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Impatiens glandulifera

Species description

Himalayan balsam (*Impatiens glandulifera*) is an annual terrestrial plant native to the Himalayas. The species was introduced to Europe, including Belgium, as an ornamental plant for gardens. The first record of Himalayan balsam in the environment in Belgium dates back to 1939. Natural spread from cultivated plants in private gardens, along with intentional releases in the natural environment are probably at the origin of its establishment in the wild. Today, Himalayan balsam represents a problematic invasive species in many countries worldwide and is now listed as IAS of Union concern under the (EU) Regulation No 1143/2014. Knowledge of its distribution on the Belgian territory is probably rather exhaustive due to its high detectability and active monitoring efforts. However, the species can be challenging to notice until it starts flowering.

Fig 1. *Impatiens glandulifera*.
Photo : James T M Towill

Guide de gestion complet en version française

Volledige beheergids in Nederlandse versie

Photo: Jérémie Guyon

Impatiens glandulifera

Himalayan balsam thrives in nutrient rich habitats and is mainly found in riparian zones such as alluvial forests, meadows, along waterways, as well as in artificial and semi-natural habitats such as ditches and grasslands. This shallow-rooted species can grow up to 2.5m in height and forms dense stands, causing detrimental impacts on the ecosystem and biodiversity. These impacts include riverbank erosion, light exclusion, displacement of native plants, and disruption of pollination processes for native plants due to its attractiveness to pollinators. Social and economic effects include access restriction to waterways for recreational activities and management related costs.

Biological characteristics, reproduction and spread

In Belgium, Himalayan balsam flowers between June and October. The plant has self-compatible flowers which attract many pollinator species due to their high nectar sugar production. It, then, dies back in autumn, leaving the ground bare, and does not survive frost. Seedlings begin to grow in April. As for all annual plant species, flowering, germination, seed production and death happens all in the same year.

In western Europe, Himalayan balsam propagates exclusively by seeds, with a germination rate of around 80%. Each plant produces approximately 2,500 seeds contained in capsules. These capsules, once mature, open explosively when disturbed (e.g. when touched), expelling the seeds up to 7m away from the mother plant. The seed bank remains viable for approximately 2 years, although observations from some regions indicate that seeds might sometimes be able to survive for up to 3 years. Seed dispersal over long distances occurs via waterways with seeds being transported in the sediments or floating along watercourses. Recreational activities can also contribute to seed dispersal. Those very high regeneration and dispersal abilities highlight the importance of implementing effective management measures.

Fig 2. Himalayan balsam can grow in many different habitats. Photo: Dido Gosse

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General considerations about management

Various management options have successfully been used to control and eradicate this species. Local eradication of Himalayan balsam is considered achievable for limited or even large infestations. The feasibility of eradicating Himalayan balsam populations must, however, always be assessed on a case by case basis, considering site specificities, and be thoroughly discussed within the management team.

Due to the species' ability to reproduce by seeds, precautionary measures must be implemented before initiating management to prevent seed spread within the managed area or to uninvaded sites. Because seeds are easily transported downstream, management must begin with source populations in upstream areas, and gradually progress downstream along riverbanks and floodplain habitats. It is essential to initiate management actions before seed production to limit reproductive output as much as possible.

The harvested plant material must be safely disposed of away from water systems and is either dried, burned, buried (at least 1m deep) or composted. If left to dry on site, it is recommended to avoid leaving the plant material in contact with the ground. If a large amount of plant material is piled up to compost, it must be covered by a tarpaulin to prevent regrowth. Only vegetative and pre-flowering plant parts can be piled up on site. If the plant material is transported off site, it must be treated by adequate waste disposal infrastructures. Material that has been in contact with soil that may contain seeds (e.g. shoes, vehicles) should be checked and cleaned before going to another site.

Managed and downstream sites must remain under enhanced surveillance for a period of 3 years after the implementation of the last treatment.

Fig 3. Himalayan balsam invading the banks of water systems.and the edges of agricultural lands Photo: Jérémie Guyon

Metro Vancouver. (2021) *Best management practices for Himalayan Balsam in the Metro Vancouver Region.* Metro Vancouver and the Invasive Species Council of Metro Vancouver.

