Water lettuce

Pistia stratiotes

Water lettuce is a free-floating aquatic weed that rapidly forms dense mats covering rivers, dams and irrigation canals. It can restrict water flow, increase water loss by transpiration and serve as a breeding ground for mosquitoes. Water lettuce spreads both by vegetative reproduction and by seeds.

Much of the Murray–Darling catchment is currently free of this weed and all efforts should be made to control known infestations and prevent further introduction. In all other areas of Queensland, an integrated control strategy should be adopted to reduce infestations.

Declaration details

Water lettuce is a declared Class 2 plant under *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.

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Description and general information

As the name suggests, the entire plant resembles a small, floating, open head of lettuce. The aquatic perennial is spongy and consists of a floating rosette of pale green, fan-shaped leaves covered with hairs. These hairs trap air and give the plant its buoyancy. It has a tuft of unbranched, fibrous roots up to 80 cm long.

Mature plants produce a large number of small, green, inconspicuous flowers in their centre. A membrane separates the male and female flowers. The fruit is a berry 5–8 cm across with oblong seeds about 2 mm long, tapered at each end.

The problem

Under tropical conditions, growth is rapid; dense mats form, often covering rivers, dams and irrigation canals. These mats, with their long roots, can restrict the flow of water, increase water loss through transpiration and reduce light infiltration that is necessary for photosynthesis in submerged aquatic plant life.

The presence of water lettuce is especially undesirable in the Murray–Darling system as it could possibly spread into inland New South Wales, Victoria and South Australia.

Heavy infestations can affect waterbodies 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 of a heavy infestation. Water lettuce 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 drinking water if the surface is completely covered by weeds.

Water flow to irrigation equipment is reduced due 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 increase water loss.

Degradation of water quality

Heavy water lettuce infestations reduce the infiltration of sunlight necessary for native plant growth in creeks and rivers. Heavy weed cover also prevents the exchange of air, which normally occurs on an open water surface.

As the plant dies and decomposes, oxygen is removed from the water; this causes 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 lettuce is a physical barrier for aquatic and semi-aquatic animals, restricting their territorial movements and breeding activities.

Recreation and aesthetics

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

Life cycle

Seeds from the muddy bottom germinate in late November to early December and float to the surface as seedlings. Flowering and reproduction commences early in the plant's life—about the fourth or fifth leaf stage, when plant densities are high.

Propagation is through flower pollination or by stolons (20 cm long), which produce daughter plants. Water lettuce is sensitive to frost and can grow in polluted water.

Habitat and distribution

Originally from Asia, water lettuce was introduced as an aquarium and water garden specimen, and has become naturalised in the Northern Territory. As a result of flooding and abandonment, the plant is now found in a number of areas throughout eastern Queensland. The plant prefers stationary or slow-moving streams and could become established in most areas of the state.

Like other floating plants, water lettuce can survive for long periods when stranded on mud banks or in other damp situations (such as a roadside culvert where it may even take root).

Prevention

New infestations may become established when plants are brought into new areas by flooding. Surveillance and physical removal at such times may prevent infestation. Public education to prevent disposal of plants from domestic situations is necessary.

Control

Weed control is not cheap, but it is *relatively* cheap when you consider the costs 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 to carefully investigate the pest problem.

Some issues to consider include:

- Where is the weed coming from?
- Can I realistically eradicate the weed?
- 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 to choose control methods that suit the specific weed and the particular situation.

Mechanical control

Water lettuce removal by hand or racking is a practical control method often used for small areas or when numbers are low. The use of water weed harvestors may also be used in larger areas.

Physical removal is most effective for small infestations and should be made before flowering and seeding.

Mechanical control of water lettuce can help take advantage of flooding or water flushes that deposit water lettuce in dams, lagoons and calm water areas of rivers and creeks. When using this approach it is essential water lettuce is removed before its rapid growth commences. Water lettuce can survive if it is deposited or left on moist banks it. To help prevent the reintroduction of water lettuce into the watercourse, it is essential it is moved from the waters edge.

Biological control

Two weevils (*Neohydromonus pulchellus and Orchetina bruchi*) have been introduced and exert good control in some areas.

The weevils have proved effective on dams from Bundaberg to Brisbane. The life cycle of the weevil takes about three months. Eggs are laid in the fleshy leaves and the larvae tunnel through the plant tissue. The openings assist the entry of fungi and bacteria, causing the tissue to rot.

Biological control is most effective on large infestations, but it may take many years to achieve satisfactory control if used in isolation from other methods. To establish an effective breeding population of biological control agents, infested plants should be placed in an area where the water lettuce is concentrated.

Your local government office or local Biosecurity Queensland officer can assist you with protocols and information on the collection site nearest to you.

Herbicide control

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

Spraying with herbicides is often the only practical method for large infestations. Autumn applications tend to be more effective than summer ones.

Table 1 lists the herbicides registered for control of water lettuce.

Integrated control

Integrated control is a sensible strategy that includes a 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 lettuce 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 your local government office, or by contacting Biosecurity Queensland (call 13 25 23 or visit our website at www.biosecurity.qld.gov.au).

Table 1. Herbicides registered for the control of water lettuce

Situation	Herbicide	Rate	Comments
Aquatic Areas	Diquat (20 g/L) e.g. Watrol non-residual herbicide®	50 L to 100 L/ha or 4 L/100 L water	Add wetting agent. Higher rate for denser infestations or dirty water. Overall spray, thoroughly wetting foliage. Follow label instructions
	Diquat (20 g/L) e.g. Vegetrol herbicide®	50 L/ha to 100 L/ha or 4 L/100 L water	Add wetting agent. Follow label instructions
Aquatic areas	Diquat (200 g/L) e.g. Reglone non-residual herbicide®	5 L/ha to 10 L/ha or 0.4 L/100 L water	Add wetting agent. Follow label instructions
	Glyphosate (360 g/L) (Numerous)	1 L to 1.3 L/ 100 L water or 6 L/ha to 9 L/ha	Use in Summer. Follow label instructions

Notes:

1. Diquat is the only product registered for use in water storage areas used for human consumption. Note that 14 days must elapse after treatment before water can be consumed.
2. For best results, use diquat in winter and glyphosate in summer. Diquat can be used all year round but glyphosate needs warmer weather.

Fact sheets are available from Department of Employment, Economic Development and Innovation (DEEDI) service centres and our Customer Service Centre (telephone 13 25 23). Check our website at www.biosecurity.qld.gov.au to ensure you have the latest version of this fact sheet. The control methods referred to in this fact sheet should be used in accordance with the restrictions (federal and state legislation, and local government laws) directly or indirectly related to each control method. These restrictions may prevent the use of one or more of the methods referred to, depending on individual circumstances. While every care is taken to ensure the accuracy of this information, DEEDI does not invite reliance upon it, nor accept responsibility for any loss or damage caused by actions based on it.

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