BIOLOGICAL CONTROL OF WATER HYACINTH: EARLY OBSERVATIONS

By S. Laup, Biologist, Aquatic Weed Control Unit,
Saramandi Research Station, Wewak, East Sepik Province

INTRODUCTION

Water hyacinth, *Eichhorniae crassipes*, is a water weed that comes from South America. It has spread to most tropical countries as an aquarium or ornamental plant. This weed forms dense floating masses in lakes, lagoons and waterways. It prevents the use of the water for recreation and transport; it chokes pumping stations; it alters the habits of fish and fishermen; it provides a surface for breeding of disease carrying insects like the mosquito.

An article in Harvest, Volume 10, No. 2 described the water hyacinth, its spread within Papua New Guinea and methods of controlling it. In this article we give the latest information on the spread of water hyacinth, and outline the first steps in an attempt at biological control of this weed.

Water hyacinth growing in a pond in Baiuni, Bulolo area, Morobe Province

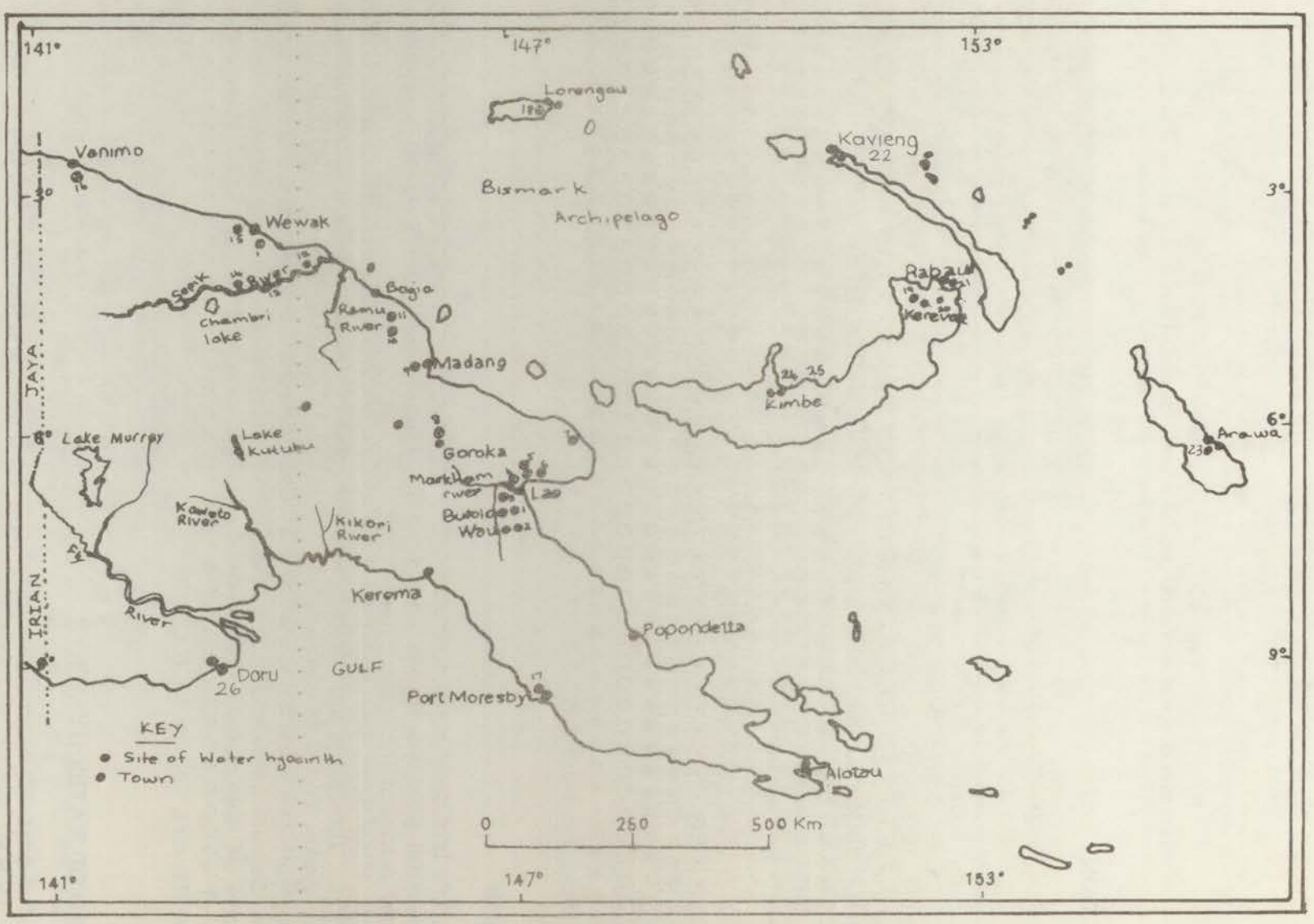
DESCRIPTION

Water hyacinth is a very attractive plant. It has a beautiful pale blue flower with 6 petals. In the centre of the upper petal is a small bright yellow spot, surrounded by a purple margin. The leaves are circular in shape, shiny green, and with swollen leaf bases. The plant can grow as tall as one metre. The diagram on page 38 shows the main features of the plant. A coloured illustration of water hyacinth appeared on the cover of Harvest, Volume 10, No. 2.

Water hyacinth, showing its size

THE SPREAD OF WATER HYACINTH

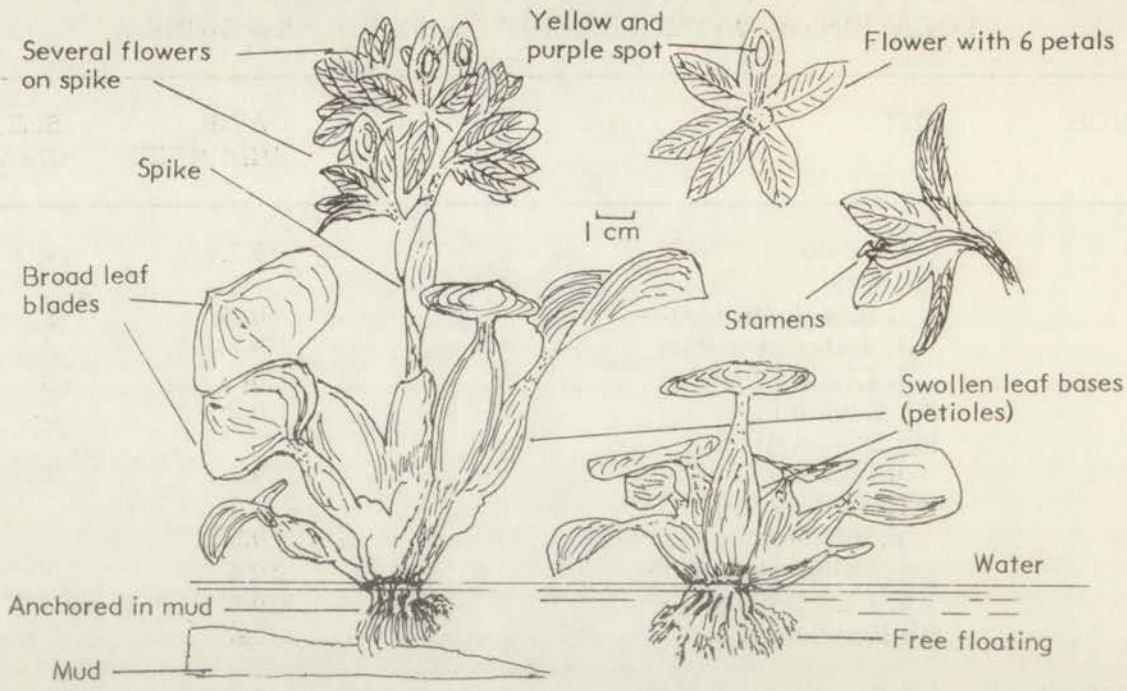
The earliest record of water hyacinth in Papua New Guinea was at Bulolo in 1962. Since then the plant has spread to other



Distribution of water hyacinth infestations in Papua New Guinea

TABLE 1. LOCATION OF WATER HYACINTH IN PAPUA NEW GUINEA.

