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Koenigia polystachya

Species description

Himalayan knotweed (*Koenigia polystachya*) (syn: *Persicaria wallichii*, *Polygonum polystachyum*, *Rubrivena polystachya*) is a perennial terrestrial plant native to the Himalayas. The species was introduced to Europe, including Belgium, as an ornamental plant for gardens and public green spaces. The first record of Himalayan knotweed in the environment in Belgium dates back to 1898. Natural spread from cultivated plants in private gardens is probably at the origin of its escape into the wild. Today, Himalayan knotweed represents a problematic invasive species in many countries worldwide and was recently listed as IAS of Union concern under the (EU) Regulation No 1143/2014. Its distribution on the Belgian territory probably remains underestimated as the species can easily be confused with other knotweed species such as *Fallopia japonica*, widely distributed and highly invasive in Belgium.

Fig 1. *Koenigia polystachya*. Photo : Nele Van Hemelen

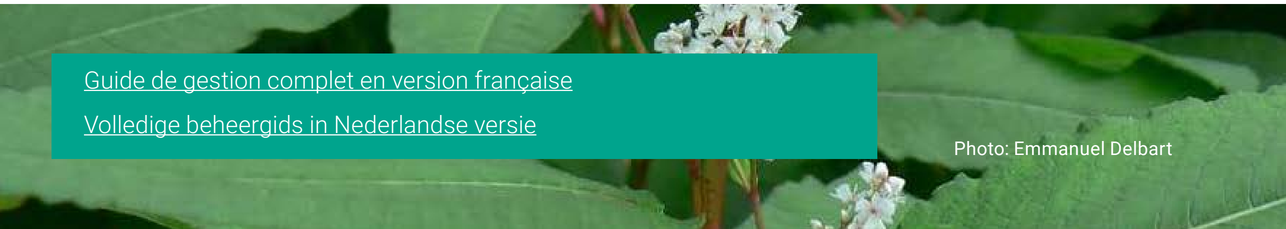

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Photo: Emmanuel Delbart

Koenigia polystachya

Himalayan knotweed thrives in nutrient-rich habitats as well as moist and disturbed soils such as roadside, ditches but also wetlands and riparian areas. This rhizomatous invader, growing to heights of 40 to 120 cm, can form large and persistent colonies causing detrimental impacts on the ecosystem and biodiversity. The plant, which strongly competes with other species for space and resources, can exclude native vegetation, prevent tree seedlings development, encourage river bank erosion, reduce species richness and can lead to important population declines in species of high conservation value. Social and economic impacts include damages to human infrastructures (as the plant can grow through concrete), access restriction to waterways for recreational activities, maintenance and management related costs.

Biological characteristics, reproduction and spread

In Belgium, Himalayan knotweed flowers between July and October and produces seeds around September. The above-ground plant material, which is not resistant to frost, dies back in winter, leaving brown stems and an important quantity of leaves that form dense mats on the ground. New shoots emerge from mid-spring until late summer.

Reproduction of Himalayan knotweed in western Europe is mainly vegetative. When the plant breaks into fragments, either naturally or because of human activity, those fragments, as small as 1 cm long, can form a new plant, and therefore a new population, away from the initial invaded area. The plant can also reproduce sexually by seeds. However, seed production appears to be rather rare in its introduced range. Seed germination requirements and viability remain unknown. Spread of this invasive weed can happen through seeds, rhizome and stem fragments being dispersed by waterways, flooding events, wind, animal movement or human activity. Those high regeneration and dispersal abilities highlight the importance of implementing effective management measures.

Fig 2. Invasion of Himalayan knotweed. Photo : Emmanuel Delbart

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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 knotweed is considered complicated, even for small infestations due to its extensive underground rhizome structure and its capacity to produce new plants from any rhizome or stem fragment. It also requires long-term management efforts. The feasibility of eradicating Himalayan knotweed populations must, therefore, 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 and fragments, precautionary measures must be implemented before management to prevent spread within the managed area or to uninvaded areas.

The harvested plant material must be safely disposed of far away from water systems or moist areas and is either destroyed (incinerated), dried or deeply buried (min 5m). If left to dry, the plant material cannot be in contact with the ground. It is therefore either safely placed on tarpaulins or on concrete surfaces, where public access is restricted. Plant material must not be left on site or composted and is safely transported in adequate containers. Material that has been in contact with the plant (e.g. clothing, shoes) should be checked, cleaned and dried before being taken to another site.

Managed and downstream sites must remain under enhanced surveillance for a minimum period of 5 years after the last treatment.

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Manual removal

- v Local eradication can be achieved if conducted in the long term
- 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 and recent infestations (young plants with limited rhizome systems)
- x Manual removal is time-consuming and labor intensive

Method description

The principle is to remove the whole plant from the ecosystem. Plants are pulled out by the roots by operators. Manual removal is conducted in areas where the substrate allows for this technique to be implemented (e.g. loose and soft substrate). It is recommended for workers to collaborate in pairs - one handling the spade while the other pulls out the rhizomes. This management strategy is carried out once a month between April and September and is repeated every year for several years (minimum 3 years) to eliminate new shoots. Operators must ensure the removal of as much of the root system as possible. The use of tools is often necessary.

