

Wetland Phytodiversity :

A Complete Guide to Indian Helobieae

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and
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***Dedicated to
our
Teachers***

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PREFACE

Helobieae (sensu Engler & Prantl, 1887-1889) is a specialized group of hydrophytic monocotyledons, developing on its own line but still exhibiting morphological and ecological diversity. The present work "*Wetland Phytodiversity: A Complete Guide to Indian Helobieae*" is an attempt to critically evaluate the taxonomic status of the Indian taxa of Helobieae taking into account the morphological description phytogeography, pollen morphology, floral biology and ecology. Informations on biosystematics, embryology, anatomy, phenology and fossil reports have also been provided.

With the advent of modern technology like SEM, TEM etc. characters of the micromorphology to plant species are considered as a valuable aid for better understanding of the plant taxonomy and systematic botany. The importance of palynological characters in the classification of plants has been taken into consideration since long. Pollen morphology helps in critical analysis of disputed and controversial taxa and thus has great impact on modern plant science and in addition it also helps in identifying fossil pollen grains. An attempt has been made in the present work to use pollen morphological criteria to find out affinities, systematic position and relationships within the families of Helobieae and with other families of angiosperms.

Ratna Guha
M.S. Mondal

FOREWORD

The order Helobieae (*sensu* Engler & Prantl, 1887-89) is a divergent group and represented to families essentially inhabiting aquatic and marshy habitats and hence, the name Helobieae. 10 families (Alismataceae, Aponogetonaceae, Butomaceae, Hydrocharitaceae, Juncaginaceae, Najadaceae, Potamogetonaceae and Zannichelliaceae) were incorporated in majority Indian works. The present work deals with 27 genera and 75 species. Some members extend to marine environment. The present work titled “Wetland Phytodiversity : A Complete Guide to Indian Helobieae” was executed through a Ph.D. program and the task assigned was truly tough, as the families dealt here are a diverse assemblage (often looked upon as unnatural group) and treated differently by various taxonomists due to inherent diversity ranging from apparently simple forms of *Najas* spp. to differentiated forms seen in *Alisma* L., *Sagittaria* L. and *Hydrocharis* L. spp. Helobieal families exhibit diverse pollination mechanisms with wind pollinated *Potamogeton* L. species to ephidrophilous *Ruppia maritima* spp. *spiralis* L. ex Dum. and hyphidrophilous *Ruppia maritima* L. and *Zannichellia palustris* L. The presence of minute scales that associate with leaves and near to complete absence of endosperm in the seed are important features that unify this group. Some families — Aponogetonaceae (*A. appendiculatus* Bruggen, *A. bruggenii* and *A. satarensis* Sundara Raghavan Kulkarni et Yadav), Alismataceae (*Wisneria triandra* (Dalz.) Mich.) and Najadaceae (*Najas foreslata* A. Br. ex Magnus var. *minor* Rendle and *N. minor* All. var. *spinosa* Rendle) are represented by narrow endemics while some families like Cymodoceaceae embody with more vulnerable sea grasses. Some are notorious weeds, several yield edible tubers for humans and cattle and a few others are applied as green manure. The biology of majority taxa is still not clear which has implications in the management of aquatic habitats. The authors judiciously reviewed the literature with respect to Helobieae in general and component families in particular. Further, they carefully analyzed morphology, anatomy, palynology, embryology, karyosystematics and chemotaxonomy to evaluate the taxonomic status and intra and inter family affinities. The phytogeographical and fossil

evidences were also taken into account to understand affinities among different taxa. Micromorphological features seem to have lent some help in evaluating these relationships and also in resolving taxonomic and phylogenetic issues. Some interesting taxonomic decisions were taken, based on studies in pollen morphology. The book, besides resolving a few issues, expectantly offers valuable clues for future researchers to pursue problems still left unresolved.

