



## Progress with Weed Biocontrol Projects

CABI in the UK

June 2018

Cover image: A Yorkshire SSSI with a vast infestation of *Crassula helmsii* (bright green vegetation in foreground) which may see the release of the mite, *Aculus* sp. in 2018.

## 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 ninth in a series of annual summary notes on progress made and covers the time frame to the end of June 2018.

## Japanese knotweed (*Fallopia japonica*)



Mass releases of the psyllid (2010-2013) had limited success in establishing 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 thus 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 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 was observed at most sites, with no significant impact in the recipient environment. In spring 2016 overwintering was confirmed in one southern site. In autumn 2016, releases using winter morph adults and new psyllid stock were carried out. 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 were prioritised for release at 16 sites in England and Wales in 2017, however field establishment and overwintering success were low, possibly influenced by challenging environmental conditions.

The leaf-spot fungus *Mycosphaerella polygoni-cuspidati* is currently under evaluation for use as a mycoherbicide failing to be 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. Such potential mycoherbicide will be based on a single-mating type isolate which would prevent the fungus from reproduction, persistence and spread in the field. To protect the idea UK and International patent applications held in the name of the Secretary of State have been filed and published. "Proof of concept" research is progressing under quarantine conditions and a Pest Risk Assessment (PRA) to extend this research to experimental field trials has been compiled and submitted to the relevant UK authorities for consideration. 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*)



Despite a harsh winter which knocked back persistent Azolla populations, reports of Azolla infestation have been frequent since mid spring. The extent of Azolla has led to fairly high early demand for the Azolla biocontrol weevil, *Stenopelmus rufinasus*, which is mass reared at CABI. This small weevil feeds specifically on Azolla and in high densities can cause local eradication of the plant. Azolla feed production for weevil mass rearing has been affected by environmental conditions, resulting in a slower start to shipping compared to 2017, however, peak weevil production by mid-summer is well on course. As noted in 2017, reports have been received this year of Azolla infestations being brought under effective control by 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. [www.azollacontrol.com](http://www.azollacontrol.com)

## Floating pennywort (*Hydrocotyle ranunculoides*)

---



The Pest Risk Assessment (PRA) process remains on hold for the prioritised weevil, *Lissonotus elongatus*, as the research intended to address the 2017 feedback has yet to be completed; the prolonged period of cold and frost in the UK had a severe impact on the quality of stock floating pennywort for rearing and consequently the UK weevil culture has been compromised. Cold tolerance experiments on the weevil have been initiated in Argentina and suggest good resilience. With export negotiations still ongoing, contacts have been made in Paraguay to facilitate export from an alternative, but geographically close locality. Stakeholder engagement, site information collation and project promotion have been sustained as interest remains high. Pending export from Argentina/Paraguay, efforts to bulk up the existing UK culture will continue over the summer months so that the supporting research can be carried out and the PRA consolidated.

## 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 27th July 2014. The rust was released at 3 sites in 2014, and releases have continued in subsequent years (25 in 2015, 10 in 2016, 22 in 2017 and 10 in 2018) in 15 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 mite. A Pest Risk Analysis (PRA) detailing the research conducted to date on the mite was submitted to Defra in 2017 following the completion of studies on the establishment potential of the mite. The PRA has been assessed by several groups including an expert scientific panel and public consultation and is now awaiting ministerial approval. If the PRA is approved 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

CABI, Bakeham Lane, Egham, Surrey TW20 9TY, UK T: +44(0) 1491829049 Email: m.seier@cabi.org