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Manual removal

v Local eradication of early-detected populations can be achieved

v Manual removal is highly selective and will have minimal impact on ecosystems and other organisms

x The method is only practical for sites with small patches disseminated within the native vegetation

x Manual removal is a time-consuming and labor-intensive method that needs to be carried out until the seed bank is completely exhausted.

Method description

The principle is to remove the whole plant from the ecosystem. Plants are pulled out by the stem by operators. If the plant breaks during the process, operators should ensure the complete pulling of the plant to incorporate the roots, as the species can regrow from broken stems. Manual removal is conducted at the start of the flowering period (May, June, July) to prevent seed production. The optimal time for removal is when the first flowering buds appear. This management strategy must be repeated 4 and 8 weeks after the initial removal to eliminate potential regrowth, seedlings or plants that would have been overlooked. Additional removal may be required during autumn as some plants can germinate late in the season. As numerous seeds can be produced by a few individuals only, it is crucial to ensure the destruction of the vast majority of the population every year. Manual removal must be repeated twice a year until the depletion of the seedbank (usually 2 to 3 years).

Fig 4. Manual removal of the Himalayan balsam with the help of volunteers. Photo: Jérémie Guyon

References

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Material

Management: Padded gloves, wheelbarrows and rakes. Tools such as shovels might be required if working on compacted soils.

Transport: Trucks (if the harvested plant material is transported off site)

Precautionary measures: tarpaulin

Sarat, E. et al. (2015) Les espèces exotiques envahissantes dans les milieux aquatiques : connaissances pratiques et expériences de gestion - Expériences de gestion. ONEMA, UICN, GT IBMA and Irstea. Report number: 2

Fig 5. Himalayan balsam populations in woodland. Photo: INTREEGUE Photography/Shutterstock

Mechanical removal: brush cutting

- v Local eradication can be achieved
- v Good control can be expected rapidly
- v The method is effective and adequate for large infestations
- x Brush cutting must be repeated several times a year

Fig 6. Brush cutting of Himalayan balsam followed by the removal of the harvested plant material from the stream. Photo : Jérémie Guyon

References

Adriaens, T. *et al.* (2019) *Feasibility of eradication and spread limitation for species of Union concern sensu the EU IAS Regulation (EU 1143/2014) in Belgium.* Institute for Nature and Forest Research, Service Public de Wallonie, National Scientific Secretariat on Invasive Alien Species, Belgian Biodiversity Platform.

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Method description

The principle is to mechanically remove visible parts of the plant from the ecosystem. Plants must be cut at ground level, below the lowest node, to prevent regeneration, using machinery. This method is implemented for large infested sites with dense patches before the flowering period (April, May) or with the first blossoms (June), to prevent seed production. Brush cutting (or manual removal depending on the situation) must be repeated 4 to 8 weeks after the initial removal to eliminate any regrowth or plants that would have been overlooked. Manual removal is implemented as a follow-up measure to remove any remaining individuals (if limited number). For larger populations, brush cutting must be repeated twice a year until no regrowth occurs, following the exhaustion of the seed bank, which usually takes 2 to 3 years.

Sarat, E. *et al.* (2015) *Les espèces exotiques envahissantes dans les milieux aquatiques : connaissances pratiques et expériences de gestion - Expériences de gestion.* ONEMA, UICN, GT IBMA and Irstea. Report number: 2

Material

Management: Hand-held brush cutter, strimmer, flail or agricultural machinery (for larger populations)

Transport: Trucks (if the harvested plant material is transported off site)

