The salvinia weevil *Cyrtobagous salviniae* controls salvinia in temperate Sydney

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Summary Management of *Salvinia molesta*, one of the world's worst aquatic weeds, is proving to be a challenge in temperate areas of Australia, particularly in the Hawkesbury-Nepean catchment of NSW. Biological control using the salvinia weevil, *Cyrtobagous salviniae,* has been a useful tool in the management of this weed in tropical areas of the world since the 1980s, but has been less useful in temperate areas. Although salvinia biological control was partially successful in the Sydney area in the 1990s, lack of perseverance with this method and therefore lack of experience meant that herbicides were used in preference (M. Julien pers. comm.). A serious outbreak on the Hawkesbury-Nepean River in 2003, led to a three year field trial of the salvinia weevil in the Hawkesbury-Nepean catchment.

Weevils were released at 12 locations in the Hawkesbury-Nepean catchment, in Spring 2004. Three different types of habitat (river, creeks and dams) were selected with four sites in each.

All sites were monitored monthly for salvinia tip damage which is an indicator of weevil population presence and for the presence of adults. Air and water temperature (logged hourly at each site) and phosphorus, potassium and nitrogen levels were examined as possible limiting factors. The dry matter content of nitrogen, phosphorus and potassium were measured in samples taken from each site every three months.

Weevils controlled salvinia on the river at all four trial sites during the first summer. In 2006 salvinia samples from throughout the catchment were examined and found in early spring to contain weevil eggs and larvae. Biological control is now the major controlling method used for salvinia growing on the Hawkesbury-Nepean River.

Mixed results have been achieved for salvinia growing on the creeks and dams. Weevils controlled salvinia at two creek and two dam sites. Those sites where the weevils have not been able to control salvinia all have lower nitrogen levels compared with the river sites. However, one creek site that was controlled by the weevils also had lower nitrogen levels.

Salvinia phosphorus and potassium levels did not appear to have any effect on weevil populations or level of control.

Temperatures may be a limiting factor. One creek site had temperatures that were consistently lower than all the other sites, particularly in spring and autumn. This was in a shady area that had a very cool microclimate, and the weevil population slowly died out.

The creeks and dams had lower temperatures than the river and this may partially account for the slower biocontrol at some of these sites. However the salvinia infestations on some creek and dam sites were controlled quickly in the first year.

The variation in control achieved by the weevil may be related more to the type of habitat and salvinia abundance than to either temperature or nitrogen levels. Other factors that must be considered include the area and depth of the body of water and whether or not there is any movement in the water. Mats of salvinia that cover the whole surface of still water bodies have a negative impact on water quality and this may have contributed to the poor control achieved on this type of habitat. Present studies on water quality may lead to better management of salvinia in temperate climate still water habitats.

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