e,** nut (0.5 mm); **f,** plant with inflorescence in field (inset).

Pycreus polystachyos (Rottb.) P. Beauv.: Figure 40.

Rhizomes short or absent. Culms tufted, stiffly erect, (10-) 20-60 (-80) cm tall, 1-2 (-3) mm thick, smooth, 2-sided becoming 3-angled just below the inflorescence. Leaves few, shorter than the culm; sheaths reddish-brown; biades flat or slightly plicate, 5-40 cm long, 1.5-3 (-5) mm wide. Involucral bracts 3-5, at least the lowest overtopping the inflorescence, the longest up to 20 cm long. Inflorescence loose or compact panicle or contracted in a subglobose or irregularly lobed head-like cluster of spikelets; primary rays 0-8, spreading, up to 7 cm long. Spikelets digitally arranged, linear to linear-lanceolate, flattened, (0.5-) 1-2.5 cm long, 1.5-2 mm wide, with 10-50 flowers, gradually narrowed to an acute apex, yellowish to red-brown; rachilla flexuous, narrowly winged. Glumes oblong-ovate to ovate-elliptical, 1.7—2.5 mm long, 0.8-1 mm wide, yellowish to red-brown, the sides nerveless, margin whitish hyaline, the tip acutish or obtuse with a minute mucro; keel distinct, green, 3-nerved. Stamens (1) 2. Style ± twice as long as the nut. Nuts biconvex flattened, narrowly oblong to oblong, 1-1.5 mm long, 0.3-0.5 mm wide, stipitate, subtruncateat top, minutely apiculate, minutely puncticulate.

Flowering and Fruiting: June to October.

Field Collections: Gopinathpur and Jhangia at Pingla, Jambini, Silda, Purunia at Dantan, Bishnupur at Sobong, Goura at Ghatal, Roskundu at Gowaltore.

Ecological Notes: Annual or short-lived perennial. Seasonally flooded areas, damp places, marshes, rice fields, river banks and at the margins of pools.

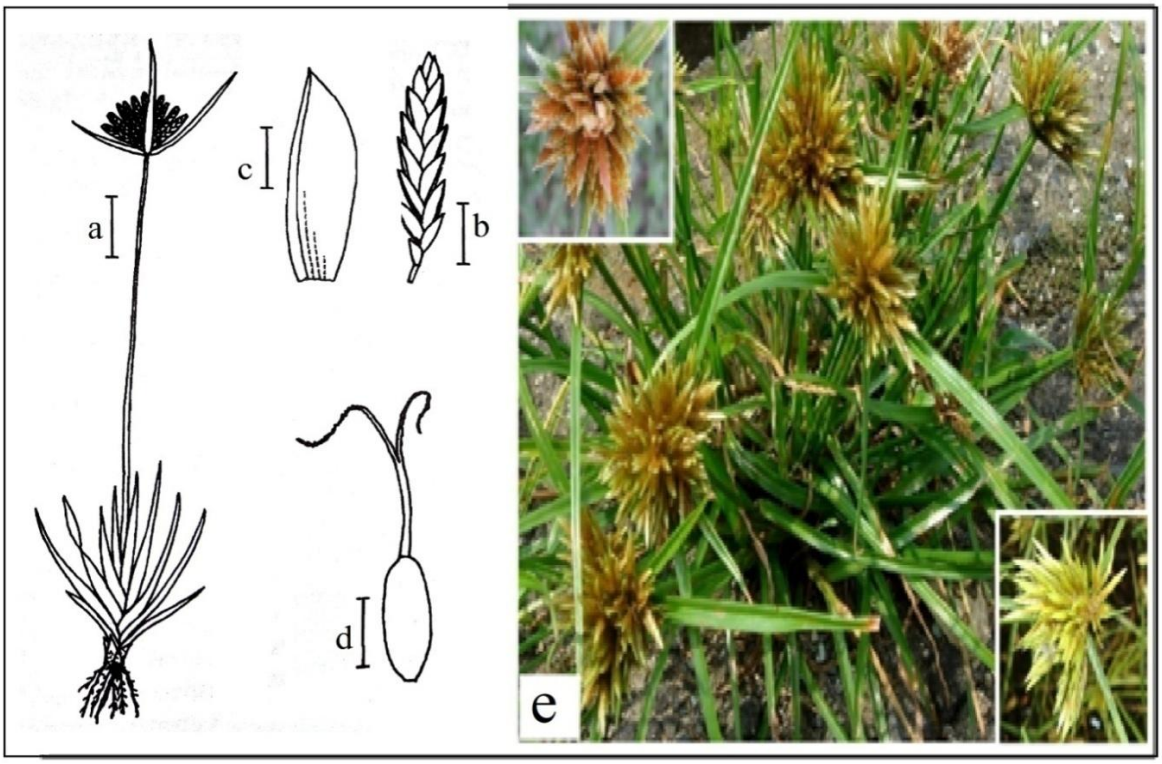


Figure 40. *Pycreus polystachyos*: **a,** whole plant (1cm); **b,** spikelet (2mm); **c,** glume (0.5mm); **d,** nut (0.5mm); **e,** plant in field.

Schoenoplectiella: 2 species

Key to species

1. Culms and main inflorescence bracts with distinct transverse septa **S. *articulata***

2. Culms and main inflorescence bracts without transverse septa or if culms septate then bracts not sepate ***S. juncoides***

Schoenoplectiella articulata (L.) Lye: Figure 41.

Vernacular name: Patpati or Chincko

Roots shallow. Culms in tufts of 3-10, terete but with shallow ridges, (4-) 10-40(-80) cm tall including the bract, (1-)3-10 mm in diameter, at base hardened, above hollow or pith-filled, with transverse septa at intervals of 5-20 mm, smooth, deep green, slightly shiny. Leaves reduced to 1 or 2(3), bladeless sheaths, the lower scale-like and brown, the upper cylindrical, 3-20 cm long, much wider than the culm, pale green becoming yellow later, often reddish below, ending in a broad lobe. Main inflorescence bract appearing as a continuation of the

culm, much longer than the culm proper, 6-40 (-60) cm long, somewhat flattened above with very conspicuous transverse septa. Inflorescence pseudo lateral, of 1-30(-60) sessile, apparently lateral spikelets in a dense, head-like cluster (1-4 cm in diameter). Spikelets sessile, ovoid or oblong-ovoid, terete, 6-18 mm long, 4-6 mm in diameter (or up to 10 mm with glumes spreading), variegated grey, greenish and reddish-brown. Glumes relatively stiff, deltate to broadly ovate, concave, 3.5-6.6 mm long and wide, acute, apiculate, many-nerved, pale green to golden or reddish-brown, with a green and protruding midrib, longitudinal ridges distinct; keel scarcely prominent. Perianth segments absent. Style 1.5-2 mm long; stigmas 3, shorter than the style. Nuts 3 angled, with slightly concave sides, obovoid, 1.5-2 mm long, 1.5-1.7 wide, smooth, whitish when young becoming dark brown to black when mature.

Flowering and Fruiting: December to March.

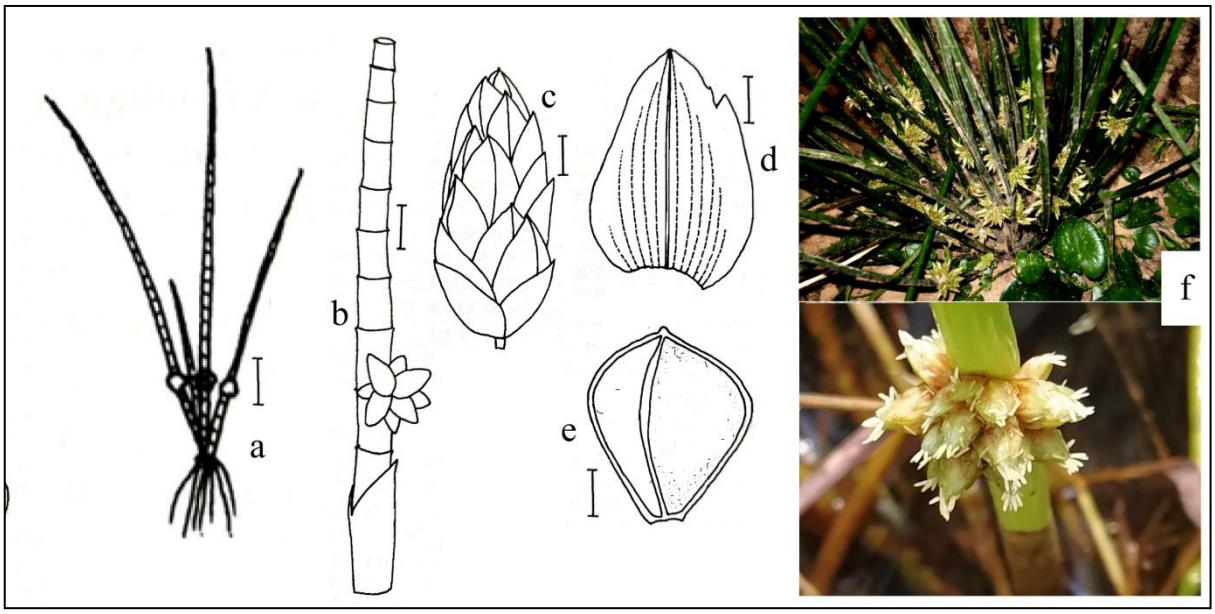


Figure 41. *Schoenoplectiella articulata*: **a,** habit (10 cm); **b,** basal portion of culm with inflorescence (1 cm); **c,** spikelet (5 mm); **d,** glume (1 mm); **e,** nut (0.5 mm); **f,** plant with inflorescence (inset) in field.

Ecological Notes: Annual or perhaps sometimes perennial. In seasonally flooded places, flowering as the water recedes, also in swamps and rice fields; sometimes in brackish water.

Field Collections: Dujipur at Pingla, Hosnabad at Medinipur sadar, Shyamchak at Debra.

Schoenoplectiella juncoides (Roxb.) Lye: Figure 42.

Culms tufted, subterete or obtusely several-angled and ribbed, 15-70 (-120) cm tall, 1-4 mm thick, light green, dull. Leaves reduced to 2 or 3 sheaths, the lower one's scale-like and brown, the upper one cylindrical, 5-15 cm long, membranous, pale green, with a small, mucronate, rudimentary blade. Main inflorescence bract 5-15 cm long, shorter than the culm, 1-furrowed on the inner side, rather suddenly subacute at the callous tip. Inflorescence pseudolateral, of (1-) 2-10 (12), sessile, apparently lateral spikelets in a dense head-like, cluster. Spikelets ovoid to oblong-ovoid, terete, 5-18 mm long at anthesis, lengthening to 30 mm in fruit, 2-6 mm in diameter, densely many flowered brownish to straw-coloured. Glumes broadly ovate, 2.5-4 mm long, 1.8-3.5 mm wide, concave; sides faintly many-nerved, purplish; margins minutely hairy towards the tip; midrib not prominent, excurrent or not and keeled, green, 1 or 3 nerved, minutely mucronate. Perianth bristles 4-6, with backwardly directed, hair-like teeth along the margins, shorter or some slightly longer than the nut, the longest rarely more than 2.5 mm long. Style 2 mm long; stigmas 2 or sometimes a third short branch present. Nuts broadly obovoid, unequally biconvex, 1.8-2 mm long, 1.5-1.8 mm wide, with faint pits or transverse wrinkles, shining dark brown to black.

Flowering and Fruiting: August to November.

Ecological Notes: Annual, found in wet places, swamps, river banks, often in shallow water, particularly common in inundated rice fields.

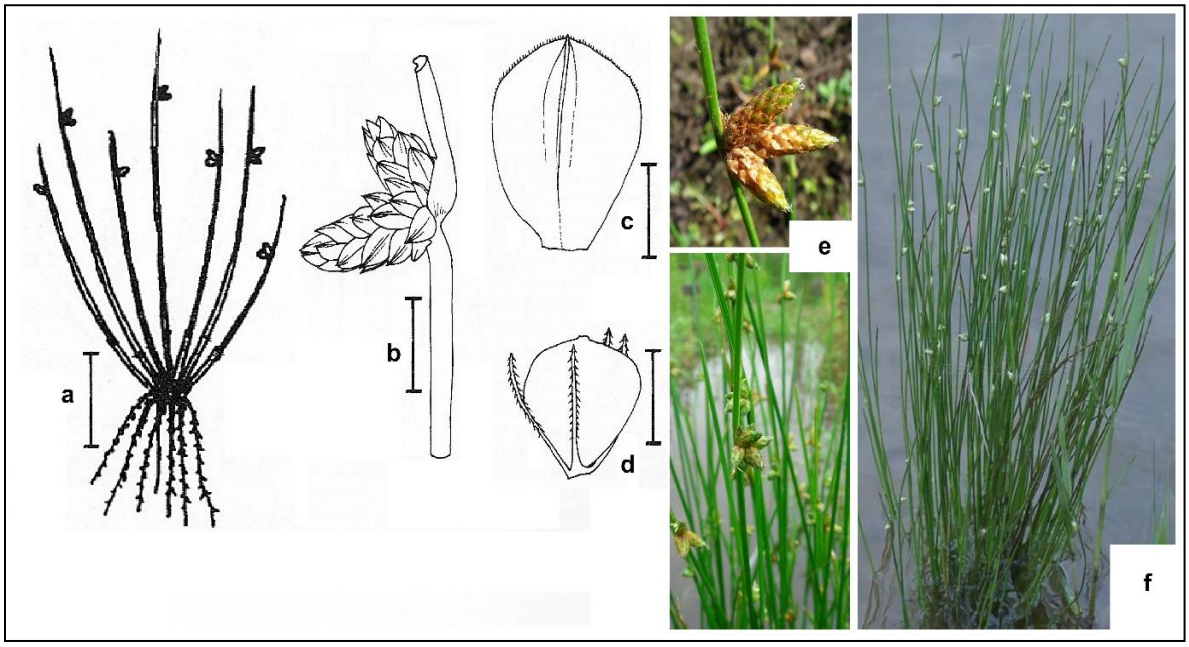


Figure 42. *Schoenoplectiella juncoides*: **a,** habit (10 cm); **b,** inflorescence (1 mm); **c,** glume (0.5 mm); **d,** nut (0.5 mm); **e,** plant with inflorescence (inset); **f,** plant in field.

Field Collections: Dujipur at Pingla, Hosnabad at Medinipur sadar, Shyamchak at Debra. Jhilinga at Kharagpur, Tutranga at Narayangarh and also common in other places.

Actinoscirpus grossus (L.f.) Goetgh. & D.A. Simpson: Figure 43.

Vernacular name: Bara Kashur

Stolons slender, up to 5 mm in diameter, ending in small tubers. Culms solitary (often growing in straight lines) or a few in tufts, corm-like at base, 80-200 cm tall, 2-2.5 cm in diameter towards the base, 0.7-1 cm in diameter below the inflorescence, sharply 3 angled, the faces concave, smooth. Leaves few to a culm, linear, 50-180 cm long, 1.5-3 cm wide, mostly equaling the culm. Involucral bracts 3 or 4, leaf-like, at least 2 exceeding the inflorescence a large terminal corymb with primary, secondary and tertiary rays. Spikelets solitary, the terminal ones sessile, the rest pedicellate, ellipsoid, (4-) 6-10 mm long, 3.5-4 mm in diameter, many-flowered, light brown to rusty coloured. Glumes broad-elliptical to oval-

elliptical, boat-shaped, 2-3 mm long, 2-2.5 mm wide, rusty brown, ciliate along the margins, obtuse at apex, nerveless, keel green. Perianth bristles (5) 6, light brown, slightly exceeding the nut, subequal, the longest 2 mm or more long, retrorsely scabrous. Stamens 3; anthers 1.5 mm long, connective deltoid. Style 3 mm long, the upper half 3 cleft. Nuts somewhat flattened, broadly obovate, 1-1.5 mm long, up to 1 mm wide, yellowish-brown.

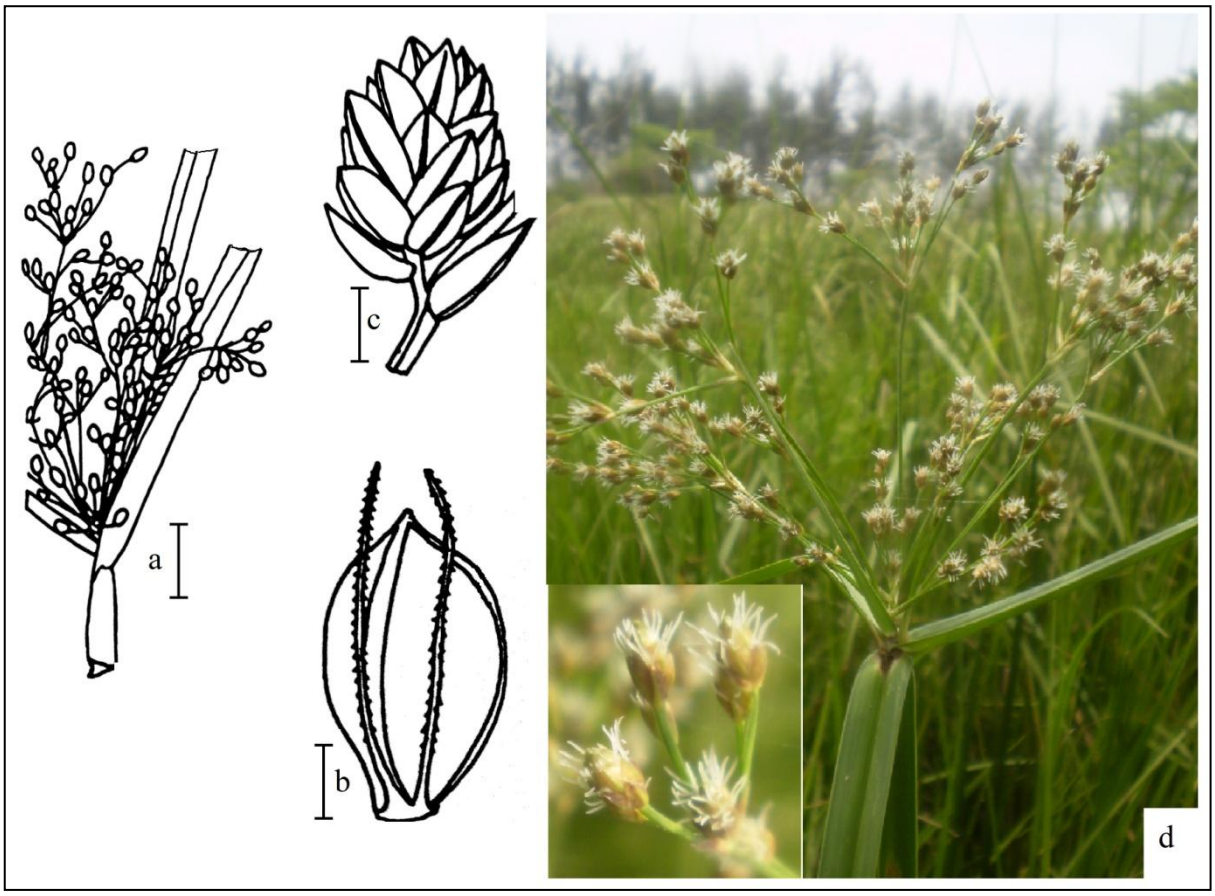


Figure 43. *Actinoscirpus grossus*: **a,** part of inflorescence (2 cm); **b,** nut (0.5 mm); **c,** spikelet (2 mm); **d,** plant in field with inflorescence (inset).

Flowering and Fruiting: July to December.

Ecological Notes: Perennial, marshy places both inland and near the coast, often standing in shallow water, common and gregarious.

Field Collection: Gopinathpur and Jhangia at Pingla, Jambini, Silda, Purunia at Dantan, Bishnupur at Sabong, Goura at Ghatal, Roskundu at Gowaltore, Jhilinga at Kharagpur, Tutranga at Narayangarh, also common in other places.

ERIOCAULACEAE: 1 genus, 4 species

Eriocaulon: 4 species

Key to species

1. Stems elongate; leaves filiform or ribbon-like; submerged aquatics, leaves clothing the elongate stems, not widened below ***E. setaceum***

1. Stems abbreviated with leaves in a rosette or if elongate then leaves linear and 1-6 mm wide; leaves more than 0.5 mm wide; temporarily submerged or marsh plants

2. Anthers white or pale yellow; leaves needlelike in a neat and dense cushion-like cluster, 1-2 (-5) cm long, not more than 4 mm wide at the base ***E. cinereum***

2. Anthers black; leaves usually flattened, usually forming spiky rosettes, mostly more than 2 cm longand usually more than 4 mm wide at the base

3. Seeds with longitudinal, white, ribbon-like bands; male sepals 2-lobed; female sepals 2 ***E. truncatum***

3. Seeds without longitudinal bands; male sepals 3-lobed; female sepals ***E. xeranthemum***

Eriocaulon cinereum R.Br.: Figure 44.

Vernacular name: Guri

Plants tufted, glabrous. Leaves numerous, forming a net, dense cluster, capillary or subulate, 1-2 (-5) cm long, 0.2-0.4 mm in diameter, up to 4 mm wide at base but usually less, green. Scapes few or many, ±4-8(-15) cm long, 0.5-0.4 mm in diameter, 5-ribbed, scarcely to tightly twisted; sheaths shorter than the leaves, slightly inflated, shortly obliquely split, acute. Heads globose to conical or ovoid, 2-4 mm in diameter, whitish, greyish or straw-coloured;

receptacle thinly pilose to almost glabrous. Involucral bracts shorter than the head, obovate-oblong, 1.2-1.5 mm long, ascending or spreading, glabrous, pale yellowish-grey. Floral bracts linear-elliptical to lanceolate-oblong, 1.5-2.25 mm long, membranous, loosely erect (not overlapping), glabrous, pale or dark, but usually with a dark central band and scarious margins. Flowers 3-merous, the female around the periphery. Male flowers: the 3 sepals united into a spathe with a 3-pointed tip, 0.75-1 mm long, dark grey, glabrous or sparsely hairy at the tip; petals included within the sepals, the lobes minute, unequal; anthers white or pale yellow. Female flowers: much reduced, sepals 3, 2 or absent, filiform, 0.6-1 mm long, simple or branched, caducous; petals absent or small and linear; stipes strikingly linear, glandular. Seeds ovoid- ellipsoid, 0.25-0.3 mm long; seed coat cells transversely elongate, aligned in vertical rows, appearing almost translucent, glossy, very faintly reticulate; appendages absent.

Flowering and Fruiting: July to January.

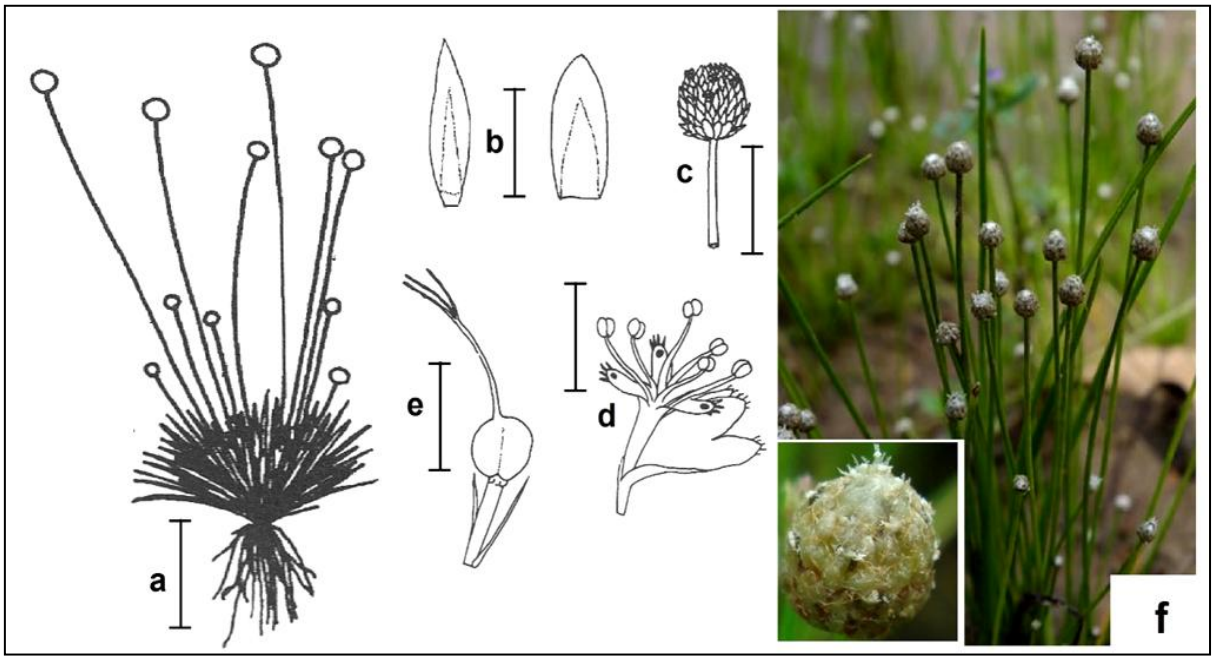


Figure 44. *Eriocaulon cinereum*: **a,** habit (1 cm); **b,** floral bract (0.5 mm) in left and involucral bract (0.5 mm) in right; **c,** head (2 mm); **d,** male flower (0.25 mm); **e,** female flower (0.25 mm); **f,** plant with inflorescence(inset); **f,** plant in field with head (inset).

Ecological Notes: A small annual. Mostly found in shallow, temporary water or in sewage areas. Abundantly found as weed in the paddy fields; and moist swampy areas.

Field Collections: common in selected district, specialy in Kechenda at Jhargram, Kendugari at Gopiballavpur, Kakrajor in Belpahari, Tapoban in Nayagram,

Eriocaulon setaceum L.: Figure 45.

Stems elongate, 10-35 (-160) cm long, spongy, densely clothed in numerous leaves, terminating in an umbel of many scapes, the heads floating on or emerging above the water surface. Leaves filiform, 4-10 cm long, 0.1-0.4 mm wide, broadening towards the base, glabrous, semi-translucent, 1-nerved. Scapes 7-20 cm long, ± 0.4 mm in diameter, 5- to 7-ribbed, twisted; sheaths up to 3.5 cm long, loose, glabrous, parallel sided, obliquely split, acute. Heads hemispherical to conical, whitish, pale green, brown, grey or black, 2.5—4.5 mm in diameter; receptacle conical to columnar, pilose. Involucral bracts shorter than the head width, obovate-oblong, ± 1.25 mm long, rounded, glabrous, with scarious and sometimes cut margins, turned slightly downwards at maturity. Floral bracts oblong-cuneate, ±1.25 mm long, black, white-papillose on the centre back or glabrous, acute. Flowers 3-merous, 0.9-1.4 mm long, enclosed within the bracts. Male flowers shortly stalked; sepals united and spathe- like to almost free, ± 1 mm long, 3-lobed, black or yellowish-grey glabrous or with some white papillae near the rounded tips; petals minute, enclosed within the sepals, without black glands; anthers black. Female flowers shortly stalked; sepals subequal, variable, boatlike, swollen, ± 0.75 mm long, with a thickened and sometimes winged keel, glabrous or white papillose; petals narrowly oblanceolate to almost linear, ± 0.75 mm long, white papillose at the tip, glands poorly developed or absent. Seeds oblong-ellipsoid, 0.4-0.6 mm long; seed coat cells transversely elongated, aligned in vertical rows; appendages 3-8 arising

from the transverse radial walls, appearing as transverse rings on the seed surface, bristle-like, truncate at die tip, with a mucilaginous coat above the appendages.

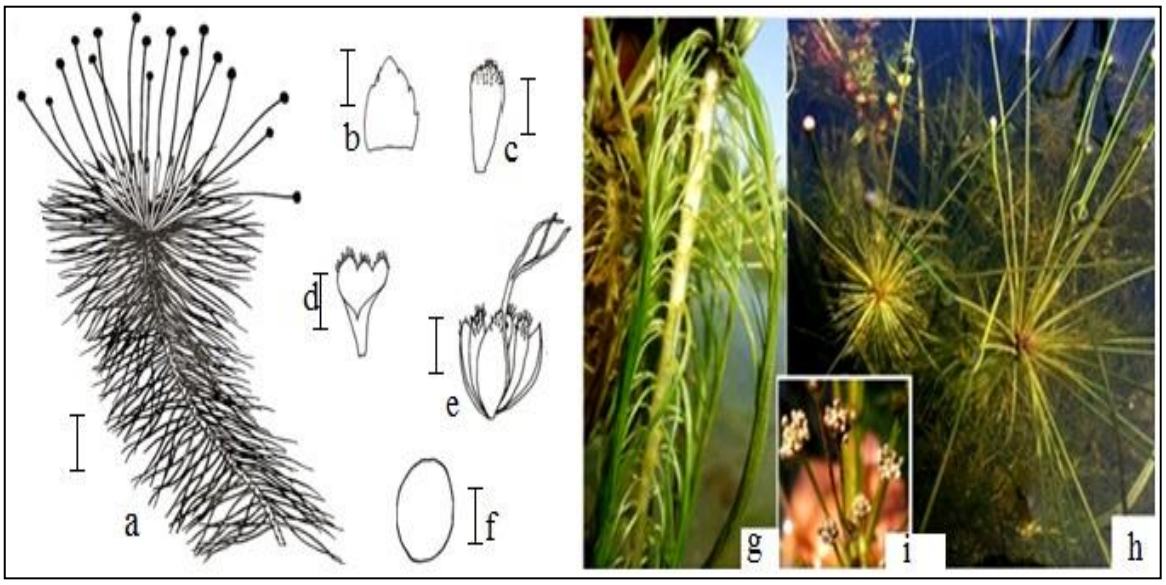


Figure 45. *Eriocaulon setaceum*: **a,** habit (2 cm); **b,** involucral bract (0.5 mm); **c,** floral bract (0.5 mm); **d,** male sepals (0.5 mm); **e,** female flower (0.5 mm); **f,** seed (0.18 mm); **g,** submerged leaves; **h,** aerial plant part on water with heads (inset).

Flowering and Fruiting: June to October.

Ecological Notes: Annual or perhaps sometimes perennial. Vegetative parts totally submerged. Found in a wide variety of aquatic habitats.

Field Collections: Asui and Kendugari at Gopiballavpur, Rohini at Sakrail, Hatibari near Jamsola gate.

Eriocaulon truncatum Buch.-Ham. ex Mart.: Figure 46.

Tufted, leaves linear to lanceolate, 1-6 cm long, 1.5-3.8 mm wide, glabrous, rather broad at the base, 10- to 18-nerved, subacute and apiculate, dying back at maturity to expose the central bunch of scape sheaths. Scapes few or many (4-30), stout, 5-15 (-25) cm long, 0.4-0.8 mm in diameter, 5- to 8-ribbed, twisted; sheaths loose, up to 4.5 cm long, shorter than the leaves, obliquely spathe-like at the mouth, often splitting and becoming 2-lobed. Heads cup-shaped to flattened- giobose, 3-5.5 mm in diameter, glistening white or yellowish-grey;

receptacle thinly pilose to almost glabrous. Involucral bracts as wide as the head, at or before anthesis sometimes visible when viewed from above, broadly obovate or oblong, 2-3 mm long, truncate or with an obtusely triangular tip, pale yellowish-grey, shiny, glabrous and glistening, spreading upwards in fruit. Floral bracts closely overlapping and enclosing the flowers, oblong-ovate to spathulate, 1.75-2.5 mm long, membranous, glabrous or papillose at the tip, scarious and shiny. Flowers 1.5-1.6 mm long, male and female intermingled. Male flowers: stipe 0.25-0.7 mm long; sepals 2, oblong, ± 1.25 mm long, grey, glabrous, united on one side at the base; petals 3, very small, with white papillae; anthers black. Female flowers: sepals 2 (3), free, linear-spathulate, ±1.3 mm long; petals 3, narrowly oblanceolate, 1.25-1.5 mm long, thinly pilose to almost glabrous. Seeds oblong to ovoid, 0.35-0.5 (-0.7) mm long; seed coat cells rectangular, vertically elongated, aligned in vertical rows; appendages in the form of ribbon-like bands from the vertical walls and solitary incomplete bands from the transverse radial walls, the seed surface appearing coarsely reticulate with longitudinal white, ribbon-like bands.

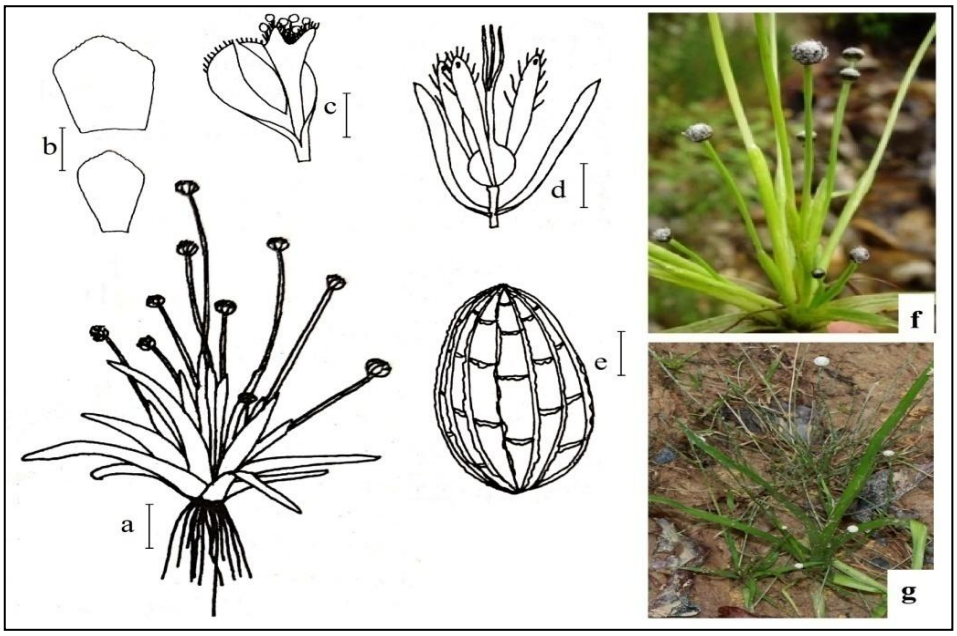


Figure 46. *Eriocaulon truncatum*: **a,** flowering plant (1 mm); **b,** involucral bract and floral bract (0.5 mm); **c,** male flower (0.5mm); **d,** female flower (0.5mm); **e,** seed (0.2mm); **f,g,** plant in field.

Flowering and Fruiting: July to December.

Ecological Notes: Annual. In undated places, marshland and wet rocks, common in rice fields.

Field Collections: Asui and Kendugari at Gopiballavpur, Rohini at Sakrail, Hatibari near Jamsola gate.

Eriocaulon xeranthemum Mart.: Figure 47.

Tufted, leaves linear or linear-lanceolate, rarely more than 4 cm long; ± 3 mm wide, flat, glabrous, attenuate towards an acute or acuminate tip. Scapes many or few, rarely more than 6 cm long, 4-7 mm in diameter, 5- to 7-ribbed, glabrous; sheaths lax, up to 3 cm long, acute or subacuminate. Heads hemispherical to flattened, ± 6 mm in diameter, yellowish-grey; receptacle convex, glabrous. Involucral bracts linear- oblong to oblanceoiate, 2-3.5 mm long, 0.25-0.75 mm wide, erect or spreading, much longer than the floral bracts and flowers, straw-coloured to almost white, glabrous, often showing beyond the margin of the head when viewed from above, acuminate. Floral bracts cuneate, ± 1.25 mm long, membranous, truncate, hyaline, the tips papillose hairy. Flowers 3-merous. Male flowers: sepals united below, spathe- like and split down one side, cuneate, ± 1 mm long, black, 3-lobed, the lobes truncate, the tips papillose hairy; petals very small, with white papillae and a black apical gland; anthers black. Female flowers: sepals free, ± 1 mm long dark, 2 lateral ones oblanceoiate, yellowish-grey obtuse, with white hairs at the tip, the third linear, glabrous or with a few white hairs at the tip; petals spathulate, 0.75-1 mm long, hyaline, hairy at the tip, with black glands. Seeds oblong-ellipsoid, ± 0.42 mm long; seed coat cells transversely elongate, aligned in vertical rows; appendages 2-4 from the transverse radial walls, shorter than the seed coat cells, appearing as transverse rings on the surface of the seeds, bristle-like, truncate at the tip.

Flowering and Fruiting: July to January.

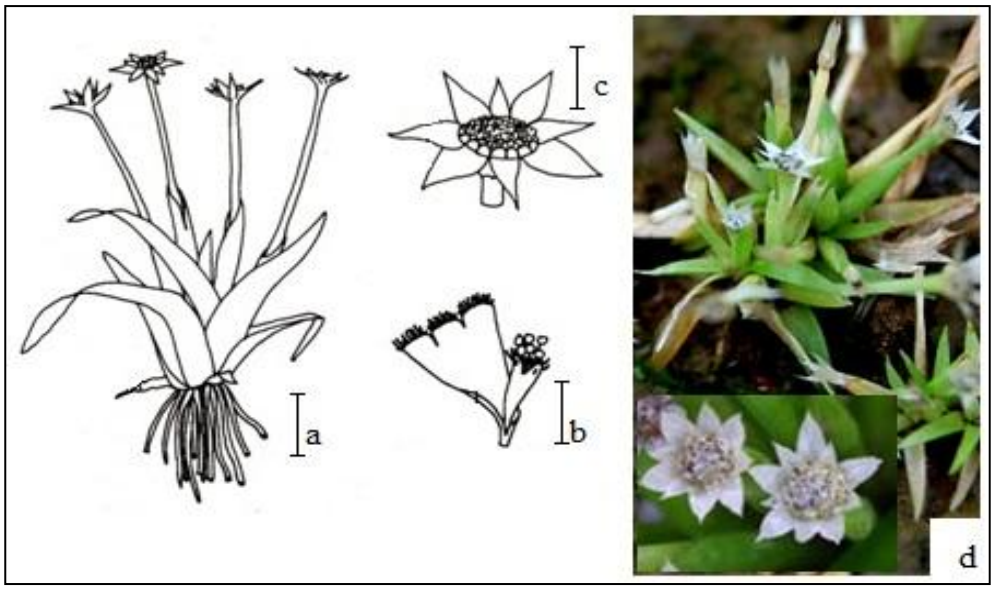


Figure 47. *Eriocaulon xeranthemum*: **a,** flowering plant (1 cm); **b,** male flower (1 mm); **c,** head (1 mm); **d,** plant in field with head.

Ecological Notes: Annual. In marshes, pools on laterite rice fields and other seasonally inundated places.

Field Collections: Asui in Gopiballavpur, Hatibari, Nayagram.

HYDROCHARITACEAE: 6 genera, 10 species

***Blyxa*:** 4 species

Key to species

1. Stems elongate, flaccid; leaves cauline; spathes sessile or nearly so ***B. japonica***

1. Stems contracted to a simple or forked rootstock or corm; leaves radical; spathes distinctly pedunculate; peduncles up to ± 50 cm long

2. Flowers bisexual; stamens 3

3. Seeds ellipsoidal, 1.25-1.8 mm long, smooth or with up to 12, somewhat irregular, longitudinal non-spiny ridges or ribs, without apical and basal tails ***B. aubertii***

3. Seeds with up to 12, irregular but distinctly spiny ridges and with apical and or basal tails ***B. echinosperma***

2. Flowers unisexual; stamens 9 ***B. octandra***

Blyxa aubertii Rich.: Figure 48.

Stems corm- or rootstock-like, leaves radical, 2.5-60 cm or more long, 0.2-1.2 cm wide, linear but gradually attenuate to a fine point at the apex, midrib distinct and prominent with up to 10 secondary and up to 28 tertiary parallel veins, faint cross-veins often present; margin (at least towards the apex) with macroscopic, regularly spaced, unicellular spines. Spathes 1- or rarely spaced 2-flowered; distinctly pedunculate; peduncles up to ± 50 cm long (flowers carried above the leaves). Flowers bisexual, usually emergent but sometimes submerged. Petals linear, band-like, often remaining folded and twisted within the calyx. Stamens 3, antesepalous. Stigmas laterally papillose. Capsules (2-) 3-5 (8-) cm long. Seeds ellipsoidal, 1.25-1.8 mm long, smooth or with up to 12, somewhat irregular, longitudinal ridges or ribs, long spines and apical and or basal tails absent.

Flowering and Fruiting: Throughout the year.

Ecological Notes: Usually annual but may persist longer in permanent water. The leaves are submerged. It usually grows in temporary water and is often found in rice fields and irrigation ditches, but is not considered to be a serious weed.

Field Collections: common in selected district, specialy in Kechenda at Jhargram, Kendugari at Gopiballavpur, Kakrajor in Belpahari, Tapoban in Nayagram, Asari in Debra, Bhadutala at Midnapore, Ruinan at Sabong, Goura at Daspur, Belti at Narayangarh.

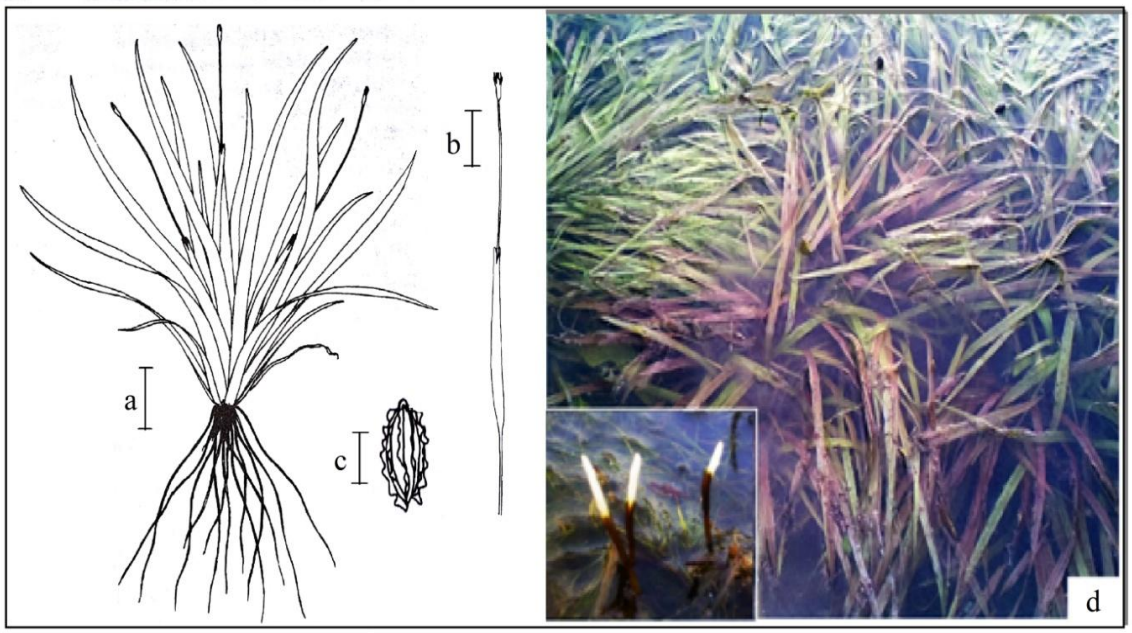


Figure 48. *Blyxa aubertii*: **a,** whole plant (2 cm); **b,** inflorescence (1 cm); **c,** seed (1 mm); **d,** plant in field with flower (inside).

Blyxa echinosperma (C.B. Clarke) Hook.f.: Figure 49.

Like *Blyxa aubertii* but the seeds have up to 12, irregular but distinctly spiny ridges and with apical and or basal tails.

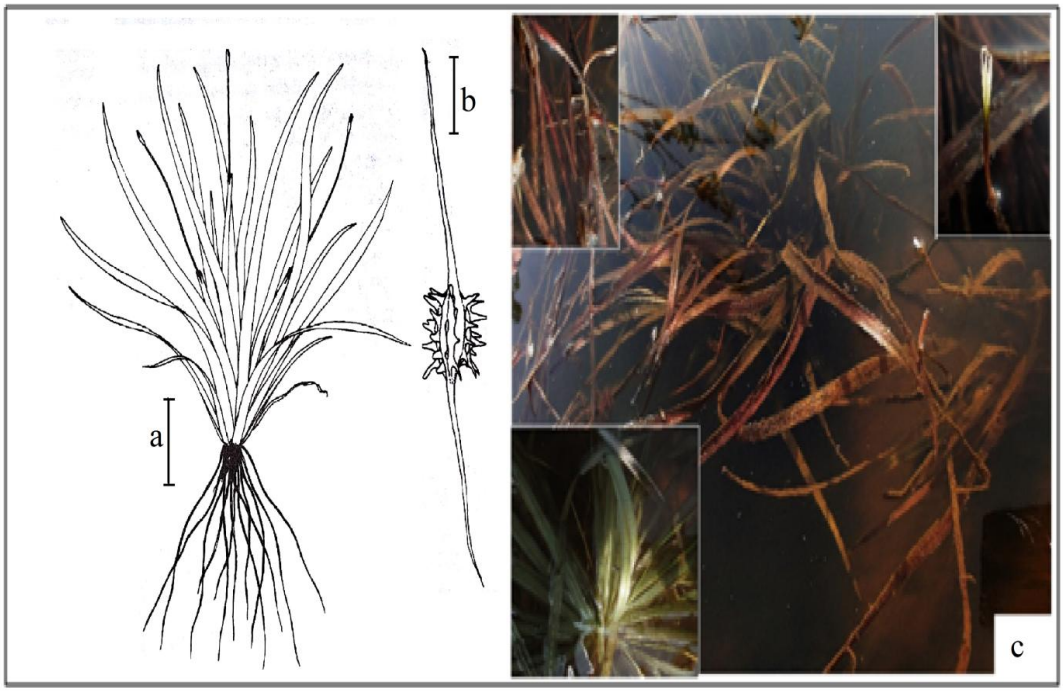


Figure 49. *Blyxa echinosperma*; **b,** seed (1 mm); **c,** plant in field.

Flowering and Fruiting: Throughout the year.

Ecological Notes: Ecologically indistinguishable from *Blyxa aubertii.*

Field Collections: Pandachhancha at Gopiballavpur, Dhankamra at Nayagram, Tapsia at Gopiballavpur.

Blyxa japonica (Miq.) Maxim. ex Asch. & Gürke*:* Figure 50.

Stems flaccid, slender, (1-) 10-20 (-60) cm long, usually branched below and simple above. Leaves cauline, lanceolate, 15-50 (-70) mm long, 0.75-3 (-4) mm wide, semi-amplexicaul at base, gradually attenuate to a blunt point at the tip, midrib distinct and prominent with up to 12 secondary parallel veins; unicellular spines. Spathes 1- or rarely 2- flowered, sessile or nearly so. Flowers bisexual, usually emergent but sometimes submerged. Petals lanceolate, 3-8 (-10) mm long, 0.2-0.8 (-1) mm wide, attenuate to a fine point. Stamens 3, antesepalous. Stigmas linear, 3-4.5 mm long, white. Capsules 1-2 (-2.5) cm long. Seeds fusiform, (1-) 1.5-2 (-2.5) mm long, smooth.

Flowering and Fruiting: October to June.

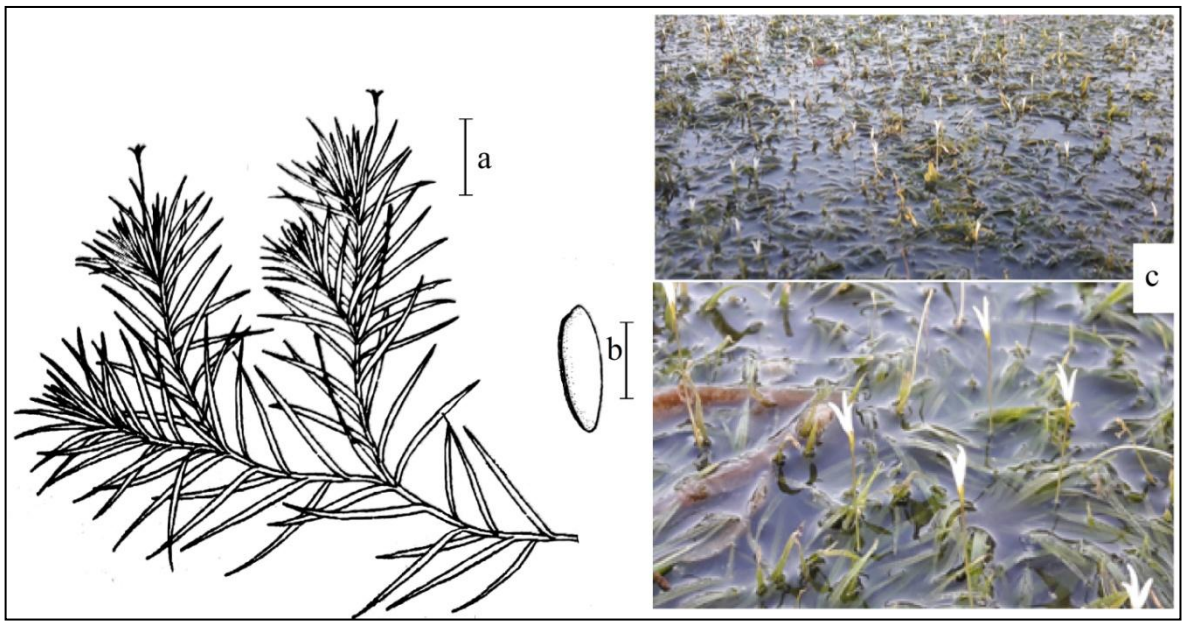


Figure 50. *Blyxa japonica*: **a,** flowering shoot (2 cm); **b,** seed (1 mm); **c,** plant in field with flower.

Ecological Notes: Annual. Found in temporary pools and streams, frequently in rice fields but hardly considered to be a serious weed. The flowers show pre-anthesis cleistogamy.

Field Collections: Chatinasol at Nayagram, Jamsol and Saria at Gopiballavpur, Tapsia at Gopiballavpur.

Blyxa octandra (Roxb.) Planch. ex Thwaites. Figure 51.

Vernacular name: Patasayola

Stems cormor rootstock-like. Leaves radical, 6-40 cm or more long, 0.2-0.8 cm wide, linear, somewhat narrowed below, gradually attenuate to a fine and flat point at the tip, midrib distinct and prominent with up to 20 secondary parallel veins, faint cross-veins often present; margin (at least towards the apex) with microscopic, regularly spaced, unicellular spines. Spathes distinctly pedunculate; peduncles up to ± 50 cm long (flowers carried above the leaves); the male with 22 or more flowers in each spathe, 1 or 2 opening each day; the female with 1 or rarely 2 flowers. Flowers unisexual. Male petals linear, up to ± 15 mm long, white, the adaxial surface with 3 longitudinal furrows and row of fine pollen carrying papillae. Stamens 9, the lowest 3 anthers ± 34 mm long, almost sessile; pollen grains 33.6 ± 4.4 pm in diameter. Female petals filiform, about as long as the stigmas, withering as the stingmas spread. Stigmas superficially resembling the petals of male flowers. Capsules 2.3-5.4 cm long. Seeds oblong-ellipsoidal, 1.3-2 mm long, with up to 12, somewhat irregular, longitudinal ridges, each bearing blunt peg-like spines.

Flowering and Fruiting: October to January.

Ecological Notes: Annual. In pools that dry out in the dry season, sometimes also in rice fields. Male plants often out number female ones.

Field Collections: Chatinasol at Nayagram, Jamsol, Saria and Tapsia at Gopiballavpur and Gokulpur at Kharagpur-II block.

Figure 51. *Blyxa octandra*: **a,** whole plant (9 cm); **b,** female flower (5 mm); **c,** male flower (5 mm); **d**, seeds (0.5 mm), **e** and **f,** plant in field.

Hydrilla verticillata (L.f.) Royle**:** Figure 52.

Vernacular name: Jhangi

Gynodioecious. Roots unbranched. Stems elongate branched regularly but at distant intervals, horizontal and stoloniferous below, erect and spreading above bulbil-like hibernacula (turions) develop either underground terminally on stolons or terminally or axillary on erect stems or their branches. Leaves cauline, scale -like and opposite or foliate in whorls of 3-12, sessile, linear to lanceolate or rarely widely ovate, regularly spaced along the stem but contracted towards the apex, margin serrate or toothed, apex acute and terminating in a single spine cell; squamulae intravaginales paired (or more at branches), ± 5 mm long narrowly triangular to lanceolate, fringed with finger-like, orange-brown hairs. Inflorescences

in the axils of normal foliage leaves; spathe sessile or subsessile, of 2 united bracts. Male flowers solitary, small, abscising as buds and opening explosively on the water surface; sepals 3, ovate and reflexed; petals 3, linear and reflexed; stamens 3, staminodes absent. Female flowers solitary, subsessile but with a long thread-like hypanthium carrying the flower to the surface; perianth of 3 oblong-ovate sepals and 3 elongate-ovate petals, spreading and floating; staminodes 3, minute. Carpels 3; styles 3, simple, very small (up to 0.75 mm long). Fruit a cylindrical capsule, indehiscent, armed or smooth. Seed rarely more than 5, fusiform and smooth.

Flowering and Fruiting: September to January.

Field Collections: Gopinathpur and Jhangia at Pingla, Jambini, Silda, Purunia at Dantan, Bishnupur at Sobong, Goura at Ghatal, Roskundu at Gowaltore. Jhilinga at Kharagpur, Tutranga at Narayangarh, also common in other places.

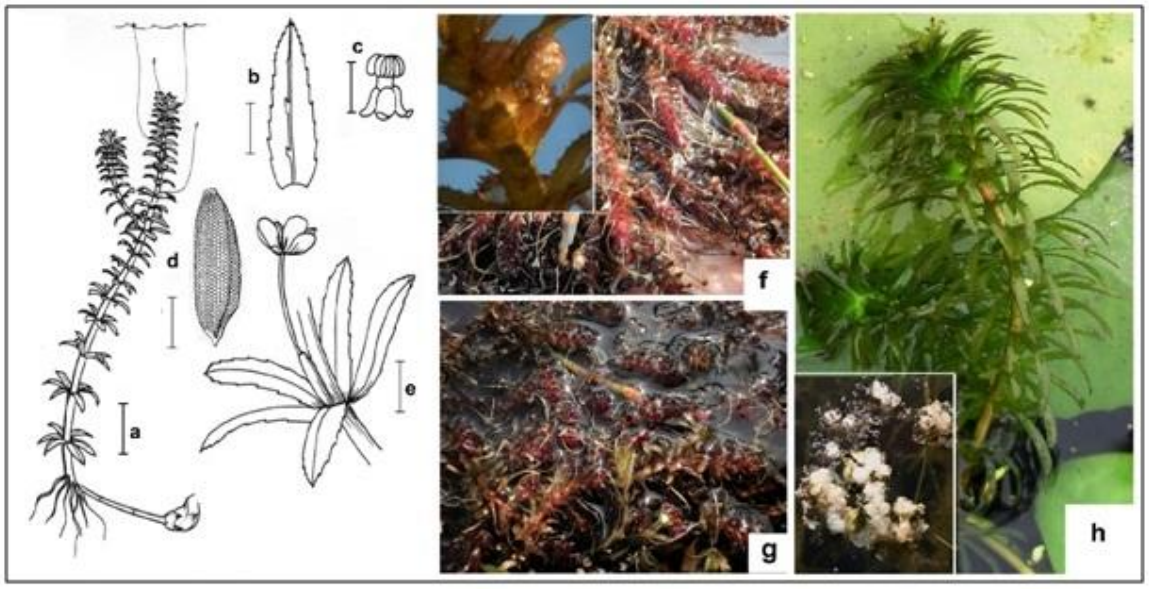


Figure 52. *Hydrilla verticillata*: **a,** female flowering shoot (8 cm); **b,** leaf (5 mm); **c,** male flower (1 mm); **d,** seed (1 mm); **e,** female flower (3 mm); **f, g,** female inflorescence with male inflorescence (inside); **h,** plant in field with male flower.

Ecological Notes: Mostly perennial but sometimes annual, totally submerged, growing in still or slowly flowing water, often very abundant and dominant over large areas.

Nechamandra alternifolia (Roxb. ex Wight) Thwaites: Figure 53.

Vernacular name: Rasna Jhangi

Dioecious. Root branched. Stems elongate up to 1 m or more long, irregularly branched, internodes long or contracted at apparently irregular intervals. Leaves cauline, sometimes clustered, distichous, flat, band-shaped, 1.5-6 cm long, veins parallel without a prominent midrib, sheathing and somewhat amplexicaul at the base, the margin and apex with unicellular spines. Inflorescences axillary, often in clusters; spathe of 2 united bracts. Male flowers very small, very numerous, abscising as buds and opening on the water surface; sepals 3, becoming reflexed at anthesis; petal 1 rudimentary or absent; staminode 1 or absent; stmens 2, borne parallel to the water surface. Female flowers solitary, sessile, with long thread- like hypanthia, floating on the surface at maturity; sepals 3; petals 1 rudimentary or absent; staminodes rudimentary or absent. Ovary of 3 carpels; styles 3, with flattened irregularly obdeltoid lobes. Fruit breaking irregularly, seeds numerous, ovoid, ± 1 mm long, with reticulate seed coat.

Flowering and Fruiting: January to June.

Ecological Notes: Annual or sometimes persisting longer in permanent water. Commonly grow on the village ponds, Jheels, roadside, canals and ditches; associated with other members of the family Hydrocharitaceae.

Field Collections: Kechenda at Jhargram, Kalikadihi at Debra, Akalposh at Debra, Gowaltore at Chandrakona, Jhilinga at Kharagpur, Tutranga at Narayangarh, also common in other places. Jamna, Belar, Sahara at Pingla.

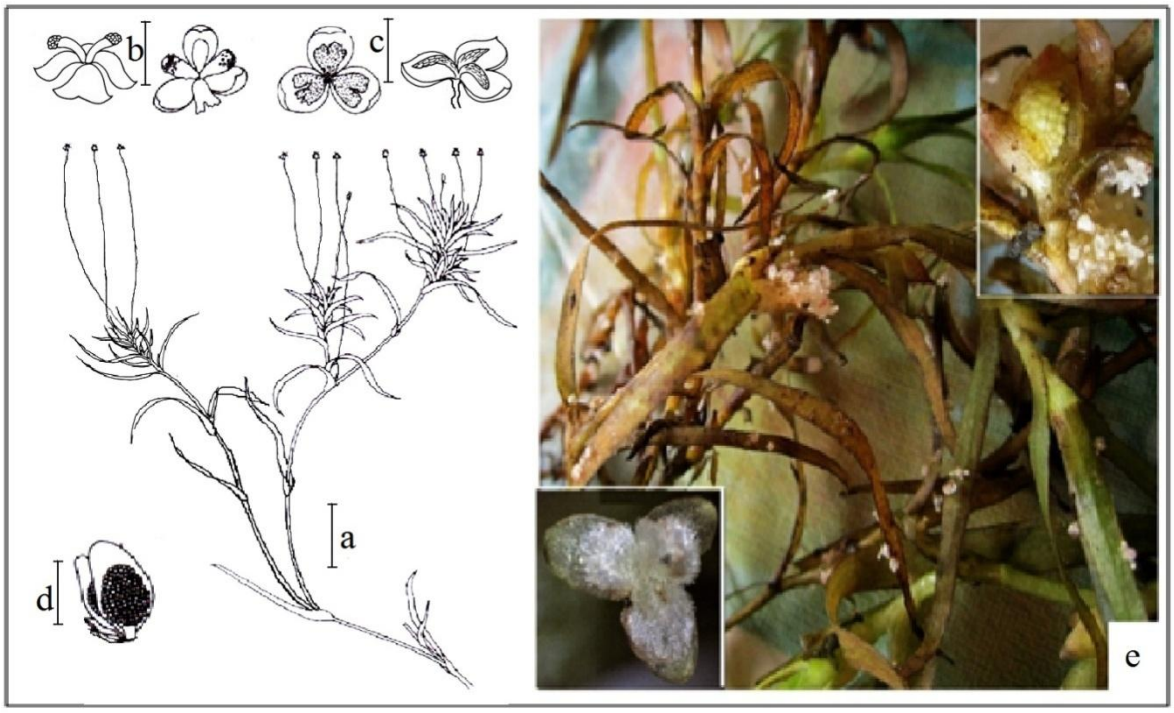


Figure 53. *Nechamandra alternifolia*: **a,** whole female plant (1 cm); **b,** male flower (1 mm); **c,** female flower (1 mm); **d,** male spathes (2.5 mm); **e,** plant in the field with male spathes and female flower.