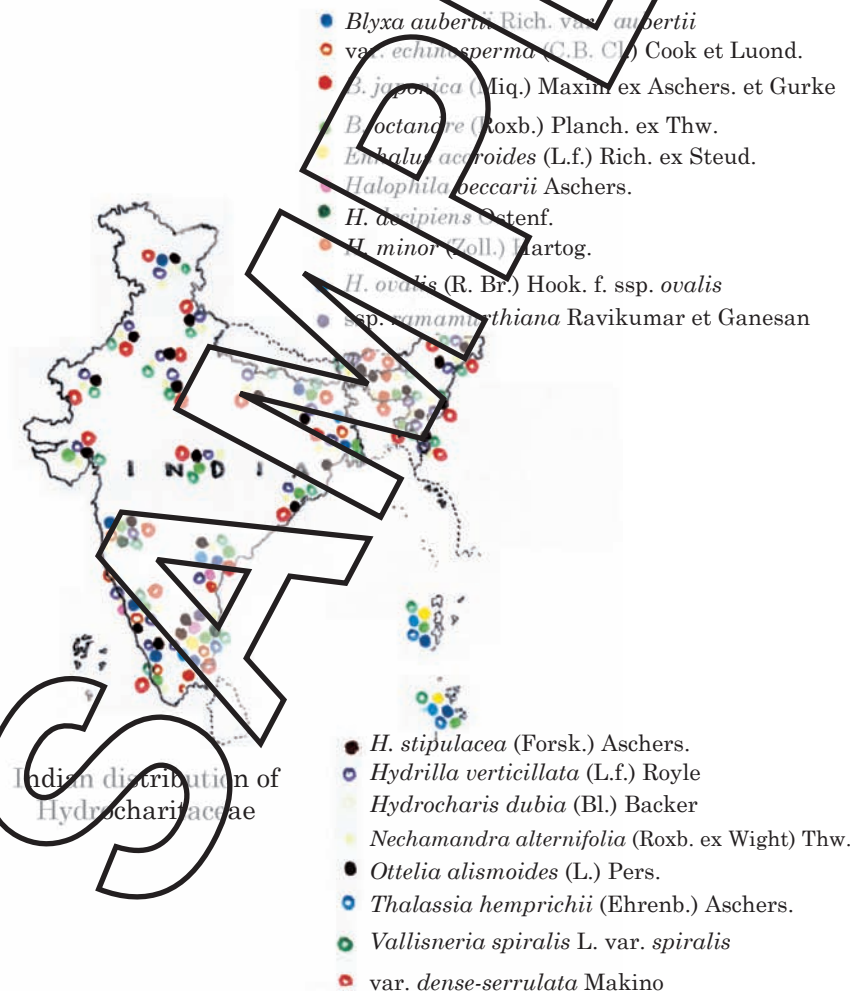
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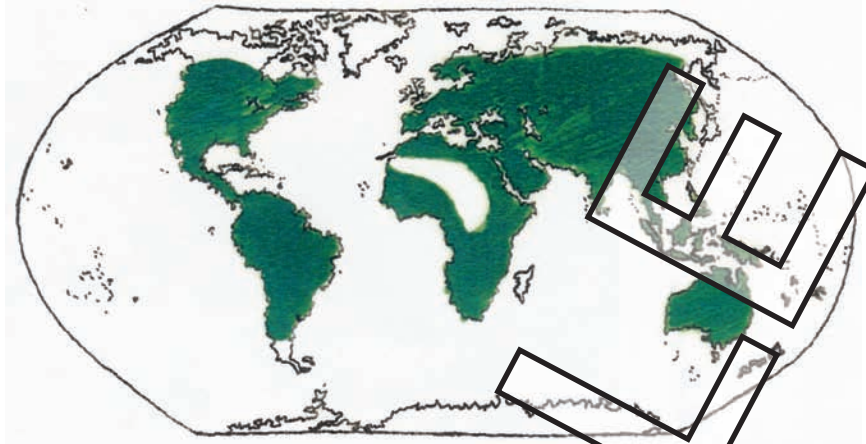
Map 1



World distribution of Hydrocharitaceae (After Heywood, 1978).



