

## Weedy Plants of Ayer Hitam Forest Reserve, Selangor

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### ABSTRAK

Hutan Simpan Ayer Hitam berkemungkinan menghadapi masalah ancaman spesies rumpai dari kawasan yang membangun di sekitarnya. Jumlah takson rumpai yang dikenal pasti dari hutan ini adalah 33 spesies, 29 genus dan 13 famili. Daripada jumlah ini hanya dua merupakan spesies rumpai akuatik iaitu *Ceratopteris thalictroides* (Parkeriaceae) dan *Hydrilla verticillata* (Hydrocharitaceae). Spesies rumpai terrestrial yang paling dominan di hutan ini pula adalah *Clidemia hirta* (Melastomataceae) dan *Chromolaena odorata* (Compositae). Semua spesies rumput dan sedge direkodkan di kawasan kajian terganggu sahaja. *Mimosa pigra* hanya terdapat di kawasan yang sangat terganggu sahaja di sempadan hutan.

### ABSTRACT

The Ayer Hitam Forest Reserve has possibly been under constant threat from invasive species especially the weeds from surrounding development sites. The total number of weed taxa identified from this forest were 33 species, 29 genera and 13 families. Of these taxa, only two species aquatic weeds viz., *Ceratopteris thalictroides* (Parkeriaceae) and *Hydrilla verticillata* (Hydrocharitaceae). The most dominant terrestrial weedy species in this forest were *Clidemia hirta* (Melastomataceae) and *Chromolaena odorata* (Compositae). All grasses and sedges species were recorded at the disturbed sampling sites only. *Mimosa pigra* was only found at the most disturbed site bordering the forest.

### INTRODUCTION

Many aquatic plant species which have medicinal and ornamental values are on the brink of extinction due to development and disturbances of their natural habitats. For example, the everlasting threat of anthropogenic disturbances have gradually decreased the *Cryptocoryne* populations (Kiew 1990). In addition, the invasion of aquatic weed population such as *Hydrilla verticillata* has displaced the original populations of these endemic species.

The concept of weeds has emerged since the beginning of human civilization when man learn to grow their very own food (Mercado 1979). There are many definitions of weeds but the definition used herein is a plant out of place, unwanted and possess no importance for human (Bailey 1941, Anon 1956). An example is *Eichhornia crassipes*, the water hyacinth which has been the centre of attention of many aquatic weed scientists due to its ability to colonize lakes and ponds in many areas of the world. The intrusion of this species into any pristine or disturbed areas has proved to create problems.

Another aquatic weed which is considered a nuisance is *Hydrilla verticillata*. This submerged weed species has been found to be very problematic not only in Malaysia but also in many tropical countries (Cheam 1974, Anwar 1978, Gopal 1990, Jacobsen 1990, Mashhor and Masnadi 1994).

### METHODOLOGY

A field survey was conducted from 4<sup>th</sup> to 5<sup>th</sup> May 2000 at the Ayer Hitam Forest, which covers 1248 ha of logged-over mixed dipterocarp forest in Puchong, Selangor. This relatively small and green area has been the centre of forestry research and development for Universiti Putra Malaysia since 1996 (Faridah Hanum 1999). A total of six sampling sites which were divided into undisturbed and disturbed areas were identified. The undisturbed areas were Sungai Rasau, Sungai Bohol and a pool in Sungai Rasau. The disturbed areas were the 3km logging trail, base-camp and part of Sungai Rasau that flows through a nearby construction site (Figure 1).