Ottelia alismoides (L.) Pers. Figure 54.

Vernacular name: Panikala

Leaves totally submerged; petiole up to 50 cm or more long; leaf blades usually cordate with a distinct midrib and 2-10 longitudinal veins connected by numerous cross-veins joining at an angle of 60-70, giving the lamina the appearance of a quilt with rhomboidal patches. Spathes membranous with 3 or more wings. Flowers polygamous but in India mostly bisexual. Stamens 3-12, without staminodes. Ovary of 3-9 (-10) carpels; styles bifid to the base. Fruit ovoid to cylindrical, (15-) 20-40 (-50) mm long. Seeds up to 2000 or more, fusiform, 0.9-1.1 (-1.8) mm long, ± 0.3 mm wide, dark purple to black when mature, densely covered in whitish, unicellular hairs.

Flowering and Fruiting: September to March.

Figure 54. *Ottelia alismoides*: **a,** flowering plaant (7 cm); **b,** flower (3 cm); **c,** plant in field with flower.

Ecological Notes: Annual, may persist longer in permanent flowing or very deep water, very common on the shallow water ponds, Jheels, roadside canals or in the paddy fields.

Field collection: Kechenda at Jhargram, Kalikadihi at Debra, Akalposh at Debra, Gowaltore at Chandrakona.Jhilinga at Kharagpur, Tutranga at Narayangarh, also common in other places. Jamna, Belar, Sahara at Pingla.

Vallisneria spiralis L.: Figure 55.

Vernacular name: Patasyola

Submerged, stoloniferous, tufted herb. Leaves linear, acute or obtuse at apex, margin serrulate or entire, translucent green. Male spathe 5 to 10 mm long. Stamens of the staminate flowers 2, free and obliquely extended forming a 'V', without any hairs at the base. Female flowers with an incision deepest petal rudiment. Stigmas fringed along the margin Female spathe on long coiled peduncle which at maturity uncoiled and help fertilization after getting floating pollen from the water surface. Fruit linear, seeds numerous, oblong.

Ecological Notes: Perennial or occasionally annual. Commonly occur in the ditches, unused or less used ponds, Jheels or nalas and sometime on the paddy fields; associated with other aquatic plants.

Field Collections: Dujipur at Pingla Hosnabad at Medinipur sadar, Shyamchak at Debra. Jhilinga at Kharagpur, Tutranga at Narayangarh, also common in other places.

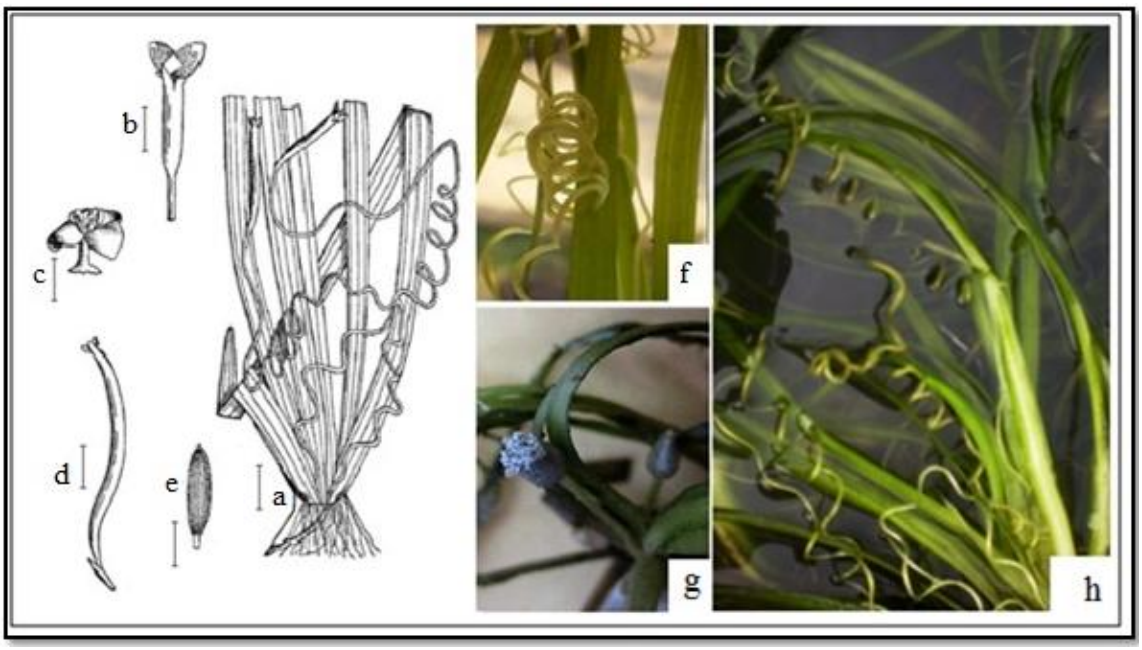


Figure 55. *Vallisneria spiralis*: **a,** whole plant (5 cm); **b,** female flower (1 cm), **c,** male flower (1 mm); **d,** fruit (5 cm); **e,** seed (2 mm); **f, h,** female plant; **g,** male plant in field.

***Najas*:** 2 species

Key to species:

1. Male flower enclosed within a spathe (female flower naked); anther 4-sporangiate, (0.8) 1.1-1.4 mm long; leaf blades with or without septa, marginal teeth cells borne on multicellular swellings; leaf sheaths slightly with large auricles; spate of male flower (1.4-) 1.6-2.3 mm long (widespread) ***N. indica***

1. Male flower naked (female flower naked); Anather 4-sporangiate, leaf margin teeth minute and hardly visible with the unaided eye ***N. graminea***

Najas graminea Delile: Figure 56.

Vernacular name: KantaJhangi

Monoecious, slender or robust, often appearing feather-like above because of closely packed leaves. Stems without spines, 0.4-1.5 mm in diameter. Leaf sheaths (1.4-) 2-4 (-5) mm long (including auricle and spine cells), 0.9-2 (-2.7) mm wide, deeply auricular; auricles (0.4-) 0.8-1.2 (-2.6) mm long (including the spines), (0.16-) 0.2-0.3 (-0.5) mm wide, serrulate with 3-14 spines on each side and 1-7 on the inner edge, apex acute. Leaf blades, flat, (9-) 14-25 (-33) mm long, (0.24-) 0.5-0.9 (-1.1) mm wide (including the teeth), (0.2-) 0.4-0.8 (-0.9) mm wide (excluding teeth); margins minutely serrulate, with unicellular teeth, invisible to the unaided eye; teeth (18-) 34-60 (-74) on each margin, 0.02-0.07 (-0.12) mm long, not borne on multicellular swellings; midrib without teeth; septa absent; fibres mostly present along the midrib and along the margins. Male flowers naked; anther 4-sporangiate, 0.7-1.3 (-2.7) mm long. Female flower naked, 1.6-3.7 mm long. Seeds elliptical-oblong, (1.26-) 1.5-2.4 (-4.2) mm long, (0.42-) 0.5-0.7 (-0.9) mm in diameter; seed coat pits squarish to hexagonal or rectangular, (0.05-) 0.06-0.08 mm long in regular longitudinal rows or (23-) 25-35 (-60).

Flowering and Fruiting: August to November.

Ecological Notes: Perennial and probably also annual, often locally dominant in standing fresh or brackish water.

Field Collections: Kechenda at Jhargram, Kalikadihi at Debra, Akalposh at Debra, Gowaltore at Chandrakona. Jhilinga at Kharagpur, Tutranga at Narayangarh, also common in other places such as Jamna, Belar, Sahara at Pingla.

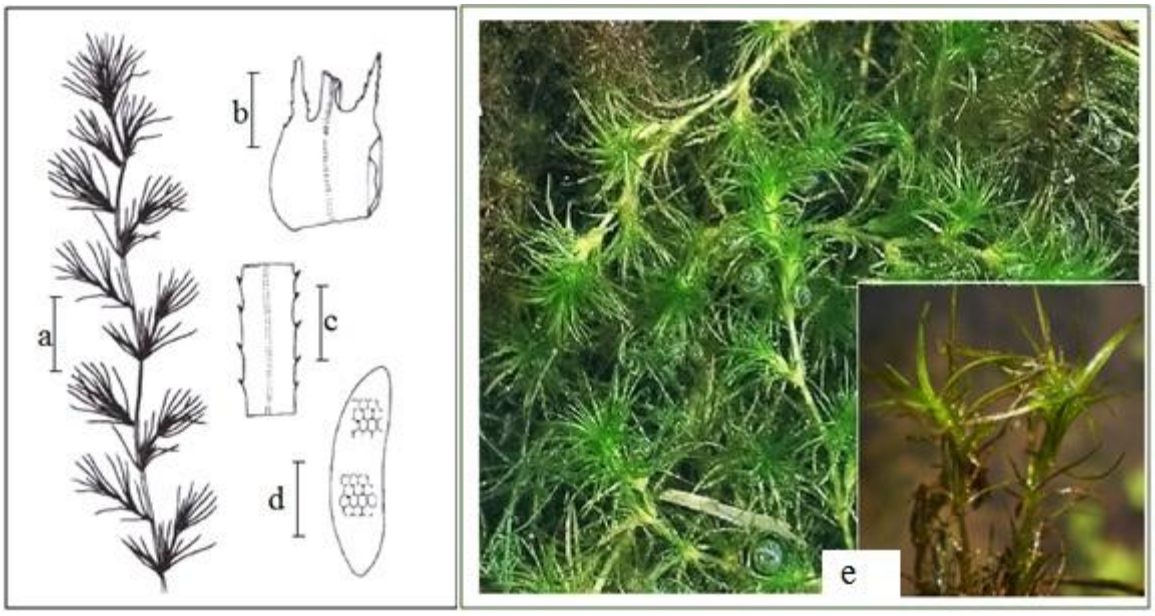


Figure. 56: *Najas graminea*: **a,** habit (1 cm); **b,** leaf sheath (1 mm); **c,** leaf blade part (0.3 mm); **d,** seed (0.6 mm); **e,** plant in field.

Najas indica (Willd.) Cham.: Figure 57.

Probably dioecious but perhaps monoecious, slender. Stems without spines, ± 1-1.3 mm in diameter. Leaf sheaths auriculate, truncate or lacerate, 1.6-3.7 mm long (including the spine cells), 0.2-3.2 mm wide, serrulate or laciniate with 4-10 spines on each side; auricle 0.22-1 mm long (including the spine cells), 0.2-0.64 (-0.8) mm wide, serrulate or laciniate with 4-10 spines on each side but none on the inner edge, apex rather obtuse. Leaf blades flat, flexible, 10-26 mm long, 0.5-1.2 mm wide (including the teeth), 0.2-0.5 (-0.8) mm wide (excluding the teeth); margins serrulate, with 8-20, conspicuous spiny conspicuous, the teeth 0.14-0.4 mm long, borne on broad multicellular swellings, clearly visible to the naked eye; midrib mostly without teeth; septa clearly visible up to the margins; fibres absent. Male flowers borne in spathes, (1.3-) 2-3 mm long; anther 4-sporangiate, (0.8-) 1.4-1.6 mm long. Female flowers naked. Seeds elliptical-oblong, 1.5-2.6 mm long, 0.6-0.8 mm in diameter, seed coat pits squarish to hexagonal, over lapping but in regular longitudinal rows of 25-35.

Flowering and Fruiting: August to November.

Ecological Notes: Perennial and perhaps also annual.

Field Collections: Jhilinga at Kharagpur, Tutranga at Narayangarh, also common in other places. Jamna, Belar, Sahara at Pingla.

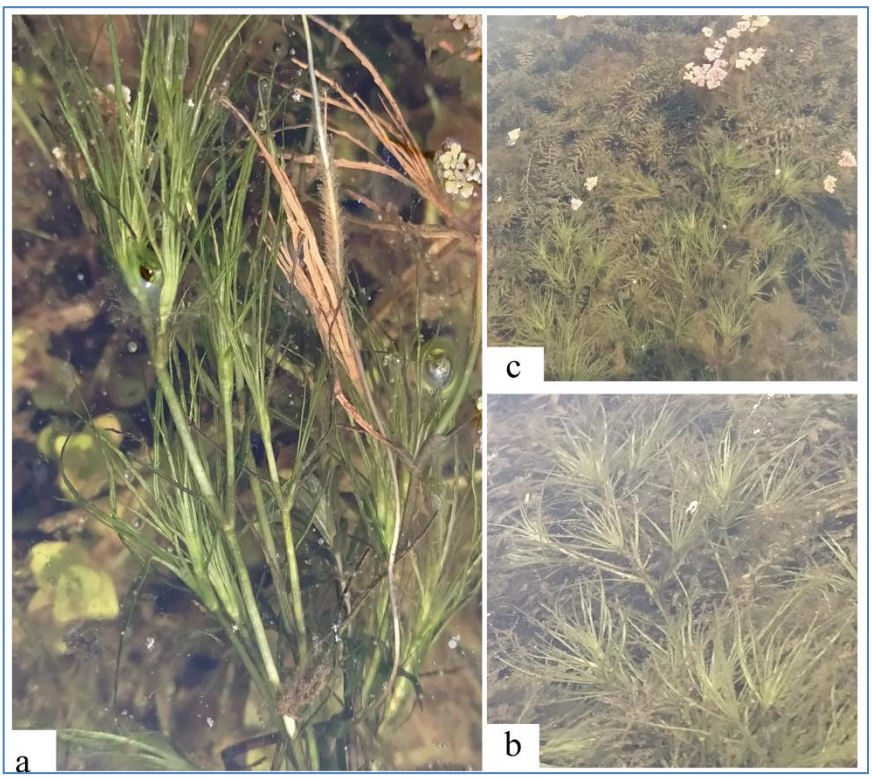


Figure. 57: *Najas indica*: **a,** branches; **b,** leaf blade part; **c,** habit in field.

LEMNACEAE: 3 genera, 3 species

Lemna trisulca L.: Figure 58.

Fronds submerged except when flowering or fruiting, remaining together and often forming branched chains, flattened, narrowly ovate, with the margin toothed towards the tip, narrowed at the base to a persistent green stalk, 3-15 mm long (excluding the stalk), 1-5 mm wide, 2-3.5 times as long as wide, the stalk 2-20 mm long; the upper without papillae, green or reddish; veins (1) 3. Roots up to 2.5 mm long; root sheath not winged; root cap pointed (fresh material

needed). Seeds 1 per fruit, 0.6- 1.1 mm long, 0.5-0.8 mm in diameter, with 12-18 longitudinal ribs, retained in fruit when ripe.

Flowering and Fruiting: May to December.

Ecological Notes: Common in ponds, tanks, Jheels and roadside ditches. Perennial. Found in still water in rather sheltered situations, often between emergent reeds.

Field Collections: Kechenda at Jhargram, Kalikadihi at Debra, Gowaltore at Chandrakona. Jhilinga at Kharagpur, Tutranga at Narayangarh, also common in other places; Jamna, Belar, Sahara at Pingla and also common in other places.

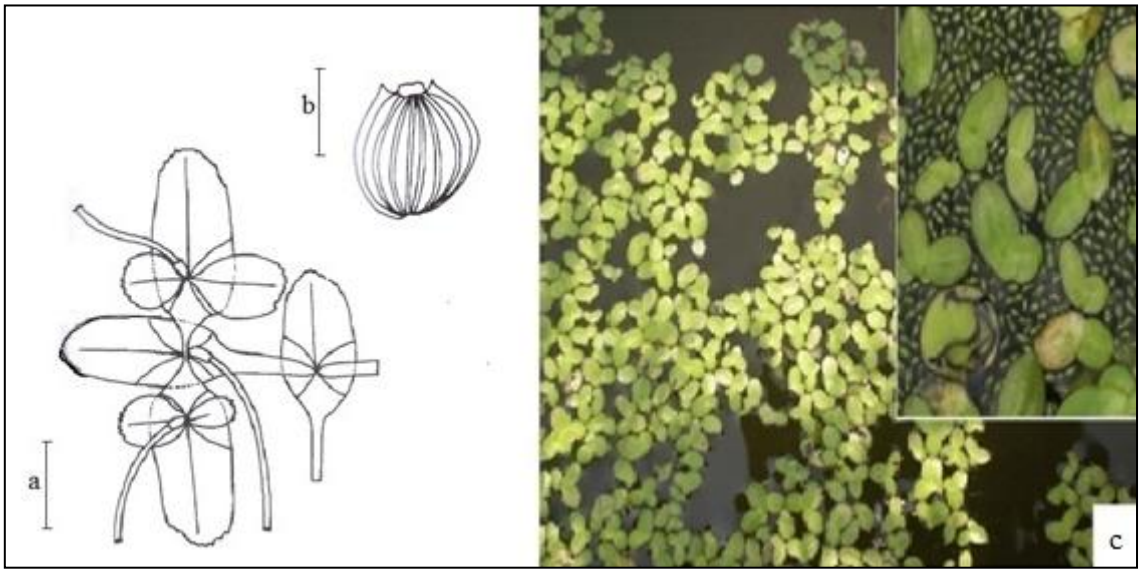


Figure 58. *Lemna trisulca*: **a,** plants (1 mm); **b,** seed (0.4 mm); **c,** plant in field.

Spirodela polyrrhiza (L.) Schleid.: Figure 59.

Vernacular name: Mator Dal Pana

Fronds ovate to orbicular, 1.5-10 mm long, 1.5-8 mm wide, usually rounded at the tip but sometimes pointed; upper leaf surface usually with a red fleck above the node; veins 7-16 (-21), roots 7-21, rarey more than 1 perforates the lobe which covers the point or the roots.

Seeds 0.7-1 mm long, ± 0.7 mm in diameter, with 12-20 longitudinal ribs, turions may develop.

Flowering and Fruiting: January to April.

Ecological Notes: Perennial, usually found in eutrophic conditions, mostly in lakes and large tanks, often growing together with *Lemna* or *Wolffia*. Plants very rarely flower and fruit.

Field Collections: Jhilinga at Kharagpur, Tutranga at Narayangarh; also common in other places. Jamna, Belar, Sahara at Pingla.

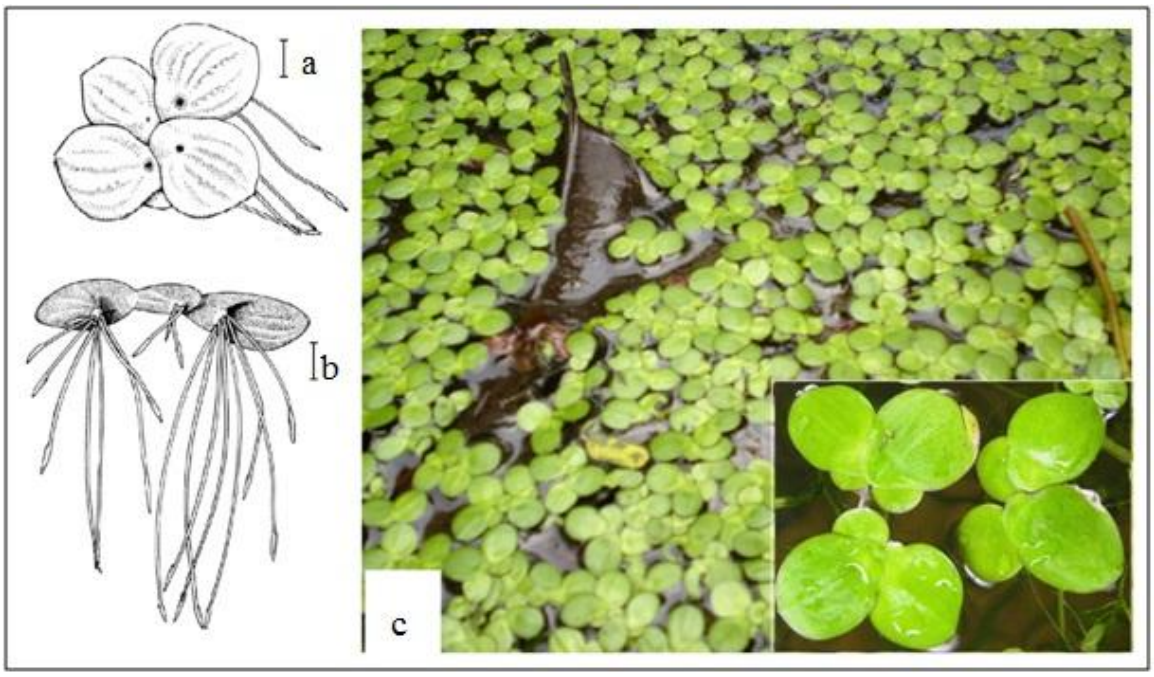


Figure 59. *Spirodela polyrrhiza*: **a,** plant in front view above (2.5 mm); **b,** frond viewed from (2 mm); **c,** plant in field.

Wolffia globosa (Roxb.) Hartog &Plas: Figure 60.

Vernacular name: Kudii-pana.

Probably perennial, fronds floating at or just below the surface of the water, ellipsoidal, with greatest width lightly below the surface of the water, 0.4-0.8 mm long, 0.3-0.5 mm wide, 1.3-

2 times as long as wide, 1-1.5 times as deep as wide, with 1-10 (-15) stomata, rather pale and transparently green at the surface; seeds unknown.

Flowering and Fruiting: July to October.

Ecological Notes: Free floating on the surface water and resembling small green and grandular dots, common on the Jheels, lakes, ponds, ditches and on the stagnant sewage water.

Field Collections: Kechenda at Jhargram, Kalikadihi at Debra, Akalposh at Debra, Gowaltore at Chandrakona. Jhilinga at Kharagpur, Tutranga at Narayangarh, also common in other places such asJamna, Belar, Sahara at Pingla.

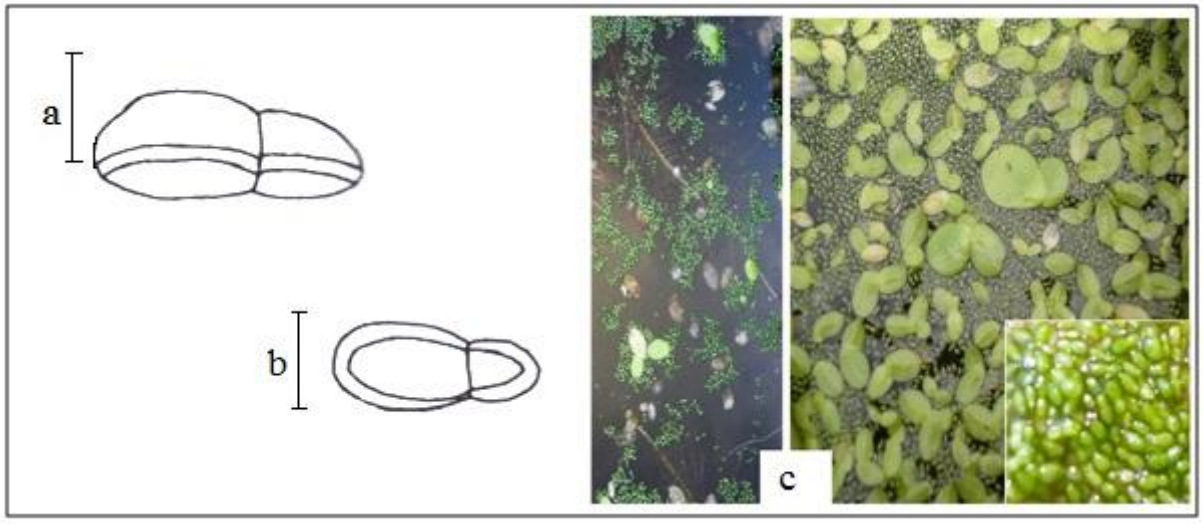


Figure 60. *Wolffia globosa*: **a,** frond viewed from side (0.4 mm); **b,** frond viewed from above (0.4 mm); **c,** plant in field.

POACEAE: 14 genera, 21species

Arundo donax L.: Figure 61.

Vernacular name: Gaba nal

Rhizomes creeping, knotty. Culms mostly erect, (0.4-) 2-4 (-6) m tall, often with stilt roots below. Leaves cauline; ligules short, membranous with minutely hairy margin, the hairs up to

0.3 mm long; leaf blades (10-) 50-75 (-100) cm long, (2.5-) 4-5 (-8) cm wide, glabrous, rounded to cordate and clasping the culm at the base, tapering above to a long fine point. Inflorescence a dense, erect panicle, 30-60 cm long, feathery, whitish to brown. Spikelets pedicelled, solitary, 2- to 5- (-7) flowered, 8-18 mm long, laterally flattened, disarticulating above the glumes and between the florets; rachilla glabrous or shortly hairy. Florets bisexual. Glumes 2, almost equal, about as long as the spikelet, 3- or 5- nerved, acute. Lemmas with long silky hairs, awned; awn ± 3 mm long.

Flowering and Fruiting: November to March.

Ecological Notes: Along water courses, ditches, prefer moist localities, grow gregariously. Perennial, often found standing in water but mostly in areas subject to flooding or along ditches and canals.

Field Collections: Radhamohanpur, Khirai, Laxmibari and Jalchak at Pingla; Ashari, Malihati, Gologram at Debra; Khakurda, Kalibagicha and Handalghat at Narayangarh.

Figure 61. *Arundo donax*: **a,** shoot with inflorescence (10 cm), **b,** rhizome (2 cm), **c,** stem with ligule (8 cm); **d, e**, spiklet (3 mm); **f,** plant in field.

Brachiaria: 3 species

Key to species:

1. Stoloniferous very robust perennial; culms erect, 5-10 mm in diameter ***B.mutica***

1. Stolons not developing, annual or not very robust perennial; culms decumbent or creeping below, not more than 3 mm in diameter

2. Spikelets glabrous, rarely more than 2 mm long; leaves rarely more than 5 times as long as wide ***B. reptans***

2. Spikelets hairy, 2 mm or more long; leaves more than 6 times as long as wide

B. eruciformis

***Brachiaria eruciformis* (**Sm.) Griseb.: Figure 62.

Culms 10-75 cm tall, rarely more than 3 mm in diameter, ascending from a creeping base, rooting at lower nodes. Ligule 0.5-1 mm long, hairy; leaf blades 2-8 cm long, 3-6 mm wide, glabrous or somewhat hairy. Inflorescence ± linear, 4-6 (-10) cm long, of 2-15 ± erect spike-like racemes, each 1.5-3 cm long; rachis 3-angled, hairy. Spikelets solitary, borne in 2 rows, 1.8-2.5 mm long, up to 1.2 mm wide, sometimes tipped with purple. Lower glume minute (0.3-1 mm long), 1-nerved or without nerves; upper glume as long as the spikelet, 5-nerved. Lemma of lower floret ± like upper glume; lemma of upper floret slightly shorter than the spikelet, smooth, glossy and hardened. Palea hard like lemma of upper floret.

Flowering and Fruiting: May to October

Ecological Notes: Annual, in rice fields, along ditches and canals and in marshy places. Not confined to wetlands and also found as a weed in cultivated fields.

Field Collections: Nedhuya, Bagerpukur and Lohatekri at Midnapur.

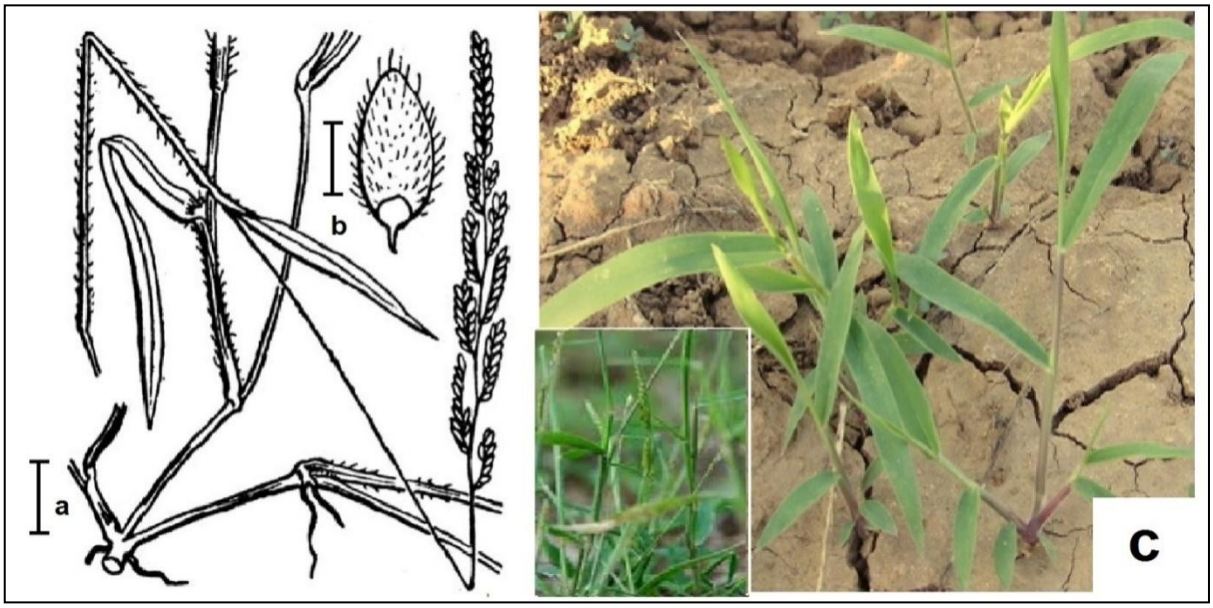


Figure 62. *Brachiaria eruciformis:* **a,** Plant part with inflorescence (2 cm); **b,** Spikelet (1 mm); **c,** Plant in field.

Brachiaria mutica (Forssk.) Stapf: Figure 63.

Vernacular name: Nar-dul

Stolons up to 5 m long. Culms 50-200 cm tall, 5-10 mm in diameter, erect, rooting at lower nodes. Ligule 0.7-1.9 mm long, membranous and fringed; leaf blades 10-30 cm long, (5-) 10-25 mm wide, glabrous or scarcely hairy. Inflorescence spreading, 8-30 cm long, with 6-20 racemes, each 2-20 cm long; flattened and winged, ± 1 mm wide, hairy at the base. Spikelets solitary or paired, (2.5-) 3-3.5 (-5) mm long, 1.5-2 mm wide, arranged untidly in 3 or 4 rows, glabrous or hairy. Lower glume up to one-third as long as the spikelet, 1-, 3- or 5-nerved; upper glume as long as the spikelet, 5- or 7- nerved; hairy. Lemma of lower floret ± like upper glume; lemma of upper floret hardened, light yellowish-brown, ± 2.4 mm long. Palea hyaline.

Flowering and Fruiting: May to October.

Ecological Notes: Perennial. It is very vigorous and widely planted as a pasture grass. It is frequently found in aquatic biotopes and along the banks of streams and backwaters, sometimes becoming dominant in marshes, also sometimes forming floating mats.

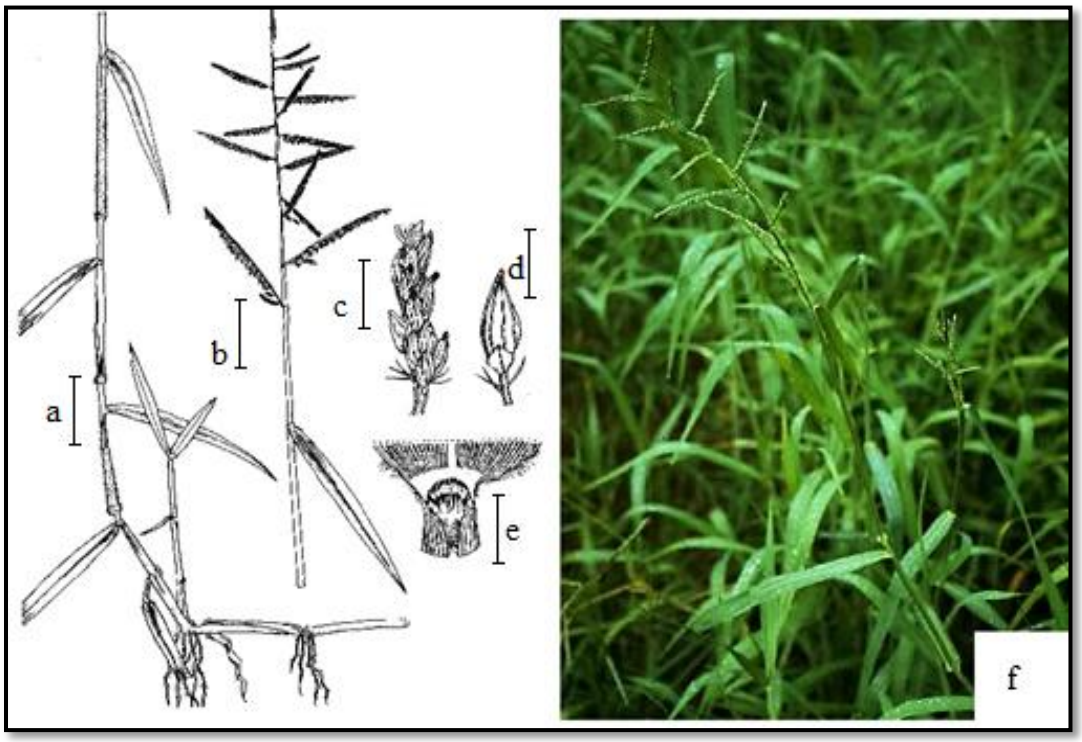


Figure 63. *Brachiaria mutica*: **a,** flowering shoot (4 cm); **b,** inflorescence (3 cm); **c,** inflorescence with spikelets (7 mm); **d,** spikelet (1 mm); **e,** ligule (4 mm); **f,** plant in field.

Field Collections: Dujipur at Pingla, Hosnabad at Medinipur sadar, Shyamchak at Debra.

Brachiaria reptans (L.) C.A. Gardner& C.E. Hubb.: Figure 64.

Vernacular name: Chhota-jalganti

Culms (10-) 15-35 (-50) cm tall, rarely more than 3 mm in diameter, ascending from a creeping base, rooting at lower nodes. Ligule membranous, 0.5-1 mm long, fringed with hairs; leaf blades ovate-lanceolate, 1.5-10 cm long, 4-20 mm wide, mostly hairy, at the base mostly clasping the culm, margin often wavy. Inflorescence spreading, 2-7 cm long, of 3-10 (-15) racemes, each 1.5-5 cm long; rachis flattened, sparsely hairy. Spikelets paired, 1.8-2.3 mm long, ± 0.8 mm wide, glabrous. Lower glume minute (0.2-0.5 mm long), faintly 1- or 3-nerved; upper glume as long as the spikelet, glabrous, 5- to 9-nerved; the nerves green. Lemma of lower floret ± like upper glume; but not more than 5-nerved, lemma of upper floret boat-shaped, hardened, golden brown. ± 1.6 mm long. Palea like lemma of upper floret.

Flowering and Fruiting: March to November.

Field Collections: Jhilinga at Kharagpur, Tutranga at Narayangarh, also common in other places.

Ecological Notes: Annual or sometimes perennial when in water. A common weed of cultivated land, particularly in rice fields, on the banks of channels and other wet areas.

Figure 64. *Brachiaria reptans*: **a,** flowering shoot (2cm); **b,** inflorescence (10 mm); **c,** spikelet in different view (1 mm).

Chloris barbata Sw.: Figure 65.

Perennial tufted grass; culms erect, stout, with creeping branched base; nodes with large tuft of leaves. Leafblades flat, sometimes folded, mouth of the sheath ciliate, ligule a narrow membranous ring. Inflorescence a whorl of 4-20 spikes, sub-erect, rachis scabrid. Spikelets usually reddish purple.

Flowering and Fruiting: August to December.

Ecological Notes: Grow everywhere in wet places.

Field Collections: Palbari, Harishpur, Bangya, Hatihalka and Nedhuya at Midnapore; Hatibari, Asui and Sumitrapur at Gopiballavpur; Baklasani and Tabageria at Debra.

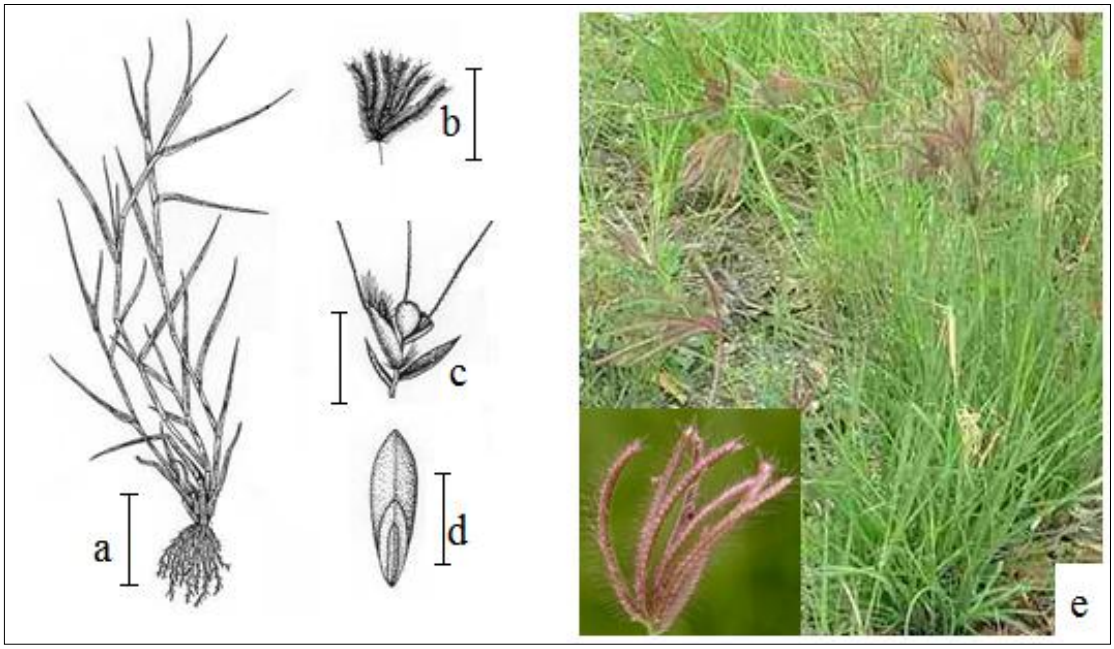


Figure 65. *Chloris barbata*: **a,** flowering shoot (10 cm); **b,** inflorescence (3cm); **c,** spikelet (2 mm); **d,** grain (1 mm); **e,** plant in field with inflorescence.

***Coixa*:** 2 species

Key to species:

1. Annual; lower glume of the male spikelets narrowly or hardly winged; spikelets 2-4 mm board; leaves linear-lanceolate, 10-40 cm long, 1-3.5 cm wide ***C. lachrymal-jobi***

1. Perennial; lower glume of the male spikelets broadly winged; spikelets 5-6 mm board; leaves linear-acuminate, 10-90 cm long, 1.5-6 cm wide ***C. aquatica***

Coixa aquatica Roxb.: Figure 66.

Like *C. gigantea* but culms creeping or floating, up to 30 m or more long, when in water swollen with floating roots; upper surface of the leaf blades with conspicuous glands which bear bristle-like hairs; utricle abruptly constricted at the neck, into a beak or at the middle, remains of the leaf blade often apparent.

Flowering and Fruiting: June to January.

Field Collections: Gopinathpur and Jhangia at Pingla, Jambini, Silda, Purunia at Dantan, Bishnupur at Sobong, Goura at Ghatal, Roskundu at Gowaltore.

Ecological Notes: Perennial. Found in water, often forming large floating mats.

Coix lacryma-jobi L.: Figure 66.

Vernacular name: Gurgor

Culms tufted, (10-) 25-100 (-150) cm tall. Leaf blades lanceolate to linear-lanceolate, 10-40 cm long, 1-3.5 mm wide, upper surface usually glabrous or smalltubercule-based hairs. Utricle surrounding the female spikelets cylindrical to ovoid or globose, (5-) 8-12 (-15) mm long white to yellowish-white or bluiesh grey, terete or partl flattened, smooth or with longitudinal ridges. Male spikelets (5-) 8-12 (-15) mm long. 2-3 (-4) mm broad; lower glume papery, 5-15 mm long, 2-4 mm wide, 13- or more-nerved, with narrowly winged or hardly margins; upper glume thin, oblong-lanceolate, 5-12 mm long, 2-3 mm wide, 7- or 9-nerved; lemmas oblong-lanceolate, 5-10 mm long, faintly 5- or 7-nerved; paleas elliptical to oblong-lanceolate, 5-10 mm long, 1-2 mm wide, 2-nerved, 2-keeled. Caryopses ovoid to globose, ± 5 mm long.

Flowering and Fruiting: September to March.

Ecological Notes: Common along the water courses and ditches; sometime cultivated as fodder or ornamental plants; an undoubted indicator of moist condition.

Field Collections: Dharma, Palbari, Harishpur, Bangya, Hatihalka and Nedhuya at Midnapore; Hatibari, Asui and Sumitrapur at Gopiballavpur; Baklasani and Tabageria at Debra.

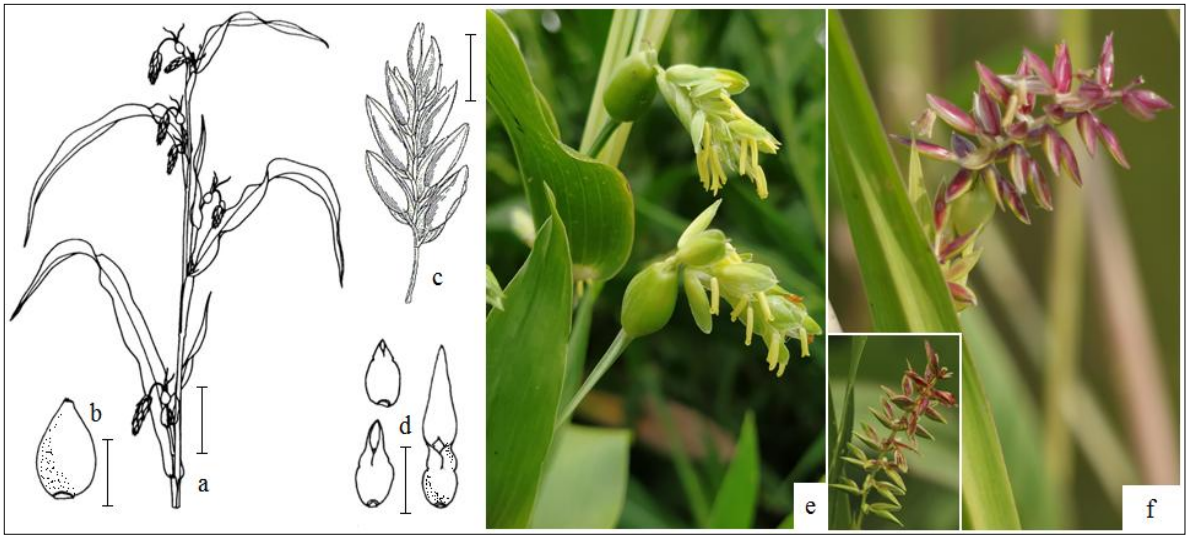


Figure 66. *Coix lacryma-jobi*: **a,** flowering shoot (5 cm); **b,** utricle (5 mm); **e,** plant in field. *Coixa quatica*: **c,** inflorescence (2 cm); **d,** utricles (5 mm); **f,** plant in field.

Echinochloa: 2 species

Key to species:

1. Lemma of upper florets acuminate to awned; spikelets hispid; racemes untidily 2- to several-rowed, the longest 2-10 cm long ***E. crus-galli***

1. Lemma of upper florets acute to cuspidate (the cusp not more than 1 mm long); spikelets hispid; racemes tidily 4- to several-rowed, the longest rarely exceeding 3 cm long ***E. colona***

Echinochloa colona (L.) Link: Figure 67.

Vernacular name: Shyama Ghash or Shyama Dhan

Tufted. Culms erect or ascending, 10-100 cm long. Leaf sheaths glabrous, up to 6 cm long; ligules absent; blades (2-) 10-15 (-30) cm long, 2-8 mm wide, occasionally marked with purple bars. Inflorescence usually linear in outline, 1-15 cm long with (3-) 8-10 racemes; racemes usually ± 4-rowed, 1-2 (-3) cm long, usually ± half their length apart and appressed to the axis or sometimes spreading and subverticillate. Spikelets ovoid-ellipsoid to sub-

globosely, (1-) 2-2.5 (-3) mm long, pubescent. Lower glume ovate, 1-2 mm long, half as long as the spikelet, acuminate or shortly cuspidate but not awned, 5-nerved; upper glume ovate to boat-shaped, equlling the spikelet, acuminate 3- to 11-nerved, hispid. Lemma of lower floret ovate, 2-4 mm long, acute or shortly cuspidate, the cusp not more than 2 mm long; lemma of upper floret 2-3 mm long. Anthers violet or purple.

Flowering and Fruiting: June to December.

Ecological Notes: Annual. Often in wet and marshy places, in ditches, along canals, at the edges of ponds, sometimes a serious pest in rice fields.

Field Collections: Jhilinga at Kharagpur, Tutranga at Narayangarh, also common in other places.

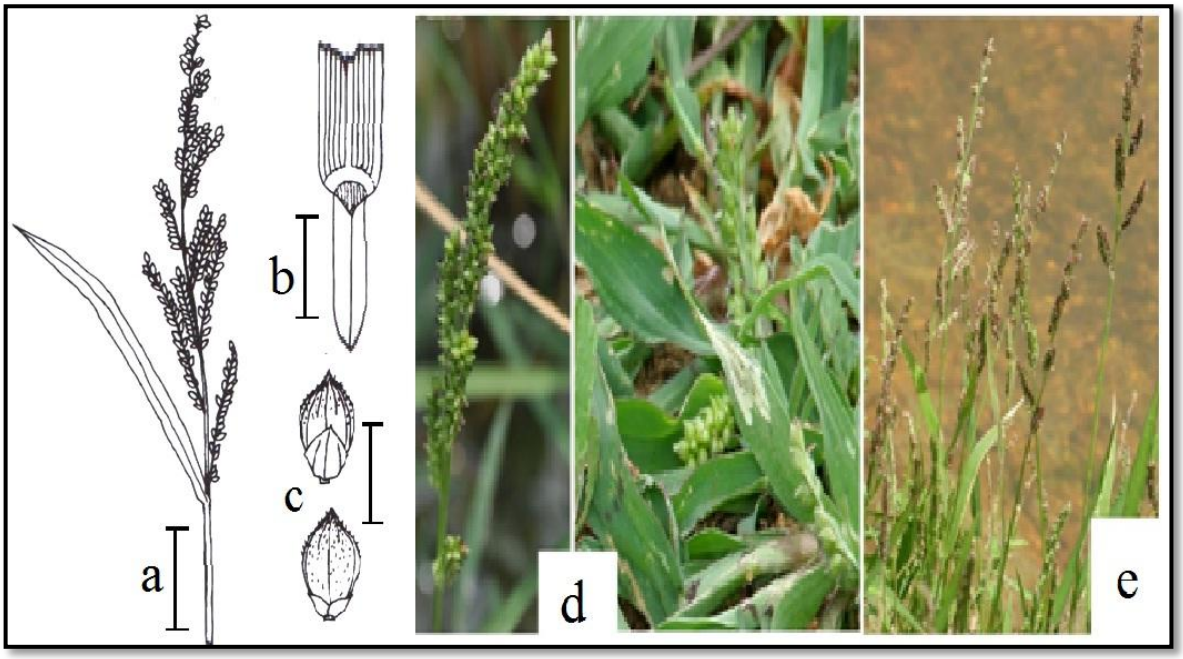


Figure 67. *Echinochloa colona*: **a,** inflorescence (2 cm); **b,** ligule (5 mm); **c,** spikelet in different view (1 mm); **d,** plant with inflorescence; **e,** plant in field.

Echinochloa crus-galli (L.) P. Beauv.: Figure 68.

Vernacular name: Bara-Shyama

Tufted. Culms erect or ascending, (15-) 25-100 (-150) cm long. Leaf sheaths glabrous or rarely with impressed hairs; ligules absent; blades 5-35 (-50) cm long, 4-20 mm wide. Inflorescence linear to ovate, 6-20 (-25) cm long; racemes untidily 2- to everal-rowed, the longest 2-10 cm long, usually with secondary branchlets at the base; hairs as long as the spikelets. Spikelets ovoid-ellipsoid, (2.5-) 3-4 (-5) mm long, hispid, pale green or purple. Lower glume 1-3 mm long, one-third to two-fifths as long as the spikelet, 3- or 5-nerved; upper glume ovate-lanceolate, 3-5 mm long, as long as the spikelet, 3-or 5-nerved, with bristly hairs. Lemma of lower floret ovate-lanceolate, acuminate or with an awn up to 5 cm long; lemma of upper floret ovate, 2-4 mm long, including the short. herbaceous tip, 2-keeled, 2-nerved. Anthers brown or yellow.

Flowering and Fruiting: July to December.

Ecological Notes: Annual perhaps sometimes perennating; aquatic grass, growing usually near the margins of the paddy fields, ponds, roadside nalas and ditches.

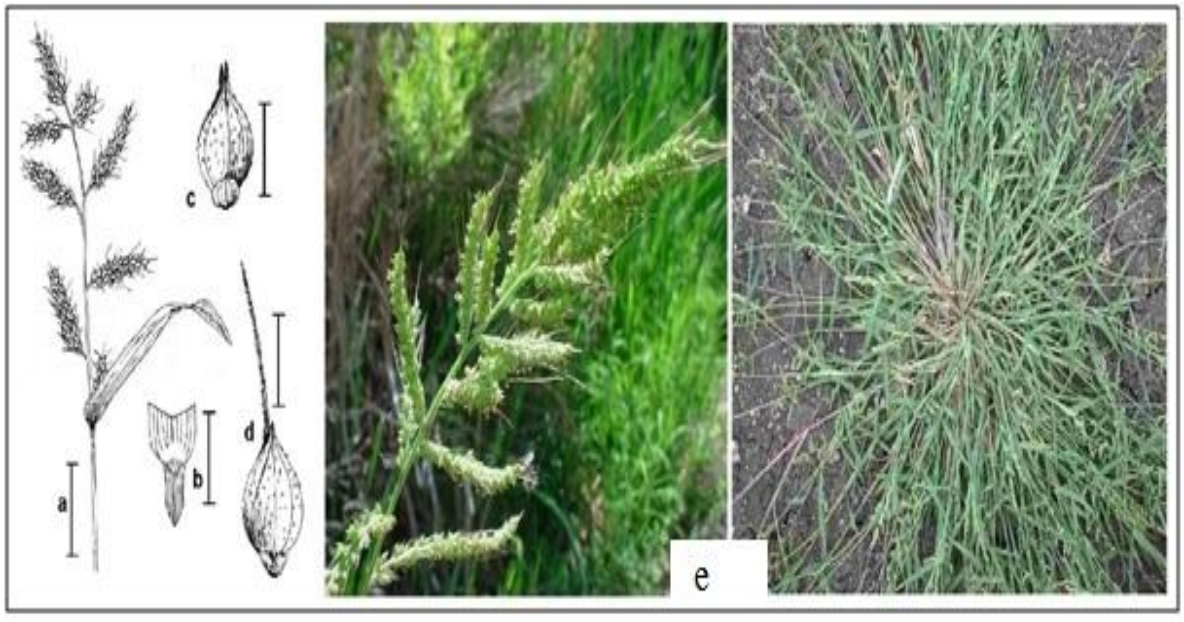


Figure 68. *Echinochloa crus-galli*: **a,** inflorescence (1 cm); **b,** ligule (5 mm); **c** and **d,** spikelet in different view (1 mm); **e,** plant in field with inflorescence.

Field Collections: Radhamohanpur, Khirai, Laxmibari and Jalchak at Pingla; Ashari at Debra; Khakurda, Kalibagicha and Handalghat at Narayangarh.

Hemarthria compressa (L.f.) R. Br.: Figure 69.

Vernacular name: Pansheru.

Stolons creeping or floating, up to ± 8 m long. Culms floating, erect or ascending from a creeping base, 40-80 cm tall. Leaf sheaths hairy at base and throat; ligules very short, membranous, ciliate; leaf blades folded in bud, afterwards flat, 9-15 cm long, up to 8 mm wide, base rounded or sub-cordate, margins rough. Inflorescence of axillary, solitary or bunched, spike-like racemes; racemes 3-12 cm long, sometimes partly enclosed in leaf sheaths. Spikelets in opposite pairs; each pair with 1 pedicelled and 1 sessile spikeles (the pedicel joined to the internodes of the rachis;thus, each opposite pair is made up of a sessile spikelet and a pedicelled spikelet of the next lower node); rachis tough, disarticulating tardily. Spikelets 4-6 mm long; 2-flowered, awnless, flattened abaxially; the lower floret reduced to a sterile lemma; the upper floret bisexual. Lower glume lanceolate, ± 5 mm long leathery, usually gradually acuminate or obtuse, 5- or 7-nerved, indistinctly winged above; the upper glume ± 4 mm long; membranous except for a hardened tip. Sterile lemma ± 3 mm long, 2-nerved. Caryopses somewhat laterally flattened, oblong in outline, ± 1 mm long.

Flowering and Fruiting: April to October

Ecological Notes: Perennial. Bottom-rooted or floating at edges of pools, lakes and rivers, also in damp places, ditches, banks and abandoned paddy fields

Field Collections: Dujipur at Pingla, Hosnabad at Medinipur sadar, Shyamchak at Debra. Jhilinga at Kharagpur, Tutranga at Narayangarh, also common in other places.

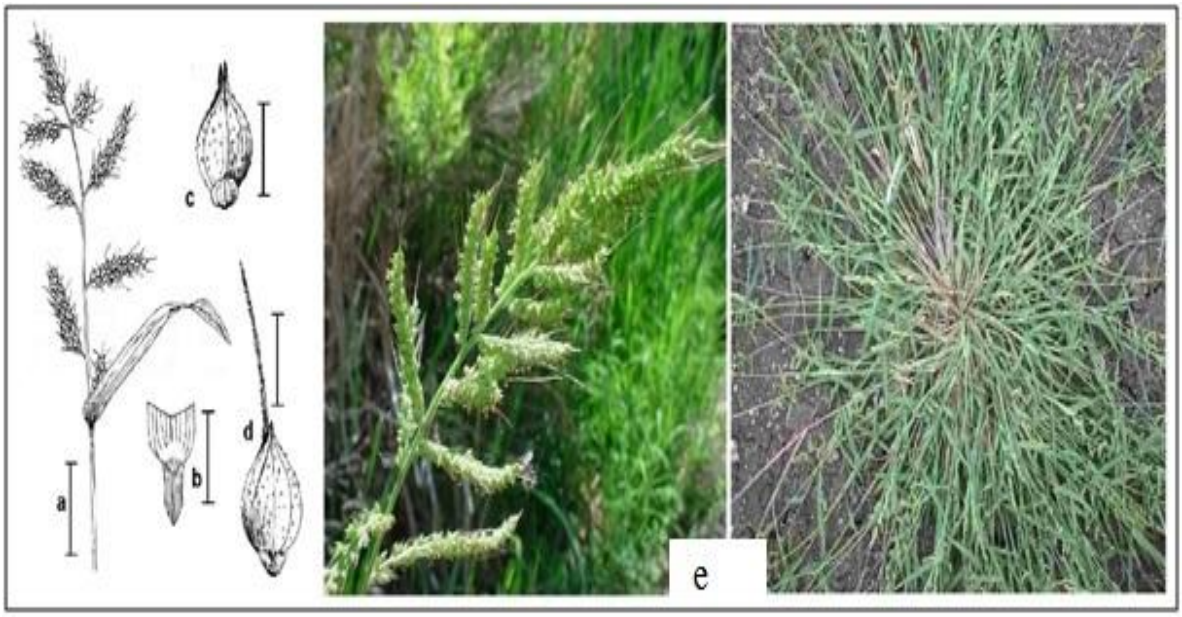


Figure 69. *Hemarthria compressa*: **a,** flowering culm (3 cm); **b,** spikelet (1 mm); **c,** inflorescence; **d,** plant in field.

Ischaemum rugosum Salisb.: Figure 70.

Culms tufted or creeping and rooting below, 26-80 cm tall; nodes glabrous or hairy. Leaf blades linear to lanceolate, 4-15 cm long, 3-6 mm wide, at the base narrowed and tapering, acute at tip. Racemes (1-) 2 (-3) cm long. Sessilespikelets ovate-oblong, 4-6 mm long, distinctly awned; lower flower male; upper flower;bisexual; lower glume oblong-lanceolate, 4.5-5 mm long, becoming hard and shell-like with prominent side modules connected by well-defined ridges and furrows, 13or 15-nerved; upper glume boat-shaped, 4-6 mm long, somewhat leathery, 3- or 5-nerved, keeled on the back; lemma of the lower floret oblong-lanceolate, 4-5 mm long, paper-like, obscurely 3-nerved, glabrous; palea elliptical-lanceolate, 3-3.5 mm long; lemma of the upper flower 3-4 mm long, notched at tip, with awn, the piai 6-12 mm long. Pedicelled spikelet oblong, 4-5 mm, without an awn; pedicels ± 1 mm long, lower glume 4.5-5 mm long, hardened, broadly or narrowly winged on 1 margin, 11- to 15-nerved; upper glume and other floral parts like those in sessile spikelet.

Flowering and Fruiting: June to November.

Ecological Notes: Annual or perennial. It is not confined to wetlands is common in wet plates and found as a weed in rice fields, sometimes it grows in standing water.

