Salvinia molesta

Salvinia molesta is a '*Weed of National Significance'* in Australia and a declared weed in Queensland. It is a declared Class 2 plant under the Land Protection Act and by law all landholders must attempt to maintain their land free of this pest. *Salvinia molesta* is considered one of the worst weeds in Australia due to its potential for spread, invasiveness, economic cost to the community, along with its environmental impacts. Landholders in Queensland can be directed by their local government to manage this aquatic weed on their property.

Salvinia molesta is native to Southern Brazil, is a free floating aquatic weed and was first identified on the East Coast of Australia in the early 1950's. It is a fern and multiplies vegetatively covering water surfaces cutting out light and air to other aquatic organisms. Being a fern, it does not produce flowers, but in Australia has also not been known to produce spores and is possibly a sterile hybrid. Mature salvinia plants multiply by producing buds at each leaf node which develop into new plants.

Salvinia molesta grows in still or slow moving fresh water, prefers water temperatures between 20° and 30°C, and has become an environmental weed throughout temperate, sub-tropical and tropical areas. Salvinia is frost sensitive and produces minimal growth during winter especially with temperatures below 10°C however under ideal conditions it grows extremely quickly with infestations capable of doubling in size every 2 to 3 days. Once introduced into a waterway or water storage, it is capable of quickly spreading and choking the system. The weight of a severe infestation of salvinia can be as much as 400 tonnes per hectare.

Salvinia molesta forms dense mats of aquatic weed consisting of many branched horizontal stems floating on the water surface. These floating weed mats comprise pairs of floating, oval, hairy, green leaves/fronds situated at each node along a common stem with brown filaments hanging from each pair of leaves/fronds acting like roots to absorb nutrients. The leaves/fronds of salvinia thicken and fold at the mid rib as the plant matures and the weed infestation increases in size.

Salvinia molesta infestations can increase the evaporation loss from water storages due to the high transpiration rates of the plants in summer (up to four times). It shades other vegetation, impedes the natural oxygen exchange at the water surface, generally makes the water unsuitable for fish or other animal and plant life, and can become a breeding area for mosquitoes. It can interfere with irrigation systems, clog suction lines and foot valves, increase pump wear and maintenance, increase disinfestation loads, decrease filter backwash intervals and block sprinklers and emitters. Severe infestations can pose problems during severe flood events and are identified as a hazard for animals and people with the risk of becoming entangled in the dense floating weed mats.

Salvinia molesta infestations are difficult to eradicate and are best managed when first identified and the outbreak is small. Monitoring of on-farm water storage areas and the waterways and drains that feed into the storage area is an important step in the process. Rain events and floods, animal movement especially aquatic birds, and human activity are the most likely cause of salvinia movement into farm storages.

Management of *Salvinia molesta* infestations is best undertaken as an integrated approach including the establishment of a management plan to exclude the entry of salvinia along with the following methods:

- Physical - hand or mechanical removal of the floating weed mass
- Biological – introduction of the salvinia weevil *Cyrtobagous salviniae*
- Chemical – strip spraying with registered herbicides.
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Physical: Small salvinia infestations can be removed by hand from the bank of the waterway or water storage using rakes and shovels, or boats can be used to reach further into the storage areas. Contractors with mechanical harvesters are available for larger infestations but are relatively expensive. Material removed should be located to prevent re-entry into the water storage in a rain event.

Biological: The salvinia weevil *Cyrtobagous salviniae* can be introduced to manage the pest. The salvinia weevil is most active and the best results obtained when the air temperatures are between 27° and 35°C and the

nitrogen levels in the plant are high. The larvae burrow inside the stems and buds while the adult feeds on the buds, eventually causing death of the plant. The dead plant material will turn brown and sink to the bottom of the water storage and decompose. As the plant decomposes, oxygen will be removed from the water, causing water pollution and stagnation. This decomposition process will also release nutrients back into the water storage further feeding the salvinia.

Chemical: All herbicides must be applied strictly in accordance with the directions on the label and any herbicides require that the water not be used for irrigation after treatment for 10 to 14 days. Most herbicide treatments will also impede biological management as the herbicide damages the salvinia weevil. Selectively spraying strips of the salvinia weed mat is a recognised approach concentrating any biological activity into the untreated areas. Treated weeds will however die and fall to the bottom of the water storage degrading water quality. Herbicide treatments that affect the buoyancy of the salvinia plants are best applied to small infestations as the plants must be in contact with the water for success.

Small infestations of *Salvinia molesta* can be contained into small sections of the waterway or water storage using floating booms allowing for easier treatment of the weed. Floating booms can also be utilised in larger infestations to exclude the weed from sensitive areas such as the area surrounding the pump intake or foot valve to allow for the installation of aeration and circulation devices. Floating booms can be constructed from large diameter water pipe capped at each end to trap the air inside and maintain buoyancy.

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