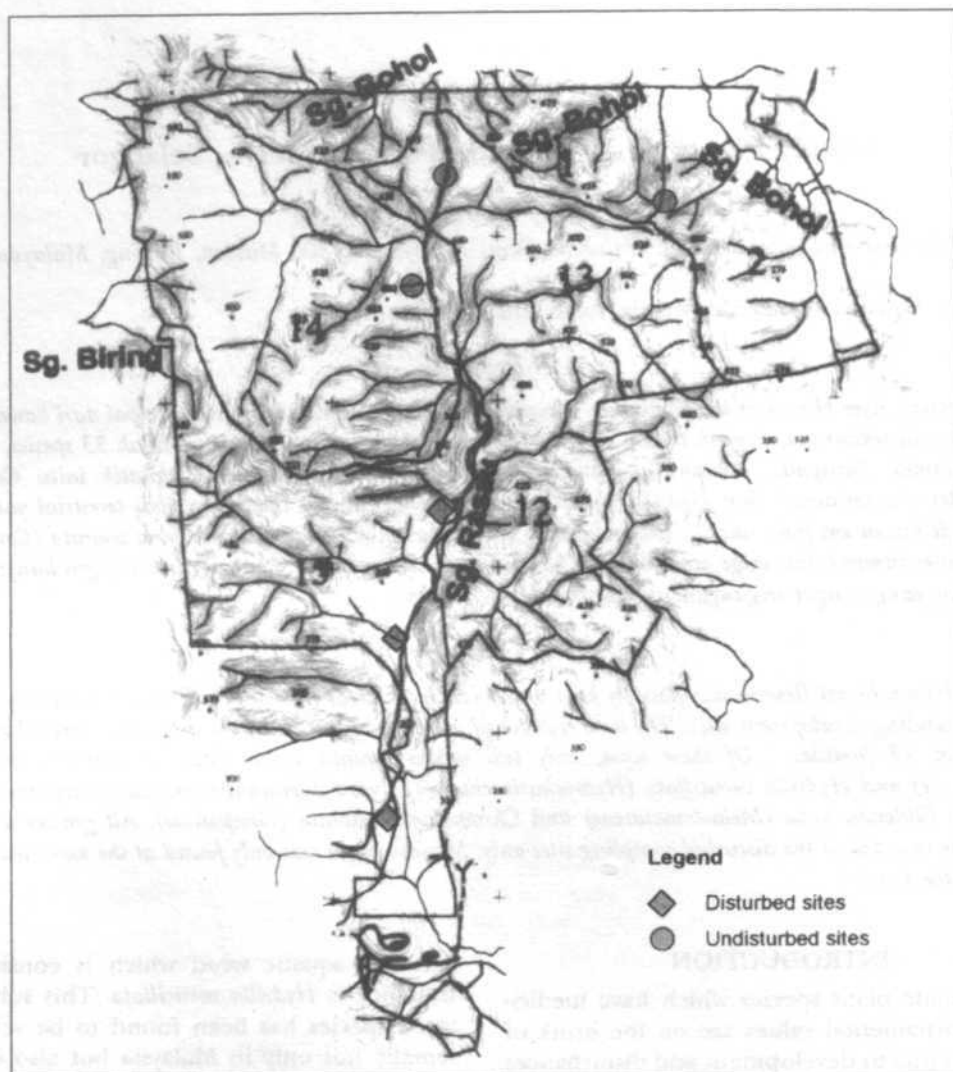


Fig. 1. Sampling sites at Ayer Hitam Forest Reserve, Selangor

All aquatic and terrestrial weeds located within the sampling sites were recorded and collected as herbarium specimens. All specimens were deposited at the Herbarium, School of Biological Sciences, Universiti Sains Malaysia, Penang. The abundance of weeds were determined by the Braun-Blanquet method (1932).

#### RESULTS AND DISCUSSION

A total of 13 families, 29 genera and 33 species of plants were recorded in the survey (Table 1). From the survey conducted only two aquatic weeds, *Ceratopteris thalictroides* and *Hydrilla verticillata* were found to be abundantly distributed along the disturbed area of Sg. Rasau. The

dominant terrestrial weedy species recorded were *Clidemia hirta* and *Chromolaena odorata*. These two species were found to be relatively abundant at all disturbed sampling sites. Several populations of the noxious weedy species *Mimosa pigra* flourish at the construction site only (Table 1) while grasses and sedges species were recorded from all the disturbed sites surveyed (Table 1).