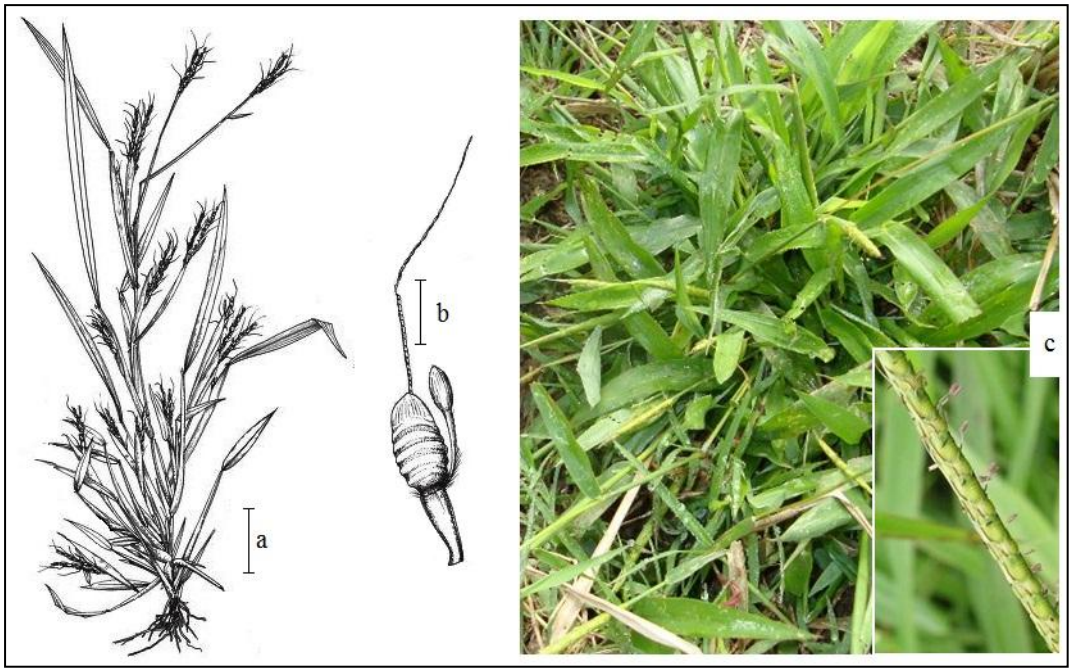


Figure 70. *Ischaemum rugosum*: **a,** Habit (3 cm); **b,** spikelets (1 mm); **c,** plant in field with flowering culm.

Field Collections: Dashagram, Gopinathpur, Gokulpur, Moharh, Jamna, Maligram, Banpatna at Paschim Medinipur.

Leptochloa chinensis (L.) Nees.: Figure 71.

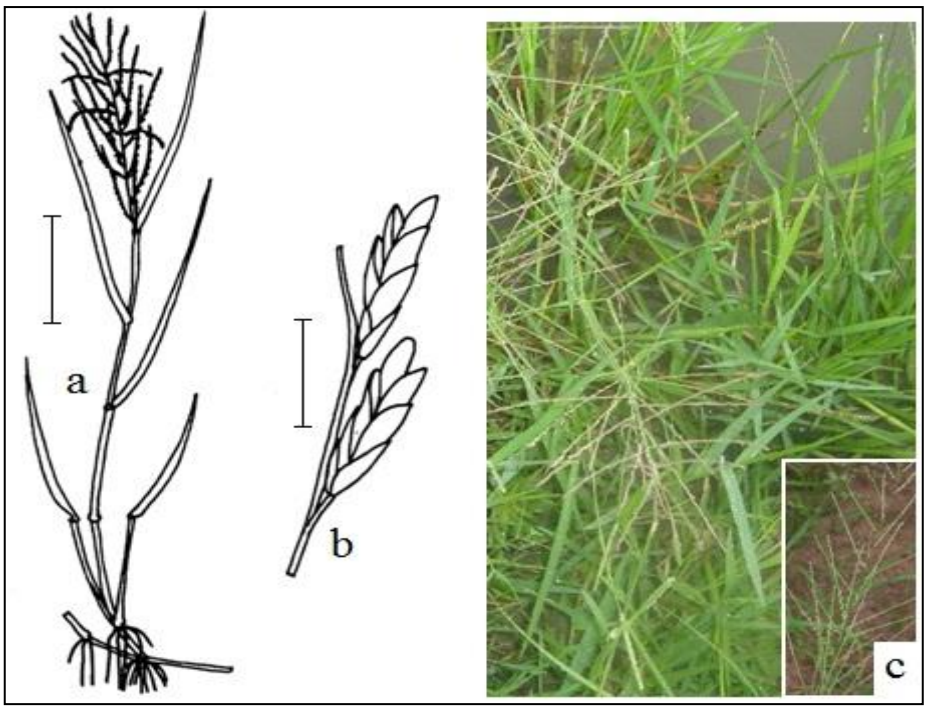
Vernacular name: Bara Pininati.

Culms stout; leafblades narrow and flat, often convulute sheaths loose, smooth, ligule short, laurate. Inflorescence false spikes, spreading. Spikelets-almost sessile on unilateral and slender false spikes. Fruit grains loose, obtusely trigonous sub-rugose with acute pericarp.

Flowering and Fruiting: April to August.

Ecological Notes: Aquatic grass growing profusely along the margins of the jheels, marshes and paddy fields. Growth of the plant is luxuriant

Field Collections: Sankowa at Kharagpur local, Kechenda at Jhargram, Maninathpur at Narayangarh.



Fiogure 71. *Leptochloa chinensis*: **a,** flowering plant (8 cm); **b,** Spikelets (1 mm); **c,** plant in field.

Hygroryza aristata **(**Retz.) Nees ex Wight & Arn.: Figure 72.

Culms creeping or trailing, floating, branching, ascending, rooting at internodes; nodes glabrous. Leaf sheaths open, strongly inflated, forming floats, partly emergent; ligules truncate, ± 0.8 mm long, membranous, unfringed; leaf blades emergent, ovate-lanceolate to elliptical, (1-) 2-5 (-8) cm long, (3-) 5-20 mm wide, glaucous beneath, somewhat cordate at base, without a prominent midrib. Inflorescence a pyramidal panicle, 2-5 (-8) cm long. Spikelets solitary, 1-flowered, 6-8 mm long, slightly flattened laterally, long-pedicelled, disarticulating from the pedicel. Gumes and sterile lemmas absent. Lemma lanceolate, 6-8 mm long, papery, 5-nerved, narrowed into an awn; awn 0.5-1.7 cm long. Palea as long as the lemma, narrower, 3-nerved. Stamens 6. Caryopses narrowly oblong, ± 3.5 mm long.

Flowering and Fruiting: November to March

Ecological Notes: Perennial or sometimes annual. It is found in water reservoirs, pools, canals, backwaters and flooded rice fields.

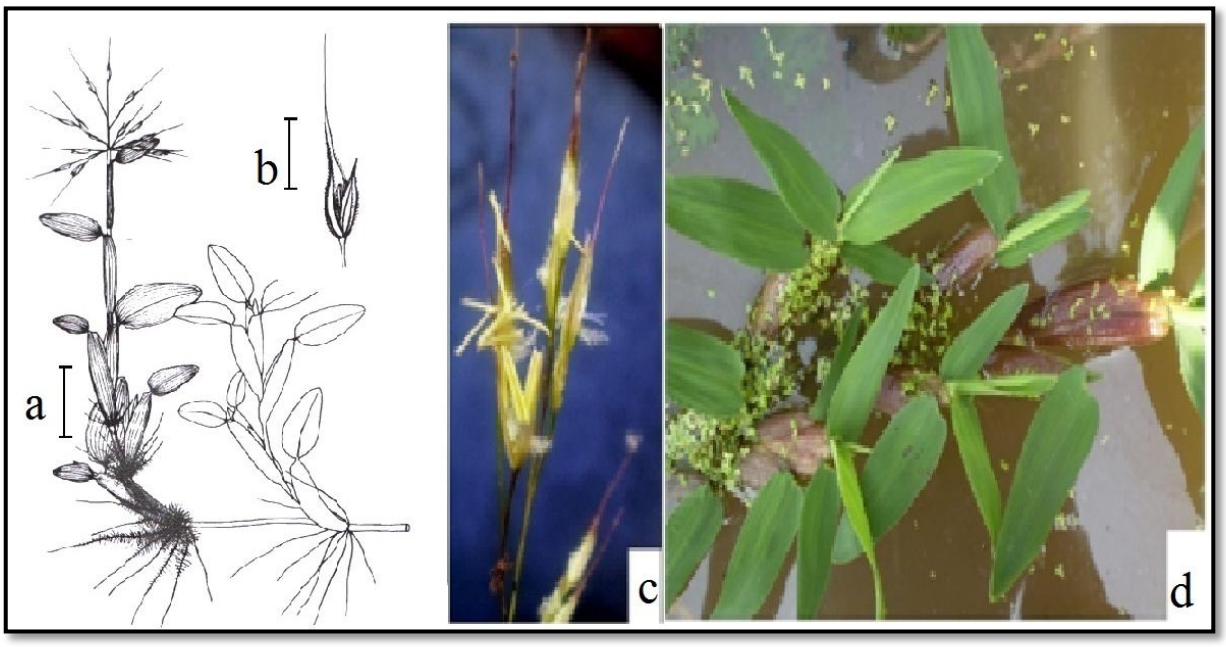


Figure 72. *Hygroryza aristata*: **a,** flowering plant (2 cm); **b,** spiklet (5 mm); **c,** inflorescence; **d,** plant in field.

Field Collections: Tegria, Gumria, and Sahara at Pingla; Kechenda at Jhargram.

***Isachne*:** 3 species

Key to species:

1. Lemmas in any single spikelet similar in outline and structure ***I. albens***

1. Lemmas in any single spikelet dissimilar in outline and structure

2. Leaf blades (1.5-) 3-12 cm long, mostly with cartilaginous and thickened margins; spikelets (1.8-) 2-2.8 mm long; nodes glabrous; ligule hairs (1.5-) 2-3.5 mm long ***I. globosa***

2. Leaf blades 1-2.5 (-3.5) cm long, mostly without cartilaginous and thickened margins; spikelets (1.2-) 1.5-2 (-2.8) mm long; nodes hairy or glabrous; ligule hairs 0.8-1.5 (-2) mm long ***I. miliacea***

Isachne albens Trin.: Figure 73.

Culms erect or ascending, (6-) 20-150 cm tall. Leaf sheaths glabrous; ligules hairs 1-2 (-3) mm long; leaf blades linear to broadly lanceolate or ovate, (1.5-) 3-12 cm long, 3-12 mm wide, glabrous; midnerve and 3-6 pairs of nerves very prominent on abaxial surface; margins cartilaginous. Inflorescence 7-40 cm long, spreading; branches secondarily divided, densely flowered, eglandular or with bands of glands. Spikelets globose or globose-obovoid, (0.8-) 1-2 (-3.2) mm long. Upper and lower florets almost alike in shape, size and texture, ellipsoid. Glumes subequal, 0.8-1.3 (-2) mm long. Lemmas broadly elliptical, concave, rather hard, with obscure nerves. Paleas like lemmas but flat with incurved margins, nerveless.

Flowering and Fruiting: May to October.

Figure 73. *Isachne albens*: **a,** flowering shoot (2 cm); **b,** erect culms (2 cm); **c,**flosculi (0.5mm); **d,** spikelet (0.5 mm) ;**e,** glume in different view (0.5 mm); **f,** lemma (0.5 mm); **g,** flowering shoot in field.

Ecological Notes: Annual or sometimes perennial. On mud or emgent in shallow water, often found in floating stage, common and occasionally very abundant. Sometimes becoming troublesome weeds in rice fields and irrigation ditches.

Field Collections: Jamna, Belar, Sahara at Pingla and also common in other places.

Isachne globosa (Thunb.) Kuntze: Figure 74.

Culms tufted or spreading, often rooting below, (10-) 20-80 cm tall; nodes glabrous. Ligule hairs (1.5-) 2-3.5 mm long; leaf blades linear-lanceolate to ovate-lanceolate, (1.5-) 3-12 cm long, (3-) 6-15 mm wide, glabrous or hirsute, with cartilaginous margins. Inflorescence up to 18 cm long, compact or spreading; branches and pedicels with or without glandular bands. Spikelets globose or globose-obovoid, (1.8-) 2-2.5 (-3) mm long. Upper and lower florets dissimilar; the lower one longer and flatter. Glumes subequal, ± 2.5 mm long, 7to 11 nerved. Lemma of the lower floret elliptical, ± 2.5 mm long, usually exceeding the lower glume, thin, paper-like, obscurely 5-nerved, glabrous. Lemma of the upper floret ovate-elliptical, 1.5-2 (-2.4) mm long, not exceeding the upper glume, concave, coriaceous, nerve obscure, glabrous or sparsely hairy. Palea of lower floret like lemma but narrower. Stamens 3; anthers 1-1.5 cm long. Lemma of upper floret and palea up to 2 mm long, glabrous, without nerves.

Flowering and Fruiting: May to October.

Ecological Notes: Annual or sometimes perennial. On mud or emgent in shallow water, often found in floating stage, common and occasionally very abundant. Sometimes becoming troublesome weeds in rice fields and irrigation ditches.

Field Collections: Jamna, Belar, Sahara at Pingla and also common in other places.

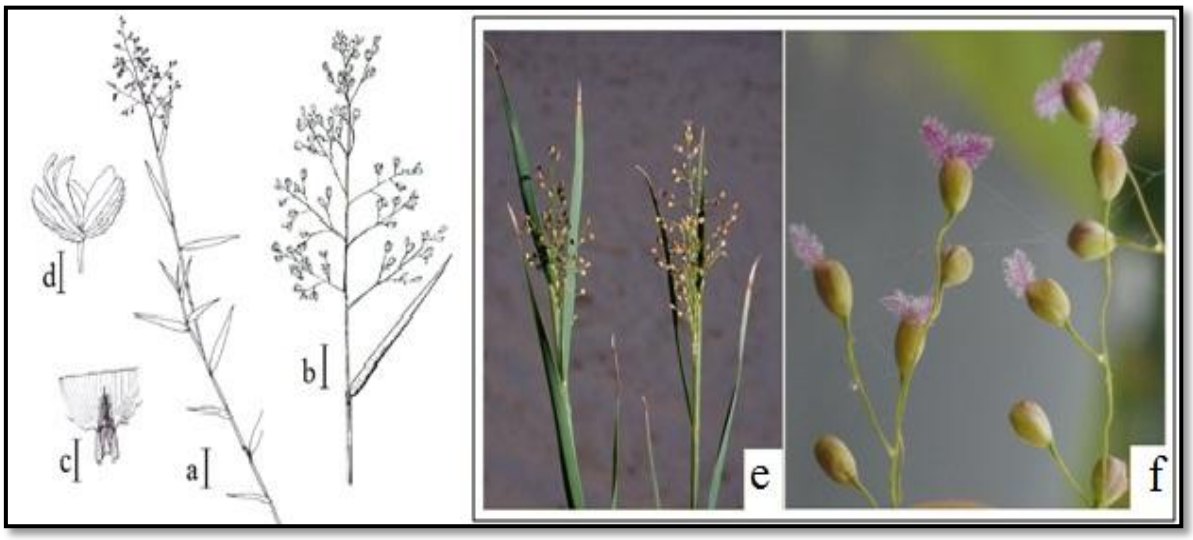


Figure 74. *Isachne globosa*: **a,** flowering shoot (2 cm); **b,** inflorescence (1 cm); **c,** ligule (1 mm); **d,** spikelet (0.5 mm); **e,** flowering shoot; **f,** inflorescence in field.

Isachne miliacea Roth: Figure 75.

Culms erect or ascending, creeping and rooting below, 8-35 (-50) cm long; nodes hairy or glabose. Ligule hairs 0.8-1.5 (-2) mm long; leaf blades lanceolate to ovate-lanceolate, 1-3 (-6) cm long, 2.5-6(-10) mm wide, glabrous or sparsely hirsute, without cartilaginous margins. Inflorescence up to 6 (-10) cm long, spreading; branches and pedicels with or without glandular bands. Spikelets (1.2-) 1.5-2 mm long 7- to 11-nerved. Lemma of the lower floret elliptical 1.8-2.5 mm long, slightly exceeding the lower glumes hard, glabrous. Lemma of the upper floret ovate-elliptical, 1.2-2 mm long, not exceeding the upper glumes concave, coriaceous.

Flowering and Fruiting: May to October.

Ecological Notes: Perennial or perhaps sometimes annual. Common and often abundant; found in wet places, hollows in grassland, sometimes turf-forming and sometimes forming floating mats.

Field Collections: Jhilinga at Kharagpur, Tutranga at Narayangarh, also common in other places such as Jamna, Belar, Sahara at Pingla.

Figure 75. *Isachne miliacea*: **a,** flowering shoot (1 cm); **b,** ligule (1 mm); **c** and **d,** spikelet (0.5 cm); **e,** plant in field.

Leersia hexandra Sw.: Figure 76.

Stoloniferous, culms ascending, 25-150 cm long or longer when floating in mats; nodes swollen, cuff like, hairy. Ligules membranous, 4-9 mm long; leaf blades linear-lanceolate to lanceolate, 5-15 (-30) cm long, 2-6 (-12) mm wide. Inflorescence a lax panicle, 3-12 cm long, with flexuous branches. Spikelets 1-flowered, strongly flattened laterally, 3-4.5 mm long, yellowish-green, awn less, sessile or nearly so, pedicels not jointed, disarticulating below the glumes. Glumes reduced to an entirere or 2-lobed and somewhat thick ended rim. Lemmas all fertile, oblong. 3—4 mm long, leathery, 5-nerved. Paleas linear-oblong 2—3 mm long, 3-nerved, the edges clasping the inrolled margins of the lemma. Stamens 6 or sometimes less. Caryopses to somewhat laterally flatten.

Flowering and Fruiting: March to October.

Ecological Notes: Perennial. Common and widespread, found in or floating on water, in pools, streams and ditches, also in marshes and rice fields.

Field Collections: Gurguripal at Medinipur, Kechenda at Jhargram, Kalikadihi at Debra, Akalposh at Debra, Gowaltore at Chandrakona

Figure 76. *Leersia hexandra*: **a,** flowering shoot (3 cm); **b,** spikelets inflorescence (5 mm); **c,**spiklet (2 mm); **d,** plant in field with inflorescence.

Oryza: 2 species

Key to species:

1. Anthers (3.5-) 4-6.2 mm long, yellow or brown; spikelets deciduous when ripe, disarticulating above the glumes ***O. rumfipogon***

1. Anthers 0.8-2 (-2.5) mm long, white or yellow, persisting when ripe ***O. sativa***

Oryza sativa L.: Figure 77.

Vernacular name: Dhan.

Tufted, without stolons. Culms erect to ascending (90-) 50-150 (190) cm long, rooting below, sheaths often inflated below, tight above; liguleovate-lanceolate to linear-lanceolats;Spikelets oblong oblong lanceolate, 5-12 mm long, persisting. ± 03 mm long. Sterile lemmas ovate-oblong lanceolate, 13-4 (-10) mm long. Fertile oblong to lanceolate, 6-11 mm long; awn very up to 150 mm long. Anthers 03-2 (-23) mm white or yellow. Caryopses oblong, cylindrical, 5-8 long, whitish-yellow, brown to reddish-brown.

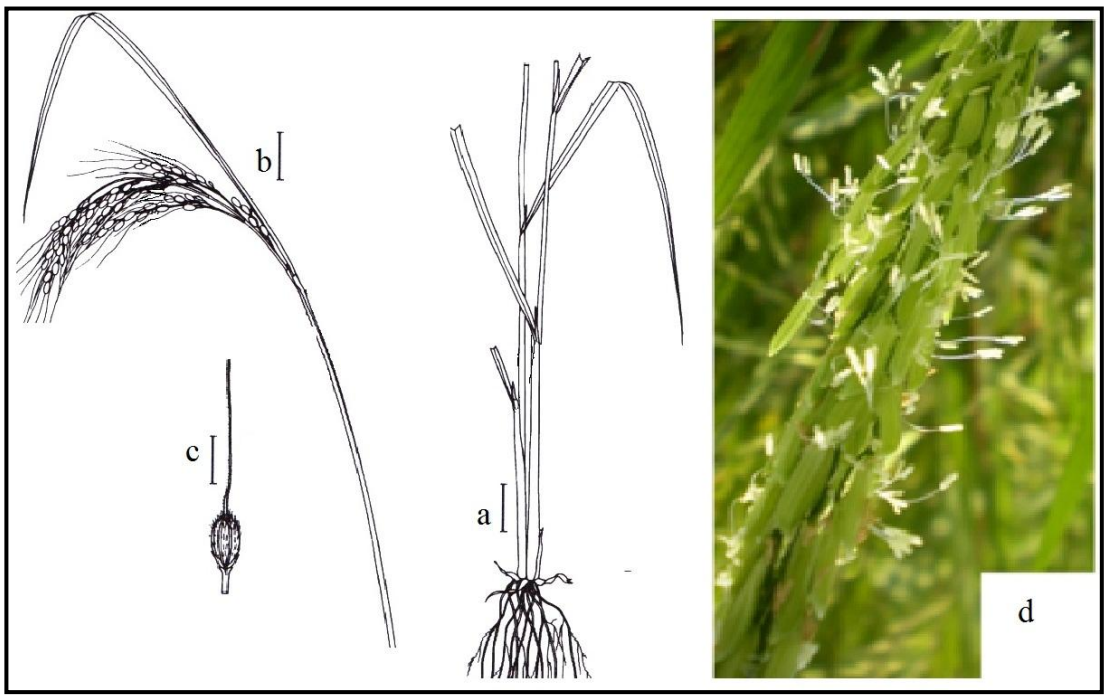


Figure 77. *Oryza sativa*: **a,** flowering plants (5 cm); **b,** inflorescence (2 cm); **c,** spikelet (4 mm); **d,** plant inflorescence in field.

Flowering and Fruiting: June to November

Ecological Notes: Annual or rarely perennial. Widely cultivated, occasionally escaping and found in a wide variety wetland habitat.

Field Collections: Common in everywhere.

Oryza rufipogon Griff.: Figure 78.

Vernacular name: Buno Dhan

Tufted or stoloniferous. Culms decumbent and floating or ascending to erect, (30-) 70-90 (330) cm long, branching and rooting below. Leaf sheaths often inflated below, tight above; ligule triangular to narrowly triangular, 9-25 (-45) mm long; leaf blades linear, (10-) 27-60 cm long, 7-15 (-25) mm wide. Panicles loosely contracted, up to 30 cm long. Spikelets oblong to obovate-oblong, 6-11.5 mm long, deciduous, disarticulating above the glumes. Glumes ±03 mm long. Sterile lemmas triangular to linear- lanceolate, 1.25-7.5 mm long. Fertile lemma obovate to lanceolate, 7-11 mm long; awn very variable, up to 110 mm long. Anthers (33-) 4-6.2 mm long, yellow or brown. Caryopses oblong, cylindrical, 5.2-6.7 mm long, reddish-brown.

Figure 78. *Oryza rufipogon*: **a,** stem (1 cm); **b,** ligule (5 mm); **c,** flower (1 mm); **d,** spikelet; **e** and **f,** plant in field with inflorescence.

Flowering and Fruiting: October to December.

Ecological Notes: Perennialor annual. Commonly found on the marshy places, ditches or along the margin of the paddy fields.

Field Collections: Common in everywhere.

Panicum: 2 species

1. Culms spongy at the base; stolons not irregularly thickened, rarely penetrating the substrate; lower glumes without nerves; usually developing grains ***P. paludosum***

1. Culms not spongy; stolons irregularly thickened, deeply penetrating the substrate; lower glumes with 1 or 3 faint nerves; usually not developing grains ***P. repens***

Panicum paludosum Roxb.: Figure 79.

Vernacular name: Kalashar

Like *P.ripens* but aquatic or subaquatic with lower part of culms creeping, stolon-like, spongy and inflated, 30-100 cm long; leaf sheaths glabrous or pilose at the mouth only; leaf blades flat, bright green; spikelets narrowly lanceolate-ellipsoid, 3-43 mm long, approved to the branches; lower glume without nerves; lemma of lower floret sterile; caryopses 13-2 mm long.

Figure 79. *Panicum paludosum*: **a,** inflorescence (3 cm); **b,** base of culm (3 cm); **c,** glume (1 mm); **d,** plant in field.

Flowering and Fruiting: June to March.

Field Collections: Dujipur at Pingla, Hosnabad at Medinipur sadar, Shyamchak at Debra.

Ecological Notes: Plentiful in the marshes and waste places. Perennial or annual. A gregarious and vigorous gram found growing in water. It roots in the substrate or forms floating mats on the surface. It is readily eaten by buffalo.

Panicum repens L.: Figure 80.

Vernacular name: Baranda.

Perennial erect herb. Culms stoloniferous, leafy, rooting at nodes, striate, glabrous. Leafblades distichous, erect, stiff, rigid, linear, lanceolate, acuminate, round at base, glabrous or hairy, margins cartilaginous, sheath ciliate. Ligule narrow, coriaceous ring. Inflorescence panicles, irregularly branched tips of pedicels cupular. Spikelets sessile white or purplish, glabrous, ovate. Cariyopses enclosed in the glumes.

Flowering and Fruiting: Almost throughout the year.

Field Collections: Chilkigarh at Jamboni, Malighati at Debra, Eligang at Keshpur.

Ecological Notes: Extensively creeping stolons and are abundant on the banks of tanks or marshes. A low land grass. Grows along the sandy shores.

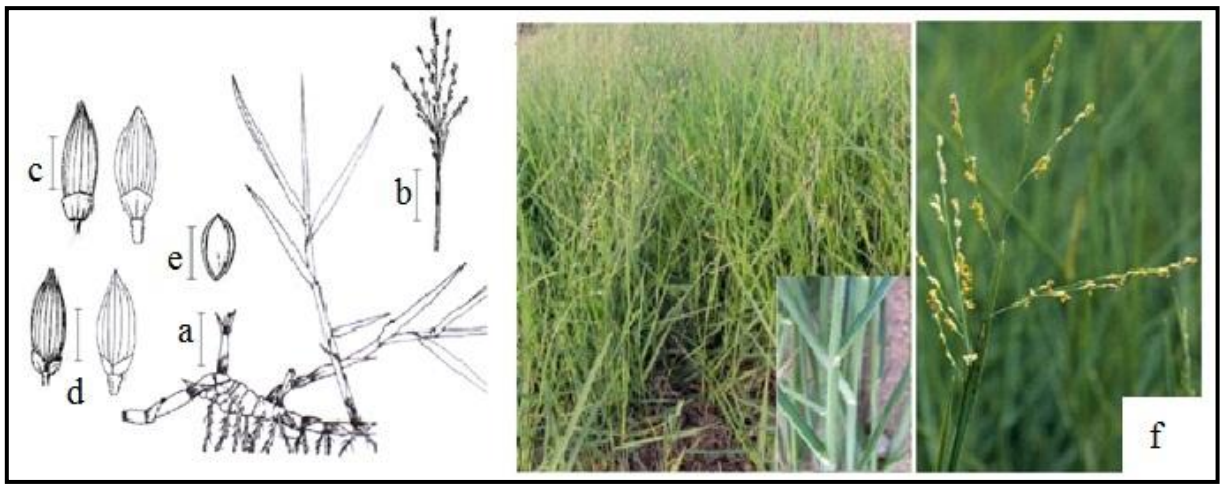


Figure 80. *Panicum repens*: **a,** rhizome (2 cm); **b,** flowering shoot (1 cm); **c, d,** spikelet in different view (1 mm); **e,** seed (0.5 mm); **f,** plant in field.

Paspalum: 2 species

1. Glumes pubescent; spikelets 2.5—3.5 mm long ***P. distichum***

1. Glumes glabrous, spikelets 2-2.5 mm long ***P. scrobiculatum***

Paspalum distichum L.: Figure 81.

Stolontferous or rhizomatous. Culms erect, 5-60 cm long leaf sheaths keeled towards the top, the collar glabrous; ligules 0.5-1.5 mm long; leaf blades linear to lanceolate, 3-12 cm long; 2-6 mm wide, usually glabrous or sometimes pubescent, the base slightly rounded and ciliate, the tip acute to acuminate Racemes 2, rarely with a 3rd below, apprised or widely spreading and reflexed, each 1.5-8 cm long. Spikelets elliptical to ovate, 2.5-3.5 (-4) mm long, light green, acute. Upper glume broadly ovate to elliptical-lanceolate, ± as long as the lemma of lower floret, with short appressed hairs, lemma of lower floret ovate-oblong to oblong-elliptical, papery; lemma of upper floret ovate-oblong to oblong-elliptical, 2-2.5 mm long, hardened, faintly 5- or 7-nerved. Anthers 1.3-1.7 mm long.

Flowering and Fruiting: June to November.

Ecological Notes: Perennial. Common and widespread, often forming large patches.

Field Collections: Chilkigarh at jamboni, Malighati at Debra, Eligang at Keshpur.

Figure 81. *Paspalum distichum*: **a,** flowering culm (1 cm); **b,** flowering twig; **c,** spikelet (1 mm); **d,** plant in field with inflorescence.

Paspalum scrobiculatum L.: Figure 82.

Vernacular name: Khodoadhan

Culms tufted, erect or decumbent at the base, rooting at the lower nodes, 16-120 cm long, leaf sheaths slightly keeled towards the top, usually glabrous but sometimes pubescent; ligules 0.3-1.2 mm long; leaf blades linear to lanceolate, (2-) 5-30 (-40) cm long; 2-8 (-12) mm wide, usually glabrous or sometimes pubescent, the base rounded or shallowly cordate, the tip acute to acuminate. Racemes (1) 2-4 (5), ascending to widelv spreading, each 1-8 (-10) cm long. Spikelets ovate to almost orbicular, (1.8-) 2-2.5 (-3) mrn long, olive green to brown or glaucous green blotched with brown. Upper glume ovate to orbicular, ± as long as the lemma of lower floret, thin, 3- to 7-nerved. Irmma of lower floret ovate to orbiculate, papery'; lemma of upper floret ovate, 2-2.5 mm long, hardened, faintly 3 to 7-nerved. Anthers 1-1.3 mm long.

Flowering and Fruiting: June to January.

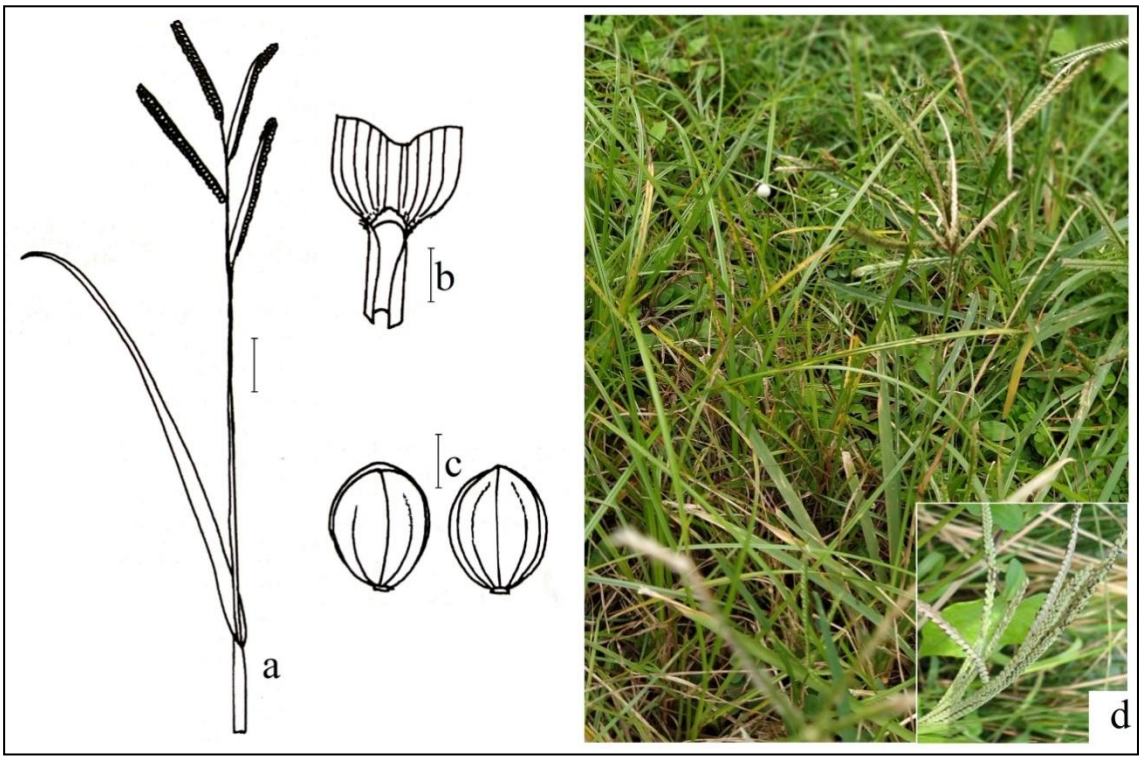


Figure 82. *Paspalum scrobiculatum*: **a,** inflorescence (1 cm); **b,** ligule (5 mm); **c,** spikelet in different sides view (1 mm); **d,** plant in field with inflorescence.

Ecological Notes: Perennial or some races annual. Not confined to wetlands but often found in wet places such as in waterlogged soil along the margins of tanks and streams, in marshes, backwaters and rice fields.

Field Collections: Commonly found in study area, especially Kharagpur, Pingla, Sabong and other parts of district.

Saccharum spontaneum L.: Figure 83.

Rhizomatous. forming dumps. Culms erect. 1-3 m tall, 5-15 mm in diameter, green or white, covered to the bare with percent leaf sheaths. Leaf sheath, with the auricles and around the ligule; ligules membranous, ovate. 3-8 mm long; leaf blades linear-lanceolate. 30-150 (-200) cm long, 15 cm wide, glaucous, serrulate along the margins, with prominent mid nerves Inflorescence a large feathery panicle. (15-) 40-70 cm long, bearing numerous spreading branches, all invested with silky hairsprominent below the inflorescences. Spikelets linear-lanceolate, 3-5 mm long, with long silky hairs (8—14 mm long), in pairs, one sessile the other pedicellate; pedicelled spikelet disarticulating from the pedicel, the pedicel 0.5-3 2 mm long; the sessile spikelet disarticulating with the inferior internode and the pedicel of the pedicelled spikelet, with or without awns, 3.5-5.5 mm in long, 2-flowered. lower floret sterile, the upper one bisexual. Lower glumes ovate-lanceolate, 3-5 mm long, 2- or 3-nerved; upper glume 3-5, 1-nerved. Lemma of lower florets up to 4.5 mm long, nerveless or weakly 3-nerved, sometimes almost suppressed; lemma of upper floret strap shaped, up to 4 mm long, very thin, sometimes almost suppressed. Caryopses oblong to globose.

Ecological Notes: Perennial. It is not confined to wetland but frequently found in seasonally inundated places, in swamps and along stream, river, backwater and ditches.

Field Collections: Common in the district.

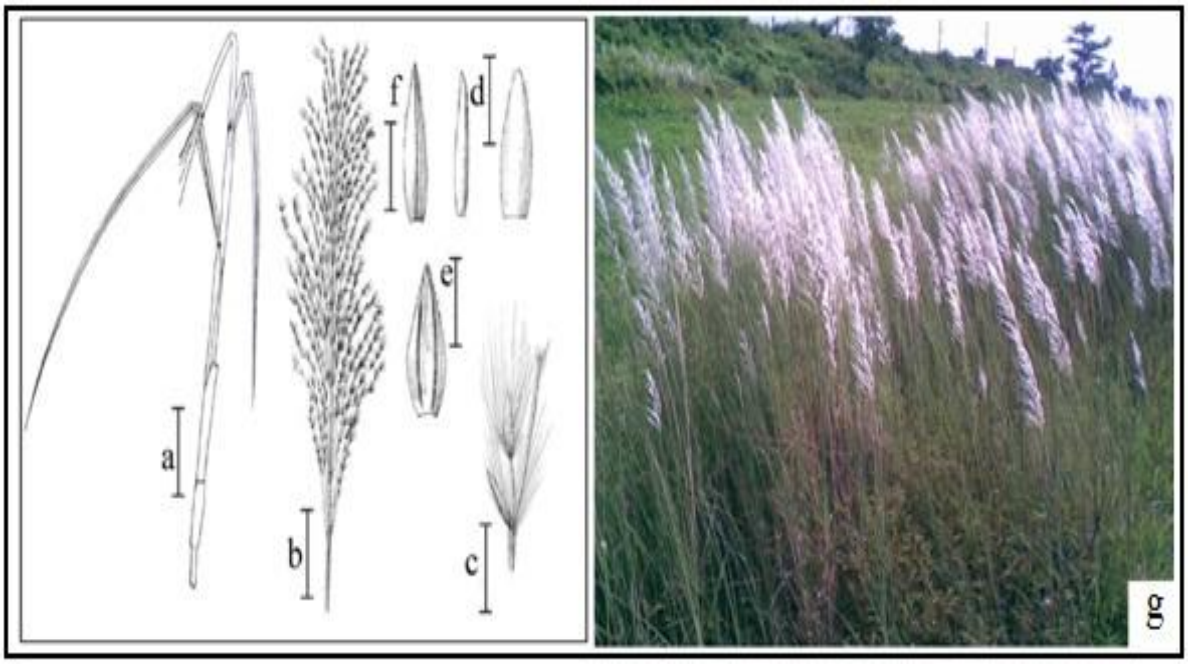


Figure 83. *Saccharum spontaneum*: **a,** clumps (5 cm); **b,** inflorescence (3 cm); **c,** spikelet (2 mm); **d,** lower lemma (0.5 mm); **e,** lower glume (0.5 mm); **f,** upper glumes (0.5); **g,** plants in the field.

Phragmites karka (Retz.) Trin. ex Steud.: Figure 84.

Vernacular name: Nal or pharma

Culms erect from a stout, creeping rootstock and with extravaginal young shoots. Leafblades flat, lanceolate, ligule narrow, a row of short hair. Inflorescence lax panicles, silky hairy at the base. Spikelets bi-sexual 3-4 fid, rachilla jointed below the flowering glumes and pcnicillate, pedicel and glumes all glabrous. Fruit grain free, loosely enclosed by the lemna and palea, oblong, semiterete, hilum-oblong, short, basal.

Flowering and Fruiting: December to March.

Ecological Notes: Perennial. Common and widespread, often forming large patches.

Field Collections: Jhilinga at Kharagpur, Tutranga at Narayangarh, also common in other places.

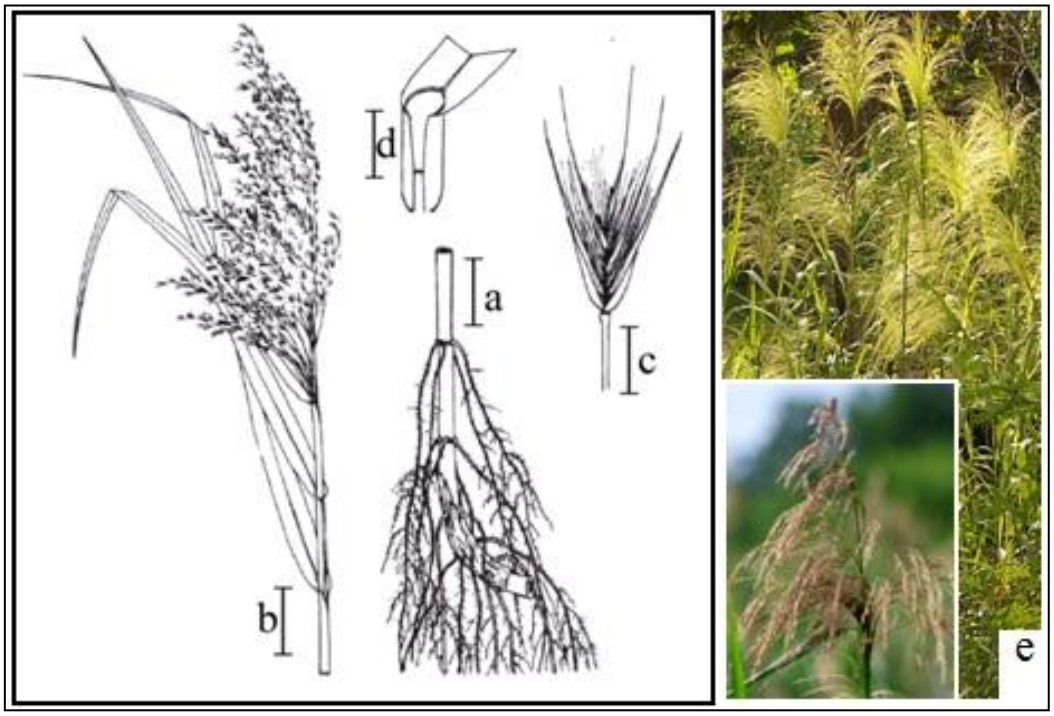


Figure 84: *Phragmites karka*: **a,** culm base (20 cm); **b,** inflorescence (20 cm); **c,** raceme (2 mm); **d,** ligule (1 cm); e, plant in field with inflorescence.

Sacciolepis: 2 species

1. Spike-like panicle continuous, rarely more than 6 cm long; lower glume more than half as long as the spikelet; culms slender, never inflated ***S. indica***

1. Spike-like panicle interrupted below, mostly comsiderably longer than 6 cm; lower glume half or less as long as the spikelet; culms inflated ***S. interrupta***

Sacciolepis indica (L.) Chase: Figure 85.

Tufted. Culms erect or reading, slender, (5-) 25-70 (-100) cm tall, less than 1 cm thick. Ligules a ctlamt membrane 0.3-1 mm long; leaf blades (0.5-) 2-26 cm long, 1-8 mm wide. Spike-like panicle cylindrical, 1-4 (-8) cm long, continuous. Spikelets 2.2—3.5 mm long glabrous or hairy, green or with a purple tinge. Lower glume 0.5-2 mm long, more than half as long as the spikelet, 3 to 7-nerved; upper glume 1.5-3 mm long 5 to 11-nerved. Lemma of lower floret empty, 1-3 mm long, 5- to 11-nerved; lemma of upper floret 0.5-1.5, half as long

as the spikelet, hard and shiny. Anthers purple or deep violet, 0.5-0.7 mm long. Caryopses ellipsoid usually abaxialliy flattened, ± 0.8 mm long.

Flowering and Fruiting: September to January.

Field Collections: Jhilinga at Kharagpur, Tutranga at Narayangarh, also common in other places. Jamna, Belar, Sahara at Pingla.

Ecological Notes: Annual, not confined to wetlands but often found in marshes, seasonally flooded places, banks of rivers, common in rice fields.

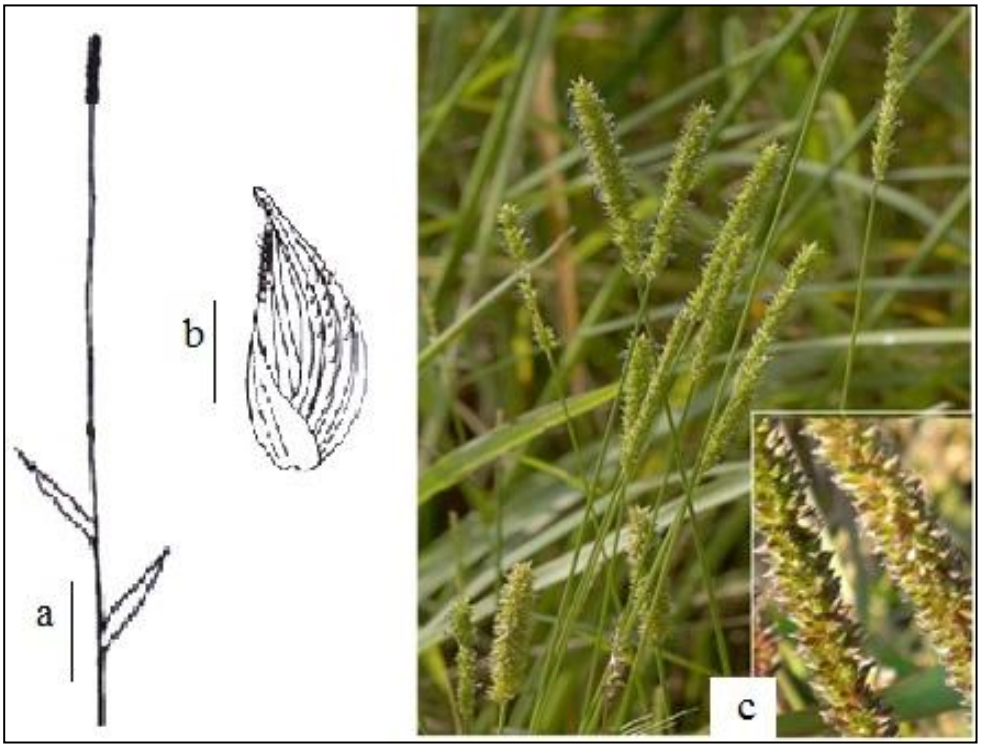


Figure 85. *Sacciolepis indica*: **a,** flowering culm (10 cm); **b,** spikelet (0.5 mm); **c,** plant in field with inflorescence.

Sacciolepis interrupta (Willd.) Stapf: Figure 86.

Vernacular name: Nardula

Erect branched, perennial, quite glabrous grass. Culms form a stout creeping and rooting or floating root stock, base spongy, lower intemodes rooting. Leaf blades soft, flat, glabrous,

long base rounded or sub-cordate, many nerved, ligule short, broad, membranous. Inflorescence spike like panicles, cylindric, interrupted below, striate: rachis stout, terete, short channeled. Spikelets lanceolate, densely crowded in small fascicles, very shortly pedicelled, many imperfect, ovoid, turgid spreading, caryopsis obovoid, apiculate.

Flowering and Fruiting: August to December.

Ecological Notes: Common on the dampy grass lands.

Field Collections: Common in Chaksola, Balpai, Maligram at pingla; Chakraghu.

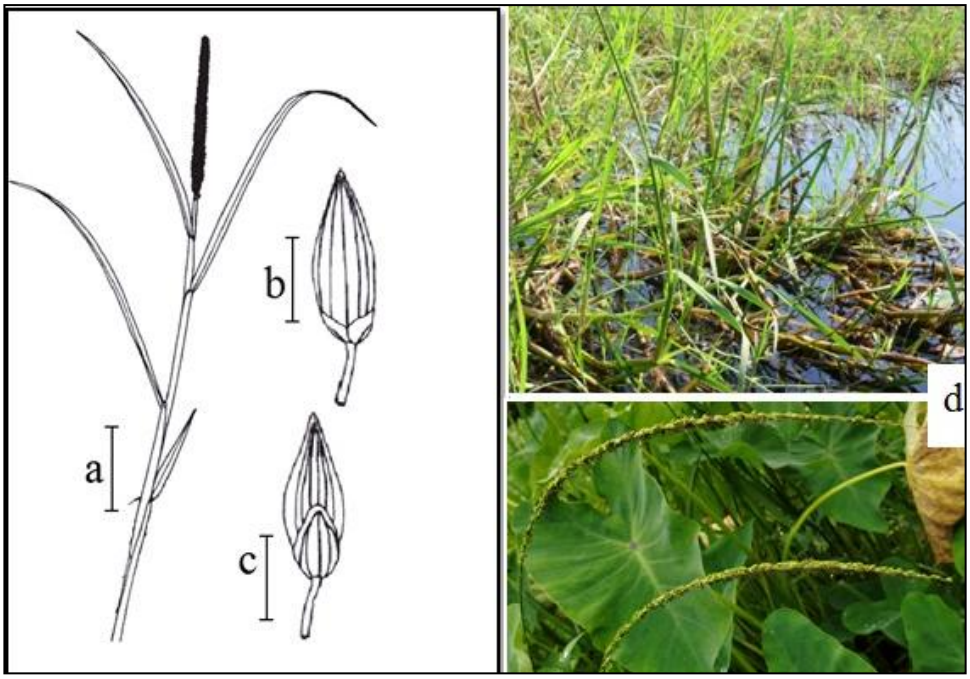


Figure 86. *Sacciolepis interrupta*: **a,** flowering shoot (2cm); **b** and **c,** spikelet in different view (1 mm); **d,** plant in field with inflorescence.

Chrysopogon zizanioides (L.) Roberty: Figure 87.

Rhizomatous but forming clumps. Culms up 3 m tall. Leaf sheaths flattened, glabrous; ligule a ciliate membrane, the membrane 0.2-1.4 mm long; leaf blades 25-90 (-130) cm long, 3-15 mm wide. Inflorescence a panicle, 15-40 cm of numerous whorls of simple or rarely bract racemes. Spikelets in pairs; sessile spikelet disarticulating with the pedicel of the pedicelled spikelet and sometimes the inferior internodes, 3.6-5 (-7) mm long, slightly flattened laterally,

2-flowered; lower floret sterile; upper floret bisexual; lower glume convex, as long as the spikelet, keeled, with numerous upwardly directed spines, 7-nerved, with incurved (not inflexed) margins; upper glume like lower bur somewhat shorter, 3-nerved, with spines on midnerve only, lemma of sterile floret as long as spikelet, thinly membranous, 2- or 3 nerved; lemma of upper floret, 2.8-3.9 mm long, shorter than sterile one, 1- or 3-nerved, bearing a 0.4-1.8mm long awn. Pedicelled spikelet 2 5-4.4 mm long, shorter than the sessile one, 2-flowered, the lower flower sterile, the upper one usually male; glumes thinner not as spiny as the sessile spikelet; lemmas usually awnless. Caryopses oblong in outline, enclosed in spiny glumes.

Flowering and Fruiting: August to December.

Ecological Notes: Grow everywhere both in dry and wet situations easily recognized by its reddish racemes; aerial parts dried up during hot time but new shoots appear with monsoon.

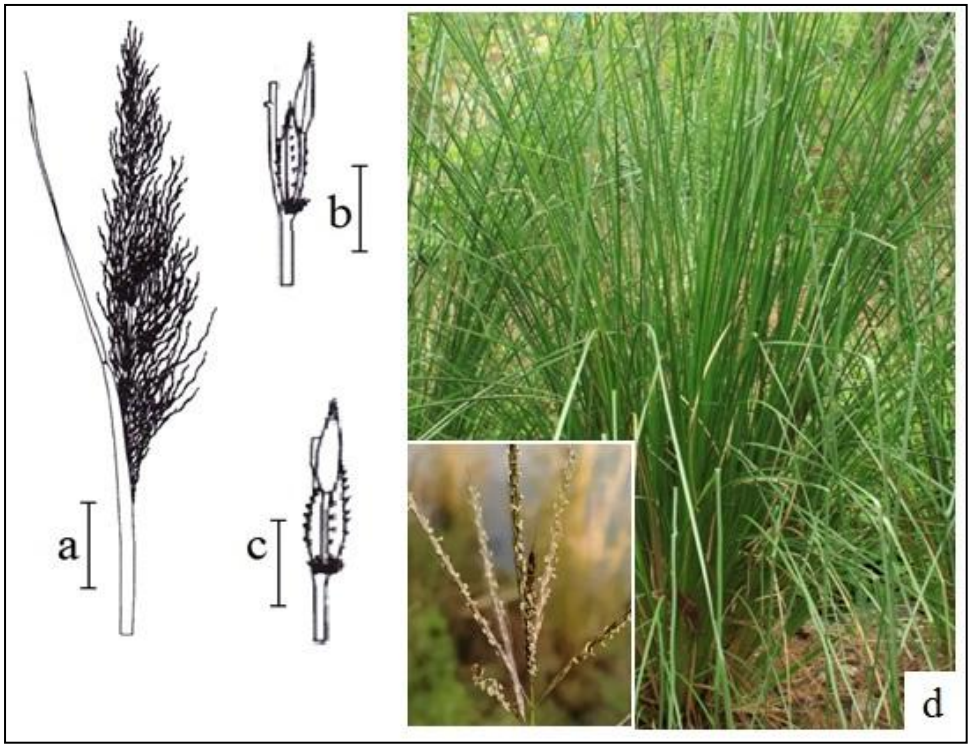


Figure 87. *Chrysopogon zizanioides*: **a,** flowering shoot (3 cm); **b** and **c,** spikelet in different view (1 mm); **d,** plant in field with flowering shoot.

Field Collections: Gowaltore at Chandrakona. Jhilinga at Kharagpur, Tutranga at Narayangarh, also common in other places. Jamna, Belar, Sahara at Pingla

PONTEDERIACEAE: 2 genera, 3 species

Eichhornia crassipes (Martins) Solms: Figure 88.

Stems floating, stoloniferous or creeping, leaves of Juveniles submerged, cauline, linear; leaves of adults emergent, differentiated into petiole and blade; petiole up to ± 30 cm long, usually with a bulbous swelling below; blade broadly ovate to orbicular, 5—25 cm in diameter, at base subcordate, truncate or rounded, Inflorescence a spike, up to 50 cm long spathes dissimilar, the lower leaf-like, the upper like. Perianth blue, tubular below. 6-Iobed, the , unequal, the upper one larger, blue with a yellow on the adaxial lobe, up to 4 cm long, at 2 levels; filaments with glandular hairs; dorsifixed. Fruit a 3-valved capsule. Seeds numerous, oblong, ±1.5 mm long, with 8-10 longitudinal ribs.

Flowering and Fruiting: throughout the year.

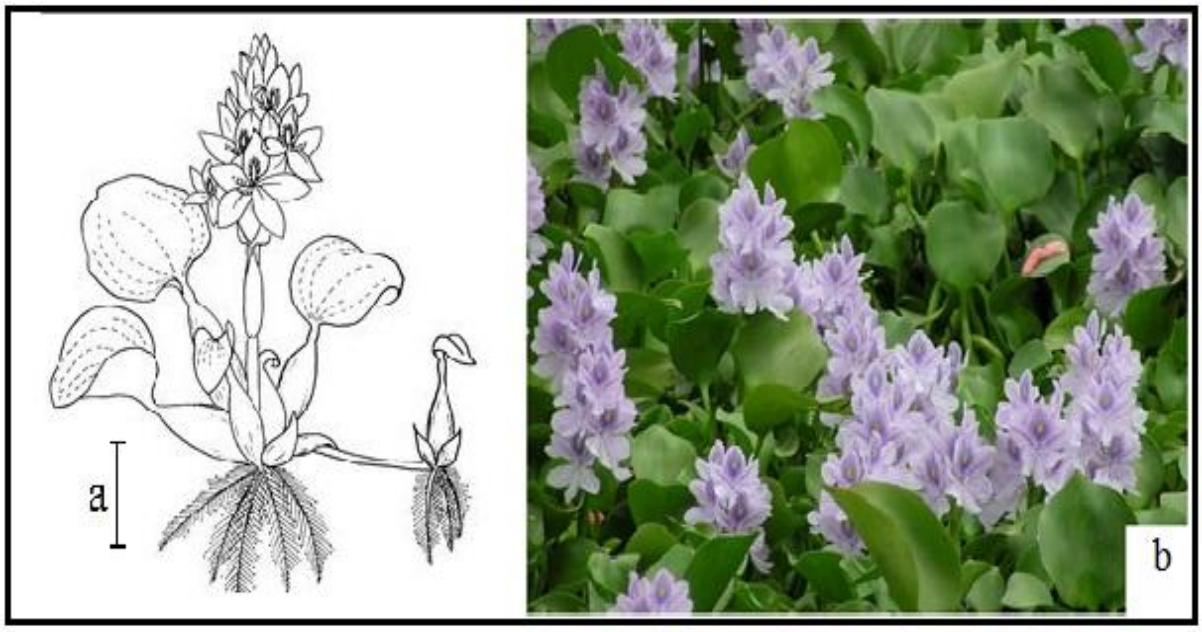


Figure 88. *Eichhornia crassipes*: **a,** flowering plant (4 cm); **b,** plant in field.

Ecological Notes: Perennial or occasionally annual. The juveniles 3 submerged, the adults are free-floating. It is found m large variety of aquatic habitats and is often dominant over large areas.

Field Collections: Common in everywhere of the district.

Monochoria: 2 species

Key to species:

2. Robust rhizomatous perennial; inflorescences usually with more than 20 flowers; blue anthers 6-10 mm long; styles more than 8 mm long ***M. hastata***

2. Annual or weakly rhizomatous perennial; inflorescences usually with less than 20 flowers; blue anthers (1.8-) 1.5-4 mm long; styles (2-) 4-5 mm long ***M. vaginalis***

Monochoria vaginalis (Burm.f.) C.Presl: Figure 89.

Blades of the lower spathes linear or lanceolate to ovate, the bases usually cuneate but sometimes truncate or even cordate. Inflorescences usually contracted-racemose but sometimes reduced to 1 or 2 flowers, strongly deflexed in fruit, borne below the leaves, with (1-) 2-7 (-20) flowers. Pedicels most simple, sometimes bearing 2 flowers, up to 3 cm few but usually very much less. Blue anthers (1.8-) 1.5-4 mm long. Styles (2-) 4-5 mm long. Seeds (0.5-) 0.7-0.8 (-1) mm long.

Flowering and Fruiting: May to November.

Ecological Notes: Annual or perhaps sometimes perennial. Often highly gregarious in inundated places, in swamps or the edges of pools, ditches and canals.

Field Collections: Sankowa at Kharagpur local, Kechenda at Jhargram, Maninathpur at Narayangarh.

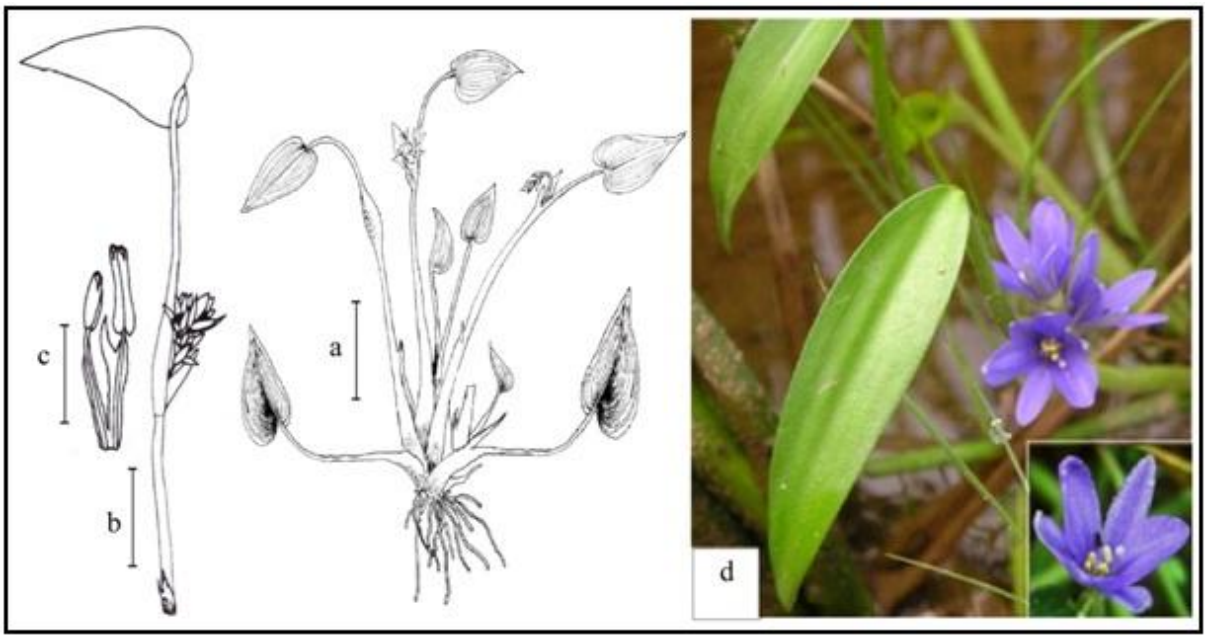


Figure 89. *Monochoria vaginalis*: **a,** flowering plant (10 cm); **b,** flowering shoot (5cm); **c,** stamens (2 mm); **d,** plant in field.