Map 2

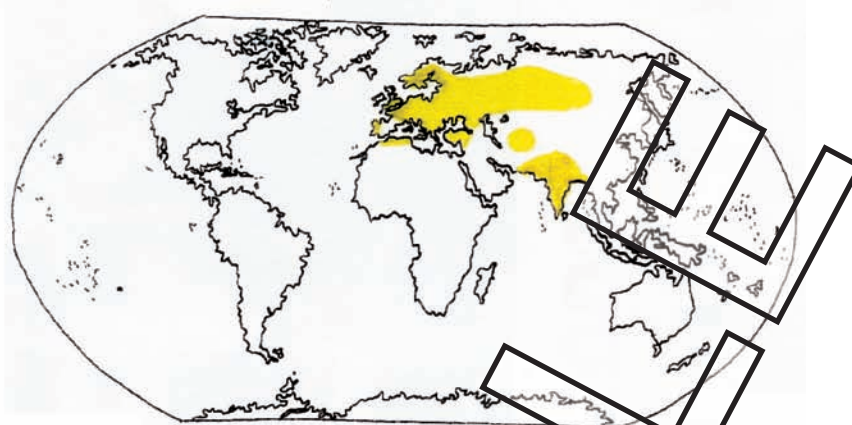


World distribution of Alismataceae (after Heywood, 1978).



Indian distribution of Alismataceae

Map 3



World distribution of Butomaceae



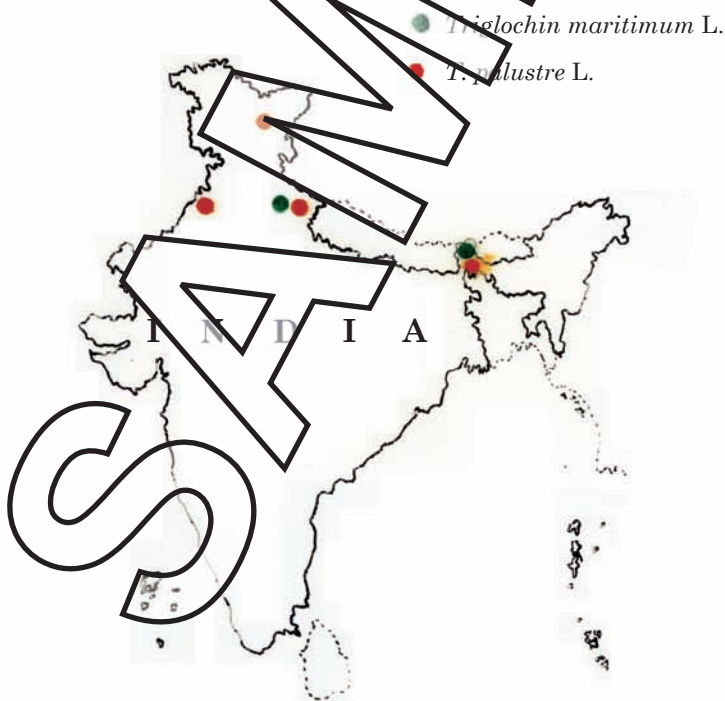
- *Butomopsis latifolia* (D. Don) Kunth
- *Butomus umbellatus* L.

Indian distribution of Butomaceae

Map 4

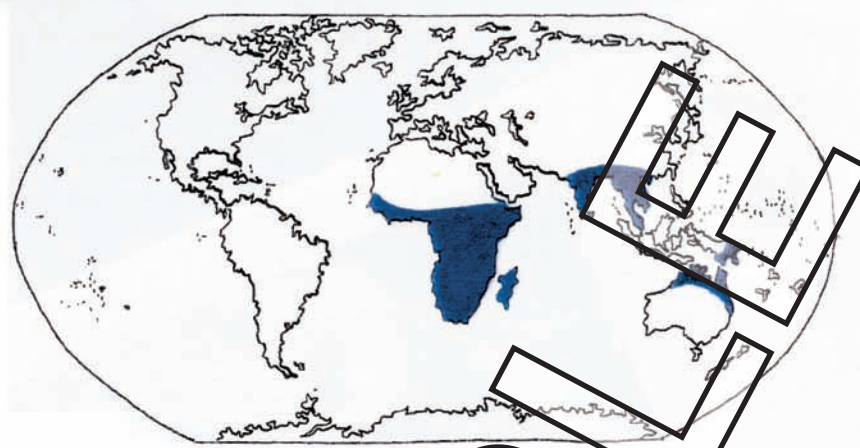


World distribution of Juncaginaceae (After Heywood, 1978).