The low number of aquatic weedy species recorded in the area was probably due to the physical conditions of the forest. Sg. Rasau and Sg. Bohol are fast flowing rivers, thus the habitats are not suitable for the colonization of many aquatic plants especially a floating one which needs a stagnant condition. Strong current can



TABLE 1

Abundance of weeds taxa in Ayer Hitam Forest Reserve, Selangor

Vegetation surveyed using Braun-Blanquet (1932) cover scale: (1) vegetation cover &lt; 5%, (2) 5% ≤ vegetation cover &lt; 25%, (3) 25% ≤ vegetation cover &lt; 50%, (4) 50% ≤ vegetation cover &lt; 75%, (5) 75% ≤ vegetation cover ≤ 100%.

Family	Species	Sampling sites					
		Undisturbed area			Disturbed area		
		Sg. Rasau	Sg. Bohol	Pool	Logging trail (3 km)	Base Camp	Sg. Rasau (construction site)
<b>Aquatic</b>							
Parkeriaceae	<i>Ceratopteris thalictroides</i> (L.) Brongn.			1		5	4
Hydrocharitaceae	<i>Hydrilla verticillata</i> (L.f.) Royle						5
<b>Broadleaf</b>							
Acanthaceae	<i>Asystasia nemorum</i> Nees			1	3	4	3
Acanthaceae	<i>Asystasia gangetica</i> (L.) T. Anderson	1	1				
Compositae	<i>Chromolaena odorata</i> (L.) R.M. King & H. Rob			2	4	5	5
Compositae	<i>Mikania micrantha</i> Kunth.		1		3	3	5
Compositae	<i>Agerantum conyzoides</i> L.						5
Dilleniaceae	<i>Tetracera scandens</i> (L.) Merr.			1	2	1	2
Euphorbiaceae	<i>Phyllanthus amarus</i> Schumach. & Thonn.				1	3	
Euphorbiaceae	<i>Croton hirtus</i> L' Her.				1	1	
Leguminosae	<i>Desmodium heterophyllum</i> (Willd.) DC	1				1	
Leguminosae	<i>Mimosa pudica</i> L.			1	2	4	5
Leguminosae	<i>Mimosa diplotricha</i> C.Wright ex Sauvalle			1		3	5
Leguminosae	<i>Mimosa pigra</i> L.						5
Melastomataceae	<i>Clidemia hirta</i> (L.) D. Don				5	3	5
Melastomataceae	<i>Melastoma malabathricum</i> L.				4	2	5
Oxalidaceae	<i>Oxalis corniculata</i> L.				1	1	2
Rubiaceae	<i>Hedyotis corymbosa</i> (L.) Lam				2	2	3
Rubiaceae	<i>Borreria laevicaulis</i> (Miq.) Ridl.				1	1	1
Scrophulariaceae	<i>Lindernia crustacea</i> (L.) F.Muell.			1			2
<b>Grasses</b>							
Gramineae	<i>Cynodon dactylon</i> (L.) Pers.				2	2	3
Gramineae	<i>Eragrostis amabilis</i> (L.) Wight & Arn. ex Hook & Arn.					1	1
Gramineae	<i>Pennisetum polystachion</i> (L.) Schult.				3		5
Gramineae	<i>Axonopus compressus</i> (Sw.) P. Beauv				1		1
Gramineae	<i>Panicum repens</i> L.				2	2	4
Gramineae	<i>Paspalum conjugatum</i> Berg.					3	5
Gramineae	<i>Chrysopogon aciculatus</i> (Retz.) Trin.				1	2	2
Gramineae	<i>Imperata cylindrica</i> (L.) P. Beauv				3	3	5
Gramineae	<i>Centotheca lappacea</i> (L.) Desv.				1	2	3
<b>Sedges</b>							
Cyperaceae	<i>Kyllinga nemoralis</i> (J.R. Forst.& G. Forst)						
Cyperaceae	Dandy ex Hutch.& Dalziel				2	2	3
Cyperaceae	<i>Kyllinga polyphylla</i> Willd. ex Kunth				2	3	4
Cyperaceae	<i>Scleria sumatrensis</i> Retz.				3	2	4
Cyperaceae	<i>Cyperus distans</i> L. f.				1	3	2