Monochoria hastata (L.) Solms: Figure 90.

Blades of the lower spathes widely sagittate or hastate. Inflorescences subumbellate, borne below the leaves, usually with more than 20 flowers. Pedicels mostly 1-2 cm long, the lower ones sometimes branched. Blue anthers 6-10 mm long. Styles more than 8 mm long. Seeds 0.8-1 mm long.

Vernacular name: Nukha

Flowering and Fruiting: May to November

Ecological Notes: Perennial with a large and thick rhizome. Grows in clumps at the edges of pools, tanks and canals and in ditches.

Field Collections: Rupnarayanpur, Radhakishor at Kharagpur; Chandkuri, Nila andAdasimla at Sabong; Kechenda, Lodhasuli, Chandri at Jhargram; Tapsia and Chichira at Gopiballavpur.

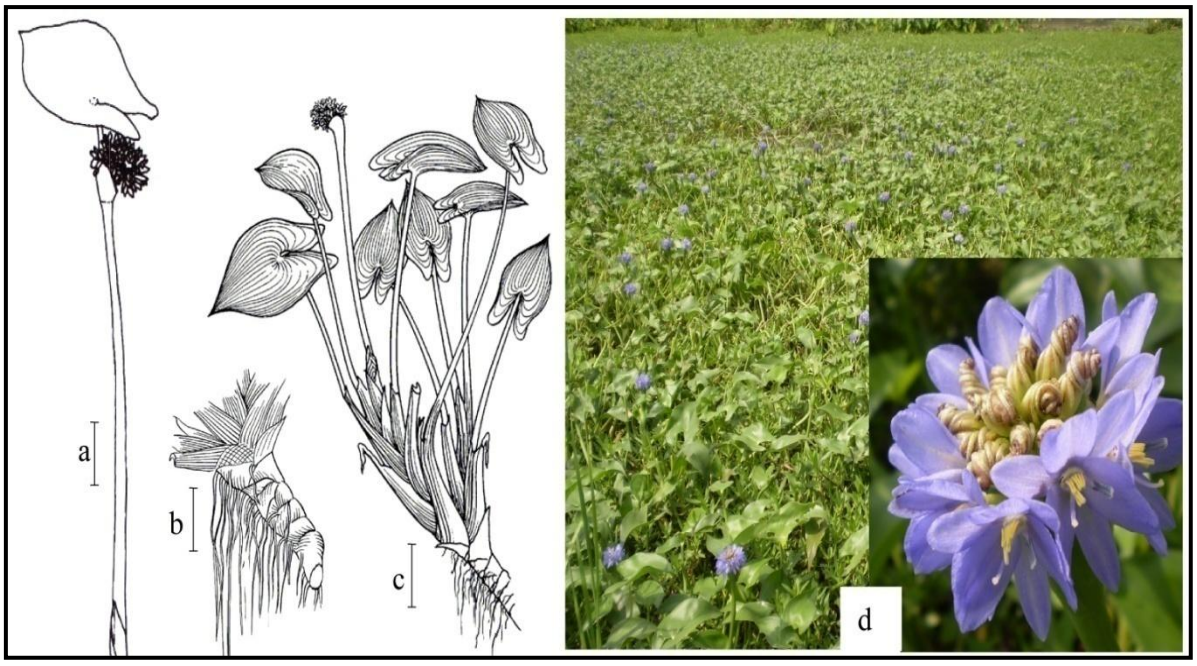


Figure 90. *Monochoria hastata*: **a,** flowering plant (20 cm); **b,** rhizome (5 cm); **c,** flowering shoot (3 cm); **d,** plant in field with inflorescence (inside).

POTAMOGETONACEAE: 1 genus, 2 species

***Potamogeton*:** 2 species

Key to species

1. Blades of submerged leaves clasping the stem (amplexicauidal) at the base, sessile; floating leaves lacking ***P. crispus***

1. Blades of submerged leaves gradually narrowed at the base, never clasping the stem, petiolate or sessile; floating leaves present or absent ***P. nodosus***

Potamogeton crispus L.: Figure 91.

Stolons not more than 2 mm thick much branched reddish, lying flat just below the surface of the strate, often developing turions (tubers) at the Stems 10-70 (—200) cm long, somewhat flattened and angular, usually branched, reddish. Stipules very thin, deciduous, 4—15 mm long; submerged leaves translucent, linear with almost parallel sides (5-10 times as long

wide), (1-) 4-6 (-10) cm long, (3-) 5-10 (-15) mm wide, the margins serrate (teeth just visible to the naked eye) and usually wavy, rounded or sometimes acute at the tips, rounded at the base, 3 or 5 veined, midrib prominent; floating leaves absent. Peduncles rigid erect, emergent, up to 10 cm long. Spikes with 2-10 flowers, dense, rarely more than 2 cm long. Drupelets globose, usually united below, 5-6 mm long including the ± 2 mm long curved beak.

Flowering and Fruiting: December to March.

Ecological Notes: Submerged perennial, benthos or common pond weed, throughout the Kansai River.

Field Collections: Palbari, Harishpur, Bangya, Hatihalka and Nedhuya at Midnapore; Hatibari, Asui and Sumitrapur at Gopiballavpur; Basantapur, Baklasani and Tabageria at Debra.

Figure 91. *Potamogeton crispus*: **a,** flowering plant shoot (2 cm); **b** and **c,** flower in different view (1 mm); **d,** fruit (2 mm); **e,** plant in field.

Potamogeton nodosus Poir.: Figure 92.

Stolons rhizomatous, robust, creeping, yellowish-white. Stem up to 2 m long, terete, nodes often swollen, simple inched. Stipules thin up to 6 cm long; submerged leaves usually present at time of flowering, translucent, 6-20 (-30) cm long, 2-3 cm wide (the lower usually smaller and wider), the margins entire and cute at the tips, cuneate at the base and running a distinct petiole, many-veined; floating leaves usually present, rather leathery, dark green to reddish-brown, ovate to elongate lanceolate, 5-10 (-20) cm long, 2-3.5 cm wide, the margins entire and flat, acute at the winded at the base and running into a distinct petiole 5- 12 (-25) cm long, many-veined; some leaves intermediate between the submerged and floating ones usually develop, Peduncles rigid, erect, emergent, up to Spikes many-flowered, dense, 3-4 (-5) cm long.Drupelets sharply keeled, 2-3.5 (-4) mm long; the beak less than ±1 mm long.

Flowering and Fruiting: Almost throughout the year.

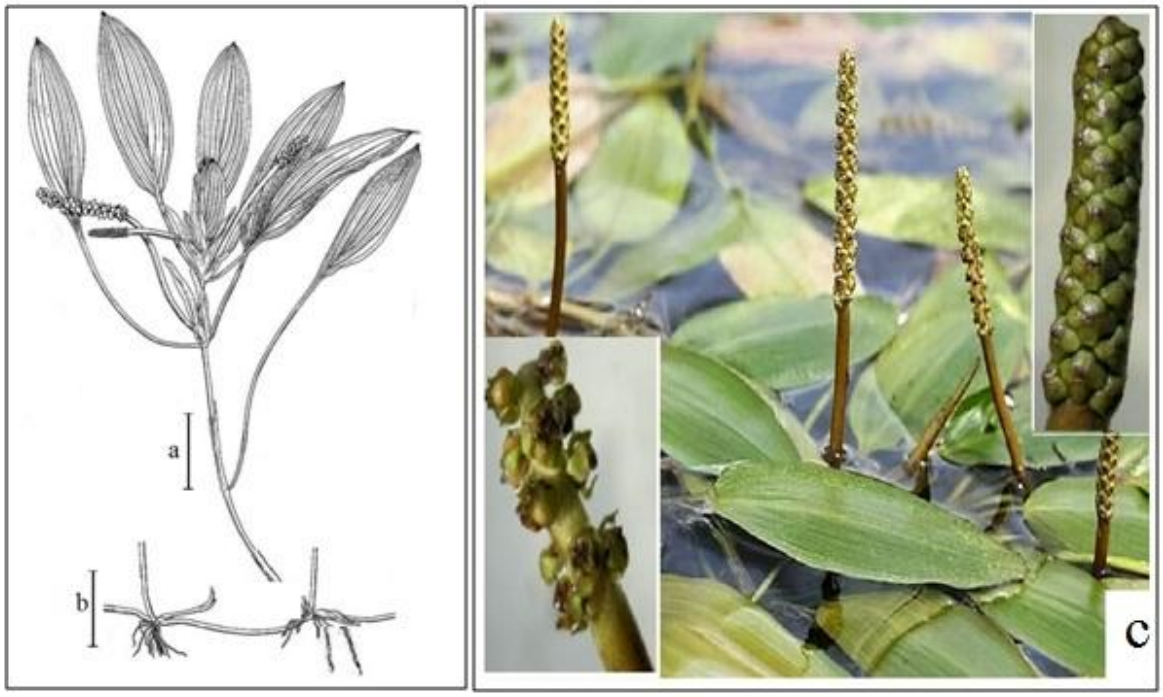


Figure 92. *Potamogeton nodosus*: **a,** flowering plant shoot (2 cm); **b,** stolons (1 cm); **c,** plant in field with inflorescence (inside).

Field Collections: Palbari, Harishpur, Bangya, Hatihalka and Nedhuya at Midnapore; Hatibari, Asui and Sumitrapur at Gopiballavpur; Basantapur, Baklasani and Tabageria at Debra.

Ecological Notes: Gregariously grow on the stagnant water, unused or less used pools, ponds or jheels, Perennial.

TYPHACEAE: 1 genus, 2 species

Typha: 2 species

Key to species

1. Leaves in transverse section lens-shaped, lacking a keel, with 1 central row of gas chambers; female heads in fruit light cinnamon brown; hairs in male heads forked; pollen grains single ***T. domingensis***

1. Leaves in transverse section 3-angled, distinctly keeled below, with more than 1 row of gas chambers; female heads in fruit dark reddish-brown; hairs in male heads simple; pollen in tetrads ***T. elephantina***

Typha domingensis Pers.: Figure 93.

Vernacular name: Hogla

Rhizomes robust up to 1.5 cm in diameter, superficial (not deeply rooted), up to 50 cm or more between aerial shoots, internodes 2.5-6.6 cm long, the cortex with spongy aerenchyma and some, irregularly arranged gas chambers. Scale leaves nearly surrounding the nodes. Photosynthetic leaves (0.3-) 1-3 (-4) m long, (3-) 5-10 (-16) mm wide, abaxially convex, adaxially flat or weakly convex, with a single and central row of gas chambers (usually 10-12 large and 2-4 small); sheaths usually decurrent or uppermost cauline leaves with shoulders or small auricles. Inflorescence stalks 1.0-2.5 m tall, longer than or slightly shorter than the subtending leaves. Female inflorescences in fruit (5-) 7-20 (-35) cm long, 1.4-2.5 cm in diameter and light cinnamon brown. Gap between male and female inflorescences (0-) 1-3 (-9) cm long. Male inflorescences up to ± 35 cm long, about as long as the female

inflorescence, interrupted by 4-9 caducous spathes. Male flowers: hairs simple or branched (forked, anchor- or antler-like), at tip lanceolate or irregularly laciniate; stamens in groups of (1-) 2 (-6); filaments usually simply forked; anthers after anthesis (1-) 1.4-1.8 (-2.2) mm long; connective appendages 0.3-0.8 mm long; pollen single, 20-31 µm in diameter. Female flowers with bracts; bracts exceeding the perianth hairs, at base linear, at tip lanceolate to ovate, light brown, the apex distinctly acuminate or mucronate. 4-8 cells across, the acumen or mucro usually white (contrasting with the rest); perianth hairs 20-41, arising from about 3, loose whorls occupying the basal ± 0.6 mm of the gynophore, linear or enlarged at tip, white except for isolated brown cells near the apex; stigmas linear, filamentous, ± 0.5-1.0 mm long, partly borne above the perianth hairs, at anthesis green, later becoming dark brown but in fruit becoming light cinnamon brown. Pistillodia club-shaped, mucronate at the apex, at maturity as long as the perianth hairs, visible from the surface. Ramuli in fruit with a 0.7-1.0 mm high basal part; terminal part 2-2.4 mm long, mostly bearing 1 or 2 (3) pistillodia and a terminal tuft of (2) 3 (-5) bracts. Fruits 1-1.5 mm long. Seeds (0.6-) 0.8-1.1 (-1.2) mm long, 0.21-0.29 mm wide.

Flowering and Fruiting: March to May

Ecological Notes Perennial. Often dominant in fresh and brackish marshes, backwaters, lagoons, pools and along water courses**:**

Field Collections: Rupnarayanpur, Malancha, Inda at Kharagpur; Hatihalka, Amtala at Medinipur; Sripur, Ashari, Akalposh at Debra; Daspur, Bakultala at Ghatal.

Figure 93. *Typha domingensis*: **a,** whole plant with rhizome in base (7 cm); **b,** flowering shoot (3 cm); **c,** inflorescence (5 cm); **d,** bract (0.5 mm); **e,** plant in field with inflorescence.

Typha elephantina Roxb.: Figure 94.

Vernacular name: Pati Hogla

Rhizomes very robust, up to 5 cm in diameter, with internodes up to 8 cm long, the cortex with many gas chambers arranged regularly in several rows, usually dimorphic with part horizontal and part vertical; horizontal rhizomes usually deep, 0.8-2 m below the soil surface; vertical rhizomes terminate in aerial shoots crowned with persistent leaf bases. Scale leaves appressed to but not surrounding and enclosing the in tern odes. Photosynthetic leaves robust and stiff with rather sharp margins, up to 4 m or more long, (14-) 17-22 (-40) mm wide, with a prominent adaxial ridge from base to apex, in transverse section distinctly 3-angled and containing (1-) 2 (-3) rows of gas chambers; sheaths decurrent. Inflorescence stalks up to 3 m or more tall, subtended by numerous leaves which about equal the flowering stems in length. Female inflorescence in fruit 10-25 cm long, dark reddish- brown. Gap between male and female inflorescences 2-10 cm or more long. Male flowers: hairs simple, with spathulate or

club-shaped tips; stamens mostly single; filaments mostly simple, up to 2 mm long; anthers after an thesis ± 2.5-5 mm long; pollen in tetrads, individual grains (16-) 20-26 µm in diameter. Female flowers subtended by simple bracts with dark brown to almost black, linear to slightly club-shaped tips; perianth hairs 15-21 (-28), slightly swollen at the tip. arising from the base of the gynophore; stigmas linear lanceolate to spathulate, up to 1 mm long, distinctly exceeding the perianth hairs pistillodia narrowly club- shaped with mucronate tips, overtopped by perianth hairs. Ramuli in fruit with 0.3-0.5 mm tall basal part, terminal part 0.3-1.5 mm or perhaps more long, terminates in a naked pistillodium or a tuft of hairs or bracts. Seeds are 1.1 -1.3 mm long, ± 0.2-0.25 mm in diameter.

Flowering and Fruiting: May to January.

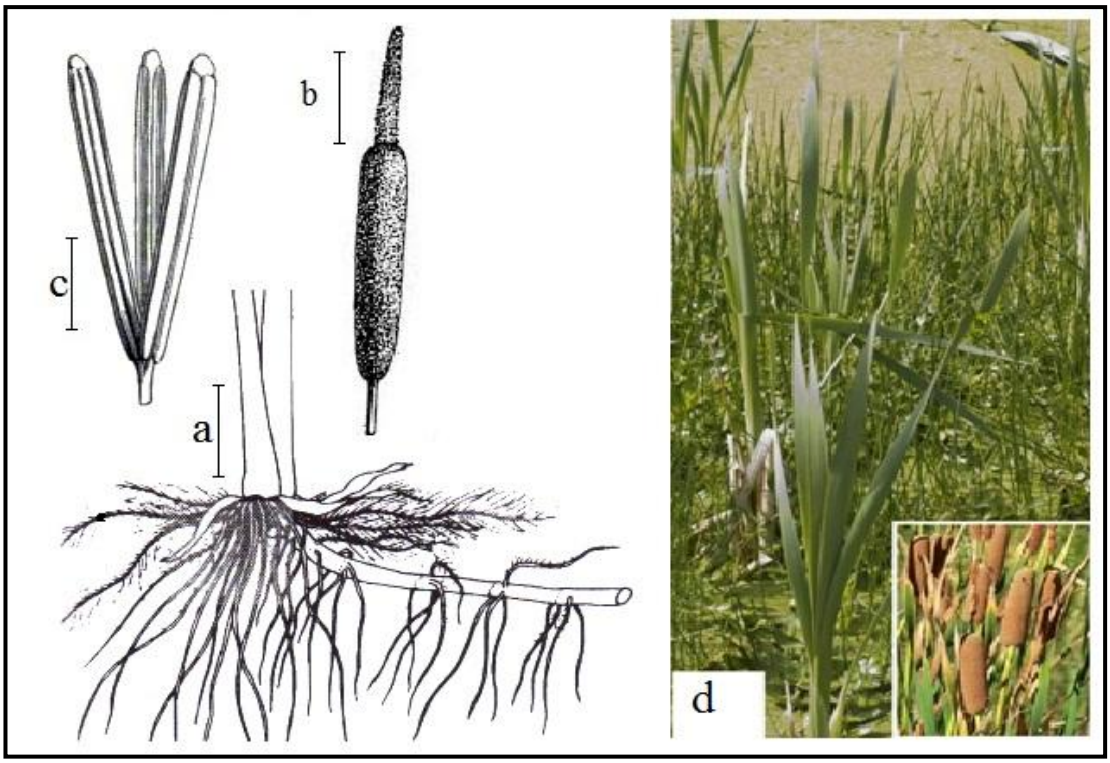


Figure 94. *Typha elephantina*: **a,** plant base with rhizome (6 cm); **b,** inflorescence (5 cm); **c,** male flower (3 mm); **d,** plant in field with inflorescence (inside).

Ecological Notes: Gregariously grow on the shallow ponds, Jheels, lakes canals or roadside ditches. Found in a wide variety of wetland habitats, including alkaline and brackish conditions

Field Collections: Gopinathpur and Jhangia at Pingla; Routhmoni, Gokulpur and Mahadiha at Kharagpur-II; Jambini, Silda, Purunia at Dantan, Bishnupur at Sobong, Goura at Ghatal, Roskundu at Gowaltore

XYRIDACEAE: 1 genus, 1 species

Xyris indica L.: Figure 95.

Vernacular name: Chine Ghash.

Leaves without ligules; sheaths reddish-green to reddish-brown; blades unifacial, flat, (10-) 30-50 (-70) cm long, (1.5—) 5-6 (-13) mm wide, the margins not thickened, smooth or sparsely papillate, with conspicuous, short transverse ribs connecting the longitudinal nerves. Culms terete, (5-) 30-70 (-110) cm long, (1.2-) 2-3 (-4.5) mm wide, with 6-15 longitudinal ridges. Inflorescence globose to ovoid or cylindrical, (4) 10-15 (35) mm long, (3-) 8-14 mm wide. Bracts in the middle of the inflorescence dark or light brown, margins entire, the tip entire or slightly notched greenish-brown or grey field on the abaxial surface below the tip triangular-rhombic. 1-2 mm long, 0.8-2 mm wide, not protruding upwards. Lateral sepals light brown to almost hyaline, with a coarsely saw light crest. Capsules 2.9-4.2 mm long. Seeds are ovoid, 0.5-0.6 mm long; yellow, with 14-18 longitudinal ridges.

Flowering and Fruiting: October to March.

Ecological Notes: Perennial and perhaps sometimes annual. In wet sand or muddy soil in swampy places, sometimes in shallow water in streams, pools, ditches and canals, also in rice fields.

Field Collections: Gurguripal at Medinipur, Kendugari at Nayagram, Rohini at Sakril

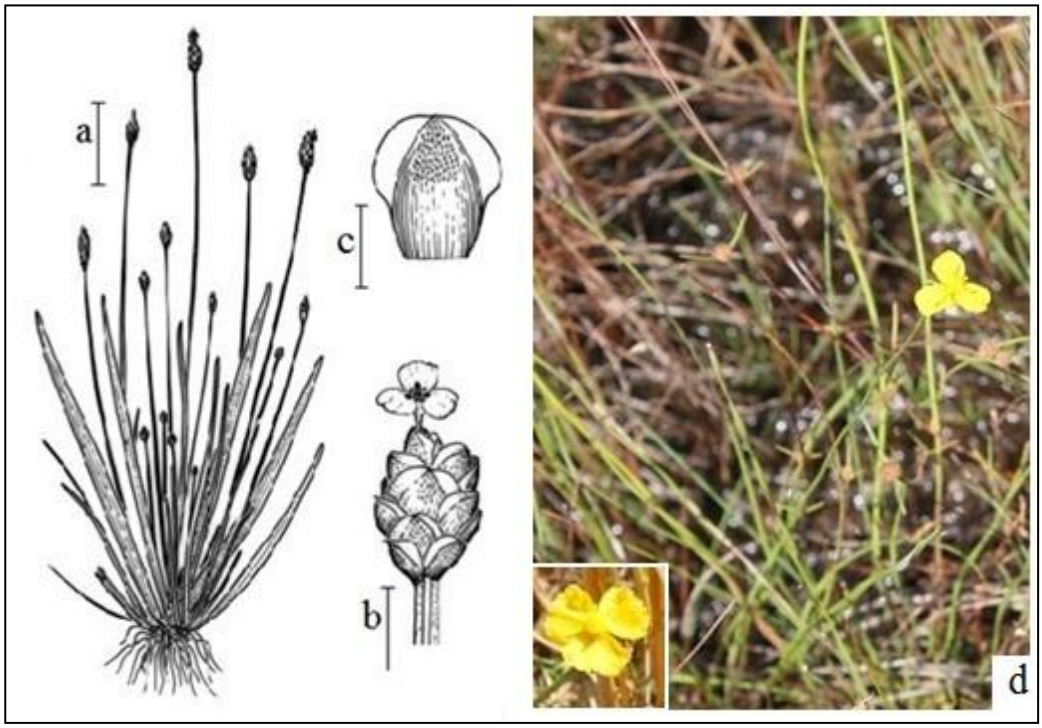


Figure 95. *Xyris indica*: **a,** flowering plant (4 cm); **b,** spike with flower (6 mm); **c,** bract (3 mm), **d,** plant in field with spike.

ZINGIBERACEAE: 1 genus, 1 species

Alpinia aquatica (Retz.) Roscoe: Figure 96.

Vernacular name: Taro or Taruko

Stout perennial herb, 1-2 m high; root tuberous, aromatic. Leaves sessile, linear-oblong, acute, cuspidate, glabrous; sheath long, glabrous. Flowers pink in erect, dense-flowered panicles; calyx sub-campanulate 1.0 -1.25 cm long, pubescent; corolla-tube as long as the calyx, lobes longer than the tube, linear oblong; style glabrous; stigma small. Fruit black, thin, globose, 1.5 cm diameter. Seeds many, small black.

Flowering and Fruiting: May to December.

Field Collections: Dujipur, Sahara at Pingla; Goura, bakultala at Daspur.

Ecological Notes: Occasionally in the wet places and in the railway tracks and road sides forming a dense jungle.

Figure 96. *Alpinia aqutica*: **a,** plant rhizome; **b,** plant in field; c**,** inflorescence.

6.2.2. Dicotyledonous Plant descriptions with their flowering, fruiting, ecological notes and collection sites.

ACANTHACEAE: 1 genus, 3 species

Hygrophila: 3 species

Key to the species

1. Plants with hard and sharp axillary spines ***H. auriculata***

1. Plants without spines,

2. Blades of lower or submerged leaves pinnately divided into linear segments or pinnatifid; blades of emergent leaves pinnatisect to tooth; retinacula conical and straight, rather small; flowers often solitary or 2 or 3 in a cluster ***H. difformis***

2. Blades of lower or submerged leaves simple and entire; blades of emergent leaves simple and entire; retinacula long and curved, mostly hooked; flowers usually in dense terminal spikes with imbricate bracts ***H. polysperma***

Hygrophila auriculata (Schumach.) Heine: Figure 97.

Vernacular name: Kuileakhara

Subshrubby herbs with axillary spines up to 4 cm long. Stems up to 1 m or more tall, mostly unbranched, hispid, thickened at the nodes. Leaves sessile or nearly simple, in spurious whorls of 6 thorns and 8 leaves, the outermost leaves longest, lanceolate to linear-lanceolate, 5-10 (-15) cm long, 1.5-2.5 cm wide, hairy when aerial, base cuneate, margins minutely dentate, tips acute; thorns up to 3 cm long. Flowers in artillery whorls, usually surrounded by spines, bracts and bracteoles leafy, ±1.5 cm long. Sepal tube unequally 4 lobbed the longest lobe linear-lanceolate, 1 cm long. Petal blue, purple or sometimes pink, glabrous, up to 2.5 cm

long; petal lobes rounded to acute, the middle lobe of the abaxial (lower) lip with yellow spot. Stamen filaments in 2 pairs, 1 pair 5 mm long, the other pair 10 mm long; anthers unequal, up to 3 mm long. Capsules linear-oblong, 1 cm long. Seeds 4-8 orbicular 3 mm in diameter, retinacula long and curved.

Flowering and Fruiting: August to January.

Ecological Notes: Perennial or perhaps sometimes annual. Grow to the wet or swampy area of ditches, in temporary pools, road side canals, banks of stream and rice-fields also.

Field Collections: Common in every sub-division of this district. Chatinasol, Asui, Dantan, Dujipur, Jamna, Temthini Lutinia, Basantapur and other places.

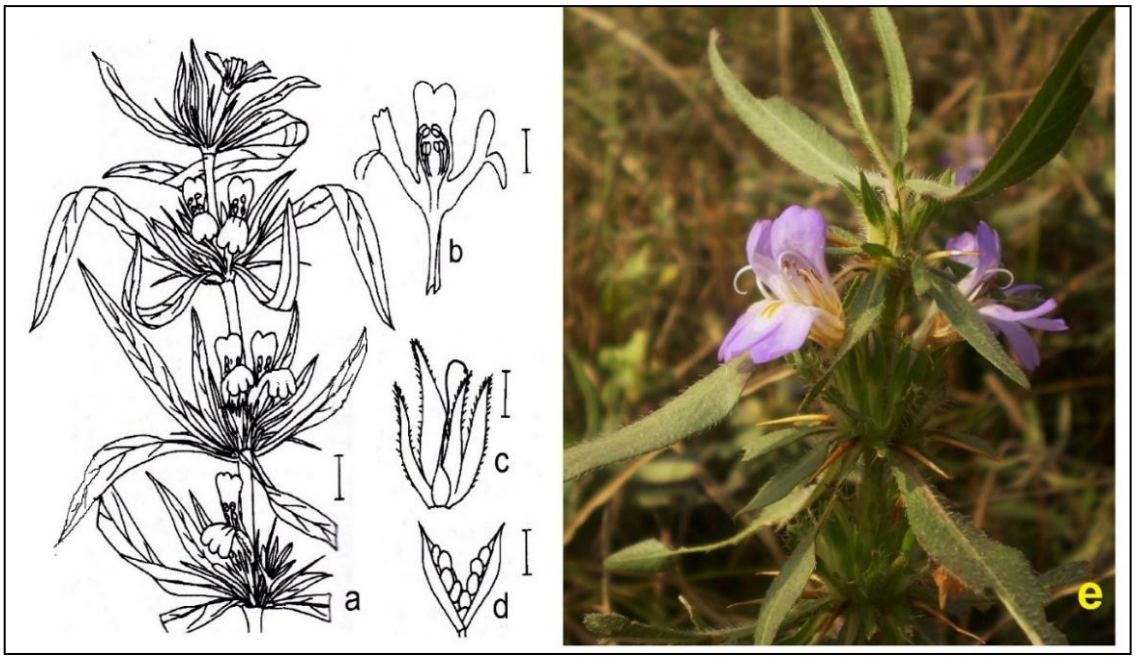


Figure 97. *Hygrophila auriculata*: **a,** part of inflorescence (2 cm); **b,** opened petal tube (5 mm); **c,** opened sepal tube with ovary (5 mm); **d,** capsule with seeds (5 mm); **e,** part of inflorescence in field.

Hygrophila difformis (L. f.) Blume: Figure 98.

Pubescent, decumbent annuals; leaf blades of emergent stems (subtending flowers or flower clusters) elliptical to ovate, rarely more than one and a half times as long as wide; emergent stems and leaves densely clothed in long and short glandular hairs; stem 30-60 cm long, basal nodes rooting. Leaves highly variable, sessile or sub-sessile lower pinnatifid, upper ones obscurely crenate. Flowers 1-3 in axils, flowers often solitary or 2 or 3 in axillary clusters, forming terminal spikes by the gradual reduction of leaves; bracteoles up to 6 mm. long. Capsule 1 cm. long, linear oblong, 2-valved. Seeds 40-60.

Flowering and Fruiting: December to April

Ecological Notes: Perennial or perhaps sometimes annual. Usually found in shallow water where it may be bottom-rooted or straggling over the surface.

Field Collections: Pingla, Sabong, Ghatal, Belda, Gorhbeta, Mohanpur, Nayagram, Keshpur.

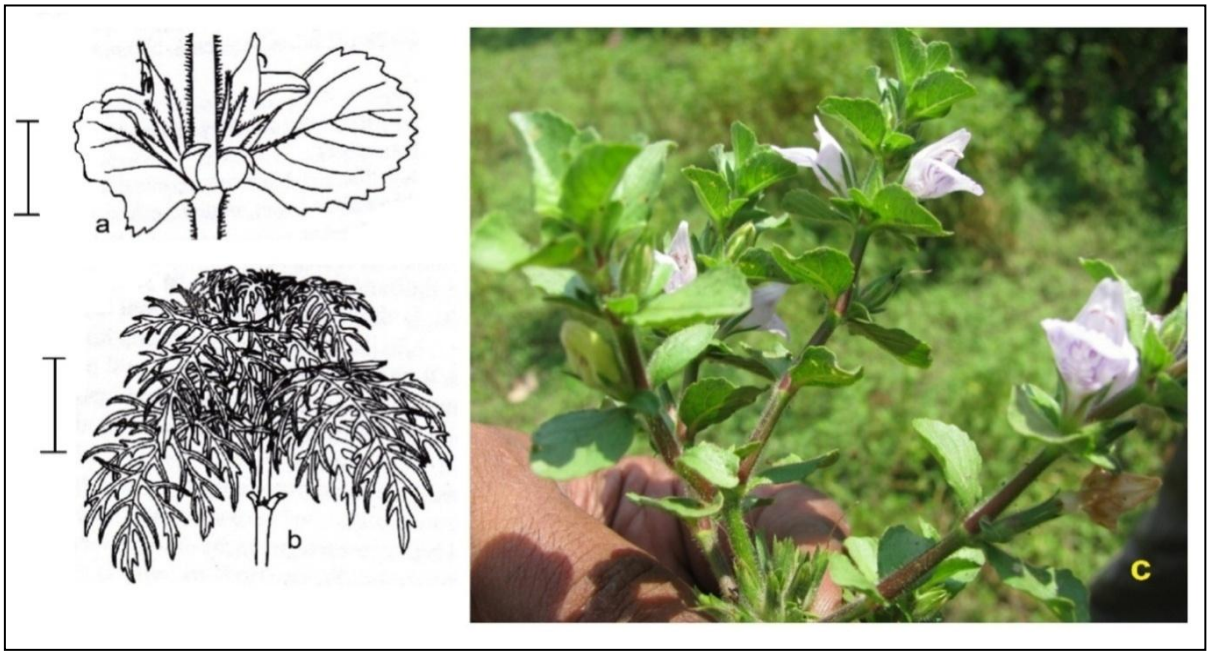


Figure 98. *Hygrophila difformis*: **a,** inflorescence (4 mm) with marginal glandular hairs; **b,** apical part of a submerged shoot (2 cm); **c,** upper part of shoot with inflorescence in field.

Hygrophila polysperma (Roxb.) T.Anderson: Figure 99.

Stems creeping and rooting at nodes, ascending or erect, branched, 20-50 (-100) cm tall, when sub-merged not noticeably swollen. Submerged leaves usually distinctly stalked, usually glabrous, elliptical to oblong, with entire margins, usually larger than the emerged ones; emergent leaves sessile or shortly stalked, glabrous or pubescent, elliptical to obovate-elliptical, 1.2-4 cm long, with entire margins. Flowers mostly in distinct terminal spikes, occasionally in axillary clusters or solitary in the axils of leaf-like bracts; spikes dense, oblong or cylindric, up to 15 cm long. Bracts broadly elliptical, 0.6-1 cm long, pubescent, usually imbricate. Bracteoles lanceolate to linear, nearly as long as the sepals.Sepals 5, the lobes linear with ciliate mergins. Petals blue or white, pubescent up to ±12 mm long; palate of the abxial (lower) lip grabrous. Stamens 4, 2 with fertile anthers; adaxial (upper) filaments with an appendage towards the base; the adaxial (upper) stamens reduced to minute teeth. Fruit narrow, up to 15 mm long; seeds 15-25; retinacula hard, slender and curved.

Flowering and Fruiting: November to March.

Figure 99. *Hygrophila polysperma*: **a,** habit (1 cm); **b,** opened petal tube (2 mm); **c,** sepals (2 mm); **d,** part of inflorescence.

Ecological Notes: Perennial or perhaps rarely annual. Commonly found in the moist places and dried river banks and sloping of the ponds, temporary pools and in slowly moving water in streams and canal sides.

Field Collections: Asui in Gopiballavpur, Hatibari, Nayagram.

AMARANTHACEAE: 1 genus, 3 species

Alternanthera: 3 species

Key to the species

1. Flower heads distinctly pedunculate, either terminal or single at nodes; stems hollow with age ***A. philoxeroides***

1. Flower heads sessile or nearly so, either in clusters or pairs; stems not hollow

2. Leaves and flower heads clustered; perianth segments unequal, each 3-nerved; fertile stamens 5 ***A. ficoidea***

2. Leaves and flower heads paired; perianth segments equal, each 1-nerved; fertile stamens 3 ***A. sessilis***

Alternanthera philoxeroides (Mart.) Griseb.: Figure 100.

Stems decumbent, becoming hollow and flattened with age, usually much branched below, forming mats, glabrous except for a band or strip of multicellular hairs within the leaf bases. Leaves paired; blades linear-elliptical, acute at the tips, tipped with a tiny spine, tapering at the base to form a short petiole-like base which clasps the stem. Flower heads single in leaf axils or terminal, white, globose, ± 1 cm in diameter, pedunculate. Bracts and bracteoles 1-2 mm long. Perianth segments ± equal, ± 4 mm long, glabrous, acute. Stamens 5, alternating with fringed petaloid staminodes; filaments united below into a short tube or replaced by pseudo-ovaries. Mature fruit and seeds not seen.

Flowering and Fruiting: March to June.

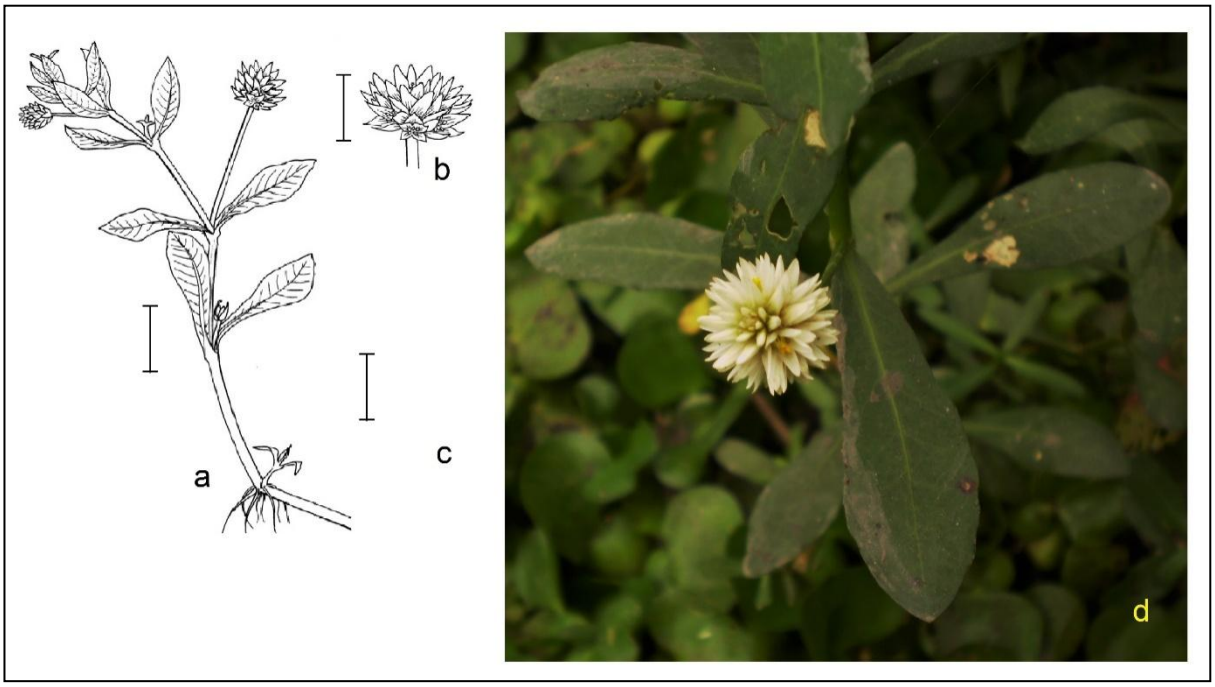


Figure 100. *Alternanthera philoxeroides*: **a,** part of a floating shoot with inflorescence (1 mm); **b,** longitudinal section of a flower (2 mm); **d,** plant in field.

Ecological Notes: Perennial. Moist, waste lands, commonly on the margins of ditches and ponds or shallow marshy lands.

Field Collections: Common in every subdivision. Asti, Hasimnagar in Pingla; Madanmohanchak, Kotaigarh, Bhadrakali in Narayangarh; Keshiary, Belda, Sonakonia, Jahalda, Turka, Topsia, Asui, Patina, Chatinasol.

Alternanthera sessilis (L.) R.Br. ex DC.: Figure 101.

Vernacular name: Chanchi

Stems prostrate, usually much branched, forming mats, fistular when floating, with clusters of whitish roots at nodes, with a narrow line of whitish hairs along each side of the stem, the nodes pilose. Leaves paired, sessile or nearly so; blades lanceolate to spathulate or oval, 1-9 (-15) cm long, 0.2-2 (-3) cm wide, rounded to acute at the tips, cuneate at the base. Flower heads paired or rarely in clusters of up to 5, white, globose and sessile at anthesis, ± 7 mm in diamter, becoming cylindrical in fruit. Bracts deltoid-ovate, 1 mm long; bracteoles like bracts

but shorter and folded, persistent. Perianth segments ± equal, oval-elliptical, 1.5-2, 5 mm long, glabrous, 1-nerved, acute to blunt. Stamens 5, 3 fertile alternating with 2 filamentous staminodes; filaments ± 0.5 mm long; anthers ± 0.3 mm long. Capsule compressed heart-shaped, 1.2-2.5 mm long, ± 2 mm wide. Seeds discoid, 0.75-1 mm in diameter.

Flowering and Fruiting: Almost throughout the year.

Ecological Notes: Annual or sometimes perennial. Very common weed in the cultivated lands and other moist waste places. Essentially a terrestrial of seasonally water logged soil, but particularly common at the edges of tanks, rivers, canals and ditches.

Field Collections: common in all studied area.

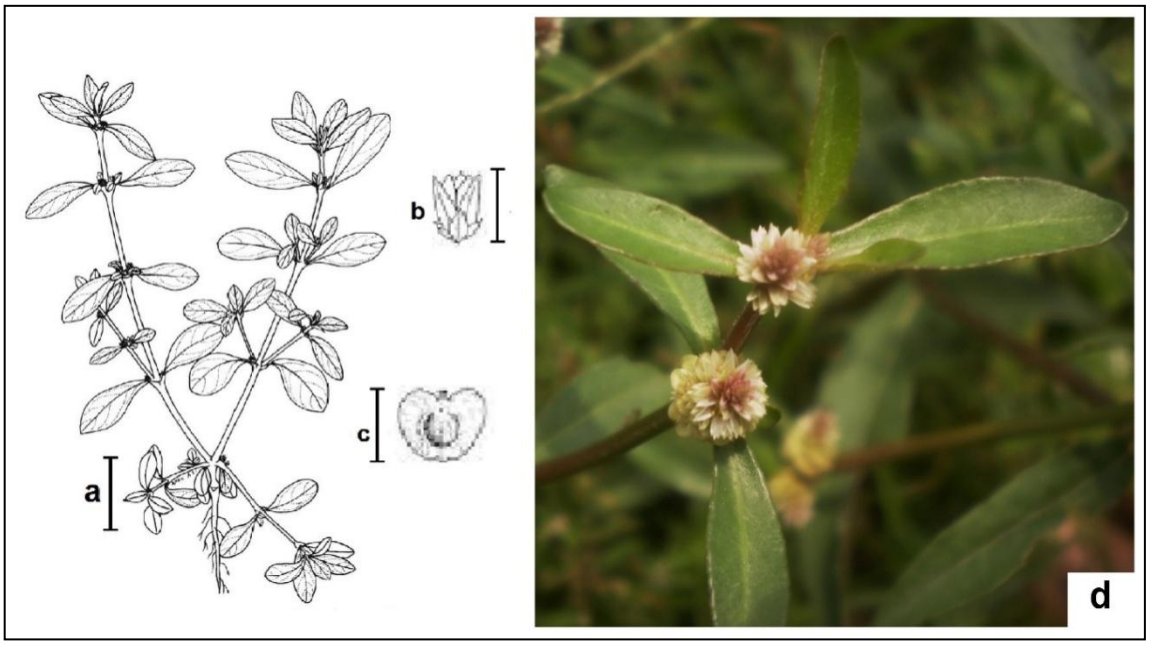


Figure 101. *Alternanthera sessilis*: **a,** flowering plant (2 cm); **b,** flower (1 mm); **c,** seed (0.5 mm); **d,** part of flowering shoot with inflorescence in field.

Alternanthera ficoidea (L.) Sm.: Figure 102.

Stems reddish, prostrate, creeping and branched, mat forming and ± white-villous when young. Leaves clustered, subsessile or petiolate; blades oblanceolate-elliptical to obovate-rhomboid, (0.5-) 1-1.5 (-4) cm long, 0.2-1.2 cm wide, white hairy when young, base

attenuate, tip obtuse to subacute. Flower heads sessile, solitary or 2-3 in clusters, subglobose to oblong, sometimes to 1.5 cm long, 0.5 cm in diameter. Bracts ovate-acuminate, mucronate with the excurrent midrib, ± 2.5 mm long; bracteoles like bracts but narrower, deciduous. Perianth oblong-lanceolate, 3-nerved, pilose on back, unequal, the outer 2 larger, 4-4.5 mm long, the inner 3.5-4 mm long. Stamens 5, all fertile, alternating with short, subulate pseudostaminodes. Capsule compressed orbicular-obcordate, ± 2 mm in diameter; seeds discoid, ± 1.2 mm in diameter.

Flowering and Fruiting: June to December.

Ecological Notes: Perennial with a stout vertical rootstock. It is not confined to wetlands but is found in sandy places subjected to periodical inundation, such as rice fields, river banks, irrigation ditches.

Field Collections: Radhamohanpur, Gokulpur near railway station, Basantapur near NH-6.

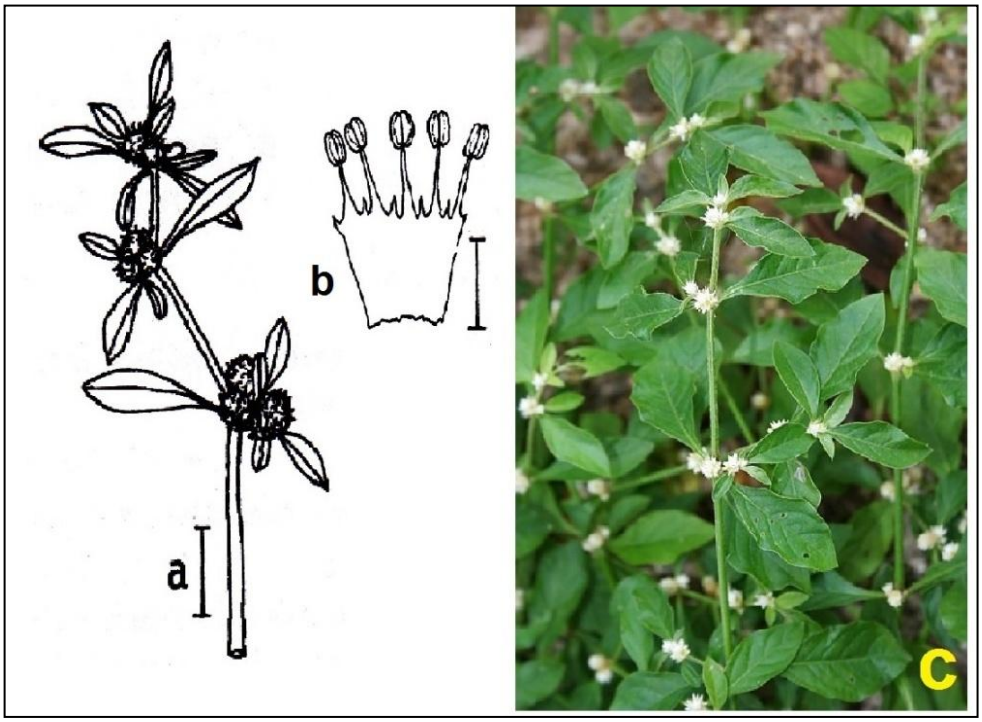


Figure 102. *Alternanthera ficoidea*: **a,** flowering shoot (1 cm); **b,** staminal tube (0.3 mm); **c,** part of flowering shoot with inflorescence in field.

APIACEAE: 1 genus, 1species

Centella asiatica (L.) Urb.: Figure 103.

Vernacular name: Thankni

Stems creeping, stolon-like, usually reddish, hairy when young. Leaves in rosettes, 1-6 clustered on short shoots at each node, distinctly petiolate; petioles 1-10 (-40) cm long, sheathed below; blades simple, reniform to orbicular, 0.5-2 (-7) cm long, 1-3 (-8) cm broad; margins entire or crenate to crenate-dentate. Umbels borne opposite leaves, simple, solitary or 2-5 together; involucral bracts 2, ovate, 2-3 mm long, peduncles 0-2 (-5) cm long (much shorter than the leaves). Flowers usually 3, the middle one usually sessile; pedicels 0.5-1 mm long. Petals white to red, Fruit ovoid to ellipsoid, flattened, 2-3 mm long, 3-4 mm broad; mericarps 7- to 13-ribbed, ribs connected by transverse veins; oil tubes absent.

Flowering and Fruiting: July to January.

Ecological Notes: Perennial. Floating, emergent or terrestrial.Very common on the moist or marshy places, along the irrigation channels.

Field Collections: Common in all subdivision, Narayangarh, Mohanpur, Pingla, Debra.

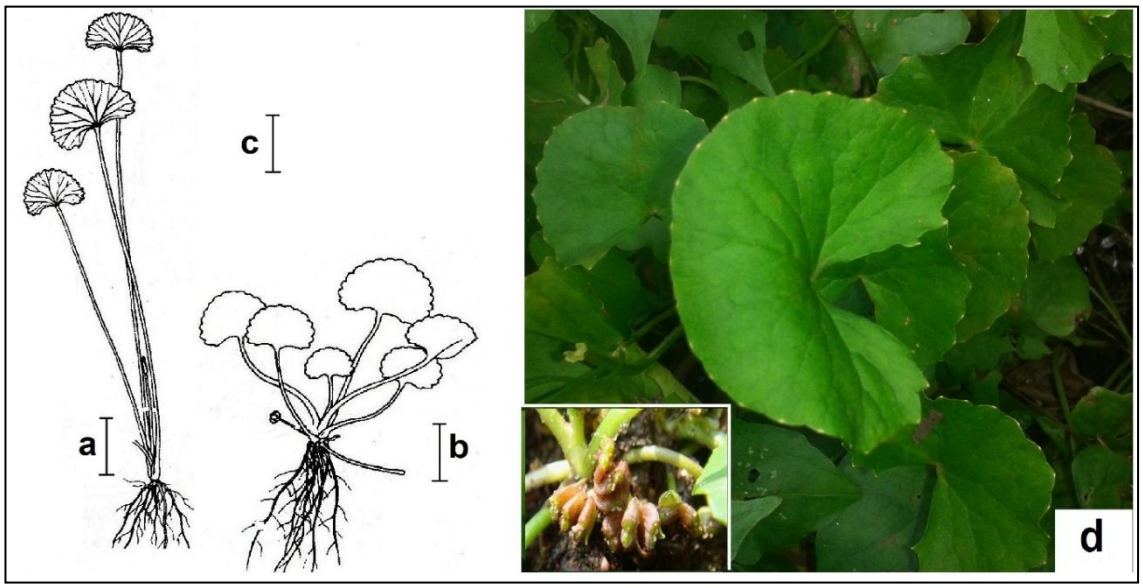


Figure 103. *Centella asiatica*: **a,** aquatic shoot (2 cm); **b,** terrestrial shoot (2 cm); **c,** Fruit (2 mm); **d,** plant shoot in field with mericarps (inset).

ASTERACEAE: 4 genera, 5 species

Sphaeranthus: 2 species

Key to the species

1. Margins of the leaf blades and the wings of the stems, branches and peduncles entire or sometimes simply toothed but never spiny or spiny-dentate ***S. africanus***
1. Margins of the leaf blades and the wings of the stems, branches and peduncles spiny, spiny-dentate or spiny-double dentate ***S. indicus***

Sphaeranthus africanus L.: Figure 104.

Stems usually one arising from the base, erect and bearing numerous ascending or spreading branches throughout its length, up to ± 60 (-90) cm tall. Wings on stems and branches entire or with here and there a minute mucro, glabrous or pubescent Leaves of the main stem obovate to oblanceolate, 2-10 cm long, 0.7-3.3 cm wide, pubescent or sometimes almost glabrous, the margins subentire or denticulate, the tip rounded to subacute, the base gradually narrowed and and decurrent, forming the wings of the stems; leaves of the branches generally smaller and narrower, sometimes elliptical or linear-lanceolatc. Compound heads globose or somewhat ellipsoid, 7-13 mm long, 6-12 mm in diameter; peduncles up to 3 cm long, winged below and tapering off towards the tip, the wings entire. Subtending bracts just visible but only covering the base of the flowering heads at anthesis, oblong-spathulate, apiculate or rounded at the tip.

Flowering and Fruiting: March to September.

Ecological Notes: Annual. In wet places, swamps, rice fields, often in brackish water, sometimes temporarily submerged.

Field Collections: Dantan, Gopiballavpur, Daspur, Narajol, Salboni, Maligram.

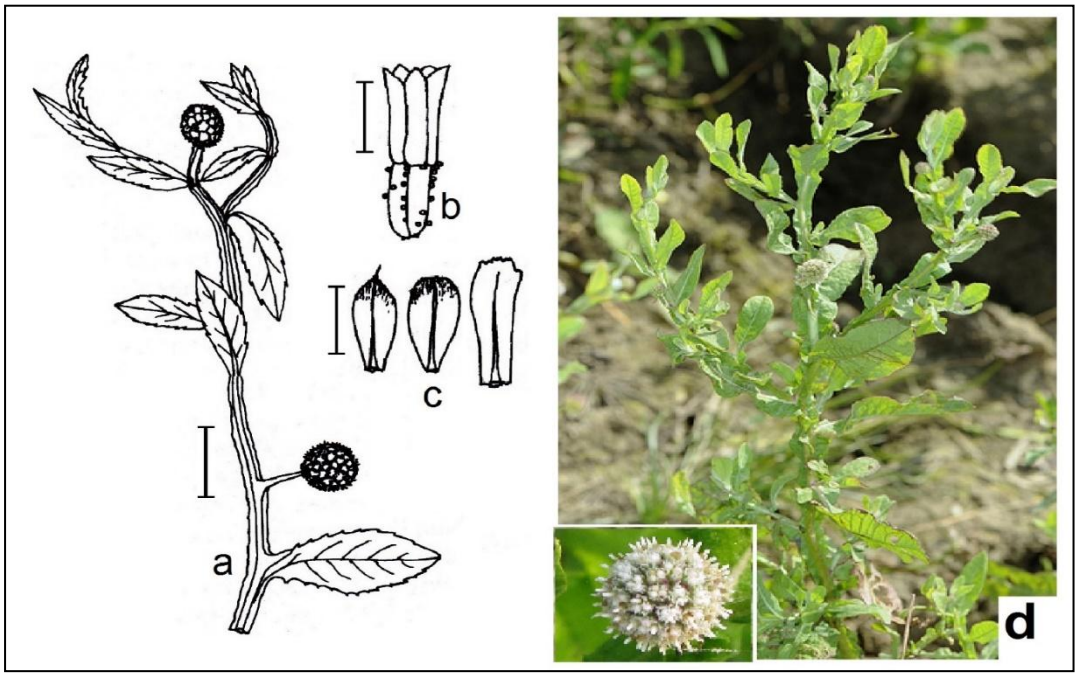


Figure 104. *Sphaeranthus africanus*: **a,** upper part of the flowering shoot (1 cm); **b,** floret (0.5 mm); **c,** three bracts (1 mm); **d,** flowering shoot in field.

Sphaeranthus indicus L.: Figure 105.

Vernacular name: Murmuria

Stems usually several arising from the base, erect, ascending or spreading and again branched above, up to ± 45 cm tall. Wings on stems and branches strong, irregularly spinulose-dentate, densely hairy or villose and bearing stalked glands. Leaves obovate to oblanceolate or sometimes elliptical, 1.5-6 cm long, 0.7-2.7 cm wide, usually smaller on the ultimate branches, villose to sparsely hirsute, never woolly or tomentose, the margins usually double dentate, irregularly spinulose- denticulate to coarsely dentate, the tip rounded to sub-acute and aristate, the base gradually rounded and decurrent, forming the wings of the stems. Compound heads globose to somewhat ellipsoidal, 10-16 mm long, 10-16 mm in diameter; peduncles 1-4.5 cm long, strongly winged from base to just below the compound head. Subtending bracts of the flowering heads not visible at anthesis, linear to linear-oblanceolate, apiculate at the tip.

Flowering and Fruiting: November to February.

Ecological Notes: Annual. Frequently found in wet places mostly in paddy fields. Sometimes found in wet areas, occasionally temporarily submerged.

Field Collections: Dashagram, Gopinathpur, Gokulpur, Moharh, Jamna, Maligram, Banpatna.

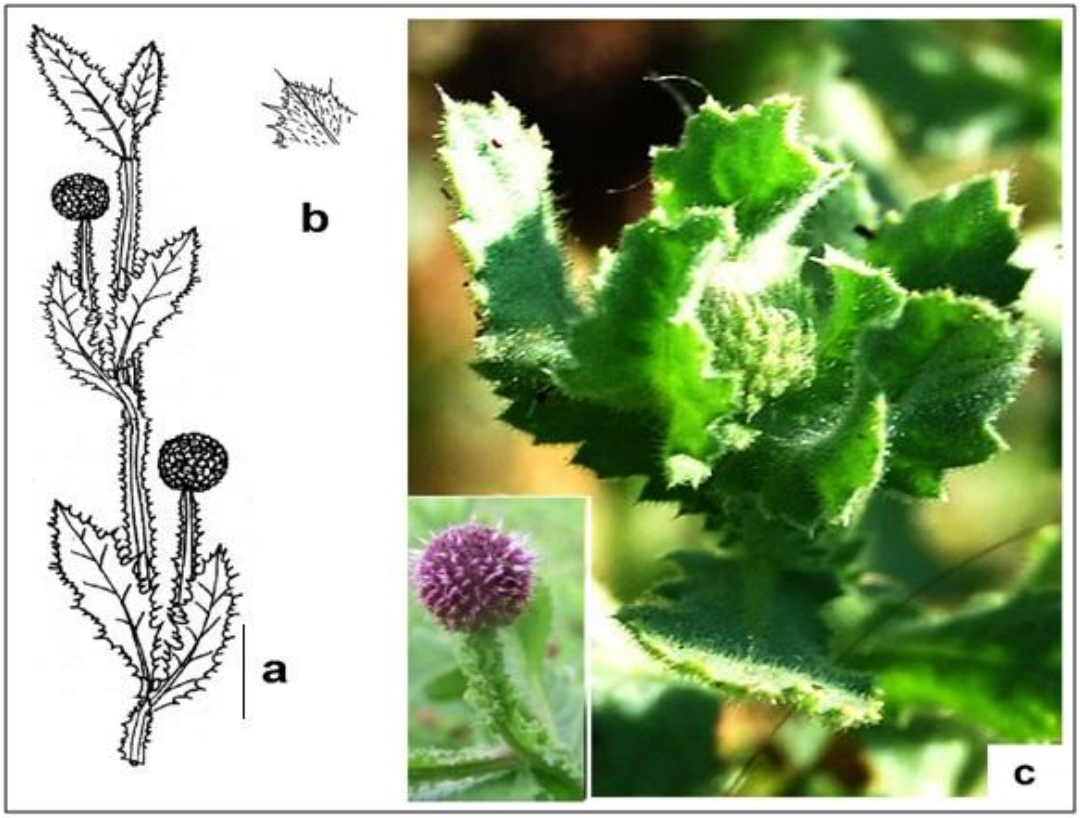


Figure 105. *Sphaeranthus indicus*: **a,** upper part of flowering shoot (1 cm); **b,** part of a leaf blade (2 mm); **c,** plant with flowering shoot in field (inset).

Eclipta prostrata (L.) L.: Figure 106.

Vernacular name: Kesut

Stems, leaves and bracts clothed in white, appressed, almost bristle-like hairs. Stems creeping, ascending or erect, 20-30 (-75) cm long, often reddish, rather hard, usually branched, swollen when submerged, often rooting at internodes. Leaves opposite, sessile or nearly lanceolate or narrowly ovate-lanceolate, 1-6 (-8) cm long, 0.3-2 cm wide, margins entire to serrate. Flower heads pedunculate, most axillary, up to 1 cm in diameter; peduncles 4-7 cm long; involucral

bracts in 2 rows, few, ovate-lanceolate, overlapping. Ligulate florets white to cream; tubular florets white to cream, 4-toothed. Cypselas 3-3.5 mm long, dimorphic but alike in each head; most heads with straw-coloured, tuberculate, slightly flattened cypselas; other heads with dark grey to black, smooth cypselas; pappus reduced to 2, minute and united scales, with or without a few hairs.

Flowering and Fruiting: Almost throughout the year.

