Water hyacinth

Eichhornia crassipes

DECLARED CLASS 2

Originally introduced to Australia as an aquatic ornamental plant, water hyacinth has become a major pest of rivers and dams. Not only does it destroy native habitats, but it also seriously depletes water bodies of oxygen, increases water loss and provides a breeding ground for mosquitoes.

An integrated control program that includes prevention and control (by physical, biological and chemical means) is the most effective management strategy. Ideally, dead plants are removed to avoid putrefaction of the water body.

Description

Water hyacinth is a floating waterweed with a fibrous root system and dark green rounded leaves up to 5 cm in diameter. The leaf stalks are swollen into spongy, bulbous structures.

Flowers are light purple with a darker blue/purple and yellow centre. They are carried in dense spikes projecting above the plant.

The problem

Rampant growth of water hyacinth can destroy native wetlands and waterways, killing native fish and other wildlife.

Water hyacinth can form dense mats that spread out across water surfaces eventually choking the entire water body. Propagation can be so rapid that an infestation may double in size every week under ideal conditions.

Water hyacinth can spread rapidly through the waterways of catchments. It is particularly important that infestations are prevented from entering the Murray-Darling system where an infestation could easily spread into three southern states.

Heavy infestations can affect water bodies in a number of ways:

Safety and health risk
Children and livestock may be in danger of drowning if they become entangled in the roots and stolons of a heavy infestation. Water hyacinth mats also create a haven for mosquitoes that are vectors of Ross River Fever and Encephalitis.

Interference with irrigation and stock watering
Stock may have difficulty gaining access to water to drinking water if the surface is completely covered by weeds.

Water flow to irrigation equipment is reduced to the restrictive action of the roots, which in turn increases pumping times and costs.

Damage to structures
Under flood conditions, rafts of plant material build up at fences and bridges that in turn collect other floating debris. The combined weight may cause these structures to collapse.

Loss of water
High rates of transpiration through the leaves during summer can cause up to four times the loss of water from normal water surface evaporation.

Degradation of water quality
Heavy water hyacinth infestations reduce the infiltration of sunlight necessary for native plant growth in creek and riverbeds. Heavy weed cover also prevents the exchange of air, which normally occurs on an open water surface.

As the weed dies and decomposes, oxygen is removed from the water causing water pollution and stagnation. This stagnation affects water quality and may result in the death of aquatic animals.

Destruction of wildlife habitats
A large infestation of water hyacinth is a physical barrier for aquatic and semi-aquatic animals, restricting their territorial movements and breeding activities.

Recreation and aesthetics
Large infestations of water hyacinth stop the passage of boats by clogging the inlets of boat engine water-cooling systems. The mats of weed also degrade the quality of swimming and make fishing impossible. The natural beauty of an open water body can be spoilt and further degraded as native aquatic plants, birds and animals are displaced.

Life cycle

Water hyacinth grows from seed and through vegetative reproduction. Seeds are produced in capsules at the base of each flower. Daughter plants are produced by vegetative reproduction, remain attached to the parent plant until they are broken off by wind or other physical damage.

Flowering can begin as early as October and continue through the summer months. Each of the flowers on a stalk remains open for one to two days before beginning to whither. When all the flowers on a plant have withered, the stalk gradually bends into the water and after about 18 days, seeds are released from capsules at the base of each dead flower.

In warm climates, vegetative reproduction is rapid and enables the formation of large, dense rafts of plants within a short time.

Habitat and distribution

Originally from Brazil, water hyacinth was introduced to the Brisbane metropolitan area as an ornamental pond specimen in the early 1900s. Valued for its floral presentation, it was released into ponds and lagoons in public parks throughout Queensland.

Flooding then spread the plant into creeks, rivers and dams where, having no natural predators, it flourished and quickly became a nuisance.

Infestations now occur mostly in coastal Queensland and New South Wales where the plant prefers fresh, static or slow flowing water with high organic content.

Declaration details

Water hyacinth is a declared Class 2 plant under the *Land Protection (Pest and Stock Route Management) Act 2002*. A **Class 2** pest is one that has already spread over substantial areas of Queensland, but its impact is so serious that we need to try and **control** it and avoid further spread onto properties that are still free of the pest. By law, all landholders must try to keep their land free of Class 2 pests and it is an offence to keep or sell these pests without a permit. A Local Government may serve a notice upon a landholder requiring control of declared pests.

Prevention

Floodwater can deposit water hyacinth in dams, lagoons and in calm water areas of rivers and creeks. Attempts to physically remove plants should be made before they flower and set seed.

As water hyacinth seeds are extremely long-lived, new plants may spring up long after older plants have been removed.

Control

Weed control is not cheap, but it is cheaper now when you consider the effects to you, your property and the environment if nothing is done. It is also much easier and cheaper to prevent weed establishment when small weed infestations are treated quickly.

The development of a pest management plan can help ensure value for money and time. When developing a pest management plan it is essential the pest problem is carefully investigated. Some issues to consider include:

- Where is the weed coming from?
- How can I contain the weed and stop new infestations?
- What can I do to reduce existing infestations?
- What does the legislation require me to do?
- What does the Local Government Area Pest Management Plan require me to do?
- How does weed control fit into my property plan?
- What can I do to restore areas and prevent the weed re-establishing?
- Who can I work with to get a better result?
- What other impacts do I need to consider when I control the weed?