Precautionary measures: Tarpaulin

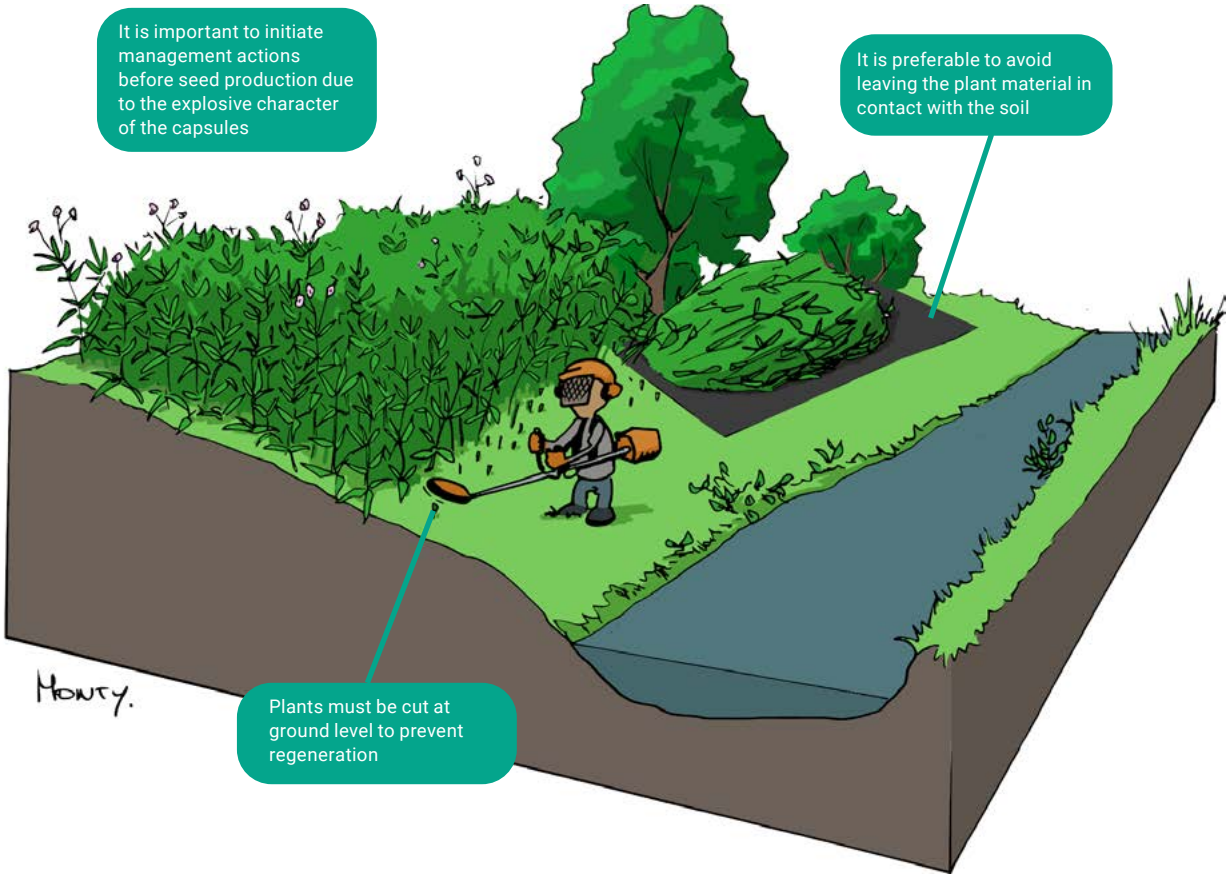

Fig 7. Brush cutting of Himalayan balsam

Grazing

- v Local eradication can be achieved in the long term
- v Good control can be expected rapidly
- v Grazing requires few resources
- v Livestock can access steep areas which are inaccessible to machinery and managers
- x Local eradication can be achieved in the long term but remains hardly achievable by grazing alone
- x This method is not recommended in sites with high conservation value or in riparian zones
- x There is a risk of seed spread to uninvaded areas

Method description

The principle is to introduce generalist herbivores to control Himalayan balsam populations among other plant species. Livestock is released in a closed environment for a limited period of time. Grazing is similar to cutting, as the animals feed on visible plant parts (above the soil) which eventually depletes nutrient reserves as well as prevents flowering and seed production. Livestock is released in early spring (April), before seed production, and remains throughout the growing season. Grazing is continued until no regrowth occurs (minimum 2 years). Infested areas that are not accessible to livestock (e.g. behind fences) must be manually managed to avoid re-colonisation. This method is only implemented in semi-natural habitats such as grassland and is not recommended in sites with conservation value or in riparian zones as intense grazing can have significant negative impact on ecosystems.

Material

Livestock: Sheep or cattle. Sheep, however, appear to be a better option as they graze close to the ground (below the lowest node).

Equipment: Fencing such as electric wire or steel fences, shelters, water supply.

References

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The impact of management actions on ecosystem services

While the adverse effects of IAS are well-known and provide strong incentives for implementing management actions, the impacts of these management actions on ecosystems and the services they provide are less considered. The matrices are the result of expert assessments of the evolution of relevant ecosystem services (ES) from a highly invaded situation towards a managed situation. ES evolution is considered over 2 given periods of time: 1 year and 5 years after the initiation of management.