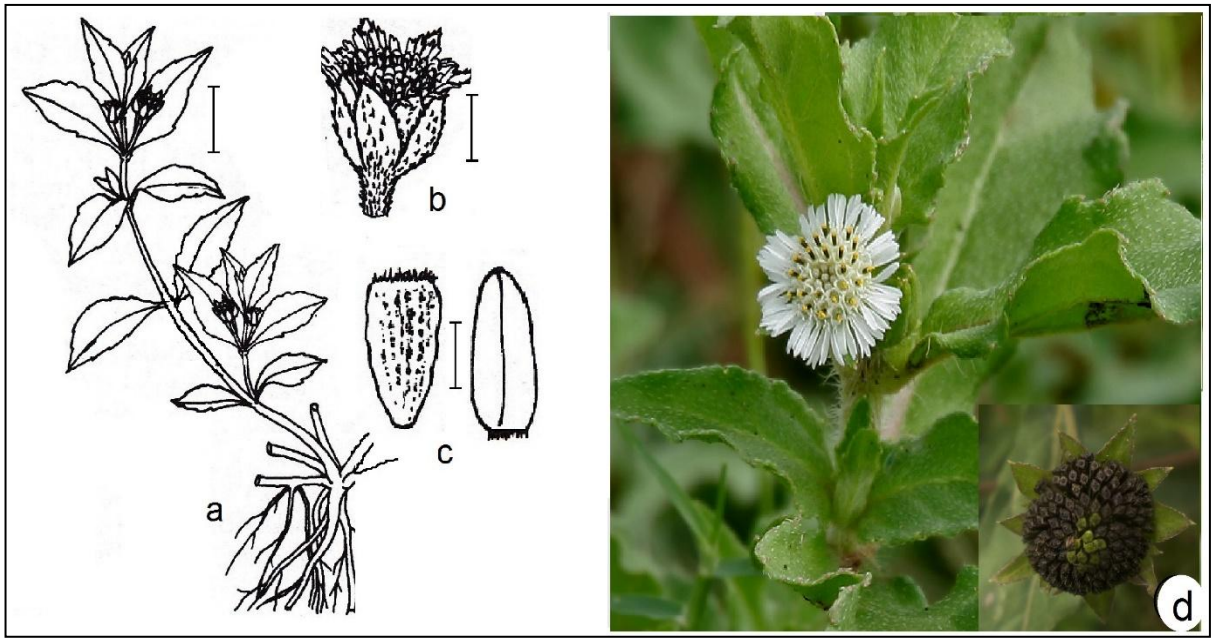


Figure 106. *Eclipta prostrata*: **a,** plant (1cm); **b,** flowering head (4 mm); **c,** two cypselas, left corky, right smooth (1mm); **d,** flowering shoot, mature seed containing head in field.

Field Collections: Narayangarh, Salboni, Chandrakona, Pingla, Sabong, Dantan, Lalgarh.

Ecological notes: Usually annual but in very wet conditions it may perennate by rooting at the nodes. It is common in and along the edges of pools, tanks, irrigation canals, rice field and ditches.

Enhydra fluctuans Lour: Figure 107.

Vernacular name: Hingcha

Stems creeping and rooting at internodes or ascending, up to 30 cm tall. Leaves in opposite pairs, subsessile, linear to lanceolate, 1.2-4 (-7) cm long, 0.5-1 cm wide, glabrous, sometimes auriculate at the base, margins slightly toothed. Flower heads sessile or sub-sessile in one of a pair of leaves, ± 8 mm in diameter; involucral bracts 4, very wide and leaf-like, enclosing the heads, the outer pair obtuse, ± 1.5 cm long, the inner pair rounded at the apex, ± 6 mm long. Florets all ligulate, with very short tongues, mostly appearing tubular. Cypselas ± 1 mm long, brown, enclosed in scales; scales persistent, rigid and hardened, with glandular hairs at the tip; pappus absent.

Flowering and Fruiting: January to April.

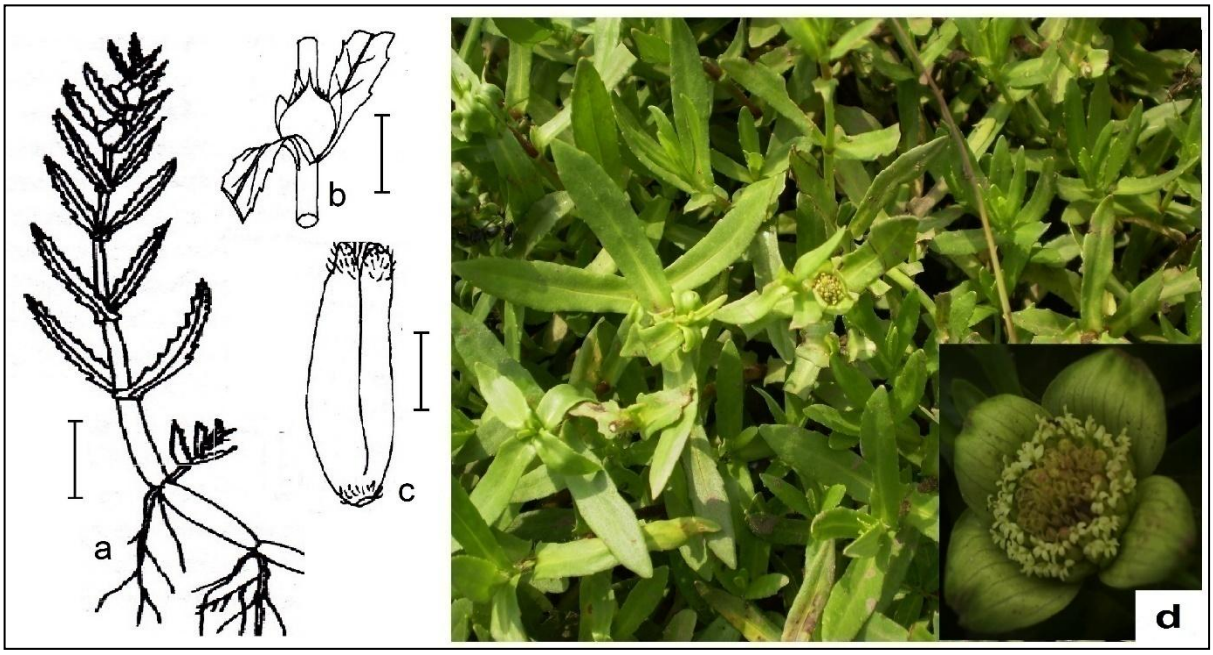


Figure 107. *Enhydra fluctuans*: **a,** Whole plant (2 cm); **b,** flowering head (1 cm); c, receptacular scale (1 mm); **d,** upper part of flowering shoot with inflorescence (inset).

Ecological Notes: Annual or sometimes perennial.Erect helophytes found in marshy places, tanks, and ditches or sometimes also floating.

Field Collections: Common in many places; Kharagpur near railway canals, Debra, Sabong, Daspur and Binpur.

Grangea maderaspatana (L.) Poir.: Figure 108.

Vernacular name: Namuti

Stems, leaves and bracts clothed in white, soft, multicellular hairs, also bearing minute glands. Stems arising from a single tap root, ribbed, creeping, ascending or erect, sometimes reduced to a single rosette, usually branched, the branches 5-30 cm long. Leaves alternate, numerous, sessile, up to 10 cm long and 4 cm wide, oblong-ovate to obovate, usually pinnatifid or at least pinnately lobed, the lobes opposite or nearly so, in 2-6 pairs, smaller towards the base, each entire, toothed or the larger ones sometimes pinnately lobed, leaf base subauriculate. Flowering heads pedunculate or rarely sessile, solitary and leaf-opposed or sometimes 2 or 3 together, globose, 0.75-1.3 cm in diameter, peduncles up to 2.5 cm long; involucral tracts ± in 3 rows, subequal, the outer ones up to 7 mm long and 2.5 mm wide, linear-oblong to elliptical, obtuse, with membranous and ciliate margins; receptacle convex, glabrous. Ligulate florets yellow, in ±3 rows, the limbs 2- to 4-lobed; tubular florets more than ligulate ones, yellow, 4- or 5-toothed. Cypselas 1.25-1.5 (-2) mm long, obovoid to ellipsoid, weakly flattened, with scattered short hairs and glands; pappus a crown-like, cylindrical membrane, fimbriate at tip.

Flowering and Fruiting: December to May.

Ecological Notes: Annual or perhaps occasionally perennial. Found at the edges of tanks, canals and ditches, also in rice fields but not considered to be serious weed.

Field Collections: Mostly common in everywhere. Pingla, Debra, Shyamchak, Makrampur.

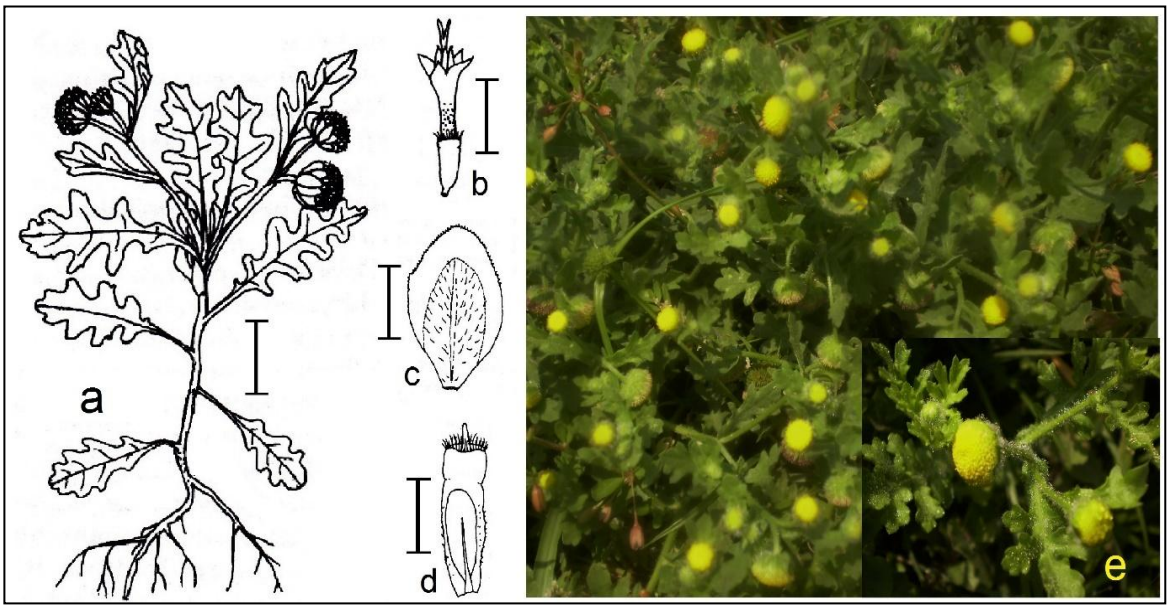


Figure 108. *Grangea maderaspatana*: **a,** whole plant (1 cm); **b,** bisexual flower (1 mm); **c,** involucral bract (1 mm); **d,** cypsela (0.5 mm); **e,** flowering shoot in field.

BALSAMINACEAE: 1genus, 1 species

Hydrocera triflora (L.) Wight & Arn.: Figure 109.

Vernacular name: Domuti

Glabrous. Stems ascending or floating, up to 1 m long, usually branched below and simple above, 5-angled; internodes swollen and spongy when submerged or floating, bearing numerous roots. Leaves alternate, sessile or with petiole up to 1 cm long; stipules absent; leaf blades linear to elliptical, up to 10-28 cm long, 6-37 mm wide, the bases bearing paired glands; leaf margin toothed. Inflorescences axilary, cymose, (1-) 3- to 5-flowered. Flowers bisexual, bilaterally symmetrical, mostly borne in pairs, pinkish to purple, the throat yellowish. Sepals 5, free, petaloid; the 2 outer laterals flat becoming adaxial due to twistiag; the abaxial one prolonged backwards into a short, hollow spur. Petals 5, free, the 2 outer abaxial ones longer, concave, reddish. Stamens 5; filaments broad, united towards the connective; anthers whitish, united around the style. Carpels 5, united, superior; ovule 2 or 3 in each carpel, axile. Fruit a purplish-red, sub globose berry, containing up to 5 stony seeds.

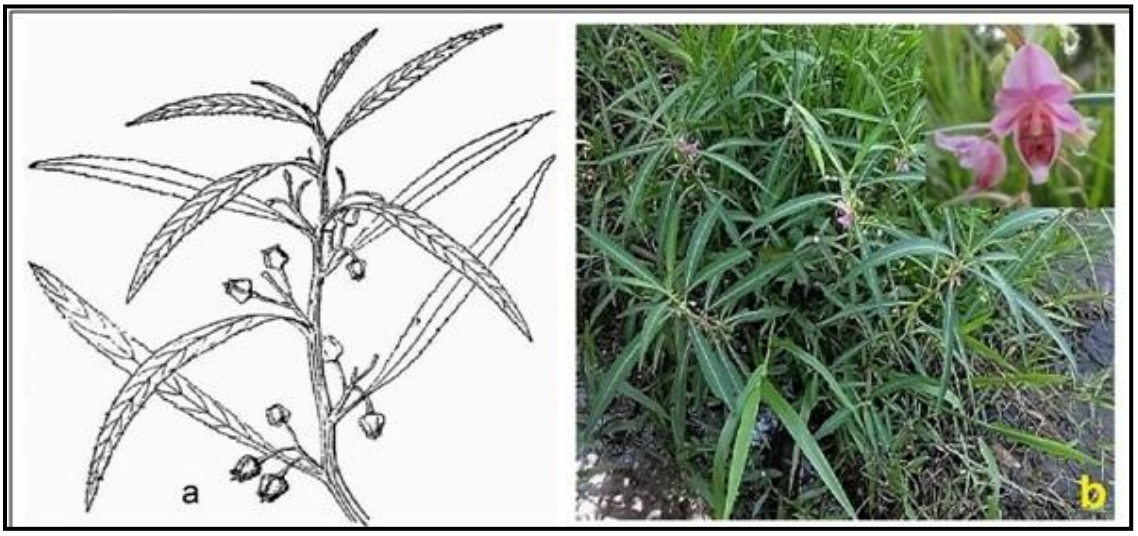


Figure 109. *Hydrocera triflora*: **a,** flowering shoot (2 cm); **b,** flowering shoot in field with flower (inset).

Ecological Notes: Annual or perennial. Found in shallow water at the edge of pools, in marshes, rice fields and other wet places.

Field Collections: common in everywhere. Dujipur in Pingla, Rohini, Nayagram, Changuyal, Gorhbeta, Hoomgarh, Keshiyari, Goura in Daspur.

BORAGINACEAE: 2 genera, 3 species

Heliotropium: 2 species

Key to the species

1. Stems woody at the base; leaf blades more than 5 cm long, sparsely hairy; mericarps beaked. ***H. indicum***

1. Stems not woody at the base; leaf blades 5 cm or less long, clothed in white hairs; mericarps obtuse, not beaked, Mericarps with hairs, not corky; stigmas sessile or nearly so; fruiting sepals spreading. ***H. ovalifolium***

Heliotropium indicum L.: Figure 110.

Stems hispid, erect, woody at base, up to 50 (-75) cm tall. Leaves alternate above; petioles partially winged, up to 8 cm long; blades ovate to ovate-orbicular, 5-12 cm long, 5-8 cm wide,

hispid to pubescent along the nerves, base cordate or narrowed, decurrent into the winged petiole, tips acute. Flowers 2-ranked in elongated, up to 22 cm long, terminal or leaf-opposed, scorpioid spikes. Sepals 2-3 mm long, divided almost to the base, sparsely hairy. Petal tubes 3-4 mm long, cylindrical, longer than the sepals; petal lobes broadly ovate, ±1.5 mm long, blue-white to pale violet. Stamens not joined at the tips. Styles 0.5-0.7 mm long. Fruits deeply bifid, each lobe ± 0.7 mm long and beaked, sometimes remaining in pairs or finally dividing into 1-seeded mericarps.

Flowering and Fruiting: April to January.

Ecological Notes: Annual, found in seasonally flooded places, in rice fields, on sandy river banks and along streams.

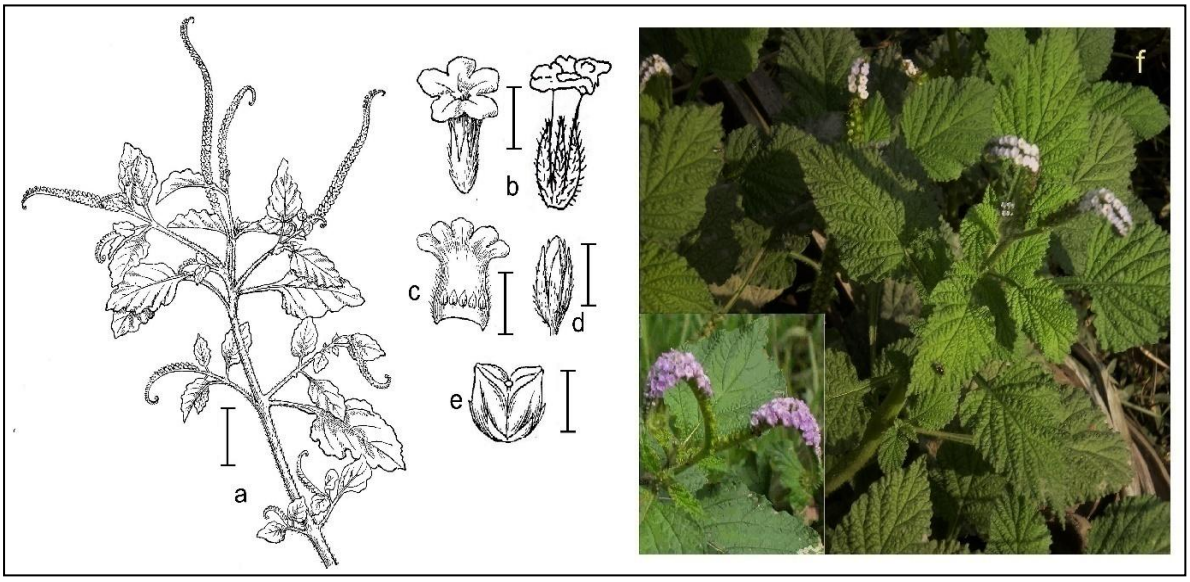


Figure 110. *Heliotropium indicum*: **a,** flowering shoot with inflorescence (10 cm); **b,** two flowers (2 mm); **c,** petal (2 mm); **d,** calyx (1 mm); **e,** two mericarps; **f,** flowering shoot with inflorescence in field.

Field Collections: Dujipur, Kalitala, Pasang in pingla; Keshpur, Sonakonia, Mohanpur, Salboni, Gopiballavpur, Hatibari, Radhamohanpur, Mohar, Kherai, Dheruya.

Heliotropium ovalifolium Forssk.: Figure 111.

Seems erect or decumbent, herbaceous from a frutescent base, branching from the base, 10-40 cm with silky white hairs. Petioles channeled, up to 12 cm long, shorter towards the tips of the

shoots; induced obovate to elliptical, (0.25-) 1-2.5 cm long, 0.5-1.3 cm wide, with long silky hairs, at the fine sounded, margins narrowly revolute, tips rounded with a mucro. Flowers 2-ranked, in 2-5 cm long, scorpioid spikes. Sepals divided almost to the base, 1-2.5 mm long at anthesis, persistent, enlarging and spreading in with appressed hairs; sepal lobes densely ciliate, unequal, 1 almost twice as wide as the others. Petal tubes ±1.5 mm long, cylindrical; petal lobes hairy, 0.5-1 mm long, ovate, oblong, acute. Stigma sessile. Mericarps exceeding 1 mm long, densely appressed-hairy with white silky hairs on the convex back, obtuse.

Flowering and Fruiting: September to April.

Figure 111. *Heliotropium ovalifolium*: **a,** Flowering shoot with hairs omitted (1 cm); **b,** young fruit with hairs omitted from the mericarps (1 mm); **c,** one of four mericarps; **d,** flowering shoot with inflorescence in field.

Ecological Notes: Perennial perhaps occasionally annual. Drying ponds, ditches, common in fallow rice fields and along roadsides.

Field Collections: Jakpur, Krishnapur, Balichak, Marhtala, Chakmakrampur, Belti, Salua, Dhansol, Kalaikunda, Dhamtor, Molighati, Nedhuya, Boita, Binpur, Bolaipanda, Jalchak.

Coldenia procumbens L.: Figure 112.

Vernacular name: Triphunki

Stems prostrate, trailing, white-hairy. Petioles 3-9 mm long; blades obovate-oblong, oblique, 1-2.5 cm long, 0.6-1 cm wide, white-hairy, crisped and plicate, base tapering, margins crenate to coarsely seriate, tips rounded. Flowers minute, usually extra axillary, sessile or nearly so, the upper ones sometimes in short, 1-sided leafy spikes. Sepals 4 (5), ±2.5 mm long, divided almost to the base; lobes ovate, very hairy, ciliate at margin, persistent, Petals 4 (5), the tube ±2.5 mm long; lobes, white or pale yellow, spreading, usually more than 1 mm long. Ovary shallowly 4-lobed; style terminal, bifid. Fruit dry, at first breaking into 2, 2-seeded halves, these finally breaking into 1-seeded mericarps.

Flowering and Fruiting: April to January.

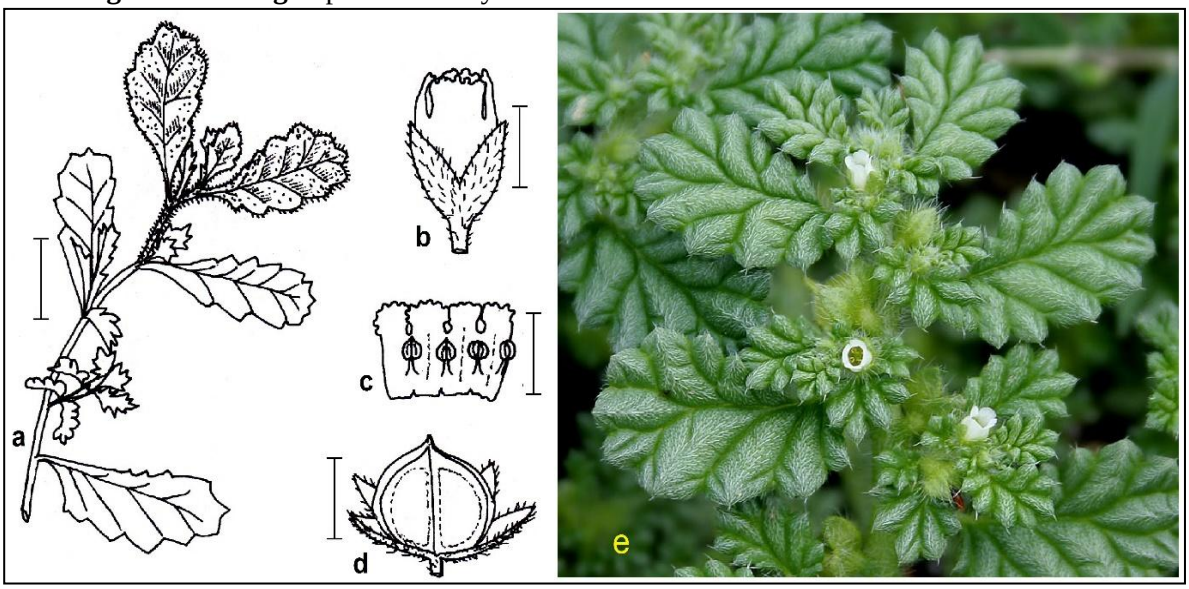


Figure 112. *Coldenia procumbens*: **a,** shoot with hairs omitted from lower part (1 cm); **b,** flower (2 mm); **c,** petal tube opened (1 mm); **d,** fruit (2 mm); **e,** flowering shoot in field.

Ecological Notes: Annual. Commonly found in moist places, in shallow water margins of drying tanks and harvested rice fields.

Field Collections: Asti, Hasimnagar in Pingla; Madanmohanchak, Kotaigarh, Bhadrakali in Narayangarh; Keshiary, Belda, Sonakonia, Jahalda, Turka, Topsia, Asui, Patina, Chatinasol.

CAMPANULACEAE: 1genus, 2 species

Lobelia: 2 species

Key to the species

1. Stem 3-sided, prostrate, ascending and 3-winged; free basal part of the 2 anterior filaments twice as broad as the other filaments; stem, leaf blades, pedicels and sepal tube glabrous or nearly so ***L. alisnoides***

1. Stem terete or indistinctly 3-sided, not winged, at most with ridges below the leaves; free basal part of all filaments equally wide; stem, leaf blades, pedicels and sepal tube distinctly hairy ***L. zeylanica***

Lobelia alsinoides Lam.: Figure 113.

Stem prostrate, ascending or erect, 3-20 (-40) cm long, 3-sided and 3-winged, often rooting at lower nodes. Petiole 1-9 mm long, mostly very short; upper stem leaves usually sessile or nearly so; leaf blades broadly ovate, 0.5-2 cm long, 0.5-1.8 cm wide, glabrous on both surfaces, base truncate to subcordate, margins toothed, tip subacute to obtuse. Flowers solitary in the axil of leaf-like bracts or on old shoots sometimes raceme-like. Bracts subulate up to 3 mm long. Pedicels 1-3.5 cm long. Sepal tubes urn-shaped, up to 3 mm long; sepal lobes triangular, subulate, 2-6 mm long, entire. Petal tubes 4-4.5 mm long, bluish-white to violet; adaxial (upper) lip erect with ovate-elliptical lobes; abaxial (lower) lip spreading, 6-7 mm across, bright blue with 2 white streaks at the base of the middle lobe. Stamens 5; free basal part of the 2 anterior filaments twice as broad as the other filaments; all anthers with an apical tuft of hairs. Capsules obovoid to hemispherical, 2-3 mm long, 1.5-3 mm wide. Seeds ovoid, 0.4-0.75 mm long, 3-angled, with thickened marginal.

Flowering and Fruiting: August to March.

Ecological Notes: Annual. Often very abundant in wet rice fields, roadside ditches and in

other wet or inundated places.

Field Collections: Narayangarh, Beldha, Keshiary, Dantan, Sonakonia, Topsia, Rogrha, Keshpur, Mohar, Gorhbeta, Daspur.

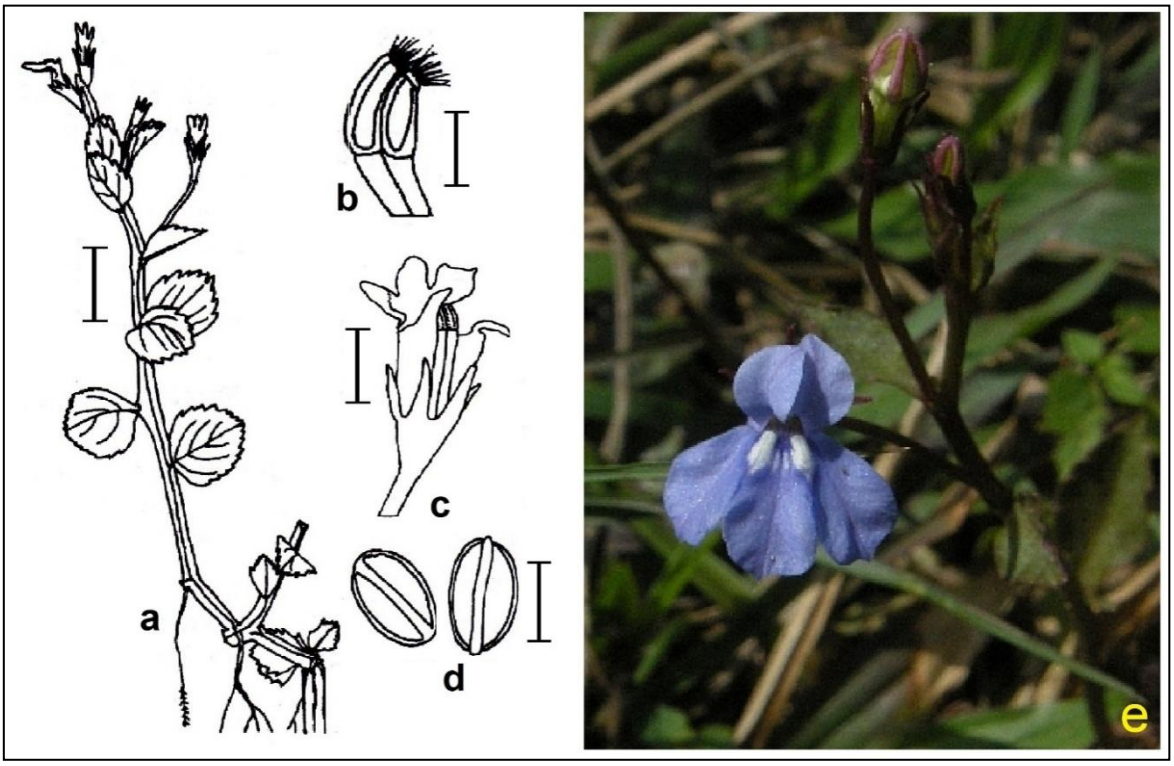


Figure 113. *Lobelia alsinoides*: **a,** flowering shoot (1 cm); **b,** anthers (1 mm); **c,** flower (2 mm); **d,** two seeds (0.25 mm); **e,** flowering shoot in field.

Lobelia zeylanica L.: Figure 114.

Like *L. alisnoides* but lower part of stem creeping and rooting at nodes, terete to indistinctly 3-sided, without wing but sometimes ridged just below the leaves; petioles 1-20 mm long; leaf blades ovate to suborbicular, (0.7-) 1-6 cm long, (0.5-) 1-3.5 cm wide, blunt to subcordate base, sparsely hairy or glabrous on the adaxial (upper) surface, usually distinctly hairy on the abaxial (lower) surface, particularly along the nerves; pedicels usually hairy, 1-3.6 cm long; sepal tubes usually hairy, 2-4 mm long; sepal lobes usually hairy, 3-5 mm long, entire; petal tubes pale blue or lilac; lobes of adaxial lip lanceolate, 2 mm long, each with

bristly hairs beneath; free basal part of all filaments equally wide; capsule obconical to oblong-ovate, 3-7 mm long, 2-4 mm wide. Seed 0.4-0.6 mm long.

Flowering and Fruiting: September to March.

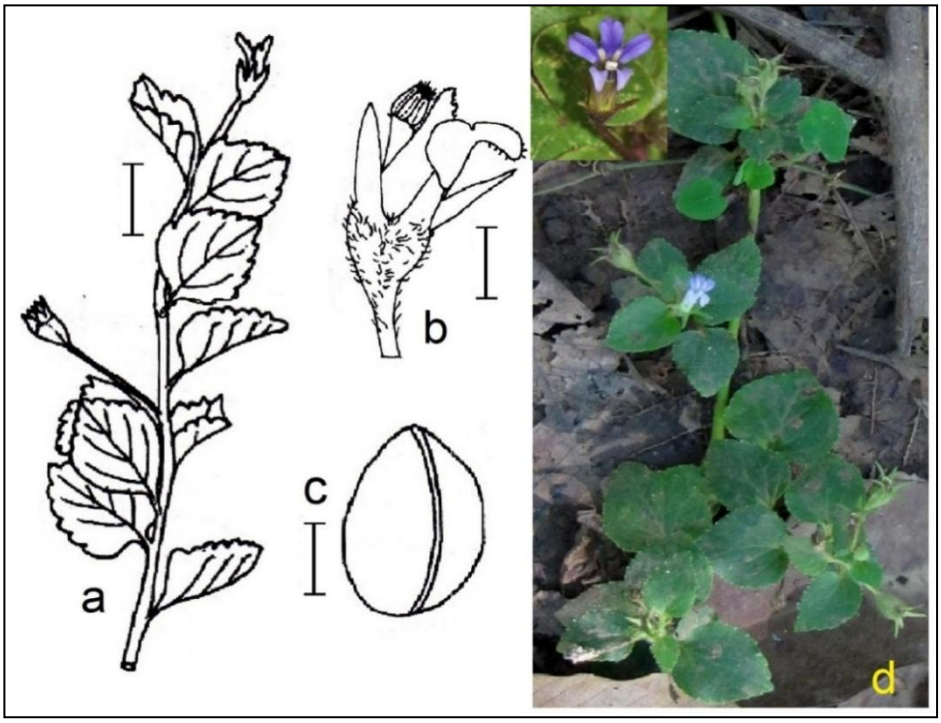


Figure114.

Lobelia zeylanica: **a,** flowering shoot (1 cm) with flower (inset); **b,** flower (2 mm); **c,** seed (0.25 mm); **d,** flowering shoot in field.

Ecological Notes: Annual. In wet and waterlogged places, often in shade.

Field Collections: Narayangarh, Beldha, Keshiary, Dantan, Sonakonia, Topsia, Rogrha, Keshpur, Mohar, Gorhbeta, Daspur.

CERATOPHYLLACEAE: 1 genus, 1 species

Ceratophyllum demersum L.: Figure 115.

Vernacular name: Jhanji

Shoot tips often with shortened internodes giving it a 'bottle brush' appearance. Leaves usually bright or olive green, robust, rigid, brittle, feeling hard in the hand, the majority 1 or 2 times forked (lower part of main axis sometimes 3 or rarely 4, times forked); teeth along the margins numerous, conspicuous, arising from a pad of tissue, present on lower and upperparts of the leaves. Male flowers mostly with considerably more than 10 stamens; connective prolonged at the tip 2 spines and central projection. Nut body 3-4 (-6) mm long, 2-4 mm wide,

the surface smooth or slightly tuberculate; nut margins winged or wingless but without spines; apical spine straight, 2-7 mm long; basal spines 2, up to 8 mm long or redeced to minute tubercles.

Flowering and Fruiting: August to November.

Ecological Notes: Common in the lakes, ponds and marshes.

Field Collections: Jakpur and Radhamohanpur near railway canals, Laxmibari, Badalpur, Ruinan, Mirzapur, Shaymalpur, Pirakata, Bhadutala, Kechenda sebayatan, Jamboni.

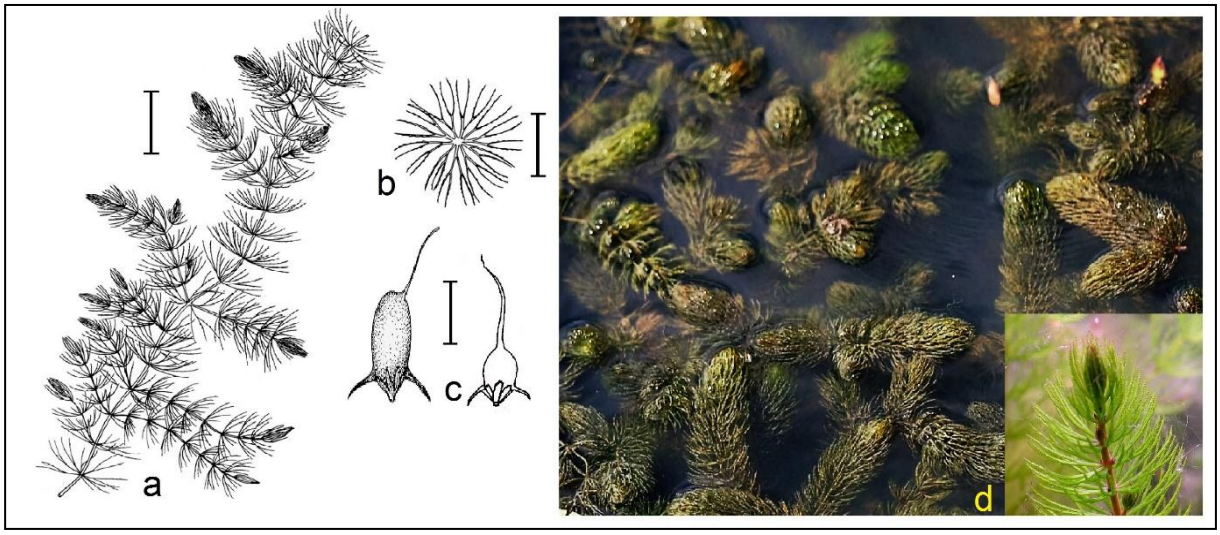


Figure 115. *Ceratophyllum demersum*: **a,** plant part (12 cm), **b,** whorl of leaves (2 cm); **c,** fruits (2 mm); **d,** plant parts in field with leaf arrengements (inset).

CONVOLVULACEAE: 1 genus, 2 species

Ipomoea: 2 species

Key to the species

1. Stems erect, never twining, more than 1 m tall, somewhat woody ***I. fistulosa***

1. Stems prostrate or if erect then not more than 25 cm tall or twining, never woody ***I. aquatica***

Ipomoea aquatica Forssk.: Figure 116.

Vernacular name: Kalmi

Shrub with milky juice, 2-5 m high, stem erect or ascending; young parts puberulent by age glabrous. Leaves 10-20 X 6-10 cm, ovate-oblong, acuminate at apex, cordate at base; midrib below with 2 small glands at the base of the blade petiole; 3-12 cm long. Inflorescences axillary and terminal; peduncle, 5-14 cm long, cymosely few to many flowered; pedicels longer than the calyx; bracts minute, ovate, caducous. Capsule upto 1.8 cm long, pale-brown, finely puberulent at base, ovoid, mucronate, 4-celled or 2-celled, 4-valved. Seeds 4 or less, black sericeous.

Flowering and Fruiting: Almost throughout the year.

Ecological Notes: Common in ponds, marshes, sluggish ditches, sometime amphibious on marshy ground when the levels of water goes down.

Field Collection: Common in all places; Chatinasol, Asui, Dantan, Dujipur, Jamna, Temthini Lutinia, Basantapur.

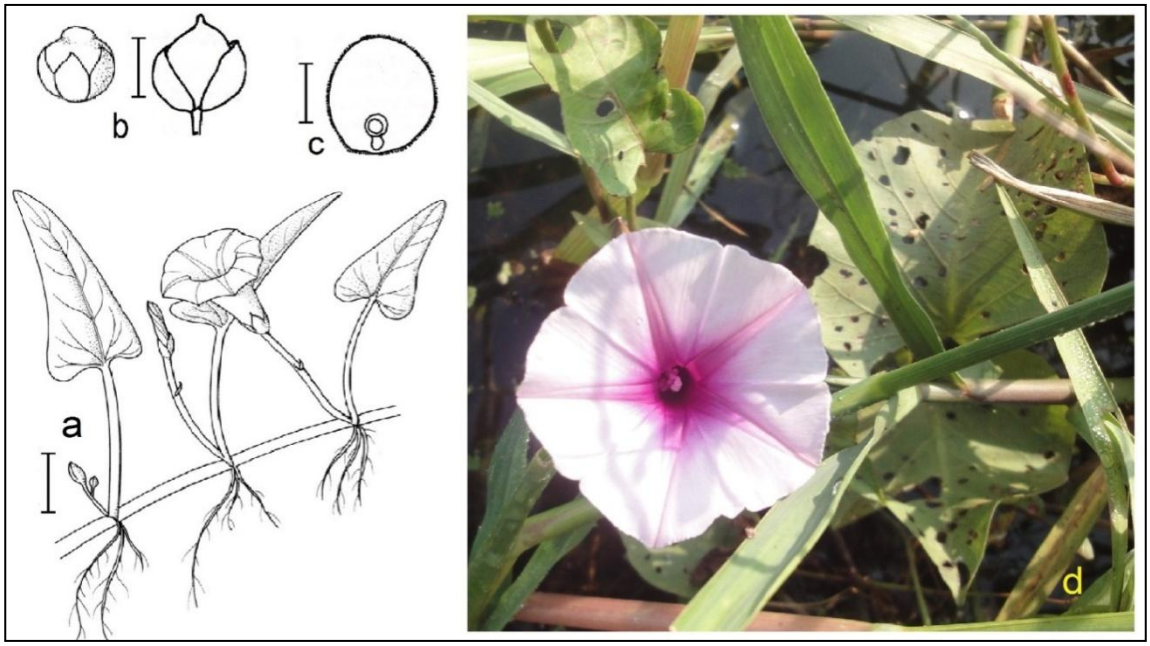


Figure 116. *Ipomoea aquatica*: **a,** flowering shoot (2 cm); **b,** capsules with sepals (1 cm); **c,** seed (2 mm); **d,** flowering shoot in field.

Ipomoea fistulosa Mart.ex Choisy: Figure 117.

Vernacular name: Berkalmi

Usually shrubby, 2.5 m or more tall, stem swollen when in water. Leaves simpli; petioles upto 8 cm long, with nectaries above; leaf blades broadly ovate to deltate or hastate, 8-15 (-25) cm long, 4-7 (-10) cm wide, base cordate to truncate, basal lobes rounded, tips gradually acuminate. Flowers in axillary cymes or panicles, rarely subterminal; peduncles up to 10 cm long; bracts deciduous; pedicels up to 1.5 cm long. Sepal lobes 5, subequal, ovate, ±8 mm long, ±5 mm wide, puberulous at first, obtuse, with nectaries outside (active while in bud). Petals usually pink to rose, funnel-shaped, up to ±7 (-10) cm in diameter; tube ± 4.5 cm long. Stamen filaments villous at the base, 1-2 cm long; anthers ±7 mm long. Capsules globose, ± 1.5 cm in diameter, persistant sepals embrace the fruit. Seeds ovoid, up to ± 1 cm long, densely covered with long, brownish, woolly hairs.

Flowering and Fruiting: Almost throughout the year.

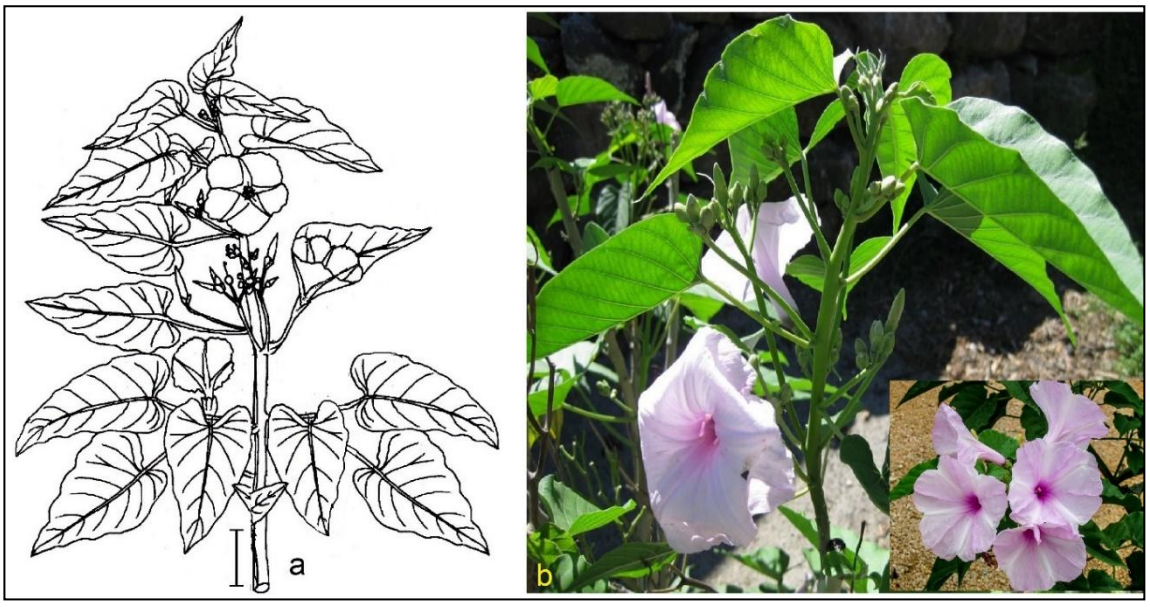


Figure 117. *Ipomoea fistulosa*: **a,** flowering shoot (2 cm); **b,** flowering shoot wth more flower (inset) in field.

Ecological Notes: Perennial. It shows an exceptional ecological tolerance; it may be found on dry banks.

Field Collection: Sabong, Pingla, Nayagram, Hatibari, Gorhbeta, Daspur, Keshpur, Ghatal, Debra, Dantan, Keshiary, Sakrail, Kharagpur, Salboni, Lalgarh, Belda.

DROSERACEAE: 1genus, 1 species

Drosera burmanni Vahl: Figure 118.

Leaves in basal rosettes, cauline leaves absent; stipules 3-partite, scarious; blades obovate-orbicular, 5-8 mm long, 3.5-6 mm wide, reddish to green. Inflorescences up to 10 cm long, (2-) 10- to 20- flowered. Sepals oblong. Petals oblong-oblanceolate, ± 4 mm long, pink to whitish. Ovary of 5 carpels; styles 5. Capsule 5-valved, 1-2 mm long.

Flowering and Fruiting: December to January.

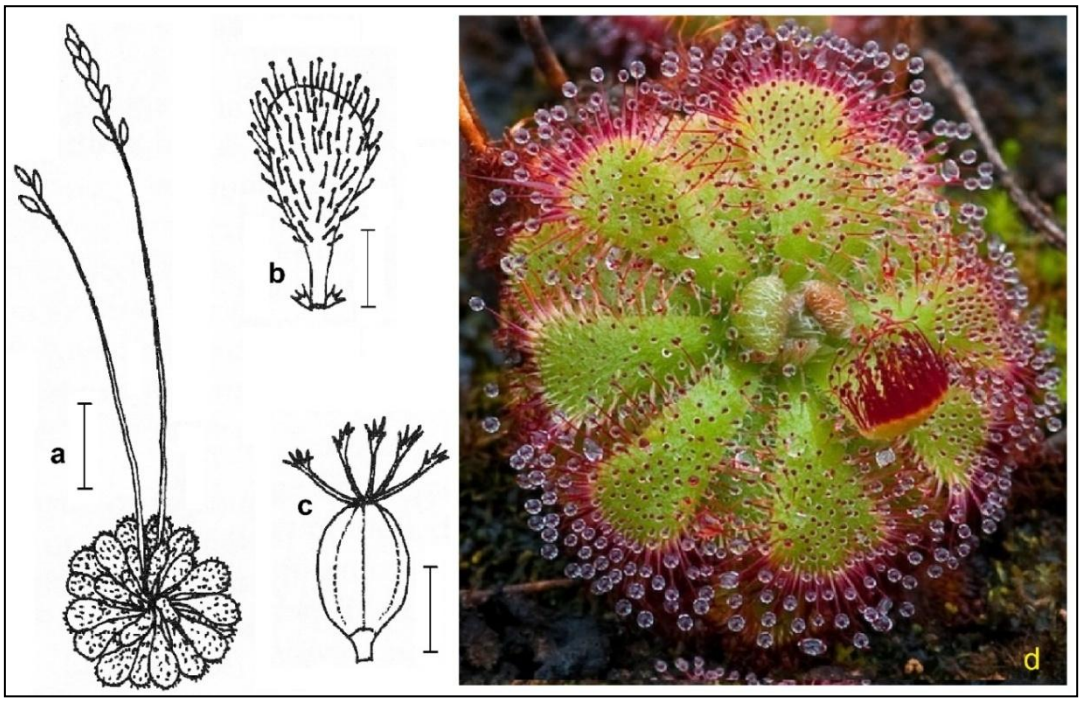


Figure 118. *Drosera burmanni*: **a,** flowering plant (5 mm); **b,** young leaf with stipules (1 mm); **c,** fruit (2 mm); **d,** plant in field.

Ecological Notes: Perennial, in permanently wet places or regularly flooded areas. Usually on sandy soil in open marshes amidst grass and around tanks.

Field Collections: Gurguripal, Kechenda, Keshpur, Dheruya, Maligram, Sabong, Ghatal, Bolaipanda, Jalchak.

ELATINACEAE: 1genus, 1 species

Bergia capensis L.: Figure 119.

Vernacular name: Lal-Keshuria

Stems erect or creeping and rooting at nodes, usually branched, up to 50 cm long but usually less, red or pink, glabrous, inflated but constricted at nodes when submerged or floating. Stipules erect, elongate- triangular, 1-3 mm long, membranous, with toothed margins, leaves sessile; blades lanceolate to elongate- lanceolate, 1.5—5 cm long, 0.75—2.5 cm wide, serrate, green with red teeth. Flowers in dense axillary cymes, pedicels up to ± 4 mm long. Sepals 5, pale green with red flecks and tips, 1-2 mm long. Petals 1.3-2 (-5) mm long, spreading, translucent white or pink. Stamens 15 or less; filaments unequal, 0.5-1 mm long. Styles 0.25-0.3 mm long. Capsules globose, ± 2.5 mm in diameter, green or pale brown, opening by 5 valves. Seeds oblong, 0.4-0.6 mm long, slightly curved, with reticulate seed coat.

Flowering and Fruiting: November to May

Ecological Notes: Annual or perhaps sometimes perennial. Usually found in seasonally inundated areas, characteristically found around tanks, in rice fields and along irrigation ditches.

Field Collections: Narayangarh, Beldha, Keshiary, Dantan, Sonakonia, Topsia, Rogrha, Keshpur, Mohar, Gorhbeta, Daspur, Goura, Debra, Pingla, Sabong.

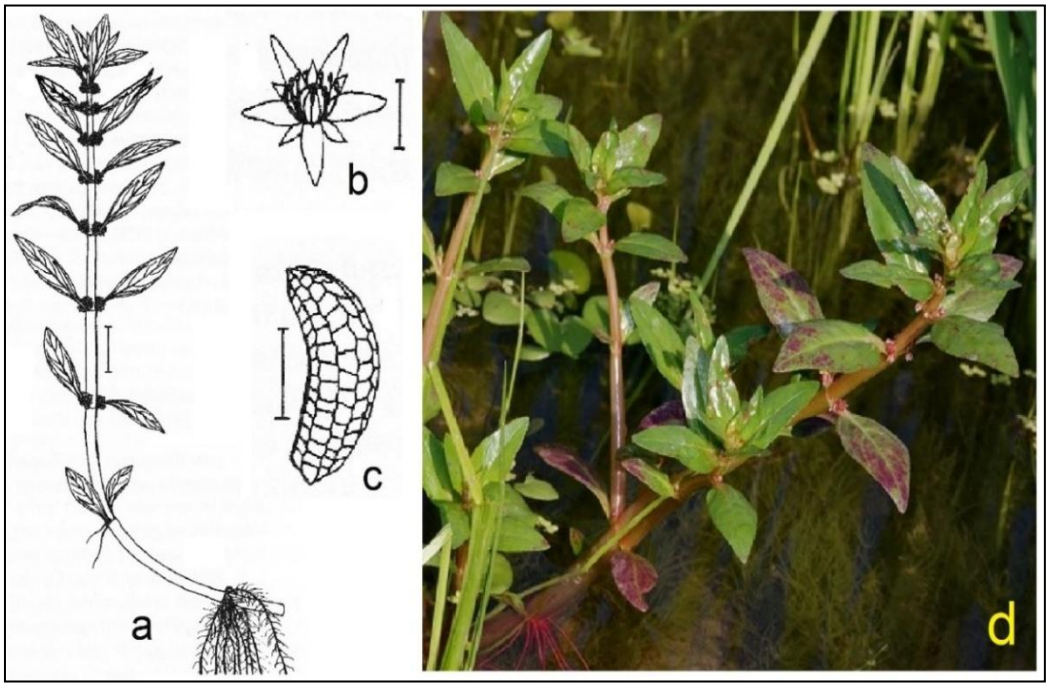


Figure 119. *Bergia capensis*: **a,** whole plant (2 cm); **b,** flower (1 mm); **c,** seed (0.25 mm); **d,** flowering shoot in field.

LEGUMINOSAE (FABACEAE): 2genera, 4 species

Aeschynomene: 2 species

Key to the species

1.Flowers 12-18 mm long; sepals hairy, ± 9 mm long, pod falling apart in (1-) 3-5 (-7) joints, each 10-15 mm long usually; adaxial (upper) suture of the pod indented as much as the abaxial, rough on the faces above the seeds; stems usually thick and spongy ***A. aspera***

1. Flowers usually less than 10 mm long; sepals glabrous, 4-6 mm long; pod falling apart in 6-l0 joints, each 3-6 mm long; adaxial (upper) suture of the pod straight, smooth or papillose on the faces above the seeds; stem slender or thick and fistular but rarely spongy and then only at the base ***A. indica***

Aeschynomene aspera L.: Figure 120.

Stems erect and up to 2 m tall or trailing and floating, in water developing spongy tissue up to 5 cm m diameter. Stipules narrowly ovate, 8-19 mm long, 1.5-3 mm wide, attenuate, the

margin ciliate or toothed, produced below their point of insertion to a spur; lower part ± 5 mm long, ± 2 mm wide, usually notched or toothed. Leaves shortly petiolate; rachis 6-22 cm long, ending in a minute stipe; leaflets in (10-) 30-50 pairs, linear-oblong, 5-10 (-16) mm long, those near the base and apex shorter than those in the centre, 1.5-3 mm wide, with 1 median, usually black vein, the base asymmetrical, obtuse, the tip subacute but minutely mucronate. Flowers 1-4,12-18 mm long, peduncles (0.6-) 1-3 (-5) cm long, hairy; bracts cordate, 3-5 mm long, 1.5-3 wide, with or without hairs, the hairs yellowish; pedicels 1-5 mm long, hairy; bracteoles ovate, 4-5 mm long, ± 2 mm wide, hairy. Sepals hairy, 2-lobed almost to the base, each 6-8 (-10) mm long. Petals partly hairy, yellow; adaxial petal obovate, 10-15 mm long, 14-17 mm wide, with a 1-2 mm long claw, the upper margin sometimes toothed; lateral petals 8-10 (-16) mm long, ± 3 mm wide; keel 14-20 mm long, ± 6 mm broad. Stamens in 2 bundles of 5, 15-20 mm long. Pods borne on 10-20 mm long stalks, strap-shaped, 4—6 cm long, 7-8 mm wide, flattened, the adaxial (upper) suture of the pod indented as much as the abaxial, rough on the faces above the seeds; falling apart in (1-) 3-5 (-7) almost quadrangular, 1-seeded joints, each 10-15 mm long, 7.5-9 mm wide. Seeds kidney-shaped, ± 7 mm long, 4-5 mm wide, ± 1.5 mm thick, black, glossy.

Flowering and Fruiting: April to December

Ecological Notes: Perennial or annual. In wet places, along ditches, around pools, in irrigated fields and waste places.

Field Collections: Jakpur and Radhamohanpur near railway canals, Laxmibari, Badalpur, Ruinan, Mirzapur, Shaymalpur, Pirakata, Bhadutala, Kechenda sebayatan, Jamboni.

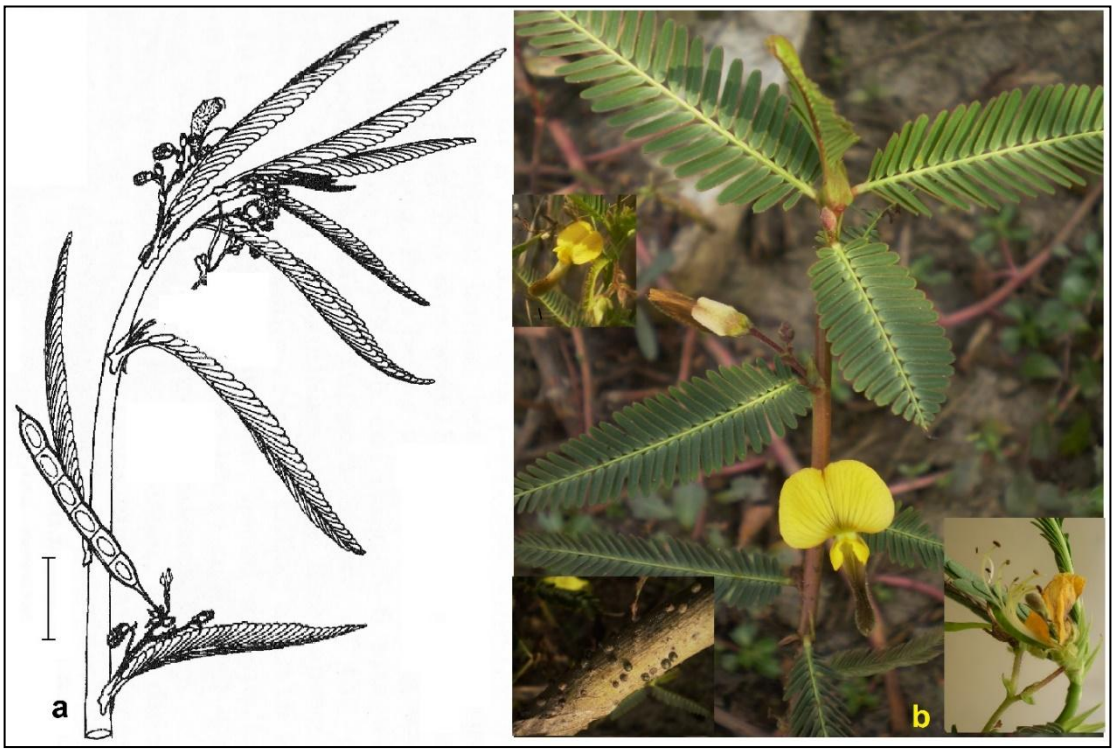


Figure 120. *Aeschynomene aspera*: **a,** flowering shoot (4 cm); **b,** flowering shoot with flower and stem surface (inset).

Aeschynomene indica L.: Figure 121.

Stems erect, often somewhat woody at the base, branched, 30-250 cm tall; main stem cylindrical and warty at the base; the warts bearing caducous glandular hairs, rarely spongy and then only at the base. Stipules narrowly ovate or elliptical, 5-18 mm long, 1-3.5 mm wide, acuminate, produced below their point of insertion; lower part usually notched or toothed. Leaves petiolate; petioles 0.5-2 cm long; rachis 4-14 cm long, ending in a minute stipe; leaflets glabrous, in (4-) 8-10 (-45) pairs, linear-oblong, 2-10 (-13) mm long, 1-2.5 (-4) mm wide, with 1 median vein, the base asymmetrically obtuse, the tip obtuse but minutely mucronate. Flowers 1-4 (-6) (peduncle often bears a leaf with another raceme in the axil), 7-9 mm long. Peduncles 3-8 cm long, bearing minute tubercles; bracts ovate, 1.5-4, subentire or serrate, acute; pedicels 1.5-6 mm long; bracteoles lanceolate-ovate to oblong, 1-4 mm long, subentire or serrate. Sepals glabrous, 1-lobed almost to the base, each 4-6 mm long. Petals

glabrous, yellow with orange flush, often with purple streaks; adaxial petal obovate, 6.5-10 mm long, 4-7 mm wide, with a 1-2 mm long claw, the upper margin sometimes ciliate; lateral petals and keel subequal, 6-9 mm long, 2-3 mm wide. Stamens in 2 bundles of 5, 6-9 mm long. Pods borne on 4-11 mm long stalks, strap-shaped, (1.2-) 2.5-5 cm long, 3-6 mm wide, flattened, the adaxial (upper) suture of the pod straight, smooth or papillose on the faces above the seeds, the abaxial suture crenate, falling apart in (3-) 6-10 (-13) almost quadrangular, 1-seeded joints, each 1-6 mm long. Seeds oblong kidney shaped, 3-4 mm long, 2-3 mm wide, dark brown to black, glossy.

Flowering and Fruiting: July to November.

Ecological Notes: Perennial or annual. In wet places, along ditches, around pools, in irrigated fields and waste places. It makes a good green manure and is used as fodder but it can become a toublesome weed in irrigated fields.

Field Collections: Gorhbeta, Rohini, Homgorh, Sonakonia, Naya, Kherai, Ashari, Nayabasan, Jadhughanashyampur, Bakultala Daspur, Martala, hadutala, Lodhasuli, Dujipur.

