



PLANT TYPES FOR SMALL WETLAND TREATMENT


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Final Response

**A DEW Point study by
Steve Collins of**



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Contact and correspondence:	DEW Point, The Old Mill • Blisworth Hill Barns • Stoke Road • Blisworth • Northampton, • NN7 3DB • UK TEL: +44 (0)1604 858257 FAX: +44 (0)1604 858305 e-mail: helpdesk@dewpoint.org.uk www.dewpoint.org.uk	
Authors:	Steve Collins	
Organisations undertaking work:		
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Task Manager :	Ingrid Carlier	
Quality Assurance	Name:	Date:
Quality Assurance Internal:	Todd Sajwaj, Specialist Consultant (Biodiversity), AEA	2 nd April 2009
	Gill Wilkins, DEW Point Project Director, AEA	2 nd April 2009
Quality Assurance. DEW Point:		

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¹ Consortium comprises Harewelle International Limited, NR International, Practical Action Consulting, Cranfield University and AEA Energy and Environment

Plant types for small wetland treatment

This is a response to a recent enquiry received via the DEW Point resource centre from Frank Greaves, Water and Sanitation Adviser for Tearfund. The enquiry was regarding plant types for small wetland treatment.

The original enquiry was:

“Our partner agency in Indonesia has been installing septic tanks + small (3m x 1m) treatment gardens, to further treat the effluent from the septic tank. The work is still in progress, and the partner is asking for further advice as to the type of plants to grow in the treatment "garden". I know that Phragmites species reeds are good, because it forms horizontal rhizomes that penetrate the entire filter depth, but these may not be readily available. Could you suggest alternative plant species that would do the job well?”

- Frank Greaves, Water and Sanitation Adviser, Tearfund.

The response is provided by specialist consultant Steve Collins from AEA.

Provided is a list of plants which are ideal for a treatment wetlands. There is little available data on plants native to Indonesia, much less, Sumatra. It appears that Indonesia still consider wetlands to be swamp areas lacking real value and subsequently burning for rice and palm oil plantations is the preferable land management activity over preservation. The list is therefore comprised only of Genera and only a few species were identified, all within the genus Cyperus (sedges).

On the upside, the two best genera for treatment wetlands are Phragmites (as was correctly identified in your email) and Typha and species within these genera can occur naturally in desert regions, tundra, and rainforest. Therefore, we can assume they would be in Sumatra.

Hundreds of different plant species, encompassing several genera are commonly used in the development of treatment wetlands (see the table below). The primary goals of these plants are to absorb nitrogen, phosphorous, dissolved solids, heavy metals and other contaminants. Secondary goals include mosquito control, odour control, and adding to visual appeal.

An effective treatment wetland should focus on the primary goals. Species most commonly used due to their effectiveness include species of arrowhead, bulrushes, rushes, sedges, cattail, and common reed. Cattails and common reeds are regarded as being the most effective at absorbing nitrogen and phosphorous.

Generally, these species exhibit more growth when planted in combination. Homogeneous planting will not perform as well as heterogeneous groupings.

Maintenance will be an issue, particularly in smaller ponds. The most effective species tend to grow rapidly and will quickly fill the enclosure. Manual removal is recommended at regular intervals, as overcrowding will slow growth and functionality.

Regular manual removals will also assist in controlling the mosquito population with the treatment wetland. Mosquitoes are more common in smaller, shallow ponds than in larger

deep ponds. Some species, including water ferns, duck weed and pond weed will cover surface water on the pond also reducing mosquito populations.

Indonesia / Sumatra Wetland Species List

Scientific name	Common name	Usefulness
Emergents		
* <i>Sagittaria</i>	Arrowhead	Nitrogen, phosphorous absorption
* <i>Scirpus</i>	Bulrushes	Nitrogen, phosphorous absorption
<i>Canna</i>	Canna	Ornamental
<i>Iris</i>	Iris	Ornamental
<i>Panicum</i>	Millet / crab grass	Nitrogen, phosphorous absorption
<i>Pontederia</i>	Pickerel weed	Nitrogen, phosphorous absorption
<i>Alisma</i>	Plantain	Nitrogen, phosphorous absorption
* <i>Juncus</i>	Rushes	Nitrogen, phosphorous absorption
* <i>Cyperus diffuses, C. kyllingia, C. nutans, C. pedunculatus, C. pilosus, C. esculentus</i>	Sedges	Nitrogen, phosphorous absorption
<i>Zizania</i>	Wild rice	Nitrogen, phosphorous absorption
* <i>Typha</i>	Cattail	Nitrogen, phosphorous absorption

<i>*Phragmites karka</i>	Common reed	Nitrogen, absorption	phosphorous
<i>*Phalaris</i>	Common reed	Nitrogen, absorption	phosphorous
<i>*Potamogeton</i>	Pondweed	Aids mosquito control	
<i>*Sparganium</i>	Bur-reed	Aids mosquito control	
Submerged			
<i>Ceratophyllum</i>	Hornwort	Nitrogen, absorption	phosphorous
<i>Najas</i>	Najas / Naiad	Nitrogen, absorption	phosphorous
<i>*Elodea</i>	Pondweed	Aids mosquito control	
<i>Vallisneria</i>	Water celery	Nitrogen, absorption	phosphorous
Floating			
<i>Spirodela</i>	Duck weed	Aids mosquito control	
<i>*Lemna</i>	Duck weed	Aids mosquito control	
<i>Eichhornia</i>	Hyacinth	Ornamental	
<i>*Azolla</i>	Water fern	Aids mosquito control	

Rooted Floating Leaf		
<i>Nelumbo</i>	Water lotus	Ornamental
<i>Nymphoides</i>	Water fringe	Ornamental, odour
* <i>Nymphaea</i>	Water lilies	Ornamental

Clarification of table contents:

- Items in **bold** categorize types of wetland plants basically by growth habit. These are standard.
- Items written in *italics* are Latin names of plant species (*Genus species*). This is standard but another accepted notation is underlined (Genus species).
- An * denotes a most desired species. These are species that are commonly used in treatment wetlands because they are very effective. We have provided several of these as treatment wetlands and wetland species in general tend to operate better and grow better when planted with other species. For example, a 1m x 3m box planted with only *Phragmites* will work but the same box planted with *Phragmites* and *Typha* would work better. Add *Lemna* to the box and it will function better yet, and give a bit of protection against mosquitoes. In addition, mosquito fish are often placed in treatment wetlands as well for more effective mosquito control. While you did not enquire specifically about this, it is worth mentioning as it is likely that this issue will arise with small wetland treatment.

We hope that this response is helpful and addresses the enquiry. Please don't hesitate to contact DEW Point if you require further information regarding plant types for small wetland treatment or for any other related query that may arise.

