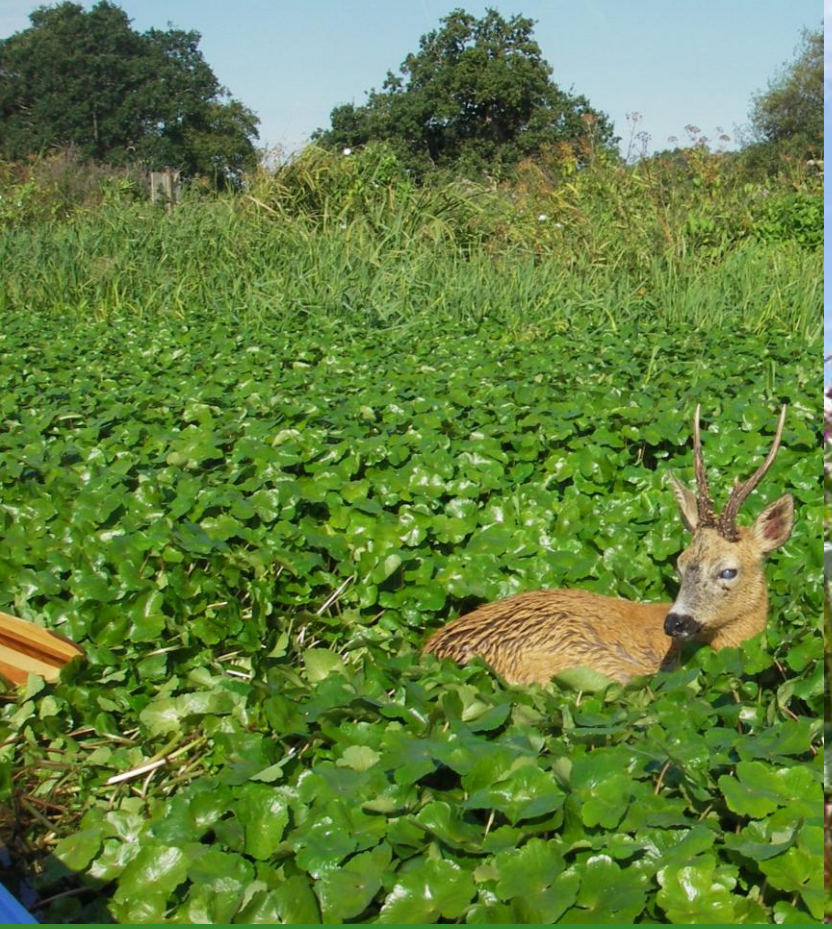






Using natural enemies to tackle some of the UK's worst invasive, non-native weeds

Djami Djeddour

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

APSE meeting, 06.11.26

Who we are



CABI is an international not-for-profit organization that improves people's lives by providing information and applying scientific expertise to solve problems in agriculture and the environment

What are invasive non-native species ?

- Species that have been introduced from one country or region to another, where they do not occur naturally
- They are a subset of “alien” species, known to have established and spread with negative impacts in the area of introduction
- Invasive plants often the worst offenders

- Affecting
  - Biodiversity (e.g. outcompete native species, alter ecosystems)
  - Livelihoods (wars, famines, food security)
  - Trade (contaminants)
  - Human/animal health (vectors of diseases, toxicity)

- A global synthesis of the annual cost of biological invasions (IBPES report) estimated at >USD 423 billion
- Invasive alien species reported to cost UK economy ~£4 billion per year
- Exacerbated by climate change, land use changes etc




Giant Hogweed: Alarming pictures show huge blisters caused by touching dangerous plant