Material

Management: Spades

Transport: Trucks, bags

Precautionary measures: Bags and tarpaulin (if dried)

References

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Light deprivation: terrestrial cover

- v Good control can be achieved
- v Drastic biomass reduction can occur in a short amount of time
- x This method is suitable for managing small populations in sites free from obstacles
- x When used independently, this method is insufficient to achieve complete eradication
- x The method is not selective and will impact other living organisms

Method description

The principle is to install bank covers that both compress vegetation and exclude sunlight, causing the death of the plants. Sheets of thick, light-blocking material are manually placed by operators over the entire population. Highly resistant material must be used to prevent the risk of the plant breaking and growing through the sheeting. Several layers of adequate sheeting will be required. The use of a single continuous piece of sheeting over pre-cut sheets for each layer is recommended whenever possible to prevent the risk of plant development between overlapping sheets. All plants must be cut at ground level prior to covering. The sheeting must extend at least 7m beyond the managed infestation. The material is secured to the ground by deeply burying its edges (50cm). Sheeting is placed in winter or early spring and remains in place for minimum 2 years (more than 5 years is recommended). Frequent checks are necessary to ensure that new stems are not appearing along the edges of the sheeting and that no damage to the cover has occurred. Manual removal is then implemented during a few years as a follow-up measure to ensure that no regrowth occurs.

Material

Management: The adequate quantity of thick and heavy light-blocking sheeting such as black plastics or recycled conveyor belt. Loppers or a machete, duct tape, rocks, sandbags or stakes

Fig 3. Himalayan knotweed population managed using terrestrial covers. Photo: Marijke Thoonen

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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.

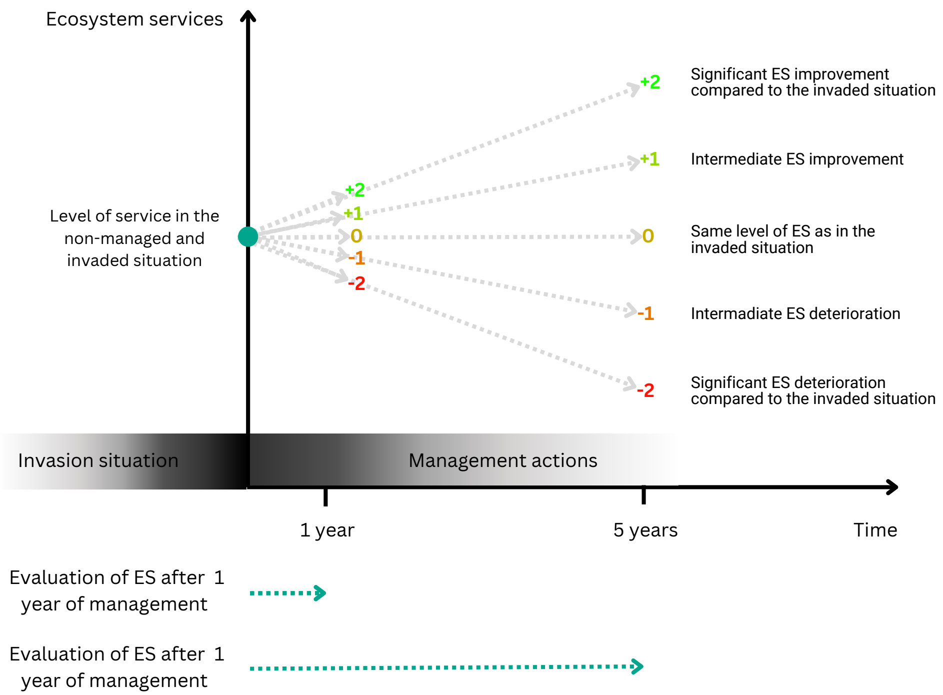

Fig 4. Representation of the survey process

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.