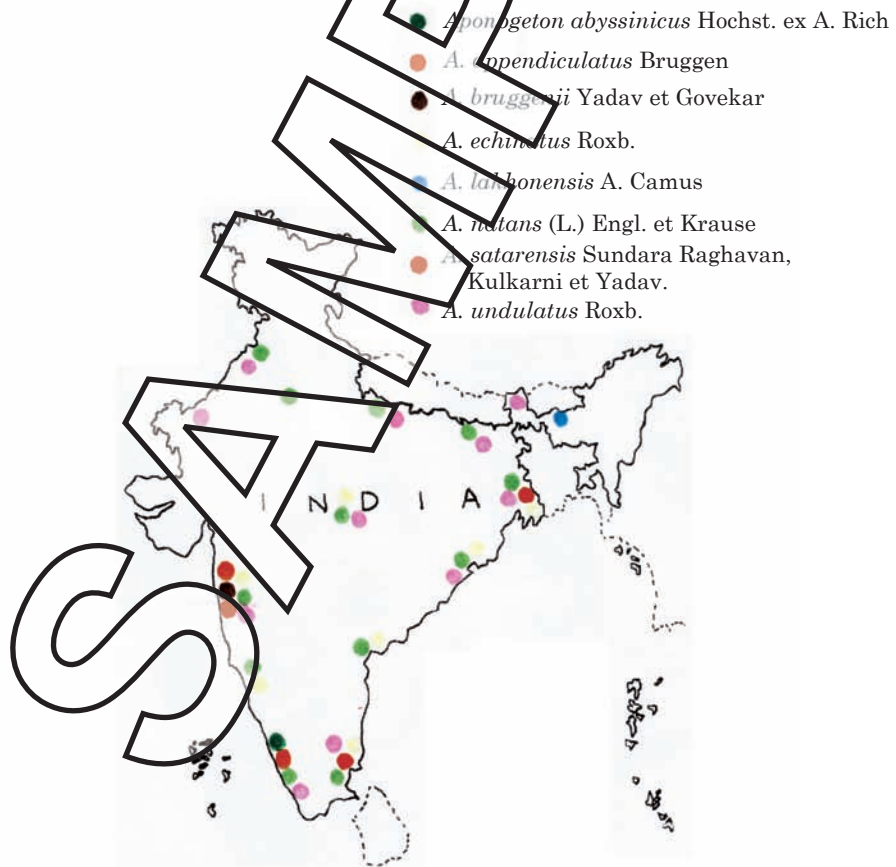


Indian distribution of Juncaginaceae

Map 5



World distribution of Aponogetonaceae (After Heywood, 1978).



Indian distribution of Aponogetonaceae

Map 6



World distribution of Potamogetonaceae (After Heywood, 1978)

- *Potamogeton alpinus* Balbis
- *P. crispus* L. var. *crispus*
- var. *serrulatus* (Schrad. ex Opiz.) Reichb.
- *P. filiformis* Pers.
- *P. fluviatilis* Roth.
- *P. lucens* L. ssp. *lucens* var. *lucens*
- var. *deuninatus* (Schum.) Fries.
- *P. malaiensis* Miq.
- *P. natans* L.
- *P. nodosus* Poir.