PROVINCE	SITE	DATE REPORTED	SITE NUMBER ON MAP
Morobe	(a) Bulolo	1962	1
	(b) Wau		
	i. Black's Properties	1963	2
	ii. Water race Pool	1963	2
	iii. Clarkes Pool	1963	2
	(c) Golden Pine	1962	3
	(d) Baiune River		
	i. Blue Lagoon	1962	3
	(e) Lae township		
	i. Settlements 2-5 mile	1986	4
	ii. Police stn 3 mile	1986	5
	iii. PTC College	1986	
	(f) Finschhafen	1986	7
Eastern Highlands	(a) Goroka township	1986	8
	(b) Ukarumpa (SIL)	1986	
Madang	(a) Madang township		
	i. Fisch Street, Wagol tributary	1983	9
	ii. Melanesian Hotel crk, Bogia Road	1983	9
	(b) Wewak Timbers, Bogia Road	1984	10
	(c) Plantation hotel crk, Bogia Road	1984	11
East Sepik	(a) Wewak township	1984	15
	(b) Taway, near Sepik River	1984	12
	(c) Kanduanum, near Sepik River	1984	13
	(d) Timbunke, near Sepik River	1984	14
West Sepik	(a) Vanimo town	1986	16
National Capital	(a) Port Moresby	1969	17
Manus	(a) Lorengau town	1986	18
East New Britain	(a) Rabaul township, Chinese Premises	1969	21
	(b) Keravat Kurakakaul creek	1969	19
	(c) Malabunga High School	1969	20
New Ireland	(a) Kavieng town	1979	22
North Solomons	(a) Kieta town	1986	23
West New Britain	(a) Kimbe town	1986	24
	(b) Oil Palm settlements	1986	25
Western	(a) Daru township	1986	26
	(b) Balimo station	1986	27



This diagram shows details of the various parts of the water hyacinth plant

areas such as Golden Pine near Bulolo where it covers 2 -3 ha. Water hyacinth has become widespread throughout Morobe and Madang Provinces. A few infestations have been eradicated (completely removed) from both the East and West Sepik Provinces. Infestations reported from East New Britain have also been removed. The weed has also been reported in Manus, New Ireland, North Solomons, Eastern Highlands, Central, West New Britain Province and Western Provinces. The dates and locations of outbreaks are shown on the map on page 36, and in Table 1.

CONTROLLING THE WEED

Two methods of control have been used in Papua New Guinea - physical control and chemical control.

Physical control

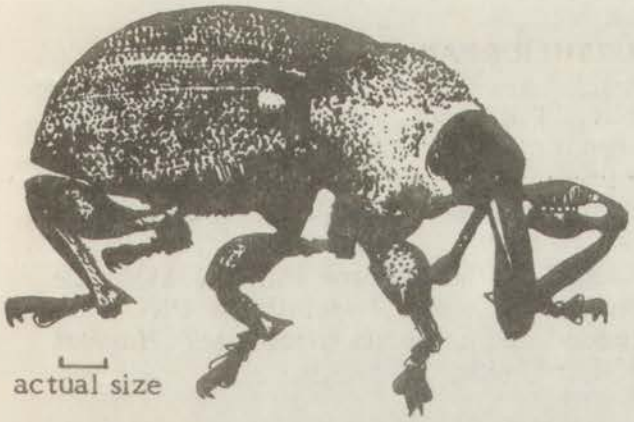
The plants are uprooted, dried and then burnt with distillate. Distillate is used to help the plants burn completely. Follow-up checks are made for new out-breaks or re-growths. This method is suitable for dealing with small infestations only.

Chemical control

Larger infestations can be sprayed with chemicals such as 2,4-D ester at 0.5-1.5 kg/500 litres water, before and after flowering. A mixture of 2,4-D and another chemical called 2,4,5-T is also effective. However, chemicals are expensive and will become even more expensive. There is also the danger of environmental pollution (poisoning).