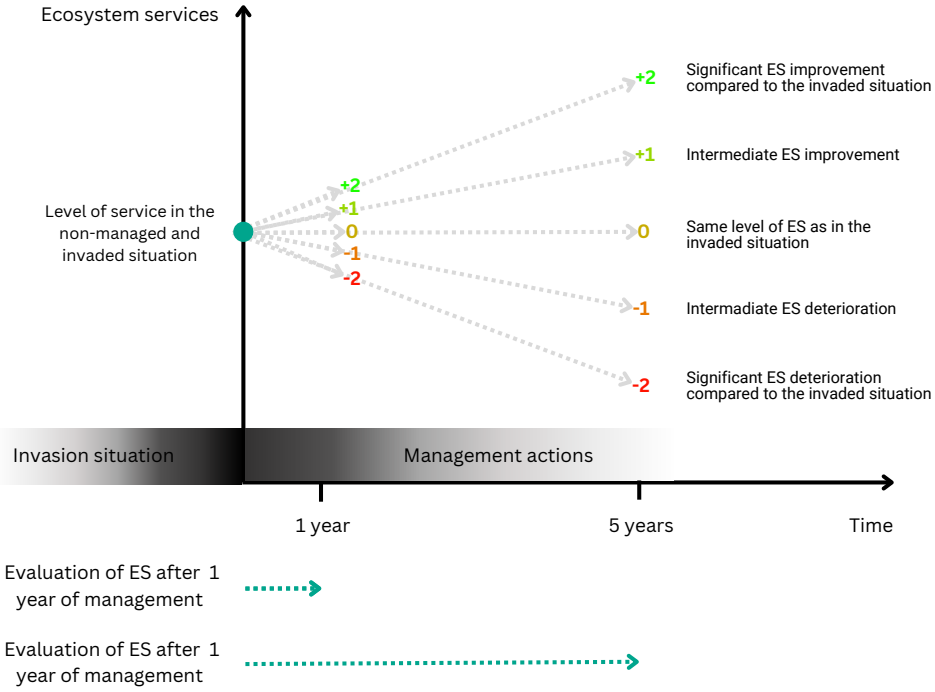

Fig 8. Representation of the survey process

Each matrix displays the average impact scores of management methods on ecosystem services. These scores have been associated to colours to facilitate the visualization of the impacts of every method on every relevant ecosystem service. Green indicates a significant improvement in the ecosystem services (ES) due to management, orange represents no or minimal effect, and red signifies a negative impact of the method on the ES.