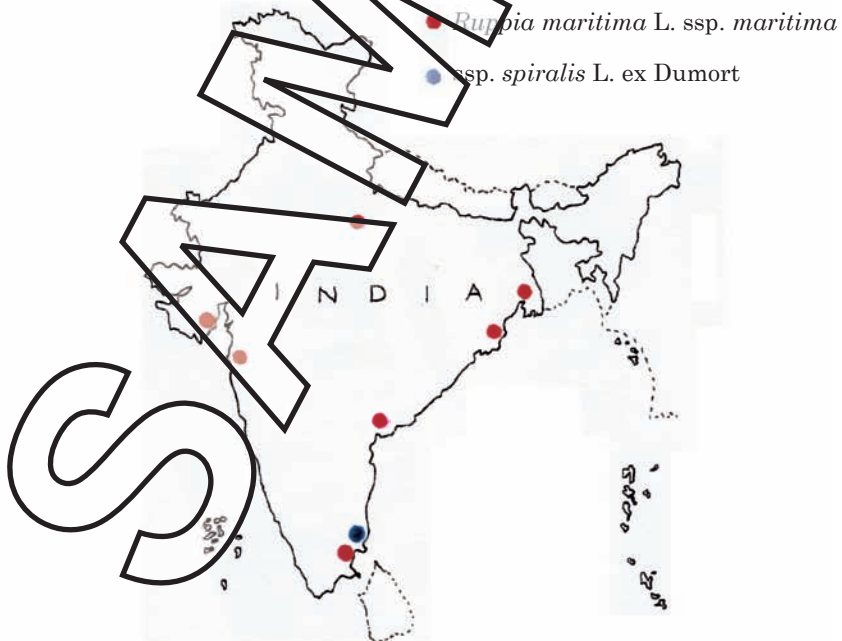
Indian distribution of Potamogetonaceae

- *P. octandrus* Poir.
- *P. orientalis* Hagstrom.
- *P. pectinatus* L.
- *P. perfoliatus* L.
- *P. polygonifolius* Pourr.
- *P. pusillus* L. ssp. *pusillus*
- ssp. *flabellatus* (Bab.) Hook.f.
- *P. stylatus* Hagstrom.
- *P. tepperi* A. Benn.
- *P. zizii* Mert. et Koch.

Map 7

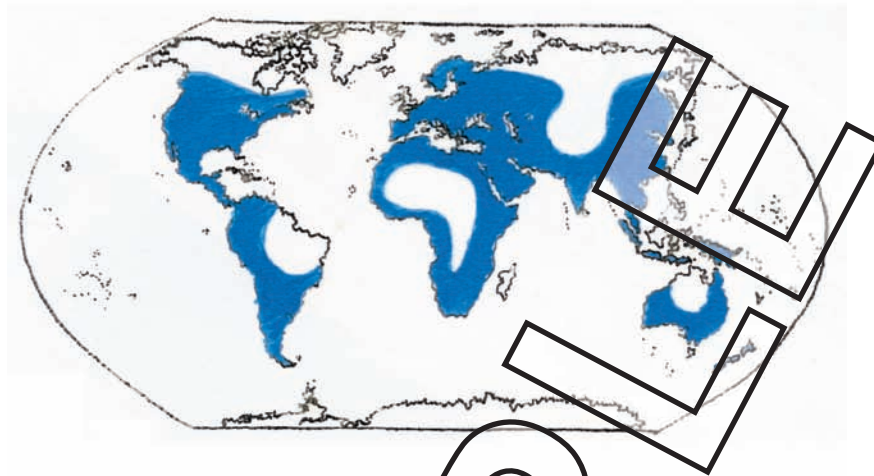


World distribution of Ruppiaceae (After Heywood, 1978).

