



Updates on Biocontrol Initiatives for Great Britain

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14th Local Action Groups Workshop

History of GB biocontrol initiative

- Since 2011, Defra-funded, in partnership with Welsh Government and NE, work on biocontrol of **Japanese knotweed**, **Himalayan balsam**, **Australian swamp stonecrop** and **floating pennywort**
- Mass-rearing and supplying the **water fern** (Azolla) weevil at cost to ensure ongoing biological control
- Support from EA, Canal & River Trust, private water companies, the MoD, a number of conservation groups, trusts, Local Authorities and LAGs, Canadian and Dutch stakeholders
- In 2021, conducted biocontrol feasibility studies on **parrot's feather** and **water primrose**
- In 2022, further feasibility studies conducted for **tree of heaven**, **butterfly bush**, **ice plant**, and **Canadian/Nuttall's waterweeds**



Japanese knotweed – psyllid, *Aphalara itadori*

- Long-term releases including riparian sites since 2015
- Overwintered in very low numbers -> establishment too low for population persistence -> psyllid density too low for impact
- CLIMATE is the key to psyllid establishment
- Murakami psyllid strain collected from climate-matched area in Japan in 2019, causing **curling damage** on Japanese knotweed
- Murakami psyllids prefer *Reynoutria x bohemica* over *R. japonica* in lab studies
- Release of the Murakami psyllid granted by Defra in Jan 2021 → released at *R. japonica* and *R. x bohemica* sites near CABI
- Damage found at both release sites, severe damage in the *R. x bohemica* population
- Overwintering morph was found in the *R. x bohemica* population in 2023
- Further release made in 2023 and monitored monthly
- **New Bohemian knotweed sites for 2024 release**



Psyllid damage in the field (Murakami strain)



Himalayan balsam – rust fungus, *Puccinia komarovii* var. *glanduliferae*

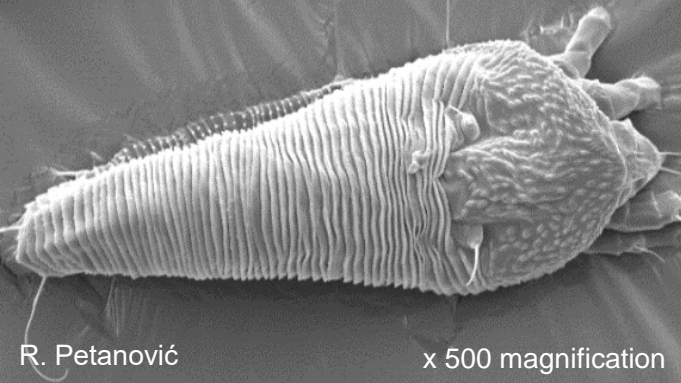
- *Puccinia komarovii* var. *glanduliferae* approved for release in England and Wales in 2014, released across England, Wales & Scotland
- **Two strains** of the rust (ex India and Pakistan) – **pre-release testing** required to determine susceptibility, not all populations infected
- Rust released at **27 sites in 2023**, continued releases of the rust in GB anticipated for 2024 (up to 21 sites depending on site)



Molecular analysis pinpointed key geographic regions for additional surveys.

New strains collected from NE Pakistan in 2023. Work underway to get strains established in lab.

One strain, collected in 2022, is being tested against unsusceptible populations in CABI's quarantine facility.