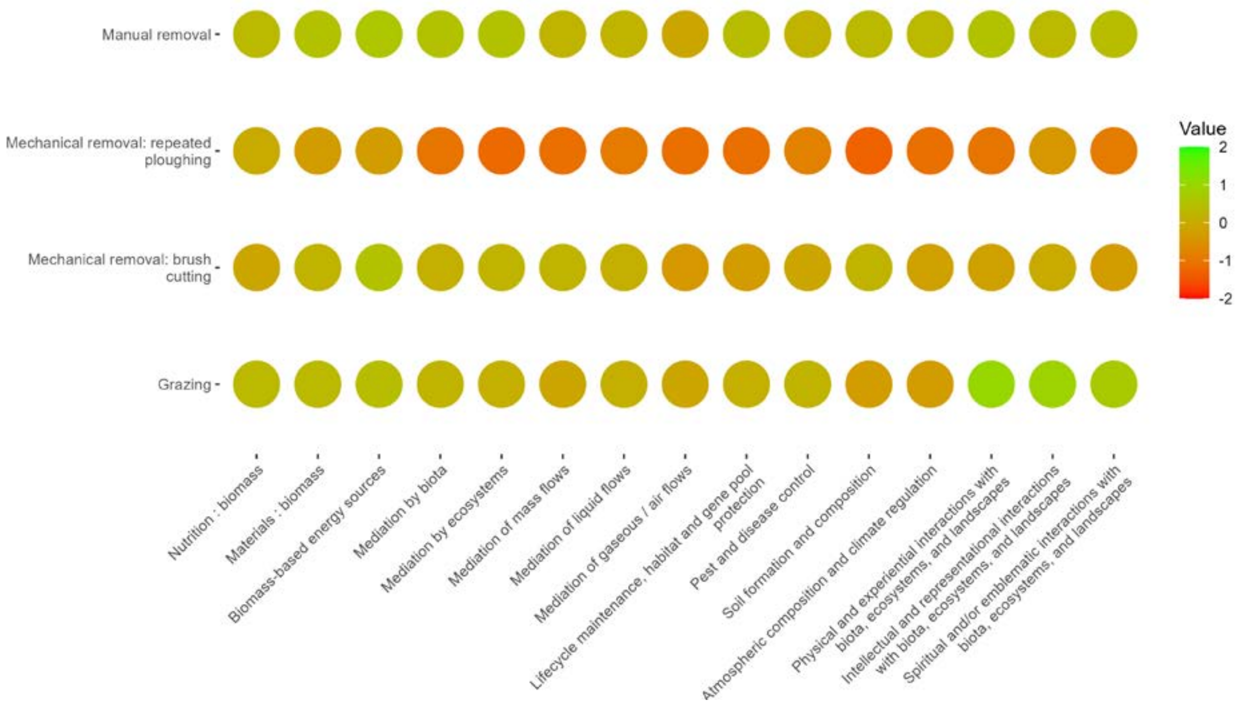

Fig 5. Matrix displaying the impact of management methods for riparian plant species on ecosystem services after 1 year

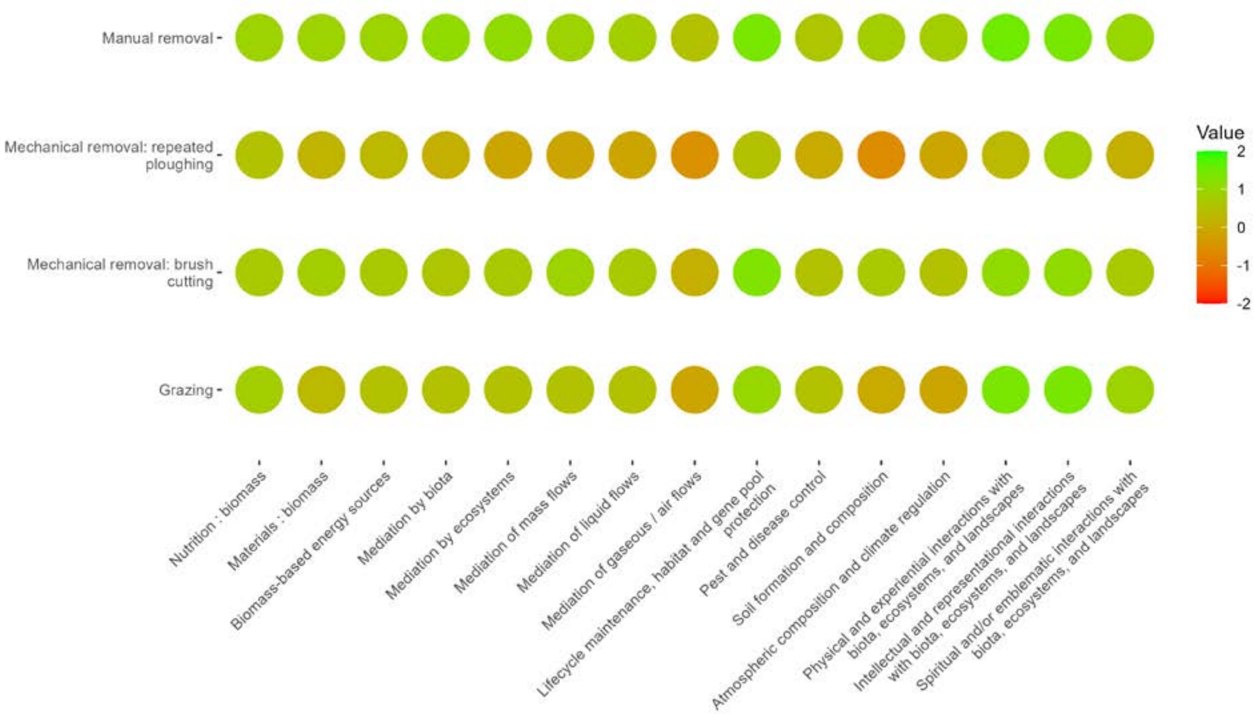

Fig 6. Matrix displaying the impact of management methods for riparian plant species on ecosystem services after 5 years

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Reaching Integrated and Prompt Action in Response to Invasive Alien Species

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