The plant grows in various rural areas - and should come with a warning


Biol Invasions
https://doi.org/10.1007/s10530-023-03107-2

ORIGINAL PAPER

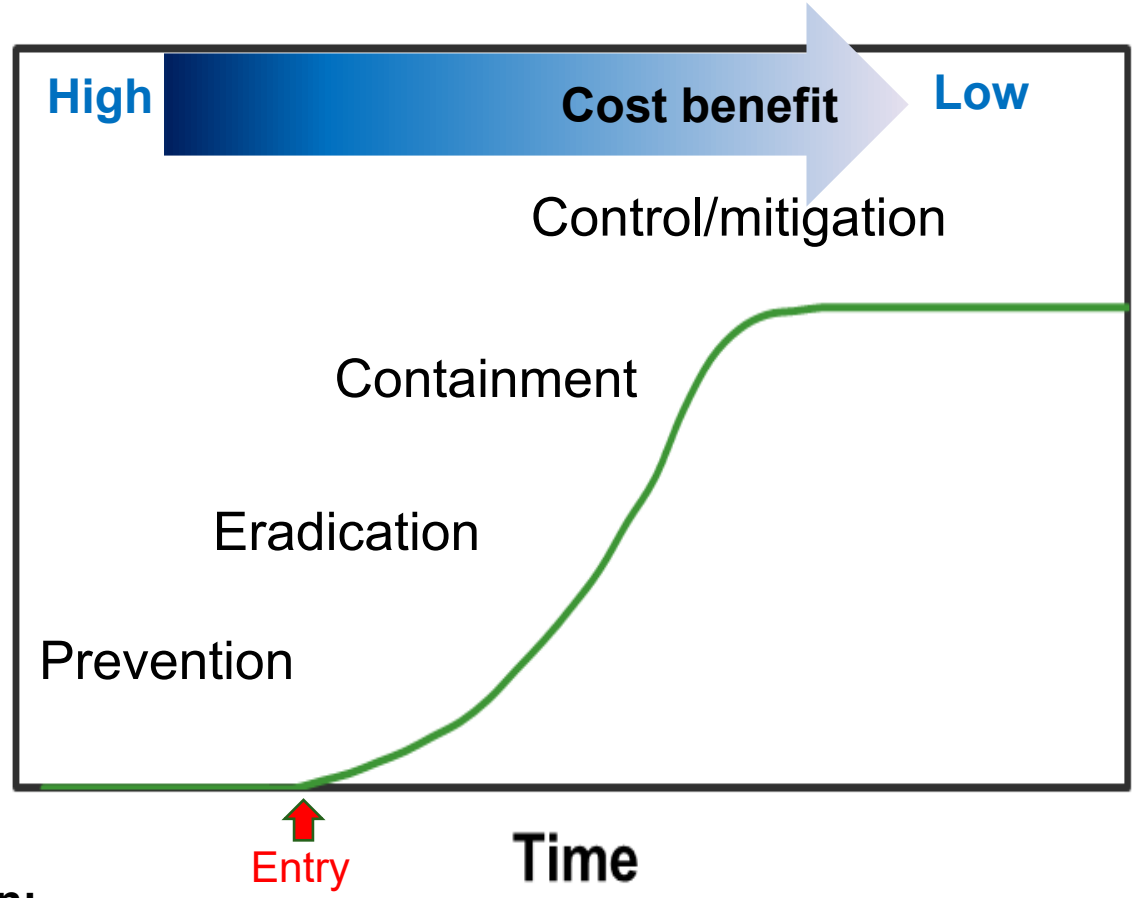
An updated assessment of the direct costs of invasive non-native species to the United Kingdom

René Eschen · Mariam Kadzamira · Sonja Stutz · Adewale Ogunmodede · Djami Djeddour · Richard Shaw · Corin Pratt · Sonal Varia · Kate Constantine · Frances Williams

Strategies for Managing Invasive species

The Invasive Alien Species (Enforcement and Permitting) Order 2019 –list of species of Union concern

Wildlife and Countryside Act 1981



Adapted from Western Australian Agriculture Authority (2015)

Distribution:

Absent ➡ Few local pops ➡ Spreading ➡ Abundant, widespread

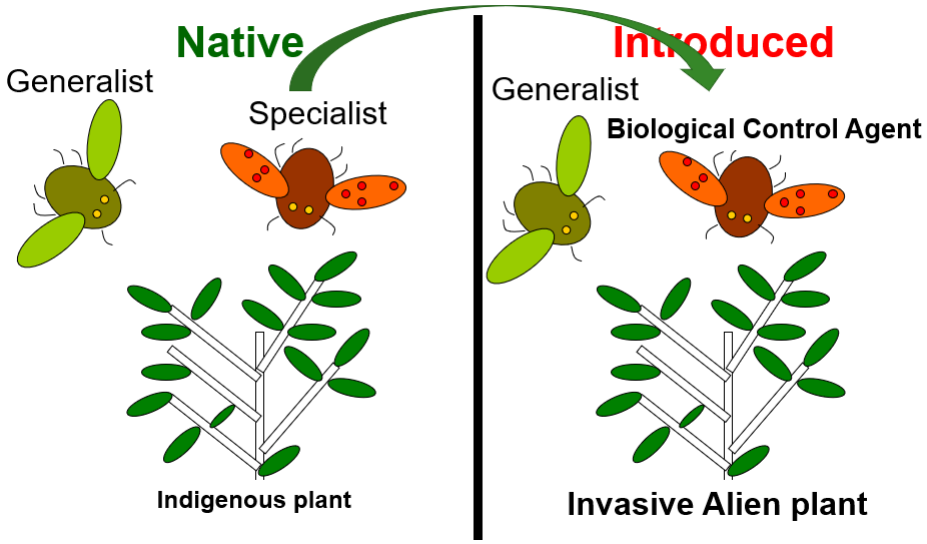


GB Non-native Species Secretariat has responsibility for helping to coordinate the approach to invasive non-native species in Great Britain

Why can non-native species be invasive…..?

...because they have an unfair advantage

- Arrive in the new range without the natural enemies that keep them in check in their native range
- Those native species which do attack them do not cause enough damage
- Some of the many co-evolved insects and diseases in the native range may be safely used to control the invasive species in the new introduced range – **Classical Biological Control (CBC)**
- This approach has been implemented across the globe for over **150 years**
- International code of conduct, rigorous safety testing, spectacular successes worldwide and very few non-target impacts- most predictable by modern day standards



- **2300 intentional releases globally, 250 weeds & > 600 agents**
- **Slower on the uptake in Europe… many bordering countries, risk aversion, smaller problems**

Classical Biological Control (CBC) of weeds

Phase 1: Years 1-3

Carry out literature search and **identify** survey areas
Conduct thorough field **surveys** and collect natural enemies
Analyse the prospects and **feasibility** for biological control
Prioritise a selected number of potential biocontrol agents



Phase 2: Years 3-10

Establish a **test plant list**
Conduct detailed studies on the **host-specificity** and impact of the prioritised agents
Decide which of the **prioritised agents** is suitable for field release



Phase 3: Years 10-12

Prepare and submit **petition** for field release in collaboration with partners in the invaded range
Obtain **permission** for field release of the agent



Phase 4: Years 12-15

Maintain **rearing colony** of agent
Ship agent to quarantine facilities in the invaded range
Release and distribution of biocontrol agent (conducted by CABI partners in invaded range)



Biological control of Azolla

- Classical biocontrol target in South Africa – weevil *Stenopelmus rufinasus* released in 1997. Azolla no longer poses a threat– extremely successful program
- Same weevil introduced unintentionally with aquatic trade as a stowaway on Azolla, now naturalised in various countries
- Weevil first identified in Britain in 1921, considered ‘ordinarily resident’ (Defra). Also present long-term in continental Europe including France (1901), the Netherlands (1922) and Belgium
- CABI mass rears weevils early in the season and ships to customers to control outbreaks – highly effective agent
- New research estimates that without this biocontrol annual costs of management would range from £8.4m to £16.9m*