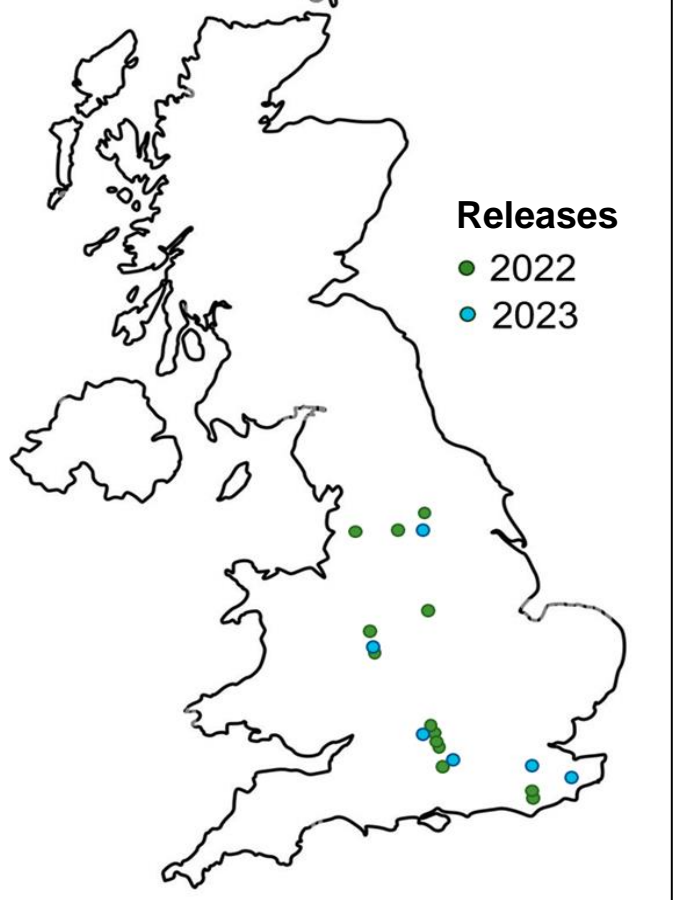


Australian swamp stonecrop – mite, *Aculus crassulae*



- *Aculus crassulae* – **gall-forming mite** from Australia. Approved for release in the wild in 2018. Mites now released at multiple sites in England and Wales
- **2022** - overwintering at 5/8 release sites. Good spread and colonising of new *Crassula* plants within sites, **some excellent spread (>30m)**. Extreme high temperatures affected some releases in 2022.
- **2023** - overwintering was affected by conditions - combined effect of drought/heatwaves in 2022 + cold winter/ spring?
- Mites previously proven to overwinter but affected by late frosts, killing plants hosting overwintering mites in the past.
- Focus is now on releasing mites at the **most suitable sites** aiming to establish self-sustaining and robust mite populations
- Most suitable sites where **emergent plants** are available for mites all year round (or only submerged short-term)
- Exploring option for more native range surveys to find **additional natural enemies** that could complement the mite

Floating pennywort - weevil, *Listronotus elongatus*



- Leaf feeding/stem mining weevil approved for release in England in Sept 2021. First field releases made in Nov 2021 (Uxbridge)
- **Releases** at 13 sites in 2022, 6 new in 2023, with top ups at 11 sites
- **Monitoring** for weevil survival, development, spread and impact, as well as examination of non-targets plants
- **In 2023:** Overwintering confirmed at Pevensy Levels (Sussex), in the Colne Valley (2 years running) and in the West Midlands
- **Status:** Weevils recorded developing at all release sites in 2023, with greatest impact and spread (>150m) associated with more southerly sites and/or earlier releases
- Some **sites compromised** by mat movement through high flows and/or accidental removal (Wey Navigation (Surrey), Wyrley & Essington Canal and River Wreake (Midlands)) -weevil status unknown
- **Collaborations** with local groups, Angling Trust, British Canoeing, EA and field managers have been essential for year-round material collection and site selection/prioritisation
- **2024:** Monitoring and releases to be continued (Cam Washes and Marsh Dykes scoped).
- Feasibility of biocontrol in **Netherlands** - research and risk assessment to be prepared



Parrot's feather – beetles *Lysathia* sp. & *Listronotus marginicollis*

- Biocontrol feasibility study carried out in 2021
- Two **South American beetles** of interest: *Lysathia* sp. & *Listronotus marginicollis*. Host-range testing carried out for both in South Africa
- *Lysathia* sp. an **effective biocontrol** agent in South Africa
- Host-range testing of *Lysathia* sp. with prioritised plant species now underway in UK quarantine. Some non-target feeding
- Partnership with collaborators in native range – field surveys underway
- Aiming to ship *L. marginicollis* weevil from Argentina early in 2024 for further testing following delays due to drought impacting field sites
- CABI Switzerland working on same plant target (*Myriophyllum aquaticum*) for North America. Also assessing North American weevil *Phytobius vestitus* as potential agent and sharing data



