Salvinia

Salvinia spp.

There are several species of salvinia that occur naturally in America, Europe and Asia. So far, only one species—*Salvinia molesta* (a native of Brazil)—has become established in Queensland.

Salvinia affects water quality and availability by creating a haven for mosquitoes, which are vectors of Ross River fever and encephalitis. Heavy weed cover also prevents the exchange of air that normally occurs on an open-water surface. High rates of transpiration through the leaves during summer can cause up to four times more water to be lost than is normally lost through water surface evaporation.

Queensland Government

The mats of weed also interfere with swimming and make fishing impossible. As native aquatic plants, birds and animals are displaced, the natural beauty of an open water body can be spoilt and further degraded.

Under flood conditions, rafts of weed material build up at fences and bridges that, in turn, collect other floating debris. The combined weight may cause these structures to collapse. Water flow to irrigation equipment is reduced due to the restrictive action of the roots, which in turn increases pumping times and costs. Salvinia is listed as a Weed of National Significance.

Legal requirements

Salvinia molesta is a category 3 restricted invasive plant under the *Biosecurity Act 2014*. It must not be given away, sold, or released into the environment. All other salvinia species are prohibited invasive plants under the *Biosecurity Act 2014,* which requires that all sightings be reported to Biosecurity Queensland within 24 hours.

The Act requires everyone to take all reasonable and practical measures to minimise the biosecurity risks associated with invasive plants under their control. This is called a general biosecurity obligation (GBO).

At a local level, each local government must have a biosecurity plan that covers invasive plants in its area. This plan may include actions to be taken on salvinia. Some of these actions may be required under local laws. Contact your local government for more information.

Description

All species of salvinia are free-floating aquatic ferns, with small, spongy, green leaves positioned in pairs along a common stem. The surface of each leaf is covered with long, stiff, water-repellent hairs. When the plant matures, the leaves become thick and fold at the mid-rib.

The young leaves of salvinia are oval, about 12 mm wide, and lie flat on the water surface, often resembling duckweed. A root trails from each pair of young leaves. As salvinia matures, its long filamentous roots resemble wet hair. Trailing stems with small, hairy spore capsules may also be found among the roots of mature plants.

Life cycle

Salvinia is a fern and is believed to be a sterile hybrid. It does not produce flowers—reproducing only by vegetative means. Salvinia prefers warmer temperatures and, because it is frost sensitive, it produces little growth in winter. When summer temperatures rise, salvinia increases its vegetative growth. Under optimal growth conditions salvinia can double in volume every two to three days.

Salvinia reproduces from fragments that can form large thick mats, which can completely cover water storage areas in a relatively short time. To prevent salvinia spreading into other states, it is important that all infestations are controlled—especially those in the Murray–Darling catchments.

Methods of spread

Salvinia is mainly spread by people who empty aquariums and ponds into waterways.

Habitat and distribution

Salvinia is a native of South America and was first reported in Queensland in 1953. It is now found in isolated water bodies from northern Queensland to the New South Wales border, and west to Mount Isa.

Many salvinia infestations can be traced back to plants discarded by aquarium owners.

Generally, salvinia prefers slowly moving streams, or still water ponds with high nutrient levels and water temperatures around 20–30^{0}C.

Control

Managing salvinia

The GBO requires a person to take reasonable and practical measures to minimise the biosecurity risks posed by salvinia. This fact sheet provides information and some options for controlling salvinia.

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

First, make certain that the biological control agents are established on the infestation, then carry out mechanical control or a spray program using a selective herbicide.

Selectively controlling strips of the salvinia mats helps concentrate biological control insects onto the remaining weed, increasing their effectiveness. Mechanical removal of dead plants will prevent masses of rotting weed from degrading water quality.

Prevention and early detection

Prevention is the best form of weed control. The best way to prevent the spread of salvinia is to stop its introduction into waterways from aquariums. It is essential that the washing of plants, or plant parts, into gutters, waterways, creeks, streams and rivers is avoided when ponds and fish tanks are emptied.

Mechanical control

Removal of salvinia by hand or machine is a practical control method often used for small areas, or when weed numbers are low.