*Pratt et al 2022 CABI Agriculture and Bioscience

SSSI in Surrey, UK





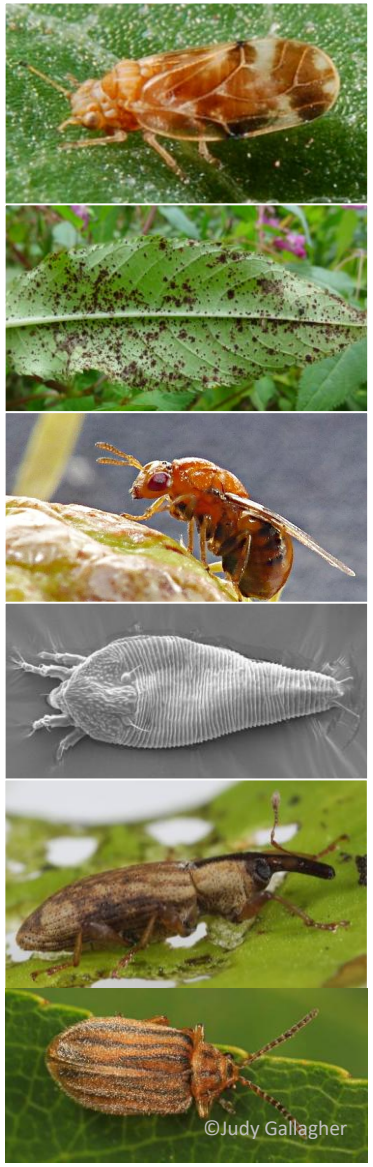
30/07/2008

Progress with Biocontrol in the UK

- Research funded by Defra since 2010 (WFD initiative)
- Subsequently supported by a range of stakeholders including devolved governments, Environment Agency, Natural England, Wildlife Trusts, Water companies, Local Councils, Internal Drainage Boards, Canal and River Trust and many other organisations
- Working in partnership with collaborators in native range and in the invaded range with landowners, Local Action Groups, volunteers
- Piggy-backing opportunities for European countries with shared problem plants



Classical Biocontrol Releases in UK and Europe



- **2010** - *Aphalara itadori* - Japanese knotweed, *Reynoutria japonica* in the UK; 2020 in NL
- **2014** - rust fungus, *Puccinia komarovii* var. *glanduliferae* - Himalayan balsam, *Impatiens glandulifera* in the UK
- **2015** - gall wasp *Trichilogaster acaciaelongifoliae* - *Acacia longifolia* in Portugal
- **2018** - mite, *Aculus crassulae* – *Crassula helmsii* in the UK 2025 in NL
- **2021** - weevil, *Listronotus elongatus* – floating pennywort *Hydrocotyle ranunculoides* in the UK; 2025 in NL
- **2025** – leaf beetle, *Ophraella communa* – common ragweed *Ambrosia artemisiifolia* in France

Fallopia japonica- Japanese knotweed



Aphalara itadori sap sucking psyllic

Himalayan balsam

Native to foothills of Himalayas

Rust fungus biocontrol, *Puccinia komarovii var. glanduliferae* from India and Pakistan

