



## Progress with Weed Biocontrol Projects

CABI in the UK

November 2017

Cover image: CABI staff in discussion with the public at the gold-awarded Chelsea Flower Show stall “Nature vs Invader”, May 2017

## Introduction

Since April 2011, Defra has been funding specialist scientists to investigate the scope for biological control of invasive, non-native aquatic and riverside weeds. The technique has the potential to play an important role in protecting aquatic and riparian habitats where chemical and mechanical control options are impractical or prove to be prohibitively expensive, and thus to help meet requirements of the EU Water Framework Directive.

We are targeting **Australian swamp stonecrop** (*Crassula helmsii*), **Himalayan balsam** (*Impatiens glandulifera*) and **floating pennywort** (*Hydrocotyle ranunculoides*). These projects complement CABI's on-going work on the biocontrol of **Japanese knotweed** (*Fallopia japonica*) and **water fern** (*Azolla filiculoides*). This is the eighth in a series of annual summary notes on progress made and covers the time frame to the end of October 2017.

## Japanese knotweed (*Fallopia japonica*)

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Mass releases of the psyllid (2010-2013) had limited success in establishing large populations at eight isolated release sites but demonstrated that the psyllid had no untoward effects on native flora and fauna. In 2014, a caged field trial revealed the safety of the agent for native invertebrates if present in high densities. A new licence was subsequently issued permitting the release of psyllids at riparian sites thought to offer better conditions for establishment. During 2015 and 2016 an intensive release and monitoring campaign was conducted in collaboration with Local Action Groups and Local Authorities at 18 sites (9 in 2015) across England and Wales. Adults were found in all sites with lower abundance towards the end of the season. Early establishment (nymph stage) was observed at most sites, with no significant impact in the recipient environment. In spring 2016 overwintering was only confirmed in one southern site. For the first time, releases using winter morph adults and new psyllid stock were carried out in autumn 2016. Surveys undertaken in spring 2017 confirmed overwintering survival at sites across the UK. Psyllid cultures made up of predominantly newer psyllid stock and reared from outdoor overwintered adults have been prioritised for release at 16 sites in England and Wales in 2017. These psyllids are expected to be hardier and better suited to field conditions, enhancing prospects for establishment.

The leaf-spot fungus *Mycosphaerella polygoni-cuspidati* is currently not considered for classical biocontrol due to its ability to cause restricted disease symptoms on a couple of non-target plant species under quarantine greenhouse conditions. The pathogen is, however, under evaluation for use as a mycoherbicide based on a single-mating type isolate of the fungus which will prevent its reproduction and spread in the field. This idea has been protected through UK and International patent applications held in the name of the Secretary of State. Preliminary "proof of concept" experiments are currently under way and it is hoped that ultimately a product can be developed to control Japanese knotweed which would be applied in much the same way as a herbicide.

## Water fern (*Azolla filiculoides*)

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A mild winter allowed Azolla to survive well into 2017 with the plant widespread in England and Wales. The extent of Azolla infestation resulted in high early demand for the Azolla biocontrol weevil, *Stenopelmus rufinus*, which is mass reared at CABI ([www.azollacontrol.com](http://www.azollacontrol.com)). This small weevil feeds specifically on Azolla and in high densities can cause local eradication of the plant. Weevil shipments began earlier in 2017 than in previous seasons thanks to the use of a new polytunnel for mass rearing. Early shipment allows maximum weevil impact over the season. In mid-summer, several significant infestations of Azolla were monitored and found to be under effective control due to naturalised populations of the weevil in regions that had recently received large weevil introductions by CABI, demonstrating the valuable underlying control exerted by this effective agent. By targeting Azolla outbreaks in a timely manner it is possible to limit the extent of infestations and redistribution of the weed, bringing about economic savings, reducing leisure impacts and preserving the biodiversity of freshwater ecosystems.



## Floating pennywort (*Hydrocotyle ranunculoides*)



Preliminary feedback from the Non-Native Biocontrol Licensing group on the Pest Risk Assessment (PRA) for the prioritised weevil, *Lissonotus elongatus*, highlighted specific areas of research requiring further substantiation, in particular the potential risk the weevil might pose to the native species *Hydrocotyle vulgaris* and *Apium repens* in the natural environment. To this end, research will now be focused on addressing these concerns in detail with experiments better reflecting the field situation as well as addressing outstanding establishment and overwintering queries. Stakeholder and public interest in the project and the prospects of any biocontrol remains high as floating pennywort's spread and impact over the summer months has been particularly serious this year. Once the PRA data has been further collated and submitted, the evaluation process will resume with external consultation and assessment by licencing authorities in 2018.

## Himalayan balsam (*Impatiens glandulifera*)



In 2014 CABI completed the host-range testing of the Himalayan balsam rust *Puccinia komarovii* var. *glanduliferae* from India, which proved the rust is a true specialist on its host. In total, 75 plant species of importance to Europe were tested including native, ornamental and economically important plant species. A PRA which fully detailed the research conducted on the host range, life-cycle and ecology of the rust was submitted to Defra in 2014. The PRA underwent further evaluation by the European Commission's Standing Committee on Plant Health and following their feedback Ministers approved the release of the rust on the 27<sup>th</sup> July 2014. The rust was released at 3 sites in 2014, and releases have continued in subsequent years (25 in 2015, 10 in 2016 and 22 in 2017) in 12 counties across England and South Wales. The rust was found to spread naturally up to 10 meters from the area of release in the first year. Successful overwintering of the rust has been shown at some sites with the development of good levels of leaf infection during the following growing season. The level of rust infection achieved in the field has improved significantly following a new release protocol and the matching of weed biotypes with rust isolates. Although these are early days, the results are encouraging, and provide evidence that the rust is well capable of establishment in the UK. The spread and impact of the rust will be monitored over the next few years.

## Australian swamp stonecrop (*Crassula helmsii*)



The Australian gall forming mite, *Aculus* sp. (Eriophyidae) which is new to science, has been prioritised as the biocontrol agent for the control of *Crassula helmsii*. Host range testing is now complete and studies have shown that the mite has the potential to survive and establish under UK climatic conditions. Results of the host range testing have demonstrated that the mite only infects and damages its host, *C. helmsii* while other important plant species in the UK are not affected by the presence of the mite. A Pest Risk Assessment (PRA) detailing the research conducted to date on the mite was submitted to Defra following the completion of studies on the establishment potential of the mite. If the PRA is approved by the regulators and the application for a release licence is successful, the mite may be released in trials in 2018. The hope is that the mite will support the management of terrestrial forms of *Crassula* in the future.

## Contact

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