Mechanical control can take advantage of flooding or water flushes that deposit salvinia in dams, lagoons and calm waters of rivers and creeks. When using this approach, it is essential to remove salvinia before rapid growth commences.

Salvinia can survive for long periods out of water when it is deposited on moist banks. To help prevent its reintroduction into a watercourse, it is essential that it be moved away from the water's edge and, preferably, burnt.

Biological control

As a result of CSIRO research, *Cyrtobagous salviniae* (salvinia weevil) has been extensively released. In Queensland, it is the main form of biological control of salvinia.

The salvinia weevil is 2–3 mm long and dark brown to black. It is most effective when air temperatures are 27–35^{0}C and plant nitrogen levels are high.

The salvinia weevil larvae feed on the new growth buds and tunnel into the rhizome. Tunnelling weakens the salvinia, reducing its ability to grow and compensate for bud loss. As they prefer to feed on buds, adult weevils also affect plant growth.

In the initial stages of weevil damage, some salvinia leaves will turn brown. As the salvinia weevils continue their control efforts, the whole mat will turn brown, sink underwater and finally decompose.

Although effective in tropical areas, the salvinia weevil is not establishing as intensely in cooler southern Queensland and may take several years to control infestations there. Depending on the size of the infestation and the environmental conditions, the time taken for weevils to control salvinia varies from 1–3 years. They may take more than five years to establish in cooler areas.

To ensure maximum build up, it is best to release salvinia weevils in spring. When releasing weevil-infested salvinia, it is essential to choose warm, sunny positions where a drop in water level will not leave the salvinia stranded.

To establish an effective breeding population of weevils, infested plants should be placed in an area where the salvinia is concentrated. Your local government office can assist you with protocols and information on the collection site nearest to you.

Herbicide control

All herbicides must be applied strictly in accordance with the directions on the label and minor use permit. When a wetting agent is recommended, always use a commercial wetting agent or surfactant.

More information

More information is available from your local government office or visit biosecurity.qld.gov.au.

Table 1. Herbicides for the control of salvinia

Situation	Herbicide	Rate	Comments
Aquatic areas (drains, channels, margins of streams, lakes and dams)	Calcium dodecylbenzene sulphonate 300 g/L (e.g. Apparent Immerse)	1 part in 19 parts kerosene	Sprinkle onto free-floating plants and adjacent water surface lightly, just enough to change their normal colour. Do not use water for potable consumption.
Minor water impoundments	Orange oil 55.2 g/kg + sufactants 195 g/kg (e.g. Water Clear, Freefall)	1 L/100 L water	Do not use water for potable consumption. Do not use in natural water bodies.
Aquatic areas	Gyphosate 360 g/L and registered for aquatic use (e.g. Weedmaster Duo)	1 L/100 L water applied at 900 L/ha	Permit 10892 for persons generally (expires 31/08/2027)
	Diquat 200 g/L (e.g. Reglone, Diquat 200)	5–10 L/ha or 400 mL/100 L water	Thoroughly wet foliage. Use higher rate for heavy infestations or for deep or dirty water (consult label). Do not use water for 10 days after application.
	Diquat 200 g/L (e.g. Reglone, Diquat 200)	400 mL/ha plus Bonus wetting agent Permit 81236 (permit expires 30/06/2023)	Small areas: spray to wet weeds thoroughly About 1 mL should be sufficient to treat 1 m^2. Do not use water for 10 days after application.
Water impoundments and associated channels managed by Queensland State water authorities	Gyphosate 360 g/L and registered for aquatic use (e.g. Weedmaster Duo)	6–9 L/ha or 1 L/100 L water plus Bonus wetting agent Permit 81236 (expires 30/06/2025)	Permit 86933 for staff or contractors employed or contracted by SEQ Water, Sunwater or other Queensland State water authorities (expires 30/09/2025)

Diquat is the only product registered for use in water storage areas used for human consumption. Do not use treated water for human consumption, livestock watering or irrigation purposes for 10 days after application of diquat.

Read the label carefully before use and always use the herbicide in accordance with the directions on the label.

Fact sheets are available from biosecurity.qld.gov.au. The control methods recommended 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, the department does not invite reliance upon it, nor accept responsibility for any loss or damage caused by actions based on it.

02/24