BIOLOGICAL CONTROL

Biological control means introducing a natural enemy of the weed, which will feed off it and eventually kill it. One of the reasons why water hyacinth grows so well in Papua New Guinea is that it has no natural enemies here. In South America the weed is kept under control by its natural enemies. One of these is a small weevil *Neochetina eichhorniae*. This weevil has been found to be very promising in controlling water hyacinth. In June 1985, 500 adults of *N. eichhorniae* were imported from CSIRO, Australia into Papua New Guinea, for the control of water hyacinth.



Adult Neochetina eichhorniae, *about 18 times natural size*

(Illustration: Jackson Kaumana)

Release sites

The 500 weevils were released into 3 patches of water hyacinth in Madang Province in June 1985.

Damage to water hyacinth

After releasing the weevils onto water hyacinth, the adults first feed on the leaf blades and petioles (stems), causing scars 2-3 mm across. There can be from 10 to 300 scars per leaf. This is followed by more feeding, especially around the base of the plant.

The larvae feed by tunnelling through the leaf blades, petioles and crown (just below the flower). This is followed by a break-down of tissue due to soft rot. The larvae move from one petiole to another to feed. Eventually the plant becomes waterlogged and dies.

Leaf scars on water hyacinth, caused by the feeding of the weevil

Biology

The adults lay eggs on the leaf blades, petioles and leaf sheaths. After 7 to 14 days larvae hatch from the eggs. The larvae feed for 75 to 90 days, then move to the roots where they pupate (enter the resting stage). This stage lasts 14-20 days, after which the adults emerge.

The adults feed mostly at night. During the day, they gather in the tightly folded tissue in the crown of the plant. These weevils can live only in an aquatic (water) or partly aquatic environment. A wax coating protects them from the water. They die soon after exposure to dry conditions. Adult *N. eichhorniae* live from 90 days up to 1 year.

Distribution of the weevils

The population of the weevils is increasing at all 3 release sites but only very slowly. The rise in population level was expected to be slow. When enough insects are available, more releases will be made at other water hyacinth infestations in Papua New Guinea.

PUBLICITY

It is very important at this stage to make people aware that, water hyacinth could be a serious weed of Papua New Guinea's rivers and waterways. People must be discouraged from growing it on their premises as an ornamental plant.

Already a poster has been issued by the Aquatic Weed Control Unit. This poster states the dangers of water hyacinth in English, Pidgin and Motu. It has been sent to all Provincial Government authorities, and to the Division of Primary Industry in each Province, as part of the public awareness programme.

CONCLUSION

Since the biological control of water hyacinth is still at an early stage, it is very important to continue a publicity campaign to inform people about its dangers. Any water hyacinth found growing should be removed immediately. It is hoped that this

will reduce the risk of this weed becoming a serious problem on Papua New Guinea's fresh-water lakes and river systems.

IF YOU DISCOVER WATER HYACINTH...

If you discover water hyacinth growing in your area, the Aquatic Weed Control Unit would like to hear about it. If the infestation is very small, the plants should be removed and burnt as described earlier in this article. If a large area is covered with the weed, you should contact the Aquatic Weed Control Unit for advice about the best way to get rid of the plants. You should write to:

The Officer-In-Charge
Aquatic Weed Control Unit
Saramandi Research Station
P.O. Box 433
WEWAK
East Sepik Province

Telephone: 883083

Copies of the poster mentioned above can also be obtained from this address.

FURTHER READING

Henty E.E. and Pritchard G.H. (1982). *Weeds of New Guinea and Their Control.* Botany Bulletin 7, Division of Botany, Office of Forest Lae, Papua New Guinea.

Leach G.J. and Osborne P.L. (1984). The spread of water hyacinth in PNG - A second warning or is it too late? *Harvest* 10 (2): 51-53.

Leach G.J. and Osborne P.L. (1985). *Freshwater Plants of Papua New Guinea.* University of Papua New Guinea Press PNG.