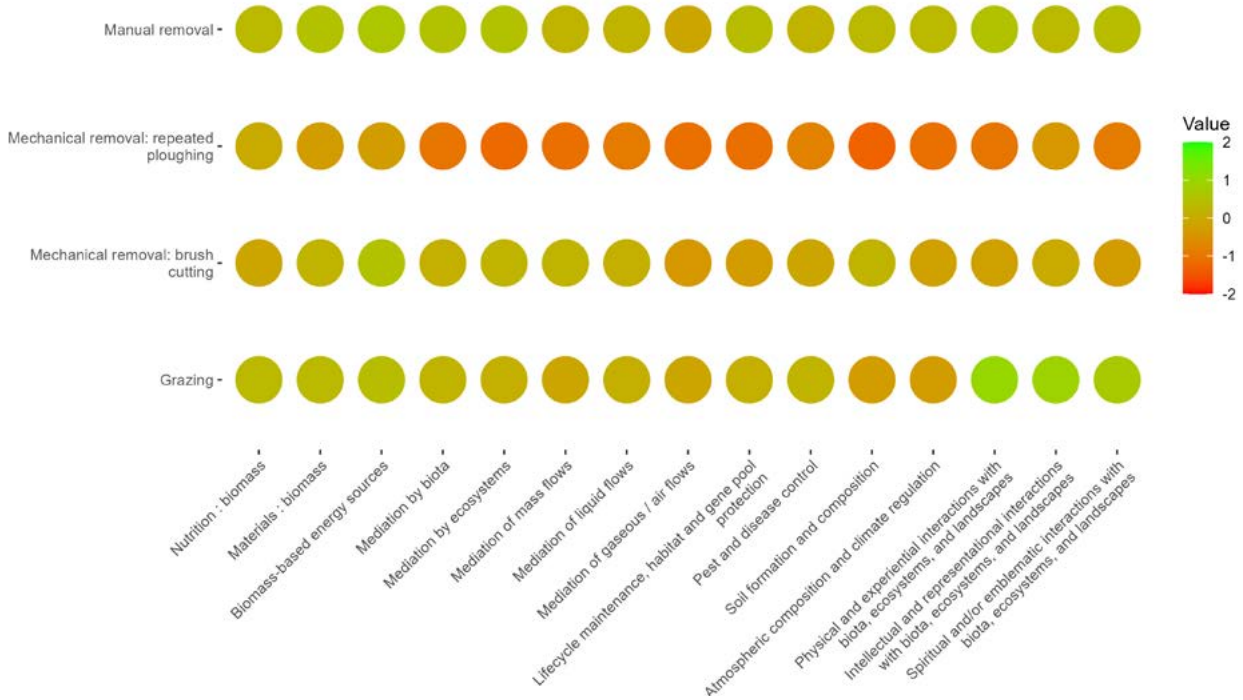

Fig 9. Matrix displaying the impact of management methods for riparian plant species on ecosystem services after 1 year

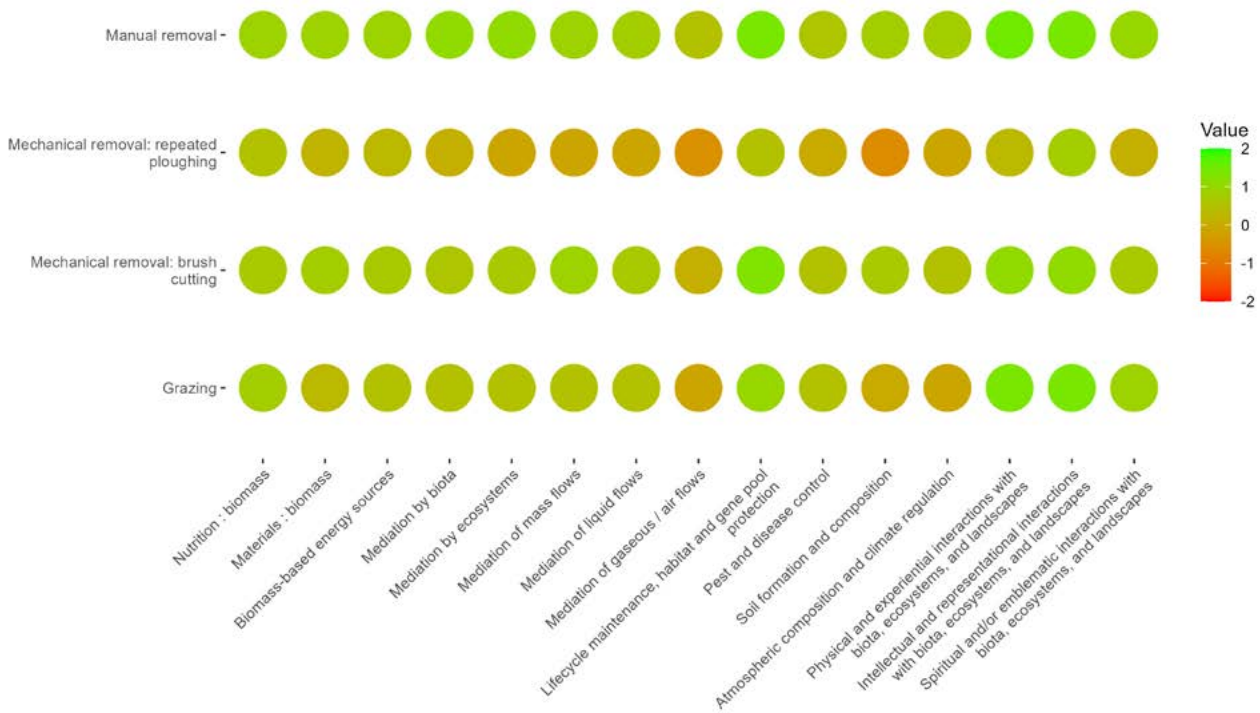

Fig 10. Matrix displaying the impact of management methods for riparian plant species on ecosystem services after 5 years

LIFE RIPARIAS

Reaching Integrated and Prompt Action in Response to Invasive Alien Species

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