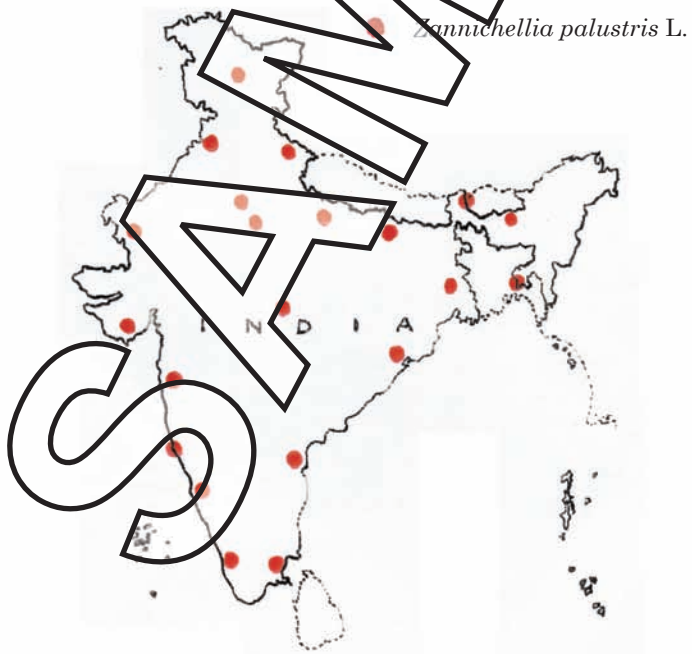


Indian distribution of Ruppiaceae

Map 8

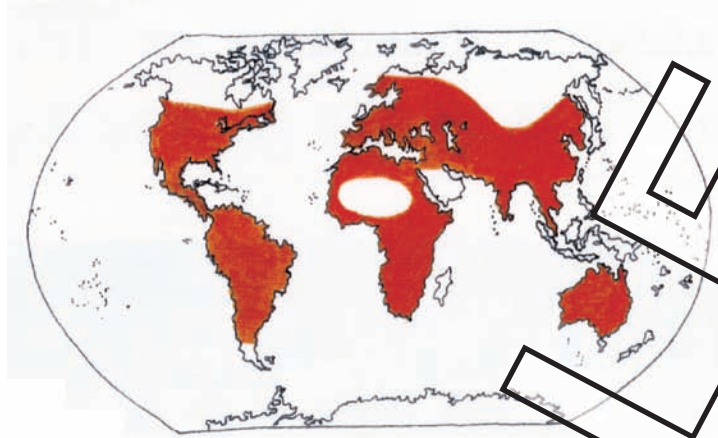


World distribution of Zannichelliaceae (After Heywood, 1978).

