Hygrophila polysperma 简体中文 正體中文 **System:** Terrestrial

Kingdom	Phylum	Class	Order	Family
Plantae	Magnoliophyta	Magnoliopsida	Scrophulariales	Acanthaceae

Common name Miramar weed (English), Indian swamp weed (English), East Indian hygrophila (English), hygro (English)

Synonym *Justicia polysperma* , Roxb., Fl. Ind. 1:120. 1820.
Hemidelphis polysperma , (Roxb.) Nees in Wall., Pl. Asiat. Rar. 3:30. 1832.

Similar species *Hygrophila costata, , Alternanthera philoxeroides*

Summary The herbaceous perennial Hygrophila polysperma, commonly known as the Indian swamp weed, is a freshwater amphibious herb that was most likely introduced through the aquarium trade. It is found in warmer climates and prefers flowing streams, but may also be found in slow-moving waters and in lakes. It is a fast-growing and fast-spreading species that out-shades and out-competes other submersed plants. Hygrophila polysperma interferes with navigation and has been known to compete with other aggressive non-native invasive plants. Hygrophila polysperma is difficult to control. Mechanical harvesting only fragments the plants and increases its distribution. Typical biological control agents for aquatic invasives do not affect this species and most registered aquatic herbicides only provide marginal control.

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Species Description
H. polysperma is sparsely hairy with both aquatic and emergent stems. The aquatic form has opposite, elliptic to oblong leaves to 4cm long. The emergent form differs in having smaller, narrower and darker leaves. The flowers are stalkless in the leaf axils of the emergent stems and are surrounded by two hairy modified leaves 5-15mm long. The outer portion of the flower (sepal) is green, hairy and divided nearly to the base. The inner portion of the flower (petal) is blue to white, hairy and up to 9mm long. The fruit is a capsule to 9mm long covered with hairs especially near the top (Hall and Vandiver, 2003).

Notes
Doyle *et al.* (2003) report that, \"*H. polysperma* also has low light saturation and compensation points, making it capable of positive net photosynthesis at low light levels (Spencer and Bowes, 1985, in Doyle *et al.* 2003). Another adaptive characteristic is its perennial growth habit coupled with the relatively low seasonality of the plant (Spencer and Bowes, 1985, in Doyle *et al.* 2003) which allows it to maintain shoot biomass and occupy its niche throughout the year.\"

Lifecycle Stages
Hall and Vandiver (2003) describing the lifecycle in its introduced range in the North American region state that, \"*H. polysperma* is rooted in the hydro-soil. Dense stands of shoots are produced with elongated nodes and large leaves which will extend upward to the water surface from depths exceeding 3 m. Emergent shoots have smaller, more compact, darker green leaves and shorter internodes. When rooted on moist banks the shoots are only 15-20cm tall. If submersed the emergent shoots will drop their leaves and produce new leaves of the underwater type. Elongation of shoots begins with the increase in water temperature around March. Shoots reach the surface in late spring. During the summer, fragments with numerous adventitious roots break away from the mats. Upon contact with soil they will readily root. During the hot weather of late August the whole shoot will break off near the root crown. These shoots form large, heavy, floating mats, which can cause severe water flow problems. The whole mat can sink and produce a new colony, or individual pieces can do so. The old root crowns quickly produce new shoots, which grow slowly during the winter.\"

Uses
H. polysperma appeared in the aquarium trade in 1945 known as 'oriental ludwigia' (FLEPPC, 2003).

Habitat Description
Ramey (2001) reports that in warmer climates *H. polysperma* prefers flowing streams, but may be found in slow-moving waters and also in lakes.

Reproduction
H. polysperma stems are brittle, and easily fragment. These fragments easily develop new stands from rooted nodes of even small fragments. This species is also able to photosynthesize in lower light than most native submersed species, and tends to grow more vigorously in flowing water (FLEPPC, 2003).

Nutrition
H. polysperma can subsist within a pH range of 6.5 - 7.8, a temperature range of 18 - 30C, and a water hardness level of 30 - 140ppm (FNZAS, UNDATED). Doyle *et al.* (2003) offers a different pH range for this species stating that, \"The plant is most commonly found in waters with pH between 5 and 7\" and adds that, \"Its leaves are adapted to draw CO2 directly from water or the atmosphere (Bowes, 1987, in Doyle *et al.* 2003).\"

General Impacts
Ramey (2001) states that *H. polysperma* is a fast-growing and fast-spreading invasive that can out shade other submersed plants. It can also occupy the entire water column. This species has many adventitious roots at stem nodes, which means that broken off fragments can easily grow. *H. polysperma* clogs irrigation and flood-control canals, and mats of fragments can collect at culverts and interfere with water control pumping stations. This species also interferes with navigation of the waters it invades. *H. polysperma* also competes with another aggressive non-native invasive plant, Hydrilla verticillata. Doyle *et al.* adds that, \"The weed potential of the species appears high and related to several growth characteristics including multiple growth forms (Botts *et al.* 1990, in Doyle *et al.* 2003), the ability to produce a high biomass, and the ability to form a dense canopy at the water-air interface (Spencer and Bowes, 1985, in Doyle *et al.* 2003).\"

Management Info
H. polysperma is described as a difficult aquatic plant to control.
Mechanical: The action of mechanical harvesters and chopping machines fragment the plants and increase their distribution (Ramey, 2001).
Biological: The Chinese grass carp, a common biological control agent, have a low preference for *H. polysperma*. Ramey (2001) reports that no other biological control work has been done for this species.
Chemical: Registered aquatic herbicides provide only marginal control of *H. polysperma*. Ramey (2001) states that according to the University of Florida's Aquatic Weed Management Guide, the only herbicide labeled to be used against *H. polysperma* is \"Aquathol Super K Granular Aquatic Herbicide\", having the active ingredient, \"endothall\".

Pathway
H. polysperma appeared in the aquarium trade in 1945 as 'oriental ludwigia' (FLEPPC, 2003).

Principal source: Hall and Vandiver, 2003 East Indian hygrophila, *Hygrophila polysperma* (Roxb.) T. Anderson Ramey, 2001 *Hygrophila polysperma* (Roxb.) T. Anders.

Compiler: National Biological Information Infrastructure (NBII) & IUCN/SSC Invasive Species Specialist Group (ISSG)

Review: Dr. Donald Les The University of Connecticut Department of Ecology and Evolutionary Biology USA

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Summary: A scientific study on the competitiveness of *polysperma* that offers background information on the species.
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Summary: Information on description, economic importance, distribution, habitat, history, growth, and impacts and management of species.
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Ramey, V. 2001. *Hygrophila polysperma* (Roxb.) T. Anderson. Non-Native Invasive Aquatic Plants in the United: States Center for Aquatic and Invasive Plants, University of Florida and Sea Grant.
Summary: Information on description, economic importance, distribution, habitat, history, growth, and impacts and management of species.
Available from: http://aquat1.ifas.ufl.edu/seagrant/hygpol2.html [Accessed 12 January 2004]

General information
ITIS (Integrated Taxonomic Information System), 2002. Online Database *Hygrophila polysperma*.
Summary: An online database that provides taxonomic information, common names, synonyms and geographical jurisdiction of a species. In addition links are provided to retrieve biological records and collection information from the Global Biodiversity Information Facility (GBIF) Data Portal and bioscience articles from BioOne journals.
Available from: http://www.itis.gov/servlet/SingleRpt/SingleRpt?search_topic=TSN&search_value=182342 [Accessed March 2005]

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