



Department  
for Environment  
Food & Rural Affairs



Llywodraeth Cymru  
Welsh Government



## Progress with Weed Biocontrol Projects



**CABI - UK**

**March 2021**

**Cover image:** Purpose-built greenhouse facility at CABI, Egham enabling large-scale mass rearing of biocontrol agents approved for release against *Crassula helmsii* and *Hydrocotyle ranunculoides*



## Introduction

Since April 2011, Defra in partnership with the Welsh Government and Natural England has been funding specialist scientists to investigate the scope for biological control (biocontrol) of invasive, non-native aquatic and riverside weeds. Additional financial support for this research has been provided by the Environment Agency, the Canal & River Trust, private water companies, the MoD, and a number of Wildlife Trusts and Local Authorities (\* see also footnote for additional funders). Biocontrol 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. This will help to meet statutory and policy commitments, both at a UK government level and within the Devolved Administrations (DAs). This control method is already providing sustained and highly successful management of the invasive exotic water fern *Azolla filiculoides* through *Stenopelmus rufinasus*, a weevil native to the Americas which was introduced into the UK together with the weed.

CABI is targeting **Australian swamp stonecrop** (*Crassula helmsii*), **Himalayan balsam** (*Impatiens glandulifera*) and **floating pennywort** (*Hydrocotyle ranunculoides*), and these projects complement our on-going work on the biocontrol of **Japanese knotweed** (*Fallopia japonica*). CABI is also mass-rearing and supplying the **water fern** weevil, for early season inoculation of infestations of the weed, to ensure ongoing biocontrol. Initial biocontrol feasibility studies have been undertaken for the two invasive aquatic species **parrot's feather** (*Myriophyllum aquaticum*) and **water primrose** (*Ludwigia* spp.). The sale of any of these species in the UK is an offence due to their highly invasive nature. This is the 12<sup>th</sup> in a series of annual summary notes on progress made and covers the time frame from February 2020 to the end of March 2021. <http://www.invasive-species.org/united-kingdom/>

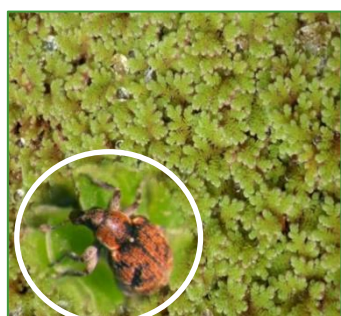
## Japanese knotweed (*Fallopia japonica*)



Early releases of the Kyushu line of the psyllid *Aphalara itadori* (2010-2014) demonstrated safety, but only resulted in limited establishment at isolated sites. From 2015, large scale release and monitoring were conducted across England and Wales in coordination with Local Action Groups and Local Authorities, and then regional coordinators in conjunction with the EU RAPID LIFE project including at riparian sites under an amended licence. Reproduction was observed on *F. japonica* at several release sites, with some overwintering recorded; however, long-term establishment and persistent overwintering have proved elusive. To tackle these issues, a survey further north in Japan was conducted in 2019 to collect better climatically-matched psyllid cultures. Extensive and severe leaf curling damage attributable to psyllids was found at Murakami in the Niigata Prefecture (Murakami line). Host-specificity testing showed that the Murakami line is specific to Japanese knotweed species and very similar to the Kyushu line. An approval to release the Murakami line from the quarantine facility in CABI, Egham was received from Defra in 2021. This line of psyllid was actually released in the Netherlands in late 2020 and field results will be shared.

The leaf-spot fungus *Mycosphaerella polygoni-cuspidati* is under evaluation for use as a mycoherbicide as studies showed that the pathogen can cause restricted disease symptoms on selected non-target plant species under quarantine conditions and is thus not suitable for classical biocontrol. Basing a potential mycoherbicide on a single-mating type isolate would prevent reproduction, persistence and spread of the fungus in the field and allow for targeted applications. A European patent held in the name of the Secretary of State protects the idea with registration in twelve individual countries; further international patent applications are pending. Following Defra approval for release from quarantine, CRD-licensed experimental field trials have been conducted with the agent at CABI, Egham in 2019 and 2020; a third trial is planned for 2021. Collated trial data will allow an assessment of the pathogen's performance under more natural conditions. Research is also being undertaken into how best to retain agent virulence as well as ensure good shelf life and effective delivery in the field. Collaboration with private industry has been established 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 but without side effects.