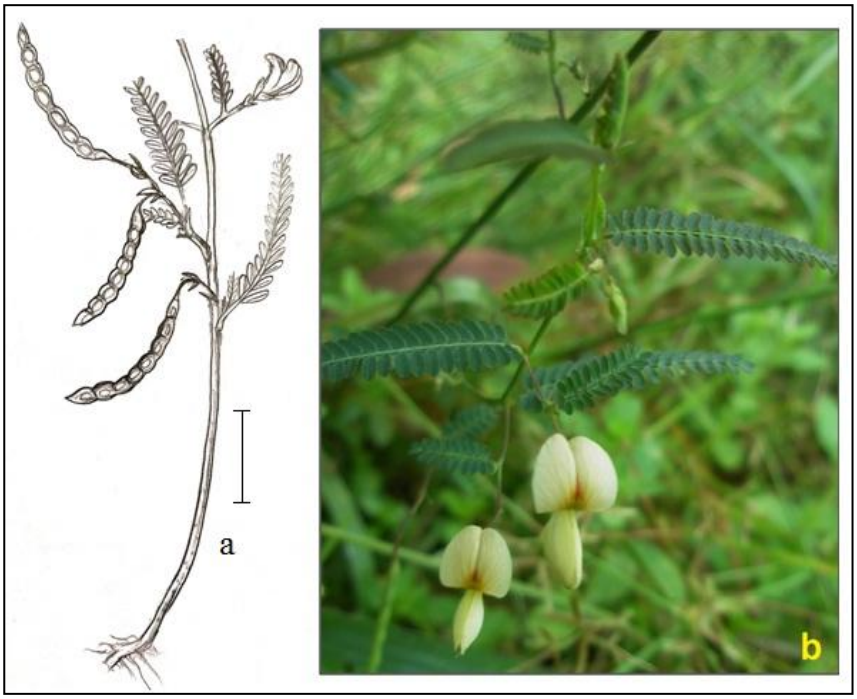


Figure 121. *Aeschynomene indica*: a, flowering shoot (5 cm); b, flowering shoot in field.

Sesbania: 2 species

Key to the species

1. Adaxial petal more than 2 cm long, with 2 appendages at the base which run as keels into the claw; stems and leaf rachides smooth, without prickles; pods twisted, pendulous ***S. javanica***

1. Adaxial petal not more than 1 cm long, without appendages or appendages not running as keels into the claw; stems and leaf rachides usually bearing prickles; pods straight or curved but not twisted, erect or ascending ***S. bispinosa***

Sesbania bispinosa (Jacq.) W.Wight: Figure 122.

Vernacular name: Jayanti

Stems erect, branched, up to 3 m tall, bearing short prickles. Stipules linear-lanceolate, 6-10 mm long. Leaves up to 35 cm long; stipules lanceolate, deciduous; rachis and petiole with prickles; leaflets in 25-55 pairs, oblong, 1-2 cm long, up to ± 3 mm wide, glabrous. Racemes erect, 3- to 12-flowered, up to 13 cm long. Sepals glabrous except for margin, tube ± 3 mm long, teeth triangular ± 1 mm long. Petals brownish- yellow with violet flecks; adaxial petal ±10 mm long, usually slightly longer than wide, cuneate at the base, the appendages wedge-shaped, the claw ± 3 mm long; keel ± 7 mm long, the basal tooth narrow, very acute. Filament sheaths 9-13 mm long, free parts 2-4 mm long. Pods subterete, ± erect, up to 30 cm long, ± 2 mm in diameter, not twisted, slightly constricted between the seeds, the margins not grooved. Seeds ± 40, brown, ± 3 mm long.

Flowering and Fruiting: July to November.

Ecological Notes: Annual or biennial. Common as weed of the crop fields, also found near banks of the canals and in moist, waste and water logged places during rainy season.

Field Collections: Narayangarh, Beldha, Keshiary, Dantan, Sonakonia, Topsia, Rogrha, Keshpur, Mohar, Gorhbeta, Daspur.

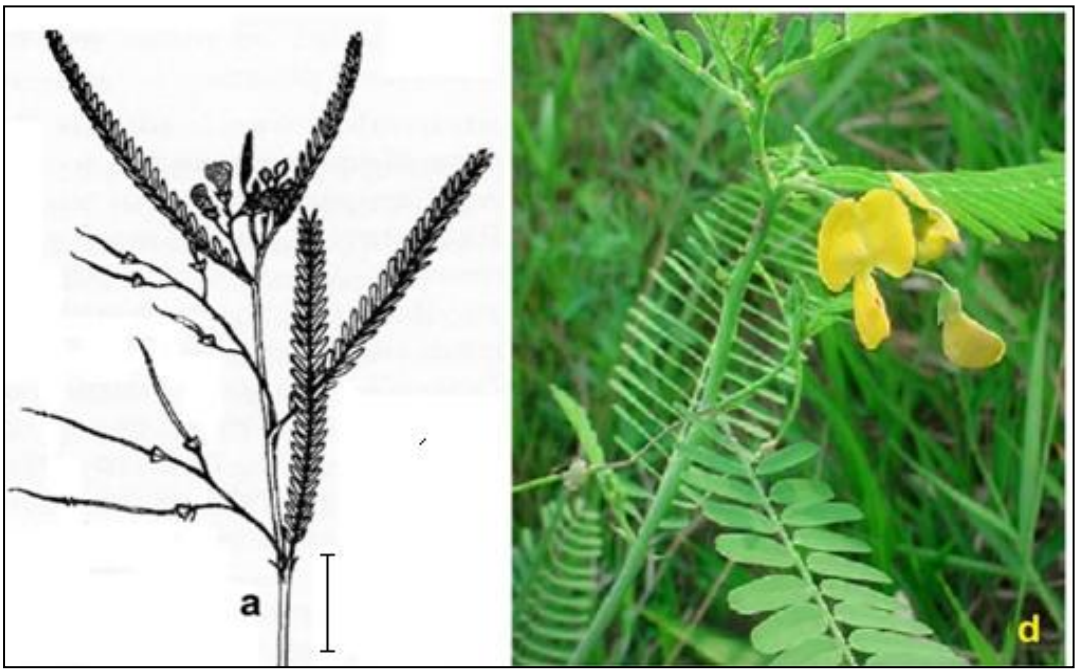


Figure 122. *Sesbania bispinosa*: **a,** flowering shoot (2 cm); **d,** flowering shoot in field.

Sesbania javanica Miq.: Figure123.

Vernacular name: Kath Sola

Stems up to 3 m tall, swollen at the base (up to 5 cm in diameter) with white pith-like aerenchyma. Stems and leaf rachides smooth, without prickles. Stipules 8 mm long. Leaves 15-30 cm long, with 10-32 pairs of leaflets; leaflets linear to oblong, 0.4-2.5 (-4) cm long, 2-7 mm wide, tapering and apiculate at the tip. Flowers m racemes of 5-12; pedicels 5-13 mm long. Sepal tube 6-8 mm long, die teeth 1.5-2 mm long. Adaxial petal 2-3 cm long, 2.4-3 cm wide, yellow inside with dark brown or purple dots and streaks outside, bearing 2 appendages at the base which run as keels into the claw; Pods usually pendulous, 25—30 cm long, somewhat twisted, slightly constricted between the seeds.

Flowering and Fruiting: December to March.

Ecological Notes: Annual. Found in stagnant pools, marshy places, swamps on the village ponds and rice fields. Sometimes cultivated as a green manure and for shade in plantations.

Field Collections: Jakpur and Radhamohanpur near railway canals, Laxmibari, Badalpur, Ruinan, Mirzapur, Shaymalpur, Pirakata, Bhadutala, Kechenda sebayatan, Jamboni.

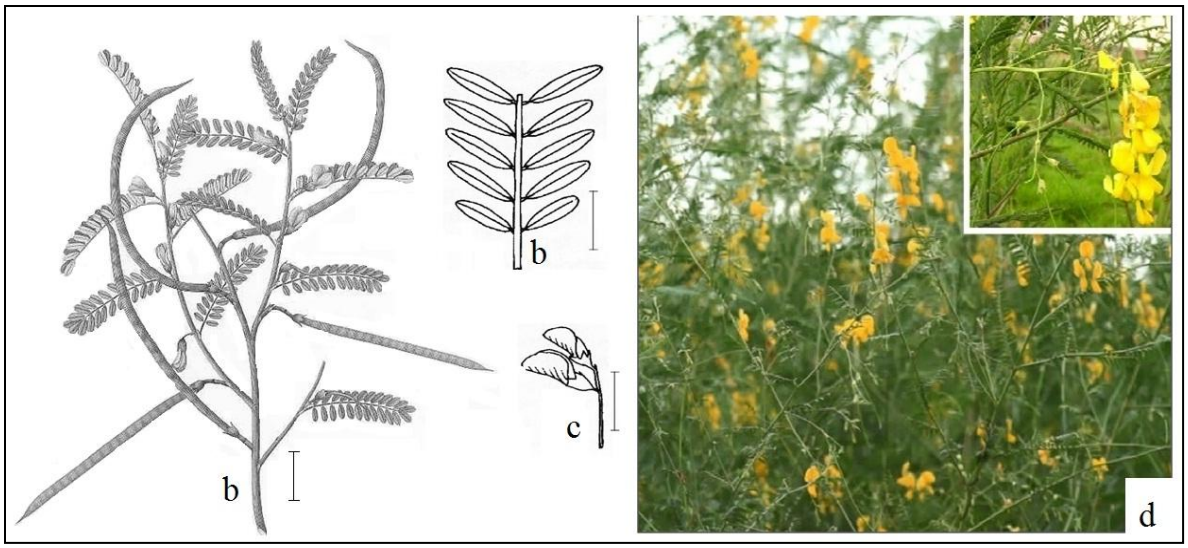


Figure 123. *Sesbania javanica*: **a,** flowering shoot; **b,** base of rachis with five pairs of pinnae (2 cm); **c,** two flowers (2 cm); **c,** flowering shoot with inflorescence (inset).

HALORAGACEAE: 1genus, 1 species

Myriophyllum indicum Willd.: Figure 124.

Stems submerged, floating or ascending, upper part usually emergent. Leaves in whorls of (4) 5 or 6; submerged leaves, 1.5-4 cm long, with 12-24 pairs of filiform segments, the segments 1-2 mm long, brown- tipped; aerial leaves pinnate below with stiff segments becoming lanceolate above with a few teeth or entire. Bracts leaf-like, but smaller, rarely more than 1.25 cm long, usually reflexed in fruit; bracteoles pinnately or digilately dissected or lobed, 0.6-1 mm long. Flowers sessile, solitary, usually bisexual below and male above. Sepals deltate, 0.1-0.3 mm long, entire or finely serrate. Petals 1-2 mm long, deciduous. Stamens 8; anthers linear, 1.5-1.8 mm long. Fruit ± 2 mm long and wide; mericarps ovate, rounded on the back, with ± flat sides, finely tuberculate or usually smooth.

Fls. & Frts: July to October.

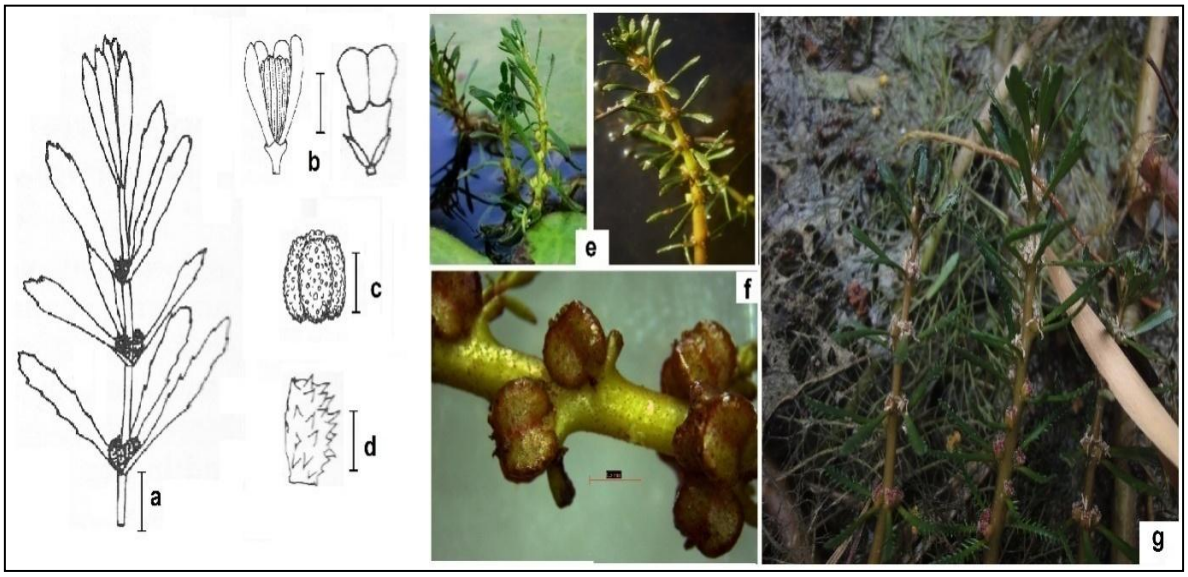


Figure 124. *Myriophyllum indicum*: **a,** flowering shoot (5 mm); **b,** male flower (1 mm); **c,** fruit (1 mm); **d,** one mericarp (2 mm); **e,** flowering shoot in field with flowers; **f,** fruits; **g,** flowering shoots.

Ecological Notes: Perennial or perhaps sometimes annual. In ponds, tanks and lowland marshes.

Field Collections: Gokulpur near Benapur, Kharagpur (near railway station canal), Asti and Mundumari in Pingla, Masantapukur in Sabong and Kechenda in Jhargram.

HYDROLEACEAE: 1genus, 1 species

Hydrolea zeylanica (L.) Vahl: Figure125.

Vernacular name: Ishalangulya or Lasschra

Stems prostrate or erect, up to 60 cm tall, green to brown often tinged with purple, without spines, glabrous or hairy, sometimes glandular towards the tip. Leaf blades ovate to lanceolate, 2-10 cm long, 3-25 mm wide, glabrous or hairy. Flowers in terminal panicles. Sepal segments lanceolate, 4.5-8 mm long, 1-2 mm wide. Petal lobes 4.5-8 mm long, 1.5-3.5 mm wide, bright blue. Capsules globose to cylindrical, 4-5 mm long, 2.5-3.5 mm broad;

placenta of each locule entire, not winged. Seeds ovoid to oblong, 0.3-0.4 mm long, less than 0.2 mm broad, with longitudinal and transverse ridges.

Flowering and Fruiting: November to March

Field Collections: Dujipur, Kalitala, Pasang in pingla; Keshpur, Sonakpnia, Mohanpur, Salboni, Gopiballavpur, Hatibari, Radhamohanpur, Mohar, Kherai, Dheruya.

Ecological Notes: Perennial or sometimes annual. Seasonally submerged emergent or helophytic, often gregarious and forming a distinct zone above receding water.

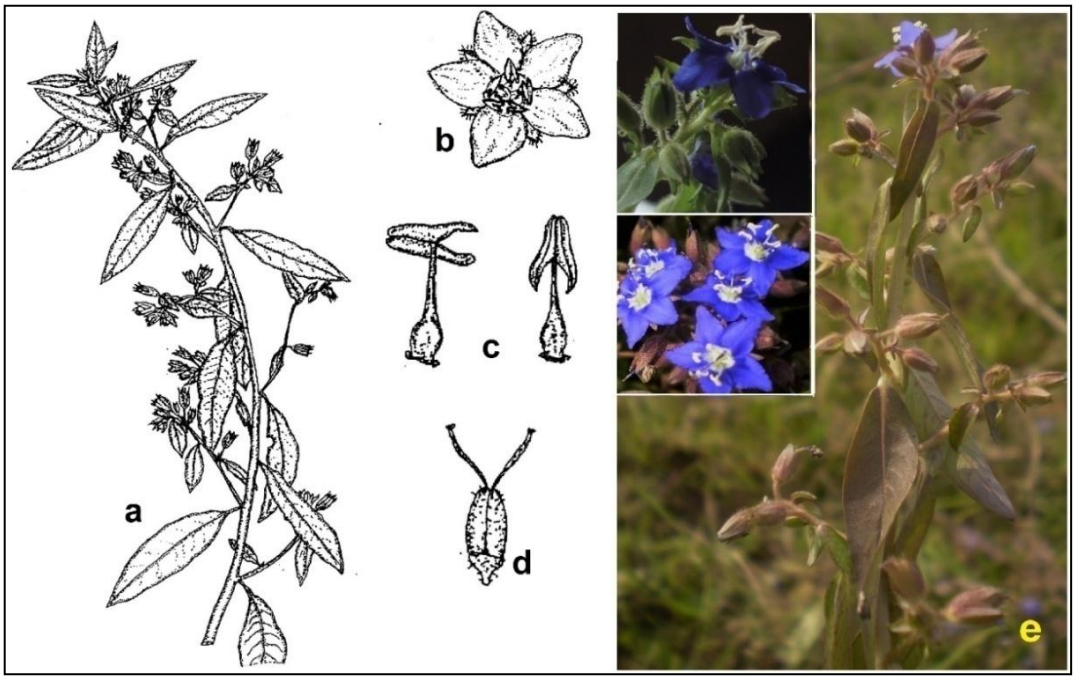


Figure 125. *Hydrolea zeylanica*: **a,** Flowering shoot (2 cm); **b,** flower (5 mm); **c,** anthers (0.5 mm); **d,** Gynoecium (1 mm); **e,** flowering shoot in field with flowers and fruits (inset).

LENTIBULARIACEAE: 1 genus, 5species

Utricularia: 5 species

Key to the species

1. Leaves divided into norrowly linear or capillary segments; submerged aquatics, usually planktonic; traps borne on leaves floating below the surface; bracteoles absent

2. Leaves sparsely forked with rarely more than 6 ultimate segments; adaxial (upper) lip of the petals as large as or larger than the abaxial (lower) one and usually 3-lobed ***U. gibba***

2. Leaves many times forked with 10 or many more ultimate segments; adaxial (upper) lip of the petals smaller than the abaxial (lower) one and entire or 2-lobed

3. Inflated organs on the inflorescence stall stalked, arising from near the base, fusiform bearing leaf-like or rhizoid-like capillary segments at intervals along their entire length ***U. aurea***

3. Inflated organs on the inflorescence stall sessile, arising from the distal half, short, ellipsoidal bearing leaf-like capillary segments only from the distal half ***U. stellaris***

1. Leaves entire, linear to obovate or orbicular; emergent aquatics or halophytes, firmly fixed in the soil; traps borne in or near the substrate; bracteoles present or absent

4. Bracts subtending flowers, attached at some point above the base or produced below the point of attachment to the base (basisolute) ***U. caerulea***

4. Bracts subtending flowers attached by the base (basifixed), Adaxial sepal broadly ovate, obtuse at apex; inflorescence stalk not twining; pedicels deflexing in fruit; capsule wall of uniform thickness ***U. bifida***

Utricularia aurea Lour.: Figure 126.

Vernacular name: Jhangi

Rhizoids usually present at the base of the inflorescence stalk, either short and linear or elongated and inflated, up to 10 cm long, bearing leaf-like branches. Stolons filiform, terete, branched, papillose, up to 1 m long, 0.5-2 mm thick, sometimes bearing capillary air shoots. Leaves very numerous, 1-8 cm long, divided from the base into 3-5 primary filiform or somewhat inflated segments, the secondary segments pinnate, each pinna forked from the base into numerous further segments, the ultimate segments capillary, usually with some bristles; stipule-like auricles usually present at the base of the primary segments. Traps

dimorphic, mostly lateral on the secondary or tertiary leaf segments, obliquely ovoid, 1-4 mm long, the mouth lateral, naked or with 2 sparsely branched bristle-like appendages; others sparsely clustered at the base of primary segments, subglobose, the mouth basal, usually without oral appendages. Inflorescence stalk erect, emergent, 1-20 (-30) cm long, terete, glabrous. Scales absent. Bracts basifixed, broadly ovate to circular, apex rounded, 1-2 mm long, obscurely nerved. Bracteoles absent. Flowers 5-10; the axis initially short, becoming elongated in fruit; pedicels dorsoventrally compressed, 0.4-2 cm long, erect at anthesis, usually sharply deflexed and thickened, especially distally, in fruit. Sepals subequal (abaxial sepal often slightly broader), ovate, apex rounded to subacute, 2-3 mm long at anthesis, becoming ± fleshy and much larger, up to 9 mm long and spreading on reflexed in fruit. Petals pale yellow with reddish-brown veins, 1-1.5 cm long, glabrous to densely pubescent; adaxial lip broadly ovate, apex rounded; abaxial (lower) lip limb transversely elliptical, the base with a prominent, 2-lobed swelling, apex rounded or emarginate; palate pubescent; spur cylindrical from a narrowly conical base, often somewhat constricted near the middle, apex obtuse or subacute, about as long and parallel with the abaxial (lower) lip. Filaments curved, 1-1.5 mm long; anther thecae ± confluent. Capsule globose, up to 5 mm in diameter, the wall relatively thick and fleshy, circumscissile, and the persistent style greatly enlarged, ± as long as or longer than the capsule. Seeds disk-shaped, ± 5 angled, 1.5-2 mm in diameter, narrowly winged on all angles.

Flowering and Fruiting: August to December.

Ecological Notes: Floating in the pools and marshes, common in the rice fields. Perennial perhaps sometimes annual. Planktonic or anchored by rhizoids or stolons. In tanks, pools, back-waters, rice fields, ditches and canals.

Field Collections: Jakpur and Radhamohanpur near railway canals, Laxmibari, Badalpur, Ruinan, Mirzapur, Shaymalpur, Pirakata, Bhadutala, Kechenda sebayatan, Jamboni, Midnapore.

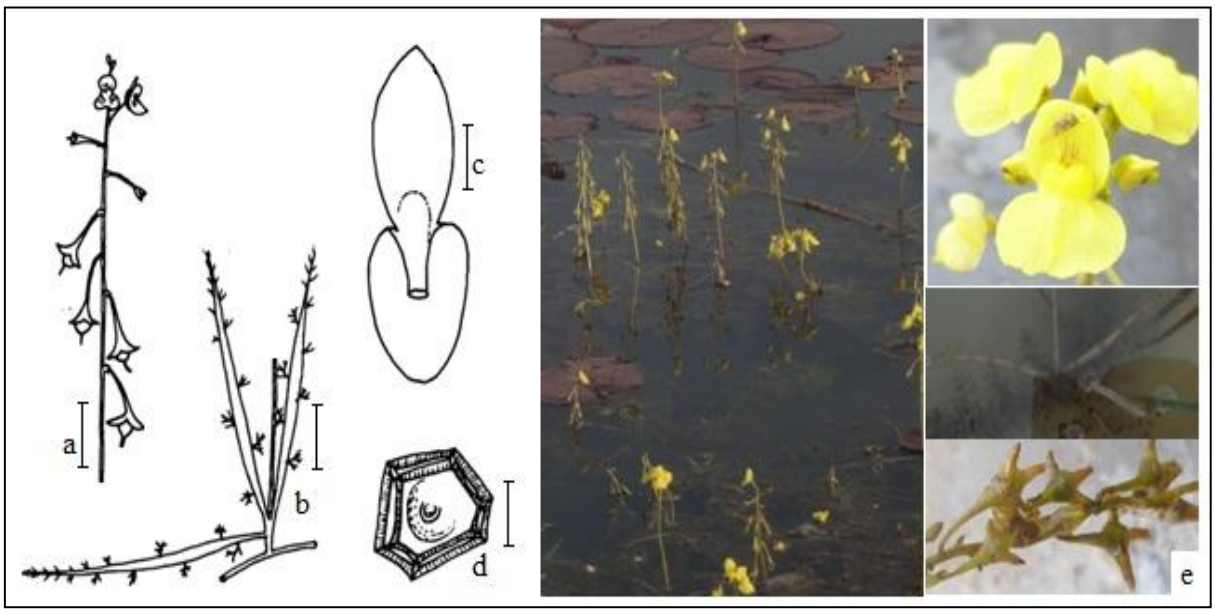


Figure 126. *Utricularia aurea*: **a,** Plant inflorescence (1 cm); **b,** sepals at anthesis (1 mm); **c,** plants floats (1 cm); **d,** seed (0.4 mm); **e,** flowering plant at field with inflorescence, floats and fruits (inset).

Utricularia bifida L.: Figure127.

Rhizoids numerous, branching, capillary. Stolons few, branched, capillary. Leaves arising from stolon nodes, up to 2 cm long, 1-nerved, petiolate, the lamina narrowly linear, 0.5-1 mm wide, apex rounded or subacute. Traps ovoid, 0.6-1 mm long, the mouth basal, with 2 simple, subulate, reflexed, adaxial appendages and with a rounded swelling on the abaxial side of the mouth or on the adjacent stalk. In florescence stalk erect, 3-20 cm long, glabrous. Scales few, like bracts. Bracts attached by the base, ovate, 1-3 mm long, 1-to 5-nerved, apex obtuse to acute. Bracteoles subulate, much shorter than the bract. Flowers 1-10; pedicels spreading at anthesis, decurved in fruit, capillary, broadly winged, 2-5 mm long. Sepals slightly unequal, 2.5-7 mm long, broadly ovate, glabrous; adaxial sepal with obtuse apex; abaxial (lower) sepal

slightly smaller, apex rounded or very shortly 2-lobed. Petals 6-10 mm long, yellow; adaxial lip slightly constricted below the middle, the superior part oblong or oblong-ovate, apex rounded, the inferior part broadly ovate-deltoid; abaxial (lower) lip ± circular, the base with a prominent rounded swelling, apical margin rounded; palate margin hairy; spur subulate, curved, ± as long as and diverging from the abaxial (lower) lip. Filaments straight, ± 1 mm long; anther thecae distinct. Capsule broadly ellipsoid, dorsoventrally flattened, 2.5-3 mm long, dehiscing by adaxial and abaxial, longitudinal slits. Seeds obliquely obovoid, 0.4-0.5 mm long.

Flowering and Fruiting: August to December.

Ecological Notes: Small annual. In seasonally flooded places, wet soil between rocks and in rice fields.

Field Collections: Gurguripal Eco Park at Chandabila forest range.

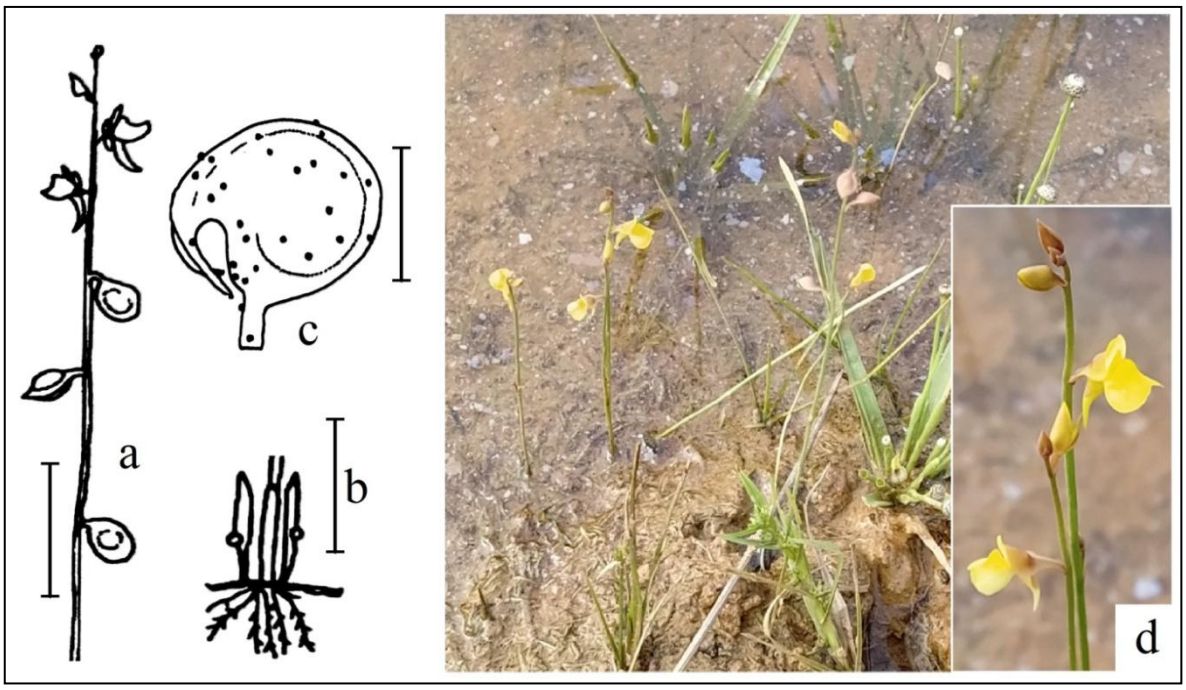


Figure 127. *Utricularia bifida*: **a,** base of plant with stolens and inflorescence (1 mm)**; b,** trap (0.2 mm); **c,** plant inflorescence stalk (1 cm); **d,** flowering plant at field with inflorescence, with flower at anthesis (inset).

Utricularia caerulea L.: Figure 128.

Rhizoids arising from the base of the inflorescence stalk, numerous, branched, capillary. Stolons branched, capillary. Leaves arising from base of inflorescence stalk and from stolons, often in rosettes, up to 1 cm long, 1-nerved, petiolate, the lamina narrowly obovate, up to 2 mm wide. Traps ovoid, dimorphic, the larger ones 1-1.5 mm long, the smaller ones 0.25-0.5 mm long, the mouth lateral, surrounded by an oblique funnel-shaped rim, the margin and inner surface of which is covered with radiating rows of long-stalked glands; the adaxial side of the rim of the large traps produced into a long, narrowly deltoid beak, reaching 2 times as long as the body of the trap, the beak bearing long-stalked glands. Inflorescence stalk erect, (2-) 5-30 (-50) cm long, glabrous above, usually papillose below. Bracts basisolute, attached just above the middle, ± 1 mm long, superior part ovadte with apex acute, the inferior part narrower, apex very acute. Bracteoles ± basisolute, attached very near the base, superior part like superior part of bract. Flowers 1-20 or more, distant to congested; pedicels erect at anthesis, spreading to sharply deflexed in fruit, filiform, terete, 0.5-1 mm long. Sepals unequal, 1.5-3 mm long, glabrous; adaxial sepal ovate-oblong, apex rounded; abaxial (lower) sepal broader, transversely elliptical, apex retuse. Petals 2-8 (-12) mm long, white or yellowish at the base of the abaxial (lower) lip; adaxial lip constricted near the middle, with the superior part oblong or ovate-oblong, apex retuse; inferior part broadly deltoid; abaxial (lower) lip broadly ovate, with a basal, usually 4-ridged swelling, apex rounded, entire or emarginate; palate pubescent with a distal, transverse crest, the crest terminating at each end in an acute conical process; spur narrowly conical-subulate, often constricted towards the apex, usually considerably, rarely shorter than the abaxial (lower) lip. Filaments straight, 1-2 mm long; anther thecae almost distinct. Capsule globose or ellipsoid, 1.5-2 mm long, dehiscing by a short, abaxial, proximal, marginally thickened slit. Seeds obovoid, 0.2-0.25 mm long.

Flowering and Fruiting: July to January.

Ecological Notes: Annual and perhaps also perennial in permanently wet habitats. Seasonally flooded places, between rocks, in wet grassland and long stream sides.

Field Collections: Gurguripal Eco Park at Chandabila forest range and Kechenda in Jhargram.

Figure 128. *Utricularia caerulea*: **a,** base of plant with stolens and inflorescence (1 mm); **b,** flower with bract and bracteoles; **c,** sepals (1 mm); **d,** trap (0.4 mm); **e,** flowering plant at field with inflorescence and flower anthesis (inset).

Utricularia gibba L.: Figure 129.

Rhizoids absent or filiform, sometimes stolon-like. Stolons usually numerous, much branched and often mat-forming, filiform, terete, glabrous, up to 20 cm long or longer. Leaves numerous, 0.5-1.5 cm long, ± uniform, the primary segments (1) 2, sparsely forked into up to 4 (rarely 8) untimate segments or sometimes. 1 branch of each fork replaced by a trap, the ultimate segments capillary, usually with some bristles; stipule like auricles absent. Traps lateral on the primary to penultimate segments, ovoid, 1-1.25 mm long, the mouth lateral with 2 adaxial and bristle-like branched appendages. Inflorescence stalk erect, emergent (or sometimes submerged with cleistogamous flowers), 1-20 (-30) cm long, solitary or sometimes 2 or more toether or developing in succession, filiform. Scales 1 or sometimes 2, at or near the middle of the stalk, similar to the bracts or frequently absent. Bracts basifixed, semi-amplexicaul, ± semicircular, apex rounded, truncate or obscurely toothed, ± 1 mm long, minutely glandular, obscurely nerved. Bracteoles absent. Flowers (1-) 2-6 (-12); pedicels erect or spreading, filiform, terete, 0.2-3 cm long. Sepals subequal, broadly ovate to circular, 1-3 mm long, apex rounded. Petals yellow, often with reddish-brown veins. 4-25 mm long; adaxial lip broadly ovate to almost circular, somewhat 3-lobed; abaxial (lower) lip smaller, circular to transversely elliptical, the base with a prominent, rounded, 2-lobed swelling, apex rounded; palate densely pubescent with simple 1-celled hairs; spur narrowly cylindrical from a conical base, apex obtuse or ± obscurely bifid, shorter than the abaxial lip. Filaments curved, 1-1.5 mm long; anther thecae confluent. Capsule globose, 2-3 mm in diameter. Seeds thickly lenticular, 0.8-1 mm in diameter, with a relatively broad wing surrounding the seed.

Flowering and Fruiting: August to February

Ecological Notes: Annual or perennial. Affixed or planktonic, in humid regions sometimes found growing terrestrially.

Field Collections: Kechenda, Gopiballavpur, Hatibari.

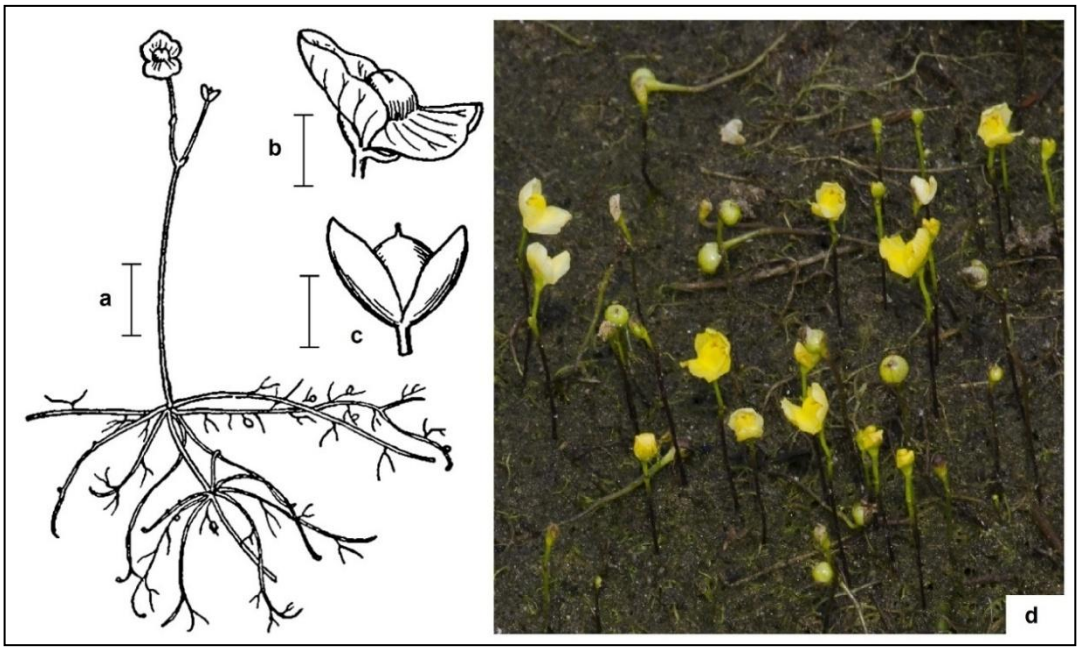


Figure 129. *Utricularia gibba*: **a,** Plant shoot with inflorescence (1 cm); **b,** flowers (1 mm); **c,** fruit (0.5 mm); **d,** flowering plant at field with inflorescence.

Utricularia stellaris L.f.: Figure 130.

Rhizoids absent, stolons filiform, terete, sparsely branched, glabrous, up to 1 m long, 0.5-1.5 mm thick sometimes bearing capillary air shoots, with apical, minute, elliptical membranous scales. Leaves very numerous, semicircular in outline, 1-6 cm long divided from the base into 3-6, semi-vericillate, primary, filiform segments, the secondary segments pinnate, alternate, each pinna forked from the base into numerous further segments, the ultimate segments capillary, somewhat flattened, usually with some bristles; stipule-like auricles usually present at the base of the primary segments. Traps numerous, lateral on the secondary segments, obliquely ovoid, 1-3 mm long, the mouth lateral, naked or with 2 simple or sparsely branched bristle-like appendages. Inflorescence cence stalk erect, emergent, 3-30 cm long, glabrous 0.5-1.5 mm thick, with a whorl of 3-8 spongy floats considerably above the middle; the floats narrowly ovoid, 0.5-2 cm long, sessile, with a few short, capillary, leaf segments at or near the

apex only. Scales absent. Bracts basifixed, broadly ovate to circular, apex obtuse or rounded, membranous, ± 2 mm long obscurely many-nerved. Bracteoles absent. Flowers 2-12; the axis short, not greatly elongating in fruit; pedicels filiform, dorsoventrally compressed and winged, 1-5 mm long, erect at anthesis, usually sharply deflexed and thickened, especially distally, in fruit. Sepals subequal, broadly ovate to circular, ± 3 mm long at anthesis, reflexed and accrescent in fruit but scarcely as long as the capsule with stigma; adaxial sepal with a rounded apex; abaxial (lower) sepal with a retuse apex. Petals yellow, 0.7-1 cm long, ± densely covered with fine, multicellular, glandtipped hairs; adaxial lip broadly ovate with a retuse or emarginated apex; abaxial (lower) lip limb transversely elliptical, the base with a prominent, 2-lobed swelling, apex rounded or emarginate; palate pubescent; spur cylindrical from a broad, conical base, apex retuse or emarginate, shorter than the abaxial lip. Filaments slightly curved; anther thecae ± confluent. Capsule globose, up to 3-4 mm in diameter, the wall somewhat fleshy, circumscissile, the persistent style up to 1.5 mm long. Seeds disk-shaped, 4-6 angled, 0.8-1.2 mm in diameter, usually 3 or more times as wide as long, narrowly winged on all angles.

Flowering and Fruiting: June to February

Ecological Notes: Probably perennial perhaps sometimes annual. Planktonic with emergent flowers. In shallow to deep, still or slowly flowing water in lakes, pools, backwaters ditches, swamps and rice fields. It can be a serious weed in newly planted rice fields.

Field Collections: Hatihalka and Khalsuli at Midnapore, Basantapu at Debra, Dujipur at Pingla, Asui at Gopiballavpur. Jhilinga at Kharagpur, Tutranga at Narayangarh, also common in other places

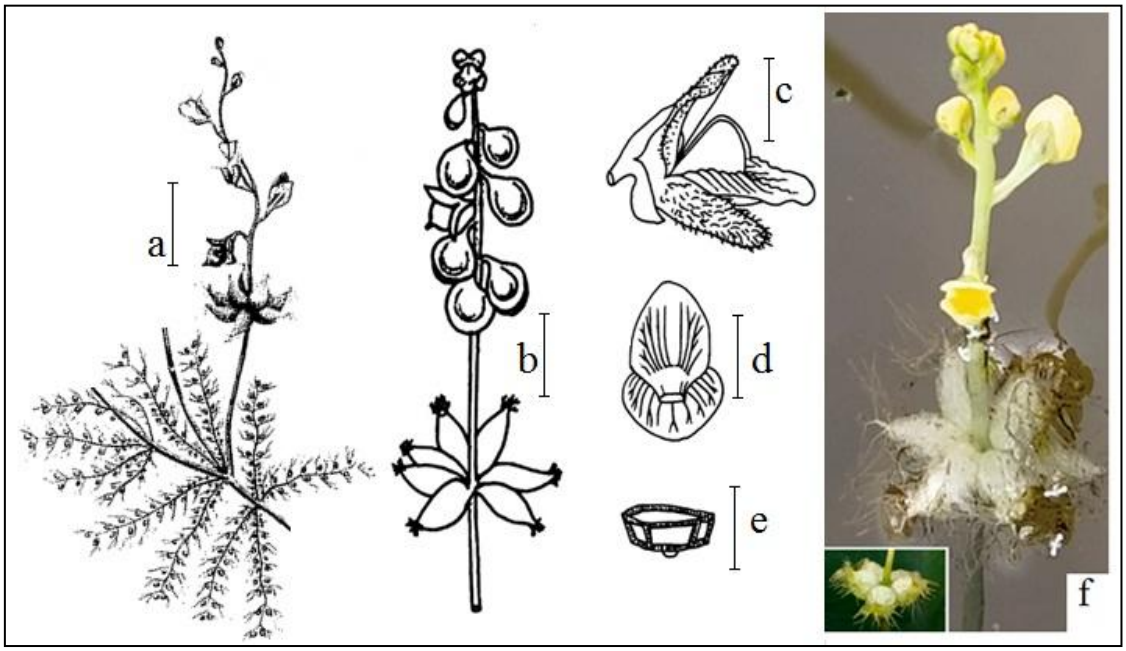


Figure 130. *Utricularia stellaris*: **a,** leaf segments (2 mm); **b,** inflorescence (1 cm); **c,** flower (2 mm); **d,** sepals (1mm); **e,** seed (0.3mm); **f, g** and **h,** flowering shoot in field.

LYTHRACEAE: 3 genera, 5 species

Trapa natans var. ***bispinosa*** (Roxb.) Makino: Figure 131.

Vernacular name: Paniphal or Singara Phal.

Stems elongate, mostly simple, flexible, submerged, bottom-rooted. Leaves opposite below, alternate above. dimorphic; submerged leaves sessile, linear, entire, caducous (after falling off green, pinnately branched, adventitious roots develop from the leaf scars, these roots are often mistaken for leaves in the literature); floating leaves in terminal rosettes, the blades rhombic with toothed margins and broadly cuneate to truncate bases, the petiole often with an ellipsoidal and spongy swelling. Flowers bisexual, radially symmetrical, solitary, shortly pedicelled, often cleistogamous. Sepals 4, triangular, united to the ovary, persistent, developing into 2, 5 or 4 hard spines or horns in fruit. Petals 4, white or lilac, caducous. Stamens 4. Ovary half-inferior, 2-locular; ovules pendent, 1 in each locule, but only 1-develops. Fruit a large, woody or bony, very polymorphic, variously sculptured, spinose nut,

mostly with 2- large and 2 small (often rudimentary) spines; the spines with or without barbed tips

Flowering and Fruiting: July to October.

Field Collections: Tegaria, Gumra, Chaksala, Pasang, Radhamohanpur at Pingla; Belki, Masantapukur, Nila, Adasimla, Dehati, Kolanda, Bilkuya, Malpar at Sabong.

Ecological Notes: Commonly cultivated on the ponds, Jheels, railway side canals, pools and any other marshy places. Free floating; do not reach the bottom, but remain suspended in the water. Annual or perennial.

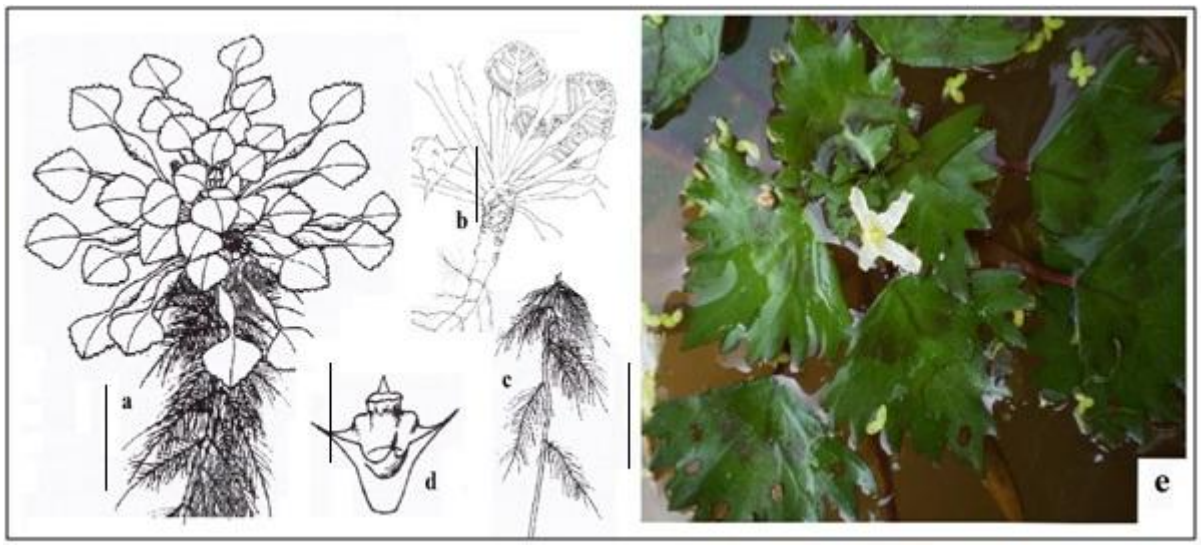


Figure 131. *Trapa natans* var. *bispinosa*: **a,** floating shoot with branching root (9 cm); **b,** plant shoot (6 cm); **c,** branching root (1 cm); **d,** nut (1 cm); **e,** plant in field.

Trapa natans L.: Figure 132.

Vernacular name: PaniPhal or SingaraPhal.

Stoloniferous, free floating herb. Stem cylindrical, spongy. Floating leaves crowded in the upper parts of the stem; 3 lobed, rosulate, rhomboid, broader than longer; submerged leaves dissected, petioles spongy near top. Flowers solitary; sepals persistent, two of it transformed into scabrous spreading horns of the fruit. Nut angled, shortly beaked at the apex and with a spiny horn on either sides.

Flowering and Fruiting: July to October.

Ecological Notes: Common on the ponds, jheels, railwayside canals, pools and any other marshy places.

Field Collections: Tegria, Dhaneswarpur at Pingla; Kechenda at Jhargram.

Figure 132. *Trapa natans*: **a,** floating shoot with branching root (6 cm); **b,** plant in field with flower.

***Ammannia*:** 2 species

Key to species

1. Styles (0.5-) 1-5 mm long; Leaves glabrous; axillary cymes distinctly pedunculate; sepal tube embranous ***A. auriculata***

1. Styles less than 0.5 mm long; Leaves and sepals glabrous; sepal appendages absent ***A. baccifera***

Ammannia auriculata Willd: Figure 133.

Seems 10-30 (-57) cm tall, erect or decumbent, usually 4-angled, simple or with ascending branches. Leaf blades linear-lanceolate to lanceolate, (0.6-) 1-6 (-9) cm long, (1.7-) 3-8 (-14) mm wide, mostly longer than the stem internodes, base cordate with .auricles, tips acute. Cymes pedunculate, (1-) 3-15 flowered; peduncles (1.5-) 2-4 (-6) mm long; pedicels of the

central flowers 3-17 mm long. Sepal tube ± campanulate, becoming ± globose in fruit, (1-) 2-3 mm long, 1.5-3.5 mm broad, with 8-10 green longitudinal ribs at anthesis; sepal lobes reduced to 3-angled teeth; sepal appendages smaller than the lobes or absent. Petals purple, violet or white, 2-5 mm long, deciduous. Stamens 4 (8). Styles (1.5-) 2-3 mm long. Capsules globose, 2-3.5 mm in diameter, exceeding the sepals. Seeds discoid.

Flowering and Fruiting: July to October.

Ecological Notes: Annual or perhaps sometimes perennial. In wet places, marshes, river banks and rice fields.

Field Collections: Tilantapara, Laxmibari at Pingla; Adasimla, Jhikuria, Laro, Bonai, Harnan at Sabong; Benachapra, Kota, Nabagram at Keshpur.

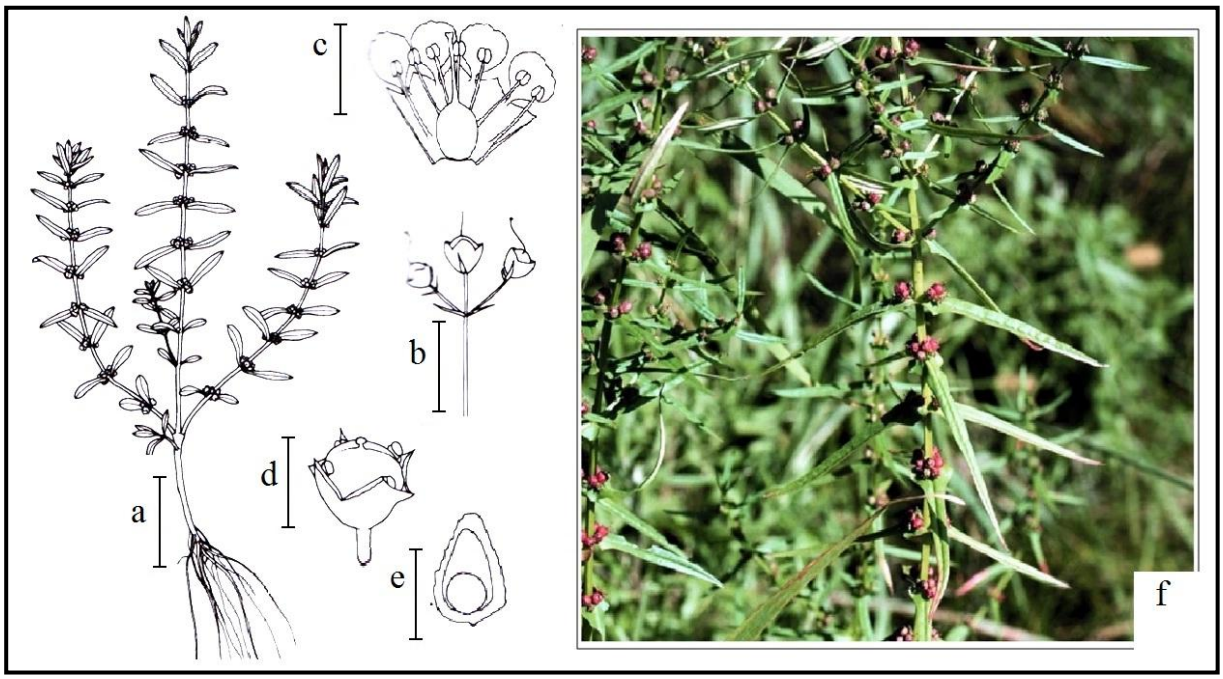


Figure 133. *Ammannia auriculata*: **a,** whole plant (1 cm); **b,** inflorescence (3 mm); **c,** flower (1 mm); **d,** fruit (0.5mm); **e,** seed (0.25 mm); **f,** plant in field.

Ammannia baccifera L.: Figure 134.

Vernacular name: Dadmari

Stems (-7) 25-50 (-100) cm tall, glabrous, decumbent or erect, usually much branched, the branches ascending and shorter than the main axis. Leaf blades linear-lanceolate to oblanceolate, (4-) 10-40 (-70) mm long, (0.5-) 1-8 (-1.6) mm wide, glabrous, mostly longer than the stem internodes, becoming smaller towards the apex of the stem, base gradually narrowed, rarely truncate or cordate, apex acute to subobtuse. Cymes compact, globose, sessile or nearly so or flowers solitary. Flowers sessile or nearly so; pedicels at centre rarely more than 1 mm long. Sepal tube broadly bell-shaped or obpyramidal, (0.5-) 1-2.5 mm long, 1-2.5 mm in diameter, with 8 longitudinal ribs; sepals 4 (5), lobes deltate, ± two-thirds as long as the tube, purple-tipped; sepal appendages absent. Petals minute or absent. Stamens 4, included; filaments red; anthers yellow. Style 0.1-0.3 (-0.5) mm long. Fruits bright red to purple. Capsules globose, 1-1.5 (-2) mm in diameter, partly exerted from the sepal tube. Seeds ± 20, ± globose, concave on the inner side, rounded on the back, 0.3-0.4 mm long, bright red.

Flowering and Fruiting: January to July

Ecological Notes: Growing on the dampy paddy-fields very profusely. Annual, in wet or regularly inundated places such as marshes, river banks, rice fields, etc., but rarely found in permanent water.

Field Collections: Jakpur and Radhamohanpur near railway canals, Laxmibari, Badalpur, Ruinan, Mirzapur, Shaymalpur, Pirakata, Bhadutala, Kechenda sebayatan, Jamboni

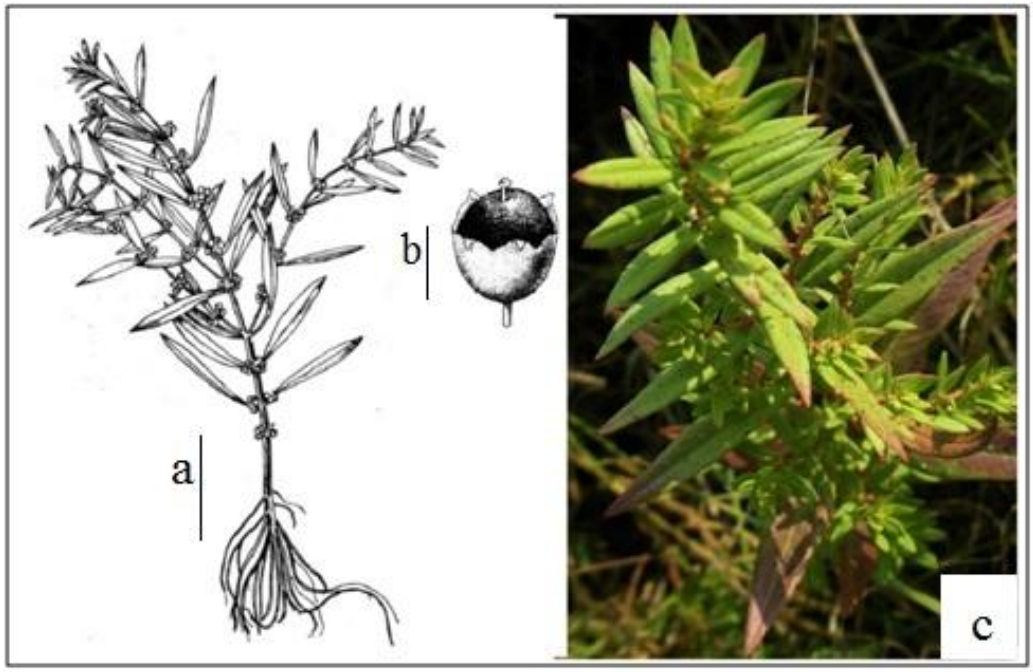


Figure 134. *Ammannia baccifera*: **a,** whole plant (1 cm); **b,** fruits (0.5 mm); **c,** seed (0.25 mm); **d,** flowering shoot in field.

Rotala densiflora (Roth) Koehne: Figure 135.

Stems erect, sometimes creeping below, up to 40 cm or more long, 4-angled, 4-winged, usually branched or sometimes simple. Leaves decussate below, sometimes in whorls of 4 above, very variable in shape and size (even on a single plant), linear-lanceolate to ovate or oblong, 2-35 mm long, base obtuse to cordate, tips acute or acuminate. Floral bracts almost dimorphic: on main stem and lower branches like foliage leaves, on branches above bract-like and scarcely exceeding the flowers; bracteoles longer than the sepals, with distinct midrib. Flowers monomorphic campanulate, ± 1 mm long; sepal lobes 5 or rarely 4, triangular to shallowly triangular, ± 0.5 mm long; sepal appendages linear or capillary, as long or up to 2 times lnger than the sepal lobes or very rarely rudimentary. Petals 5 or rarely 4, bright pink or rarely white, 0.5-1 mm long, at least as long as the sepal lobes. Stamens 5 or rarely less, inserted on the lower half of the sepal tube; anthers borne level with the sepal lobes. Style 0.5-1 mm long. Capsule as long as the sepal tube, opening by 3 valves. Seeds ± 0.5 mm long.

Field Collections: Gopiballavpur, Pingla, Nayagram, Asui, Chatinasol, Lodhasuli, Jamboni, Kapgari, Salboni, Sabong, Adasimla, Dantan, Sonakonia, Pandachacha, Daspur, Debra.

Flowering and Fruiting: August to February.

Ecological Notes: Annual. In shallow water at the edges of tanks and ditches, in floating mats of vegetation, in marshes and in rice fields.

Figure 135. *Rotala densiflora*: **a,** flowering shoot (1 cm); **b,** flower (1 mm); **c,** flower dissection (1 mm); **d,** e,flowering shoots in field.

MENYANTHACEAE: 1genus, 2 species

***Nymphoides*:** 2 species

Key to the species

1. Petal lobes not fimbriate and without hairs (except at the throat), each lobe with a smooth but undulate longitudinal crest along the centre on the inner surface and with smooth, crest-like, undulate margins ***N. hydrophylla***

1. Petal lobes either fimbriate or with hairs, crests (when present) fimbriate or toothed along the margins, Flowers bisexual; petal lobes usually 1 cm or more long, uniformly and densely

fimbriate with multicellular, cotton-like outgrowths on the inner surface and along the margins, without any longitudinal folds or crests; seeds 1-2 mm in diameter ***N. indica***

Nymphoides hydrophylla (Lour.) Kuntze: Figure 136.

Rhizome short, erect. Petiole-like shoots up to 85 cm long, slender. Petioles up to 2.5 cm long; blades of floating leaves oval- orbicular to orbicular, 4-13 cm long and 3.5-12 cm wide, green sometimes with purplish blotches, without glands, rather thin, deeply cordate to hastate at the base, coarsely crenate; nerves obscure above, prominent on abaxial (lower) surface. Flowers bisexual or sometimes female, weakly distylic, in umbel like clusters of 10-20 or more flowers, borne below a floating leaf. Pedicels 2.8-6 cm long. Bracts ovate, ± 2.5 mm long. Sepal lobes 5 (6), oval-oblong, 7-10 mm long, pure white, with a longitudinal crest along the centre on the inner surface and with crest-like undulate margins, without hairs but with some hairy glands near the base, obtuse. Stamens inserted halfway up the petal tube, anthers subsessile, ± 1.5 mm long. Disk glands 5 or 6, each suborbicular with papillose hairs at the tips. Capsule broadly ovoid, 3-6 mm long, 3.5-4 mm in diameter, dehiscing irregularly. Seeds 4-6 (-10), globose, ± 2 mm in diameter, yellowish-white, with small but prominent, slightly barbed tubercles.

Flowering and Fruiting: December to September.

Ecological Notes: Mostly annual, sometimes perennial. Deeply rooted in mud in lakes, tanks and temporary pools, sometimes in slowly flowing water **.**

Field Collections: Shyamchak, Madpur, Rupnarayanpur, Maninathpur, Turka, Sonakonia, Mundumari, Jalchak, Chandkuri, Sabong, Salboni, Martala, Narajol, Kechenda, Gidhini.

