



Progress with Weed Biocontrol projects

CABI in the UK

June 2013

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 second in a series of annual summary notes on progress made and covers progress to the end of June 2013.

Japanese knotweed (*Fallopia japonica*)



In 2010, CABI conducted the first licenced release of the specialist psyllid, *Aphalara itadori* (see inset top) for the biological control of Japanese knotweed in England and Wales (see www.cabi.org/japaneseknotweedalliance). Releases of this insect have been made annually since 2010, with successful adult overwintering noted at half of the release sites in 2012 - albeit in low numbers. Adults were present at five of the eight release sites by late summer, a figure that corresponds with previous years.

Following mass rearing, just over 150,000 psyllids were released during April and May of this year. Early indications suggest field populations will reach their highest levels this year especially if summer conditions are favourable. Importantly, psyllid activity has had no observable impact on either native plants or invertebrate communities.

On-going investigation into the potential of the leaf-spot fungus (*Mycosphaerella polygoni-cuspidati*) (see inset bottom) as an additional control agent of Japanese knotweed continues. Safety testing, using infected plant material imported from Japan has assessed the susceptibility of non-target species to the fungus. No adverse effects have been recorded for any of the UK native plant species evaluated to date, but testing is not yet complete.

New molecular research from Japan has shown that the *Mycosphaerella* leaf-spot requires mating between two isolates with complementary mating genes to complete its life cycle. This breakthrough is expected to facilitate culturing of the fungus under artificial quarantine conditions in the UK.

Water fern (*Azolla filiculoides*)



Interest and adoption of Azolla weevil, *Stenopelmus rufinasus* (see inset), released as a water fern management method continues to increase in the UK (see www.azollacontrol.com). Over 75,000 weevils were shipped for release during the summer of 2012 which led to investment and scaling-up of CABI's weevil rearing facility at Egham. Based on the number of pre-orders already placed, high demand for weevils is forecast to continue in 2013.

Azolla work continues to expand, with biocontrol demonstration trials on Azolla planned for France, Belgium, Netherlands, and the UK as part of the EU-funded **RINSE** (www.rinse-europe.eu) programme (Reducing the Impact of Non-native Species in Europe).

Australian swamp stonecrop (*Crassula helmsii*)



Host range assessment and safety testing of non-target test plant species for the stem mining fly (*Hydrellia perplexa*) (see inset) is underway. A quarter of the 42 test plants have been tested with negligible larval or adult feeding impacts observed on any to date.

Recent exploratory surveys of the Australian swamp stonecrop's native range have uncovered an interesting Eriophyid mite species. This discovery is potentially significant, as this family of mites is famously host specific. CABI has now added the mite to the screening programme at its quarantine facilities.

Work on two *Colletotrichum* fungal species, which infect the plant's leaves and stem; and three shoot-infecting fungal species recently imported from Australia is also continuing.

Himalayan balsam (*Impatiens glandulifera*)



Host range testing of the rust fungus, *Puccinia cf komarovii* for the biological control of Himalayan balsam is close to completion, with just a few test plant species requiring further replication. The biology of this rust makes it an exciting candidate as a control agent as it is a true specialist and attacks its host twice during the plant's growing season.

The rust infects seedlings and results in deformed stem growth, often causing plants to collapse and die (see inset). Late season foliar infection, during June and July, then acts to reduce photosynthetic area, lessening the plant's growth rate and vigour.

In early 2013, a Pest Risk Assessment (PRA) was submitted to FERA. This is the first step towards an authorised release in the UK. The document, which is currently under review, details the rust's safety profile, life-cycle and ecological research that CABI and its collaborators have assembled since the project's inception, seven years ago.

Floating pennywort (*Hydrocotyle ranunculoides*)



Two control agents – the stem mining fly, *Eugaurax floridensis*, and weevil *Listronotus elongatus* (see inset) – are currently under investigation. Initially imported from the US in late 2012, *E. floridensis* is now in culture and undergoing initial host range testing. CABI's collaborators in Argentina have been rearing the weevil *L. elongatus* – currently the prime candidate for biological control of floating pennywort – and after some delay were pleased to be able to make a shipment in April this year. Field work also continues through CABI's Brazil office in anticipation of further natural enemy studies. A battery of host range tests are now underway against 79 species of carefully selected test plant species. This will evaluate the suitability of the both the fly and weevil for the country-wide control of floating pennywort.

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