Released at >130 sites in the UK, establishing and spreading

Impact on seedlings and seed set

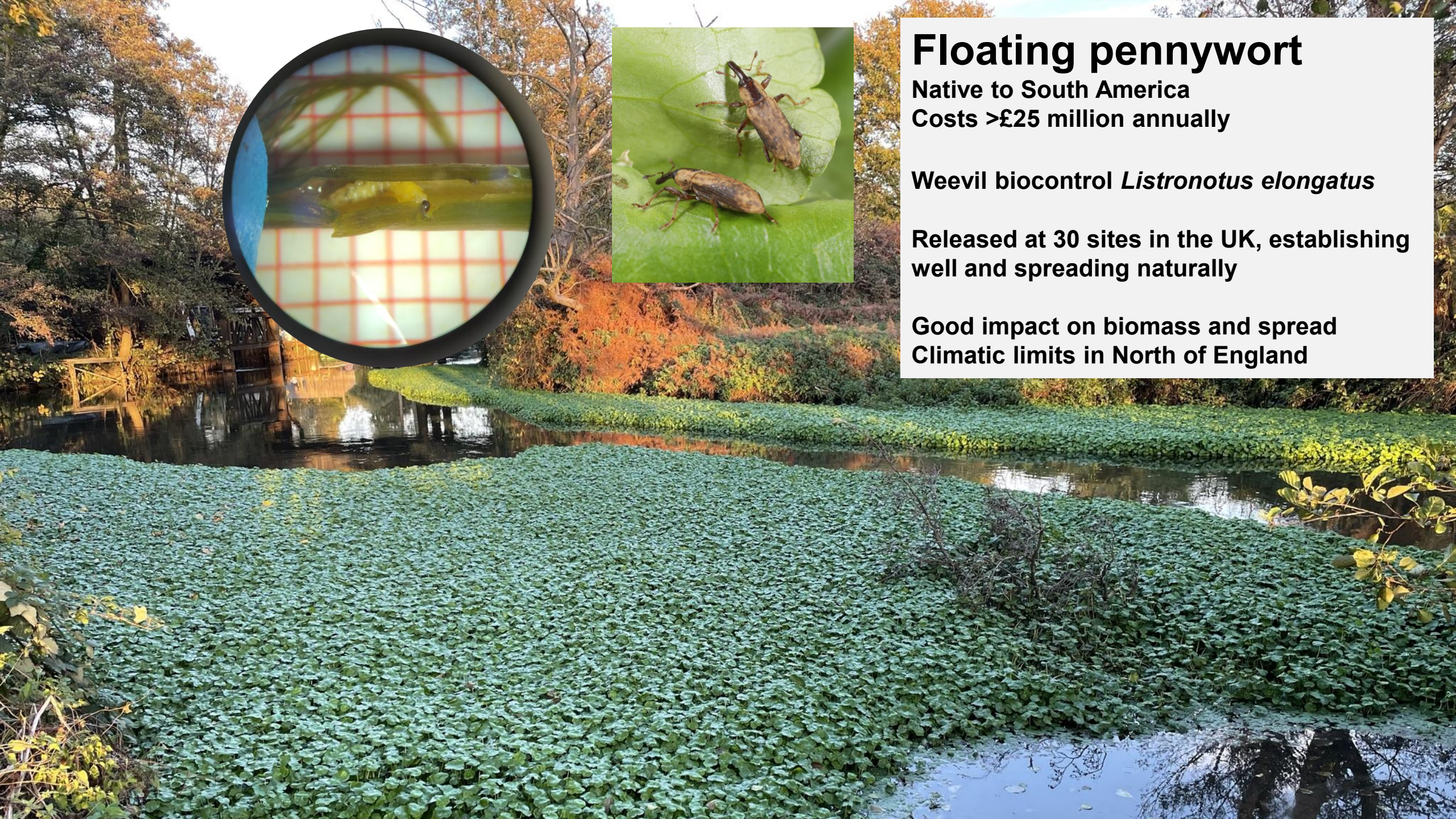




New Zealand pigmyweed (*Crassula helmsii)*







Floating pennywort

Native to South America
Costs >£25 million annually

Weevil biocontrol *Listronotus elongatus*

Released at 30 sites in the UK, establishing well and spreading naturally

Good impact on biomass and spread
Climatic limits in North of England

Ditch without weevils



Release ditch after a few years of sustained weevil activity



-Sites in the south of England are more successful because the weevils can reproduce more quickly + have higher number of generations/year
-Dispersal over several km in a few years
-Native species able to compete as biomass reduces

Before and after within 2 years of release





Partnerships with Local Councils

- Site selection, permit/landowner liaison
- Funding contributions to biocontrol trials e.g. Himalayan balsam, Japanese knotweed, Floating pennywort, Azolla
- Support monitoring trial progress
- Awareness raising in the community/volunteers/contractors
- Integration with conventional management

Calderdale Council
North Yorkshire Council
The City of Edinburgh Council
Richmond and Wandsworth Council
Elmbridge Council
Hackney Council
Cheshire West and Chester
Barnsley Council
Folkestone and Hythe District Council
Coventry Council
Bristol City Council
Kentish Stour Countryside Partnership
North Somerset
Tameside Metropolitan Borough Council
Bromsgrove District and Redditch Borough Councils
Eastbourne Borough Council and Lewes District Council
Southwell Town Council
Hampshire County Council
Kent County council
Ealing Council
Ecchinswell, Sydmonton and Bishops Green Parish Council
Bath and North East Somerset Council
Fretherne with Saul Parish Council
Bickenhill and Marston Green Parish Council
Lewes District Council and Eastbourne Borough Council
Wirral Council
Harrow Council
Sutton on the Forest Parish Council

Summary

- Classical biological control is a tried and tested approach to tackle some of the worst weeds in the world
- Aquatic weeds have proven particularly good targets
- It has a very good safety record and non-target attack is predictable
- Benefit: cost ratios for biocontrol can be very high
- Efficacy is harder to predict - biotic and abiotic complexities, not eradication
- Political, regulatory and stakeholder drivers make it likely that levels of weed biocontrol will increase in Europe
- A biocontrol programme is research – there is no commitment to release





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Schweizerische Eidgenossenschaft
Confédération suisse
Confederazione Svizzera
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Swiss Agency for Development and Cooperation SDC