



Progress with Weed Biocontrol Projects

CABI in the UK

September 2014

Cover image: Suzy Wood sampling invertebrates in *Crassula*

Introduction

Since April 2011, Defra has been funding specialist scientists to investigate the 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 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 third in a series of annual summary notes on progress made and covers progress to the end of September 2014.

Japanese knotweed (*Fallopia japonica*)



Previous mass releases of the psyllid (2010-2013) have had limited success in establishing large populations at eight licenced release sites. The main focus of the work to date is to prove that the psyllid has no untoward effects on native flora and fauna, and to date there has been no observable impact on native species. However, in order to release at more sites, larger self-sustaining populations need to establish so that the psyllid's safety can be demonstrated, thus ending the current restriction to a limited number of sites. In 2014 a replicated caged field trial was set-up to assess whether adverse impacts of the psyllid occur if it is present in high densities. The proposed study aims to reduce concerns about impacts on native flora and fauna, and provide the evidence that will end the current restrictions and facilitate future increases in the number of release sites.

The investigation into the potential of the leaf-spot fungus (*Mycosphaerella polygوني-cuspidati*) as an additional control agent of Japanese knotweed has progressed well. Susceptibility assessments of non-target plant species continued under quarantine greenhouse conditions in the UK using infected plant material imported from Japan; these were complemented by field host-range studies conducted in Japan. Additional molecular studies further characterized the genetic make-up of the pathogen. Studies showed that under quarantine conditions the leaf-spot fungus can cause some restricted disease symptoms on a couple of non-target species native to the UK. However the significance of this in a potential field situation remains unknown. The research results are currently being compiled in a pest risk assessment to be submitted to FERA for evaluation.

Water fern (*Azolla filiculoides*)



After a mild winter, Azolla was widespread in the UK from spring onwards; with demand for the Azolla weevil *Stenopelmus rufinasus* high (see www.azollacontrol.com). Scaling-up of the weevil-rearing facilities at CABI over the past few years has meant that orders can be met swiftly to deal with Azolla outbreaks in a timely manner and limit the spread of the weed.

The EU-funded **RINSE** project (Reducing the Impact of Non-native Species in Europe www.rinse-europe.eu) concluded in 2014 with CABI having conducted demonstrations of the impact of *S. rufinasus* on *Azolla* across the RINSE regions (England, Belgium, France and the Netherlands), where both the weed and weevil are naturalised. The results were very good, with the weevil providing high levels of control over the water fern at the majority of demonstration sites, and with extensive stakeholder involvement throughout. The project concluded with the submission of final reports during the summer and a closing conference in September.

Floating pennywort (*Hydrocotyle ranunculoides*)



The weevil *Listronotus elongatus* remains the prime candidate for natural control of this pernicious weed. Successful export of adults from the weevils' native range in Argentina in 2013 and 2014 after a long hiatus have allowed specificity testing to progress. To date, 72 of the 79 non target plant species have been exposed to no choice, cut leaf feeding tests with adults. Further feeding/oviposition no choice and choice tests are ongoing using whole, functional plants on any plant species which have received some feeding. Parallel research carried out by an MSc student from Imperial College London has also contributed to our knowledge of the weevils' lifecycle and impact potential.

Collaborators in Argentina will continue to assess the ecology and potential of two stem mining flies which can cause significant damage in the field. Host range testing of the UK native, *Hydrocotyle vulgaris* using the rust *Puccinia hydrocotyles*, also collected from *H. ranunculoides* in Argentina, have shown it to be susceptible to infection and consequently this pathogen has been eliminated as a potential candidate agent.

Himalayan balsam (*Impatiens glandulifera*)



In 2014 CABI completed the host range testing of the Himalayan balsam rust *Puccinia komarovii* var. *glanduliferae* which proved the rust is a true specialist to its host. In total, 75 plant species of importance to Europe were tested including native, ornamental and economically important plant species. A Pest Risk Assessment (PRA) which fully detailed the research conducted on the host range, lifecycle and ecology of the rust was submitted to FERA in 2014. The PRA underwent further evaluation by the European Commission's Standing Committee on Plant Health and following their feedback Defra Ministers approved the release of the rust on the 27th July 2014.

Since approval, the rust has been released at three sites in Berkshire and Cornwall. Six Himalayan balsam plants pre-infected with the rust were planted out within the population. The sites are being monitored for signs of rust development on the infected plants, and the wider population is monitored for signs of the rust spreading. At both sites in Berkshire, secondary infection was observed on Himalayan balsam plants growing close by to the initial release plants, proving that the rust is able to infect outside grown plants under natural conditions in the UK.

Australian swamp stonecrop (*Crassula helmsii*)



In 2014 host specificity testing of the Australian stem mining fly, *Hydrellia perplexa* continued to show positive results. The aquatic larvae of this species feed in the stem causing significant damage to the plant. Sixty percent of the test plant list has now been exposed to the fly with minimal development recorded to date. The plants tested include closely related *Sedum* species and native aquatics such as *Potamogeton* and *Callitriche* species.

A damaging mite, *Aculus* sp., which appears to be new to science, has also been under assessment at CABI's quarantine facility. These mites feed in the growing shoots of *Crassula helmsii* causing abnormal growth, apparently restricting the growth of the plant. Forty percent of the test plant list has been tested with the mite and no non target feeding has been detected. Host specificity testing has also been underway with a stem infecting *Colletotrichum* species and results are currently under evaluation in quarantine.

Contact