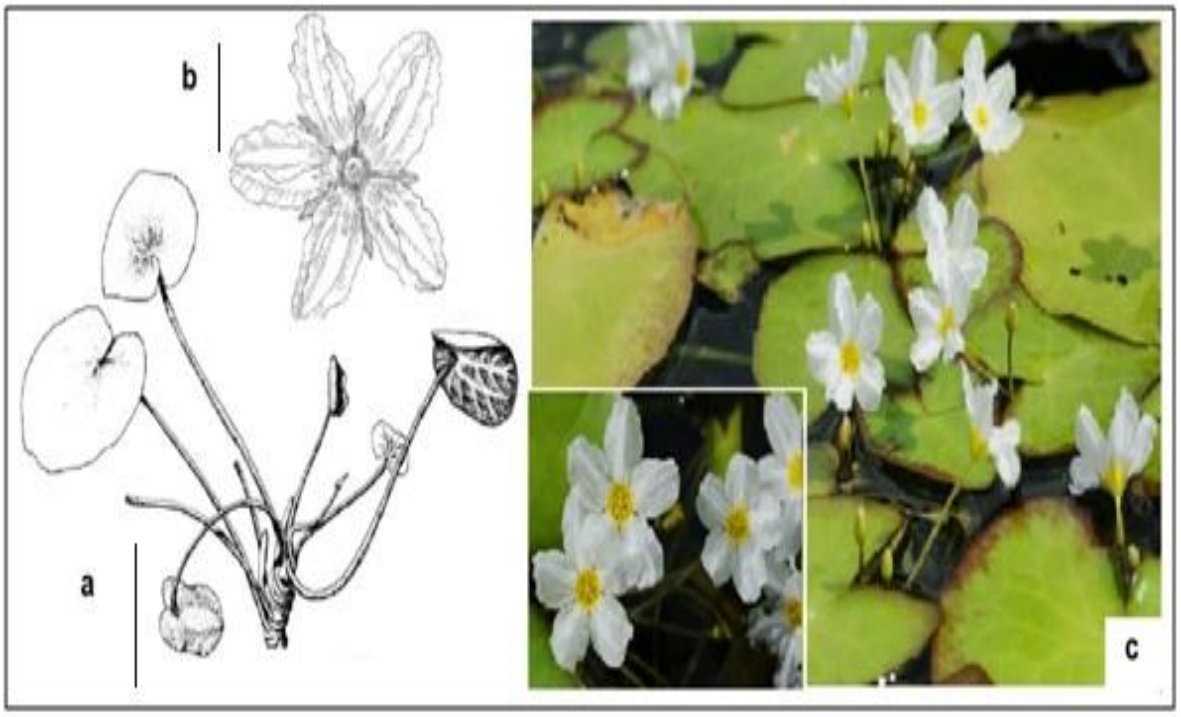


Figure 136. *Nymphoides hydrophylla*: **a,** plant shoot (4 cm); **b,** Flower (2 mm); **c,** plant in field with flower at anthesis.

Nymphoides indica (L.) Kuntze: Figure 137.

Vernacular name: Bara Pan Chuli

Rhizome oblique, up to 5 cm thick, with numerous scars and scale leaves, sending out long stolons which develop new plantlets. Petiole-like shoots up to 150 cm long, simple, flexible. Petioles up to 16 cm long but when flowering rarely more than 2 cm long; blades of floating leaves oval-orbicular to orbicular, up to ± 27 cm long and 30 cm long and 30 cm wide, glossy green above, pale and gland-dotted below, rather thick and leathery, deeply cordate at the base, coarsely crenate; nerves obscure above, prominent on abaxial (lower) surface. Flowers bisexual, distylic, in umbel-like clusters of (3-) 15-50 flowers, borne below a floating leaf. Pedicels up to 12 cm long. Bracts sheathing, oblong-lanceolate, up to 8 mm long and 5 mm wide, rather thick. Sepal lobes (4-) 5-7 (-8), ovate-lanceolate, up to 7 mm long, margins hyaline, tips obtuse, reflexed with age. Petal tubes up to 2.5 mm long, the throat yellow or

sometimes white; lobes (4-) 5-7 (-8), linear-lanceolate to oblong-lanceolate, up to ± 17 mm long, pure white or white with a yellow or orange base (sometimes entirely yellow in other regions of the world), inner surface and margins densely fimbriate, with multicellular, cotton-like outgrowths. Another filaments broadened at the base, up to 2.5 mm long, yellow; anthers ± 3 mm long, yellow. Disk glands 4-8, each suborbicular, ciliolate at the tips with papillose hairs. Styles either ± 1mm or ± 3 mm long. Capsule ellipsoid to obovoid, 6-8 mm long, 4.5-6 mm in diameter, dehiscing irregularly. Seeds globose, 1.2-2.1 mm in diameter, yellowish-white, smooth and shining or with a few small tubercles.

Flowering and Fruiting: April to October.

Ecological Notes: Annual or perennial. Generally common and abundant in fresh and brackish water. In lakes, tanks and pools in but rarely in flowing water.

Field Collections: Belar in Pingla, Topsia, Kechenda in Jhargram, Hatibari, Moya, Jamna.

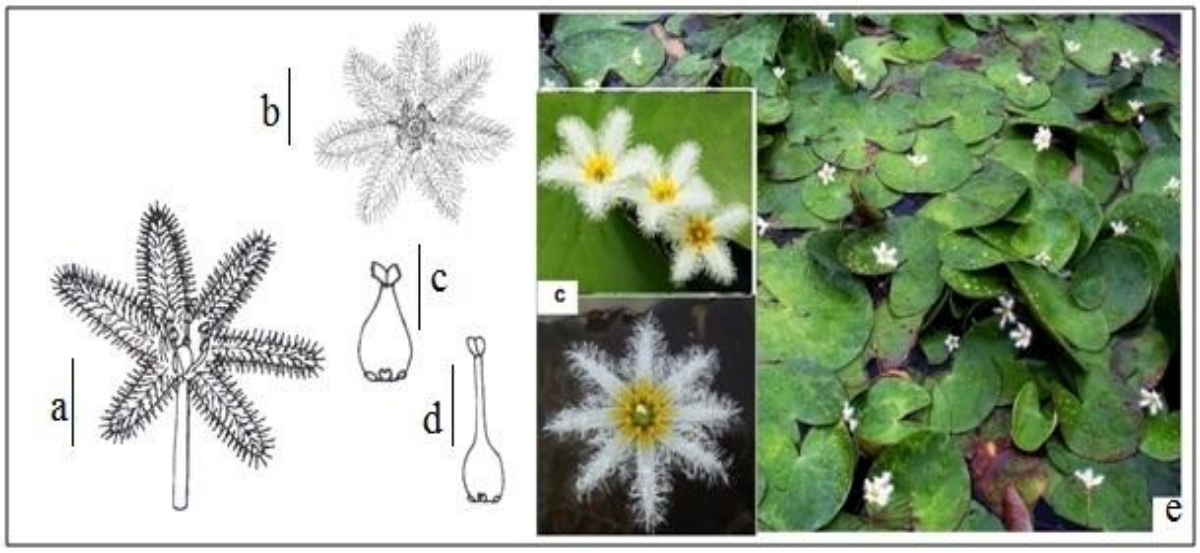


Figure 137. *Nymphoides indica*: a, flowering shoot (6 cm); b, flower (2 mm); c flowers at annthesis; d, flowering plants in field.

LEGUMINOSAE (MIMOSACEAE): 1genus, 1 species

Neptunia oleracea Lour.: Figure 138.

Vernacular name: Jal lajyaboti

Stems horizontal, hardly branched, with thickened nodes, developing white, spongy tissue when in water, rooting at nodes. Petioles glandless; stipules obliquely ovate-cordate, thin, persistent, 5-9 mm long. Pinnae 2-6, 5-8 cm long. Leaflets sessile, 8-14 (-20) pairs, narrowly oblong 3-18 mm long, 1.5-5 mm wide, the lower ones smaller. Peduncles erect, very accrescent, 6-25 cm long. Flower head oblong, up to 2.5 cm long and 0.8 cm wide. Bracts obovate, trapezoid. ± 2 mm long, ± 1 mm wide. Sepals ± 2 mm long. Petals 12 mm long. Staminodes of the sterile flowers strap shaped, ± 10 mm long. Pod flat, up to 2.5 cm long; seeds 4-10, ovate to elliptical, ± 5 mm long.

Flowering and Fruiting: Throught out the year.

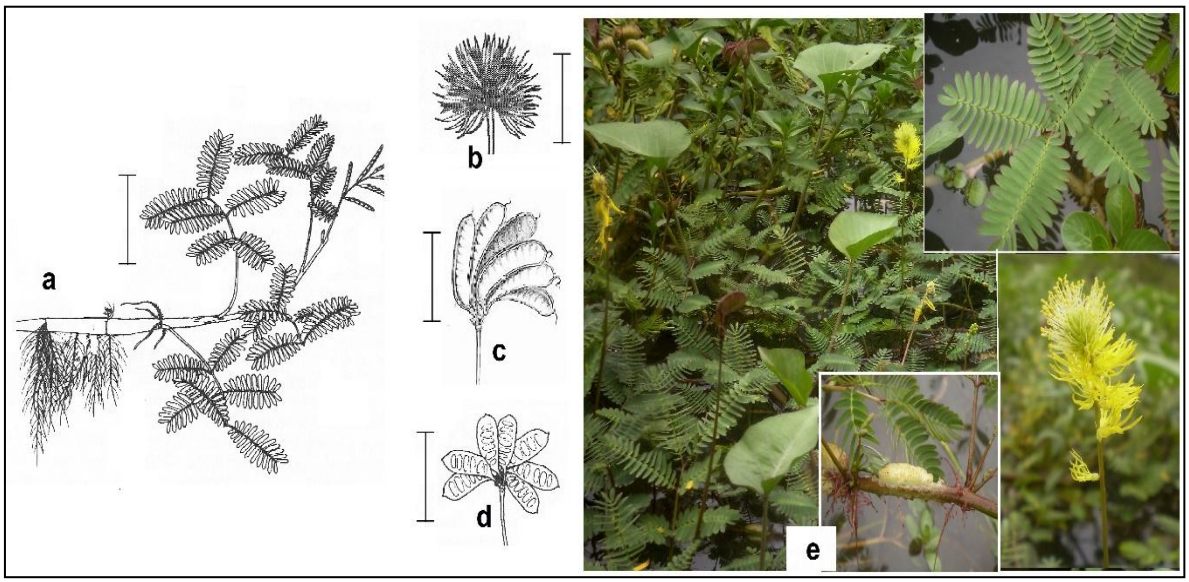


Figure 138. *Neptunia oleracea*: **a,** floating shoot (2 cm); **b,** inflorescence (0.5 cm); **c** and **d,** fruits (1 cm); **e,** flowering shoot with pinnae, inflorescence and spongy tissue in stem at field (inset).

Ecological Notes: Annual or perennial. Freely floating on the surface of water, often forming floating mats with other plants.

Field Collections: Sahara, Kechenda, Dashkhingeria, Radhamohabpur, Ashari, Malighati, Hoomgorh, Gorbeta, Ghatal, Dantan, Narajol, Pirakata, Sevayatan, Madpur.

NELUMBOACEAE: 1genus, 1 species

Nelumbo nucifera Gaertn.: Figure 139.

Vernacular name: Padma or Kamal.

Large, perennial, with milky latex. Stems dimorphic; slender horizontal, vegetative stolons or rhizomes or thickened storage rhizomes. Leaves alternate; petioles up to 3 m or more long, bearing numerous spines; leaf blades when immature floating, when mature raised above the water surface, peltate, reniform to orbicular (eccentrically peltate when very young), 10-100 cm or more in diameter, glaucous, nerves prominent but without spines. Flowers 8-20 (-40) cm in diameter; pedicels exceeding the petioles. Perianth segments 14-30, the outer 2-5 somewhat persistent, greenish-white and somewhat sepal-like the inner ones caduceus, petal-like, white to pink or red. Stamens up to 200 or more; filaments up to 1 cm long; anthers elongate, up to 1.2 cm long, connectives each with a conspicuous and fleshy terminal appendage, up to 4.5 mm long. Carpels (9-) 12-30 (-40), borne singly in cavities in the pithy obconical receptacle; fruit a head or very hard-coated nutlets; ovoid, ± 2 cm long, ± 1 cm wide.

Flowering and Fruiting: April to November.

Ecological Notes: Occasionally grow on the unlearned village ponds and jheels as attached floating herbs; sometimes planted in the village ponds as ornamental plants. The juveniles are submerged, the adults have floating or emergent leaves.

Field Collections: Near Rail station at Balichak, Gobardhanpur and Maligram at pingla, Ambi, Narayangarh, Madpur, Mundumari, Buramala, Kechenda and Kendugaree.

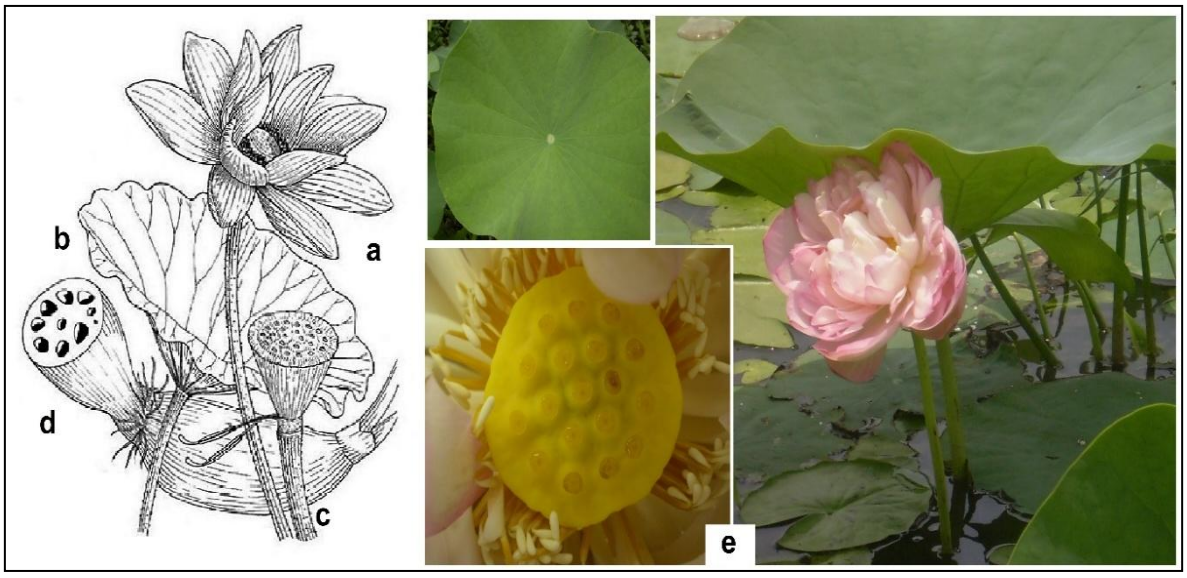


Figure 139. *Nelumbo nucifera*: **a,** flower (3 cm); **b,** leaf blade (3 cm); **c,** rhizome (4 cm); **d,** fruiting head (2 cm); **e,** flowering plants with leaves, stamen and pistil (inset).

NYMPHACEAE: 1genus, 3 species

***Nymphaea*:** 3 species

Key to the species

1. Leaf blades entire to bluntly dentate, glabrous, anthers with terminal appendages; sepals obscurely veined, usually with purple streaks, persistent in fruit; day-flowering ***N. nouchali***

1. Leaf blades sharply dentare, pubescent below (hairs sometimes restricted to veins); anthers without appendages; sepals with 5-9 white veins, decaying as the fruit develops; night-flowering ***N. pubescens***

Nymphaea nouchali Burm.f.: Figure 140.

Vernacular name: Saluk, Nil Sauk

Rhizomes horizontal or erect, up to ± 3 cm in diameter. Leaf blades mostly floating, entire to bluntly toothed, waxy, ± elliptical-orbicular to round, 5-25 (-45) cm long and wide, the radial slit to the centre or to within 6 mm of the centre, glabrous on both surfaces, the adaxial

(upper) surface green (sometimes blotched with purple), the abaxial surface reddish-purple, the margin entire or with broad obtuse teeth. Flowers barely emergent. Sepals lanceolate to ovate-lanceolate, 2.5-5 (-9) cm long, green often with purple streaks, obscurely veined, persistent in fruit. Petals 6-16, white, pinkish, blue or bluish-purple, the outer ones lanceolate to oblong-lanceolate, 2.5-7.5 cm long. Stamens (15-) 20-40 (-65), 1.5-3 cm long, not separated from the petals by a gap; anthers not flattened, yellow with white or blue apical connective appendages up to 4 mm long (usually less than one-quarter as long as the anther). Stigmatic disk surrounded by short (1-3.5 mm long), incurved, carpel appendages. Fruits 1.5-4 cm in diameter. Seeds ellipsoid-globose, 0.5-1 (-1.5) mm long.

Flowering and Fruiting: August to November

Ecological Notes: Perennial or annual. Very common, floating in the less cleaned rice fields and shallow water ponds, roadside canals and nalas, associated with other aquatic plants.

Field Collections: Common in selected areas.

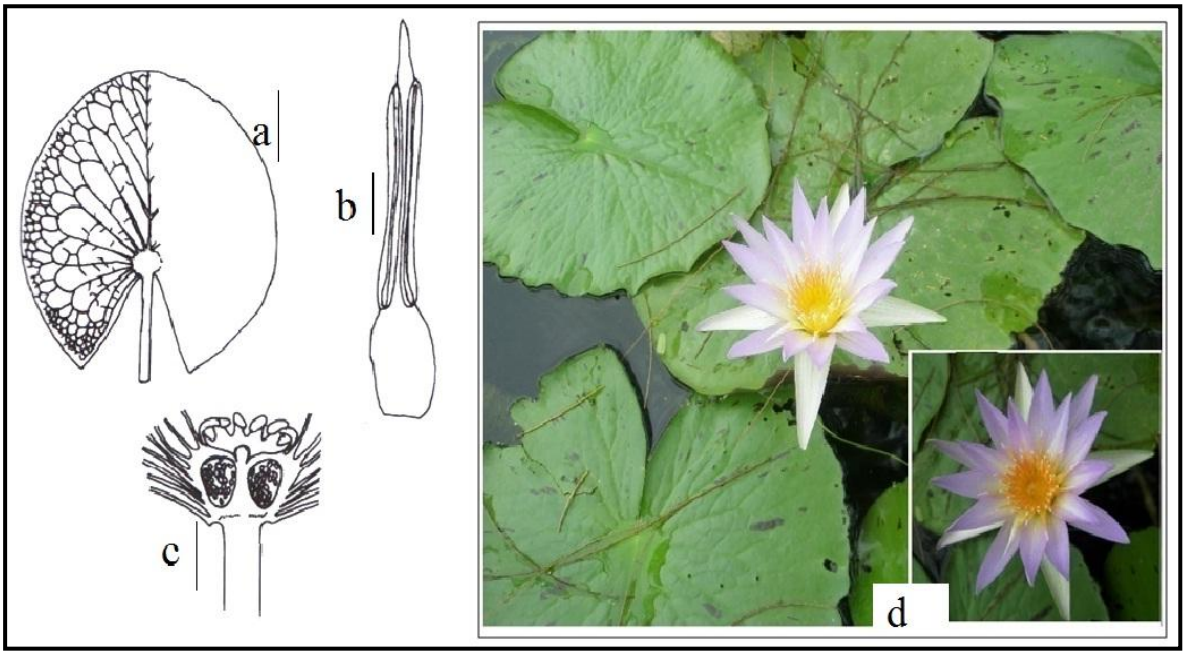


Figure 140. *Nymphaea nouchali*: a, leaf blade (6 cm); **b,** largest and smallest stamens (2 mm); c, flower in L.S (1 cm); **d,** flower at anthesis with petals in white or blue colour at field.

Nymphaea pubescens Willd.: Figure 141.

Vernacular name: Lal-Saluk

Leaf blades mostly floating, green above, brownish or purple below, ovate to round, 15-36 (-59) cm long and wide, the abaxial surface dark green and glabrous, the adaxial (lower) surface greenish, brownish or purple, densely covered with short hairs or the hairs sometimes restricted to veins, the margins sharply dentate, although the teeth sometimes absent on the apical part of old leaves; teeth 3-7 mm long, 7-15 mm apart. Flowers borne well above the water. Sepals ovate-lanceolate to obovate-oblong, 2.5-8.5 cm long, uniformly green with 5-9 white veins, decaying as the fruit develops. Petals 10-25, white to pink or deep red, the outer ones oblanceolate, 2-7 cm long. Stamens 25-70 (-90), yellow or red, separated from the petals by a gap; anthers flattened, 1-4 cm long, without appendages. Stigmatic disk surrounded by large (5-10 mm long), yellow, finger-like appendages which close over the stigmas after the first night of flowering. Fruits globose, 2.5-4 cm in diameter. Seeds ellipsoid to globose, ± 1.4 mm long, ± 1 mm wide, almost black with a white aril.

Flowering and Fruiting: April to November

Ecological Notes: Perennial or annual. It is common and often locally dominant. It mostly grows in shallow permanent and temporary water.

Field Collections: Common in selected areas.

Nymphaea rubra Roxb. ex Andrews: Figure 141.

Vernacular name: Saluk

Attached rooted and floating leaved herb; rhizomes attached with the clay. Leaves 20-25 cm across, ovate to sub-sagittate, deeply cordate with sharply minute tooth, bright green and glabrous above, pubescent beneath. Flowers 5-8 cm wide, white or rosy; anther without

appendages; stigma rays with clubbed appendages. Seeds 1 mm diam., ellipsoid or subglobose, longitudinally striate, green.

Flowering and Fruiting: August to November.

Ecological Notes: Very common, floating in the less cleaned rice fields and shallow water ponds, roadside canals, associated with other aquatic plants.

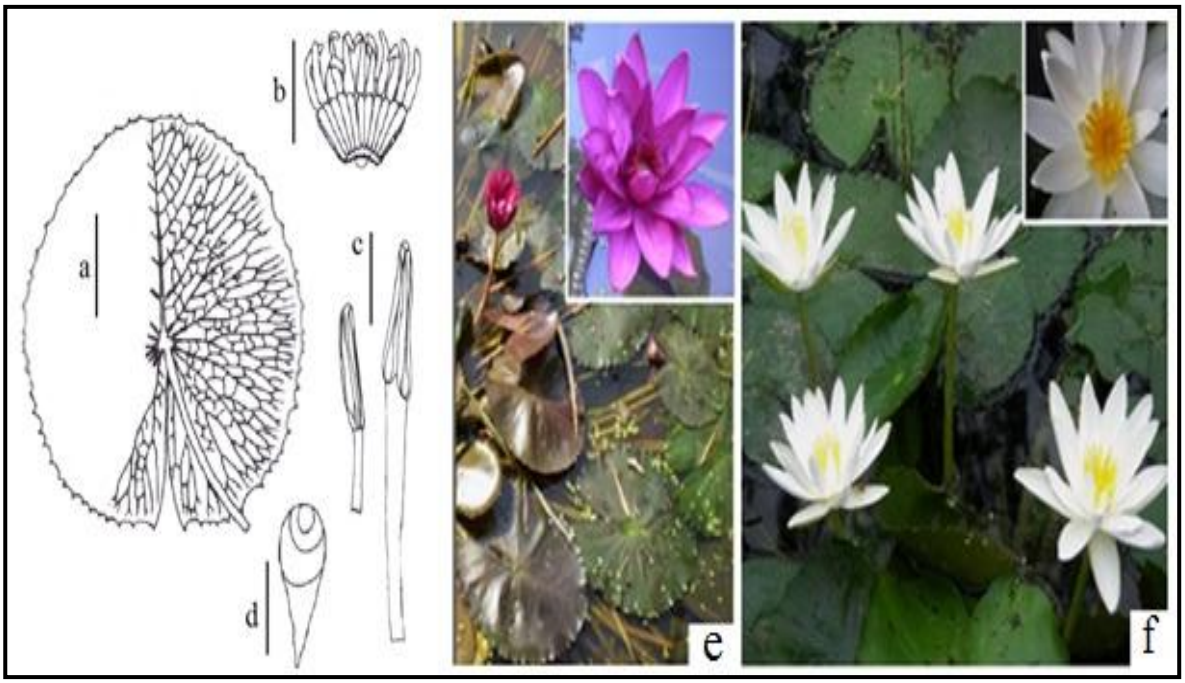


Figure 141. *Nymphaea pubescens*: **a,** leaf blade (3.5 cm); **b,** stigma with appendages (1 cm); **c,** largest and smallest stamens (2 mm); d, seed with aril (1 mm). **f,** flower at anthesis with petals in white colour at field.; **e,** *Nymphaea rubra*: flower at anthesis with petals in pink colour (inset).

ONAGRACEAE: 1genus, 4 species

Ludwigia: 4 species

Key to species

1. Petals creamy white with yellow at the base, 5; stems usually floating and bearing bunches of spongy, gas-filled, spindle-shaped pneumatophores ***L. adscendens***

1. Petals yellow, 4 or rarely 5; stems usually erect or if floating then without bunches of spindle-shaped pneumatophores

2. Stamens twice as numerous as the sepals; shrubs or subshrubs ***L. octovalvis***

2. Stamens as numerous as the sepals; herbs

3. Capsules rarely more than 1.5 cm long ± terete, impresssions of the seeds not visible through the capsule walls; seeds in several rows in each valve, 0.3-0.5 mm long; young stems and leaves usually green ***L. perennis***

3. Capsules usually more than 1.5 cm long, ± 4-angled, impressions of the seeds visible through the capsule walls; seeds in 1 row in each valve, 1.3-2.2 mm long; young stems and leaves usually tinged with red ***L. prostrata***

Ludwigia adscendens (L.) H.Hara: Figure 142.

Vernacular name: Kesaradam.

Stems prostrate or ascending, usually floating and bearing bunches of silver-white, spongy, gas-filled, spindle-shaped pneumatophores, the flowering pcetions ascending, up to 50 cm or more long. Leaves with petioles 0.5-2 cm long; leaf blades broadly oblong-elliptical, 0.4-7 cm long, 0.7-4 cm wide, glossy green with pale nerves, narrowly cuneate at the base, acute or rounded at the tips. Flowers solitary in leaf axile pedicels 2.5-5.5- 4 cm long, hairy above the middle; bracteoles deltoid, ± 1.2 long, 1.3-1.5 mm wide, borne at base of sepal tube. Sepals 5, deltoid-acuminate, 5-13 mm long, 2-3.2 mm wide, hairy or glabrous. Petals 5, obovate, 9-18 mm long, 6-12 mm wide, creamy-white, yellow near the base. Stamens 10; pollen grains shed singly. Capsule glabrous or hairy, 1.2-3.5 cm long, 3-4 mm in diameter, terete, light brown, with 10 conspicuous darker brown ribs, thick-walled, irregularly dehiscent. Seeds in 1 row in each valve, visible through the capsule wall, ± 1.5 mm apart, 1.1-1.3 mm long, firmly embedded in cubes of woody endocarp 1.2-1.5 mm high, 1-1.2 mm thick.

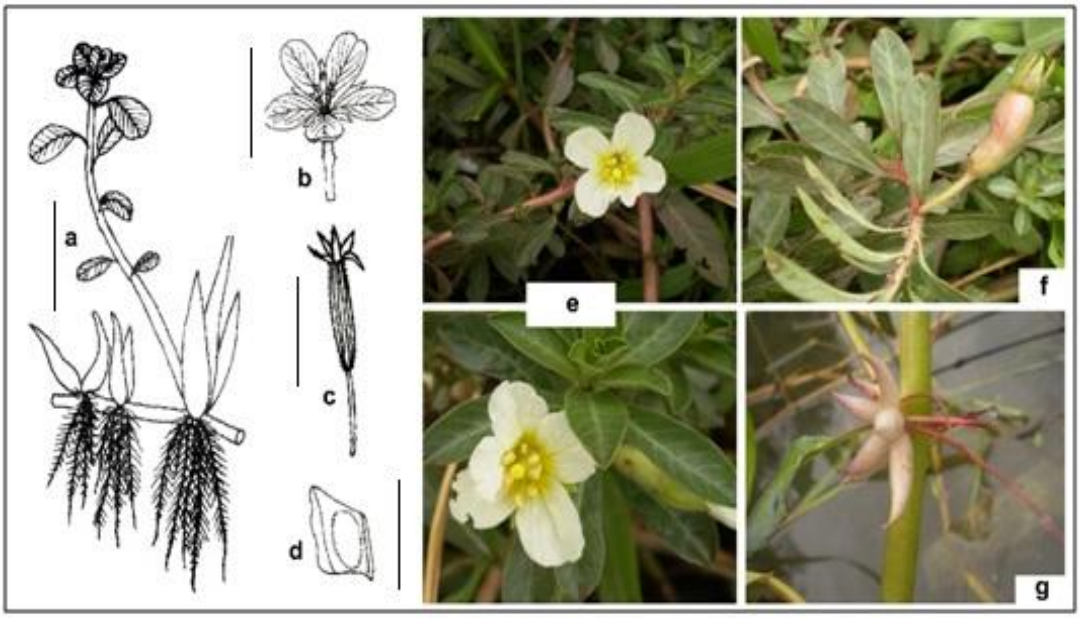


Figure 142. *Ludwigia adscendens*: **a,** emergent shoot arising from a floating stem (2 cm); **b,** flower (5 mm); **c,** fruit (1 cm); **d,** seed (1 mm); **e,** two flowering shoots at anthesis; **f,** fruit; **g,** spongy, gas filled spindle shaped pneumatophores at field.

Flowering and Fruiting: September to December.

Ecological Notes: Perennial or perhaps sometimes annual. Found in wet swampy places, usually floating on the water.

Field Collections: Jakpur and Radhamohanpur near railway canals, Laxmibari, Badalpur, Ruinan, Mirzapur, Shaymalpur, Pirakata, Bhadutala, Kechenda sebayatan, Jamboni.

Ludwigia octovalvis (Jacq.) P.H.Raven: Figure 143.

Vernacular name: Lai banlanga.

Variable in pubescence either sparsely appressed hairy or densely patently hairy. Stems robust, usually much branched, up to 4 m tall, often becoming woody at the base. Leaves with petioles up to ± 1 cm long but usually less; leaf blades linear to subovate, 0.7-14.5 cm long, 0.1-4 cm wide, narrowly or broadly cuneate at the base, attenuate at the tips. Flowers solitary in leaf axils; pedicels up to 1 cm long but usually less; bracteoles reduced or subulate and up to 1 cm long, borne above the base of the sepal tube, persisting on the capsule. Sepals 4, ovate

or lanceolate, 3-15 mm long, 1-7.5 mm wide. Petals 4, broadly obovate or cuneate, emarginate, 2-17 mm long, 2-17 mm wide, yellow. Stamens 8; pollen grains shed in tetrads. Capsule 1.7-4.5 (-6) cm long, 2-8 mm in diameter, terete or nearly so, thin-walled, pale brown with 8 darker ribs, regularly dehiscent. Seeds in several rows in each valve, not visible through the capsule wall, free, rounded, 0.6-0.75 mm long, 0.5-0.7 mm in diameter including the prominent and inflated raphe.

Flowering and Fruiting: August to January.

Ecological Notes: A common weed of the marshy places and the side of the ditches, a pantropical weed. Found in wet and swampy places rivers, ditches, canals or tanks, mostly near cultivated land.

Field Collections: Asti, Hasimnagar in Pingla; Madanmohanchak, Kotaigarh, Bhadrakali in Narayangarh; Keshiary, Belda, Sonakonia, Jahalda, Turka, Topsia, Asui, Patina, Chatinasol.

Figure 143. *Ludwigia octovalvis*: **a,** flowering twig (6 cm); **b,** flower (5 mm) ; **c,** fruit (5 mm); **d,** plant in field with inflorescences.

Ludwigia perennis L.: Figure 144.

Vernacular name: Banlanga

Stems up to 1 m tall, often becoming woody at the base. Leaves with petioles up to 2-15 mm long, winged; leaf blades narrowly elliptical to lanceolate, 1-11 cm long, 0.3-2.7 cm wide, narrowly cuneate at the base, subacute at the tips. Flowers solitary in leaf axils; pedicels absent or up to 6 mm long; bracteoles subulate, up to 1 mm long. Sepals 4 (5), deltoid, 1.5-3.5 mm long, 0.7-1.8 mm wide. Petals 4 (5), elliptical, 1-3 mm long, 0.7-2 mm wide, yellow. Stamens as many as the sepals; pollen grains shed in tetrads. Capsule 3-16 (-19) mm long, terete or nearly so, thin-walled, pale brown, regularly or irregularly dehiscent, often ± nodding. Seeds in several rows in each valve, purple, not visible through the capsule wall, free, ellip-soidal-rounded, 0.3-0.5 mm long, 0.2-2.2 mm in diameter, raphe very narrow and inconspicuous.

Flowering and Fruiting: August to January.

Ecological notes: Annual. Found in wet places, sandy river beds, along streams, common in rice fields.

Figure 144. *Ludwigia perennis*: **a,** flowering twing (6 cm); **b,** a flower (0.5cm); **c,** flower with anther (0.5 cm); **d,** fruit (1 cm); **e,** plant in field with flower.

Field Collections: Narayangarh, Beldha, Keshiary, Dantan, Sonakonia, Topsia, Rogrha, Keshpur, Mohar, Gorhbeta, Daspur.

Ludwigia prostrata Roxb.: Figure 145.

Stems 10-60 cm tall, often reddish tinged. Leaves with petioles up to 4-25 mm long; leaf blades narrowly elliptical to elliptical, 1-13 cm long, 0.3-2.7 cm wide, narrowly cuneate at the tips. Flowers solitary in leaf axils; pedicels absent or up to 6 mm long. Sepals 4 (5), deltoid, 1.3-2.5 mm long, 0.4-0.9 mm wide. Petals 4 (5), narrowly spatulate, 1.3-2.2 mm long, 0.4-0.9 mm wide, yellow. Stamens (4) 8; pollen grains shed in tetrads. Capsule 12-22 mm long, 0.8-1.5 mm in diameter, somewhat 4-angled, thin-walled, pale brown, irregularly dehiscent. Seeds in 1 row in each valve, showing as indentations on the walls of the capsules, free, ovoid, apiculate at one end, 0.5-0.6 mm long, ± 0.3 mm in diameter, raphe narrow and linear.

Flowering and Fruiting: September to January.

Ecological Notes: Frequently found in the wet places. Annual. In wet places, along ditches and streams and in rice fields.

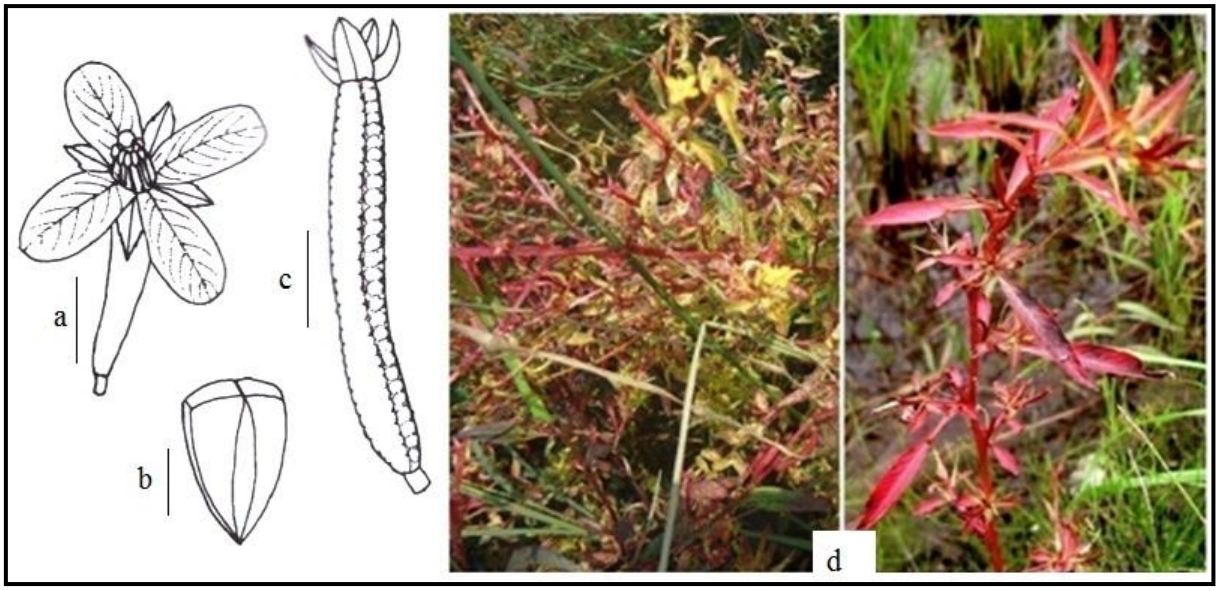


Figure 145. *Ludwigia prostrata*: **a,** flower (1mm); **b,** seed (0.5 mm); **c,** fruit (3 mm); **d,** plant in field.

Field Collections: Dujipur in Pingla, Rohini, Nayagram, Changuyal, Gorhbeta, Hoomgarh, Keshiyari, Goura in Daspur.

PLANTAGINACEAE: 3 genera, 5 species

Bacopa monnieri (L.) Wettst.: Figure 146.

Vernacular name: Brahmi Sak

Prostrate, much branched, fleshy herb; rooting at the nodes, glabrous. Leaves simple, opposite, decussate, obovate, oblong or spathulate, sessile or subsessile, entire or sometime crenulate, obtuse or rarely and minutely emarginate, veins indistinct lower surface dotted. Rowers bluish, axillary, solitary; pedicels slender, terete, bracteoles 2, small, linear, acute, entire. Calyx more or less polysepalous, glabrous; sepals very unequal, 3-larger and broader, ovate oblong, acute entire. Corolla more or less actionomorphic and campanulate, 5-lobbed, purplish or pink with purple veins. Stamens 4, didynamous, included; anthers bluish purple. Capsule ovoid, acute, glabrous, included; seeds many minute.

Flowering and Fruiting: January-June

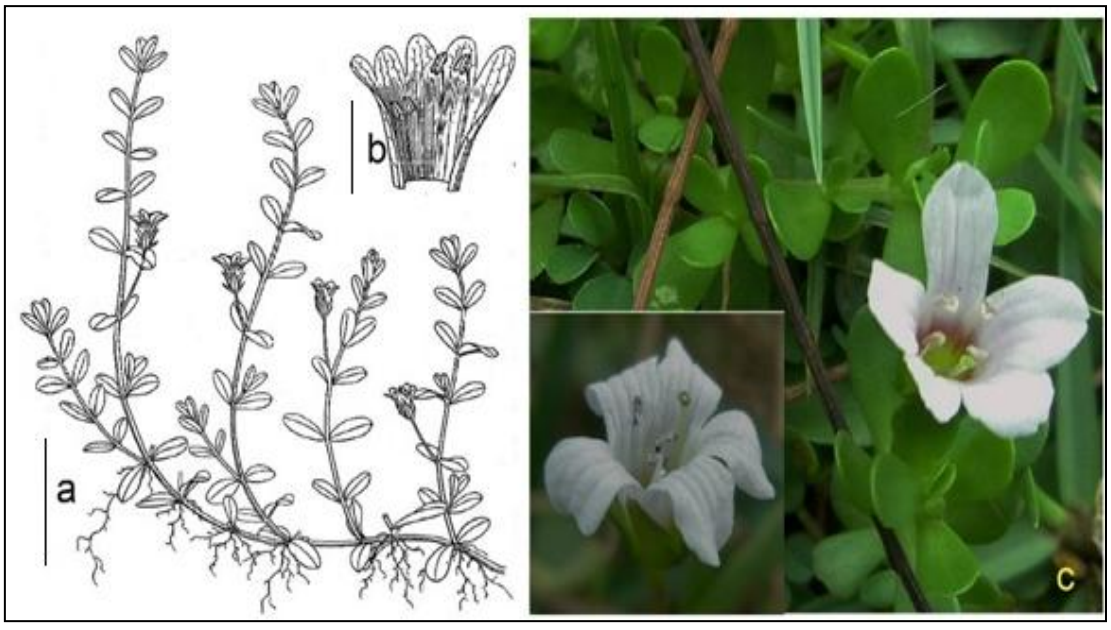


Figure 146. *Bacopa monnieri*: **a,** flowering shoots (2 cm); **b,** petal tube opned (2 mm); **c,** flowers with anthesis (inset).

Ecological Notes: Very common on the orchards or roadsides, it prefers swampy areas and on the paddy fields. Annual or perennial. Submerged, seasonally sub¬merged or terrestrial.

Field Collection: Gurguripal, Kechenda, Keshpur, Dheruya, Maligram, Sabong, Ghatal, Bolaipanda, Jalchak.

Dopatrium junceum (Roxb.) Buch.-Ham. ex Benth.: Figure 147.

Stems 10-25 (-40) cm tall. Blades of lower leaves oblong to lanceolate, 4-25 mm long, 1-7 mm wide, middle and upper leaves much smaller. Flowers in decussate pairs, the lower ones sessile or nearly so, the upper ones pedicellate; pedicel very slender, 1.5-8 (-12) mm long, erect in fruit. Sepals tubes campanulate, 1-1.5 mm long; lobes oval-lanceolate, 1-1.5 mm long, obtuse. Petals (of chasmogamous flowers) pink to blue or purple; petal tube 3.5-4 mm long, with a white blotch at the base of the middle lobe. Stamen filaments 0.5 mm long; anthers equal, 0.5 mm long, bearded. Capsules broadly ellipsoid to globose, 2-4 mm long and wide. Seeds cuneately ovoid, 0.5 mm long, longitudinally ribbed transversely rugose between the ribs.

Flowering and Fruiting: August to December. **Ecological Notes:** Rarely, as a weed plant in the paddy fields, ponds; associated with other aquatic weeds.

Field Collections: Gurguripal, Kechenda, Keshpur, Dheruya, Maligram, Sabong, Ghatal, Bolaipanda, Jalchak.

Figure 147. *Dopatrium junceum*: **a,** flowering plants (2 cm); **b,** flowering shoots with flower during pollination and submerged stem (inset).

Limnophila: 3 species

Key to species

1. Flowers distinctly pedicellate ***L. indica***

1. Flowers sessile or very nearly so

2. Upper aerial leaves and bracts finely divided or deeply lobed almost to the base ***L. sessiliflora***

2. Upper aerial leaves and bracts entire or shallowly toothed, never finely divided ***L. heterophylla***

Limnophila heterophylla (Roxb.) Benth.: Figure 148.

Submerged stems up to 80 cm long, glabrous; aerial stems erect, 5—I0 cm high, subglabrous to shortly hirsute below, usually with sessile glands towards the apex. Submerged leaves in whorls of 8-12, compound-pinnate, 0.5-3 (-5.5) cm long; segments multifid, capillary; aerial leaves decussate or in whorls below, the blades simple, sessile, linear-lanceolate to oval-

oblong 5-10 (-20) mm long, 2-4 (-7) mm wide, glabrous, margin subcrenate to serrate, a acute. Flowers solitary and axillary, sessile or nearly so, sometimes forming a lax terminal spike, cleistogamous flowers common; bracteoles absent. Sepal tube 5-4 mm long, without hairs but bearing sessile glands, not striate at maturity; sepal lobes subequal, 1.5-2 mm long, ± as long as the tube, with sessile glands, acuminate. Petals 5-6 (-10) mm long, pale pink to pinkish-violet, glabrous outside. Capsules globular, 2.5-3 (-4) mm long; style up to 6 mm long, with 2 lateral processes at the apex below the stigma. Seeds cuneiform, ±0.5 mm long, 4- or 5-angular, muricate.

Flowering and Fruiting: October to January.

Field Collections: Dujipur, Kalitala, Pasang in pingla; Keshpur, Sonakpnia, Mohanpur, Salboni, Gopiballavpur, Hatibari, Radhamohanpur, Mohar, Kherai, Dheruya.

Ecological Notes: Common on the swampy areas and paddy fields, aquatic perennial or perhaps sometimes annual is usually found in fresh or brackish water in pm and backwaters; sometimes also in rice fields.

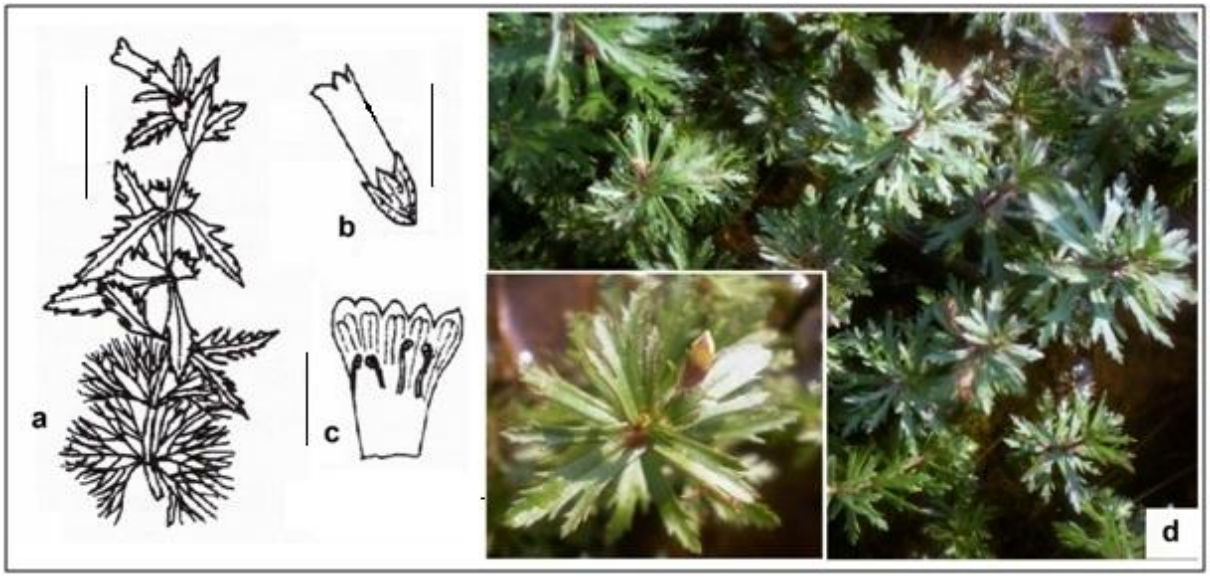


Figure 148. *Limnophila heterophylla*: **a,** flowering shoot (1 cm); **b,** flower (4mm); **c,** petal (4mm); **d,** plant with flower in the field.

Limnophila indica (L.) Druce: Figure 149.

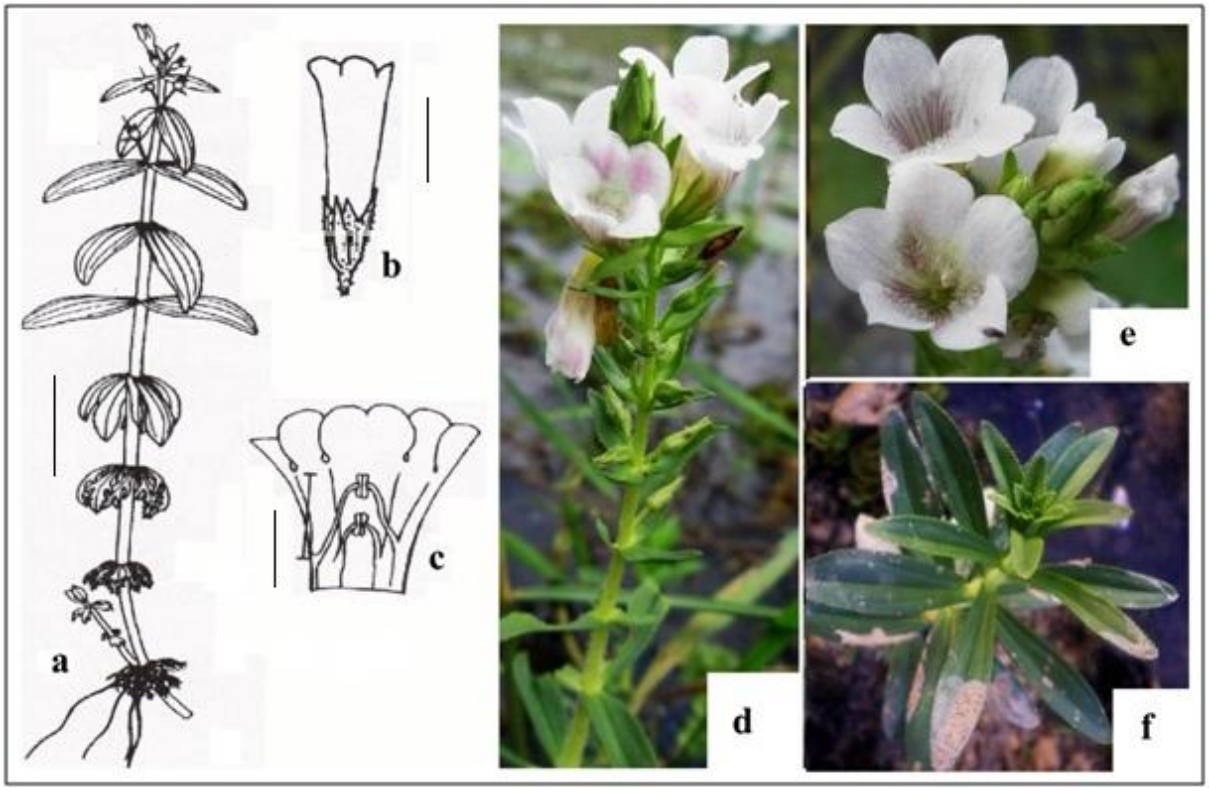
Vernacular name: Karpur

Submerged stems up to 1 m or more long, branching, glabrous or hairy; aerial stems erect or creeping below, simple or sparsely branched, up to 40 cm tall, with or without glandular hairs, with sessile or stall glands. Submerged leaves in whorls of (2-) 6-1 0.7-3 (-6) cm long, compound-pinnate or pinnatisect, the lobes divided into capillary or linear and flatten segments; aerial leaves decussate and usually entire whorled and variously dissected, 0.5-2 (-3 cm) long when dissected, up to ± 6.5 cm when entire; entire leaves with 1, 3 or rarely 5 nerves arising from the base, without hairs but often sessile glands, punctate above, margin finely spinulose-serrate. Flowers pedicellate, solitary, axillary, sometimes single, mostly in decussate pairs, all chasmogamous; bracts leaf-like (divided or entire) becoming reduced and scale-like towards the apex of old shoots; pedicels slender, (1-) 6-12 (-20) mm long, mostly exceeding the bracts, bearing sessile or stalked glands; bracteoles (0) 2, linear to linear-lanceolate, (1.5-) 5-4 mm long, simple or divided, glandular or not. Sepal tube 1.5-5 mm long, glabrous or hispid, bearing sessile glands not striate at maturity, becoming subglobose in older flowers; sepal lobes subequal, linear-lanceolate, 2-3 mm long, acuminate, occasionally ciliate. Petals (6-) 8-15 mm long, entirely white, cream, pale yellow or blue to purple, with or without a yellow fleck at the top of the throat; petal tube usually greenish-white, glabrous or slightly pubescent outside, softly villous inside; petal lobes subequal, entire. Capsules sub-ovoid, 3-3.5 (-5) mm tog; style up to 4.5 mm long with 2 lateral processes ± 0.2 mm wide at the apex below the stigma. Seeds cylindrical to oblong-cuneate, 0.5-0.7 mm long, ± 0.25 mm in diameter, 4- or 5-angled, muricate.

Flowering and Fruiting: July to March

Ecological Notes: Aquatic herbs, common on swampy areas and in the paddy fields, annual or perennial. It is found in a wide variety of aquatic habitats.

Field Collections: Kechenda at Jhargram, Kalikadihi at Debra, Akalposh at Debra, Gowaltore at Chandrakona.Jhilinga at Kharagpur, Tutranga at Narayangarh, also common in other places. Jamna, Belar, Dhaneswarpur, Sahara at Pingla.



.**Figure 149.** *Limnophila indica*: **a,** flowering shoot (1 cm); **b,** flower (5 mm); **c,** petal (5 mm); **d, e** and **f,** flowering shoot in the field.

Limnophila sessiliflora (Vahl) Blume: Figure 150.

Submerged stems 10-60 cm long, glabrous to sub- glabrous; aerial stems erect or creeping, simple or branched, 5-20 cm high, subglabrous to hairy. Submerged leaves in whorls of 5-12, (5-) 10-20 (-30) mm long, glabrous, compound-pinnatisect; lobes divided into capillary or linear and flattened segments; aerial leaves in whorls of 3-8, usually dissected or rarely entire, 4-12 (-20) mm long, glabrous, when laminate densely punctate, 1- or 3-nerved. Flowers solitary in the axils of leaves, sessile or very nearly so, frequently cleistogamous; bracteoles usually absent or if present then not more than 1.5 mm long and entire. Sepals 3-4 at anthesis

becoming 5-7 mm long in fruit, densely to sparsely hirsute, not striate at maturity; sepal lobes subequal, lanceolate, 2-3.5 (-4) mm long, acuminate. Petals (5—) 8-10.5 mm long, blue to violet or purple, glabrous outside. Capsules flattened- globose, 3-4 (-5.5) mm long; style ± 3 mm long with 2 lateral processes at the apex below the stigma. Seeds cylindrical to ovate oblong, ± 0.5 mm long, ±0.2 mm in diameter, 5-angular, muricate.

Flowering and Fruiting: November to February.

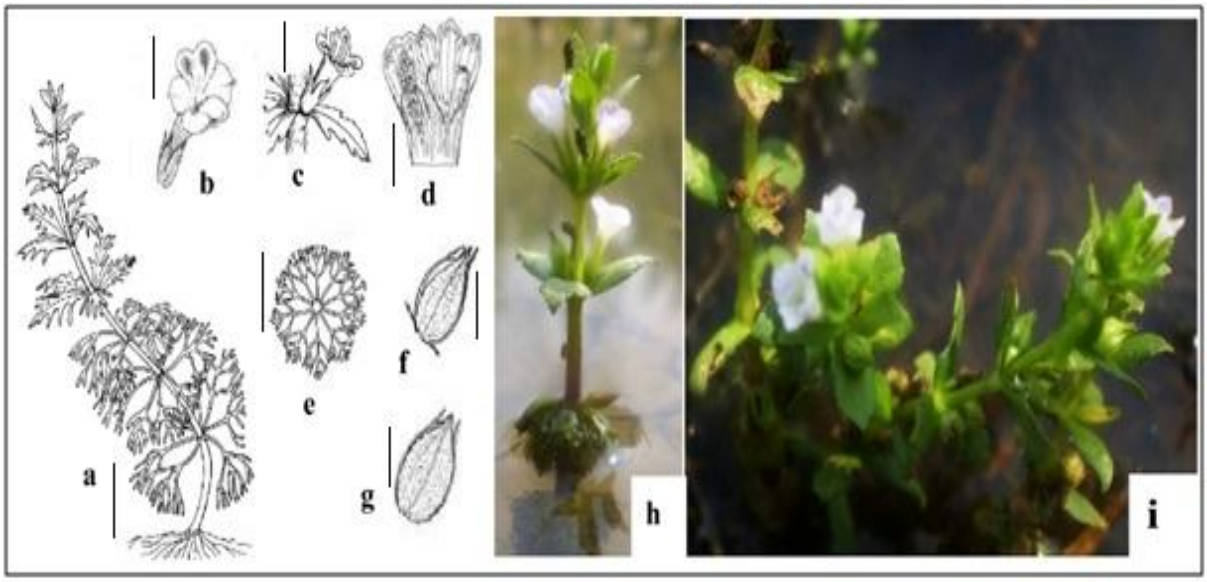


Figure 150. *Limnophila sessiliflora*: **a,** flowering shoot (1 cm); **b** and **c,** flower (4mm); **d,** petals (3mm); **e,** whole leaf under submerged condition (3 mm); **f** and **g** sepals in fruit (4mm); **h** and **i** flowering plants in the field.

Ecological Notes: Annual or perennial. Found in permanent and temporary water.

Field Collections: Kechenda at Jhargram, Kalikadihi at Debra, Akalposh at Debra, Gowaltore at Chandrakona.Jhilinga at Kharagpur, Tutranga at Narayangarh, also common in other places. Jamna, Belar, Sahara at Pingla.

POLYGONACEAE: 2 genera, 3 species

***Persicaria*:** 2 species

1. Cilia at the top of the ochrea 5-20 mm long, nearly as long as the tube; perianth white (nuts 3-angled) ***P. orientalis***

1. Cilia at the top of the ochrea not more than 3 mm long, much shorter than the tube; perianth pink to red or very rarely white (nuts biconvex or 3-angled) ***P. hydropiper***

Persicaria orientalis (L.) H.Hara: Figure 151.

Vernacular name: Bekh-unjubas

Stem erect, sometimes creeping below, 40-80 (-150) cm tall. Ochreas membranous, tubular, truncate, 1.5-2.5 cm long, the numerous nerves extended into cilia, the cilia 0.5-2 cm long; leaf blades shortly petiolate (the petiole up to 1 cm long), lanceolate, (4-) 7-12 (-20) cm long, (0.5-) 1-3 cm wide, glabrous or hairy on the nerves and margins, lateral nerves 13-20 pairs, base cuneate to attenuate, tips attenuate, acute. Flowers in terminal and axillary, up to 7 cm long spike-like racemes; bracts closely overlapping, oblong, 2.5-3 mm long, narrowed below, sparsely hairy; bracteoles up to 2 mm long. Perianth white, ± 2.5 mm in diameter; segments 5, subequal, ovate, ± 2mm long, obtuse. Stamens 5-7; filaments subequal, ± 1.5 mm long; anthers ± 0.25 mm long, style (2) 3, ± 0.5 mm long. Nut rhomboid in outline, 3-sided or some on the same plant occasionally convex, 1.8-2 mm long, ± 1.5 mm wide.

Flowering and Fruiting: July to October.

Ecological Notes: Commonly grow in the moist waste places along the road-side, margin of canals or the side of canals.

Field Collections: Sevayatan in Jhargram, Rupnarayanpur near NH-6 and Naya in Pingla.