easily uproot aquatic plants. However, the high population of *Ceratopteris thalictroides* recorded in Sg. Rasau was found in the slow moving part of the river near the bathing spot of the camp site. The high amount of light received in this location and possible adaptation to the new environment may contribute to its flourishing population. Any aquatic landscapes made by human such as dam, channel, drains and pond are likely to have a greater tendency to be infested by aquatic plants (Abdullah 1999). However, the conditions of water bodies at the surveyed sites may be insufficient for other aquatic weed species to flourish.

There were also larger populations of *C. thalictroides* and *H. verticillata* recorded at the construction site, immediately adjacent to the forest. This was probably due to the higher nutrient input from the workers' quarters. The impact of human activities to the water quality, the kind and amount of wastes and pollutants dumped into the water will create pollution and eutrophication that in turn can change the life-form in an aquatic ecosystem. Nutrients such as nitrogen, phosphorus and micronutrients are the important elements in hydrosol for the aquatic plants growth (Steward 1984, Soerjani

1986, Sutton and Portier 1995). Too high nutrient concentrations however, can trigger unnecessary floral bloom.

Weedy species coverage in disturbed areas was relatively higher when compared to less disturbed sites (Fig. 2). The vast open areas in the construction site were found to be dominated by grasses and sedges. This maybe due to the opening of the area. The abundance of *Clidemia hirta* and *Chromolaena odorata* was due to regular disturbances of the sites surveyed. These species are good indicators for a disturbed habitat especially in newly opened areas. In addition to *C. hirta*, *Melastoma malabathricum* is also found in abundance in disturbed areas. Other broad-leaved weeds (Table 1) are amongst the pioneer plant species which can subsequently colonize the whole area.

The surrounding areas adjacent to Ayer Hitam Forest are currently under extensive housing development projects. The noxious weed, *Mimosa pigra* was only found at the construction site bordering the forest. The seeds of this species are believed to be brought by heavy machines brought from areas which have already been infested by *M. pigra*.