In most cases the best management approach combines chemical, mechanical, fire and biological control methods with land management changes. It is essential the control methods chosen suit the specific weed and the particular situation.

Mechanical control

Water hyacinth removal by hand or machine is a practical control method often used for small areas or when numbers are low. Physical removal is most effective for small infestations and should be made before flowering and seed set in October.

Mechanical control of water hyacinth can help take advantage of flooding or water flushes that deposit water hyacinth in dams, lagoons and calm water areas of rivers and creeks. When using this approach it is essential water hyacinth is removed before its rapid growth commences.

When water hyacinth is deposited or left on moist banks it can survive for long periods out of water. To help prevent the reintroduction of water hyacinth into the watercourse, it is essential it is moved from the waters edge and preferably burnt.

Biological control

Biological control is most effective on large areas of water hyacinth and may take many years to achieve satisfactory control.

Four insect species have been introduced from South America and released by CSIRO since 1975. The two weevil species *Neochetina eichhorniae* and *Neochetina bruchi*, and the two moth species *Niphograpta albiguttalis* (previously known as *Sameodes albiguttalis*) and *Xubida infu*sella are present in Queensland.

The weevil *N. eichhorniae* has been the most successful and has played a key role in removing large infestations in tropical areas of the state. The adult is black, 5 mm long and feeds on the leaves making small scars. Eggs are laid in the bulbous leaf stalks and the larvae tunnel through the plant tissues. Bacteria and fungi then attack the damaged tissues and under heavy attack the plant becomes waterlogged and eventually dies. The life cycle of the weevil takes three months and the insect is inactive over winter.

The other weevil, *N. bruchii*, is active through the winter and complements *N. eic*hhorniae control. This weevil was first released in south-east Queensland in 1990 and in north Queensland in 1991. Field-testing of this weevil is still ongoing and it appears that *N.bruchii* is effective. It is suggested the introduction of both weevils to an aquatic system is the best possible option, because their life cycles complement each other. However, both weevils are much less effective in sub-tropical and cooler areas.

The moth *N. albiguttalis* is well established in north and south-east Queensland and in northern NSW. The larva of this moth tunnel into the petioles and buds and although effective on young plants the impact is often temporary and patchy.

The other moth, *A. infusella*, also has larvae that tunnel in petioles and buds and was first released in Ingham in 1981. New stocks were released in Queensland from 1996 to 1999 by CSIRO but the success of this release is currently unknown.

To establish an effective breeding population of biological control agents, infested plants should be placed in an area where the water hyacinth is concentrated. Your Local Government Office or local Land Protection Officer from the Department of Primary Industries and Fisheries can assist you with protocols and information on the collection site nearest to you.

The presence of these biocontrol agents does not relieve landholders from their responsibility under Queensland legislation to control declared plants.

Herbicide control

Before using any herbicide always read the label carefully. All herbicides must be applied strictly in accordance with the directions on the label. When treating water that is used for irrigation purposes, the withholding period should be followed in accordance with the label recommendations.

Spraying an entire heavy infestation can cause water hyacinth to sink and result in pollution from the rotting weed. This problem can be avoided by spraying strips of the weed or by mechanically removing much of the weed before spraying. For this reason it is vital to destroy scattered plants when they appear rather than delaying treatment until the entire water body has been choked. Heavy infestations on shallow water

Diquat is the only herbicide registered for use in water storage areas used for human consumption. Note that 14 days must elapse after treatment before water can be consumed.

Integrated control

Integrated control is a sensible strategy that includes the combination of mechanical, biological and chemical methods that complement each other.

First make certain that the weevils are established on the infestation, and then carry out mechanical control or a spray program using a selective herbicide. Selectively controlling strips of the water hyacinth mats helps concentrate the biological control insects onto the remaining weed to increase damage.

Mechanical removal of dead plants will avoid water quality degradation by masses of rotting weed.

Further information

Further information is available from the vegetation management/weed control/environmental staff at your local government.

TABLE 1 – HERBICIDE REGISTERED FOR THE CONTROL OF WATER HYACINTH

Situation	Herbicide	Rate	Comments
Waterways, non potable water, drains, dam margins, lakes and streams	2,4-D acid (AF 300®)	1:200 with water	Refer to label
Aquatic areas, channels, dams, bore drains, waterways	Amitrole (Amitrole R®, Weedeath®)	280 mL/100 L	Apply immediately prior to flowring. If infestation is large, treat in sections to avoid eutrophication of water.
Aquatic areas	Diquat (Reglone®)	400 mL/100 L water + 15 mL non-ionic wetting agent	Thoroughly saturate. **Do not** use water for 10 days after application.
Aquatic areas	Diqute (Watrol® Vegetrol®)	50-100 L/ha or 4 L/100 L water	Thoroughly wet foliage. **Do not** use water for 10 days after application.
Aquatic areas	Glyphosate (numerous products)	1-1.3 L/ 100L water	Refer to label
Aquatic areas	2,4-D ester	270 mL/100 L	Refer to label
Pastures, rights of way, industrial	2,4-D (dimethylamine salt)	Various	Refer to label