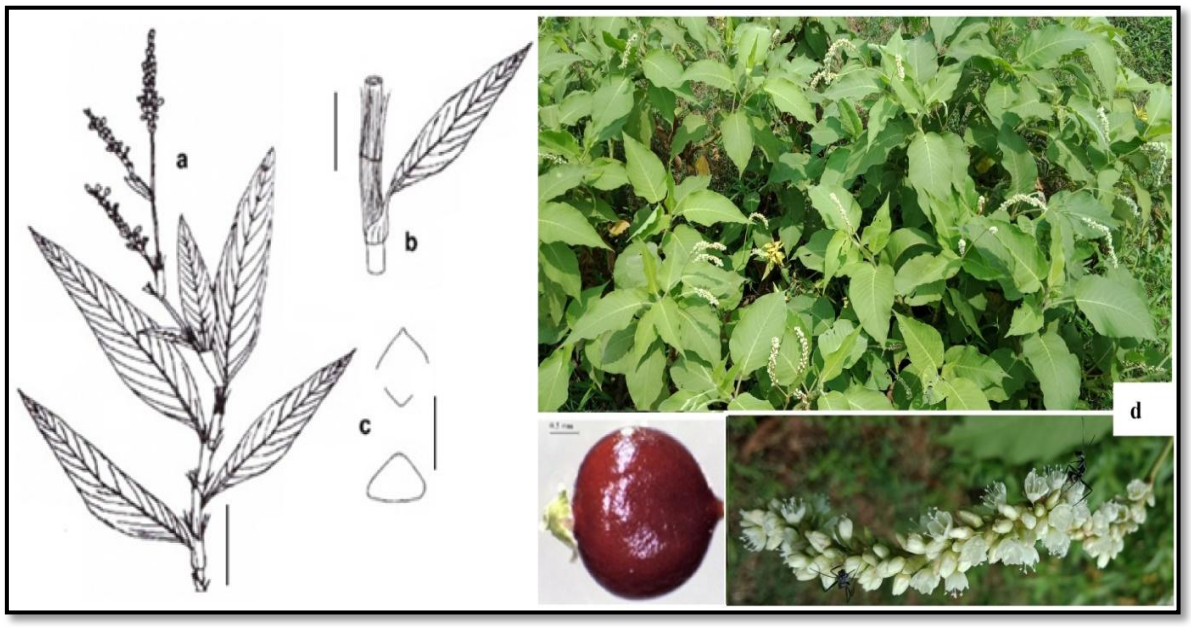


Figure 151. *Persicaria orientalis*: **a,** flowering shoot (4 cm); **b,** ochrea (1 cm); **c,** nut (1 mm); **d,** Plant in field with inflorescence and seed (inset).

Persicaria hydropiper (L.) Delarbre: Figure 152.

Vernacular name: Pakurmul.

Stems erect, prostrate or creeping and rooting, 30-60 (-100) cm tall, glabrous. Ochreas membranous, glabrous or hairy, tubular, truncate, ± 2 cm long, nerves prolonged into cilia at the tips; leaf blades shortly petiolate (petioles up to ± 1 cm long), narrowly lanceolate, 3-6 (-15) cm long, 0.7-1.5cm wide, glabrous, cuneate to decurrent, tips gradually attenuate. Flowers in terminal and axillary, lax spike ike racemes, 4-6 cm long, often hanging; bracts mostly distant and not overlapping. Perianth rose to white, with yellowish transparent glands; segments 4 (rarely 3 or 5), subequal, oblong, 3-4 mm long, obtuse. Stamens 6 (-8). Styles 2, ± 0.8 mm long. Nut biconvex or weakly 3-sided, 2.5-3.5 mm long, ±2.8 mm wide.

Flowering and Fruiting: May to September.

Ecological Notes: Annual, on moist, rich soils which are regularly flooded, also found along the margins of ponds and in irrigation ditches. Frequendy found as a weed in fields and along paths.

Field Collections: Asti, Hasimnagar in Pingla; Madanmohanchak, Kotaigarh, Bhadrakali in Narayangarh; Keshiary, Belda, Sonakonia, Jahalda, Turka, Topsia, Asui, Patina, Chatinasol.

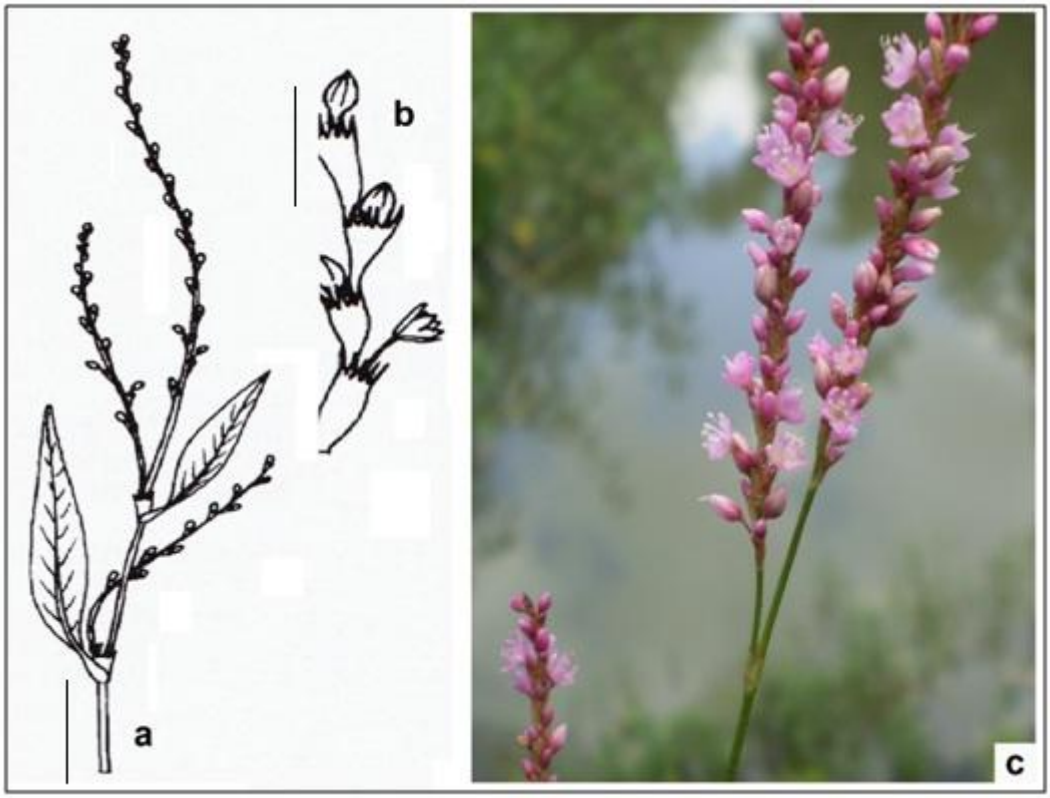


Figure 152. *Persicaria hydropiper*: **a,** flowering shoot (2 cm); **b,** part of inflorescence (6 mm); **c,** plant with inflorescence in field.

Polygonum plebeium R.Br.: Figure 153.

Stems prostrate. Ochreas hyaline, obliquely tubular ±3 mm long, the upper part lacerate; leaf blades sessile or nearly so, oblong to linear, 6-10 (-20) mm long, 1.5-3 mm wide, relatively thick, midnerve impressed above, prominent below, lateral nerves obscure, base attenuate to shortly decurrent, tips obtuse or acute. Flowers in auxiliary clusters; pedicel up to 2 mm long, jointed; bracts hyaline, 1.5 mm long; bracteoles up to 1 mm long. Perianth rose, ± 2 mm in

diameter; segments 5, unequal; the outer 3 vertically folded and usually spotted; the inner 2 oblong, smooth, up to 2mm long. Stamens 5 (6), filaments ± 0.8 mm long; anthers ±0.2 mm long. Styles ± 0.3 mm long; stigmas 3, staple. Nut distinctly 3-sided, ± 2 mm long, ± 1 mm wide, with persistent style.

Flowering and Fruiting: February to May.

Figure 153. *Polygonum plebeium*: **a,** whole plant (2 cm), **b,** part of inflorescence (5 mm); **c,** inflorescence in closure view; **d,** plant in field; **e,** seed (inset).

Ecological Notes: Annual or perhaps sometimes perennial, forming dense prostrate mats. Gregarious by rivers, canals and drying out pools; sometimes growing in rice fields but rarely considered being troublesome.

Field Collections: Dujipur, Kalitala, Pasang in pingla; Keshpur, Sonakpnia, Mohanpur, Salboni, Gopiballavpur, Hatibari, Radhamohanpur, Mohar, Kherai, Dheruya.

RANUNCULACEAE: 1 genus, 1 species

Ranunculus sceleratus L.: Figure 154.

Vernacular name: Polica

Stems erect, glabrous, 35-65 cm tall, deeply furrowed, hollow, usually branched. Basal leaves in a rosette, floating or emergent; petioles 5—30 cm long, with wide sheaths; blades kidney-shaped in outline, simple, 1-6 cm long, 1—10 cm wide, trilobed, the lateral lobes often 2- or 3-lobcd, at base cordate, margin toothed, the tips acute or obtuse; stem leaves alternate, at base of stem like rosette leaves, becoming petioleless with 3 lanceolate lobes above. Inflorescence cymose but flowers appearing solitary and opposed to leaf-like tracts. Flowers bisexual, radially symmetrical; pedicels elongating in fruit. Sepals 5, yellowish-green, ovate, 2-6 mm long, underside hairy, at anthesis reflexed, deciduous in fruit. Petals (morphologically nectar-leaves, often called honey-leaves) 5, broadly elliptical to narrowly ovate, 2-4 mm long, usually shorter than the sepals, pale yellow. Stamens numerous. Receptacle at anthesis 1—2 mm long, becoming 2.5-9 mm long in fruit. Carpels numerous, superior, free. Fruit a head of 50-150, l-seeded nutlets. Nutlets oval, 0.8—1 mm in diameter, the sides smooth or laterally wrinkled, glabrous; style persistent and somewhat beak-like, 0.1 -0.2 mm long.

Flowering and Fruiting: December to February.

Ecological Notes: Common annual or sometimes biennial herb. In seasonally inundated places, on the marshy places, along the canal sides, paddy fields during winter season and edges of ponds, streams and rivers.

Field Collections: Kangsaboti River at Midnapore, Gorhbeta, Sabong, Dantan.

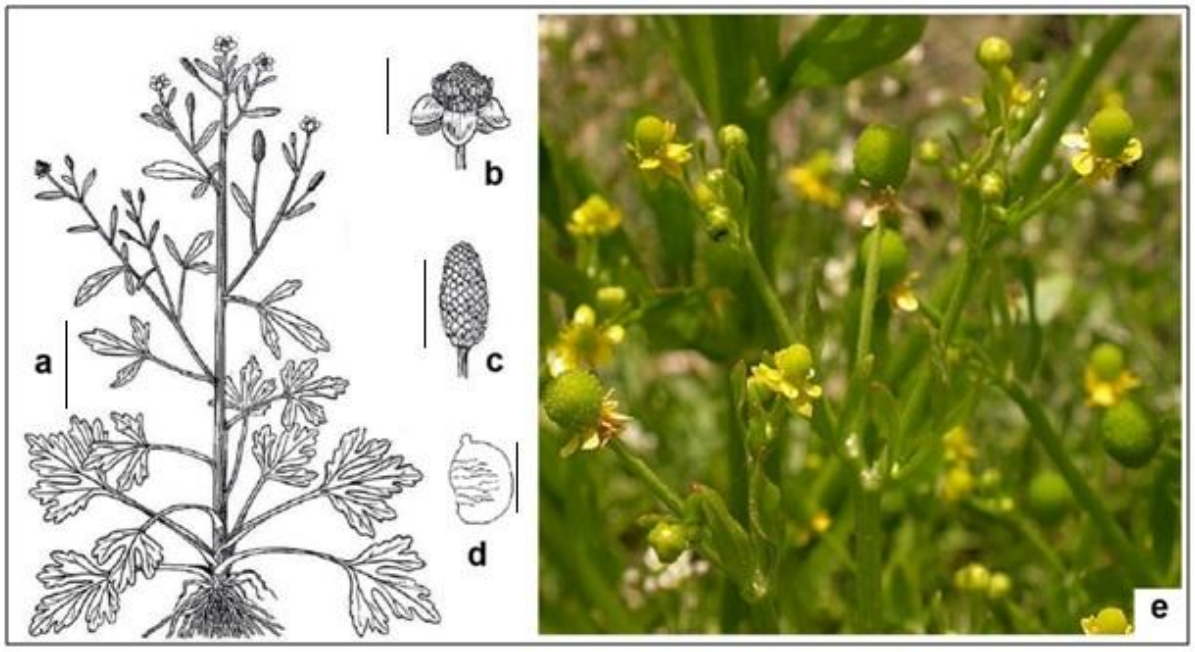


Figure 154. *Ranunculus sceleratus*: **a,** flowering plants (5 cm); **b,** inflorescence (2 mm); **c,** fruiting head (2mm); **d,** nutlets (0.5 mm); **e,** flowering shoot in field.

RUBIACEAE: 2 genera, 4 species

Dentella repens (L.) J.R.Forst. & G.Forst.: Figure 155.

Vernacular name: Bhumipat

Stems creeping, rooting, much branched, cushion-forming. Leaves distichous in opposite pairs, shortly petiolate at base of shoot, sessile above; stipules inter-petiolar, united below, transparent, entire, with few hairs; petiole 2-4 mm long; blades elliptical-oblong to oblong-obovate to rhomboid, 4-10 mm long, 2-5 mm wide, 1-nerved, base cuneate, apex acute to attenuate. Flowering nodes alternating with flowerless ones. Flowers solitary in the axils of leaf-like bracts or in branch axils, subsessile; pedicel 0.5-2 mm long. Sepal tube 5-ribbed, 2-3 mm long, glabrous or hairy; lobes 5, equal, valvate, narrowly triangular, ± 2 mm long, acute-acuminate. Petals funnel-shaped, 5-15 mm long, with club-shaped hairs inside; lobes 5, usually somewhat unequal, white with a purplish spot at the base, ± 4,5 mm long, membranous, subacute. Stamens 5, included within the petals, attached near to the base of the

tube; filaments up to 0.5 mm long; anthers ± 1 mm long. Capsule 2-locular, indehiscent, subglobose, 3-4 mm in diameter, densely hairy with white somewhat swollen hairs or glabrous, crowned by the persistent sepals. Seeds ± 0.5 mm long, angular, dark brown, with a reticulate surface pattern.

Flowering and Fruiting: Throughout the year.

Ecological Notes: Abundant in the moist or wet sandy soils and paddy fields. Annual or perhaps sometimes perennial delicate herb forming dense mats.

Field Collections: Dujipur, Kalitala, Pasang in pingla; Keshpur, Sonakpnia, Mohanpur, Salboni, Gopiballavpur, Hatibari, Radhamohanpur, Mohar, Kherai, Dheruya.

Figure 155. *Dentella repens*: **a,** flowering shoot (1 cm); **b,** flower (2 mm); **c,** plant in fileld.

Oldenlandia: 3 species

Key to species

1. Stems 4-angled or 4-winged; petals with a rfe§ hairs at the throat; capsules spreading or erect ***O. corymbosa***

1. Stems terete or longitudinally ribbed but newer 4-angled or 4-winged; petals glabrous, without a ring hairs; at least some capsules nodding

2. Stems, peduncles and pedicels glabrous, with short bristle-like hairs; flowers not more than 2 in a cyme ***O. brachypoda***

2. Stems, peduncles and pedicels with short brisl like hairs, at least some flowers in 3- or more flowered cymes ***O. diffusa***

Oldenlandia brachypoda DC.: Figure 156.

Stems floating, prostrate or erect, often rooting t nodes, branched, glabrous, terete, smooth or longitudinally ribbed but never 4-angled or 4ribbed, 10-45 (-200) cm long. Leaf blades sessile, linear or linen lanceolate, 1-3 (-5) cm long, 1-5 mm wide, base narrowed, margin usually inrolled, apex acute to apiculate Flowers solitary, 2 at a node or in 2-flowered cymes; peduncles up to ± 5 mm long; pedicels 0-1 (-3) mm long at an thesis sometimes elongating later. Sepal 1-1.3 mm long, usually glabrous; lobes 4, equal, narrow triangular, much shorter than the petal tube, often spreading in bud, 1-1.3 mm long in fruit, ciliate, or acuminate. Petal tube 1.25—2.5 mm long, glabrous: lobes 4, triangular, white or purplish, glabrous at the threat Stamens 4, attached towards the top of the tube; anthers ±0.25 mm long. Capsule mostly nodding globose to ovoid, somewhat compressed, 2-3 mm long, 2-3 mm wide, crown of capsule hardly raised, opening by slits which enlarge into a pore. Seeds are numerous irregularly angular, ± 0.3 mm long, brown, surface reticulate. **Flowering and Fruiting:** August to December.

Ecological Notes: Annual. Weed in irrigated fields dated places and marshes.

Field Collections: Dujipur, Kalitala, Pasang in pingla; Keshpur, Sonakpnia, Mohanpur, Salboni, Gopiballavpur, Hatibari, Radhamohanpur, Mohar, Kherai, Dherua.

.

Figure 156. *Oldenlandia brachypoda*: **a,** flowering shoot (1 cm); **b,** fruit (1.5 mm); **c,** longitudinal section of fruits (1.5 mm); **d,** flowering shoot in field.

Oldenlandia diffusa (Willd.) Roxb.: Figure 157.

Stems floating, prostrate or erect, often rooting at nodes, branched, with small bristle-like hairs, terete, smooth or longitudinally ribbed but 4-ribbed, 3-10 (-45) cm long or in water 1m or more long. Leaf blades sessile, linear-lanceolate. 1-3(-5) long, 2-5 mm wide, base narrowed, margin usually inrolled, apex acute to apiculate. Bowers solitary, sometimes 2 at a node, usually to 7-flowered cymes; peduncles up to ±1.5 cm long; pedicels 0.3-2 (-3) mm long at anthesis sometimes elongating later. Sepal tube ± 2 mm long, usually glabrous; lobes 4 (5), equal, narrowly shorter than the petal tube, 1-13 mm ciliate, acute or acuminate. Petal long, glabrous; lobes 4 (5), triangular, white or purplish, glabrous at the throat. Stamens 4, attached towards the top of the tube; anthers ±0.25 mm long. Capsule usually nodding, subglobose, somewhat flattened, 2-3 mm long, 2-3 mm wide, crown of capsule distinctly raised, opening by slits which enlarge into a pore. Seeds numerous, irregularly angular, ± 0.3 mm long, brown, surface reticulate.

Flowering and Fruiting: August to December.

Ecological Notes: Commonly found as crop weed and in other waste, wet places. Annual or perhaps also perennial in wet places. A weedy plant by no means confined to wetlands but common in rice fields and temporary pools.

Field Collections: Narayangarh, Beldha, Keshiary, Dantan, Sonakonia, Topsia, Rogrha, Keshpur, Mohar, Gorhbeta, Daspur, Goura, Debra, Pingla, Sabong.

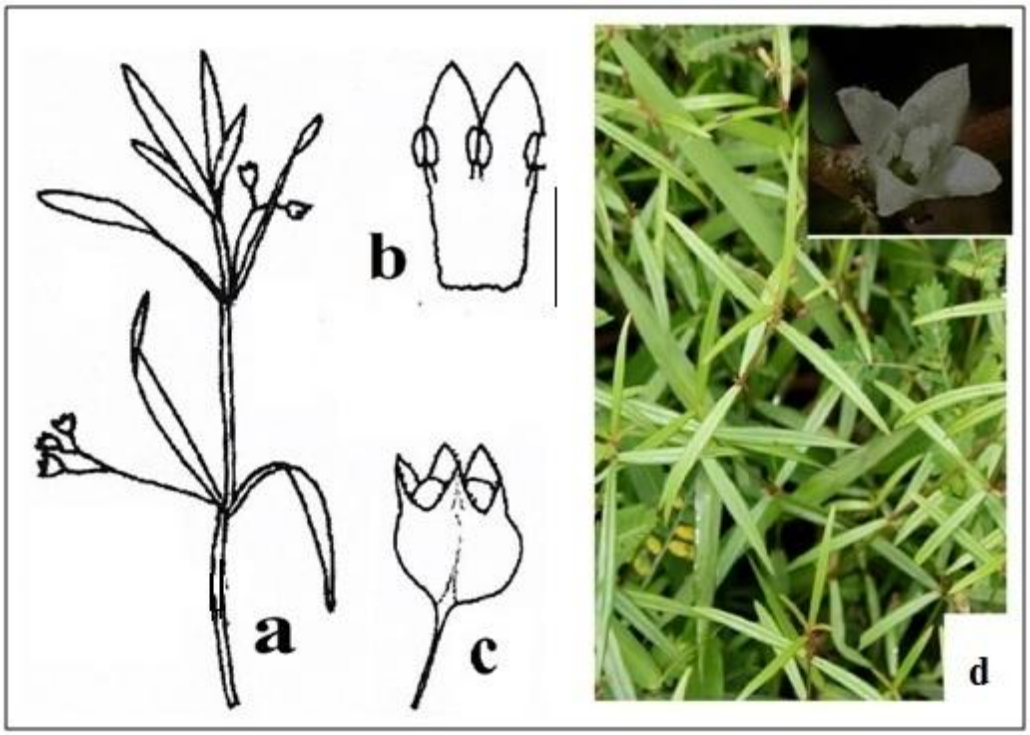


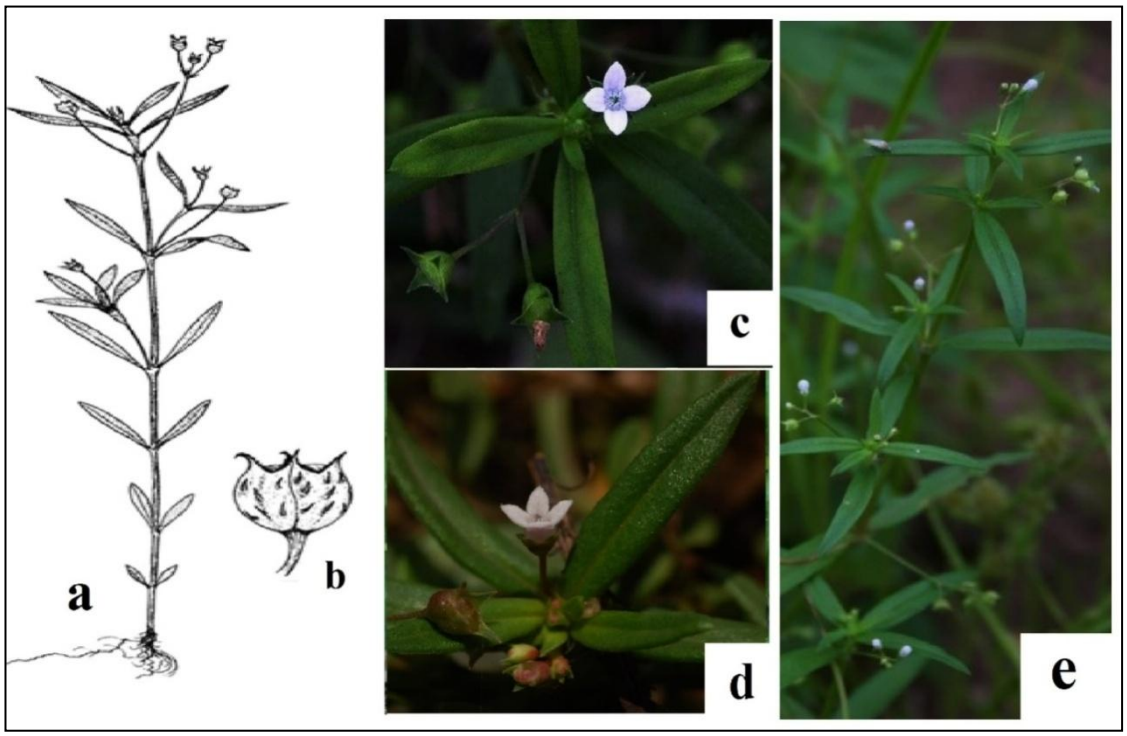
Figure 157. *Oldenlandia diffusa*: **a,** flowering shoot (2cm); **b,** petals (0.5 mm**); c,** fruit (2 mm); **d,** plant in field with flower (inset).

Oldenlandia corymbosa L.: Figure 158.

Stems prostrate with ascending branches, 4 angled, 4- ribbed or 4-winged, usually branched from the base, (1.5-) 5-30 (-60) cm long. Leaf blades sessile, linear to narrowly elliptical, (0.6-) 1-3 (-5) cm long, (0.5-) 1.5-3 (-7) mm wide, glabrous, base narrowed, usually inrolled, apex acute to apiculate, mostly in pedunculate pairs or solitary; peduncles (0-) 4-8 (-20) mm long; pedicels 1-7 (-20) mm long, very slender. Sepal tube subglobose, ± 1 mm in diameter;

lobes 4 (5), equal triangular, shorter than the petal tube, 0.5-2 mm long in fruit acuminate. Petal tube cylindrical, 0.5-2 mm long; lobes 4 (5), elliptical or ovate, 0.5-2 mm long silky hairs at the throat. Stamens 4 (5) the base of the petal tube; filaments 0.2-0.5 mm long anthers dark blue, ± 0.4 mm long petal tube. Style and stigma shorter Capsule erect, subglobose to transverse section, somewhat flattened, 1.2-3 mm long, 1-3.5 mm wide, crown of capsule slightly opening by slits which enlarge into a numerous, obconic, laterally angular, ± 0.3 mm long, light brown, surface reticulate.

Figure 158. *Oldenlandia corymbosa*: a, flowering plant (2cm); b, fruit (1.5mm); c,d and e, flowering twig in the field.



Flowering and Fruiting: Throughout the year

Field Collection: Dashagram, Gopinathpur, Gokulpur, Moharh, Jamna, Maligram, Banpatna.

Ecological Notes: A common and widespread weedy plant not confined to wetlands but frequently found in rice fields, flooded lake shores, pools on laterite and others seasonally inundated places, sometimes even in flowing water.

LINDERNIACEAE: 1 genera, 3 species

***Lindernia*:** 3 species

Key to species

1. Sepals united to above the middle

2. Capsules linear-cylindrical, ± twice as long as the sepals ***L. ciliata***

2. Capsules ellipsoid to oblong-ovoid, not or slightly longer than the sepals ***L. crustacea***

1. Sepals free almost to the base or if united their below the middle ***L. antipoda***

Lindernia ciliata (Colsm.) Pennell: Figure 159.

Vernacular name: Bhumi-nim

Stems glabrous or sparsely hairy at the nodes laxly branched, erect or ascendant, 5-20 cm tall. Leaves glabrous, sessile, elliptical obovate to oblong. 0.6-3.5 cm long, 0.2-1.2 cm wide, pinnately nerved, base narrowed and semi-amplexicaul, margins saw-like, the teeth very sharp and each terminating in a spine. The teeth very sharp and each terminating in a spine. The tips terminating in spines. Flowers in up to 10 cm long, terminal, laxly-flowered recemes, born in opposite pairs; bracts reduced, scale-like linear, 2-4 mm long; pedicels 1-5 mm long at anthesis, 3-15 mm long in fruit. Sepals glabrous, when young tubular almost to the base later, 3-5 mm long; lobes lanceolate to subulate. Equal or 1 smaller, Petals 6-8 mm long, up to 1 cm in diameter, petal tube 3.5 mm long, whitish to pink or blue below, blue or purple in the throat; adaxial lip 2-6 mm long; Stamens 4,2 with fertile anthers; filaments 1.5 mm long, anthers unequal, 1 mm long ; staminodes 1.5 mm long, the tips divergent. Capsules cylindrical, acuminate, 7-17 mm long, 2-3 times as long as the sepals, arching upwards when ripe. Seeds ellipsoid with truncate ends, 0.3 mm long, 0.15 mm in diameter, pitted.

Flowering and Fruiting: July to November.

Ecological Notes: Common on the moist and waste localities. Annual. Often gregarious, found along the banks of post-monsoon streams. In rice fields, moist ground, damp rocks, lateritic slopes and in wet grassland.

Field Collections: Kechenda at Jhargram, Kalikadihi at Debra, Akalposh at Debra, Gowaltore at Chandrakona. Jhilinga at Kharagpur, Tutranga at Narayangarh, also common in other places. Jamna, Belar, Sahara at Pingla.

Figure 159. *Lindernia ciliata*: **a,** flowering shoot (3 cm); **b,** petal (3 mm); **c,** anther (1 mm); **e,** gynoecium (1mm); **f,** fruit (2mm); **g,** plant in the field.

Lindernia antipoda (L.) Alston: Figure 160.

Stems glabrous, prostrate and rooting below, spreading above, 5-20 (-40) cm long, leaves sessile, oblanceoate to obovate-oblong, 0.6-4.5 cm long, 0.2-1.4 cm wide, pinnately nerved, base narrowed, margins slowly saw-like, tips acute. Flowers solitary in the axils of leaf-like bracts or in lax recemes, borne singly or in pairs; bracts oblong-lanceolate, to linear, 3-7 mm long, margins saw-like, pedicel stout, 2-6 mm long at anthesis, becoming 4-17 mm long in

fruit, glabrous, sepals deeply 5 lobed almost to the base, 3-5 mm long at anthesis, 5-6 mm long in fruit lobes linear-lanceolate, 8-10 mm long, ±6 mm long in fruit, lobes linear-lanceolate, minutely scabrid and minutely toothed. Petals purple, usually yellow at the throat; petal tube 5 mm long, adaxial lip 3-4 mm long, entire; abaxial lip, 5-6 mm long, with 2 yellow tongues below. Stamens 4, 2 with fertile anthers; filaments 2 mm long, anthers 1 mm long; staminodes 2, 3 mm long, yellow hooked at the tips, glabrescent, the hooks converges, 1-1.5 mm in diameter, 2 or 3 times as long as the sepals, spreading horizontally or slightly deflexed, when ripe, seeds shortly cylindrical, 0.3-0.5 mm long, 0.2 mm in diameter, striate, minutely pitted.

Flowering and Fruiting: July to December.

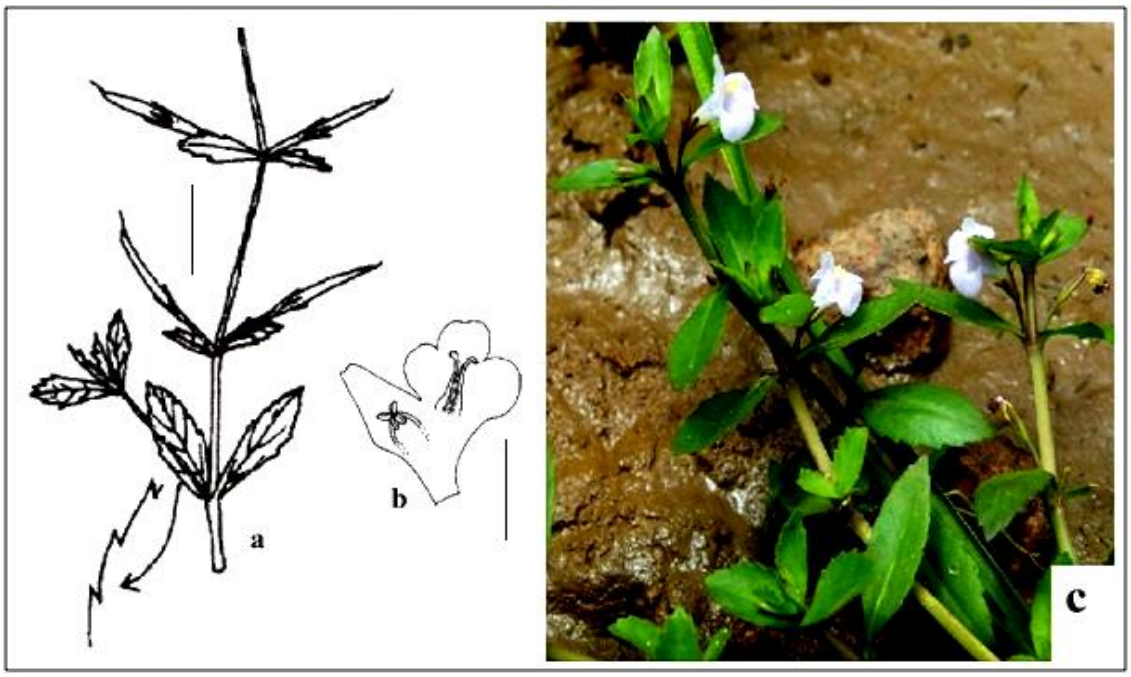


Figure 160. *Lindernia antipoda*: a, flowering shoot (2 cm); b, petals (2 mm); c, flowering shoot in the field.

Ecological Notes: Annual. Along the banks of rivers, tanks and ponds on banks, in rice files, in short grass and in exposed humus filled rocky hollows.

Field Collections: Dujipur at Pingla, Hosnabad at Medinipur sadar, Shyamchak at Debra. Jhilinga at Kharagpur, Tutranga at Narayangarh, also common in other places.

Lindernia crustacea (L.) F.Muell.: Figure 161.

Stems 4-angled. glabrous or sparsely pubescent on the angles, laxly branched, prostrate or erect, with ascending branches, occasionally rooting below, 2-20 cm long. Leaves petiolate becoming sessile awards the tips; petiole up to 1 cm long, glabrous or pubescent; blades ovate to almost rhomboid or suborbicular, 0.5-1.7 cm long, ± 0.4-1.5 cm wide, pinnately nerved, glabrous to sparsely hispid on the margins, base truncate to cordate, margins coarsely toothed with rounded or pointed teeth and ciliate, tips subacute. Flowers solitary in the axils of leaf like bracts, borne in opposite pairs; bracts becoming above; pedicel 0.4—2.5 cm long, sometimes forming lax terminal racemes. Sepals tubular, united from above the middle, often red, 3-4 mm long at an thesis becoming 4-6 mm long in fruit; tube 5-ribbed, ridged or slightly winged, sparsely hispid on the main lobes short, acute. Petals 7-11 mm long. ±4 mm diameter, white or pink to blue or purple or whitish blue flecks on the margins; petal tube 4-7 mm long, sometimes pale yellow at the base, adaxial lip 2—3 mm long. 2-lobed: abaxial lip 2-4 mm long. Stamens 4, with fertile anthers; adaxial pair with ±1.5mm long filament, the anthers ±0.7 mm long; abaxial pair with ± 1.5 mm long filaments, each with a subulate, purplish-blue blunt appendage 0.4—0.5 (-0.9) mm long, near the base, the anthers like the abaxial ones. Capsules oblong-ovoid, 3-5 mm long, 2—3 mm in diameter, not or slightly exceeding the sepals, patent when ripe. Seeds oval, 0.3—0.5 mm long, ±0.25 mm in diameter, pitted.

Flowering and Fruiting: June to January

Ecological Notes: Annual. Low lying pastures, river banks, rice after the harvest and drying out tanks, grows near the sea shore. Common in the moist situations, near grassy lands and paddy fields and on the canal sides also.

Field Collections: Dujipur, Kalitala, Pasang in pingla; Keshpur, Sonakpnia, Mohanpur, Salboni, Gopiballavpur, Hatibari, Radhamohanpur, Mohar, Kherai, Dheruya.

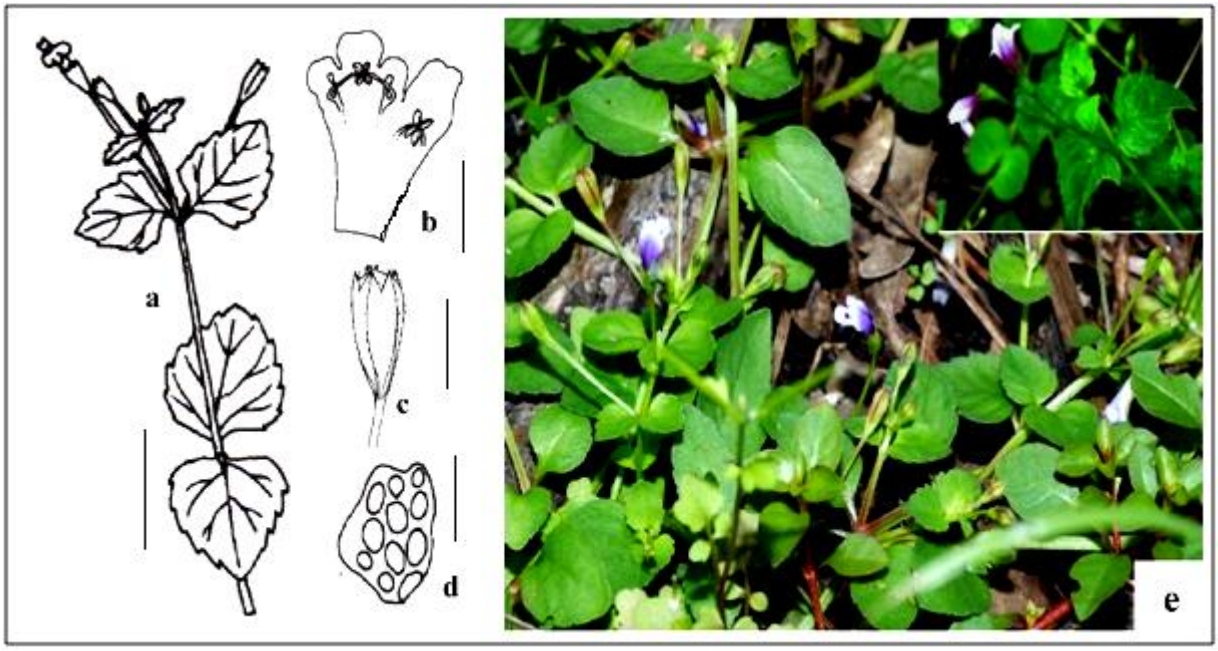


Figure 161. *Lindernia crustacea*: **a,** flowering shoot (2 cm); **b,** petals (2 mm); **c,** sepals covering the fruit (2mm); **d,** seed (0.25 mm); **e,** flowering shoot in the field.

SPHENOCLEACEAE: 1 genus, 1 species

Sphenoclea zeylanica Gaertn.: Figure 162.

Vernacular name: Jhilmarich

Stems erect or decumbent, usually swollen and pithy at the base, up to ± 150 cm high, leaves alternate; stipules absent; petioles up to 1.3 cm long; blades lanceolate, up to 10 cm long, up to 3 cm broad, glabrous, entire, tips ± acute. Inflorescence a dense terminal spike, up to 7 cm long, ± 1 cm in diameter. Flowers bisexual, radially symmetrical. Sepals united to the ovary, with 5 ovate-rounded, imbricate lobes. Petals bell-shaped, perigynous; lobes 5, as long as the

sepals, greenish-white. Stamens 5, adnate to the petals, alternating with the petal lobes; filaments very short. Ovary semi-inferior, 2-locular; style 1, short; stigma very shortly forked. Fruit a capsule, subglobose, apically flattened, and opening along a horizontal line; the valve coming off like a lid; seeds minute, numerous, attached to a large and spongy axile placenta. **Flowering and Fruiting:** June to October.

Ecological Notes: Occasionally in the marshy localities, rice-fields, sides of ponds, ditches and water-sources. Annual. Seasonally submerged, emergent or temporarily terrestrial, often found in swampy areas, along the banks of water courses and in rice fields.

Field Collections: Mawa, Daskhingeria, Sankowa at Kharagpur local; Ashari, Sripur, Maratala, Taegeria at Debra.

Figure 162. *Sphenoclea zeylanica*: **a,** whole flowering plant (8 cm); **b,** inflorescence (2 cm); **c,** petals (2mm); **d,** capsule (1 mm); **e,** plant in field.

VERBINACEAE: 1 genus, 1 species

Phyla nodiflora (L.) Greene: Figure 163.

Vernacular name: Bhui okra

Stems creeping and rooting at nodes, (5-) 30-95 cm long, pubescent with centrally attached and appressed white hairs; flowering shoots sometimes ascending, very rarely more than 10 cm tall, leaves in opposite pairs, sessile or tapered with short subpetiolate bases, oblanceolate, spathulate or obovate, (0.7-) 1-5 (-7) cm long, (2.5-) 3-7 (-10) mm wide, apically rounded or obtuse, rarely acute, marginally toothed from the middle or just above; teeth sharp, (3-) 5 (-7) on each side. Inflorescence a very dense, many-flowered, cylindrical spike with flowers borne in the axils of tightly overlapping bracts; bracts cuneate-obovate, 2.5—3 mm long, with ciliate margins, somewhat apiculate. Sepal tube somewhat flattened, with 2 narrow pubescent keels each running into an erect triangular to subulate lobe; lobes 1.5-2 mm long, split to more than half their length, extending beyond the fruit. Petals white to pale rose-purple tubular, 2-lipped, 4- or 5-lobed. Stamens 4, in 2 pairs, anthers not exerted beyond the petals. Fruit ellipsoid-globose, separating into 2 mericarps, each truncate and 1-2 nm long.

Flowering and Fruiting: Almost throughout the year.

Ecological Notes: Perennial or annual. Found in regions regularly flooded, flowering as the water recedes, particularly common on the banks of irrigation ditches and ponds but also found in moist grassland and regularly watered lawns. Gregariously grow on the moist waste places, even on the cultivate lands

Field Collections: Common in Pingla, Sabong, Debra, Keshpur, Chandrakona and Ghatal blocks.

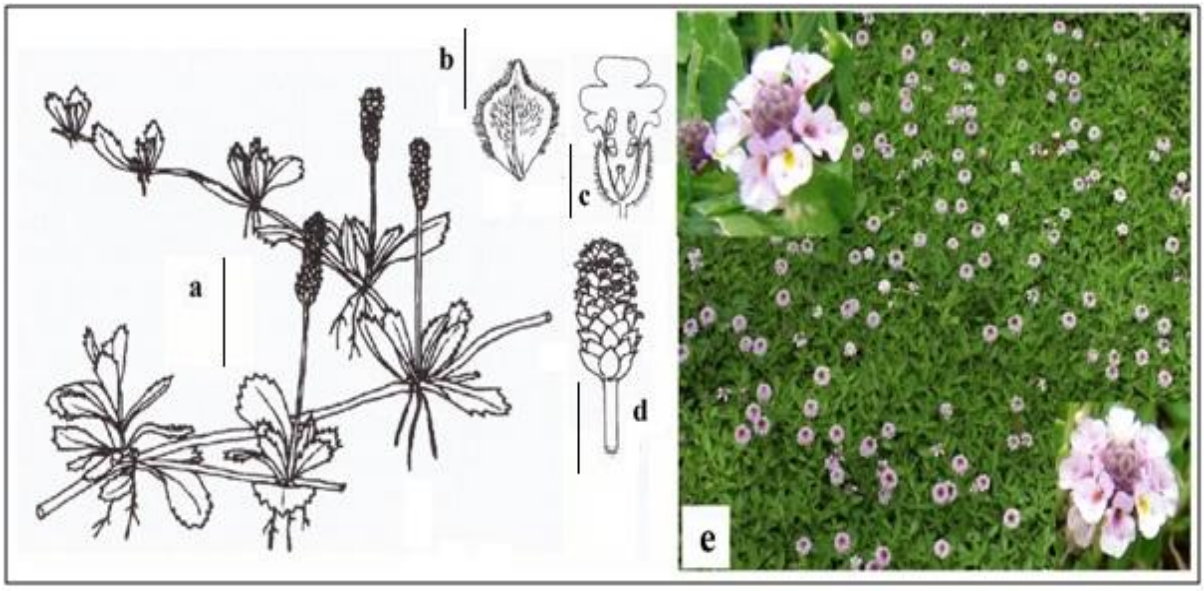


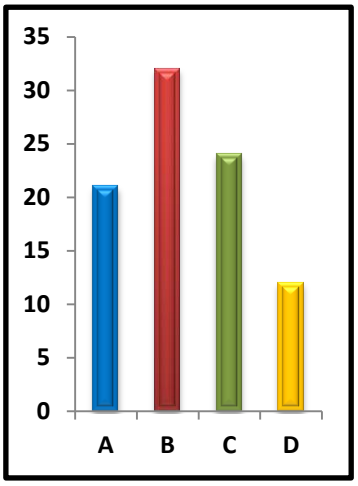
Figure 163. *Phyla nodiflora*: **a,** flowering shoot (2 cm); **b,** bracts (1 mm); **c,** petals (2 mm); **d,** inflorescence (1 cm); **e,** flowering shoot in the field.

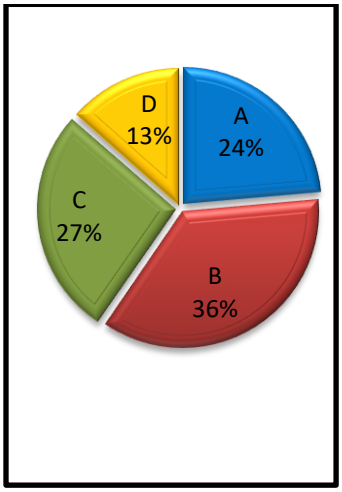
6.3. Role of Aquatic plant as a Home remedy and Ethnomedicine:

Tribes are living close to nature that helps them to acquire knowledge about Ethnomedicine. Our studies on collecting and identifying aquatic Ethnomedicinal, home remedies plants from this particular area of Paschim Medinipur district. Use of plants among the tribal people such as Lodha, Munda, Oraon, Santal, other tribal communities and rural people, Ojhas, quack doctors, Kabiraj (Ayurved practitioners) of selected areas as an Ethnomedicine for their primary treatment and home remedies.

Table 44: Showing the different uses of plants; Graph 45: presented the number and % of plant with their different uses.

S.N.	Different uses	No. of Plant
A	Edible	21
B	Medicinal	32
C	Fodder	24
D	Home remedies	12





The roots, barks, leaves, fruits, and other parts took from the plants as use for Ethnomedicine. The remedies of common ailments like cuts, headache, pain, etc. known to most of the members of the tribal communities. Most of these plants utilized in the preparation of herbal drugs such as Ayurved, Unani, Siddha, and Tantra therapy. The prevailing disease of the tribal people is biliousness, fever, colic, diarrhea, dysentery, dyspepsia, ringworm, Scabies ulcer, venereal diseases, etc. common female diseases are amenorrhea, anemia, menorrhagia, dysmenorrheal, hysteria, mastitis, leucorrhoea, etc.

The plants were collected after regular field trips to the different tribal aquatic zones of the district of Paschim Medinipur. The plants identified properly with the help of available

literature and the departmental herbarium of the Department of Botany and Forestry, Vidyasagar University. The information regarding medicinal values, tribal, name, common names, description, Flowering and Fruiting periods, application in home remedies, and ethnomedicinal importance documented. The plant materials preserved following the standard method and the herbarium specimens were preserved.

A large number of aquatic floras also provide food and feed materials for local human beings. These are Ipomoea aquatic, *Enhydra fluctuans*, *Nelumbo nucifera*, *Trapa natans*, etc. After the survey, we collect 21 edible plants, 32 medicinal plants, 24-fodder plant, and 12 plants those used for home remedies for local inhabitants. Many plants grow besides of the aquatic zone, but we did not consider these plants due to lack of their original aquatic habitat; those are excluded from our observation, such as *Mollug odisticha*, *Cleome chelidonii*, *Polycarpon prostratum*, *Chenopodium ambrosioides*, *Euphorbia prostrate*, *Clerodendron indium*, etc. Table 44-45, Graph 46, Figure 160-162.

Table 45: Shows the uses of different aquatic and marshy land plants as **ethno-medicinal and home remedies.**

S.N.	Plant names	Different uses of plant parts
1.	***Altenanthera philoxeroides*** Family- Amaranthaceae Local name- Bara Senchi	Used as a green manure, it is also used in medicine, sold in market as a vegetable.
2.	***Alternanthera sessilis*** Family- Amaranthaceae Local name- Senchi	Loadhas prescribe green plants as vegetable to women against deficiency of eye diseases.
3.	***Arundo donax*** Family- Poaceae Local name- Nal-gaha	Lodhas give root decoction with paste to women in the treatment of scanty menstruation; decoction of rhizomes with common salts to cattle dysentery. Also used as a fodder. Grasses used for preparation of paper pulp.
4.	***Aeschynomena indica*** Family- Fabaceae Local name- Kathsola	Used in the treatment of fever, for relief from pains.
5.	***Aeschynomena aspera*** Family- Fabaceae Local name- Sola	Root paste used for jaundice.
6.	***Bacopa monnieria*** Family- Plantaginaceae Local name-Brambhi	Completely plant used as astringent, cooling, intellect promoting, carminative and bronchodilator; used in inflammation, epilepsy, tumors, ulcer etc. Fresh leaves used as memory activated tonic. Leaf juice boiled taken with ghee in empty stomach at morning to cure cold and cough.
7.	***Brachiaria eruciformis*** Family-Poaceae Local name-Bholaghas	Used as fodder grass.
8.	***Brachiaria mutica*** Family-Poaceae Local name-Nardul	Used as fodder grass. Grasses used as soil binder.
9.	***Brachiaria reptans*** Family-Poaceae Local name- Chota-jalganti	Used as fodder grass.
10.	***Centella asiatica*** Family-Apiaceae Local name-Thankuni	Used in fatigue, bloodless, weakness, excessive sweat, constipation, indigestion and loss of memory, irregular menstruation, cold and cough, dysentery, jaundice, mouth ulcer and improve skin glaze.
11.	***Coix aquatica*** Family- Poaceae Local name- Nalkhakra	Utricles are used for decoration, medicine and as food as flour or for beer. It is good fodder, leaf sometimes used for thatching. Used as fodder grass.

Table 45 continued...

S.N.	Plant names	Different uses of plant parts

12.	***Colocasia esculenta*** Family- Araceae Local name- kachu	Cultivate for its starchy Rhizomes and edible leaves or for ornament. Used as a stimulant, as a remedy for body-ache and internal hemorrhages.
13.	***Commelina benghalensis*** Family- Commelinaceae Local name- Badokansira	Locally used as refrigerant for skin inflammations and as a cure for leprosy. Whole plants used in dropsy, ringworm and eczema. Leaves also use as an antidote to snakebite.
14.	***Commelina diffusa*** Family- Commelinaceae Local name- Jata-kansira	The bruised plant used locally against burns, itches and boils.
15.	***Crinum asiaticum*** Family- Amaryllidaceae Local name- Bara Kansur	Bulbs used as diaphoretic, laxative, tonic; used in burn and urinary troubles. Leaves and root used in skin disease, in inflammations at the end of the toes and figures, in inflamed joints and sprains.
16.	***Cyperus iria*** Family- Cyperaceae Local name- Jalmutha	Fresh plant, particularly roots, is aromatic and used as medicine, and it also used for marketing mats.
17.	***Cyperus difformis*** Family- Cyperaceae Local name- Behua	The rhizome given successfully in the treatment of irregular menstruation, gastralgia, dyspepsia, diarrhea and vomiting
18.	***Cyperus rotundus*** Family- Cyperaceae Local name- Muthaghas	Used to treat leprosy, fever, blood disease, biliousness, pain, ophthalmic, dyspepsia, diarrhea, stomach complaints; fresh juice applied in the burn and ulcer.
19.	***Drosera burmannii*** Family- Droseraceae Local name- surjasisir	Plant paste with a decoction of seedling as cure dysentery and with common salt in blood dysentery; organs put mucilage as a cure for caries of teeth.
20.	***Echinochloa crus-galli*** Family- poaceae Local name- Jal-shama-ghas	Good for fodder before flowering, Prescribe plant juice with dry powder of turmeric in the treatment of internal hemorrhage and carbuncle.
21.	***Echinochloa colona*** Family- poaceae	Use seed as food grains, whole plant used as fodder grass.

Table 45 continued...

S.N.	Plant names	Different uses of plant parts

22.	***Eclipta prostrata*** Family- Asteraceae Local name- kesut	Used leaf juice in cough and fever with honey, leaf paste mixed with burning charcoal applied against toothache. Leaf juice applied in empty stomach in case of liver and spleen disorder.
23.	***Eichhornia crassipes*** Family- Pontederaeae Local name- kachuripana	Utilize as fodder, manure and source of methane and alcohol, for purifying water, for decoration. Prescribe root paste as a cure for toothache, fresh root paste for treatment of gaiter.
24.	***Enhydra fluctuans*** Family- Asteraceae Local name- hincha	Prescribe fresh juice with goat milk in the treatment of constitutional disorders; plant as a vegetable for improving memory; plant decoction used for diabetes and pox; boiled leaves used as laxative; plant paste as antidote to snake venom.
25.	***Grangea maderaspatana*** Family- Asteraceae Local name- Namuti	Leaves used in stomachic, antispasmodic, de-obstruent and hysteria. Leaf juices take as instillation for earache.
26.	***Hygroryza aristata*** Family- Poaceae Local name-Jamglo-dha	Dried seed powder uses as astringent; decoction with a paste of ginger to patient suffering from prolonged fever. Used as fodder grass.
27.	***Hygrophila auriculata*** Family- Acanthaceae Local name- kulekhara	Seed used in gonorrhea, spermatorrhoea, tubercular fistula. Whole plant used in swelling and anemia. Stem used in constipation disorder.
28.	***Heliotropium indicum*** Family- Boraginaceae Local name- Hatisur	Root used in snakebite, a paste used in ringworm, anemia during pregnancy period with honey. Leaves paste used in joint swelling, cold, fever, typhoid fever, eczema. Flower paste used in abortion up to three months of pregnancy.
29.	***Ipomoea aquatica*** Family- Convolvulaceae Local name- kami	Plant decoction for the mother after delivery to recovery, vitality; plant juice for treatment of jaundice; applies the flower juice for treatment of eye diseases.
30.	***Ischaemum rugosum***	Used as fodder grass.
31.	***Ludwigia adscendens*** Family- Onagraceae Local name- Keshardam	A fresh leaf paste used as coolant after boil and burn, shoot used in empty stomach against strangers.

Table 45 continued...

S.N.	Plant names	Different uses of plant parts

32.	***Kyllinga brevifolia*** Family- Cyperaceae	Whole plants used as antidote to snake bite. Roots used in fever, extract with water taken to treat in fever and diabetes.
33.	***Kyllinga tenuifolia*** Family- Cyperaceae Local name-	Root useful in thirst, fever, diabetes, blood disease,. Root oil used as purities in skin and liver.
34.	***Lemna trisulca*** Family- Lemnaceae Local name- Haspana	Plant parts used in diabetes after roasting in a fire and filtrate in water.
35.	***Limnophila indica*** Family- Plantaginaceae Local name- Kodo-sag	Plant paste used for treatment of elephantiasis; plant juice for treatment of anthelmintic.
36.	***Monochoria vaginalis*** Family- Pontedericeae Local name- Nukha	Is leaves and flowers are used as potherbs and medicine, root is used for toothache.
37.	***Monochoria hastata*** Family- Pontedericeae Local name- Jal-kundri	Leaves used in burning sensation of the body, vitiated conditions of pitta, dyspepsia, strangury, gastropathy, cough, asthma.
38.	***Nelumbo nucifera*** Family-Nympeaceae Local name- Padma	Root used on piles, dysentery, ring worm; leaves and flower buds used in diarrhea; flowers used in cholera fever, liver disease; seeds used in leprosy, vomiting; decoction of the rhizome used in menstrual disorder.
39.	***Neptunia oleracea*** Family- Mimosacee Local name- Jallaggaboty, Alambusa	It is used by tribal people for the treatment of syphilis, burning sensation, dyspepsia, diarrhea, strangury and helminthiasis, useful in vitiated condition of pita and otalgia.
40.	***Nymphaea nouchali*** Family- Nymphaceae Local name- Raktosaluk	Lodhas prescribe rhizome decoction for the treatment of scanty menstruation; fresh rhizome paste on belly as a cure for dyspepsia; dried rhizome powder used for blood dysentery; young leaf paste on scabies; root paste used for piles and rhizome paste for treatment of gaiter and burn wounds.
41.	***Nymphaea stellata*** Family- Nymphaceae Local name- Nil-saluk	Rhizome and stack used to treat dyspepsia, diarrhea, piles and blood disease, to increase breast milk. Flowers used to treat palpitation of the heart.

Table 45: continued...

S.N.	Plant names	Different uses of plant parts

42.	***Nymphoides indica*** Family- Menyanthaeaceae Local name- Jalchirata	Plant decoction with common salt to women for treatment of fever after delivery; leaf juice used for removing black spot on skin and fruit paste uses to cure headache on forehead; root decoction for jaundice.
43.	***Oryza rufipogon*** Family- Poaceae Local name- Jhari	For conjunctivitis they used intends as drop wise; root paste applies for orchitis; seed powder applies as diaphoretic; give boiled seed to patient as diet during fever.
44.	***Oldenlandia corymbosa*** Family- Rubiaceae Local name-Asangao	Whole plant use as anthelmintic; used to treat remittent fever with gastric irritability, nervous depression, biliary fever, jaundice, diarrhea, burning of the palms of the hands and soles of the feet from fever, liver disease, prolong fever.
45.	***Ottelia alismoides*** Family- Hydrocharitaceae Local name-Panikala	Seed used as food like fried rice.
46.	***Panicum paludosum*** Family- Poaceae Local name- Chikni	Lodhas prescribe root decoction with common salt as cure for stomach ache; root paste on skin eruptions like pimples. Used as fodder grass.
47.	***Panicum repens*** Family- Poaceae Local name- Adigantia	Plant juice as a drop in eye diseases; apply a paste of sharp pointed Solons with paste of black peppers as a cure for piles. Grasses used as soil binder.
48.	***Paspalum scrobicidatum*** Family-Poaceae	Whole plant used as a scorpion sting.
49.	***Phyla nodiflora*** Family- Verbenaceae Local name- Jalpaply	It is useful in vitiated conditions of pitta, burning of sensation, anorexia, flatulence, colic, dyspepsia, helminthiasis, diarrhea, ulcers, asthma, bronchitis, knee joint pain, gonorrhea and fever.
50.	***Phragmites karka*** Family- Poaceae Local name- Nal	Used as ornamental grasses, broom making; Wattle walls. Grasses used for preparation of paper pulp.

Table 45 continued...

S.N.	Plant names	Different uses of plant parts

51.	***Pistia stratiotes*** Family- Arceae Local name- Topapanna	Fresh plant extract applied to ear pain, eczema and paste applied in boils and burns.
52.	***Polygonum barbatum*** Family- polygonaceare Local name- Bekh-unjubas	Fresh leaves have taken against constipation and stomach disorder. Seed paste taken regularly against strangury. Leaf paste uses in cutaneous infection.
53.	***Polygonum hydropiper*** Family- Polygonaceae Local name- Pakurmul.	Crashed shoot applied in fever. Seed powder taken to cure strangury.
54.	***Ranunculus scleratus*** Family- Ranunculaceae Local name- Birmani	To cure gout plant wrapped with leaf of the banana and mixed with charcoal. After planting boiled residue use in blisters and eczema.
55.	***Sasccharum spontaneum*** Family- Poaceae Local name- Noble-cane	Root decoction as diuretic; root paste for allergic eruptions and useful for septic wounds of cattle. Use as broom making, ornamental plants. Grasses used for preparation of paper pulp.
56.	***Sacciolepis interrupta*** Family- Poaceae Local name-Nardul	Plant decoction is used for treatment of stone in the gall bladder.
57.	***Sacciolepis indica*** Family- Poaceae	Used as fodder grass.
58.	***Sagittaria sagittifolia*** Family- Alismataceae Local name- Chhotakut	The fresh root paste has taken along with honey during cough.
59.	***Sesbania bispinosa*** Family- Fabaceae	Seed paste used for ringworm boiled flower and fruit as laxative.
60.	***Sphaeranthus indicus*** Family- Asteraceae	Whole plant used to treat insanity, tuberculosis glands, indigestion, elephantiasis, anemia, uterus and vagina pain, piles, asthma, vomiting, jaundice, chest disease.

Table 45continued...

S.N.	**Plant names**	**Different uses of plant parts**

61.	***Trapa natans*** Family- Lythraceae Local name- Panifal	Fruit paste use for healing bone fracture, dried powder for treatment of constitutional disorders
62.	***Typha domingensis*** Family- Typhaceae Local name- Hogla	Root paste used for dropsy, skin eruptions; rhizome decoction in the ear as a drop for purulent discharges; root decoction use for madness.
63.	***Chrysopogon zizanoides*** Family- Poaceae	Root used to relief scorpion bite. Used to prepared essential oil (Vetiveria oil- which necessary for soap industry). Also use as an ornamental grass.