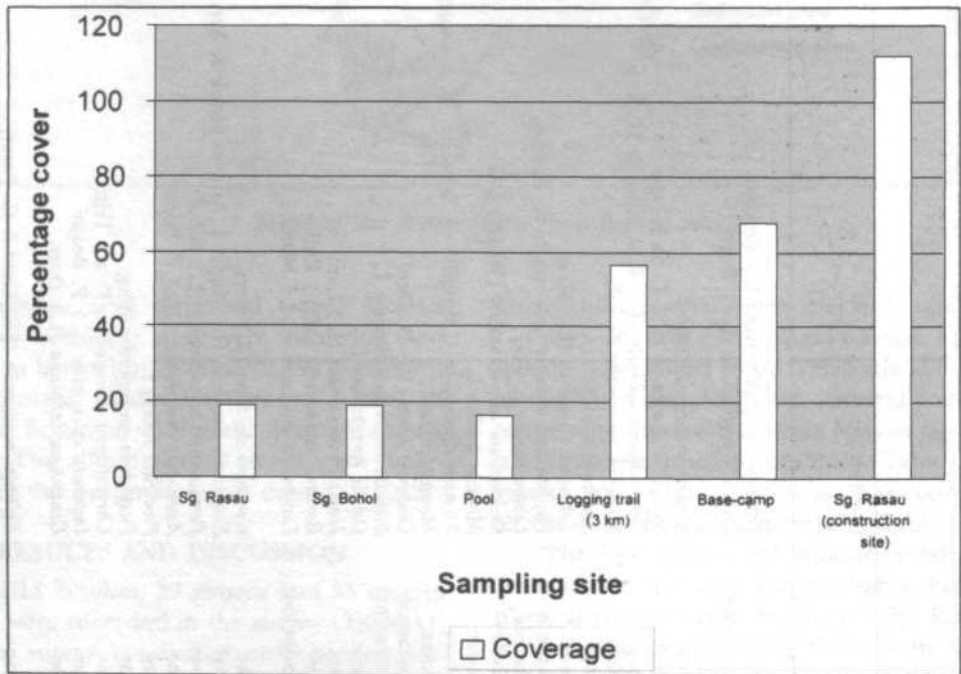


Fig. 2. Percentage cover of sampling sites by weeds



## CONCLUSION

The intrusion of weedy species especially the noxious ones should be considered as a serious threat to the Ayer Hitam Forest ecosystem. The invasion of noxious weeds such as *Mimosa pigra* from the adjacent area deserves close monitoring as it can displace original populations of other species in the undisturbed areas of the forest.

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## REFERENCES

- ABDULLAH, H. 1999. Effect of 2,4-D on aquatic weed *Hydrilla verticillata*. MSc. Thesis, USM. Penang (Unpublished).
- ANON. 1956. Terminology Committee of Weed Science Society of America.
- ANWAR, A. I. 1978. Some recent studies of *Salvinia*, an aquatic weed in rice. Information paper no. 6. Rice Research Branch (MARDI) 10 p.
- BAILEY, L.H and E.Z. BAILEY. 1941. *Hortus the Second*. New York: Macmillan.
- BRAUN-BLANQUET, J. 1932. *Plant sociology: the Study of Plant Communities*. Transl. G.D Fuller & H.S. Conard, 430 p. New York: Mc Graw Hill Book Co.
- CHEAM, A.H. 1974. Current status of aquatic weed problems in Peninsular Malaysia. Paper presented at *Southeast Asia Workshop on Aquatic Weeds*, 25-29 June 1974, Malang, Indonesia. 18 p.
- FARIDAH HANUM, I. 1999. Plant diversity and conservation value of Ayer Hitam Forest, Selangor, Peninsular Malaysia. *Pertanika. J. Trop. Agric. Sci.* 22(2): 73 - 83.
- GOPAL, B. 1990. Aquatic weed problems and management in Asia. In A.H. Pieterse & K.J. Murphy (Eds.), *Aquatic Weeds, the Ecology and Management of Nuisance Aquatic Vegetation*. p. 318-354. Oxford: Oxford Science Publications.
- JACOBSEN, N. 1980. Does *Cryptocoryne ferugina* flower at full moon? *Aroideana* (3): 111 - 116.
- KIEW, R. 1990. Conservation of plants in Malaysia In *The Plant Diversity of Malesia*. ed. P. Baas. p. 313 - 322.
- MASSHOR, M. and M. MASNADI. 1994. *Cryptocoryne elliptica*, an endangered amphibious plant in Pomdok Tanjog Forest Reserve, Peninsular Malaysia. *Aquatic Botany* 47: 91 - 96.
- MERCADO, B.L. 1979. *Introduction to Weed Science*. South East Asia Regional Center for Graduate Study and Research in Agriculture (SEARCA), College, Laguna, Philippines. 292 p.
- SOERJANI, M. 1986. Aquatic vegetation management. In *Weeds and the environment in the Tropics*. ed. K Noda and B.L. Mercaso. 10th Conference of the Asian-Pacific Weed Science Society, p. 33 - 49. Thailand: Chiang Mai.
- STEWART, K.K. 1984. Growth of *Hydrilla (Hydrilla verticillata)* in hydrosol of different composition. *Weed Science* 32: 371 - 375.
- SUTTON, D.L and K.M. PORTIER. 1995. Growth of dioecious *Hydrilla* in sediments from six Florida lakes. *J. Aquat. Plant Management* 33: 3 - 7.