Ailanthus altissima (tree of heaven)

- Deciduous ornamental tree native to north-east and central China/Taiwan.
- Subject of classical biocontrol study by CABI CH & other European biocontrol scientists since 2020. A mite from China, *Aculus taihangensis*, is under evaluation for Canada. A *weevil* and *Verticillium wilt* are under consideration/ use elsewhere
- **Test plant list** compilation for the UK and review of potential for the UK/Europe
- Surveys have been carried out in England and Wales to search for the mite and any pathogens

Buddleja davidii (butterfly bush)

- Popular and widespread ornamental from China and Japan
- Invasive alongside and on railway lines, brownfield sites, urban wasteland and road verges
- Target of very successful biocontrol campaign in NZ since 2006 using a **leaf feeding weevil**
- Phase 1-**Test plant list** compilation and review of potential for the UK/Europe (2022/23)
- Phase 2-Explore **public and stakeholder attitudes** to biocontrol research through brief **online survey** (2024)



Buddleja davidii

- The silver leaf fungus, *Chondrostereum purpureum*, is widely used as a mycoherbicide
- It is a wood-rotting basidiomycete, used as **cut-stump treatment** to prevent re-sprouting
- Field surveys to find an **isolate associated with *B. davidii*** were conducted in the UK in 2023 but were unsuccessful
- However, fruiting bodies were found on **poplar, alder and oak** and identification will be confirmed using molecular methods
- The **isolates will be assessed** in small glasshouse and field experiments using a selection of techniques

Rhododendron ponticum

- Field surveys in Hampshire, Devon and Cornwall conducted in 22/23 to source strains of *C. purpureum* and **other fungal species** associated with *R. ponticum*
- *C. purpureum* as yet not sourced from *Rhododendron*, but fresh strains of the species **from alder and poplar** brought into culture for future testing
- Assessment of *Stereum rugosum* isolated from decaying wood of rhododendron underway

Carpobrotus edulis – ice plant

- Biocontrol feasibility assessment
- **UK survey** for natural enemies 2022 – Cornwall and Isles of Scilly
- Located target **South African scale** insect known to have major impact on *C. edulis* in USA – *Pulvinariella mesembryanthemi*
- **Native/naturalised parasitoids** apparent in scales – collected and identified
- Likely low impact in UK at present, **densities limited** by climate and parasitism
- Collaboration established with Centre for Biological Control, Rhodes University
- **Native range survey** to South Africa's Western Cape, December 2023
- **Numerous promising natural enemies** collected including weevils, scales, pathogens, midges, moths, mirid and coreid
- Priority **armoured scales** imported to UK quarantine for host range assessment
- Further prioritised species being reared and identified in South Africa, with preliminary **host range assessment** to follow



Elodea nuttallii and *E. canadensis* - Nuttall's and Canadian waterweed

- Literature review and **biocontrol feasibility** study completed
- **MALDI-TOF** (mass spectrometry) can differentiate between samples of *E. nuttallii*, *E. canadensis*, *Lagarosiphon major*, *Egeria* sp.
- **UK field surveys** – no significant attack or decay of plant material, only generalists (e.g. snails) found
- **Canadian field survey** – preliminary search for natural enemies in the native range
- Canadian plants brought back to UK Quarantine facility
- **Several invertebrates** found, to be morphologically identified
- Including an Ephydriidae fly (*Hydrellia* sp.?)
- **CLIMEX modelling** to identify regions of native range most climatically matched to UK, for potential future natural enemy survey and collection





Thank you for your support in 2023

<https://www.invasive-species.org/united-kingdom/>



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