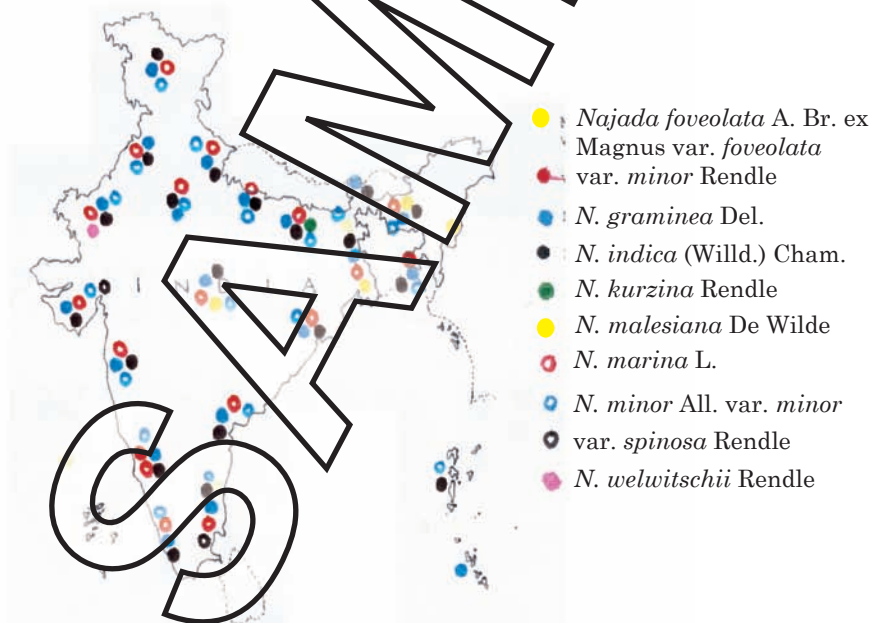


Indian distribution of Zannichelliaceae

Map 9

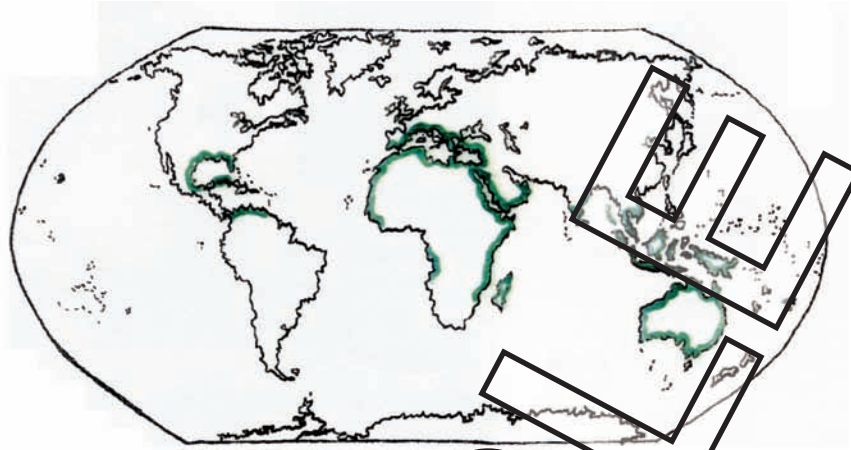


World distribution of Najadaceae (After Heywood, 1978).

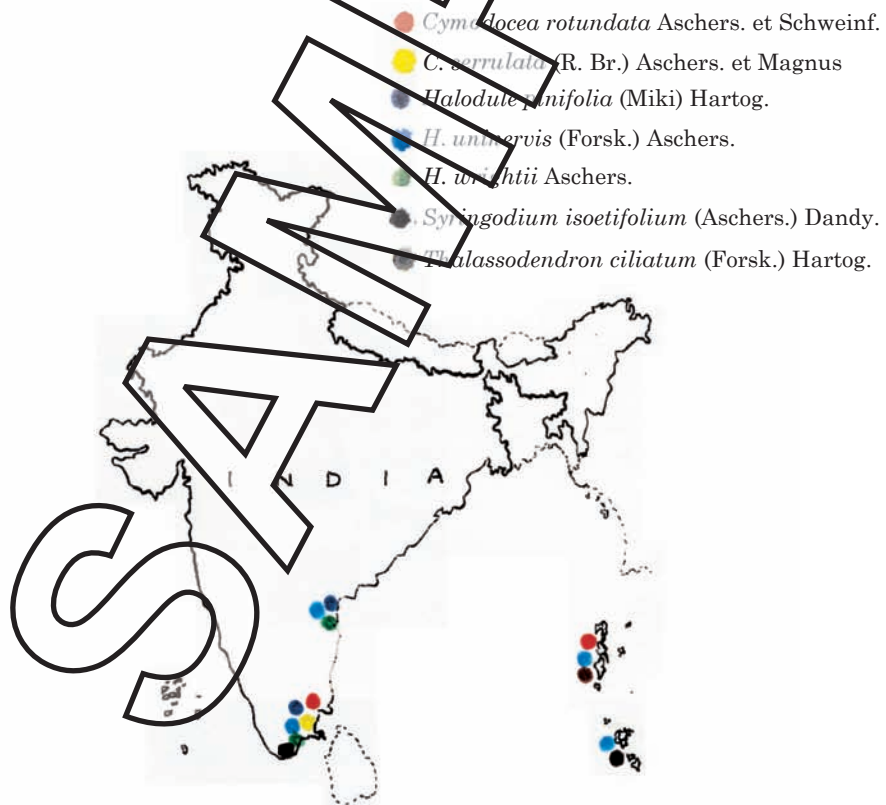


Indian distribution of Najadaceae

Map 10



World distribution of Cymodoceaceae (After Heywood, 1978).



Indian distribution of Cymodoceaceae