## Water fern (*Azolla filiculoides*)



*Azolla* survived the winter relatively unscathed into 2020 leading to high early demand for the *Azolla* 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 weed. Despite pandemic restrictions CABI was able to adapt procedures and met all orders. As in recent seasons, several *Azolla* infestations were brought under effective control by naturalised populations of the weevil in regions that had recently received large weevil introductions without further releases, demonstrating the valuable underlying control exerted by this effective agent. By targeting *Azolla* outbreaks in a timely manner, it is possible to limit impacts and preserve the biodiversity of freshwater ecosystems. [www.azollacontrol.com](http://www.azollacontrol.com)

## Floating pennywort (*Hydrocotyle ranunculoides*)



A revised and strengthened Pest Risk Assessment (PRA) for the weevil *Lissonotus elongatus* has been reviewed positively by Defra and external bodies (devolved authorities and the Advisory Committee for Releases into the Environment). The PRA is currently undergoing a public and stakeholder **consultation** prior to Ministerial review, with a decision anticipated in summer 2021. Collaborative agreements are in place to export weevils from Argentina to allow the mass rearing effort to begin over the summer. To this end, a large polytunnel (rearing facility) has been constructed to maximise breeding efforts and provide shelter for rearing stocks overwinter. Molecular characterisation of pennywort populations has been initiated and will continue to establish if there are any discernible differences between populations across the UK and also from Europe and the native range. Stakeholder engagement and communications have been maintained to help identify potential release sites and to try to secure funding to support the release and monitoring

phases of the project over the next few years, should the weevil be approved for release. A coordinated approach, with many partnerships, is likely to be needed to ensure biological and conventional control methods are well integrated to provide efficient and sustainable management of floating pennywort across the country.

## Himalayan balsam (*Impatiens glandulifera*)



A strain of the Himalayan balsam rust fungus *Puccinia komarovii* var. *glanduliferae* from India, was approved for release into the wild in the UK, in July 2014. However, due to the presence of some rust-resistant populations, an additional rust strain from Pakistan, which was found to infect a different subset of Himalayan balsam populations, was approved for release in 2017. To date, the rust has been released at more than 50 sites in England, Wales and in 2020, it was released into Scotland for the first time. Pre-release susceptibility testing, to ensure the most virulent and pathogenic strain is released at each site, and an updated release strategy involving working with LAGs across the country, has significantly increased infection levels in the field. Although early days, the results are encouraging; the rust has established at numerous sites, successfully overwintered with the development of good levels of leaf infection during the following growing season and spread naturally more than 65 metres. The rust continues to be released at compatible sites, however, in order to counter the presence of resistant populations and achieve full control, additional rust strains are required. Key regions in the native range harbouring strains more likely to be fully compatible with UK populations were identified through molecular analysis. Plans to survey these areas in 2021 are underway.

## Australian swamp stonecrop (*Crassula helmsii*)



*Aculus* sp. adults and eggs within a *Crassula* bud.

The gall-forming mite, *Aculus crassulae* (Eriophyidae) was approved as a biocontrol agent against *Crassula helmsii* in August 2018 following the acceptance of the Pest Risk Analysis (PRA) detailing the research conducted to date on the mite. Field trials with the mite were initiated in September 2018 with the inclusion of additional sponsors from the water industry. Despite COVID-19 related delays and travel restrictions, overwintering assessments of 2019 release sites were able to take place in summer 2020. Mites were found at three of the five release sites in the summer. Mites were also released at five new sites in England and further releases will take place at these and new sites in 2021. The mite has now been released at ten sites across England and Wales. At the release sites, mites have been observed infesting plants within and close to release plots, and the number of mite-infested plants has generally increased over the course of the summer. Overwintering studies at CABI have also provided evidence that *A. crassulae* can survive and develop sustainable populations

under UK environmental conditions. Efforts are now needed to increase the population density of mites at release sites to enable establishment and later, impact.

## Contact

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\*Footnote: Prior to 2011, funding for this research has also been provided by the Scottish Government, predecessor bodies of the Welsh Government, Network Rail, Cornwall Council, the Regional Development Agency of South West England